Personal Computer
Circuit Design
Tools

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Model Libraries

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Contents

TABLE OF CONTENTS

TABLE OF CONTENTS

Model Listings

Introduction

The ICAP model libraries consist of IsSPICE .MODEL and .SUBCKT statements which are grouped into several files, each having a different library name with the extension ".LIB".

This booklet contains a listing of all IsSPICE models in the ICAP packages, Power Supply Designer's Library, RF Device Library, Mechatronics Library and the vendor-supplied IC libraries. One or more of the following categories will be provided in the listings.

Part #	Model/Sub-circuit Name	IsSPICE Letter	SPICENET Symbol	Passed Parameters	Library Name	Description

The "Part #" column provides the part number for the component. It may also give an indication of the device's functionality. The "Model/Subcircuit Name" is the name used in the IsSPICE .MODEL or .SUBCKT statement. The "IsSPICE Letter" is the key letter that is used in the IsSPICE netlist to refer to the element. It will be "A, D, J, M, Q, R, S, O, U, W, or Z", for any device that is described using the IsSPICE .MODEL statement, and "X" for a device that is described by an IsSPICE .SUBCKT netlist. The "SPICENET Symbol" is the name of the symbol that is used to call the device when in SPICENET. SPICENET symbols come in three types; primitives (i.e. diodes, transistors, JFETs, MOSFETs),

specific subcircuit symbols (i.e. UA741), and generic subcircuit symbols. There are two classes of generic subcircuit symbols, one for elements that use the parameter passing syntax (i.e. XFMR, OPAMP), and one that applies to a specific class of devices (i.e. IGBT, OPTO, FUSE, etc.). The "Passed Parameters" show a list of the parameters that must be defined before the element can be used. The "Library Name" is the filename.LIB file in which the device is located. The "Description" is self-explanatory. The connections to the device, in the order that they appear in the IsSpice statement, may also be listed.

Using Intusoft's SPICE Models

To use these models directly with any other SPICE program:

• Enter the proper syntax for the desired element into the input netlist. Use the .MODEL or .SUBCKT name which is listed in the Model/Subcircuit Name column.

• Append the appropriate .MODEL or .SUBCKT netlist from the .LIB file, listed in the Library Name column, into your input SPICE netlist (.CIR file). Run normally.

Getting SPICE Models

Intusoft has four packages which help you get IsSPICE models:

Power Supply Designer's Library

RF Device Library

Vendor Supplied Op-amp/IC Models

Mechatronics Library

Standard ICAP/4 Libraries

There are also other ways to get or create IsSPICE models:

Intusoft Technical Support Staff

SPICEMOD - Modeling Spreadsheet Program

CMSDK - Code Model Software Development Kit

Generic Template Models

All generic models are represented by IsSpice subcircuits. This means that they all must be called with the IsSpice key letter "X" in the input netlist. All generic models require specific parameters to be passed into the subcircuit. These parameters and their units are listed below.

Part Name	Subcircuit Name	SpiceNet Symbol	Library Name	[Connections] & Parameters
NPN Transistor **PNP Transistor** **NPN Power BJT**	NBJT PBJT NPWR	NBJT PBJT NPWR	Device Device Device	[Collector, Base, Emitter] **COB** C-B Cap. in Farads at 10V **FT** Gain Bandwidth Product in Hz **TS** Storage Time in Seconds **IMAX** Max. IC in Amps
Rectifier Diode	DIODE	DIODE	Device	[Anode,Cathode] **IMAX** Max. ID in Amps **TRR** TRR in Seconds **VMAX** Maximum Continuous Reverse Voltage in Volts
Soft Recovery Diode	DBEHAV	DBEHAV	Device	[Anode,Cathode]
Zener Diode, Low Voltage	LZEN	LZEN	Device	[Anode,Cathode] **ZV** Breakdown at .02 Amps in V
Zener Diode, High Voltage	HZEN	HZEN	Device	[Anode,Cathode] **ZV** Breakdown at 125mW Dissipation in V
N Channel JFET	JFET	JFET	Device2	[Drain, Gate, Source] **VTO** Threshold Voltage in V **IDSS** Drain Current in Amps **GDS** Output Conductance in mhos
GaAs FET	GAS	GAS	Device	[Drain, Gate, Source] **VT** Threshold Voltage in Volts **L** Channel Length in microns **W** Channel Width in microns **KP** Gain in Amps/Volt^2 **DC** Capacitance in Farads/micron **N** Number of Parallel Stripes **RHOG** Gate Metal Res. in Ω/micron **RHOD** Drain Metal Res. in Ω/micron
Transformer **Transformer** **Center Tapped**	XFMR XFMR-TAP	XMFR XFMR-TAP	Device Device	[Pri+, Pri-, Sec+, Sec-] **RATIO** Turns Ratio (Secondary/Primary) [Pri+, Pri-, Sec+, Sec Center, Sec-]
Saturable Core	CORE	CORE	Device	[Hi, Lo, Flux Test Point] **VSEC** Flux Capacity in V-Sec **IVSEC** Initial Flux Capacity in V-Sec **LMAG** Magnetizing Inductance in H **LSAT** Saturation Inductance in H **FEDDY** Eddy Current Critical Frequency in Hz
Pulse Width Modulator	PWM	PWM	Device	[In+, In-, Out, Control+, Control-] No Parameters

Generic Template Models

Part Name	Subcircuit Name	SPICENET Symbol	Library Name	[Connections] & Parameters
Wire	WIRE	WIRE	Device	[In, Out]
Wire4	WIRE4	WIRE4	Device	**LEN** Interconnect Length in in. **Z** Interconnect Impedance in Ω
WireA (Wire elements made from LC sections)	WIREA	WIREA	Device	[In, Out] **Z** Interconnect Impedance in Ω **LEN** Interconnect Length in in. **K** dielectric constant
Crosstalk Model [In+, Out+, In-, Out-]	MWIRE	MWIRE	Device	**LEN** Interconnect Length in in. **Z** Interconnect Impedance in Ω **KM** Inductive Coupling Constant **KC** Capacitive Coupling Constant
Ground Plane Coupling [Signal In, Signal Out, Gnd In, Gnd Out]	GWIRE	GWIRE	Device	**LEN** Interconnect length in in. **Z** Interconnect Impedance in Ω **KM** Inductive Coupling Constant **N** Turns Ratio
Potentiometer	RPOT	RPOT	Device2	[Top, Wiper, Bottom, Ctrl+, Ctrl-] **RPOT** Resistance in Ω
Crystal	XTAL	XTAL	Device2	[In, Out] **FREQ** Freq. of Oscillation in Hz **Q** Q of Crystal **RS** Series Resistance in Ω **CP** Parallel Capacitance in Farads
Crystal with Temperature	XTALT	XTALT	Device2	Above plus **TEMP** Crystal Temperature in Deg. C **TC** Temp. Coefficient in ppm per Deg. C
Switch	SWITCH	SWITCH	Device	[Term1, Term2, Control] No Parameters
Psw1 Voff Case	SWITCH	SWITCH2	Device	[+, -, Ctrl+, Ctrl- (Same as S element)], Von >
Psw2 Von < Voff Case	SWITCH	SWITCH2	Device	**Ron** On resistance in Ω **Roff** Off resistance in Ω
Gsw	SWITCH	SWITCH3	Device	**Von** On voltage in Volts
Expsw	SWITCH	SWITCH3	Device	**Voff** Off voltage in Volts
Defaults: Ron=1, Roff=1MEG, Von=1V, Voff=0V, SC=15.78 for GSW, SC=20 for WXPSW				
Tanhsw Defaults Ron=1, Roff=1MEG, Von=1V, Voff=1V	SWITCH	SWITCHPB	Device	[Term1, Term2, Control] **Ron** On resistance in Ω **Roff** Off resistance in Ω **Von** On voltage in Volts **Voff** Off voltage in Volts
SSWITCH	SSWITCH	Switches		Smooth Transition
TIMESW	TIMESW	Switches		Vout=In2 after Tswitch
Resistance Time Variable $R = Rnom \cdot Vin^2$	VARES	VARES	Device	[Term1, Term2, Vin] **Rnom** in Ω
Capacitance Time Variable $C = Cnom(1 + Vin)$	VARCAP	VARCAP	Device	[Term1, Term2, Vin] **Cnom** in Farads

Generic Template Models

Part Name	Subcircuit Name	SPICENET Symbol	Library Name	[Connections] & Parameters
Inductance Time Variable L = Lnom•Vin	VARIND	VARIND	Device	[Term1, Term2, Vin] **Lnom** in Henries
Inductor	IND	IND	Device	[plus, minus] **L** Inductance in Henries **DCR** DC resistance in Ω **CP** Parallel capacitance in Farads
Capacitor	CAP	CAP	Device	[plus, minus] **C** Capacitance in Farads **ESR** Series resistance in Ω **ESL** Series inductance in Henries
Generic Bipolar Op-amp	OPAMP	OPAMP	Nonlin and Lin	[In-, In+, Out, VCC, VEE] **VOS** Input Offset Voltage in Volts **IOS** Input Offset Current in Amps
Generic FET Op-amp	FETAMP	FETAMP	Nonlin and Lin	**IBIAS** Input Bias Current in Amps **FT** Gain Bandwidth in Hz **DVDT** Slew Rate in Volts/Sec. **GAIN** DC Gain in Volts/Volt
Transimpedance Op-amp (5Volt)	AMPC5G	AMPC5G	Nonlin	[In-, In+, Out, VCC, VEE] **RF** Feedback Resistor in Ω **FC** -3db Bandwidth in Hz
Transimpedance Op-amp (15Volt)	AMPC15G	AMPC15G	Nonlin	**DVDT** Slew Rate in Volts/Sec.
FUSEG See April 1991 Newsletter for parameter definition	FUSEG	FUSEG	Thermal	[Fuse+, Fuse-] **Rcolde**, **HCTE**, **KS**, **TB**
CCORE1	CCR1_DEF		CM1	Behavioral PWL mode core
CCORE2	CCR2_DEF		CM1	Behavioral Hysteresis mode core
Lcouple	Lcouple		CM1	coupled inductor model

Part #	Part Name	Part Type	Part Sub Type	Description
COUPLEDL	COUPLEDL	Transformers		Coupled Inductors
ROYRXFMR	ROYRXFMR	Transformers		Dual CT Input, Single Output
TURNS	TURNS	Transformers		Winding
CCCS	CCCS	Dep. Sources	Linear	Current Controlled Current
CCVS	CCVS	Dep. Sources	Linear	Current Controlled Voltage
VCCS	VCCS	Dep. Sources	Linear	Voltage Controlled Current
VCVS	VCVS	Dep. Sources	Linear	Voltage Controlled Voltage
REALG	RGa_Def	Real	Generic	Gain for real data; Sampled Data
REALZ	RZ_Def	Real	Generic	Z^-1 real unit delay; Sampled Data

Part #	Part Name	Part Type	Part Sub Type	[Connections] & Parameters [F1, F1, F2, F2]
FTUBE	FTUBE	Tubes	Fluorescent	VTHRES Cold lamp strike voltage VARC Lamp arc voltage ISUS Current at which arc stops

For Other Generic Models, Please See The Following Sections: Analog Behavioral Models, Power Electronics, Vacuum Tubes, Magnetic Cores, and Thermal Models.

Diodes

Zener Diodes [669]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
02BZ2_2	Z02BZ2_2	Diodes	Zener <=10V	2.2V 250mW
02BZ2_7	Z02BZ2_7	Diodes	Zener <=10V	2.7V 250mW
02BZ3_3	Z02BZ3_3	Diodes	Zener <=10V	3.3V 250mW
02BZ3_9	Z02BZ3_9	Diodes	Zener <=10V	3.9V 250mW
02BZ4_7	Z02BZ4_7	Diodes	Zener <=10V	4.7V 250mW
02CZ10	Z02CZ10	Diodes	Zener <=10V	10V 200mW
02CZ11	Z02CZ11	Diodes	Zener 10V-50V	11V 200mW
02CZ12	Z02CZ12	Diodes	Zener 10V-50V	12V 200mW
02CZ13	Z02CZ13	Diodes	Zener 10V-50V	13V 200mW
02CZ15	Z02CZ15	Diodes	Zener 10V-50V	15V 200mW
02CZ16	Z02CZ16	Diodes	Zener 10V-50V	16V 200mW
02CZ18	Z02CZ18	Diodes	Zener 10V-50V	18V 200mW
02CZ2_0	Z02CZ2_0	Diodes	Zener <=10V	2.0V 200mW
02CZ2_2	Z02CZ2_2	Diodes	Zener <=10V	2.2V 200mW
02CZ2_4	Z02CZ2_4	Diodes	Zener <=10V	2.4V 200mW
02CZ2_7	Z02CZ2_7	Diodes	Zener <=10V	2.7V 200mW
02CZ20	Z02CZ20	Diodes	Zener 10V-50V	20V 200mW
02CZ22	Z02CZ22	Diodes	Zener 10V-50V	22V 200mW
02CZ24	Z02CZ24	Diodes	Zener 10V-50V	24V 200mW
02CZ27	Z02CZ27	Diodes	Zener 10V-50V	27V 200mW
02CZ3_0	Z02CZ3_0	Diodes	Zener <=10V	3.0V 200mW
02CZ3_3	Z02CZ3_3	Diodes	Zener <=10V	3.3V 200mW
02CZ3_6	Z02CZ3_6	Diodes	Zener <=10V	3.6V 200mW
02CZ3_9	Z02CZ3_9	Diodes	Zener <=10V	3.9V 200mW
02CZ30	Z02CZ30	Diodes	Zener 10V-50V	30V 200mW
02CZ33	Z02CZ33	Diodes	Zener 10V-50V	33V 200mW
02CZ36	Z02CZ36	Diodes	Zener 10V-50V	36V 200mW
02CZ39	Z02CZ39	Diodes	Zener 10V-50V	39V 200mW
02CZ4_3	Z02CZ4_3	Diodes	Zener <=10V	4.3V 200mW
02CZ4_7	Z02CZ4_7	Diodes	Zener <=10V	4.7V 200mW
02CZ5_1	Z02CZ5_1	Diodes	Zener <=10V	5.1V 200mW
02CZ5_6	Z02CZ5_6	Diodes	Zener <=10V	5.6V 200mW
02CZ6_2	Z02CZ6_2	Diodes	Zener <=10V	6.2V 200mW
02CZ6_8	Z02CZ6_8	Diodes	Zener <=10V	6.8V 200mW
02CZ7_5	Z02CZ7_5	Diodes	Zener <=10V	7.5V 200mW
02CZ8_2	Z02CZ8_2	Diodes	Zener <=10V	8.2V 200mW
02CZ9_1	Z02CZ9_1	Diodes	Zener <=10V	9.1V 200mW
02Z10A	Z02Z10A	Diodes	Zener <=10V	10V 250mW
02Z11A	Z02Z11A	Diodes	Zener 10V-50V	11V 250mW
02Z12A	Z02Z12A	Diodes	Zener 10V-50V	12V 250mW
02Z13A	Z02Z13A	Diodes	Zener 10V-50V	13V 250mW
02Z15A	Z02Z15A	Diodes	Zener 10V-50V	15V 250mW
02Z16A	Z02Z16A	Diodes	Zener 10V-50V	16V 250mW
02Z18A	Z02Z18A	Diodes	Zener 10V-50V	18V 250mW
02Z20A	Z02Z20A	Diodes	Zener 10V-50V	20V 250mW
02Z22A	Z02Z22A	Diodes	Zener 10V-50V	22V 250mW
02Z24A	Z02Z24A	Diodes	Zener 10V-50V	24V 250mW
02Z5_6A	Z02Z5_6A	Diodes	Zener <=10V	5.6V 250mW
02Z6_2A	Z02Z6_2A	Diodes	Zener <=10V	6.2V 250mW
02Z6_8A	Z02Z6_8A	Diodes	Zener <=10V	6.8V 250mW
02Z7_5A	Z02Z7_5A	Diodes	Zener <=10V	7.5V 250mW
02Z8_2A	Z02Z8_2A	Diodes	Zener <=10V	8.2V 250mW
02Z9_1A	Z02Z9_1A	Diodes	Zener <=10V	9.1V 250mW
04AZ10	Z04AZ10	Diodes	Zener <=10V	10V .4W
04AZ11	Z04AZ11	Diodes	Zener 10V-50V	11V .4W
04AZ12	Z04AZ12	Diodes	Zener 10V-50V	12V .4W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
04AZ13	Z04AZ13	Diodes	Zener 10V-50V	13V .4W
04AZ15	Z04AZ15	Diodes	Zener 10V-50V	15V .4W
04AZ16	Z04AZ16	Diodes	Zener 10V-50V	16V .4W
04AZ18	Z04AZ18	Diodes	Zener 10V-50V	18V .4W
04AZ2_0	Z04AZ2_0	Diodes	Zener <=10V	2.0V .4W
04AZ2_2	Z04AZ2_2	Diodes	Zener <=10V	2.2V .4W
04AZ2_4	Z04AZ2_4	Diodes	Zener <=10V	2.4V .4W
04AZ2_7	Z04AZ2_7	Diodes	Zener <=10V	2.7V .4W
04AZ20	Z04AZ20	Diodes	Zener 10V-50V	20V .4W
04AZ22	Z04AZ22	Diodes	Zener 10V-50V	22V .4W
04AZ24	Z04AZ24	Diodes	Zener 10V-50V	24V .4W
04AZ27	Z04AZ27	Diodes	Zener 10V-50V	27V .4W
04AZ3_0	Z04AZ3_0	Diodes	Zener <=10V	3.0V .4W
04AZ3_3	Z04AZ3_3	Diodes	Zener <=10V	3.3V .4W
04AZ3_6	Z04AZ3_6	Diodes	Zener <=10V	3.6V .4W
04AZ3_9	Z04AZ3_9	Diodes	Zener <=10V	3.9V .4W
04AZ30	Z04AZ30	Diodes	Zener 10V-50V	30V .4W
04AZ33	Z04AZ33	Diodes	Zener 10V-50V	33V .4W
04AZ36	Z04AZ36	Diodes	Zener 10V-50V	36V .4W
04AZ39	Z04AZ39	Diodes	Zener 10V-50V	39V .4W
04AZ4_3	Z04AZ4_3	Diodes	Zener <=10V	4.3V .4W
04AZ4_7	Z04AZ4_7	Diodes	Zener <=10V	4.7V .4W
04AZ5_1	Z04AZ5_1	Diodes	Zener <=10V	5.1V .4W
04AZ5_6	Z04AZ5_6	Diodes	Zener <=10V	5.6V .4W
04AZ6_2	Z04AZ6_2	Diodes	Zener <=10V	6.2V .4W
04AZ6_8	Z04AZ6_8	Diodes	Zener <=10V	6.8V .4W
04AZ7_5	Z04AZ7_5	Diodes	Zener <=10V	7.5V .4W
04AZ8_2	Z04AZ8_2	Diodes	Zener <=10V	8.2V .4W
04AZ9_1	Z04AZ9_1	Diodes	Zener <=10V	9.1V .4W
05AZ10	Z05AZ10	Diodes	Zener <=10V	10V .5W
05AZ100	Z05AZ100	Diodes	Zener >50V	100V .5W
05AZ11	Z05AZ11	Diodes	Zener 10V-50V	11V .5W
05AZ12	Z05AZ12	Diodes	Zener 10V-50V	12V .5W
05AZ13	Z05AZ13	Diodes	Zener 10V-50V	13V .5W
05AZ15	Z05AZ15	Diodes	Zener 10V-50V	15V .5W
05AZ16	Z05AZ16	Diodes	Zener 10V-50V	16V .5W
05AZ18	Z05AZ18	Diodes	Zener 10V-50V	18V .5W
05AZ2_4	Z05AZ2_4	Diodes	Zener <=10V	2.4V .5W
05AZ2_7	Z05AZ2_7	Diodes	Zener <=10V	2.7V .5W
05AZ20	Z05AZ20	Diodes	Zener 10V-50V	20V .5W
05AZ22	Z05AZ22	Diodes	Zener 10V-50V	22V .5W
05AZ24	Z05AZ24	Diodes	Zener 10V-50V	24V .5W
05AZ27	Z05AZ27	Diodes	Zener 10V-50V	27V .5W
05AZ3_0	Z05AZ3_0	Diodes	Zener <=10V	3.0V .5W
05AZ3_3	Z05AZ3_3	Diodes	Zener <=10V	3.3V .5W
05AZ3_6	Z05AZ3_6	Diodes	Zener <=10V	3.6 .5W
05AZ3_9	Z05AZ3_9	Diodes	Zener <=10V	3.9V .5W
05AZ30	Z05AZ30	Diodes	Zener 10V-50V	30V .5W
05AZ33	Z05AZ33	Diodes	Zener 10V-50V	33V .5W
05AZ36	Z05AZ36	Diodes	Zener 10V-50V	36V .5W
05AZ39	Z05AZ39	Diodes	Zener 10V-50V	39V .5W
05AZ4_3	Z05AZ4_3	Diodes	Zener <=10V	4.3V .5W
05AZ4_7	Z05AZ4_7	Diodes	Zener <=10V	4.7V .5W
05AZ40	Z05AZ40	Diodes	Zener 10V-50V	40V .5W
05AZ47	Z05AZ47	Diodes	Zener 10V-50V	47V .5W
05AZ5_1	Z05AZ5_1	Diodes	Zener <=10V	5.1V .5W
05AZ5_6	Z05AZ5_6	Diodes	Zener <=10V	5.6V .5W
05AZ51	Z05AZ51	Diodes	Zener >50V	51V .5W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
05AZ56	Z05AZ56	Diodes	Zener >50V	56V .5W
05AZ6_2	Z05AZ6_2	Diodes	Zener <=10V	6.2V .5W
05AZ6_8	Z05AZ6_8	Diodes	Zener <=10V	6.8V .5W
05AZ62	Z05AZ62	Diodes	Zener >50V	62V .5W
05AZ68	Z05AZ68	Diodes	Zener >50V	68V .5W
05AZ7_5	Z05AZ7_5	Diodes	Zener <=10V	7.5V .5W
05AZ75	Z05AZ75	Diodes	Zener >50V	75V .5W
05AZ8_2	Z05AZ8_2	Diodes	Zener <=10V	8.2V .5W
05AZ82	Z05AZ82	Diodes	Zener >50V	82V .5W
05AZ9_1	Z05AZ9_1	Diodes	Zener <=10V	9.1V .5W
05AZ91	Z05AZ91	Diodes	Zener >50V	91V .5W
1AZ10	Z1AZ10	Diodes	Zener <=10V	10V .5W
1AZ11	Z1AZ11	Diodes	Zener 10V-50V	11V 1W
1AZ12	Z1AZ12	Diodes	Zener 10V-50V	12V 1W
1AZ13	Z1AZ13	Diodes	Zener 10V-50V	13V 1W
1AZ15	Z1AZ15	Diodes	Zener 10V-50V	15V 1W
1AZ16	Z1AZ16	Diodes	Zener 10V-50V	16V 1W
1AZ18	Z1AZ18	Diodes	Zener 10V-50V	18V 1W
1AZ20	Z1AZ20	Diodes	Zener 10V-50V	20V 1W
1AZ200	Z1AZ200	Diodes	Zener >50V	200V 1W
1AZ200Y	Z1AZ200Y	Diodes	Zener >50V	200V 1W
1AZ22	Z1AZ22	Diodes	Zener 10V-50V	22V 1W
1AZ220Z	Z1AZ220Z	Diodes	Zener >50V	220V 1W
1AZ24	Z1AZ24	Diodes	Zener 10V-50V	24V 1W
1AZ240	Z1AZ240	Diodes	Zener >50V	240V 1W
1AZ240Y	Z1AZ240Y	Diodes	Zener >50V	240V 1W
1AZ240Z	Z1AZ240Z	Diodes	Zener >50V	240V 1W
1AZ27	Z1AZ27	Diodes	Zener 10V-50V	27V 1W
1AZ270	Z1AZ270	Diodes	Zener >50V	270V 1W
1AZ270X	Z1AZ270X	Diodes	Zener >50V	270V 1W
1AZ270Y	Z1AZ270Y	Diodes	Zener >50V	270V 1W
1AZ270Z	Z1AZ270Z	Diodes	Zener >50V	270V 1W
1AZ30	Z1AZ30	Diodes	Zener 10V-50V	30V 1W
1AZ300	Z1AZ300	Diodes	Zener >50V	300V 1W
1AZ300X	Z1AZ300X	Diodes	Zener >50V	300V 1W
1AZ300Y	Z1AZ300Y	Diodes	Zener >50V	300V 1W
1AZ300Z	Z1AZ300Z	Diodes	Zener >50V	300V 1W
1AZ33	Z1AZ33	Diodes	Zener 10V-50V	33V 1W
1AZ330	Z1AZ330	Diodes	Zener 10V-50V	30V 1W
1AZ330X	Z1AZ330X	Diodes	Zener 10V-50V	30V 1W
1AZ330Y	Z1AZ330Y	Diodes	Zener 10V-50V	30V 1W
1AZ330Z	Z1AZ330Z	Diodes	Zener 10V-50V	30V 1W
1AZ36	Z1AZ36	Diodes	Zener 10V-50V	36V 1W
1AZ47	Z1AZ47	Diodes	Zener 10V-50V	47V 1W
1AZ51	Z1AZ51	Diodes	Zener >50V	51V 1W
1AZ6_8	Z1AZ6_8	Diodes	Zener <=10V	6.8V 1W
1AZ7_5	Z1AZ7_5	Diodes	Zener <=10V	7.5V 1W
1AZ8_2	Z1AZ8_2	Diodes	Zener <=10V	8.2V 1W
1AZ9_1	Z1AZ9_1	Diodes	Zener <=10V	9.1V 1W
1N1530	ZN1530	Diodes	Zener <=10V	8.4V .25W
1N1735	ZN1735	Diodes	Zener <=10V	6.2V .2W
1N1736	ZN1736	Diodes	Zener 10V-50V	12.4V .4W
1N1737	ZN1737	Diodes	Zener 10V-50V	18.6V .6W
1N1738	ZN1738	Diodes	Zener 10V-50V	24.6V .8W
1N1739	ZN1739	Diodes	Zener 10V-50V	31V 1W
1N1740	ZN1740	Diodes	Zener 10V-50V	37.2V 1.2W
1N1741	ZN1741	Diodes	Zener 10V-50V	43.4V 1.4W
1N1742	ZN1742	Diodes	Zener 10V-50V	49.6V 1.6W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N2970A	ZN2970A	Diodes	Zener <=10V	6.8V 10W
1N2971A	ZN2971A	Diodes	Zener <=10V	7.5V 10W
1N2972A	ZN2972A	Diodes	Zener <=10V	8.2V 10W
1N2973A	ZN2973A	Diodes	Zener <=10V	9.1V 10W
1N2974A	ZN2974A	Diodes	Zener <=10V	10V 10W
1N2975A	ZN2975A	Diodes	Zener 10V-50V	11V 10W
1N2976A	ZN2976A	Diodes	Zener 10V-50V	12V 10W
1N2977A	ZN2977A	Diodes	Zener 10V-50V	13V 10W
1N2978A	ZN2978A	Diodes	Zener 10V-50V	14V 10W
1N2979A	ZN2979A	Diodes	Zener 10V-50V	15V 10W
1N2980A	ZN2980A	Diodes	Zener 10V-50V	16V 10W
1N2982A	ZN2982A	Diodes	Zener 10V-50V	18V 10W
1N2983A	ZN2983A	Diodes	Zener 10V-50V	19V 10W
1N2984A	ZN2984A	Diodes	Zener 10V-50V	20V 10W
1N2985A	ZN2985A	Diodes	Zener 10V-50V	22V 10W
1N2986A	ZN2986A	Diodes	Zener 10V-50V	24V 10W
1N2988A	ZN2988A	Diodes	Zener 10V-50V	27V 10W
1N2989A	ZN2989A	Diodes	Zener 10V-50V	30V 10W
1N2990A	ZN2990A	Diodes	Zener 10V-50V	33V 10W
1N2991A	ZN2991A	Diodes	Zener 10V-50V	36V 10W
1N2992A	ZN2992A	Diodes	Zener 10V-50V	30V 10W
1N2993A	ZN2993A	Diodes	Zener 10V-50V	43V 10W
1N2994A	ZN2994A	Diodes	Zener 10V-50V	47V 10W
1N2995A	ZN2995A	Diodes	Zener 10V-50V	50V 10W
1N2997A	ZN2997A	Diodes	Zener >50V	51V 10W
1N2998A	ZN2998A	Diodes	Zener >50V	52V 10W
1N2999A	ZN2999A	Diodes	Zener >50V	56V 10W
1N3000A	ZN3000A	Diodes	Zener >50V	62V 10W
1N3001A	ZN3001A	Diodes	Zener >50V	68V 10W
1N3002A	ZN3002A	Diodes	Zener >50V	75V 10W
1N3003A	ZN3003A	Diodes	Zener >50V	82V 10W
1N3004A	ZN3004A	Diodes	Zener >50V	91V 10W
1N3005A	ZN3005A	Diodes	Zener >50V	100V 10W
1N3006A	ZN3006A	Diodes	Zener >50V	105V 10W
1N3007A	ZN3007A	Diodes	Zener >50V	110V 10W
1N3008A	ZN3008A	Diodes	Zener >50V	120V 10W
1N3009A	ZN3009A	Diodes	Zener >50V	130V 10W
1N3010A	ZN3010A	Diodes	Zener >50V	140V 10W
1N3011A	ZN3011A	Diodes	Zener >50V	150V 10W
1N3012A	ZN3012A	Diodes	Zener >50V	160V 10W
1N3014A	ZN3014A	Diodes	Zener >50V	180V 10W
1N3015A	ZN3015A	Diodes	Zener >50V	200V 10W
1N4057	ZN4057	Diodes	Zener 10V-50V	12.4V 1.5W
1N4058	ZN4058	Diodes	Zener 10V-50V	14.6V 1.5W
1N4059	ZN4059	Diodes	Zener 10V-50V	16.8V 1.5W
1N4060	ZN4060	Diodes	Zener 10V-50V	18.5V 1.5W
1N4061	ZN4061	Diodes	Zener 10V-50V	21V 1.5W
1N4062	ZN4062	Diodes	Zener 10V-50V	23V 1.5W
1N4063	ZN4063	Diodes	Zener 10V-50V	27V 1.5W
1N4064	ZN4064	Diodes	Zener 10V-50V	30V 1.5W
1N4065	ZN4065	Diodes	Zener 10V-50V	33V 1.5W
1N4066	ZN4066	Diodes	Zener 10V-50V	37V 1.5W
1N4067	ZN4067	Diodes	Zener 10V-50V	43V 1.5W
1N4068	ZN4068	Diodes	Zener 10V-50V	47V 1.5W
1N4069	ZN4069	Diodes	Zener >50V	51V 2W
1N4070	ZN4070	Diodes	Zener >50V	56V 2W
1N4071	ZN4071	Diodes	Zener >50V	62V 2W
1N4072	ZN4072	Diodes	Zener >50V	68V 2W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N4073	ZN4073	Diodes	Zener >50V	75V 2W
1N4074	ZN4074	Diodes	Zener >50V	82V 2W
1N4075	ZN4075	Diodes	Zener >50V	87V 2W
1N4076	ZN4076	Diodes	Zener >50V	91V 2W
1N4077	ZN4077	Diodes	Zener >50V	100V 2W
1N4078	ZN4078	Diodes	Zener >50V	105V 2W
1N4079	ZN4079	Diodes	Zener >50V	110V 2W
1N4080	ZN4080	Diodes	Zener >50V	120V 2W
1N4081	ZN4081	Diodes	Zener >50V	130V 2.5W
1N4082	ZN4082	Diodes	Zener >50V	140V 2.5W
1N4083	ZN4083	Diodes	Zener >50V	150V 2.5W
1N4084	ZN4084	Diodes	Zener >50V	175V 2.5W
1N4085	ZN4085	Diodes	Zener >50V	200V 2.5W
1N4100	DN4100	Diodes	Zener <=10V	7.5V .25W
1N429	ZN429	Diodes	Zener <=10V	6.2V .2W
1N4370	DN4370	Diodes	Zener <=10V	2.4V .5W
1N4371	DN4371	Diodes	Zener <=10V	2.7V .5W
1N4372	DN4372	Diodes	Zener <=10V	3.0V .5W
1N4467	ZN4467	Diodes	Zener 10V-50V	12V 1.5W
1N4475	ZN4475	Diodes	Zener 10V-50V	27V 1W
1N4569A	ZN4569A	Diodes	Zener 10V-50V	6.4V .4W
1N4728	ZN4728	Diodes	Zener <=10V	3.3V 1W
1N4729	ZN4729	Diodes	Zener <=10V	3.6V 1W
1N4730	ZN4730	Diodes	Zener <=10V	3.9V 1W
1N4731	ZN4731	Diodes	Zener <=10V	4.3V 1W
1N4732	ZN4732	Diodes	Zener <=10V	4.7V 1W
1N4733	ZN4733	Diodes	Zener <=10V	5.1V 1W
1N4734	ZN4734	Diodes	Zener <=10V	5.6V 1W
1N4735	ZN4735	Diodes	Zener <=10V	6.2V 1W
1N4736	ZN4736	Diodes	Zener <=10V	6.8V 1W
1N4737	ZN4737	Diodes	Zener <=10V	7.5V 1W
1N4738	ZN4738	Diodes	Zener <=10V	8.2V 1W
1N4739	ZN4739	Diodes	Zener <=10V	9.1V 1W
1N4740	ZN4740	Diodes	Zener <=10V	10V 1W
1N4741	ZN4741	Diodes	Zener 10V-50V	11V 1W
1N4742	ZN4742	Diodes	Zener 10V-50V	12V 1W
1N4743	ZN4743	Diodes	Zener 10V-50V	13V 1W
1N4744	ZN4744	Diodes	Zener 10V-50V	15V 1W
1N4745	ZN4745	Diodes	Zener 10V-50V	16V 1W
1N4746	ZN4746	Diodes	Zener 10V-50V	18V 1W
1N4747	ZN4747	Diodes	Zener 10V-50V	20V 1W
1N4748	ZN4748	Diodes	Zener 10V-50V	22V 1W
1N4749	ZN4749	Diodes	Zener 10V-50V	24V 1W
1N4750	ZN4750	Diodes	Zener 10V-50V	27V 1W
1N4751	ZN4751	Diodes	Zener 10V-50V	30V 1W
1N4752	ZN4752	Diodes	Zener 10V-50V	33V 1W
1N4753	ZN4753	Diodes	Zener 10V-50V	36V 1W
1N4754	ZN4754	Diodes	Zener 10V-50V	39V 1W
1N4755	ZN4755	Diodes	Zener 10V-50V	43V 1W
1N4756	ZN4756	Diodes	Zener 10V-50V	47V 1W
1N4757	ZN4757	Diodes	Zener >50V	51V 1W
1N4758	ZN4758	Diodes	Zener >50V	56V 1W
1N4759	ZN4759	Diodes	Zener >50V	62V 1W
1N4760	ZN4760	Diodes	Zener >50V	68V 1W
1N4761	ZN4761	Diodes	Zener >50V	75V 1W
1N4762	ZN4762	Diodes	Zener >50V	82V 1W
1N4763	ZN4763	Diodes	Zener >50V	91V 1W
1N4764	ZN4764	Diodes	Zener >50V	100V 1W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N5221B	ZN5221B	Diodes	Zener <=10V	2.4V .5W
1N5222B	ZN5222B	Diodes	Zener <=10V	2.5V .5W
1N5223B	ZN5223B	Diodes	Zener <=10V	2.7V .5W
1N5224B	ZN5224B	Diodes	Zener <=10V	2.8V .5W
1N5225B	ZN5225B	Diodes	Zener <=10V	3.0V .5W
1N5281	DN5281	Diodes	Zener >50V	200V .5W
1N5333A	DN5333A	Diodes	Zener <=10V	3.3V 5W
1N5334A	DN5334A	Diodes	Zener <=10V	3.6V 5W
1N5335A	DN5335A	Diodes	Zener <=10V	3.9V 5W
1N5336A	DN5336A	Diodes	Zener <=10V	4.3V 5W
1N5337A	DN5337A	Diodes	Zener <=10V	4.7V 5W
1N5338A	DN5338A	Diodes	Zener <=10V	5.1V 5W
1N5339A	DN5339A	Diodes	Zener <=10V	5.6V 5W
1N5340A	DN5340A	Diodes	Zener <=10V	6V 5W
1N5341A	DN5341A	Diodes	Zener <=10V	6.2V 5W
1N5342A	DN5342A	Diodes	Zener <=10V	6.8V 5W
1N5343A	DN5343A	Diodes	Zener <=10V	7.5V 5W
1N5344A	DN5344A	Diodes	Zener <=10V	8.2V 5W
1N5345A	DN5345A	Diodes	Zener <=10V	8.7V 5W
1N5346A	DN5346A	Diodes	Zener <=10V	9.1V 5W
1N5347A	DN5347A	Diodes	Zener <=10V	10V 5W
1N5348A	DN5348A	Diodes	Zener 10V-50V	11V 5W
1N5349A	DN5349A	Diodes	Zener 10V-50V	12V 5W
1N5350A	DN5350A	Diodes	Zener 10V-50V	13V 5W
1N5351A	DN5351A	Diodes	Zener 10V-50V	14V 5W
1N5352A	DN5352A	Diodes	Zener 10V-50V	15V 5W
1N5353A	DN5353A	Diodes	Zener 10V-50V	16V 5W
1N5354A	DN5354A	Diodes	Zener 10V-50V	17V 5W
1N5355A	DN5355A	Diodes	Zener 10V-50V	18V 5W
1N5356A	DN5356A	Diodes	Zener 10V-50V	19V 5W
1N5357A	DN5357A	Diodes	Zener 10V-50V	20V 5W
1N5358A	DN5358A	Diodes	Zener 10V-50V	22V 5W
1N5359A	DN5359A	Diodes	Zener 10V-50V	24V 5W
1N5360A	DN5360A	Diodes	Zener 10V-50V	25V 5W
1N5361A	DN5361A	Diodes	Zener 10V-50V	27V 5W
1N5362A	DN5362A	Diodes	Zener 10V-50V	28V 5W
1N5363A	DN5363A	Diodes	Zener 10V-50V	30V 5W
1N5364A	DN5364A	Diodes	Zener 10V-50V	33V 5W
1N5365A	DN5365A	Diodes	Zener 10V-50V	36V 5W
1N5366A	DN5366A	Diodes	Zener 10V-50V	39V 5W
1N5367A	DN5367A	Diodes	Zener 10V-50V	43V 5W
1N5368A	DN5368A	Diodes	Zener 10V-50V	47V 5W
1N5369A	DN5369A	Diodes	Zener >50V	51V 5W
1N5370A	DN5370A	Diodes	Zener >50V	56V 5W
1N5371A	DN5371A	Diodes	Zener >50V	60V 5W
1N5372A	DN5372A	Diodes	Zener >50V	62V 5W
1N5373A	DN5373A	Diodes	Zener >50V	68V 5W
1N5374A	DN5374A	Diodes	Zener >50V	75V 5W
1N5375A	DN5375A	Diodes	Zener >50V	82V 5W
1N5376A	DN5376A	Diodes	Zener >50V	87V 5W
1N5377A	DN5377A	Diodes	Zener >50V	91V 5W
1N5378A	DN5378A	Diodes	Zener >50V	100V 5W
1N5379A	DN5379A	Diodes	Zener >50V	110V 5W
1N5380A	DN5380A	Diodes	Zener >50V	120V 5W
1N5381A	DN5381A	Diodes	Zener >50V	130V 5W
1N5382A	DN5382A	Diodes	Zener >50V	140V 5W
1N5383A	DN5383A	Diodes	Zener >50V	150V 5W
1N5384A	DN5384A	Diodes	Zener >50V	160V 5W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N5385A	DN5385A	Diodes	Zener >50V	170V 5W
1N5386A	DN5386A	Diodes	Zener >50V	180V 5W
1N5387A	DN5387A	Diodes	Zener >50V	190V 5W
1N5388A	DN5388A	Diodes	Zener >50V	200V 5W
1N5525B	ZN5525B	Diodes	Zener 10V-50V	6.2V .4W
1N5526B	ZN5526B	Diodes	Zener 10V-50V	6.8V .4W
1N5533B	ZN5533B	Diodes	Zener 10V-50V	13V .4W
1N6282	ZN6282	Diodes	Zener 10V-50V	30V 5W
1N6461	ZN6461	Diodes	Zener <=10V	5.6V 2.5W
1N6462	ZN6462	Diodes	Zener <=10V	6.5V 2.5W
1N6463	ZN6463	Diodes	Zener 10V-50V	13.6V 2.5W
1N6464	ZN6464	Diodes	Zener 10V-50V	16.4V 2.5W
1N6465	ZN6465	Diodes	Zener 10V-50V	27V 2.5W
1N6466	ZN6466	Diodes	Zener 10V-50V	33V 2.5W
1N6467	ZN6467	Diodes	Zener 10V-50V	43.7V 2.5W
1N6468	ZN6468	Diodes	Zener >50V	54V 2.5W
1N746	DN746	Diodes	Zener <=10V	3.3V .5W
1N746A	ZN746A	Diodes	Zener <=10V	3.3V .4W
1N747	DN747	Diodes	Zener <=10V	3.6V .5W
1N747A	ZN747A	Diodes	Zener <=10V	3.6V .4W
1N748	DN748	Diodes	Zener <=10V	3.9V .5W
1N748A	ZN748A	Diodes	Zener <=10V	3.9V .4W
1N749	DN749	Diodes	Zener <=10V	4.3V .5W
1N749A	ZN749A	Diodes	Zener <=10V	4.3V .4W
1N750	DN750	Diodes	Zener <=10V	4.7V .5W
1N750A	ZN750A	Diodes	Zener <=10V	4.7V .4W
1N751	DN751	Diodes	Zener <=10V	5.1V .5W
1N751A	ZN751A	Diodes	Zener <=10V	5.1V .4W
1N752	DN752	Diodes	Zener <=10V	5.6V .5W
1N752A	ZN752A	Diodes	Zener <=10V	5.6V .4W
1N753	DN753	Diodes	Zener <=10V	6.2V .5W
1N753A	ZN753A	Diodes	Zener <=10V	6.2V .4W
1N754	DN754	Diodes	Zener <=10V	6.8V .5W
1N754A	ZN754A	Diodes	Zener <=10V	6.8V .4W
1N755	DN755	Diodes	Zener <=10V	7.5V .5W
1N755A	ZN755A	Diodes	Zener <=10V	7.5V .4W
1N756	DN756	Diodes	Zener <=10V	8.2V .5W
1N756A	ZN756A	Diodes	Zener <=10V	8.2V .4W
1N757	DN757	Diodes	Zener <=10V	9.1V .5W
1N757A	ZN757A	Diodes	Zener <=10V	9.1V .4W
1N758	DN758	Diodes	Zener <=10V	10V .5W
1N758A	ZN758A	Diodes	Zener <=10V	10V .4W
1N759	DN759	Diodes	Zener 10V-50V	12V .5W
1N759A	ZN759A	Diodes	Zener <=10V	11V .4W
1N821	DN821	Diodes	Zener <=10V	6.2V .4W
1N821A	DN821A	Diodes	Zener <=10V	6.2V .4W
1N823	DN823	Diodes	Zener <=10V	6.2V .4W
1N823A	DN823A	Diodes	Zener <=10V	6.2V .4W
1N825	DN825	Diodes	Zener <=10V	6.2V .4W
1N825A	DN825A	Diodes	Zener <=10V	6.2V .4W
1N827	DN827	Diodes	Zener <=10V	6.2V .4W
1N827A	DN827A	Diodes	Zener <=10V	6.2V .4W
1N829	DN829	Diodes	Zener <=10V	6.2V .4W
1N829A	DN829A	Diodes	Zener <=10V	6.2V .4W
1N935	DN935	Diodes	Zener <=10V	9V .5W
1N935A	DN935A	Diodes	Zener <=10V	9V .5W
1N935B	DN935B	Diodes	Zener <=10V	9V .5W
1N936	DN936	Diodes	Zener <=10V	9V .5W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N936A	DN936A	Diodes	Zener <=10V	9V .5W
1N936B	DN936B	Diodes	Zener <=10V	9V .5W
1N937	DN937	Diodes	Zener <=10V	9V .5W
1N937A	DN937A	Diodes	Zener <=10V	9V .5W
1N937B	DN937B	Diodes	Zener <=10V	9V .5W
1N938	DN938	Diodes	Zener <=10V	9V .5W
1N938A	DN938A	Diodes	Zener <=10V	9V .5W
1N938B	DN938B	Diodes	Zener <=10V	9V .5W
1N939	DN939	Diodes	Zener <=10V	9V .5W
1N939A	DN939A	Diodes	Zener <=10V	9V .5W
1N939B	DN939B	Diodes	Zener <=10V	9V .5W
1N957	DN957	Diodes	Zener <=10V	6.8V .5W
1N957B	ZN957B	Diodes	Zener <=10V	6.8V .4W
1N958	DN958	Diodes	Zener <=10V	7.5V .5W
1N958B	ZN958B	Diodes	Zener <=10V	7.5V .4W
1N959	DN959	Diodes	Zener <=10V	8.2V .5W
1N959B	ZN959B	Diodes	Zener <=10V	8.2V .4W
1N960	DN960	Diodes	Zener <=10V	9.1V .5W
1N960B	ZN960B	Diodes	Zener <=10V	9.1V .4W
1N961	DN961	Diodes	Zener <=10V	10V .5W
1N961B	ZN961B	Diodes	Zener <=10V	10V .4W
1N962	DN962	Diodes	Zener 10V-50V	11V .5W
1N962B	ZN962B	Diodes	Zener 10V-50V	11V .4W
1N963	DN963	Diodes	Zener 10V-50V	12V .5W
1N963B	ZN963B	Diodes	Zener 10V-50V	12V .4W
1N964	DN964	Diodes	Zener 10V-50V	13V .5W
1N964B	ZN964B	Diodes	Zener 10V-50V	13V .4W
1N965	DN965	Diodes	Zener 10V-50V	15V .5W
1N965B	ZN965B	Diodes	Zener 10V-50V	15V .4W
1N966	DN966	Diodes	Zener 10V-50V	16V .5W
1N966B	ZN966B	Diodes	Zener 10V-50V	16V .4W
1N967	DN967	Diodes	Zener 10V-50V	18V .5W
1N967B	ZN967B	Diodes	Zener 10V-50V	18V .4W
1N968	DN968	Diodes	Zener 10V-50V	20V .5W
1N968B	ZN968B	Diodes	Zener 10V-50V	20V .4W
1N969	DN969	Diodes	Zener 10V-50V	22V .5W
1N969B	ZN969B	Diodes	Zener 10V-50V	22V .4W
1N970	DN970	Diodes	Zener 10V-50V	24V .5W
1N970B	ZN970B	Diodes	Zener 10V-50V	24V .4W
1N971	DN971	Diodes	Zener 10V-50V	27V .5W
1N971B	ZN971B	Diodes	Zener 10V-50V	27V .4W
1N972	DN972	Diodes	Zener 10V-50V	30V .5W
1N972B	ZN972B	Diodes	Zener 10V-50V	30V .4W
1N973	DN973	Diodes	Zener 10V-50V	33V .5W
1N973B	ZN973B	Diodes	Zener 10V-50V	33V .4W
1N974	DN974	Diodes	Zener 10V-50V	36V .5W
1N974B	ZN974B	Diodes	Zener 10V-50V	36V .4W
1N975	DN975	Diodes	Zener 10V-50V	39V .5W
1N976	DN976	Diodes	Zener 10V-50V	43V .5W
1N977	DN977	Diodes	Zener 10V-50V	47V .5W
1N978	DN978	Diodes	Zener >50V	51V .5W
1N979	DN979	Diodes	Zener >50V	56V .5W
1N980	DN980	Diodes	Zener >50V	62V .5W
1N981	DN981	Diodes	Zener >50V	68V .5W
1N982	DN982	Diodes	Zener >50V	75V .5W
1N983	DN983	Diodes	Zener >50V	82V .5W
1N984	DN984	Diodes	Zener >50V	91V .5W
1N985	DN985	Diodes	Zener >50V	100V .5W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N986	DN986	Diodes	Zener >50V	110V .5W
1N987	DN987	Diodes	Zener >50V	120V .4W
1N988	DN988	Diodes	Zener >50V	130V .4W
1N989	DN989	Diodes	Zener >50V	150V .4W
1N990	DN990	Diodes	Zener >50V	160V .4W
1N991	DN991	Diodes	Zener >50V	180V .4W
1N992	DN992	Diodes	Zener >50V	200V .4W
BZD2310	BZD2310	Diodes	Zener <=10V	10V 2.5W
BZD23100	BZD23100	Diodes	Zener >50V	100V 2.5W
BZD2311	BZD2311	Diodes	Zener 10V-50V	11V 2.5W
BZD23110	BZD23110	Diodes	Zener >50V	110V 2.5W
BZD2312	BZD2312	Diodes	Zener 10V-50V	12V 2.5W
BZD23120	BZD23120	Diodes	Zener >50V	120V 2.5W
BZD2313	BZD2313	Diodes	Zener 10V-50V	13V 2.5W
BZD23130	BZD23130	Diodes	Zener >50V	130V 2.5W
BZD2315	BZD2315	Diodes	Zener 10V-50V	15V 2.5W
BZD23150	BZD23150	Diodes	Zener >50V	150V 2.5W
BZD2316	BZD2316	Diodes	Zener 10V-50V	16V 2.5W
BZD2318	BZD2318	Diodes	Zener 10V-50V	18V 2.5W
BZD23180	BZD23180	Diodes	Zener >50V	180V 2.5W
BZD2320	BZD2320	Diodes	Zener 10V-50V	20V 2.5W
BZD23200	BZD23200	Diodes	Zener >50V	200V 2.5W
BZD2322	BZD2322	Diodes	Zener 10V-50V	22V 2.5W
BZD23220	BZD23220	Diodes	Zener >50V	220V 2.5W
BZD2324	BZD2324	Diodes	Zener 10V-50V	24V 2.5W
BZD23240	BZD23240	Diodes	Zener >50V	240V 2.5W
BZD2327	BZD2327	Diodes	Zener 10V-50V	27V 2.5W
BZD23270	BZD23270	Diodes	Zener >50V	270V 2.5W
BZD2330	BZD2330	Diodes	Zener 10V-50V	30V 2.5W
BZD2333	BZD2333	Diodes	Zener 10V-50V	33V 2.5W
BZD2336	BZD2336	Diodes	Zener 10V-50V	36V 2.5W
BZD2339	BZD2339	Diodes	Zener 10V-50V	39V 2.5W
BZD2343	BZD2343	Diodes	Zener 10V-50V	43V 2.5W
BZD2347	BZD2347	Diodes	Zener 10V-50V	47V 2.5W
BZD2351	BZD2351	Diodes	Zener >50V	51V 2.5W
BZD2356	BZD2356	Diodes	Zener >50V	56V 2.5W
BZD2362	BZD2362	Diodes	Zener >50V	62V 2.5W
BZD2368	BZD2368	Diodes	Zener >50V	68V 2.5W
BZD2375	BZD2375	Diodes	Zener >50V	75V 2.5W
BZD237V5	BZD237V5	Diodes	Zener <=10V	7.5V 2.5W
BZD2382	BZD2382	Diodes	Zener >50V	82V 2.5W
BZD238V2	BZD238V2	Diodes	Zener <=10V	8.2V 2.5W
BZD2391	BZD2391	Diodes	Zener >50V	91V 2.5W
BZD239V1	BZD239V1	Diodes	Zener <=10V	9.1V 2.5W
BZT0310	BZT0310	Diodes	Zener <=10V	10V 3.25W
BZT03100	BZT03100	Diodes	Zener >50V	100V 3.25W
BZT0311	BZT0311	Diodes	Zener 10V-50V	11V 3.25W
BZT03110	BZT03110	Diodes	Zener >50V	110V 3.25W
BZT0312	BZT0312	Diodes	Zener 10V-50V	12V 3.25W
BZT03120	BZT03120	Diodes	Zener >50V	120V 3.25W
BZT0313	BZT0313	Diodes	Zener 10V-50V	13V 3.25W
BZT03130	BZT03130	Diodes	Zener >50V	130V 3.25W
BZT0315	BZT0315	Diodes	Zener 10V-50V	15V 3.25W
BZT03150	BZT03150	Diodes	Zener >50V	150V 3.25W
BZT0316	BZT0316	Diodes	Zener 10V-50V	16V 3.25W
BZT03160	BZT03160	Diodes	Zener >50V	160V 3.25W
BZT0318	BZT0318	Diodes	Zener 10V-50V	18V 3.25W
BZT03180	BZT03180	Diodes	Zener >50V	180V 3.25W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
BZT0320	BZT0320	Diodes	Zener 10V-50V	20V 3.25W
BZT03200	BZT03200	Diodes	Zener >50V	200V 3.25W
BZT0322	BZT0322	Diodes	Zener 10V-50V	22V 3.25W
BZT03220	BZT03220	Diodes	Zener >50V	220V 3.25W
BZT0324	BZT0324	Diodes	Zener 10V-50V	24V 3.25W
BZT03240	BZT03240	Diodes	Zener >50V	240V 3.25W
BZT0327	BZT0327	Diodes	Zener 10V-50V	27V 3.25W
BZT03270	BZT03270	Diodes	Zener >50V	270V 3.25W
BZT0330	BZT0330	Diodes	Zener 10V-50V	30V 3.25W
BZT0333	BZT0333	Diodes	Zener 10V-50V	33V 3.25W
BZT0336	BZT0336	Diodes	Zener 10V-50V	36V 3.25W
BZT0339	BZT0339	Diodes	Zener 10V-50V	39V 3.25W
BZT0343	BZT0343	Diodes	Zener 10V-50V	43V 3.25W
BZT0347	BZT0347	Diodes	Zener 10V-50V	47V 3.25W
BZT0351	BZT0351	Diodes	Zener >50V	51V 3.25W
BZT0356	BZT0356	Diodes	Zener >50V	56V 3.25W
BZT0362	BZT0362	Diodes	Zener >50V	62V 3.25W
BZT0368	BZT0368	Diodes	Zener >50V	68V 3.25W
BZT0375	BZT0375	Diodes	Zener >50V	75V 3.25W
BZT037V5	BZT037V5	Diodes	Zener <=10V	7.5V 3.25W
BZT0382	BZT0382	Diodes	Zener >50V	82V 3.25W
BZT038V2	BZT038V2	Diodes	Zener <=10V	8.2V 3.25W
BZT0391	BZT0391	Diodes	Zener >50V	91V 3.25W
BZT039V1	BZT039V1	Diodes	Zener <=10V	9.1V 3.25W
BZX79A10	BZX79A10	Diodes	Zener <=10V	10V .5W
BZX79A11	BZX79A11	Diodes	Zener 10V-50V	11V .5W
BZX79A12	BZX79A12	Diodes	Zener 10V-50V	12V .5W
BZX79A13	BZX79A13	Diodes	Zener 10V-50V	13V .5W
BZX79A15	BZX79A15	Diodes	Zener 10V-50V	15V .5W
BZX79A16	BZX79A16	Diodes	Zener 10V-50V	16V .5W
BZX79A18	BZX79A18	Diodes	Zener 10V-50V	18V .5W
BZX79A2.4	BZX792V4	Diodes	Zener <=10V	2.4V .5W
BZX79A2.7	BZX792V7	Diodes	Zener <=10V	2.7V .5W
BZX79A20	BZX79A20	Diodes	Zener 10V-50V	20V .5W
BZX79A22	BZX79A22	Diodes	Zener 10V-50V	22V .5W
BZX79A24	BZX79A24	Diodes	Zener 10V-50V	24V .5W
BZX79A27	BZX79A27	Diodes	Zener 10V-50V	27V .5W
BZX79A3.0	BZX793V0	Diodes	Zener <=10V	3.0V .5W
BZX79A3.3	BZX793V3	Diodes	Zener <=10V	3.3V .5W
BZX79A3.6	BZX793V6	Diodes	Zener <=10V	3.6V .5W
BZX79A3.9	BZX793V9	Diodes	Zener <=10V	3.9V .5W
BZX79A30	BZX79A30	Diodes	Zener 10V-50V	30V .5W
BZX79A33	BZX79A33	Diodes	Zener 10V-50V	33V .5W
BZX79A36	BZX79A36	Diodes	Zener 10V-50V	36V .5W
BZX79A39	BZX79A39	Diodes	Zener 10V-50V	39V .5W
BZX79A4.3	BZX794V3	Diodes	Zener <=10V	4.3V .5W
BZX79A4.7	BZX794V7	Diodes	Zener <=10V	4.7V .5W
BZX79A43	BZX79A43	Diodes	Zener 10V-50V	43V .5W
BZX79A47	BZX79A47	Diodes	Zener 10V-50V	47V .5W
BZX79A5.1	BZX795V1	Diodes	Zener <=10V	5.1V .5W
BZX79A5.6	BZX795V6	Diodes	Zener <=10V	5.6V .5W
BZX79A51	BZX79A51	Diodes	Zener >50V	51V .5W
BZX79A56	BZX79A56	Diodes	Zener >50V	56V .5W
BZX79A6.2	BZX796V2	Diodes	Zener <=10V	6.2V .5W
BZX79A6.8	BZX796V8	Diodes	Zener <=10V	6.8V .5W
BZX79A62	BZX79A62	Diodes	Zener >50V	62V .5W
BZX79A7.5	BZX797V5	Diodes	Zener <=10V	7.5V .5W
BZX79A75	BZX79A75	Diodes	Zener >50V	75V .5W
BZX79A8.2	BZX798V2	Diodes	Zener <=10V	8.2V .5W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
BZX79A9.1	BZX799V1	Diodes	Zener <=10V	9.1V .5W
BZX79A91	BZX79A91	Diodes	Zener >50V	91V .5W
EQA0305	EQA0305	Diodes	Zener <=10V	5V .4W
EQA0306	EQA0306	Diodes	Zener <=10V	6V .4W
EQA0307	EQA0307	Diodes	Zener <=10V	7.2V .4W
EQA0308	EQA0308	Diodes	Zener <=10V	8.1V .4W
EQA0309	EQA0309	Diodes	Zener <=10V	9.2V .4W
EQA0310	EQA0310	Diodes	Zener 10V-50V	10.6V .4W
EQA0311	EQA0311	Diodes	Zener 10V-50V	11.9V .4W
EQA0312	EQA0312	Diodes	Zener 10V-50V	12.7V .4W
EQA0313	EQA0313	Diodes	Zener 10V-50V	13.6V .4W
EQA0314	EQA0314	Diodes	Zener 10V-50V	14.5V .4W
EQA0315	EQA0315	Diodes	Zener 10V-50V	15.4V .4W
EQA0316	EQA0316	Diodes	Zener 10V-50V	16.4V .4W
EQA0317	EQA0317	Diodes	Zener 10V-50V	17.6V .4W
EQA0318	EQA0318	Diodes	Zener 10V-50V	18.8V .4W
EQA0320	EQA0320	Diodes	Zener 10V-50V	20.2V .4W
EQA0321	EQA0321	Diodes	Zener 10V-50V	21.4V .4W
EQA0322	EQA0322	Diodes	Zener 10V-50V	22.4V .4W
EQA0323	EQA0323	Diodes	Zener 10V-50V	23.7V .4W
EQA0325	EQA0325	Diodes	Zener 10V-50V	25.6V .4W
EQA0328	EQA0328	Diodes	Zener 10V-50V	27.7V .4W
EQA0330	EQA0330	Diodes	Zener 10V-50V	29.8V .4W
EQA0332	EQA0332	Diodes	Zener 10V-50V	31.7V .4W
EQA0333	EQA0333	Diodes	Zener 10V-50V	33.6V .4W
EQA0335	EQA0335	Diodes	Zener 10V-50V	35.6V .4W
EQB0105	EQB0105	Diodes	Zener 10V-50V	5V 1W
EQB0106	EQB0106	Diodes	Zener 10V-50V	6V 1W
EQB0107	EQB0107	Diodes	Zener <=10V	6.9V 1W
EQB0108	EQB0108	Diodes	Zener <=10V	7.8V 1W
EQB0109	EQB0109	Diodes	Zener <=10V	8.8V 1W
EQB0110	EQB0110	Diodes	Zener <=10V	9.8V 1W
EQB0111	EQB0111	Diodes	Zener 10V-50V	11.1V 1W
EQB0112	EQB0112	Diodes	Zener 10V-50V	12.2V 1W
EQB0113	EQB0113	Diodes	Zener 10V-50V	13.2V 1W
EQB0114	EQB0114	Diodes	Zener 10V-50V	14V 1W
EQB0115	EQB0115	Diodes	Zener 10V-50V	15V 1W
EQB0116	EQB0116	Diodes	Zener 10V-50V	16V 1W
EQB0117	EQB0117	Diodes	Zener 10V-50V	17V 1W
EQB0118	EQB0118	Diodes	Zener 10V-50V	18V 1W
EQB0119	EQB0119	Diodes	Zener 10V-50V	19V 1W
EQB0120	EQB0120	Diodes	Zener 10V-50V	20V 1W
EQB0121	EQB0121	Diodes	Zener 10V-50V	21.2V 1W
EQB0122	EQB0122	Diodes	Zener 10V-50V	22.4V 1W
EQB0124	EQB0124	Diodes	Zener 10V-50V	23.6V 1W
EQB0125	EQB0125	Diodes	Zener 10V-50V	25V 1W
EQB0126	EQB0126	Diodes	Zener 10V-50V	26.5V 1W
EQB0128	EQB0128	Diodes	Zener 10V-50V	28V 1W
EQB0130	EQB0130	Diodes	Zener 10V-50V	30V 1W
EQB0132	EQB0132	Diodes	Zener 10V-50V	31.5V 1W
EQB0133	EQB0133	Diodes	Zener 10V-50V	33.5V 1W
EQB0135	EQB0135	Diodes	Zener 10V-50V	35.5V 1W
LM185	ZLM185	Diodes	Zener <=10V	2.5V 50mW
TVS305	TVS305	Diodes	Zener <=10V	6V 3W
TVS310	TVS310	Diodes	Zener 10V-50V	11.1V 3W
TVS312	TVS312	Diodes	Zener 10V-50V	13.8V 3W
TVS315	TVS315	Diodes	Zener 10V-50V	16.7V 3W
TVS318	TVS318	Diodes	Zener 10V-50V	20.4V 3W
TVS324	TVS324	Diodes	Zener 10V-50V	28.4V 3W

Zener Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
TVS328	TVS328	Diodes	Zener 10V-50V	30.7V 3W
TVS348	TVS348	Diodes	Zener >50V	54V 3W
TVS360	TVS360	Diodes	Zener >50V	67V 3W
TVS410	TVS410	Diodes	Zener >50V	111V 3W
TVS420	TVS420	Diodes	Zener >50V	234V 3W
TVS430	TVS430	Diodes	Zener >50V	342V 3W
TVS505	TVS505	Diodes	Zener <=10V	6V 5W
TVS510	TVS510	Diodes	Zener 10V-50V	11.1V 5W
TVS512	TVS512	Diodes	Zener 10V-50V	13.8V 5W
TVS515	TVS515	Diodes	Zener 10V-50V	16.7V 5W
TVS518	TVS518	Diodes	Zener 10V-50V	20.4V 5W
TVS524	TVS524	Diodes	Zener 10V-50V	28.4V 5W
TVS528	TVS528	Diodes	Zener 10V-50V	30.7V 5W
ZC820A	ZC820A	Diodes	Zener 10V-50V	45V .2W
ZC821A	ZC821A	Diodes	Zener 10V-50V	45V .2W
ZC822A	ZC822A	Diodes	Zener 10V-50V	45V .2W
ZC823A	ZC823A	Diodes	Zener 10V-50V	45V .2W
ZC824A	ZC824A	Diodes	Zener 10V-50V	45V .2W
ZC825A	ZC825A	Diodes	Zener 10V-50V	45V .2W
ZC826A	ZC826A	Diodes	Zener 10V-50V	45V .2W
ZC830A	ZC830A	Diodes	Zener 10V-50V	45V .2W
ZC831A	ZC831A	Diodes	Zener 10V-50V	45V .2W
ZC832A	ZC832A	Diodes	Zener 10V-50V	45V .2W
ZC833A	ZC833A	Diodes	Zener 10V-50V	45V .2W
ZC834A	ZC834A	Diodes	Zener 10V-50V	45V .2W
ZC835A	ZC835A	Diodes	Zener 10V-50V	45V .2W
ZC836A	ZC836A	Diodes	Zener 10V-50V	45V .2W
ZDX1F	ZDX1F	Diodes	Zener >50V	100V .2W
ZDX2F	ZDX2F	Diodes	Zener >50V	100V .2W
ZDX5	ZDX5	Diodes	Zener >50V	165V .2W
ZDX6	ZDX6	Diodes	Zener >50V	165V .2W

Rectifier Diodes [391]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N1183	DN1183	Diodes	Rectifier >5A	50V 35A
1N1184	DN1184	Diodes	Rectifier >5A	100V 35A
1N1185	DN1185	Diodes	Rectifier >5A	150V 35A
1N1186	DN1186	Diodes	Rectifier >5A	200V 35A
1N1187	DN1187	Diodes	Rectifier >5A	300V 35A
1N1188	DN1188	Diodes	Rectifier >5A	400V 35A
1N1189	DN1189	Diodes	Rectifier >5A	500V 35A
1N1190	DN1190	Diodes	Rectifier >5A	600V 35A
1N1199	DN1199	Diodes	Rectifier >5A	50V 35A
1N1200	DN1200	Diodes	Rectifier >5A	100V 12A
1N1202	DN1202	Diodes	Rectifier >5A	200V 12A
1N1204	DN1204	Diodes	Rectifier >5A	400V 12A
1N1206	DN1206	Diodes	Rectifier >5A	600V 12A
1N3491	DN3491	Diodes	Rectifier >5A	50V 25A
1N3492	DN3492	Diodes	Rectifier >5A	100V 25A
1N3493	DN3493	Diodes	Rectifier >5A	200V 25A
1N3494	DN3494	Diodes	Rectifier >5A	300V 25A
1N3495	DN3495	Diodes	Rectifier >5A	400V 25A
1N3879	DN3879	Diodes	Rectifier >5A	50V 6A
1N3880	DN3880	Diodes	Rectifier >5A	100V 6A
1N3881	DN3881	Diodes	Rectifier >5A	200V 6A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N3882	DN3882	Diodes	Rectifier >5A	300V 6A
1N3883	DN3883	Diodes	Rectifier >5A	400V 6A
1N3889	DN3889	Diodes	Rectifier >5A	50V 12A
1N3890	DN3890	Diodes	Rectifier >5A	100V 12A
1N3891	DN3891	Diodes	Rectifier >5A	200V 12A
1N3892	DN3892	Diodes	Rectifier >5A	300V 12A
1N3893	DN3893	Diodes	Rectifier >5A	400V 12A
1N3899	DN3899	Diodes	Rectifier >5A	50V 20A
1N3900	DN3900	Diodes	Rectifier >5A	100V 20A
1N3901	DN3901	Diodes	Rectifier >5A	200V 20A
1N3902	DN3902	Diodes	Rectifier >5A	300V 20A
1N3903	DN3903	Diodes	Rectifier >5A	400V 20A
1N3909	DN3909	Diodes	Rectifier >5A	50V 30A
1N3910	DN3910	Diodes	Rectifier >5A	100V 30A
1N3911	DN3911	Diodes	Rectifier >5A	200V 30A
1N3912	DN3912	Diodes	Rectifier >5A	300V 30A
1N3913	DN3913	Diodes	Rectifier >5A	400V 30A
1N4001	DN4001	Diodes	Rectifier <=5A	50V 1A
1N4002	DN4002	Diodes	Rectifier <=5A	100V 1A
1N4003	DN4003	Diodes	Rectifier <=5A	200V 1A
1N4004	DN4004	Diodes	Rectifier <=5A	400V 1A
1N4005	DN4005	Diodes	Rectifier <=5A	600V 1A
1N4006	DN4006	Diodes	Rectifier <=5A	800V 1A
1N4007	DN4007	Diodes	Rectifier <=5A	1000V 1A
1N4719	DN4719	Diodes	Rectifier <=5A	50V 3A
1N4720	DN4720	Diodes	Rectifier <=5A	100V 3A
1N4721	DN4721	Diodes	Rectifier <=5A	200V 3A
1N4722	DN4722	Diodes	Rectifier <=5A	400V 3A
1N4723	DN4723	Diodes	Rectifier <=5A	600V 3A
1N4724	DN4724	Diodes	Rectifier <=5A	800V 3A
1N4725	DN4725	Diodes	Rectifier <=5A	1000V 3A
1N4933	DN4933	Diodes	Rectifier <=5A	50V 1A
1N4934	DN4934	Diodes	Rectifier <=5A	100V 1A
1N4935	DN4935	Diodes	Rectifier <=5A	200V 1A
1N4936	DN4936	Diodes	Rectifier <=5A	400V 1A
1N4937	DN4937	Diodes	Rectifier <=5A	600V 1A
1N5391	DN5391	Diodes	Rectifier <=5A	50V 1.5A
1N5392	DN5392	Diodes	Rectifier <=5A	100V 1.5A
1N5393	DN5393	Diodes	Rectifier <=5A	200V 1.5A
1N5395	DN5395	Diodes	Rectifier <=5A	400V 1.5A
1N5397	DN5397	Diodes	Rectifier <=5A	600V 1.5A
1N5398	DN5398	Diodes	Rectifier <=5A	800V 1.5A
1N5399	DN5399	Diodes	Rectifier <=5A	1000V 1.5A
1N5400	DN5400	Diodes	Rectifier <=5A	50V 3A
1N5401	DN5401	Diodes	Rectifier <=5A	100V 3A
1N5402	DN5402	Diodes	Rectifier <=5A	200V 3A
1N5404	DN5404	Diodes	Rectifier <=5A	400V 3A
1N5406	DN5406	Diodes	Rectifier <=5A	600V 3A
1N5806	DN5806	Diodes	Rectifier <=5A	150V 2.5A
1N5811	DN5811	Diodes	Rectifier >5A	150V 6A
1N5816	DN5816	Diodes	Rectifier >5A	150V 20A
1N6628	DN6628	Diodes	Rectifier <=5A	600V 2A
1N6638	DN6638	Diodes	Rectifier <=5A	125V 1A
1R5BZ41	DR5BZ41	Diodes	Rectifier <=5A	100V 1.5A
1R5BZ61	DR5BZ61	Diodes	Rectifier <=5A	100V 1.5A
1R5CL41	DR5CL41	Diodes	Rectifier <=5A	150V 1.5A
1R5DL41	DR5DL41	Diodes	Rectifier <=5A	200V 1.5A
1R5DL41A	DR5DL41A	Diodes	Rectifier <=5A	200V 1.5A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1R5DU41	DR5DU41	Diodes	Rectifier <=5A	200V 1.5A
1R5DZ41	DR5DZ41	Diodes	Rectifier <=5A	200V 1.5A
1R5DZ61	DR5DZ61	Diodes	Rectifier <=5A	200V 1.5A
1R5GH45	DR5GH45	Diodes	Rectifier <=5A	400V 1.5A
1R5GU41	DR5GU41	Diodes	Rectifier <=5A	400V 1.5A
1R5GZ41	DR5GZ41	Diodes	Rectifier <=5A	400V 1.5A
1R5GZ61	DR5GZ61	Diodes	Rectifier <=5A	400V 1.5A
1R5JH45	DR5JH45	Diodes	Rectifier <=5A	600V 1.5A
1R5JZ41	DR5JZ41	Diodes	Rectifier <=5A	600V 1.5A
1R5JZ61	DR5JZ61	Diodes	Rectifier <=5A	600V 1.5A
1R5LZ41	DR5LZ41	Diodes	Rectifier <=5A	800V 1.5A
1R5NH45	DR5NH45	Diodes	Rectifier <=5A	1000V 1.5A
1R5NU41	DR5NU41	Diodes	Rectifier <=5A	1000V 1.5A
1R5NZ41	DR5NZ41	Diodes	Rectifier <=5A	1000V 1.5A
1R5TH61	DR5TH61	Diodes	Rectifier <=5A	1500V 1.5A
1S310	DS310	Diodes	Rectifier <=5A	50V 0.5A
1S311	DS311	Diodes	Rectifier <=5A	100V 0.5A
1S312	DS312	Diodes	Rectifier <=5A	200V 0.5A
1S313	DS313	Diodes	Rectifier <=5A	300V 0.5A
1S314	DS314	Diodes	Rectifier <=5A	400V 0.5A
1S315	DS315	Diodes	Rectifier <=5A	500V 0.5A
1S316	DS316	Diodes	Rectifier <=5A	800V 0.45A
1S317	DS317	Diodes	Rectifier <=5A	1000V 0.45A
1S812	DS812	Diodes	Rectifier <=5A	400V 0.5A
1S813	DS813	Diodes	Rectifier <=5A	800V 0.5A
1S814	DS814	Diodes	Rectifier <=5A	1000V 0.5A
1S815	DS815	Diodes	Rectifier <=5A	1200V 0.5A
1S822	DS822	Diodes	Rectifier <=5A	400V 2.5A
1S823	DS823	Diodes	Rectifier <=5A	800V 2.5A
1S824	DS824	Diodes	Rectifier <=5A	1000V 2.5A
1S825	DS825	Diodes	Rectifier <=5A	1200V 2.5A
BAL74	BAL74	Diodes	Rectifier <=5A	6.2V .2W
BAL99	BAL99	Diodes	Rectifier <=5A	6.2V .2W
BAR74	BAR74	Diodes	Rectifier <=5A	6.2V .2W
BAR99	BAR99	Diodes	Rectifier <=5A	6.2V .2W
BAS11	BAS11	Diodes	Rectifier <=5A	300V .3A
BAS16	BAS16	Diodes	Rectifier <=5A	75V 250mA
BAS16Z	BAS16Z	Diodes	Rectifier <=5A	6.2V .2W
BAS19	BAS19	Diodes	Rectifier <=5A	6.2V .2W
BAS20	BAS20	Diodes	Rectifier <=5A	6.2V .2W
BAS21	BAS21	Diodes	Rectifier <=5A	6.2V .2W
BAV10	BAV10	Diodes	Rectifier <=5A	60V 300mA
BAV18	BAV18	Diodes	Rectifier <=5A	50V 250mA
BAV19	BAV19	Diodes	Rectifier <=5A	100V .25A
BAV20	BAV20	Diodes	Rectifier <=5A	150V .25A
BAV21	BAV21	Diodes	Rectifier <=5A	200V .25A
BAV70	BAV70	Diodes	Rectifier <=5A	6.2V .2W
BAV74	BAV74	Diodes	Rectifier <=5A	6.2V .2W
BAV99	BAV99	Diodes	Rectifier <=5A	6.2V .2W
BAW56	BAW56	Diodes	Rectifier <=5A	6.2V .2W
BAW62	BAW62	Diodes	Rectifier <=5A	75V 450mA
BAX12	BAX12	Diodes	Rectifier <=5A	90V 800mA
BAX18	BAX18	Diodes	Rectifier <=5A	75V 400mA
BBY31	BBY31	Diodes	Rectifier <=5A	6.2V .2W
BBY40	BBY40	Diodes	Rectifier <=5A	6.2V .2W
BY251	BY251	Diodes	Rectifier <=5A	200V 3A
BY252	BY252	Diodes	Rectifier <=5A	400V 3A
BY253	BY253	Diodes	Rectifier <=5A	600V 3A
BY254	BY254	Diodes	Rectifier <=5A	800V 3A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
BY255	BY255	Diodes	Rectifier <=5A	1300V 3A
BY296	BY296	Diodes	Rectifier <=5A	100V 2A
BY297	BY297	Diodes	Rectifier <=5A	200V 2A
BY298	BY298	Diodes	Rectifier <=5A	400V 2A
BY299	BY299	Diodes	Rectifier <=5A	800V 2A
BY396	BY396	Diodes	Rectifier <=5A	100V 3A
BY397	BY397	Diodes	Rectifier <=5A	200V 3A
BY398	BY398	Diodes	Rectifier <=5A	400V 3A
BY399	BY399	Diodes	Rectifier <=5A	800V 3A
BYV27-05	BYV27-5	Diodes	Rectifier <=5A	50V 2A
BYV27-100	BYV27-10	Diodes	Rectifier <=5A	100V 2A
BYV27-150	BYV27-15	Diodes	Rectifier <=5A	150V 2A
BYV27-200	BYV27-20	Diodes	Rectifier <=5A	200V 2A
BYV28-10	BYV28-10	Diodes	Rectifier <=5A	100V 3.5A
BYV28-15	BYV28-15	Diodes	Rectifier <=5A	150V 3.5A
BYV28-200	BYV28-20	Diodes	Rectifier <=5A	200V 3.5A
BYV28-50	BYV28-5	Diodes	Rectifier <=5A	50V 3.5A
BYV36A	BYV36A	Diodes	Rectifier <=5A	200V 2A
BYV36B	BYV36B	Diodes	Rectifier <=5A	400V 2A
BYV36C	BYV36C	Diodes	Rectifier <=5A	600V 2A
BYV36D	BYV36D	Diodes	Rectifier <=5A	800V 2A
BYV36E	BYV36E	Diodes	Rectifier <=5A	1000V 2A
BYV95A	BYV95A	Diodes	Rectifier <=5A	200V 1.5A
BYV95B	BYV95B	Diodes	Rectifier <=5A	400V 1.5A
BYV95C	BYV95C	Diodes	Rectifier <=5A	600V 1.5A
BYV96D	BYV96D	Diodes	Rectifier <=5A	800V 1.5A
BYV96E	BYV96E	Diodes	Rectifier <=5A	1000V 1.5A
BYX55350	BYX55350	Diodes	Rectifier <=5A	350V 1.2A
BYX55600	BYX55600	Diodes	Rectifier <=5A	600V 1.2A
CD410430	CD410430	Diodes	Rectifier >5A	400V 30A
CD410460	CD410460	Diodes	Rectifier >5A	400V 60A
CD410830	CD410830	Diodes	Rectifier >5A	800V 30A
CD410860	CD410860	Diodes	Rectifier >5A	800V 60A
CD411230	CD411230	Diodes	Rectifier >5A	1200V 30A
CD411630	CD411630	Diodes	Rectifier >5A	1600V 30A
CS410499	CS410499	Diodes	Rectifier >5A	400V 100A
CS410699	CS410699	Diodes	Rectifier >5A	600V 100A
CS410899	CS410899	Diodes	Rectifier >5A	800V 100A
CS411099	CS411099	Diodes	Rectifier >5A	1000V 100A
CS411299	CS411299	Diodes	Rectifier >5A	1200V 100A
CS411499	CS411499	Diodes	Rectifier >5A	1400V 100A
D6513SC	D6513SC	Diodes	Rectifier >5A	600V 12A
D6520SC	D6520SC	Diodes	Rectifier <=5A	600V 1A
D6525SA	D6525SA	Diodes	Rectifier <=5A	600V 1A
D6528SC	D6528SC	Diodes	Rectifier <=5A	600V 1A
D6534SF	D6534SF	Diodes	Rectifier <=5A	600V 1A
DD1000	DD1000	Diodes	Rectifier <=5A	10000V 20MA
DD1200	DD1200	Diodes	Rectifier <=5A	12000V 20MA
DD1300	DD1300	Diodes	Rectifier <=5A	13000V 20MA
DD1600	DD1600	Diodes	Rectifier <=5A	16000V 20MA
DD300	DD300	Diodes	Rectifier <=5A	3000V 20MA
DD600	DD600	Diodes	Rectifier <=5A	6000V 20MA
ERA1501	ERA1501	Diodes	Rectifier <=5A	80V 1A
ERA1502	ERA1502	Diodes	Rectifier <=5A	160V 1A
ERA1504	ERA1504	Diodes	Rectifier <=5A	320V 1A
ERA1506	ERA1506	Diodes	Rectifier <=5A	480V 1A
ERA1508	ERA1508	Diodes	Rectifier <=5A	640V 1A
ERA1510	ERA1510	Diodes	Rectifier <=5A	800V 1A
ERA3410	ERA3410	Diodes	Rectifier <=5A	800V .1A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
ERA3804	ERA3804	Diodes	Rectifier <=5A	400V .5A
ERA3805	ERA3805	Diodes	Rectifier <=5A	500V .5A
ERA3806	ERA3806	Diodes	Rectifier <=5A	600V .5A
ERA9102	ERA9102	Diodes	Rectifier <=5A	160V .5A
ERA9202	ERA9202	Diodes	Rectifier <=5A	200V 1A
ERB0613	ERB0613	Diodes	Rectifier <=5A	1040V 1A
ERB0615	ERB0615	Diodes	Rectifier <=5A	1200V 1A
ERB3804	ERB3804	Diodes	Rectifier <=5A	400V .8A
ERB3805	ERB3805	Diodes	Rectifier <=5A	500V .8A
ERB3806	ERB3806	Diodes	Rectifier <=5A	600V .8A
ERB4402	ERB4402	Diodes	Rectifier <=5A	160V 1A
ERB4404	ERB4404	Diodes	Rectifier <=5A	320V 1A
ERB4406	ERB4406	Diodes	Rectifier <=5A	480V 1A
ERB4408	ERB4408	Diodes	Rectifier <=5A	640V 1A
ERB4410	ERB4410	Diodes	Rectifier <=5A	800V 1A
ERB9102	ERB9102	Diodes	Rectifier <=5A	160V 1A
ERC3502	ERC3502	Diodes	Rectifier <=5A	160V 2.5A
ERC3804	ERC3804	Diodes	Rectifier <=5A	400V 1A
ERC3805	ERC3805	Diodes	Rectifier <=5A	500V 1A
ERC3806	ERC3806	Diodes	Rectifier <=5A	600V 1A
ERC9102	ERC9102	Diodes	Rectifier <=5A	200V 3A
ERD0302	ERD0302	Diodes	Rectifier <=5A	160V 3A
ERD0304	ERD0304	Diodes	Rectifier <=5A	320V 3A
ERD08M15	ERD08M15	Diodes	Rectifier <=5A	1200V 5A
ERD2902	ERD2902	Diodes	Rectifier <=5A	160V 2.5A
ERD2904	ERD2904	Diodes	Rectifier <=5A	320V 2.5A
ERD2906	ERD2906	Diodes	Rectifier <=5A	480V 2.5A
ERD3102	ERD3102	Diodes	Rectifier <=5A	160V 1.5A
ERD314	ERD314	Diodes	Rectifier <=5A	320V 1.5A
ERD3302	ERD3302	Diodes	Rectifier <=5A	160V 2A
ERD3804	ERD3804	Diodes	Rectifier <=5A	400V 1.5A
ERD3805	ERD3805	Diodes	Rectifier <=5A	500V 1.5A
ERD3806	ERD3806	Diodes	Rectifier <=5A	600V 1.5A
ERE4115	ERE4115	Diodes	Rectifier <=5A	1200V 3A
ESAB9202	ESAB9202	Diodes	Rectifier <=5A	200V 5A
ESAC3904	ESAC3904	Diodes	Rectifier <=5A	400V 5A
ESAC3906	ESAC3906	Diodes	Rectifier <=5A	600V 5A
ESAC9202	ESAC9202	Diodes	Rectifier >5A	200V 16A
ESAC9203	ESAC9203	Diodes	Rectifier >5A	300V 10A
ESAD3302	ESAD3302	Diodes	Rectifier >5A	500V 20A
ESAD3904	ESAD3904	Diodes	Rectifier >5A	400V 10A
ESAD3906	ESAD3906	Diodes	Rectifier >5A	600V 10A
ESAD9202	ESAD9202	Diodes	Rectifier >5A	200V 20A
ESAD9203	ESAD9203	Diodes	Rectifier >5A	300V 20A
FE1A	FE1A	Diodes	Rectifier <=5A	50V 1A
FE1B	FE1B	Diodes	Rectifier <=5A	100V 1A
FE1C	FE1C	Diodes	Rectifier <=5A	150V 1A
FE1D	FE1D	Diodes	Rectifier <=5A	200V 1A
FE1E	FE1E	Diodes	Rectifier <=5A	250V 1A
FE1F	FE1F	Diodes	Rectifier <=5A	300V 1A
FE1G	FE1G	Diodes	Rectifier <=5A	350V 1A
FE1H	FE1H	Diodes	Rectifier <=5A	400V 1A
FMMD2835	FMMD2835	Diodes	Rectifier <=5A	6.2V .2W
FMMD2836	FMMD2836	Diodes	Rectifier <=5A	6.2V .2W
FMMD2837	FMMD2837	Diodes	Rectifier <=5A	6.2V .2W
FMMD2838	FMMD2838	Diodes	Rectifier <=5A	6.2V .2W
FMMD6050	FMMD6050	Diodes	Rectifier <=5A	6.2V .2W
FMMD6100	FMMD6100	Diodes	Rectifier <=5A	6.2V .2W
FMMD7000	FMMD7000	Diodes	Rectifier <=5A	6.2V .2W

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
FMMD914	FMMD914	Diodes	Rectifier <=5A	6.2V .2W
FMMV105G	FMMV105G	Diodes	Rectifier <=5A	6.2V .2W
FMMV109	FMMV109	Diodes	Rectifier <=5A	6.2V .2W
FMMV2101	FMMV2101	Diodes	Rectifier <=5A	6.2V .2W
FMMV2102	FMMV2102	Diodes	Rectifier <=5A	6.2V .2W
FMMV2103	FMMV2103	Diodes	Rectifier <=5A	6.2V .2W
FMMV2104	FMMV2104	Diodes	Rectifier <=5A	6.2V .2W
FMMV2105	FMMV2105	Diodes	Rectifier <=5A	6.2V .2W
FMMV2106	FMMV2106	Diodes	Rectifier <=5A	6.2V .2W
FMMV2107	FMMV2107	Diodes	Rectifier <=5A	6.2V .2W
FMMV2108	FMMV2108	Diodes	Rectifier <=5A	6.2V .2W
FMMV2109	FMMV2109	Diodes	Rectifier <=5A	6.2V .2W
FMMV3102	FMMV3102	Diodes	Rectifier <=5A	6.2V .2W
GI750	GI750	Diodes	Rectifier >5A	50V 6.00A
GI751	GI751	Diodes	Rectifier >5A	100V 6.00A
GI752	GI752	Diodes	Rectifier >5A	200V 6.00A
GI754	GI754	Diodes	Rectifier >5A	400V 6.00A
GI756	GI756	Diodes	Rectifier >5A	600V 6.00A
GI758	GI758	Diodes	Rectifier >5A	800V 6.00A
HD2A	HD2A	Diodes	Rectifier <=5A	6.2V .2W
HD3A	HD3A	Diodes	Rectifier <=5A	6.2V .2W
HD4A	HD4A	Diodes	Rectifier <=5A	6.2V .2W
HFA08TB60	A08TB60	Diodes	Rectifier >5A	600V 8A, Soft Rec.
HFA15TB60	A15TB60	Diodes	Rectifier >5A	600V 15A, Soft Rec.
HFA25TA60	A25TA60	Diodes	Rectifier >5A	600V 25A, Soft Rec.
HFA30TA60C	A30TA60C	Diodes	Rectifier >5A	600V 30A, Soft Rec.
HFA50PA60C	A50PA60C	Diodes	Rectifier >5A	600V 50A, Soft Rec.
LD102A	LD102A	Diodes	Rectifier <=5A	6.2V .2W
LD103A	LD103A	Diodes	Rectifier <=5A	6.2V .2W
LD106	LD106	Diodes	Rectifier <=5A	6.2V .2W
MBR1535CT	MBR1535C	Diodes	Rectifier >5A	35V 7.5A
MBR1545CT	MBR1545C	Diodes	Rectifier >5A	45V 7.5A
MR1366	MR1366	Diodes	Rectifier >5A	600V 6A
MR1376	MR1376	Diodes	Rectifier >5A	600V 12A
MR1386	MR1386	Diodes	Rectifier >5A	600V 20A
MR1396	MR1396	Diodes	Rectifier >5A	600V 30A
MR500	MR500	Diodes	Rectifier <=5A	50V 3A
MR501	MR501	Diodes	Rectifier <=5A	100V 3A
MR502	MR502	Diodes	Rectifier <=5A	200V 3A
MR504	MR504	Diodes	Rectifier <=5A	400V 3A
MR506	MR506	Diodes	Rectifier <=5A	600V 3A
MR508	MR508	Diodes	Rectifier <=5A	800V 3A
MR510	MR510	Diodes	Rectifier <=5A	1000V 3A
MR750	MR750	Diodes	Rectifier >5A	50V 6A
MR751	MR751	Diodes	Rectifier >5A	100V 6A
MR752	MR752	Diodes	Rectifier >5A	200V 6A
MR754	MR754	Diodes	Rectifier >5A	400V 6A
MR756	MR756	Diodes	Rectifier >5A	600V 6A
MR758	MR758	Diodes	Rectifier >5A	800V 6A
MR760	MR760	Diodes	Rectifier >5A	1000V 6A
MR810	MR810	Diodes	Rectifier <=5A	50V 1A
MR811	MR811	Diodes	Rectifier <=5A	100V 1A
MR812	MR812	Diodes	Rectifier <=5A	200V 1A
MR813	MR813	Diodes	Rectifier <=5A	300V 1A
MR814	MR814	Diodes	Rectifier <=5A	400V 1A
MR816	MR816	Diodes	Rectifier <=5A	600V 1A
MR817	MR817	Diodes	Rectifier <=5A	800V 1A
MR818	MR818	Diodes	Rectifier <=5A	1000V 1A
MR850	MR850	Diodes	Rectifier <=5A	50V 3A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
MR851	MR851	Diodes	Rectifier <=5A	100V 3A
MR852	MR852	Diodes	Rectifier <=5A	200V 3A
MR854	MR854	Diodes	Rectifier <=5A	400V 3A
MR856	MR856	Diodes	Rectifier <=5A	600V 3A
MUR10005	MUR10005	Diodes	Rectifier >5A	50V 80A
MUR10010	MUR10010	Diodes	Rectifier >5A	100V 80A
MUR10015	MUR10015	Diodes	Rectifier >5A	150V 80A
MUR10020	MUR10020	Diodes	Rectifier >5A	200V 80A
MUR105	MUR105	Diodes	Rectifier <=5A	50V 1A
MUR110	MUR110	Diodes	Rectifier <=5A	100V 1A
MUR1100	MUR1100	Diodes	Rectifier <=5A	1000V 1A
MUR115	MUR115	Diodes	Rectifier <=5A	150V 1A
MUR120	MUR120	Diodes	Rectifier <=5A	200V 1A
MUR130	MUR130	Diodes	Rectifier <=5A	300V 1A
MUR140	MUR140	Diodes	Rectifier <=5A	400V 1A
MUR150	MUR150	Diodes	Rectifier <=5A	500V 1A
MUR160	MUR160	Diodes	Rectifier <=5A	600V 1A
MUR1605CT	MUR1605C	Diodes	Rectifier >5A	50V 16A
MUR1610CT	MUR1610C	Diodes	Rectifier >5A	100V 16A
MUR1615CT	MUR1615C	Diodes	Rectifier >5A	150V 16A
MUR1620CT	MUR1620C	Diodes	Rectifier >5A	200V 16A
MUR1630CT	MUR1630C	Diodes	Rectifier >5A	300V 16A
MUR1640CT	MUR1640C	Diodes	Rectifier >5A	400V 16A
MUR1650CT	MUR1650C	Diodes	Rectifier >5A	500V 16A
MUR1660CT	MUR1660C	Diodes	Rectifier >5A	600V 16A
MUR170	MUR170	Diodes	Rectifier <=5A	700V 1A
MUR180	MUR180	Diodes	Rectifier <=5A	800V 1A
MUR190	MUR190	Diodes	Rectifier <=5A	900V 1A
MUR3005PT	MUR3005	Diodes	Rectifier >5A	50V 15A
MUR3010PT	MUR3010	Diodes	Rectifier >5A	100V 15A
MUR3015PT	MUR3015	Diodes	Rectifier >5A	150V 15A
MUR3020PT	MUR3020	Diodes	Rectifier >5A	200V 15A
MUR3030PT	MUR3030	Diodes	Rectifier >5A	300V 15A
MUR3040PT	MUR3040	Diodes	Rectifier >5A	400V 15A
MUR3050PT	MUR3050	Diodes	Rectifier >5A	500V 15A
MUR3060PT	MUR3060	Diodes	Rectifier >5A	600V 15A
MUR405	MUR405	Diodes	Rectifier <=5A	50V 4A
MUR410	MUR410	Diodes	Rectifier <=5A	100V 4A
MUR4100	MUR4100	Diodes	Rectifier <=5A	1000V 4A
MUR415	MUR415	Diodes	Rectifier <=5A	150V 4A
MUR420	MUR420	Diodes	Rectifier <=5A	200V 4A
MUR430	MUR430	Diodes	Rectifier <=5A	300V 4A
MUR440	MUR440	Diodes	Rectifier <=5A	400V 4A
MUR450	MUR450	Diodes	Rectifier <=5A	500V 4A
MUR460	MUR460	Diodes	Rectifier <=5A	600V 4A
MUR470	MUR470	Diodes	Rectifier <=5A	700V 4A
MUR480	MUR480	Diodes	Rectifier <=5A	800V 4A
MUR490	MUR490	Diodes	Rectifier <=5A	900V 4A
MUR605CT	MUR605CT	Diodes	Rectifier >5A	50V 6A
MUR610CT	MUR610CT	Diodes	Rectifier >5A	100V 6A
MUR615CT	MUR615CT	Diodes	Rectifier >5A	150V 6A
MUR620CT	MUR620CT	Diodes	Rectifier >5A	200V 6A
MUR7005	MUR7005	Diodes	Rectifier >5A	50V 70A
MUR7010	MUR7010	Diodes	Rectifier >5A	100V 70A
MUR7015	MUR7015	Diodes	Rectifier >5A	150V 70A
MUR7020	MUR7020	Diodes	Rectifier >5A	200V 70A
MUR805	MUR805	Diodes	Rectifier >5A	50V 8A
MUR810	MUR810	Diodes	Rectifier >5A	100V 8A
MUR8100	MUR8100	Diodes	Rectifier >5A	1000V 8A

Rectifier Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
MUR815	MUR815	Diodes	Rectifier >5A	150V 8A
MUR820	MUR820	Diodes	Rectifier >5A	200V 8A
MUR830	MUR830	Diodes	Rectifier >5A	300V 8A
MUR840	MUR840	Diodes	Rectifier >5A	400V 8A
MUR850	MUR850	Diodes	Rectifier >5A	500V 8A
MUR860	MUR860	Diodes	Rectifier >5A	600V 8A
MUR870	MUR870	Diodes	Rectifier >5A	700V 8A
MUR880	MUR880	Diodes	Rectifier >5A	800V 8A
MUR890	MUR890	Diodes	Rectifier >5A	900V 8A
R18C12B	R18C12B	Diodes	Rectifier >5A	1200V 185A
R18C14B	R18C14B	Diodes	Rectifier >5A	1400V 185A
R18C16A	R18C16A	Diodes	Rectifier >5A	1600V 185A
R18C18A	R18C18A	Diodes	Rectifier >5A	1800V 185A
RC184A	RC184A	Diodes	Rectifier >5A	400V 200A
RC18C6A	RC18C6A	Diodes	Rectifier >5A	600 200A
RGP30M	RGP30M	Diodes	Rectifier <=5A	1000V 3A
SDR937	SDR937	Diodes	Rectifier >5A	700V 100A 50NS

SBS [1]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
MBS4991	MBS4991	Diodes	SBS	Diode Thyristor, PD=.5W

Switching Diodes [31]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N3064	DN3064	Diodes	Switching	75V 75mA
1N3600	DN3600	Diodes	Switching	75V 200mA
1N4148	DN4148	Diodes	Switching	75V 200mA
1N4149	DN4149	Diodes	Switching	75V 200mA
1N4150	DN4150	Diodes	Switching	75V 200mA
1N4151	DN4151	Diodes	Switching	75V 200mA
1N4152	DN4152	Diodes	Switching	40V 200mA
1N4153	DN4153	Diodes	Switching	75V 150mA
1N4154	DN4154	Diodes	Switching	35V 200mA
1N4305	DN4305	Diodes	Switching	75V 200mA
1N4444	DN4444	Diodes	Switching	70V 200mA
1N4446	DN4446	Diodes	Switching	75V 200mA
1N4447	DN4447	Diodes	Switching	75V 200mA
1N4448	DN4448	Diodes	Switching	75V 200mA
1N4449	DN4449	Diodes	Switching	75V 200mA
1N4450	DN4450	Diodes	Switching	40V 200mA
1N4451	DN4451	Diodes	Switching	40V 200mA
1N4453	DN4453	Diodes	Switching	30V 200mA
1N4454	DN4454	Diodes	Switching	75V 200mA
1N4500	DN4500	Diodes	Switching	80V 500mA
1N4531	DN4531	Diodes	Switching	100V 125mA
1N4532	DN4532	Diodes	Switching	75V 125mA
1N4534	DN4534	Diodes	Switching	75V 150mA
1N914	DN914	Diodes	Switching	100V 75mA
1N916	DN916	Diodes	Switching	100V 200mA
BA220	BA220	Diodes	Switching	10V 400mA

Switching Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
BA221	BA221	Diodes	Switching	30V 400mA
BA316	BA316	Diodes	Switching	10V 225mA
BA317	BA317	Diodes	Switching	30V 225mA
BA318	BA318	Diodes	Switching	50V 225mA
BAS45	BAS45	Diodes	Switching	125V 225mA

GaAs Diodes [15]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
IRL80A	IRL80A	Diodes	GaAs	3V 60MA
LD242	LD242	Diodes	GaAs	5V .3A
LD261	LD261	Diodes	GaAs	5V 60MA
LD271	LD271	Diodes	GaAs	5V .13A
LD274	LD274	Diodes	GaAs	5V .1A
SFH400	SFH400	Diodes	GaAs	5V .3A
SFH405	SFH405	Diodes	GaAs	5V 40MA
SFH409	SFH409	Diodes	GaAs	5V .1A
SFH414	SFH414	Diodes	GaAs	5V .1A
SFH420	SFH420	Diodes	GaAs	5V .1A
SFH421	SFH421	Diodes	GaAs	5V .1A
SFH462	SFH462	Diodes	GaAs	3V 50MA
SFH480	SFH480	Diodes	GaAs	5V .2A
SFH483	SFH483	Diodes	GaAs	5V .2A
SFH484	SFH484	Diodes	GaAs	5V .1A

Varactor Diodes [41]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N5139	DN5139	Diodes	Varactors	60V 6.8pf
1N5140	DN5140	Diodes	Varactors	60V 10pf
1N5141	DN5141	Diodes	Varactors	60V 12pf
1N5142	DN5142	Diodes	Varactors	60V 15pf
1N5143	DN5143	Diodes	Varactors	60V 18pf
1N5144	DN5144	Diodes	Varactors	60V 22pf
1N5145	DN5145	Diodes	Varactors	60V 27pf
1N5146	DN5146	Diodes	Varactors	60V 33pf
1N5147	DN5147	Diodes	Varactors	60V 39pf
1N5148	DN5148	Diodes	Varactors	60V 47pf
1N5441	DN5441	Diodes	Varactors	30V 6.8pf
1N5442	DN5442	Diodes	Varactors	30V 8.2pf
1N5443	DN5443	Diodes	Varactors	30V 10pf
1N5444	DN5444	Diodes	Varactors	30V 12pf
1N5445	DN5445	Diodes	Varactors	30V 15pf
1N5446	DN5446	Diodes	Varactors	30V 18pf
1N5447	DN5447	Diodes	Varactors	30V 20pf
1N5448	DN5448	Diodes	Varactors	30V 22pf
1N5449	DN5449	Diodes	Varactors	30V 27pf
1N5450	DN5450	Diodes	Varactors	30V 33pf
1N5451	DN5451	Diodes	Varactors	30V 39pf
1N5452	DN5452	Diodes	Varactors	30V 47pf
1N5453	DN5453	Diodes	Varactors	30V 56pf

Varactor Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
1N5454	DN5454	Diodes	Varactors	30V 68pf
1N5455	DN5455	Diodes	Varactors	30V 82pf
1N5456	DN5456	Diodes	Varactors	30V 100pf
BB112	BB112	Diodes	Varactors	12V 470pf
BB119	BB119	Diodes	Varactors	15V 22pf
BB204	BB204	Diodes	Varactors	32V 36pf
BB505	BB505	Diodes	Varactors	30V 17.5pf
MV2101	MV2101	Diodes	Varactors	CT=6.8P @ 4V
MV2103	MV2103	Diodes	Varactors	CT=10P @ 4V
MV2104	MV2104	Diodes	Varactors	CT=12P @ 4V
MV2105	MV2105	Diodes	Varactors	CT=15P @ 4V
MV2107	MV2107	Diodes	Varactors	CT=22P @ 4V
MV2108	MV2108	Diodes	Varactors	CT=27P @ 4V
MV2109	MV2109	Diodes	Varactors	CT=33P @ 4V
MV2111	MV2111	Diodes	Varactors	CT=47P @ 4V
MV2113	MV2113	Diodes	Varactors	CT=68P @ 4V
MV2114	MV2114	Diodes	Varactors	CT=82P @ 4V
MV2115	MV2115	Diodes	Varactors	CT=100P @ 4V

Laser Diodes [12]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
IRL80A	IRL80A	Diodes	GaAs	3V 60MA
QWLAS11	QWLAS11	Diodes	Laser	1L Rate Full Log Gain
QWLAS12	QWLAS12	Diodes	Laser	1L Rate Simple Log Gain
QWLAS13	QWLAS13	Diodes	Laser	1L Rate gain linearized
QWLAS14	QWLAS14	Diodes	Laser	1L Rate gain linearized
QWLAS2A1	QWLAS2A1	Diodes	Laser	2L Rate w/SCH Full Log Gain
QWLAS2A2	QWLAS2A2	Diodes	Laser	2L Rate w/SCH Simple Log Gain
QWLAS2A3	QWLAS2A3	Diodes	Laser	2L Rate w/SCH gain linearized
QWLAS2A4	QWLAS2A4	Diodes	Laser	2L Rate w/SCH gain linearized
QWLAS2B1	QWLAS2B1	Diodes	Laser	2L Rate w/oSCH Full Log Gain
QWLAS2B2	QWLAS2B2	Diodes	Laser	2L Rate w/oSCH Simple Log Gain
QWLAS2B3	QWLAS2B3	Diodes	Laser	2L Rate w/oSCH gain linearized
QWLAS2B4	QWLAS2B4	Diodes	Laser	2L Rate w/oSCH gain linearized

Schottky Diodes [152]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
10KQ100	D10KQ100	Diodes	Schottky	100V 10A
10KQ30	D10KQ30	Diodes	Schottky	30V 10A
10KQ40	D10KQ40	Diodes	Schottky	40V 10A
10KQ50	D10KQ50	Diodes	Schottky	50V 10A
10KQ60	D10KQ60	Diodes	Schottky	60V 10A
10KQ90	D10KQ90	Diodes	Schottky	90V 10A
1FWJ42	DFWJ42	Diodes	Schottky	30V 1A
1FWJ43	DFWJ43	Diodes	Schottky	30V 1A
1FWJ44	DFWJ44	Diodes	Schottky	40V 1A
1GWJ42	DGWJ42	Diodes	Schottky	40V 1A
1GWJ43	DGWJ43	Diodes	Schottky	40V 1A
1N5165	DN5165	Diodes	Schottky	30V
1N5166	DN5166	Diodes	Schottky	30V
1N5167	DN5167	Diodes	Schottky	20V
1N5711	DN5711	Diodes	Schottky	70V
1N5712	DN5712	Diodes	Schottky	20V
1N5817	DN5817	Diodes	Schottky	20V 1A
1N5818	DN5818	Diodes	Schottky	30V 1A
1N5819	DN5819	Diodes	Schottky	40V 1A
1N5820	DN5820	Diodes	Schottky	20V 3A
1N5821	DN5821	Diodes	Schottky	30V 3A
1N5822	DN5822	Diodes	Schottky	40V 3A
1N5826	DN5826	Diodes	Schottky	20V 15A
1N5827	DN5827	Diodes	Schottky	30V 15A
1N5828	DN5828	Diodes	Schottky	40V 15A
1N5829	DN5829	Diodes	Schottky	20V 25A
1N5830	DN5830	Diodes	Schottky	30V 25A
1N5831	DN5831	Diodes	Schottky	50V 25A
1N6392H	DN6392H	Diodes	Schottky	High Temp
1N6392L	DN6392L	Diodes	Schottky	Low Temp
1N6392N	DN6392N	Diodes	Schottky	45V 120A
1N6660	DN6660	Diodes	Schottky	45V 40A
5082-0013	HP0013	Diodes	Schottky	400V .5A
5082-2202	HP2202	Diodes	Schottky	4V
5082-2209	HP2209	Diodes	Schottky	400V .5A
5082-2233	HP2233	Diodes	Schottky	400V .5A
5082-2263	HP2263	Diodes	Schottky	400V .5A
5082-2272	HP2272	Diodes	Schottky	400V .5A
5082-2277	HP2277	Diodes	Schottky	400V .5A
5082-2279	HP2279	Diodes	Schottky	400V .5A
5082-2280	HP2280	Diodes	Schottky	400V .5A
5082-2291	HP2291	Diodes	Schottky	400V .5A
5082-2292	HP2292	Diodes	Schottky	400V .5A
5082-2303	HP2303	Diodes	Schottky	400V .5A
5082-2350	HP2350	Diodes	Schottky	400V .5A
5082-2400	HP2400	Diodes	Schottky	400V .5A
5082-2723	HP2723	Diodes	Schottky	400V .5A
5082-275X	HP275X	Diodes	Schottky	400V .5A
5082-2787	HP2787	Diodes	Schottky	400V .5A
5082-2794	HP2794	Diodes	Schottky	400V .5A
5082-2811	HP2811	Diodes	Schottky	15V
5082-2817	HP2817	Diodes	Schottky	15V
5082-2824	HP2824	Diodes	Schottky	400V .5A
5082-2830	HP2830	Diodes	Schottky	400V .5A
5082-2831	HP2831	Diodes	Schottky	400V .5A
5082-2835	HP2835	Diodes	Schottky	400V .5A
5082-2837	HP2837	Diodes	Schottky	400V .5A

Schottky Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
5082-2900	HP2900	Diodes	Schottky	10V
5082-294	HP2294	Diodes	Schottky	400V .5A
5KQ100	D5KQ100	Diodes	Schottky	100V 5A
5KQ30	D5KQ30	Diodes	Schottky	30V 5A
5KQ40	D5KQ40	Diodes	Schottky	40V 5A
5KQ50	D5KQ50	Diodes	Schottky	50V 5A
5KQ60	D5KQ60	Diodes	Schottky	60V 5A
5KQ90	D5KQ90	Diodes	Schottky	90V 5A
BA582S	BA582S	Diodes	Schottky	Siemens
BA592S	BA592S	Diodes	Schottky	Siemens
BAS116S	BAS116S	Diodes	Schottky	Siemens
BAS125S	BAS125S	Diodes	Schottky	Siemens
BAS16S	BAS16S	Diodes	Schottky	Siemens
BAS21S	BAS21S	Diodes	Schottky	Siemens
BAS40	BAS40	Diodes	Schottky	40V 40mA
BAS40S	BAS40S	Diodes	Schottky	Siemens
BAS70	BAS70	Diodes	Schottky	70V 15mA
BAS70S	BAS70S	Diodes	Schottky	Siemens
BAT14S	BAT14S	Diodes	Schottky	Siemens
BAT15S	BAT15S	Diodes	Schottky	Siemens
BAT17	BAT17	Diodes	Schottky	4V 30mA
BAT17S	BAT17S	Diodes	Schottky	Siemens
BAT18S	BAT18S	Diodes	Schottky	Siemens
BAT62S	BAT62S	Diodes	Schottky	Siemens
BAT64S	BAT64S	Diodes	Schottky	Siemens
BAT68S	BAT68S	Diodes	Schottky	Siemens
BAT81	BAT81	Diodes	Schottky	40V 30mA
BAT82	BAT82	Diodes	Schottky	50V 30mA
BAT83	BAT83	Diodes	Schottky	60V 30mA
BAT85	BAT85	Diodes	Schottky	30V 200mA
BAW56S	BAW56S	Diodes	Schottky	Siemens
BAW78DS	BAW78DS	Diodes	Schottky	Siemens
BB515S	BB515S	Diodes	Schottky	Siemens
BB804S	BB804S	Diodes	Schottky	Siemens
BB814S	BB814S	Diodes	Schottky	Siemens
BYV10-20	BYV10-20	Diodes	Schottky	20V 1A
BYV10-30	BYV10-30	Diodes	Schottky	30V 1A
BYV10-40	BYV10-40	Diodes	Schottky	40V 1A
ERA8204	ERA8204	Diodes	Schottky	45V .6A
ERA83004	ERA83004	Diodes	Schottky	45V 1A
ERA83006	ERA83006	Diodes	Schottky	60V 1A
ERA85009	ERA85009	Diodes	Schottky	90V 1A
ERB83004	ERB83004	Diodes	Schottky	45V 2A
ERB83006	ERB83006	Diodes	Schottky	60V 2A
ERB84009	ERB84009	Diodes	Schottky	90V 2A
ERC62M04	ERC62M04	Diodes	Schottky	45V 10A
ESAC6304	ESAC6304	Diodes	Schottky	45V 20A
ESAC8204	ESAC8204	Diodes	Schottky	45V 15A
ESAE8304	ESAE8304	Diodes	Schottky	45V 60A
ESAE8306	ESAE8306	Diodes	Schottky	60V 60A
HSCH-320X	HP320X	Diodes	Schottky	400V .5A
HSCH-3486	HP3486	Diodes	Schottky	400V .5A
HSCH-5520	HP5520	Diodes	Schottky	400V .5A
HSCH-5540	HP5540	Diodes	Schottky	400V .5A
HSCH-5810	HP5810	Diodes	Schottky	400V .5A
HSCH-5812	HP5812	Diodes	Schottky	400V .5A
HSCH-5816	HP5816	Diodes	Schottky	400V .5A
HSCH-5830	HP5830	Diodes	Schottky	400V .5A

Schottky Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
HSCH-5832	HP5832	Diodes	Schottky	400V .5A
HSCH-5836	HP5836	Diodes	Schottky	400V .5A
HSCH-5912	HP5912	Diodes	Schottky	400V .5A
HSCH-5918	HP5918	Diodes	Schottky	400V .5A
HSCH-5932	HP5932	Diodes	Schottky	400V .5A
HSCH-5938	HP5938	Diodes	Schottky	400V .5A
HSCH-5952	HP5952	Diodes	Schottky	400V .5A
HSCH-5958	HP5958	Diodes	Schottky	400V .5A
HSCH-6510	HP6510	Diodes	Schottky	400V .5A
HSCH-6512	HP6512	Diodes	Schottky	400V .5A
HSCH-6530	HP6530	Diodes	Schottky	400V .5A
HSCH-6532	HP6532	Diodes	Schottky	400V .5A
HSCH-9XXX	HP9XXX	Diodes	Schottky	400V .5A
HSMS-280X	HP280X	Diodes	Schottky	400V .5A
HSMS-281X	HP281X	Diodes	Schottky	400V .5A
HSMS-282X	HP282X	Diodes	Schottky	400V .5A
HSMS-284X	HP284X	Diodes	Schottky	400V .5A
HSMS-8101	HP8101	Diodes	Schottky	400V .5A
HSMS-8202	HP8202	Diodes	Schottky	400V .5A
IR10CTQ150	I10C150	Diodes	Schottky	150V 10A
MBR115P	MBR115P	Diodes	Schottky	15V 1A
MBR120P	MBR120P	Diodes	Schottky	20V 1A
MBR130P	MBR130P	Diodes	Schottky	30V 1A
MBR140P	MBR140P	Diodes	Schottky	40V 1A
MBR20100	MBR20100	Diodes	Schottky	100V 20A
MBR2035	MBR2035	Diodes	Schottky	35V 20A
MBR2045	MBR2045	Diodes	Schottky	45V 20A
MBR2060	MBR2060	Diodes	Schottky	60V 20A
MBR2070	MBR2070	Diodes	Schottky	70V 20A
MBR2080	MBR2080	Diodes	Schottky	80V 20A
MBR2090	MBR2090	Diodes	Schottky	90V 20A
MBR6535	MBR6535	Diodes	Schottky	35V 130A
MBR6545	MBR6545	Diodes	Schottky	45V 130A
OMNI60	OMNI60	Diodes	Schottky	60V 20A
SHD1352	SHD1352	Diodes	Schottky	45V 45A Sensitron
SHD1382	SHD1382	Diodes	Schottky	45V 75A Sensitron
SSR8045	SSR8045	Diodes	Schottky	45V 40A SSDI

Diode Bridges [64]

Part #	Part Name	Part Type	Part Sub Type	Description
DB15005	DB15005	Diodes	Bridge	50V 15A, 3 Phase
DB1501	DB1501	Diodes	Bridge	100V 15A, 3 Phase
DB1502	DB1502	Diodes	Bridge	200V 15A, 3 Phase
DB1504	DB1504	Diodes	Bridge	400V 15A, 3 Phase
DB1506	DB1506	Diodes	Bridge	600V 15A, 3 Phase
DB1508	DB1508	Diodes	Bridge	800V 15A, 3 Phase
DB1510	DB1510	Diodes	Bridge	1000V 15A, 3 Phase
DB1512	DB1512	Diodes	Bridge	1200V 15A, 3 Phase
DB1514	DB1514	Diodes	Bridge	1400V 15A, 3 Phase
DB25005	DB25005	Diodes	Bridge	50V 25A, 3 Phase
DB2501	DB2501	Diodes	Bridge	100V 25A, 3 Phase
DB2502	DB2502	Diodes	Bridge	200V 25A, 3 Phase
DB2504	DB2504	Diodes	Bridge	400V 25A, 3 Phase
DB2506	DB2506	Diodes	Bridge	600V 25A, 3 Phase
DB2508	DB2508	Diodes	Bridge	800V 25A, 3 Phase

Diode Bridges (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
DB2510	DB2510	Diodes	Bridge	1000V 25A, 3 Phase
DB2512	DB2512	Diodes	Bridge	1200V 25A, 3 Phase
DB2514	DB2514	Diodes	Bridge	1400V 25A, 3 Phase
DB35005	DB35005	Diodes	Bridge	50V 35A, 3 Phase
DB3501	DB3501	Diodes	Bridge	100V 35A, 3 Phase
DB3502	DB3502	Diodes	Bridge	200V 35A, 3 Phase
DB3504	DB3504	Diodes	Bridge	400V 35A, 3 Phase
DB3506	DB3506	Diodes	Bridge	600V 35A, 3 Phase
DB3508	DB3508	Diodes	Bridge	800V 35A, 3 Phase
DB3510	DB3510	Diodes	Bridge	1000V 35A, 3 Phase
DB3512	DB3512	Diodes	Bridge	1200V 35A, 3 Phase
DB3514	DB3514	Diodes	Bridge	1400V 35A, 3 Phase
KBPC2500	KBPC2500	Diodes	Bridge	50V 25A, Full Wave
KBPC2501	KBPC2501	Diodes	Bridge	100V 25A, Full Wave
KBPC2504	KBPC2504	Diodes	Bridge	400V 25A, Full Wave
KBPC2506	KBPC2506	Diodes	Bridge	600V 25A, Full Wave
KBPC2508	KBPC2508	Diodes	Bridge	800V 25A, Full Wave
KBPC2510	KBPC2510	Diodes	Bridge	1000V 25A, Full Wave
KBPC800	KBPC800	Diodes	Bridge	50V 8A, Full Wave
KBPC801	KBPC801	Diodes	Bridge	80V 8A, Full Wave
KBPC804	KBPC804	Diodes	Bridge	250V 8A, Full Wave
KBPC806	KBPC806	Diodes	Bridge	500V 8A, Full Wave
KBPC808	KBPC808	Diodes	Bridge	800V 8A, Full Wave
KBPC810	KBPC810	Diodes	Bridge	1000V 8A, Full Wave
KBU4A	KBU4A	Diodes	Bridge	50V 4A, Full Wave
KBU4B	KBU4B	Diodes	Bridge	100V 4A, Full Wave
KBU4D	KBU4D	Diodes	Bridge	200V 4A, Full Wave
KBU4G	KBU4G	Diodes	Bridge	400V 4A, Full Wave
KBU4J	KBU4J	Diodes	Bridge	600V 4A, Full Wave
KBU4K	KBU4K	Diodes	Bridge	800V 4A, Full Wave
KBU4M	KBU4M	Diodes	Bridge	1000V 4A, Full Wave
MDA2500	MDA2500	Diodes	Bridge	50V 25A, Full Wave
MDA2501	MDA2501	Diodes	Bridge	100V 25A, Full Wave
MDA2502	MDA2502	Diodes	Bridge	200V 25A, Full Wave
MDA2504	MDA2504	Diodes	Bridge	400V 25A, Full Wave
MDA2506	MDA2506	Diodes	Bridge	600V 25A, Full Wave
MDA2508	MDA2508	Diodes	Bridge	800V 25A, Full Wave
MDA2510	MDA2510	Diodes	Bridge	1000V 25A, Full Wave
MDA3500	MDA3500	Diodes	Bridge	50V 35A, Full Wave
MDA3501	MDA3501	Diodes	Bridge	100V 35A, Full Wave
MDA3502	MDA3502	Diodes	Bridge	200V 35A, Full Wave
MDA3504	MDA3504	Diodes	Bridge	400V 35, Full Wave
MDA3506	MDA3506	Diodes	Bridge	600V 35A, Full Wave
MDA3508	MDA3508	Diodes	Bridge	800V 35A, Full Wave
MDA3510	MDA3510	Diodes	Bridge	1000V 35A, Full Wave
MDA4002	MDA4002	Diodes	Bridge	200V 40A, Full Wave
MDA4004	MDA4004	Diodes	Bridge	400V 40A, Full Wave
MDA4006	MDA4006	Diodes	Bridge	600V 40A, Full Wave
MDA4008	MDA4008	Diodes	Bridge	800V 40A, Full Wave

Full Wave [Connections: In1, In2, +, -]; SPICENET symbol: Bridge
3 Phase [Connections: +, -, P1, P2, P3]; SPICENET symbol: Bridge3

JFET Current Regulators [15]

Part #	Part Name	Part Type	Part Sub Type	Description
1N5283	DN5283	Diodes	JFET Regulator	100V .22mA
1N5286	DN5286	Diodes	JFET Regulator	100V .30mA
1N5290	DN5290	Diodes	JFET Regulator	100V .47mA
1N5297	DN5297	Diodes	JFET Regulator	100V 1.0mA
1N5314	DN5314	Diodes	JFET Regulator	100V 4.7mA
J500	J500	Diodes	JFET Regulator	100V .24mA
J502	J502	Diodes	JFET Regulator	100V .43mA
J505	J505	Diodes	JFET Regulator	100V 1mA
J508	J508	Diodes	JFET Regulator	100V 2mA
J510	J510	Diodes	JFET Regulator	100V 3.6mA
J553	J553	Diodes	JFET Regulator	100V .5mA
J554	J554	Diodes	JFET Regulator	100V 1mA
J555	J555	Diodes	JFET Regulator	100V 2mA
J556	J556	Diodes	JFET Regulator	100V 3mA
J557	J557	Diodes	JFET Regulator	100V 4.5mA

[Connections: Anode, Cathode]; SPICENET symbol: CRDIODE

Laser Diodes

Part #	Part Name	Part Type	Part Sub Type	Description
HL7801E	HL7801E	Diodes	Laser	Hitachi

[Connections: (Laser Diode) Anode, Cathode, (Monitor Diode) Anode, Cathode]

Photo Diodes [31]

Part #	Part Name	Part Type	Part Sub Type	Description
BP104	BP104	Diodes	Photo	PIN, 700MA/W
BP104BS	BP104BS	Diodes	Photo	PIN, 590MA/W
BPW21	BPW21	Diodes	Photo	PIN, 340MA/W
BPW32	BPW32	Diodes	Photo	PIN, 500MA/W
BPW33	BPW33	Diodes	Photo	PIN, 590MA/W
BPW34	BPW34	Diodes	Photo	PIN, 850nM .62A/W
BPW34B	BPW34B	Diodes	Photo	PIN, 200MA/W
BPW34F	BPW34F	Diodes	Photo	PIN, 590MA/W
BPW34FA	BPW34FA	Diodes	Photo	PIN, 650MA/W
BPX48	BPX48	Diodes	Photo	PIN, 550MA/W
BPX48F	BPX48F	Diodes	Photo	PIN, 650MA/W
BPX60	BPX60	Diodes	Photo	PIN, 200MA/W
BPX61	BPX61	Diodes	Photo	PIN, 620MA/W
BPX63	BPX63	Diodes	Photo	PIN, 500MA/W
BPX65	BPX65	Diodes	Photo	PIN, 550MA/W
BPX66	BPX66	Diodes	Photo	PIN, 550MA/W
BPX90	BPX90	Diodes	Photo	PIN, 480MA/W
BPX90F	BPX90F	Diodes	Photo	PIN, 480MA/W
BPX91B	BPX91B	Diodes	Photo	PIN, 200MA/W
BPX92	BPX92	Diodes	Photo	PIN, 500MA/W
BPY12	BPY12	Diodes	Photo	PIN, 600MA/W
BPY12H1	BPY12H1	Diodes	Photo	PIN, 600MA/W
MRD500	MRD500	Diodes	Photo	PIN, 6.6MA/W
MRD510	MRD510	Diodes	Photo	PIN, 1.5MA/W
MRD721	MRD721	Diodes	Photo	PIN, 5MA/W
MRD821	MRD821	Diodes	Photo	PIN, 50MA/W

Photo Diodes (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Cathode]
OPT201KP	OPT201KP	Diodes	Photo	w/amplifier, Burr-Brown
OPT202	OPT202	Diodes	Photo	w/amplifier, Burr-Brown
OPT209	OPT209	Diodes	Photo	w/amplifier, Burr-Brown
OPT211	OPT211	Diodes	Photo	w/amplifier, Burr-Brown
OPT301	OPT301	Diodes	Photo	w/amplifier, Burr-Brown

[Connections: Input power, Anode, Cathode, Symbol:BPW34, Library: Diode5.Lib]

Generic Diodes

Part #	Subcircuit Name	IsSPICE Letter	SPICENET Symbol	Library Name	Description	PRESPICE Parameters
Diode	DIODE	X	DIODE	Device	Switching	**IMAX** Max. ID in Amps **TRR** TRR in Seconds **VMAX** Max. Continuous Reverse Voltage in Volts
Zener	ZENER	X	LZEN	Device	Low V (2.4-12V)	**ZV** Breakdown at .02 Amps in V
Zener	ZENER	X	HZEN	Device	High V (6.8-200V)	**ZV** Breakdown at 125mW Dissipation in V

The connections for the Diode and Zener diode generic models are: [Anode, Cathode]

Bipolar Junction Transistors

Small Signal Transistors (NPN) [269]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N2102	QN2102	BJTs NPN	Gen. Purpose	65V 1A
2N2218	QN2218	BJTs NPN	Gen. Purpose	30V 800mA
2N2218A	QN2218A	BJTs NPN	Gen. Purpose	40V 800mA
2N2219	QN2219	BJTs NPN	Gen. Purpose	30V 800mA
2N2219A	QN2219A	BJTs NPN	Gen. Purpose	40V 800mA
2N2221	QN2221	BJTs NPN	Gen. Purpose	30V 800mA
2N2221A	QN2221A	BJTs NPN	Gen. Purpose	40V 800mA
2N2222	QN2222	BJTs NPN	Gen. Purpose	30V 800mA
2N2222A	QN2222A	BJTs NPN	Gen. Purpose	40V 800mA
2N2243	QN2243	BJTs NPN	Amplifier	80V .5A
2N2368	QN2368	BJTs NPN	Switching	15V 200mA
2N2369	QN2369	BJTs NPN	Switching	15V 200mA
2N2369A	QN2369A	BJTs NPN	Switching	15V 200mA
2N2453	QN2453	BJTs NPN	Amplifier	30V .05A
2N2453A	QN2453A	BJTs NPN	Amplifier	50V .05A
2N2484	QN2484	BJTs NPN	Amplifier	60V 50mA
2N2710	QN2710	BJTs NPN	Switching	20V 500mA
2N2920	QN2920	BJTs NPN	Amplifier	60V .03A
2N3019	QN3019	BJTs NPN	Gen. Purpose	80V 1A
2N3020	QN3020	BJTs NPN	Gen. Purpose	80V 1A
2N3227	QN3227	BJTs NPN	Switching	20V 200mA
2N3440	QN3440	BJTs NPN	Amplifier	250V 1A
2N3506	QN3506	BJTs NPN	Switching	40V 3A
2N3507	QN3507	BJTs NPN	Switching	50V 3A
2N3866	QN3866	BJTs NPN	Amplifier	30V 400mA
2N3904	QN3904	BJTs NPN	Switching	60V 200mA
2N4124	QN4124	BJTs NPN	Amplifier	25V 200mA
2N4239	QN4239	BJTs NPN	Gen. Purpose	80V 1A
2N4265	QN4265	BJTs NPN	Gen. Purpose	12V 200mA
2N4275	QN4275	BJTs NPN	Switching	40V 100mA
2N4401	QN4401	BJTs NPN	Gen. Purpose	60V 600mA
2N5088	QN5088	BJTs NPN	Amplifier	30V 50mA
2N5179	QN5179	BJTs NPN	Amplifier	20V 60mA
2N5209	QN5209	BJTs NPN	Amplifier	50V 50mA
2N5210	QN5210	BJTs NPN	Amplifier	50V 50mA
2N5582	QN5582	BJTs NPN	Gen. Purpose	15V 300mA
2N5770	QN5770	BJTs NPN	Switching	15V 300mA
2N6715	QN6715	BJTs NPN	Zetex	
2N918	QN918	BJTs NPN	Amplifier	15V 50mA
2SC1213	QSC1213	BJTs NPN	Amplifier	35V .5A
2SC1213A	QSC1213A	BJTs NPN	Amplifier	50V .5A
2SC1509	Q2SC1509	BJTs NPN		80V .5A 120Mhz
2SC1518	Q2SC1518	BJTs NPN		20V 1A 150Mhz
2SC1567	Q2SC1567	BJTs NPN		100V .5A 120Mhz
2SC1567A	QSC1567A	BJTs NPN		120V .5A 120Mhz
2SC1568	Q2SC1568	BJTs NPN		18V 1A 150Mhz
2SC1573	Q2SC1573	BJTs NPN		200V 70MA 45Mhz
2SC1573A	QSC1573A	BJTs NPN		300V 70MA 45Mhz
2SC1573B	QSC1573B	BJTs NPN		400V 70MA 45Mhz
2SC1627	QSC1627	BJTs NPN	Amplifier	80 V .4A
2SC1684	Q2SC1684	BJTs NPN		25V .1A 150Mhz
2SC1685	Q2SC1685	BJTs NPN		50V .1A 150Mhz
2SC1775	QSC1775	BJTs NPN	Amplifier	90V 50MA
2SC1788	Q2SC1788	BJTs NPN		20V .5A 150Mhz
2SC1819M	QSC1819M	BJTs NPN		300V .1A 60Mhz
2SC1847	Q2SC1847	BJTs NPN		40V 1.5A 150Mhz
2SC1905	Q2SC1905	BJTs NPN		300V .2A 45Mhz

Small Signal Transistors (NPN) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SC1953	Q2SC1953	BJTs NPN		150V 50MA 60Mhz
2SC2209	Q2SC2209	BJTs NPN		40V 1.5A 150Mhz
2SC2240	QSC2240	BJTs NPN	Amplifier	120 V .1A
2SC2240B	QSC2240B	BJTs NPN	Amplifier	120 V .1A
2SC2258	Q2SC2258	BJTs NPN		250V .1A 100Mhz
2SC2383	QSC2383	BJTs NPN	High Voltage	160 V 1A
2SC2396	QSC2396	BJTs NPN	Amplifier	60V .1A
2SC2458	QSC2458	BJTs NPN	Amplifier	50 V .15A
2SC2459	QSC2459	BJTs NPN	Amplifier	120 V .1A
2SC2482	QSC2482	BJTs NPN	High Voltage	300 V .1A
2SC2497	Q2SC2497	BJTs NPN		50V 1.5A 150Mhz
2SC2497A	QSC2497A	BJTs NPN		60V 1.5A 150Mhz
2SC2543	QSC2543	BJTs NPN	Amplifier	90V .1A
2SC2544	QSC2544	BJTs NPN	Amplifier	120V .1A
2SC2551	QSC2551	BJTs NPN	High Voltage	300 V .1A
2SC2556	Q2SC2556	BJTs NPN		40V 1A 200Mhz
2SC2556A	QSC2556A	BJTs NPN		50V 1A 200Mhz
2SC2565	QSC2565	BJTs NPN	Amplifier	160 V 15A
2SC2582	Q2SC2582	BJTs NPN		35V 1A 200Mhz
2SC2590	Q2SC2590	BJTs NPN		120V .5A 200Mhz
2SC2591	Q2SC2591	BJTs NPN		150V 1A 200Mhz
2SC2592	Q2SC2592	BJTs NPN		180V 1A 200Mhz
2SC2594	Q2SC2594	BJTs NPN		20V 5A 150Mhz
2SC2631	Q2SC2631	BJTs NPN		150V 50MA 160Mhz
2SC2632	Q2SC2632	BJTs NPN		150V 50MA 160Mhz
2SC2633	Q2SC2633	BJTs NPN		150V 50MA 160Mhz
2SC2637	Q2SC2637	BJTs NPN		300V .1A 60Mhz
2SC2653	Q2SC2653	BJTs NPN		300V .2A 45Mhz
2SC2655	QSC2655	BJTs NPN	Amplifier	50 V 2A
2SC27	Q2SC27	BJTs NPN	Amplifier	25V .1A 200 MHz
2SC2703	QSC2703	BJTs NPN	Amplifier	30 V 1A
2SC2705	QSC2705	BJTs NPN	High Voltage	150 V 50MA
2SC2710	QSC2710	BJTs NPN	Amplifier	30 V .8A
2SC2713	QSC2713	BJTs NPN	Amplifier	30 V .8A
2SC2715	QSC2715	BJTs NPN	Amplifier	30 V 50MA
2SC2738	Q2SC2738	BJTs NPN		400V 2A 11Mhz
2SC2859	QSC2859	BJTs NPN	Switching	30 V .5A
2SC2880	QSC2880	BJTs NPN	High Voltage	150 V 50MA
2SC2912	QSC2912	BJTs NPN	Gen. Purpose	200 V .14A
2SC2923	Q2SC2923	BJTs NPN		300V .1A 60Mhz
2SC3063	Q2SC3063	BJTs NPN		300V .1A 60Mhz
2SC3187	Q2SC3187	BJTs NPN		300V .1A 60Mhz
2SC3329	QSC3329	BJTs NPN	Amplifier	80 V .1A
2SC3381	QSC3381	BJTs NPN	Amplifier	80 V .1A
2SC3423	QSC3423	BJTs NPN	Amplifier	150 V 50mA
2SC3600	Q2SC3600	BJTs NPN	Amplifier	200V .1A 400 MHz
2SC3601	QSC3601	BJTs NPN	Gen. Purpose	200 V .15A
2SC458	QSC458	BJTs NPN	Switching	30V .1A
2SC627F	Q2SC627F	BJTs NPN	Switching	200V .1A 5 MHz
2SC641	QSC641	BJTs NPN	Switching	40V .1A
2SC727	Q2SC727	BJTs NPN	Switching	100V .1A 9 MHz
2SC728	Q2SC728	BJTs NPN	Switching	200V .1A 9 MHz
2SC827	Q2SC827	BJTs NPN	Switching	60V .5A 9 MHz
2SC850	Q2SC850	BJTs NPN	Amplifier	30V .5A 100 MHz
2SC913	Q2SC913	BJTs NPN	Switching	35V .3A 150 MHz
2SC914	Q2SC914	BJTs NPN	Switching	35V .3A 130 MHz
2SC915	Q2SC915	BJTs NPN	Switching	20V .3A 130 MHz
2SC916	Q2SC916	BJTs NPN	Switching	70V 1.5A 130 MHz
2SD756	QSD756	BJTs NPN	Amplifier	120 V 50mA

Small Signal Transistors (NPN) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BC107A	BC107A	BJTs NPN	Gen. Purpose	45V 200mA
BC107BP	BC107BP	BJTs NPN	Zetex	
BC108B	BC108B	BJTs NPN	Gen. Purpose	25V 200mA
BC108BP	BC108BP	BJTs NPN	Zetex	
BC109BP	BC109BP	BJTs NPN	Zetex	
BC109C	BC109C	BJTs NPN	Gen. Purpose	25V 200mA
BC182BP	BC182BP	BJTs NPN	Zetex	
BC183BP	BC183BP	BJTs NPN	Zetex	
BC184BP	BC184BP	BJTs NPN	Zetex	
BC237BP	BC237BP	BJTs NPN	Zetex	
BC238BP	BC238BP	BJTs NPN	Zetex	
BC239BP	BC239BP	BJTs NPN	Zetex	
BC337	BC337	BJTs NPN	Gen. Purpose	45V 500mA
BC337AP	BC337AP	BJTs NPN	Zetex	
BC338	BC338	BJTs NPN	Amplifier	25V 500mA
BC338AP	BC338AP	BJTs NPN	Zetex	
BC368	BC368	BJTs NPN	Gen. Purpose	25V 100mA
BC413BP	BC413BP	BJTs NPN	Zetex	
BC414BP	BC414BP	BJTs NPN	Zetex	
BC546	BC546	BJTs NPN	Gen. Purpose	65V 100mA
BC546BP	BC546BP	BJTs NPN	Zetex	
BC547	BC547	BJTs NPN	Gen. Purpose	45V 100mA
BC547BP	BC547BP	BJTs NPN	Zetex	
BC548	BC548	BJTs NPN	Gen. Purpose	20V 100mA
BC548BP	BC548BP	BJTs NPN	Zetex	
BC549BP	BC549BP	BJTs NPN	Zetex	
BC550	BC550	BJTs NPN	Gen. Purpose	45V 100mA
BC550BP	BC550BP	BJTs NPN	Zetex	
BC635	BC635	BJTs NPN	Amplifier	45V 1A
BC637	BC637	BJTs NPN	Amplifier	60V 1A
BC639	BC639	BJTs NPN	Amplifier	80V 1A
BC817	BC817	BJTs NPN	Amplifier	45V 500mA
BC818	BC818	BJTs NPN	Amplifier	25V 500mA
BC846	BC846	BJTs NPN	Amplifier	65V 100mA
BC846B	BC846B	BJTs NPN	Zetex	
BC847	BC847	BJTs NPN	Amplifier	45V 100mA
BC847B	BC847B	BJTs NPN	Zetex	
BC848	BC848	BJTs NPN	Amplifier	30V 100mA
BC848B	BC848B	BJTs NPN	Zetex	
BC849B	BC849B	BJTs NPN	Zetex	
BC850B	BC850B	BJTs NPN	Zetex	
BCP68	BCP68	BJTs NPN	Gen. Purpose	20V 1A
BCV72	BCV72	BJTs NPN	Zetex	
BCW32	BCW32	BJTs NPN	Zetex	
BCW60C	BCW60C	BJTs NPN	Zetex	
BCW65A	BCW65A	BJTs NPN	Zetex	
BCW66F	BCW66F	BJTs NPN	Zetex	
BCW72	BCW72	BJTs NPN	Zetex	
BCX70G	BCX70G	BJTs NPN	Gen. Purpose	45V 1A
BCX70J	BCX70J	BJTs NPN	Zetex	
BCY58-7	BCY58_7	BJTs NPN	Amplifier	32V .2A
BCY58-8	BCY58_8	BJTs NPN	Amplifier	32V .2A
BCY58-9	BCY58_9	BJTs NPN	Amplifier	32V .2A
BCY59-10	BCY59_10	BJTs NPN	Amplifier	45V .2A
BCY59-7	BCY59_7	BJTs NPN	Amplifier	45V .2A
BCY59-9	BCY59_9	BJTs NPN	Amplifier	45V .2A
BCY59X	BCY59X	BJTs NPN	Amplifier	32V 200mA
BCY65-7	BCY65_7	BJTs NPN	Amplifier	60V .2A
BCY65-8	BCY65_8	BJTs NPN	Amplifier	60V .2A

Small Signal Transistors (NPN) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BCY65-9	BCY65_9	BJTs NPN	Amplifier	60V .2A
BF469S	BF469S	BJTs NPN	Amplifier	250V .03A
BF471S	BF471S	BJTs NPN	Amplifier	300V .03A
BF554	BF554	BJTs NPN	Gen. Purpose	20V 30mA
BFQ31	BFQ31	BJTs NPN	Zetex	
BFS17	BFS17	BJTs NPN	Zetex	
BFS60	BFS60	BJTs NPN	Zetex	
BFY50	BFY50	BJTs NPN	Gen. Purpose	80V 1A
BSR13	BSR13	BJTs NPN	Amplifier	30V .8A
BSR14	BSR14	BJTs NPN	Amplifier	40V .8A
BSV52	BSV52	BJTs NPN	Switching	12V .2A
BSY95A	BSY95A	BJTs NPN	Switching	20V .1A
FCX458	FCX458	BJTs NPN	Zetex	
FCX649	FCX649	BJTs NPN	Zetex	
FMMT489	FMMT489	BJTs NPN	Zetex	
FMMT491A	FMMT491A	BJTs NPN	Zetex	
FMMT5179	FMMT5179	BJTs NPN	Zetex	
FMMT617	FMMT617	BJTs NPN	Zetex	
FMMT618	FMMT618	BJTs NPN	Zetex	
FMMT619	FMMT619	BJTs NPN	Zetex	
FMMT624	FMMT624	BJTs NPN	Zetex	
FMMT625	FMMT625	BJTs NPN	Zetex	
FMMT918	FMMT918	BJTs NPN	Zetex	
FMMTA20	FMMTA20	BJTs NPN	Zetex	
FMMTH10	FMMTH10	BJTs NPN	Zetex	
FZT649	FZT649	BJTs NPN	Zetex	
FZT651	FZT651	BJTs NPN	Zetex	
FZT657	FZT657	BJTs NPN	Zetex	
FZT658	FZT658	BJTs NPN	Zetex	
FZT688B	FZT688B	BJTs NPN	Zetex	
FZT689B	FZT689B	BJTs NPN	Zetex	
FZT690B	FZT690B	BJTs NPN	Zetex	
FZT692B	FZT692B	BJTs NPN	Zetex	
FZT694B	FZT694B	BJTs NPN	Zetex	
FZT696B	FZT696B	BJTs NPN	Zetex	
MPS3903	MPS3903	BJTs NPN	Gen. Purpose	40V 200mA
MPS5179	MPS5179	BJTs NPN	Zetex	
MPSA06	MPSA06	BJTs NPN	Amplifier	80V 500mA
MPSA18	MPSA18	BJTs NPN	Gen. Purpose	45V 200mA
MPSA20	MPSA20	BJTs NPN	Zetex	
MPSA42	MPSA42	BJTs NPN	High Voltage	300V 500mA
MPSA43	MPSA43	BJTs NPN	High Voltage	200V 500mA
MPSA44	MPSA44	BJTs NPN	High Voltage	400V 300mA
MPSA45	MPSA45	BJTs NPN	High Voltage	350V 300mA
MPSH10	MPSH10	BJTs NPN	Zetex	
MPSU06	MPSU06	BJTs NPN	Amplifier	80V 2A
MPSU07	MPSU07	BJTs NPN	Amplifier	100V 2A
MPSW42	MPSW42	BJTs NPN	High Voltage	300V 500mA
MPSW43	MPSW43	BJTs NPN	High Voltage	200V 500mA
ZTX1047A	ZTX1047A	BJTs NPN	Zetex	
ZTX1048A	ZTX1048A	BJTs NPN	Zetex	
ZTX1049A	ZTX1049A	BJTs NPN	Zetex	
ZTX1051A	ZTX1051A	BJTs NPN	Zetex	
ZTX1053A	ZTX1053A	BJTs NPN	Zetex	
ZTX1055A	ZTX1055A	BJTs NPN	Zetex	
ZTX1056A	ZTX1056A	BJTs NPN	Zetex	
ZTX107	ZTX107	BJTs NPN	Zetex	
ZTX107B	ZTX107B	BJTs NPN	Zetex	

Small Signal Transistors (NPN) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
ZTX108	ZTX108	BJTs NPN	Zetex	
ZTX108B	ZTX108B	BJTs NPN	Zetex	
ZTX109	ZTX109	BJTs NPN	Zetex	
ZTX109B	ZTX109B	BJTs NPN	Zetex	
ZTX237	ZTX237	BJTs NPN	Zetex	
ZTX237B	ZTX237B	BJTs NPN	Zetex	
ZTX238	ZTX238	BJTs NPN	Zetex	
ZTX238B	ZTX238B	BJTs NPN	Zetex	
ZTX239	ZTX239	BJTs NPN	Zetex	
ZTX239B	ZTX239B	BJTs NPN	Zetex	
ZTX320	ZTX320	BJTs NPN	Zetex	
ZTX321	ZTX321	BJTs NPN	Zetex	
ZTX325	ZTX325	BJTs NPN	Zetex	
ZTX327	ZTX327	BJTs NPN	Zetex	
ZTX337A	ZTX337A	BJTs NPN	Zetex	
ZTX338A	ZTX338A	BJTs NPN	Zetex	
ZTX450	ZTX450	BJTs NPN	Zetex	
ZTX454	ZTX454	BJTs NPN	Zetex	
ZTX455	ZTX455	BJTs NPN	Zetex	
ZTX458	ZTX458	BJTs NPN	Zetex	
ZTX618	ZTX618	BJTs NPN	Zetex	
ZTX649	ZTX649	BJTs NPN	Zetex	
ZTX650	ZTX650	BJTs NPN	Zetex	
ZTX651	ZTX651	BJTs NPN	Zetex	
ZTX653	ZTX653	BJTs NPN	Zetex	
ZTX657	ZTX657	BJTs NPN	Zetex	
ZTX658	ZTX658	BJTs NPN	Zetex	
ZTX688B	ZTX688B	BJTs NPN	Zetex	
ZTX689B	ZTX689B	BJTs NPN	Zetex	
ZTX690B	ZTX690B	BJTs NPN	Zetex	
ZTX692B	ZTX692B	BJTs NPN	Zetex	
ZTX694B	ZTX694B	BJTs NPN	Zetex	
ZTX696B	ZTX696B	BJTs NPN	Zetex	
ZTX849	ZTX849	BJTs NPN	Zetex	
ZTX851	ZTX851	BJTs NPN	Zetex	
ZTX869	ZTX869	BJTs NPN	Zetex	

Small Signal Transistors (PNP) [323]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N2904	QN2904	BJTs PNP	Gen. Purpose	40V 600mA
2N2904A	QN2904A	BJTs PNP	Gen. Purpose	60V 600mA
2N2905	QN2905	BJTs PNP	Gen. Purpose	40V 600mA
2N2905A	QN2905A	BJTs PNP	Gen. Purpose	60V 600mA
2N2906	QN2906	BJTs PNP	Gen. Purpose	40V 600mA
2N2906A	QN2906A	BJTs PNP	Gen. Purpose	60V 600mA
2N2907	QN2907	BJTs PNP	Gen. Purpose	40V 600mA
2N2907A	QN2907A	BJTs PNP	Gen. Purpose	60V 600mA
2N2955	QN2955	BJTs PNP	Germanium	25V 100mA
2N3135	QN3135	BJTs PNP	Switching	35V 600mA
2N3249	QN3249	BJTs PNP	Switching	12V 100mA
2N3250	QN3250	BJTs PNP	Switching	40V 200mA
2N3250A	QN3250A	BJTs PNP	Switching	60V 200mA
2N3485	QN3485	BJTs PNP	Switching	40V 600mA
2N3485A	QN3485A	BJTs PNP	Switching	60V 600mA
2N3486	QN3486	BJTs PNP	Switching	40V 600mA

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N3486A	QN3486A	BJTs PNP	Switching	60V 600mA
2N3634	QN3634	BJTs PNP	Switching	12V 100mA
2N3636	QN3636	BJTs PNP	Switching	175V 1A
2N3638	QN3638	BJTs PNP	Gen. Purpose	35V 500mA
2N3640	QN3640	BJTs PNP	Switching	15V 100mA
2N3906	QN3906	BJTs PNP	Gen. Purpose	40V 200mA
2N4126	QN4126	BJTs PNP	Amplifier	25V 200mA
2N4209	QN4209	BJTs PNP	Switching	15V 100mA
2N4258	QN4258	BJTs PNP	Switching	12V 100mA
2N4402	QN4402	BJTs PNP	Gen. Purpose	40V 600mA
2N4403	QN4403	BJTs PNP	Gen. Purpose	40V 600mA
2N5086	QN5086	BJTs PNP	Amplifier	50V 50mA
2N5087	QN5087	BJTs PNP	Amplifier	50V 50mA
2N5771	QN5771	BJTs PNP	Switching	15V 50mA
2N6727	QN6727	BJTs PNP	Zetex	
2SA1018	Q2SA1018	BJTs PNP	Amplifier	200V 70MA 40MHz
2SA1049	QSA1049	BJTs PNP	Amplifier	120 V .1A
2SA1080	Q2SA1080	BJTs PNP	Amplifier	40V .5A 30Mhz
2SA1091	QSA1091	BJTs PNP	High Voltage	300 V .1A
2SA1095	QSA1095	BJTs PNP	Amplifier	160 V 15A
2SA1096	Q2SA1096	BJTs PNP	Amplifier	50V 2A 150MHz
2SA1096A	QSA1096A	BJTs PNP	Amplifier	60V 2A 150MHz
2SA1128	Q2SA1128	BJTs PNP	Amplifier	20V .5A 150MHz
2SA1145	QSA1145	BJTs PNP	Amplifier	150 V 50MA
2SA1150	QSA1150	BJTs PNP	Amplifier	30 V .8A
2SA1162	QSA1162	BJTs PNP	Low Noise	50 V .15A
2SA1163	QSA1163	BJTs PNP	High Voltage	120 V .1A
2SA1185	Q2SA1185	BJTs PNP	Amplifier	50V 7A 100MHz
2SA1200	QSA1200	BJTs PNP	High Voltage	150 V 50MA
2SA1210	QSA1210	BJTs PNP	Gen. Purpose	200 V .14A
2SA1213	QSA1213	BJTs PNP	Zetex	
2SA1255	QSA1255	BJTs PNP	High Voltage	200 V 50MA
2SA1316	QSA1316	BJTs PNP	Amplifier	80 V .1A
2SA1349	QSA1349	BJTs PNP	Amplifier	80 V .1A
2SA1360	QSA1360	BJTs PNP	Gen. Purpose	150 V 50mA
2SA1375	Q2SA1375	BJTs PNP	Amplifier	200V 70MA 45MHz
2SA1406	Q2SA1406	BJTs PNP	Amplifier	200V .1A 400 MHz
2SA1407	QSA1407	BJTs PNP	Gen. Purpose	200 V .15A
2SA1498	Q2SA1498	BJTs PNP	Amplifier	400V .6A 20MHz
2SA1499	Q2SA1499	BJTs PNP	Amplifier	400V .6A 19MHz
2SA1500	Q2SA1500	BJTs PNP	Amplifier	400V 5A 15MHz
2SA1501	Q2SA1501	BJTs PNP	Amplifier	400V 5A 14MHz
2SA1512	Q2SA1512	BJTs PNP	Amplifier	20V .5A 150MHz
2SA1531	Q2SA1531	BJTs PNP	Amplifier	55V 50MA 80MHz
2SA1531A	QSA1531A	BJTs PNP	Amplifier	55V 50MA 80MHz
2SA1533	Q2SA1533	BJTs PNP	Amplifier	80V .5A 85MHz
2SA1550	Q2SA1550	BJTs PNP	Amplifier	400V .5A 20MHz
2SA1605	Q2SA1605	BJTs PNP	Amplifier	250V 70MA 45MHz
2SA1614	Q2SA1614	BJTs PNP	Amplifier	400V .5A 20MHz
2SA1674	Q2SA1674	BJTs PNP	Amplifier	80V 1A 100MHz
2SA1698	Q2SA1698	BJTs PNP	Amplifier	200V 70MA 44MHz
2SA1747	Q2SA1747	BJTs PNP	Amplifier	50V 50MA 90MHz
2SA1748	Q2SA1748	BJTs PNP	Amplifier	50V 50MA 92MHz
2SA1762	Q2SA1762	BJTs PNP	Amplifier	80V .5A 85MHz
2SA1767	Q2SA1767	BJTs PNP	Amplifier	300V 70MA 50MHz
2SA580	Q2SA580	BJTs PNP	Amplifier	40V .6A 50Mhz
2SA625	Q2SA625	BJTs PNP	Amplifier	70V .5A 50Mhz
2SA673	QSA673	BJTs PNP	Amplifier	35V .5A

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SA673A	QSA673A	BJTs PNP	Amplifier	50V .5A
2SA673AB	QSA673AB	BJTs PNP	Amplifier	50V .5A
2SA673AC	QSA673AC	BJTs PNP	Amplifier	50B .5A
2SA673AD	QSA673AD	BJTs PNP	Amplifier	50B .5A
2SA683	Q2SA683	BJTs PNP	Amplifier	25V 1A 200MHz
2SA684	Q2SA684	BJTs PNP	Amplifier	50V 1A 200MHz
2SA719	Q2SA719	BJTs PNP	Amplifier	25V .5A 200MHz
2SA720	Q2SA720	BJTs PNP	Amplifier	50V .5A 200MHz
2SA720A	Q2SA720A	BJTs PNP	Amplifier	70V .5A 120MHz
2SA777	Q2SA777	BJTs PNP	Amplifier	80V .5A 120MHz
2SA778AK	QSA778AK	BJTs PNP	Switching	180V .05A
2SA778K	QSA778K	BJTs PNP	Switching	150V .05A
2SA781K	QSA781K	BJTs PNP	Switching	15V .2A
2SA794	Q2SA794	BJTs PNP	Amplifier	100V .5A 120MHz
2SA794A	Q2SA794A	BJTs PNP	Amplifier	120V .5A 120MHz
2SA817A	QSA817A	BJTs PNP	Amplifier	80 V .4A
2SA836	QSA836	BJTs PNP	Amplifier	55V .1A
2SA844C	QSA844C	BJTs PNP	Amplifier	55V .1A
2SA844D	QSA844D	BJTs PNP	Amplifier	55V .1A
2SA844E	QSA844E	BJTs PNP	Amplifier	55V .1A
2SA872AD	QSA872AD	BJTs PNP	Amplifier	120V .05A
2SA872AE	QSA872AE	BJTs PNP	Amplifier	120V .05A
2SA872D	QSA872D	BJTs PNP	Amplifier	90V .05A
2SA872E	QSA872E	BJTs PNP	Amplifier	90V .05A
2SA879	Q2SA879	BJTs PNP	Amplifier	200V 70MA 200MHz
2SA885	Q2SA885	BJTs PNP	Amplifier	35V 1A 200MHz
2SA886	Q2SA886	BJTs PNP	Amplifier	40V 1.5A 150MHz
2SA893AD	QSA893AD	BJTs PNP	Amplifier	120V .05A
2SA893AE	QSA893AE	BJTs PNP	Amplifier	120V .05A
2SA893D	QSA893D	BJTs PNP	Amplifier	90V .05A
2SA893E	QSA893E	BJTs PNP	Amplifier	90V .05A
2SA913	Q2SA913	BJTs PNP	Amplifier	150V 1A 120MHz
2SA913A	Q2SA913A	BJTs PNP	Amplifier	180V 1A 120MHz
2SA914	Q2SA914	BJTs PNP	Amplifier	150V 50MA 65MHz
2SA939	Q2SA939	BJTs PNP	Amplifier	220V 50MA 60Mhz
2SA963	Q2SA963	BJTs PNP	Amplifier	40V 1.5A 150MHz
2SA970	QSA970	BJTs PNP	Amplifier	120 V .1A
2SA970B	QSA970B	BJTs PNP	Amplifier	120 V .1A
2SB1011	Q2SB1011	BJTs PNP	Amplifier	400V .1A 70MHz
2SB1050	Q2SB1050	BJTs PNP	Amplifier	20V 5A 120MHz
2SB1062	Q2SB1062	BJTs PNP	Amplifier	10V .5A 130MHz
2SB1063	Q2SB1063	BJTs PNP	Amplifier	100V 5A 20MHz
2SB1069	Q2SB1069	BJTs PNP	Switching	20V 4A 150MHz
2SB1069A	QSB1069A	BJTs PNP	Switching	40V 4A 150MHz
2SB1070	Q2SB1070	BJTs PNP	Switching	20V 4A 150MHz
2SB1070A	QSB1070A	BJTs PNP	Switching	40V 4A 150MHz
2SB1071	Q2SB1071	BJTs PNP	Switching	20V 4A 150MHz
2SB1071A	QSB1071A	BJTs PNP	Switching	40V 4A 150MHz
2SB1073	Q2SB1073	BJTs PNP	Amplifier	20V 4A 120MHz
2SB1075	Q2SB1075	BJTs PNP	Amplifier	40V 2A 150MHz
2SB1148	Q2SB1148	BJTs PNP	Switching	20V 10A 100MHz
2SB1148A	QSB1148A	BJTs PNP	Switching	40V 10A 100MHz
2SB1206	Q2SB1206	BJTs PNP	Amplifier	25V .1A 150MHz
2SB1207	Q2SB1207	BJTs PNP	Amplifier	10V .5A 130MHz
2SB1209	Q2SB1209	BJTs PNP	Amplifier	400V .1A 70MHz
2SB1218	Q2SB1218	BJTs PNP	Amplifier	25V .1A 80MHz
2SB1218A	QSB1218A	BJTs PNP	Amplifier	45V .1A 80MHz
2SB1219	Q2SB1219	BJTs PNP	Amplifier	25V .5A 200MHz

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SB1219A	QSB1219A	BJTs PNP	Amplifier	50V .5A 200MHz
2SB1220	Q2SB1220	BJTs PNP	Amplifier	150V 50MA 200MHz
2SB1221	Q2SB1221	BJTs PNP	Amplifier	200V 70MA 40MHz
2SB1264	Q2SB1264	BJTs PNP	Amplifier	200V 70MA 40MHz
2SB1288	Q2SB1288	BJTs PNP	Amplifier	20V 5A 120MHz
2SB1297	Q2SB1297	BJTs PNP	Amplifier	120V .5A 250MHz
2SB1319	Q2SB1319	BJTs PNP	Amplifier	20V 5A 120MHz
2SB1320A	QSB1320A	BJTs PNP	Amplifier	50V .1A 80MHz
2SB1321A	QSB1321A	BJTs PNP	Amplifier	50V .5A 200MHz
2SB1322A	QSB1322A	BJTs PNP	Amplifier	50V 1A 200MHz
2SB1376	Q2SB1376	BJTs PNP	Amplifier	50V .1A 80MHz
2SB1377	Q2SB1377	BJTs PNP	Amplifier	50V .5A 200MHz
2SB1378	Q2SB1378	BJTs PNP	Amplifier	20V .5A 150MHz
2SB1413	Q2SB1413	BJTs PNP	Amplifier	25V 1A 170MHz
2SB1414	Q2SB1414	BJTs PNP	Amplifier	180V 1A 200MHz
2SB1437	Q2SB1437	BJTs PNP	Amplifier	100V 1A 50Mhz
2SB1438	Q2SB1438	BJTs PNP	Amplifier	100V 2A 25Mhz
2SB1439	Q2SB1439	BJTs PNP	Amplifier	100V 2A 26Mhz
2SB1440	Q2SB1440	BJTs PNP	Amplifier	50V 2A 80Mhz
2SB1446	Q2SB1446	BJTs PNP	Amplifier	50V 5A 70Mhz
2SB1447	Q2SB1447	BJTs PNP	Amplifier	50V 3A 250Mhz
2SB1456	Q2SB1456	BJTs PNP	Amplifier	150V 1A 120Mhz
2SB1462	Q2SB1462	BJTs PNP	Amplifier	50V .1A 80Mhz
2SB1463	Q2SB1463	BJTs PNP	Amplifier	150V 50MA 200Mhz
2SB1473	Q2SB1473	BJTs PNP	Amplifier	120V .5A 250Mhz
2SB1488	Q2SB1488	BJTs PNP	Amplifier	400V .5A 20Mhz
2SB709	Q2SB709	BJTs PNP	Amplifier	25V .1A 80MHz
2SB709A	Q2SB709A	BJTs PNP	Amplifier	45V .1A 80MHz
2SB716	QSB716	BJTs PNP	Amplifier	120 V 50mA
2SB725	Q2SB725	BJTs PNP	Amplifier	60V .1A 80MHz
2SB767	Q2SB767	BJTs PNP	Amplifier	80V .5A 120MHz
2SB774	Q2SB774	BJTs PNP	Amplifier	25V .1A 150MHz
2SB779	Q2SB779	BJTs PNP	Amplifier	20V .5A 150MHz
2SB789	Q2SB789	BJTs PNP	Amplifier	100V .5A 120MHz
2SB789A	Q2SB789A	BJTs PNP	Amplifier	120V .5A 120MHz
2SB790	Q2SB790	BJTs PNP	Amplifier	20V .5A 150MHz
2SB807	Q2SB807	BJTs PNP	Amplifier	150V 50MA 200MHz
2SB819	Q2SB819	BJTs PNP	Amplifier	40V 1.5A 150MHz
2SB835	Q2SB835	BJTs PNP	Amplifier	18V 1A 200MHz
2SB871	Q2SB871	BJTs PNP	Switching	20V 10A 100MHz
2SB871A	Q2SB871A	BJTs PNP	Switching	40V 10A 100MHz
2SB894	Q2SB894	BJTs PNP	Amplifier	25V .1A 150MHz
2SB896	Q2SB896	BJTs PNP	Switching	20V 10A 150MHz
2SB902	Q2SB902	BJTs PNP	Amplifier	25V .1A 150MHz
2SB925	Q2SB925	BJTs PNP	Switching	20V 7A 150MHz
2SB935A	Q2SB935A	BJTs PNP	Switching	40V 10A 150MHz
2SB936	Q2SB936	BJTs PNP	Switching	20V 10A 100MHz
2SB936A	Q2SB936A	BJTs PNP	Switching	40V 10A 100MHz
2SB943	Q2SB943	BJTs PNP	Switching	80V 3A 30MHz
2SB944	Q2SB944	BJTs PNP	Switching	80V 4A 30MHz
2SB945	Q2SB945	BJTs PNP	Switching	80V 5A 30MHz
2SB946	Q2SB946	BJTs PNP	Switching	80V 7A 30MHz
2SB947	Q2SB947	BJTs PNP	Switching	20V 10A 150MHz
2SB947A	Q2SB947A	BJTs PNP	Switching	40V 10A 150MHz
2SB948	Q2SB948	BJTs PNP	Switching	20V 10A 100MHz
2SB948A	Q2SB948A	BJTs PNP	Switching	40V 10A 100MHz
2SB952	Q2SB952	BJTs PNP	Switching	20V 7A 150MHz
2SB952A	Q2SB952A	BJTs PNP	Switching	40V 7A 150MHz
2SB953	Q2SB953	BJTs PNP	Switching	20V 7A 150MHz

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SB953A	Q2SB953A	BJTs PNP	Switching	40V 7A 150MHz
2SB956	Q2SB956	BJTs PNP	Amplifier	20V 1A 200MHz
2SB968	Q2SB968	BJTs PNP	Amplifier	40V 1.5A 150MHz
2SB970	Q2SB970	BJTs PNP	Amplifier	10V .5A 130MHz
2SB976	Q2SB976	BJTs PNP	Amplifier	18V 5A 120MHz
2SB987	Q2SB987	BJTs PNP	Amplifier	120V .5A 250MHz
BC177AP	BC177AP	BJTs PNP	Zetex	
BC178AP	BC178AP	BJTs PNP	Zetex	
BC212AP	BC212AP	BJTs PNP	Zetex	
BC213AP	BC213AP	BJTs PNP	Zetex	
BC307AP	BC307AP	BJTs PNP	Zetex	
BC308AP	BC308AP	BJTs PNP	Zetex	
BC327	BC327	BJTs PNP	Amplifier	45V 500mA
BC327-16	BC327-16	BJTs PNP	Gen. Purpose	45V 500mA
BC328	BC328	BJTs PNP	Amplifier	25V 800mA
BC328-16	BC328-16	BJTs PNP	Amplifier	25V 800mA
BC369	BC369	BJTs PNP	Gen. Purpose	20V 2A
BC415AP	BC415AP	BJTs PNP	Zetex	
BC416AP	BC416AP	BJTs PNP	Zetex	
BC556	BC556	BJTs PNP	Gen. Purpose	80V .2A
BC556AP	BC556AP	BJTs PNP	Zetex	
BC557	BC557	BJTs PNP	Gen. Purpose	45V 500mA
BC557AP	BC557AP	BJTs PNP	Zetex	
BC558AP	BC558AP	BJTs PNP	Zetex	
BC559AP	BC559AP	BJTs PNP	Zetex	
BC560AP	BC560AP	BJTs PNP	Zetex	
BC856	BC856	BJTs PNP	Amplifier	65V 100mA
BC856A	BC856A	BJTs PNP	Zetex	
BC857	BC857	BJTs PNP	Amplifier	45V 100mA
BC857A	BC857A	BJTs PNP	Zetex	
BC858	BC858	BJTs PNP	Amplifier	30V 100mA
BC858A	BC858A	BJTs PNP	Zetex	
BC859A	BC859A	BJTs PNP	Zetex	
BC860A	BC860A	BJTs PNP	Zetex	
BCF70	BCF70	BJTs PNP	Gen. Purpose	45V 100mA
BCP69	BCP69	BJTs PNP	Gen. Purpose	20V 1A
BCW29	BCW29	BJTs PNP	Zetex	
BCW61A	BCW61A	BJTs PNP	Zetex	
BCW67A	BCW67A	BJTs PNP	Zetex	
BCW68F	BCW68F	BJTs PNP	Zetex	
BCW69	BCW69	BJTs PNP	Zetex	
BCW89	BCW89	BJTs PNP	Zetex	
BCY70	BCY70	BJTs PNP	Gen. Purpose	40V 200mA
BCY71	BCY71	BJTs PNP	Gen. Purpose	45V 200mA
BCY72	BCY72	BJTs PNP	Gen. Purpose	25V 200mA
BCY78-10	BCY78_10	BJTs PNP	Amplifier	32V .2A
BCY78-7	BCY78_7	BJTs PNP	Amplifier	32V .2A
BCY78-8	BCY78_8	BJTs PNP	Amplifier	32V .2A
BCY78-9	BCY78_9	BJTs PNP	Amplifier	32V .2A
BCY79-7	BCY79_7	BJTs PNP	Amplifier	45V .2A
BCY79-8	BCY79_8	BJTs PNP	Amplifier	45V .2A
BCY79-9	BCY79_9	BJTs PNP	Amplifier	45V .2A
BDB02A	BDB02A	BJTs PNP	Gen. Purpose	45V 500mA
BDB02B	BDB02B	BJTs PNP	Gen. Purpose	60V 500mA
BDB02C	BDB02C	BJTs PNP	Gen. Purpose	80V 500mA
BDB02D	BDB02D	BJTs PNP	Gen. Purpose	100V 500mA
BF470S	BF470S	BJTs PNP	Gen. Purpose	250V .03A
BF472S	BF472S	BJTs PNP	Gen. Purpose	300V .03A
BSR15	BSR15	BJTs PNP	Gen. Purpose	40V .6A

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BSR16	BSR16	BJTs PNP	Gen. Purpose	60V .6A
BSV15-10	BSV15_10	BJTs PNP	Gen. Purpose	40V 1A
BSV15-16	BSV15_16	BJTs PNP	Gen. Purpose	40V 1A
BSV15-6	BSV15_6	BJTs PNP	Gen. Purpose	40V 1A
BSV16-10	BSV16_10	BJTs PNP	Gen. Purpose	60V 1A
BSV16-16	BSV16_16	BJTs PNP	Gen. Purpose	60V 1A
BSV16-6	BSV16_6	BJTs PNP	Gen. Purpose	60V 1A
BSV17-10	BSV17_10	BJTs PNP	Gen. Purpose	80V 1A
BSV17-16	BSV17_16	BJTs PNP	Gen. Purpose	80V 1A
BSV17-6	BSV17_6	BJTs PNP	Gen. Purpose	80V 1A
FCX558	FCX558	BJTs PNP	Zetex	
FCX749	FCX749	BJTs PNP	Zetex	
FMMT549	FMMT549	BJTs PNP	Zetex	
FMMT589	FMMT589	BJTs PNP	Zetex	
FMMT591A	FMMT591A	BJTs PNP	Zetex	
FMMT597	FMMT597Q	BJTs PNP	Zetex	
FMMT717	FMMT717	BJTs PNP	Zetex	
FMMT718	FMMT718	BJTs PNP	Zetex	
FMMT720	FMMT720	BJTs PNP	Zetex	
FMMT722	FMMT722	BJTs PNP	Zetex	
FMMT723	FMMT723	BJTs PNP	Zetex	
FMMTA70	FMMTA70	BJTs PNP	Zetex	
FZT749	FZT749	BJTs PNP	Zetex	
FZT751	FZT751	BJTs PNP	Zetex	
FZT757	FZT757	BJTs PNP	Zetex	
FZT758	FZT758	BJTs PNP	Zetex	
FZT788A	FZT788A	BJTs PNP	Zetex	
FZT788B	FZT788B	BJTs PNP	Zetex	
FZT789A	FZT789A	BJTs PNP	Zetex	
FZT790A	FZT790A	BJTs PNP	Zetex	
FZT792A	FZT792A	BJTs PNP	Zetex	
MPS6651	MPS6651	BJTs PNP	Amplifier	25V 1A
MPS6652	MPS6652	BJTs PNP	Amplifier	25V 1A
MPSA55	MPSA55	BJTs PNP	Amplifier	60V 500mA
MPSA56	MPSA56	BJTs PNP	Amplifier	80V .5A
MPSU57	MPSU57	BJTs PNP	Amplifier	100V 2A
MPSW01	MPSW01	BJTs PNP	High Cur.	30V 1A
MPSW55	MPSW55	BJTs PNP	Amplifier	60V 500mA
MPSW56	MPSW56	BJTs PNP	Amplifier	80V 500mA
MPSW92	MPSW92	BJTs PNP	Amplifier	300V 500mA
MPSW93	MPSW93	BJTs PNP	Amplifier	300V 500mA
ZTX212	ZTX212	BJTs PNP	Zetex	
ZTX212A	ZTX212A	BJTs PNP	Zetex	
ZTX213	ZTX213	BJTs PNP	Zetex	
ZTX214	ZTX214	BJTs PNP	Zetex	
ZTX214A	ZTX214A	BJTs PNP	Zetex	
ZTX231A	ZTX231A	BJTs PNP	Zetex	
ZTX549	ZTX549	BJTs PNP	Zetex	
ZTX550	ZTX550	BJTs PNP	Zetex	
ZTX558	ZTX558	BJTs PNP	Zetex	
ZTX718	ZTX718	BJTs PNP	Zetex	
ZTX749	ZTX749	BJTs PNP	Zetex	
ZTX750	ZTX750	BJTs PNP	Zetex	
ZTX751	ZTX751	BJTs PNP	Zetex	
ZTX753	ZTX753	BJTs PNP	Zetex	
ZTX757	ZTX757	BJTs PNP	Zetex	
ZTX758	ZTX758	BJTs PNP	Zetex	
ZTX788A	ZTX788A	BJTs PNP	Zetex	
ZTX788B	ZTX788B	BJTs PNP	Zetex	

Small Signal Transistors (PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
ZTX789A	ZTX789A	BJTs PNP	Zetex	
ZTX790A	ZTX790A	BJTs PNP	Zetex	
ZTX792A	ZTX792A	BJTs PNP	Zetex	
ZTX795A	ZTX795A	BJTs PNP	Zetex	
ZTX796A	ZTX796A	BJTs PNP	Zetex	
ZTX948	ZTX948	BJTs PNP	Zetex	
ZTX949	ZTX949	BJTs PNP	Zetex	
ZTX951	ZTX951	BJTs PNP	Zetex	
ZTX953	ZTX953	BJTs PNP	Zetex	
ZTX955	ZTX955	BJTs PNP	Zetex	
ZTX956	ZTX956	BJTs PNP	Zetex	
ZTX957	ZTX957	BJTs PNP	Zetex	
ZTX958	ZTX958	BJTs PNP	Zetex	
ZTX968	ZTX968	BJTs PNP	Zetex	

Darlington Transistors (NPN/PNP) [77]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N6040	QN6040	BJTs PNP	Darlington	60V 8A
2N6041	QN6041	BJTs PNP	Darlington	80V 8A
2N6042	QN6042	BJTs PNP	Darlington	100V 8A
2N6043	QN6043	BJTs NPN	Darlington	60V 8A
2N6044	QN6044	BJTs NPN	Darlington	80V 8A
2N6045	QN6045	BJTs NPN	Darlington	100V 8A
2N6667	QN6667	BJTs PNP	Darlington	60V 10A
2N6668	QN6668	BJTs PNP	Darlington	80V 10A
BCX38B	BCX38B	BJTs NPN	Darlington	Zetex
BD331	BD331	BJTs NPN	Darlington	60V 6A
BD332	BD332	BJTs PNP	Darlington	60V 6A
BD333	BD333	BJTs NPN	Darlington	80V 6A
BD334	BD334	BJTs PNP	Darlington	80V 6A
BD335	BD335	BJTs NPN	Darlington	100V 6A
BD336	BD336	BJTs PNP	Darlington	100V 6A
BDV64	BDV64	BJTs PNP	Darlington	60V 12A
BDV64A	BDV64A	BJTs PNP	Darlington	80V 12A
BDV64B	BDV64B	BJTs PNP	Darlington	100V 12A
BDV65	BDV65	BJTs NPN	Darlington	60V 12A
BDV65A	BDV65A	BJTs NPN	Darlington	80V 12A
BDV65B	BDV65B	BJTs NPN	Darlington	100V 12A
BDW91	BDW91	BJTs NPN	Darlington	180V 4A
BDW92	BDW92	BJTs PNP	Darlington	180V 4A
BDW93	BDW93	BJTs NPN	Darlington	45V 12A
BDW93A	BDW93A	BJTs NPN	Darlington	60V 12A
BDW93B	BDW93B	BJTs NPN	Darlington	80V 12A
BDW93C	BDW93C	BJTs NPN	Darlington	100V 12A
BDW94	BDW94	BJTs PNP	Darlington	45V 12A
BDW94A	BDW94A	BJTs PNP	Darlington	60V 12A
BDW94B	BDW94B	BJTs PNP	Darlington	80V 12A
BDW94C	BDW94C	BJTs PNP	Darlington	100V 12A
BU323	BU323	BJTs NPN	Darlington	350V 10A
BU323P	BU323P	BJTs NPN	Darlington	200V 50A
BU806	BU806	BJTs NPN	Darlington	200V 8A
BUT50P	BUT50P	BJTs NPN	Darlington	500V 8A
FMMT38B	FMMT38B	BJTs NPN	Darlington	Zetex
FZT604	FZT604	BJTs NPN	Darlington	Zetex
FZT605	FZT605	BJTs NPN	Darlington	Zetex

Darlington Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
FZT705	FZT705	BJTs PNP	Darlington	Zetex
KS621K60	KS621K60	BJTs NPN	Darlington	1000V 600A
KS624540	KS624540	BJTs NPN	Darlington	450V 400A
MJ10005	MJ10005	BJTs NPN	Darlington	400V 20A
MJE340	MJE340	BJTs NPN	Darlington	300V 500mA
MJE350	MJE350	BJTs PNP	Darlington	300V 500mA
MMBTA13	MMBTA13	BJTs NPN	Darlington	30V 300mA
MMBTA14	MMBTA14	BJTs NPN	Darlington	30V 300mA
MPSA13	MPSA13	BJTs NPN	Darlington	30V 500mA
MPSA63	MPSA63	BJTs PNP	Darlington	30V 500mA
TIP100	TIP100	BJTs NPN	Darlington	60V 8A
TIP101	TIP101	BJTs NPN	Darlington	80V 8A
TIP102	TIP102	BJTs NPN	Darlington	100V 8A
TIP105	TIP105	BJTs PNP	Darlington	60V 8A
TIP106	TIP106	BJTs PNP	Darlington	80V 8A
TIP107	TIP107	BJTs PNP	Darlington	100V 8A
TIP110	TIP110	BJTs NPN	Darlington	60V 2A
TIP111	TIP111	BJTs NPN	Darlington	80V 2A
TIP112	TIP112	BJTs NPN	Darlington	100V 2A
TIP115	TIP115	BJTs PNP	Darlington	60V 2A
TIP116	TIP116	BJTs PNP	Darlington	80V 2A
TIP117	TIP117	BJTs PNP	Darlington	100V 2A
TIP120	TIP120	BJTs NPN	Darlington	60V 5A
TIP121	TIP121	BJTs NPN	Darlington	80V 5A
TIP122	TIP122	BJTs NPN	Darlington	100V 5A
TIP125	TIP125	BJTs PNP	Darlington	60V 5A
TIP126	TIP126	BJTs PNP	Darlington	80V 5A
TIP127	TIP127	BJTs PNP	Darlington	100V 5A
TIP140	TIP140	BJTs NPN	Darlington	60V 10A
TIP141	TIP141	BJTs NPN	Darlington	80V 10A
TIP142	TIP142	BJTs NPN	Darlington	100V 10A
TIP145	TIP145	BJTs PNP	Darlington	60V 10A
TIP146	TIP146	BJTs PNP	Darlington	80V 10A
TIP147	TIP147	BJTs PNP	Darlington	100V 10A
ZTX601B	ZTX601B	BJTs NPN	Darlington	Zetex
ZTX604	ZTX604	BJTs NPN	Darlington	Zetex
ZTX605	ZTX605	BJTs NPN	Darlington	Zetex
ZTX704	ZTX704	BJTs PNP	Darlington	Zetex
ZTX705	ZTX705	BJTs PNP	Darlington	Zetex

Power Transistors (NPN/PNP) [326]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N242	QN242	BJTs PNP	Power	35V 5A Germanium
2N3054A	QN3054A	BJTs NPN	Power	55V 4A
2N3055	QN3055	BJTs NPN	Power	60V 15A
2N3447	QN3447	BJTs NPN	Power	60V 7.5A
2N3448	QN3448	BJTs NPN	Power	80V 7.5A
2N3583	QN3583	BJTs NPN	Power	175V 1A
2N3584	QN3584	BJTs NPN	Power	250V 2A
2N3585	QN3585	BJTs NPN	Power	300V 2A
2N3700	QN3700	BJTs NPN	Power	80V 1A
2N3766	QN3766	BJTs NPN	Power	60V 4A
2N3767	QN3767	BJTs NPN	Power	80V 4A

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2N3789	QN3789	BJTs PNP	Power	80V 4A
2N3790	QN3790	BJTs PNP	Power	80V 4A
2N3791	QN3791	BJTs PNP	Power	80V 4A
2N3792	QN3792	BJTs PNP	Power	80V 4A
2N3879	QN3879	BJTs NPN	Power	100V 7A
2N4030	QN4030	BJTs PNP	Power	
2N4233A	QN4233A	BJTs NPN	Power	80V 5A
2N4899	QN4899	BJTs PNP	Power	60V 4A
2N4911	QN4911	BJTs NPN	Power	60V 4A
2N4919	QN4919	BJTs PNP	Power	60V 1A
2N4922	QN4922	BJTs NPN	Power	60V 1A
2N5190	QN5190	BJTs NPN	Power	40V 4A
2N5193	QN5193	BJTs PNP	Power	40V 4A
2N5303	QN5303	BJTs NPN	Power	100V 30A
2N5336	QN5336	BJTs NPN	Power	80V 5A
2N5337	QN5337	BJTs NPN	Power	80V 5A
2N5338	QN5338	BJTs NPN	Power	100V 5A
2N5339	QN5339	BJTs NPN	Power	100V 5A
2N5415	QN5415	BJTs PNP	Power	200V .5A
2N5428	QN5428	BJTs NPN	Power	80V 7A
2N5430	QN5430	BJTs NPN	Power	100V 7A
2N5884	QN5884	BJTs PNP	Power	
2N5886	QN5886	BJTs NPN	Power	
2N6191	QN6191	BJTs PNP	Power	80V 5A
2N6277	QN6277	BJTs NPN	Power	150V 50A
2N6420	QN6420	BJTs PNP	Power	170V 1A
2N6421	QN6421	BJTs PNP	Power	250V 2A
2N6422	QN6422	BJTs PNP	Power	300V 2A
2N6833	QN6833	BJTs NPN	Power	450V 5A
2N6836	QN6836	BJTs NPN	Power	450V 15A
2SA1040	Q2SA1040	BJTs PNP	Power	120V 10A
2SA1041	Q2SA1041	BJTs PNP	Power	120V 15A
2SA1042	Q2SA1042	BJTs PNP	Power	70V 15A
2SA1043	Q2SA1043	BJTs PNP	Power	120V 30A
2SA1044	Q2SA1044	BJTs PNP	Power	70V 30A
2SA1072	Q2SA1072	BJTs PNP	Power	120V 12A
2SA1073	Q2SA1073	BJTs PNP	Power	160V 12A
2SA1077	Q2SA1077	BJTs PNP	Power	120V 10A
2SA1078	Q2SA1078	BJTs PNP	Power	120V 2A
2SA1111	QSA1111	BJTs PNP	Power	150V 1A
2SA1182	QSA1182	BJTs PNP	Power	30 V .5A
2SA1201	QSA1201	BJTs PNP	Power	120 V .8A
2SA1202	QSA1202	BJTs PNP	Power	80 V .4A
2SA1203	QSA1203	BJTs PNP	Power	30 V 1.5A
2SA1204	QSA1204	BJTs PNP	Power	30 V .8A
2SA1232	QSA1232	BJTs PNP	Power	130V 10A
2SA1296	QSA1296	BJTs PNP	Power	20 V 2A
2SA1297	QSA1297	BJTs PNP	Power	20 V 2A
2SA1298	QSA1298	BJTs PNP	Power	25 V .8A
2SA1302	QSA1302	BJTs PNP	Power	200V 15A
2SA1306B	QSA1306B	BJTs PNP	Power	200V 1.5A
2SA968	QSA968	BJTs PNP	Power	160V 1.5A
2SA968B	QSA968B	BJTs PNP	Power	
2SA985A	QSA985A	BJTs PNP	Power	150V 1.5A
2SB1054	Q2SB1054	BJTs PNP	Power	100V 5A 20MHz
2SB1055	Q2SB1055	BJTs PNP	Power	120V 6A 20MHz
2SB1056	Q2SB1056	BJTs PNP	Power	140V 7A 20MHz
2SB1057	Q2SB1057	BJTs PNP	Power	150V 9A 20MHz

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SB1154	Q2SB1154	BJTs PNP	Power	80V 10A 30MHz
2SB1155	Q2SB1155	BJTs PNP	Power	80V 15A 25MHz
2SB1156	Q2SB1156	BJTs PNP	Power	80V 20A 25MHz
2SB1157	Q2SB1157	BJTs PNP	Power	100V 5A
2SB1158	Q2SB1158	BJTs PNP	Power	120V 6A
2SB1159	Q2SB1159	BJTs PNP	Power	140V 7A
2SB1160	Q2SB1160	BJTs PNP	Power	150V 9A
2SB1161	Q2SB1161	BJTs PNP	Power	160V 12A
2SB1162	Q2SB1162	BJTs PNP	Power	160V 12A
2SB1163	Q2SB1163	BJTs PNP	Power	180V 15A
2SB1174	Q2SB1174	BJTs PNP	Power	80V 3A
2SB1175	Q2SB1175	BJTs PNP	Power	80V 4A
2SB1176	Q2SB1176	BJTs PNP	Power	80V 5A
2SB1177	Q2SB1177	BJTs PNP	Power	80V 7A
2SB1190	Q2SB1190	BJTs PNP	Power	150V 1A
2SB1190A	QSB1190A	BJTs PNP	Power	180V 1A
2SB1191	Q2SB1191	BJTs PNP	Power	150V 1A
2SB1191A	QSB1191A	BJTs PNP	Power	180V 1A
2SB1192	Q2SB1192	BJTs PNP	Power	150V 1A
2SB1192A	QSB1192A	BJTs PNP	Power	180V 1A
2SB1233	Q2SB1233	BJTs PNP	Power	150V 1A
2SB1233A	QSB1233A	BJTs PNP	Power	180V 1A
2SB1250	Q2SB1250	BJTs PNP	Power	80V 3A
2SB1251	Q2SB1251	BJTs PNP	Power	90V 4A
2SB1252	Q2SB1252	BJTs PNP	Power	100V 5A
2SB1253	Q2SB1253	BJTs PNP	Power	110V 6A
2SB1254	Q2SB1254	BJTs PNP	Power	140V 7A
2SB1255	Q2SB1255	BJTs PNP	Power	140V 7A
2SB1317	Q2SB1317	BJTs PNP	Power	180V 15A
2SB1347	Q2SB1347	BJTs PNP	Power	160V 12A
2SB1361	Q2SB1361	BJTs PNP	Power	150V 9A
2SB1362	Q2SB1362	BJTs PNP	Power	150V 9A
2SB1371	Q2SB1371	BJTs PNP	Power	120V 6A
2SB1372	Q2SB1372	BJTs PNP	Power	140V 7A
2SB1373	Q2SB1373	BJTs PNP	Power	160V 12A
2SB1393	Q2SB1393	BJTs PNP	Power	60V 3A
2SB1393A	QSB1393A	BJTs PNP	Power	80V 3A
2SB1398	Q2SB1398	BJTs PNP	Power	25V 5A
2SB1417	Q2SB1417	BJTs PNP	Power	60V 3A
2SB1417A	QSB1417A	BJTs PNP	Power	80V 3A
2SB1434	Q2SB1434	BJTs PNP	Power	50V 2A 45Mhz
2SB1464	Q2SB1464	BJTs PNP	Power	60V 8A
2SB1469	Q2SB1469	BJTs PNP	Power	140V 7A
2SB1470	Q2SB1470	BJTs PNP	Power	160V 8A
2SB1490	Q2SB1490	BJTs PNP	Power	140V 7A
2SB713	Q2SB713	BJTs PNP	Power	140V 9A 7MHz
2SB754	QSB754	BJTs PNP	Power	50V 7A
2SB867	Q2SB867	BJTs PNP	Power	80V 3A 30MHz
2SB868	Q2SB868	BJTs PNP	Power	80V 4A 30MHz
2SB869	Q2SB869	BJTs PNP	Power	80V 5A 30MHz
2SB870	Q2SB870	BJTs PNP	Power	80V 7A 30MHz
2SB873	Q2SB873	BJTs PNP	Power	20V 5A 120MHz
2SB906	QSB906	BJTs PNP	Power	60V 3A
2SB931	Q2SB931	BJTs PNP	Power	80V 3A 30MHz
2SB932	Q2SB932	BJTs PNP	Power	80V 4A 30MHz
2SB933	Q2SB933	BJTs PNP	Power	80V 5A 30MHz
2SB934	Q2SB934	BJTs PNP	Power	80V 7A 30MHz
2SB935	Q2SB935	BJTs PNP	Power	20V 10A 150MHz

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
2SB967	Q2SB967	BJTs PNP	Power	18V 5A 120MHz
2SC2238	QSC2238	BJTs NPN	Power	160V 1.5A
2SC2238B	QSC2238B	BJTs NPN	Power	
2SC2275A	QSC2275A	BJTs NPN	Power	150V 1.5A
2SC2356	Q2SC2356	BJTs NPN	Power	400V 10A
2SC2359	Q2SC2359	BJTs NPN	Power	400V 4A
2SC2366	Q2SC2366	BJTs NPN	Power	400V 40A
2SC2427	Q2SC2427	BJTs NPN	Power	400V 7A
2SC2428	Q2SC2428	BJTs NPN	Power	180V 12A
2SC2429	Q2SC2429	BJTs NPN	Power	400V 15A
2SC2430	Q2SC2430	BJTs NPN	Power	120V 10A
2SC2431	Q2SC2431	BJTs NPN	Power	120V 15A
2SC2432	Q2SC2432	BJTs NPN	Power	70V 15A
2SC2433	Q2SC2433	BJTs NPN	Power	120V 30A
2SC2434	Q2SC2434	BJTs NPN	Power	70V 30A
2SC2500	QSC2500	BJTs NPN	Power	30 V 2A
2SC2739	Q2SC2739	BJTs NPN	Power	400V 7A
2SC2740	Q2SC2740	BJTs NPN	Power	400V 10A
2SC2831	Q2SC2831	BJTs NPN	Power	500V 1.5A
2SC2832	Q2SC2832	BJTs NPN	Power	500V 5A
2SC2834	Q2SC2834	BJTs NPN	Power	500V 7A
2SC2841	Q2SC2841	BJTs NPN	Power	400V 7A
2SC2873	QSC2873	BJTs NPN	Power	50 V 2A
2SC2881	QSC2881	BJTs NPN	Power	120 V .8A
2SC2882	QSC2882	BJTs NPN	Power	80 V .4A
2SC2883	QSC2883	BJTs NPN	Power	30 V 1.5A
2SC2884	QSC2884	BJTs NPN	Power	30 V .8A
2SC3012	QSC3012	BJTs NPN	Power	130V 10A
2SC3169	Q2SC3169	BJTs NPN	Power	400V 2A
2SC3170	Q2SC3170	BJTs NPN	Power	400V 7A
2SC3171	Q2SC3171	BJTs NPN	Power	400V 10A
2SC3210	Q2SC3210	BJTs NPN	Power	400V 10A
2SC3211	Q2SC3211	BJTs NPN	Power	500V 5A
2SC3212	Q2SC3212	BJTs NPN	Power	500V 7A
2SC3281	QSC3281	BJTs NPN	Power	200V 15A
2SC3285	Q2SC3285	BJTs NPN	Power	800V 3A
2SC3298B	QSC3298B	BJTs NPN	Power	200V 1.5A
2SC3506	Q2SC3506	BJTs NPN	Power	800V 3A
2SC3507	Q2SC3507	BJTs NPN	Power	800V 5A
2SC3527	Q2SC3527	BJTs NPN	Power	400V 15A
2SC3528	Q2SC3528	BJTs NPN	Power	400V 20A
2SC3577	Q2SC3577	BJTs NPN	Power	650V 5A
2SC3842	Q2SC3842	BJTs NPN	Power	400V 10A
2SC3843	Q2SC3843	BJTs NPN	Power	450V 10A
2SC3844	Q2SC3844	BJTs NPN	Power	450V 15A
2SC3845	Q2SC3845	BJTs NPN	Power	800V 3A
2SC3846	Q2SC3846	BJTs NPN	Power	800V 6A
2SC3847	Q2SC3847	BJTs NPN	Power	800V 10A
2SD1035	Q2SD1035	BJTs NPN	Power	120V 3A
2SD1036	Q2SD1036	BJTs NPN	Power	120V 15A
2SD1037	Q2SD1037	BJTs NPN	Power	120V 30A
2SD1038	Q2SD1038	BJTs NPN	Power	120V 40A
2SD1039	Q2SD1039	BJTs NPN	Power	120V 3A
2SD1040	Q2SD1040	BJTs NPN	Power	120V 15A
2SD1041	Q2SD1041	BJTs NPN	Power	120V 30A
2SD1042	Q2SD1042	BJTs NPN	Power	120V 40A
2SD1221	QSD1221	BJTs NPN	Power	60V 3A
2SD844	QSD844	BJTs NPN	Power	50V 7A

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BD135	BD135	BJTs NPN	Power	45V 1.5A
BD136	BD136	BJTs PNP	Power	45V 1.5A
BD137	BD137	BJTs NPN	Power	60V 1.5A
BD138	BD138	BJTs PNP	Power	60V 1.5A
BD139	BD139	BJTs NPN	Power	80V 1.5A
BD140	BD140	BJTs PNP	Power	80V 1.5A
BD175-10	BD175_10	BJTs NPN	Power	45V 3A
BD175-16	BD175_16	BJTs NPN	Power	45V 3A
BD175-6	BD175_6	BJTs NPN	Power	45V 3A
BD176-10	BD176_10	BJTs PNP	Power	45V 3A
BD176-6	BD176_6	BJTs PNP	Power	45V 3A
BD177-10	BD177_10	BJTs NPN	Power	60V 3A
BD177-6	BD177_6	BJTs NPN	Power	60V 3A
BD178-10	BD178_10	BJTs PNP	Power	60V 3A
BD178-6	BD178_6	BJTs PNP	Power	60V 3A
BD179-10	BD179_10	BJTs NPN	Power	80V 3A
BD179-6	BD179_6	BJTs NPN	Power	80V 3A
BD180-10	BD180_10	BJTs PNP	Power	80V 3A
BD180-6	BD180_6	BJTs PNP	Power	80V 3A
BD233	BD233	BJTs NPN	Power	45V 2A
BD234	BD234	BJTs PNP	Power	45V 2A
BD235	BD235	BJTs NPN	Power	60V 2A
BD236	BD236	BJTs PNP	Power	60V 2A
BD237	BD237	BJTs NPN	Power	100V 2A
BD238	BD238	BJTs PNP	Power	100V 2A
BD905	BD905	BJTs NPN	Power	40V 15A
BDW51	BDW51	BJTs NPN	Power	45V 15A
BDW51A	BDW51A	BJTs NPN	Power	60V 15A
BDW51B	BDW51B	BJTs NPN	Power	80V 15A
BDW51C	BDW51C	BJTs NPN	Power	100V 15A
BDW52	BDW52	BJTs PNP	Power	45V 15A
BDW52A	BDW52A	BJTs PNP	Power	60V 15A
BDW52B	BDW52B	BJTs PNP	Power	80V 15A
BDW52C	BDW52C	BJTs PNP	Power	100V 15A
BSW67	BSW67	BJTs NPN	Power	120V 2A
BSW68	BSW68	BJTs NPN	Power	150V 2A
BU208D	BU208D	BJTs NPN	Power	1500V 8A
BU326	BU326	BJTs NPN	Power	375V 6A
BU406D	BU406D	BJTs NPN	Power	200V 7A
BUT92A	BUT92A	BJTs NPN	Power	300V 50A
BUX21	BUX21	BJTs NPN	Power	200V 7A
MJ13330	MJ13330	BJTs NPN	Power	200V 20A
MJ13333	MJ13333	BJTs NPN	Power	400V 20A
MJ14000	MJ14000	BJTs NPN	Power	60V 60A
MJ14001	MJ14001	BJTs PNP	Power	60V 60A
MJ14002	MJ14002	BJTs NPN	Power	80V 60A
MJ14003	MJ14003	BJTs PNP	Power	80V 60A
MJ15001	MJ15001	BJTs NPN	Power	140V 15A
MJ15002	MJ15002	BJTs PNP	Power	140V 15A
MJ15003	MJ15003	BJTs NPN	Power	140V 20A
MJ15004	MJ15004	BJTs PNP	Power	140V 20A
MJ15022	MJ15022	BJTs NPN	Power	200V 16A
MJ15023	MJ15023	BJTs PNP	Power	200V 16A
MJ2955	MJ2955	BJTs PNP	Power	60V 15A
MJE15028	MJE15028	BJTs NPN	Power	120V 8A
MJE15029	MJE15029	BJTs PNP	Power	120V 8A
MJE15030	MJE15030	BJTs NPN	Power	150V 8A
MJE15031	MJE15031	BJTs PNP	Power	150V 8A

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
TIP29	TIP29	BJTs NPN	Power	40V 1A
TIP2955	TIP2955	BJTs PNP	Power	60V 15A
TIP29B	TIP29B	BJTs NPN	Power	80V 1A
TIP29C	TIP29C	BJTs NPN	Power	100V 1A
TIP29D	TIP29D	BJTs NPN	Power	120V 1A
TIP29E	TIP29E	BJTs NPN	Power	140V 1A
TIP29F	TIP29F	BJTs NPN	Power	160V 1A
TIP30	TIP30	BJTs PNP	Power	40V 1A
TIP3055	TIP3055	BJTs NPN	Power	60V 15A
TIP30A	TIP30A	BJTs PNP	Power	60V 1A
TIP30B	TIP30B	BJTs PNP	Power	80V 1A
TIP30C	TIP30C	BJTs PNP	Power	100V 1A
TIP30D	TIP30D	BJTs PNP	Power	120V 1A
TIP30E	TIP30E	BJTs PNP	Power	140V 1A
TIP30F	TIP30F	BJTs PNP	Power	160V 1A
TIP31	TIP31	BJTs NPN	Power	40V 3A
TIP31A	TIP31A	BJTs NPN	Power	60V 3A
TIP31B	TIP31B	BJTs NPN	Power	80V 3A
TIP31C	TIP31C	BJTs NPN	Power	100V 3A
TIP31D	TIP31D	BJTs NPN	Power	120V 3A
TIP31E	TIP31E	BJTs NPN	Power	140V 3A
TIP31F	TIP31F	BJTs NPN	Power	160V 3A
TIP32	TIP32	BJTs PNP	Power	40V 3A
TIP32A	TIP32A	BJTs PNP	Power	60V 3A
TIP32B	TIP32B	BJTs PNP	Power	80V 3A
TIP32C	TIP32C	BJTs PNP	Power	100V 3A
TIP32D	TIP32D	BJTs PNP	Power	120V 3A
TIP32E	TIP32E	BJTs PNP	Power	140V 3A
TIP32F	TIP32F	BJTs PNP	Power	160V 3A
TIP33	TIP33	BJTs NPN	Power	40V 10A
TIP33A	TIP33A	BJTs NPN	Power	60V 10A
TIP33B	TIP33B	BJTs NPN	Power	80V 10A
TIP33C	TIP33C	BJTs NPN	Power	100V 10A
TIP33D	TIP33D	BJTs NPN	Power	120V 10A
TIP33E	TIP33E	BJTs NPN	Power	140V 10A
TIP33F	TIP33F	BJTs NPN	Power	160V 10A
TIP34	TIP34	BJTs PNP	Power	40V 10A
TIP34A	TIP34A	BJTs PNP	Power	60V 10A
TIP34B	TIP34B	BJTs PNP	Power	80V 10A
TIP34C	TIP34C	BJTs PNP	Power	100V 10A
TIP34D	TIP34D	BJTs PNP	Power	120V 10A
TIP34E	TIP34E	BJTs PNP	Power	140V 10A
TIP34F	TIP34F	BJTs PNP	Power	160V 10A
TIP35	TIP35	BJTs NPN	Power	80V 25A
TIP35A	TIP35A	BJTs NPN	Power	60V 25A
TIP35B	TIP35B	BJTs NPN	Power	80V 25A
TIP35C	TIP35C	BJTs NPN	Power	100V 25A
TIP35D	TIP35D	BJTs NPN	Power	120V 25A
TIP35E	TIP35E	BJTs NPN	Power	140V 25A
TIP35F	TIP35F	BJTs NPN	Power	160V 25A
TIP36	TIP36	BJTs PNP	Power	80V 25A
TIP36A	TIP36A	BJTs PNP	Power	60V 25A
TIP36B	TIP36B	BJTs PNP	Power	80V 25A
TIP36C	TIP36C	BJTs PNP	Power	100V 25A
TIP36D	TIP36D	BJTs PNP	Power	120V 25A
TIP36E	TIP36E	BJTs PNP	Power	140V 25A
TIP36F	TIP36F	BJTs PNP	Power	160V 25A
TIP41	TIP41	BJTs NPN	Power	40V 6A

Power Transistors (NPN/PNP) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
TIP41A	TIP41A	BJTs NPN	Power	60V 6A
TIP41B	TIP41B	BJTs NPN	Power	80V 6A
TIP41C	TIP41C	BJTs NPN	Power	100V 6A
TIP41D	TIP41D	BJTs NPN	Power	120V 6A
TIP41E	TIP41E	BJTs NPN	Power	140V 6A
TIP41F	TIP41F	BJTs NPN	Power	160V 6A
TIP42	TIP42	BJTs PNP	Power	40V 6A
TIP42A	TIP42A	BJTs PNP	Power	60V 6A
TIP42B	TIP42B	BJTs PNP	Power	80V 6A
TIP42C	TIP42C	BJTs PNP	Power	100V 6A
TIP42D	TIP42D	BJTs PNP	Power	120V 6A
TIP42E	TIP42E	BJTs PNP	Power	140V 6A
TIP42F	TIP42F	BJTs PNP	Power	160V 6A
TIP47	TIP47	BJTs NPN	Power	250V 1A
TIP48	TIP48	BJTs PNP	Power	300V 1A
TIP49	TIP49	BJTs NPN	Power	350V 1A
TIP50	TIP50	BJTs PNP	Power	400V 1A
TIP51	TIP51	BJTs NPN	Power	250V 3A
TIP52	TIP52	BJTs NPN	Power	300V 3A
TIP53	TIP53	BJTs NPN	Power	350V 3A
TIP54	TIP54	BJTs NPN	Power	400V 3A
TIP55A	TIP55A	BJTs NPN	Power	250V 7.5A
TIP56A	TIP56A	BJTs NPN	Power	300V 7.5A
TIP57A	TIP57A	BJTs NPN	Power	350V 7.5A
TIP58A	TIP58A	BJTs NPN	Power	400V 7.5A

RF Devices

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]

RF Bipolar Transistors (459)

Part #	Part Name	Part Type	Part Sub Type	Description
TIP41A	TIP41A	BJTs NPN	Power	60V 6A
2N2857	QN2857	BJTs NPN	RF	6V 1.5mA
2N4957	QN4957	BJTs PNP	RF	10V 2mA
2N5109	QN5109	BJTs NPN	RF	15V 35mA
2N5179RF	QN5179RF	BJTs NPN	RF	6V 5mA
2N5944	QN5944	BJTs NPN	RF	Class C
2N6304	QN6304	BJTs NPN	RF	10V 10mA
2N6305	QN6305	BJTs NPN	RF	10V 10mA
2N6604	QN6604	BJTs NPN	RF	10V 10mA
2N6618	QN6618	BJTs NPN	RF	10V 3mA
2N6679	QN6679	BJTs NPN	RF	15V 25mA
2SC710	Q2SC710	BJTs NPN	RF	25V 30MA 125 MHz
AT42070	AT42070	BJTs NPN	RF	8V 35mA
AT64020	AT64020	BJTs NPN	RF	16V 110mA
AT64023	AT64023	BJTs NPN	RF	16V 110mA
BC327S	BC327S	BJTs PNP	RF	Siemens
BC328S	BC328S	BJTs PNP	RF	Siemens
BC337S	BC337S	BJTs NPN	RF	Siemens
BC338S	BC338S	BJTs NPN	RF	Siemens
BC368S	BC368S	BJTs NPN	RF	Siemens
BC369S	BC369S	BJTs PNP	RF	Siemens
BC635S	BC635S	BJTs NPN	RF	Siemens
BC636S	BC636S	BJTs PNP	RF	Siemens
BC637S	BC637S	BJTs NPN	RF	Siemens
BC638S	BC638S	BJTs PNP	RF	Siemens
BC639S	BC639S	BJTs NPN	RF	Siemens
BC640S	BC640S	BJTs PNP	RF	Siemens
BC807S	BC807S	BJTs PNP	RF	Siemens
BC808S	BC808S	BJTs PNP	RF	Siemens
BC817S	BC817S	BJTs NPN	RF	Siemens
BC818S	BC818S	BJTs NPN	RF	Siemens
BC846S	BC846S	BJTs NPN	RF	Siemens
BC847S	BC847S	BJTs NPN	RF	Siemens
BC848S	BC848S	BJTs NPN	RF	Siemens
BC849S	BC849S	BJTs NPN	RF	Siemens
BC850S	BC850S	BJTs NPN	RF	Siemens
BC856S	BC856S	BJTs PNP	RF	Siemens
BC857S	BC857S	BJTs PNP	RF	Siemens
BC858S	BC858S	BJTs PNP	RF	Siemens
BC859S	BC859S	BJTs PNP	RF	Siemens
BC860S	BC860S	BJTs PNP	RF	Siemens
BCP51S	BCP51S	BJTs PNP	RF	Siemens
BCP52S	BCP52S	BJTs PNP	RF	Siemens
BCP53S	BCP53S	BJTs PNP	RF	Siemens
BCP54S	BCP54S	BJTs NPN	RF	Siemens
BCP55S	BCP55S	BJTs NPN	RF	Siemens
BCP68S	BCP68S	BJTs NPN	RF	Siemens
BCP69S	BCP69S	BJTs PNP	RF	Siemens
BCV61PS	BCV61PS	BJTs PNP	RF	Siemens
BCV61S	BCV61S	BJTs NPN	RF	Siemens
BCW60S	BCW60S	BJTs NPN	RF	Siemens
BCW61S	BCW61S	BJTs PNP	RF	Siemens
BCW65S	BCW65S	BJTs NPN	RF	Siemens
BCW66S	BCW66S	BJTs NPN	RF	Siemens
BCW68S	BCW68S	BJTs PNP	RF	Siemens
BCX41S	BCX41S	BJTs NPN	RF	Siemens

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BCX42S	BCX42S	BJTs PNP	RF	Siemens
BCX51S	BCX51S	BJTs PNP	RF	Siemens
BCX52S	BCX52S	BJTs PNP	RF	Siemens
BCX53S	BCX53S	BJTs PNP	RF	Siemens
BCX54S	BCX54S	BJTs NPN	RF	Siemens
BCX55S	BCX55S	BJTs NPN	RF	Siemens
BCX56S	BCX56S	BJTs NPN	RF	Siemens
BCX58PS	BCX58PS	BJTs PNP	RF	Siemens
BCX58S	BCX58S	BJTs NPN	RF	Siemens
BCX59PS	BCX59PS	BJTs PNP	RF	Siemens
BCX59S	BCX59S	BJTs NPN	RF	Siemens
BCX68S	BCX68S	BJTs NPN	RF	Siemens
BCX69S	BCX69S	BJTs PNP	RF	Siemens
BCX70S	BCX70S	BJTs NPN	RF	Siemens
BCX71S	BCX71S	BJTs PNP	RF	Siemens
BF420S	BF420S	BJTs NPN	RF	Siemens
BF421S	BF421S	BJTs PNP	RF	Siemens
BF422S	BF422S	BJTs NPN	RF	Siemens
BF423S	BF423S	BJTs PNP	RF	Siemens
BF430	BF430	BJTs NPN	RF	10V 10mA
BF433	BF433	BJTs NPN	RF	10V 50mA
BF603S	BF603S	BJTs PNP	RF	Siemens
BF622S	BF622S	BJTs NPN	RF	Siemens
BF623S	BF623S	BJTs PNP	RF	Siemens
BF720S	BF720S	BJTs NPN	RF	Siemens
BF721S	BF721S	BJTs PNP	RF	Siemens
BF722S	BF722S	BJTs NPN	RF	Siemens
BF723S	BF723S	BJTs PNP	RF	Siemens
BF799S	BF799S	BJTs NPN	RF	Siemens
BF799WS	BF799WS	BJTs NPN	RF	Siemens
BFG134	BFG134	BJTs NPN	RF	SOT103
BFG135	BFG135	BJTs NPN	RF	SOT223A
BFG135AS	BFG135AS	BJTs NPN	RF	Siemens
BFG193S	BFG193S	BJTs NPN	RF	Siemens
BFG194S	BFG194S	BJTs PNP	RF	Siemens
BFG195	BFG195	BJTs NPN	RF	SOT103
BFG196S	BFG196S	BJTs NPN	RF	Siemens
BFG197	BFG197	BJTs NPN	RF	SOT143
BFG197X	BFG197X	BJTs NPN	RF	SOT143X
BFG197XR	BFG197XR	BJTs NPN	RF	SOT143XR
BFG198	BFG198	BJTs NPN	RF	8V 50mA
BFG19S	BFG19S	BJTs NPN	RF	10V 50mA
BFG19SS	BFG19SS	BJTs NPN	RF	Siemens
BFG23	BFG23	BJTs PNP	RF	SOT103
BFG235S	BFG235S	BJTs NPN	RF	Siemens
BFG25AX	BFG25AX	BJTs NPN	RF	SOT143X
BFG31	BFG31	BJTs PNP	RF	SOT223C
BFG32	BFG32	BJTs PNP	RF	SOT103
BFG33	BFG33	BJTs NPN	RF	SOT143
BFG33X	BFG33X	BJTs NPN	RF	SOT143X
BFG34	BFG34	BJTs NPN	RF	SOT103
BFG35	BFG35	BJTs NPN	RF	SOT223C
BFG505	BFG505	BJTs NPN	RF	SOT143
BFG505X	BFG505X	BJTs NPN	RF	SOT143X
BFG505XR	BFG505XR	BJTs NPN	RF	SOT143XR
BFG51	BFG51	BJTs PNP	RF	SOT103
BFG520	BFG520	BJTs NPN	RF	SOT143
BFG520X	BFG520X	BJTs NPN	RF	SOT143X

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BFG520XR	BFG520XR	BJTs NPN	RF	SOT143XR
BFG540	BFG540	BJTs NPN	RF	SOT143
BFG540X	BFG540X	BJTs NPN	RF	SOT143X
BFG540XR	BFG540XR	BJTs NPN	RF	SOT143XR
BFG541	BFG541	BJTs NPN	RF	SOT223A
BFG65	BFG65	BJTs NPN	RF	SOT103
BFG67	BFG67	BJTs NPN	RF	SOT143
BFG67R	BFG67R	BJTs NPN	RF	SOT143R
BFG67X	BFG67X	BJTs NPN	RF	SOT143X
BFG67XR	BFG67XR	BJTs NPN	RF	SOT143XR
BFG90A	BFG90A	BJTs NPN	RF	SOT103
BFG91A	BFG91A	BJTs NPN	RF	SOT103
BFG92A	BFG92A	BJTs NPN	RF	SOT143
BFG92AX	BFG92AX	BJTs NPN	RF	SOT143X
BFG92AXR	BFG92AXR	BJTs NPN	RF	SOT143XR
BFG93A	BFG93A	BJTs NPN	RF	SOT143
BFG93AX	BFG93AX	BJTs NPN	RF	SOT143X
BFG93AXR	BFG93AXR	BJTs NPN	RF	SOT143XR
BFG94	BFG94	BJTs NPN	RF	SOT223C
BFG96	BFG96	BJTs NPN	RF	SOT103
BFG97	BFG97	BJTs NPN	RF	10V 50mA
BFN16S	BFN16S	BJTs NPN	RF	Siemens
BFN17S	BFN17S	BJTs PNP	RF	Siemens
BFN18S	BFN18S	BJTs NPN	RF	Siemens
BFN19S	BFN19S	BJTs PNP	RF	Siemens
BFN21S	BFN21S	BJTs PNP	RF	Siemens
BFN22S	BFN22S	BJTs NPN	RF	Siemens
BFN23S	BFN23S	BJTs PNP	RF	Siemens
BFN24S	BFN24S	BJTs NPN	RF	Siemens
BFN25S	BFN25S	BJTs PNP	RF	Siemens
BFN26S	BFN26S	BJTs NPN	RF	Siemens
BFN27S	BFN27S	BJTs PNP	RF	Siemens
BFN36S	BFN36S	BJTs NPN	RF	Siemens
BFN37S	BFN37S	BJTs PNP	RF	Siemens
BFN39S	BFN39S	BJTs PNP	RF	Siemens
BFP22S	BFP22S	BJTs NPN	RF	Siemens
BFP23S	BFP23S	BJTs PNP	RF	Siemens
BFP25S	BFP25S	BJTs NPN	RF	Siemens
BFP26S	BFP26S	BJTs PNP	RF	Siemens
BSS63S	BSS63S	BJTs PNP	RF	Siemens
BSS64S	BSS64S	BJTs PNP	RF	Siemens
BSS79S	BSS79S	BJTs NPN	RF	Siemens
BSS80S	BSS80S	BJTs NPN	RF	Siemens
BSS81S	BSS81S	BJTs NPN	RF	Siemens
BSS82S	BSS82S	BJTs NPN	RF	Siemens
BFP136WS	BFP136WS	BJTs NPN	RF	Siemens
BFP180S	BFP180S	BJTs NPN	RF	Siemens
BFP180WS	BFP180WS	BJTs NPN	RF	Siemens
BFP181S	BFP181S	BJTs NPN	RF	Siemens
BFP181WS	BFP181WS	BJTs NPN	RF	Siemens
BFP182S	BFP182S	BJTs NPN	RF	Siemens
BFP182WS	BFP182WS	BJTs NPN	RF	Siemens
BFP183S	BFP183S	BJTs NPN	RF	Siemens
BFP183WS	BFP183WS	BJTs NPN	RF	Siemens
BFP193S	BFP193S	BJTs NPN	RF	Siemens
BFP193WS	BFP193WS	BJTs NPN	RF	Siemens
BFP194S	BFP194S	BJTs PNP	RF	Siemens
BFP196S	BFP196S	BJTs NPN	RF	Siemens

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BFP196WS	BFP196WS	BJTs NPN	RF	Siemens
BFP280S	BFP280S	BJTs NPN	RF	Siemens
BFP280WS	BFP280WS	BJTs NPN	RF	Siemens
BFP405S	BFP405S	BJTs NPN	RF	Siemens
BFP420S	BFP420S	BJTs NPN	RF	Siemens
BFP450S	BFP450S	BJTs NPN	RF	Siemens
BFP490S	BFP490S	BJTs NPN	RF	Siemens
BFP81S	BFP81S	BJTs NPN	RF	Siemens
BFP90A	BFP90A	BJTs NPN	RF	SOT173
BFP91A	BFP91A	BJTs NPN	RF	SOT173
BFP93AS	BFP93AS	BJTs NPN	RF	Siemens
BFP96	BFP96	BJTs NPN	RF	SOT173
BFQ135	BFQ135	BJTs NPN	RF	ST172A2A
BFQ162	BFQ162	BJTs NPN	RF	SOT32C (TO126)
BFQ163	BFQ163	BJTs NPN	RF	SOT5C (TO39)
BFQ166	BFQ166	BJTs NPN	RF	SOT223A
BFQ23	BFQ23	BJTs PNP	RF	SOT37
BFQ232	BFQ232	BJTs NPN	RF	SOT32A (TO126)
BFQ233	BFQ233	BJTs NPN	RF	SOT5A (TO39)
BFQ236	BFQ236	BJTs NPN	RF	SOT223A
BFQ23C	BFQ23C	BJTs PNP	RF	SOT173
BFQ252	BFQ252	BJTs PNP	RF	SOT32A (TO126)
BFQ253	BFQ253	BJTs PNP	RF	SOT5A (TO39)
BFQ256	BFQ256	BJTs PNP	RF	SOT223A
BFQ262	BFQ262	BJTs NPN	RF	SOT32B (TO126)
BFQ263	BFQ263	BJTs NPN	RF	SOT5B (TO39)
BFQ270	BFQ270	BJTs NPN	RF	ST172A2D
BFQ32	BFQ32	BJTs PNP	RF	SOT37
BFQ32C	BFQ32C	BJTs PNP	RF	SOT173
BFQ33C	BFQ33C	BJTs NPN	RF	SOT173
BFQ34T	BFQ34T	BJTs NPN	RF	SOT37
BFQ51	BFQ51	BJTs PNP	RF	10V 10mA
BFQ51C	BFQ51C	BJTs PNP	RF	SOT173
BFQ65	BFQ65	BJTs NPN	RF	SOT37
BFQ66	BFQ66	BJTs NPN	RF	SOT173
BFQ67	BFQ67	BJTs NPN	RF	SOT23
BFQ67W	BFQ67W	BJTs NPN	RF	SOT323
BFQ81S	BFQ81S	BJTs NPN	RF	Siemens
BFR106	BFR106	BJTs NPN	RF	SOT23
BFR106S	BFR106S	BJTs NPN	RF	Siemens
BFR134	BFR134	BJTs NPN	RF	SOT37
BFR180S	BFR180S	BJTs NPN	RF	Siemens
BFR180WS	BFR180WS	BJTs NPN	RF	Siemens
BFR181S	BFR181S	BJTs NPN	RF	Siemens
BFR181WS	BFR181WS	BJTs NPN	RF	Siemens
BFR182S	BFR182S	BJTs NPN	RF	Siemens
BFR182WS	BFR182WS	BJTs NPN	RF	Siemens
BFR183S	BFR183S	BJTs NPN	RF	Siemens
BFR183WS	BFR183WS	BJTs NPN	RF	Siemens
BFR193S	BFR193S	BJTs NPN	RF	Siemens
BFR193WS	BFR193WS	BJTs NPN	RF	Siemens
BFR194S	BFR194S	BJTs PNP	RF	Siemens
BFR280S	BFR280S	BJTs NPN	RF	Siemens
BFR280WS	BFR280WS	BJTs NPN	RF	Siemens
BFR35APS	BFR35APS	BJTs NPN	RF	Siemens
BFR505	BFR505	BJTs NPN	RF	SOT23
BFR520	BFR520	BJTs NPN	RF	SOT23
BFR521	BFR521	BJTs NPN	RF	SOT37

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
BFR540	BFR540	BJTs NPN	RF	SOT23
BFR541	BFR541	BJTs NPN	RF	SOT37
BFR90	BFR90	BJTs NPN	RF	10V 10mA
BFR90A	BFR90A	BJTs NPN	RF	SOT37
BFR91	BFR91	BJTs NPN	RF	10V 10mA
BFR91A	BFR91A	BJTs NPN	RF	SOT37
BFR92A	BFR92A	BJTs NPN	RF	SOT23
BFR92AW	BFR92AW	BJTs NPN	RF	SOT323
BFR92PS	BFR92PS	BJTs NPN	RF	Siemens
BFR92WS	BFR92WS	BJTs NPN	RF	Siemens
BFR93	BFR93	BJTs NPN	RF	8V 20mA
BFR93A	BFR93A	BJTs NPN	RF	SOT23
BFR93AS	BFR93AS	BJTs NPN	RF	Siemens
BFR93AW	BFR93AW	BJTs NPN	RF	SOT323
BFR93AWS	BFR93AWS	BJTs NPN	RF	Siemens
BFR96	BFR96	BJTs NPN	RF	10V 25mA
BFR96S	BFR96S	BJTs NPN	RF	SOT37
BFS17PS	BFS17PS	BJTs NPN	RF	Siemens
BFS17SS	BFS17SS	BJTs NPN	RF	Siemens
BFS17WS	BFS17WS	BJTs NPN	RF	Siemens
BFS25A	BFS25A	BJTs NPN	RF	SOT323
BFS480S	BFS480S	BJTs NPN	RF	Siemens
BFS481S	BFS481S	BJTs NPN	RF	Siemens
BFS482S	BFS482S	BJTs NPN	RF	Siemens
BFS483S	BFS483S	BJTs NPN	RF	Siemens
BFS505	BFS505	BJTs NPN	RF	SOT323
BFS520	BFS520	BJTs NPN	RF	SOT323
BFS540	BFS540	BJTs NPN	RF	SOT323
BFT25A	BFT25A	BJTs NPN	RF	SOT23
BFT92	BFT92	BJTs PNP	RF	SOT23
BFT92S	BFT92S	BJTs PNP	RF	Siemens
BFT92W	BFT92W	BJTs PNP	RF	SOT323
BFT92WS	BFT92WS	BJTs PNP	RF	Siemens
BFT93	BFT93	BJTs PNP	RF	SOT23
BFT93S	BFT93S	BJTs PNP	RF	Siemens
BFT93W	BFT93W	BJTs PNP	RF	SOT323
BFX89	BFX89	BJTs NPN	RF	10V 10mA
BFY90	BFY90	BJTs NPN	RF	10V 10mA
BLT50	BLT50	BJTs NPN	RF	SOT223C
BPF81	BPF81	BJTs NPN	RF	6V 10mA
DMBR571M	DMBR571M	BJTs NPN	RF	Gen. Purp.
DMBR901	DMBR901	BJTs NPN	RF	Gen. Purp.
DMBR931	DMBR931	BJTs NPN	RF	Gen. Purp.
DMBR941M	DMBR941M	BJTs NPN	RF	Gen. Purp.
DMBR951M	DMBR951M	BJTs NPN	RF	Gen. Purp.
DMMBR521	DMMBR521	BJTs NPN	RF	Gen. Purp.
DMRF5711M	DMRF5711M	BJTs NPN	RF	Gen. Purp.
DMRF5812M	DMRF5812M	BJTs NPN	RF	Gen. Purp.
DMRF9011	DMRF9011	BJTs NPN	RF	Gen. Purp.
DMRF9411M	DMRF9411M	BJTs NPN	RF	Gen. Purp.
DMRF947	DMRF947	BJTs NPN	RF	Gen. Purp.
DMRF9511	DMRF9511	BJTs NPN	RF	Gen. Purp.
HP00500	HP00500	BJTs NPN	RF	Gen. Purp.
HP00510	HP00510	BJTs NPN	RF	Gen. Purp.
HP00511	HP00511	BJTs NPN	RF	Gen. Purp.
HP00535	HP00535	BJTs NPN	RF	Gen. Purp.
HP00570	HP00570	BJTs NPN	RF	Gen. Purp.
HP01600	HP01600	BJTs NPN	RF	Gen. Purp.

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
HP01610	HP01610	BJTs NPN	RF	Gen. Purp.
HP01635	HP01635	BJTs NPN	RF	Gen. Purp.
HP01670	HP01670	BJTs NPN	RF	Gen. Purp.
HP21400	HP21400	BJTs NPN	RF	Oscillator
HP41400	HP41400	BJTs NPN	RF	Low Noise
HP41410	HP41410	BJTs NPN	RF	Low Noise
HP41411	HP41411	BJTs NPN	RF	Low Noise
HP41435	HP41435	BJTs NPN	RF	Low Noise
HP41470	HP41470	BJTs NPN	RF	Low Noise
HP41485	HP41485	BJTs NPN	RF	Low Noise
HP41486	HP41486	BJTs NPN	RF	Low Noise
HP42000	HP42000	BJTs NPN	RF	Med. Power
HP42010	HP42010	BJTs NPN	RF	Med. Power
HP42035	HP42035	BJTs NPN	RF	Med. Power
HP42070	HP42070	BJTs NPN	RF	Med. Power
HP42085	HP42085	BJTs NPN	RF	Med. Power
HP42086	HP42086	BJTs NPN	RF	Med. Power
HP60100	HP60100	BJTs NPN	RF	Low Noise
HP60111	HP60111	BJTs NPN	RF	Low Noise
HP60200	HP60200	BJTs NPN	RF	Low Noise
HP60211	HP60211	BJTs NPN	RF	Low Noise
HP60500	HP60500	BJTs NPN	RF	Low Noise
HP60510	HP60510	BJTs NPN	RF	Low Noise
HP60535	HP60535	BJTs NPN	RF	Low Noise
HP60570	HP60570	BJTs NPN	RF	Low Noise
HP60585	HP60585	BJTs NPN	RF	Low Noise
HP60586	HP60586	BJTs NPN	RF	Low Noise
HP64000	HP64000	BJTs NPN	RF	Linear Power
HP64020	HP64020	BJTs NPN	RF	Linear Power
HP64023	HP64023	BJTs NPN	RF	Linear Power
HXTR3102	HXTR3102	BJTs NPN	RF	15V 30mA
HXTR5104	HXTR5104	BJTs NPN	RF	18V 110mA
LT1001	LT1001	BJTs NPN	RF	8V 50mA
MFR406	MFR406	BJTs NPN	RF	Class C
MM4049	MM4049	BJTs PNP	RF	10V 10mA
MMBR521	MMBR521	BJTs NPN	RF	15W 870MegHz
MMBR536	MMBR536	BJTs PNP	RF	10V 10mA
MMBR571	MMBR571	BJTs NPN	RF	5V 50mA
MMBR571M	MMBR571M	BJTs NPN	RF	15W 870MegHz
MMBR901	MMBR901	BJTs NPN	RF	15W 870MegHz
MMBR911	MMBR911	BJTs NPN	RF	10V 20mA
MMBR931	MMBR931	BJTs NPN	RF	15W 870MegHz
MMBR941	MMBR941	BJTs NPN	RF	6V 15mA
MMBR941M	MMBR941M	BJTs NPN	RF	15W 870MegHz
MMBR951	MMBR951	BJTs NPN	RF	6V 30mA
MMBR951M	MMBR951M	BJTs NPN	RF	15W 870MegHz
MPSA42S	MPSA42S	BJTs NPN	RF	Siemens
MPSA43S	MPSA43S	BJTs NPN	RF	Siemens
MPSA92S	MPSA92S	BJTs PNP	RF	Siemens
MPSA93S	MPSA93S	BJTs PNP	RF	Siemens
MRF2369	MRF2369	BJTs NPN	RF	10V 10mA
MRF3866	MRF3866	BJTs NPN	RF	Class C 15V 50mA
MRF450	MRF450	BJTs NPN	RF	Class C
MRF492	MRF492	BJTs NPN	RF	Class C
MRF521	MRF521	BJTs PNP	RF	8V 50mA
MRF5211	MRF5211	BJTs PNP	RF	8V 50mA
MRF536	MRF536	BJTs PNP	RF	10V 10mA
MRF544	MRF544	BJTs NPN	RF	10V 25mA/25V 100mA

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
MRF545	MRF545	BJTs PNP	RF	10V 25mA/25V 100mA
MRF559	MRF559	BJTs NPN	RF	10V 50mA
MRF571	MRF571	BJTs NPN	RF	8V 50mA
MRF5711	MRF5711	BJTs NPN	RF	8V 80mA
MRF5711M	MRF5711M	BJTs NPN	RF	15W 870MegHz
MRF581	MRF581	BJTs NPN	RF	10V 100mA
MRF5812	MRF5812	BJTs NPN	RF	10V 50mA
MRF5812M	MRF5812M	BJTs NPN	RF	15W 870MegHz
MRF873	MRF873	BJTs NPN	RF	15W 870MegHz
MRF901	MRF901	BJTs NPN	RF	5V 5mA
MRF9011	MRF9011	BJTs NPN	RF	15W 870MegHz
MRF911	MRF911	BJTs NPN	RF	10V 10mA
MRF914	MRF914	BJTs NPN	RF	10V 10mA
MRF9331	MRF9331	BJTs NPN	RF	5V 1mA
MRF941	MRF941	BJTs NPN	RF	6V 15mA
MRF9411	MRF9411	BJTs NPN	RF	6V 15mA
MRF9411M	MRF9411M	BJTs NPN	RF	15W 870MegHz
MRF947	MRF947	BJTs NPN	RF	15W 870MegHz
MRF951	MRF951	BJTs NPN	RF	6V 30mA
MRF9511	MRF9511	BJTs NPN	RF	6V 30mA
MRF9511m	MRF9511m	BJTs NPN	RF	15W 870MegHz
MRF961	MRF961	BJTs NPN	RF	10V 25mA
MRF962	MRF962	BJTs NPN	RF	10V 25mA
MRF965	MRF965	BJTs NPN	RF	10V 25mA
NE21935	NE21935	BJTs NPN	RF	8V 5mA
NE22120	NE22120	BJTs NPN	RF	15V 100mA
NE32700	NE32700	BJTs NPN	RF	
NE46100	NE46100	BJTs NPN	RF	
NE46134	NE46134	BJTs NPN	RF	NEC
NE46314	NE46314	BJTs NPN	RF	5V 50mA
NE59335	NE59335	BJTs PNP	RF	
NE64700	NE64700	BJTs NPN	RF	8V 10mA
NE68000	NE68000	BJTs NPN	RF	NEC
NE68018	NE68018	BJTs NPN	RF	NEC
NE68019	NE68019	BJTs NPN	RF	NEC
NE68019D	NE68019D	BJTs NPN	RF	NEC
NE68030	NE68030	BJTs NPN	RF	NEC
NE68033	NE68033	BJTs NPN	RF	NEC
NE68100	NE68100	BJTs NPN	RF	8V 7mA
NE74000	NE74000	BJTs NPN	RF	
NE68118	NE68118	BJTs NPN	RF	NEC
NE68119	NE68119	BJTs NPN	RF	NEC
NE68130	NE68130	BJTs NPN	RF	NEC
NE68133	NE68133	BJTs NPN	RF	NEC
NE68139	NE68139	BJTs NPN	RF	NEC
NE68518	NE68518	BJTs NPN	RF	NEC
NE68519	NE68519	BJTs NPN	RF	NEC
NE68530	NE68530	BJTs NPN	RF	NEC
NE68533	NE68533	BJTs NPN	RF	NEC
NE68539	NE68539	BJTs NPN	RF	NEC
NE68618	NE68618	BJTs NPN	RF	NEC
NE68619	NE68619	BJTs NPN	RF	NEC
NE68630	NE68630	BJTs NPN	RF	NEC
NE68718	NE68718	BJTs NPN	RF	NEC
NE68719	NE68719	BJTs NPN	RF	NEC
NE68730	NE68730	BJTs NPN	RF	NEC
NE68800	NE68800	BJTs NPN	RF	NEC
NE68819	NE68819	BJTs NPN	RF	NEC

RF Devices (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Col., Base, Emit.]
NE68830	NE68830	BJTs NPN	RF	NEC
NE85600	NE85600	BJTs NPN	RF	NEC
NE85618	NE85618	BJTs NPN	RF	NEC
NE85619	NE85619	BJTs NPN	RF	NEC
NE85630	NE85630	BJTs NPN	RF	NEC
NE85633	NE85633	BJTs NPN	RF	10V 7mA/10V 30mA
NE85634	NE85634	BJTs NPN	RF	NEC
NE85639	NE85639	BJTs NPN	RF	NEC
NE901	NE901	BJTs PNP	RF	
NE94430	NE94430	BJTs NPN	RF	NEC
NE94433	NE94433	BJTs NPN	RF	NEC
PZT2222AS	PZT2222AS	BJTs NPN	RF	Siemens
PZT2222S	PZT2222S	BJTs NPN	RF	Siemens
PZT2907AS	PZT2907AS	BJTs NPN	RF	Siemens
PZT2907S	PZT2907S	BJTs NPN	RF	Siemens
PZT3904S	PZT3904S	BJTs NPN	RF	Siemens
PZT3906S	PZT3906S	BJTs PNP	RF	Siemens
PZT43S	PZT43S	BJTs NPN	RF	Siemens
PZTA42S	PZTA42S	BJTs NPN	RF	Siemens
PZTA92S	PZTA92S	BJTs PNP	RF	Siemens
PZTA93S	PZTA93S	BJTs PNP	RF	Siemens
SMBT2222AS	SMBT2222AS	BJTs NPN	RF	Siemens
SMBT2907AS	SMBT2907AS	BJTs NPN	RF	Siemens
SMBT2907S	SMBT2907S	BJTs NPN	RF	Siemens
SMBT3903S	SMBT3903S	BJTs NPN	RF	Siemens
SMBT3904S	SMBT3904S	BJTs NPN	RF	Siemens
SMBT3906S	SMBT3906S	BJTs PNP	RF	Siemens
SMBT4124S	SMBT4124S	BJTs NPN	RF	Siemens
SMBT4126S	SMBT4126S	BJTs PNP	RF	Siemens
SMBT4401S	SMBT4401S	BJTs NPN	RF	Siemens
SMBT4403S	SMBT4403S	BJTs NPN	RF	Siemens
SMBT5086S	SMBT5086S	BJTs PNP	RF	Siemens
SMBT5087S	SMBT5087S	BJTs PNP	RF	Siemens
SMBT6428S	SMBT6428S	BJTs NPN	RF	Siemens
SMBT6429S	SMBT6429S	BJTs NPN	RF	Siemens
SMBTA05S	SMBTA05S	BJTs NPN	RF	Siemens
SMBTA06S	SMBTA06S	BJTs NPN	RF	Siemens
SMBTA20S	SMBTA20S	BJTs NPN	RF	Siemens
SMBTA42S	SMBTA42S	BJTs NPN	RF	Siemens
SMBTA43S	SMBTA43S	BJTs NPN	RF	Siemens
SMBTA55S	SMBTA55S	BJTs PNP	RF	Siemens
SMBTA56S	SMBTA56S	BJTs PNP	RF	Siemens
SMBTA70S	SMBTA70S	BJTs PNP	RF	Siemens
SMBTA92S	SMBTA92S	BJTs PNP	RF	Siemens
SMBTA93S	SMBTA93S	BJTs PNP	RF	Siemens
SXT2222AS	SXT2222AS	BJTs NPN	RF	Siemens
SXT2907AS	SXT2907AS	BJTs NPN	RF	Siemens
SXT3904S	SXT3904S	BJTs NPN	RF	Siemens
SXT3906S	SXT3906S	BJTs PNP	RF	Siemens
SXTA42S	SXTA42S	BJTs NPN	RF	Siemens
SXTA43S	SXTA43S	BJTs NPN	RF	Siemens
SXTA92S	SXTA92S	BJTs PNP	RF	Siemens
SXTA93S	SXTA93S	BJTs PNP	RF	Siemens
TRW52001	TRW52001	BJTs NPN	RF	20V 220mA
UPA800T	UPA800T	BJTs NPN	RF	NEC

Transistors were matched to published S parameter data.

RF Devices (cont'd)

MMICs (56)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Output, Input, GND]
MSA0100	MSA0100	MMICs	H-P	Gen. Purp.
MSA0104	MSA0104	MMICs	H-P	Gen. Purp.
MSA0135	MSA0135	MMICs	H-P	Gen. Purp.
MSA0170	MSA0170	MMICs	H-P	Gen. Purp.
MSA0185	MSA0185	MMICs	H-P	Gen. Purp.
MSA0186	MSA0186	MMICs	H-P	Gen. Purp.
MSA0200	MSA0200	MMICs	H-P	Gen. Purp.
MSA0204	MSA0204	MMICs	H-P	Gen. Purp.
MSA0235	MSA0235	MMICs	H-P	Gen. Purp.
MSA0270	MSA0270	MMICs	H-P	Gen. Purp.
MSA0285	MSA0285	MMICs	H-P	Gen. Purp.
MSA0286	MSA0286	MMICs	H-P	Gen. Purp.
MSA0300	MSA0300	MMICs	H-P	Gen. Purp.
MSA0304	MSA0304	MMICs	H-P	Gen. Purp.
MSA0311	MSA0311	MMICs	H-P	Gen. Purp.
MSA0335	MSA0335	MMICs	H-P	Gen. Purp.
MSA0370	MSA0370	MMICs	H-P	Gen. Purp.
MSA0385	MSA0385	MMICs	H-P	Gen. Purp.
MSA0386	MSA0386	MMICs	H-P	Gen. Purp.
MSA0400	MSA0400	MMICs	H-P	Med. Power
MSA0404	MSA0404	MMICs	H-P	Med. Power
MSA0420	MSA0420	MMICs	H-P	Med. Power
MSA0435	MSA0435	MMICs	H-P	Med. Power
MSA0470	MSA0470	MMICs	H-P	Med. Power
MSA0485	MSA0485	MMICs	H-P	Med. Power
MSA0486	MSA0486	MMICs	H-P	Med. Power
MSA0500	MSA0500	MMICs	H-P	Med. Power
MSA0504	MSA0504	MMICs	H-P	Med. Power
MSA0505	MSA0505	MMICs	H-P	Med. Power
MSA0520	MSA0520	MMICs	H-P	Med. Power
MSA0600	MSA0600	MMICs	H-P	Low Noise
MSA0611	MSA0611	MMICs	H-P	Low Noise
MSA0635	MSA0635	MMICs	H-P	Low Noise
MSA0670	MSA0670	MMICs	H-P	Low Noise
MSA0685	MSA0685	MMICs	H-P	Low Noise
MSA0686	MSA0686	MMICs	H-P	Low Noise
MSA0700	MSA0700	MMICs	H-P	Low Noise
MSA0711	MSA0711	MMICs	H-P	Low Noise
MSA0735	MSA0735	MMICs	H-P	Low Noise
MSA0770	MSA0770	MMICs	H-P	Low Noise
MSA0785	MSA0785	MMICs	H-P	Low Noise
MSA0786	MSA0786	MMICs	H-P	Low Noise
MSA0800	MSA0800	MMICs	H-P	Low Noise
MSA0835	MSA0835	MMICs	H-P	Low Noise
MSA0870	MSA0870	MMICs	H-P	Low Noise
MSA0885	MSA0885	MMICs	H-P	Low Noise
MSA0886	MSA0886	MMICs	H-P	Low Noise
MSA0900	MSA0900	MMICs	H-P	High Freq.
MSA0910	MSA0910	MMICs	H-P	High Freq.
MSA0986	MSA0986	MMICs	H-P	High Freq.
MSA1000	MSA1000	MMICs	H-P	Med. Power
MSA1100	MSA1100	MMICs	H-P	High Dyn.
MSA1104	MSA1104	MMICs	H-P	High Dyn.
MSA1105	MSA1105	MMICs	H-P	High Dyn.
MSA1110	MSA1110	MMICs	H-P	High Dyn.
MSA1120	MSA1120	MMICs	H-P	High Dyn.

GaAs MESFETs [27]

ATF10100	ATF10100	GaAs MESFETs	N Channel	Low Noise
ATF10170	ATF10170	GaAs MESFETs	N Channel	Low Noise
ATF10700	ATF10700	GaAs MESFETs	N Channel	Low Noise
ATF13100	ATF13100	GaAs MESFETs	N Channel	Low Noise
ATF13300	ATF13300	GaAs MESFETs	N Channel	Low Noise
ATF13700	ATF13700	GaAs MESFETs	N Channel	Low Noise
ATF21100	ATF21100	GaAs MESFETs	N Channel	Gen. Purp.
ATF21170	ATF21170	GaAs MESFETs	N Channel	3V 20mA
ATF25100	ATF25100	GaAs MESFETs	N Channel	Low Noise
ATF25170	ATF25170	GaAs MESFETs	N Channel	Low Noise
ATF26100	ATF26100	GaAs MESFETs	N Channel	Gen. Purp.
ATF26150	ATF26150	GaAs MESFETs	N Channel	Gen. Purp.
ATF35076	ATF35076	GaAs MESFETs	N Channel	Low Noise
ATF35X00	ATF35X00	GaAs MESFETs	N Channel	Low Noise
ATF44100	ATF44100	GaAs MESFETs	N Channel	Med. Power
ATF44101	ATF44101	GaAs MESFETs	N Channel	Med. Power
ATF45100	ATF45100	GaAs MESFETs	N Channel	Med. Power
ATF45101	ATF45101	GaAs MESFETs	N Channel	Med. Power
ATF45171	ATF45171	GaAs MESFETs	N Channel	Med. Power
ATF46100	ATF46100	GaAs MESFETs	N Channel	Med. Power
ATF46101	ATF46101	GaAs MESFETs	N Channel	Med. Power
ATF46171	ATF46171	GaAs MESFETs	N Channel	Med. Power
CFY19	CFY19	GaAs MESFETs	N Channel	3.5V 30mA
CFY30	CFY30	GaAs MESFETs	N Channel	3.5V 15mA
NE71000	NE71000	GaAs MESFETs	N Channel	VDS=3V, IDS=30mA
NE76000	NE76000	GaAs MESFETs	N Channel	VDS=3V, IDS=10mA
NEC985	NEC985	GaAs MESFETs	N Channel	VDS=3V, IDS=30mA

PIN Diodes [6]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: Anode, Cathode]
1N5719	DN5719	Diodes	PIN	H-P
1N5767	DN5767	Diodes	PIN	Alpha
BAR17	BAR17	Diodes	PIN	Siemens
HP3810	HP3810	Diodes	PIN	H-P
ND6271-5E	ND62715E	Diodes	PIN	NEC
UM4000	UM4000	Diodes	PIN	Unitrode

Couplers [1]

COUPLER   Ideal: AC and Transient   [Connections: In, Out, Forward, Reverse]

RF Devices (cont'd)

RF FETs (33)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2N4416RF	JN4416RF	JFETs N	RF	15V 10mA
MRF136	MRF136	MOSFETs N	RF	28V 500mA Power
F1007	F1007		RF	
F1008	F1008		RF	
F1020	F1020		RF	
F1021	F1021		RF	
F1022	F1022		RF	
F1027	F1027		RF	
F1072	F1072		RF	
F1074	F1074		RF	
F1120	F1120		RF	
F1174	F1174		RF	
F1214	F1214		RF	
F1240	F1240		RF	
F1260	F1260		RF	
F2001	F2001		RF	
F2002	F2002		RF	
F2012	F2012		RF	
F2021	F2021		RF	
F2201S	F2201S		RF	
F2202S	F2202S		RF	
L88007	L88007		RF	
L88008	L88008		RF	
L8808112V	L8808112V		RF	
L88012	L88012		RF	
L88013	L88013		RF	
L88016	L88016		RF	
L88026	L88026		RF	
L88081	L88081		RF	
L88082	L88082		RF	
L88083	L88083		RF	
P121	P121		RF	
P123	P123		RF	

RF Beads (14)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: Plus, Minus]
2743001112	B1112	RF Beads		Bead on a lead
2743003112	B3112	RF Beads		Bead on a lead
2743004112	B4112	RF Beads		Bead on a lead
2743005112	B5112	RF Beads		Bead on a lead
2743007112	B7112	RF Beads		Bead on a lead
2743008112	B8112	RF Beads		Bead on a lead
2743009112	B9112	RF Beads		Bead on a lead
2743015112	B15112	RF Beads		Bead on a lead
2743019447	B9447	RF Beads		Surface Mount
2743021447	B1447	RF Beads		Surface Mount
2943666651	B6651	RF Beads		Wound Bead
2943666661	B6661	RF Beads		Wound Bead
2943666671	B6671	RF Beads		Wound Bead
2943777741	B7741	RF Beads		Wound Bead

JFETs

(N-Channel) [136]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2N4119	JN4119	JFETs N	Amplifier	40V 50mA, High Input Imp.
2N4119A	JN4119A	JFETs N	Amplifier	40V 50mA, High Input Imp.
BF245A	BF245A	JFETs N	Amplifier	30V 10mA
BF245B	BF245B	JFETs N	Amplifier	30V 10mA
BF245C	BF245C	JFETs N	Amplifier	30V 10mA
BFT46	BFT46	JFETs N	Amplifier	25V 10mA
BFW61	BFW61	JFETs N	Amplifier	25V 20mA
2N4091	JN4091	JFETs N	Analog Switch	40V 10mA, Low Ron
2N4092	JN4092	JFETs N	Analog Switch	40V 10mA, Low Ron
2N4093	JN4093	JFETs N	Analog Switch	40V 10mA, Low Ron
2N4391	JN4391	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4392	JN4392	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4393	JN4393	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4856	JN4856	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4857	JN4857	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4858	JN4858	JFETs N	Analog Switch	40V 50mA, Low Ron
2N4859	JN4859	JFETs N	Analog Switch	30V 50mA, Low Ron
2N4860	JN4860	JFETs N	Analog Switch	30V 50mA, Low Ron
2N4861	JN4861	JFETs N	Analog Switch	30V 50mA, Low Ron
2N5638	J2N5638	JFETs N	Analog Switch	30V 50mA
2N5639	J2N5639	JFETs N	Analog Switch	30V 50mA
BF246A	BF246A	JFETs N	Analog Switch	45V 65mA
BSJ108	BSJ108	JFETs N	Analog Switch	25V 50mA
BSJ109	BSJ109	JFETs N	Analog Switch	25V 50mA
BSJ110	BSJ110	JFETs N	Analog Switch	25V 10mA
BSR56	BSR56	JFETs N	Analog Switch	40V 50mA
BSR57	BSR57	JFETs N	Analog Switch	40V 20mA
BSR58	BSR58	JFETs N	Analog Switch	40V 8mA
BSV78	BSV78	JFETs N	Analog Switch	40V 50mA
BSV79	BSV79	JFETs N	Analog Switch	40V 20mA
BSV80	BSV80	JFETs N	Analog Switch	40V 10mA
J105	J105	JFETs N	Analog Switch	25V 50mA, Low Ron
J106	J106	JFETs N	Analog Switch	25V 50mA, Low Ron
J107	J107	JFETs N	Analog Switch	25V 50mA, Low Ron
J108	J108	JFETs N	Analog Switch	25V 50mA, Low Ron
J109	J109	JFETs N	Analog Switch	25V 50mA, Low Ron
J110	J110	JFETs N	Analog Switch	25V 50mA, Low Ron
J110A	J110A	JFETs N	Analog Switch	25V 50mA, Low Ron
J111	J111	JFETs N	Analog Switch	40V 20mA
J112	J112	JFETs N	Analog Switch	40V 5mA
J113	J113	JFETs N	Analog Switch	40V 2mA
PMBF4391	PMBF4391	JFETs N	Analog Switch	40V 50mA
PMBF4392	PMBF4392	JFETs N	Analog Switch	40V 50mA
PMBF4393	PMBF4393	JFETs N	Analog Switch	40V 50mA
PMBFJ108	PMBFJ108	JFETs N	Analog Switch	25V 50mA
PMBFJ109	PMBFJ109	JFETs N	Analog Switch	25V 50mA
PMBFJ110	PMBFJ110	JFETs N	Analog Switch	25V 10mA
PMBFJ111	PMBFJ111	JFETs N	Analog Switch	45V 20mA
PMBFJ112	PMBFJ112	JFETs N	Analog Switch	40V 5mA
PMBFJ113	PMBFJ113	JFETs N	Analog Switch	40V 2mA
PN4391	PN4391	JFETs N	Analog Switch	40V 50mA
PN4392	PN4392	JFETs N	Analog Switch	40V 50mA
PN4393	PN4393	JFETs N	Analog Switch	40V 50mA
PZFJ108	PZFJ108	JFETs N	Analog Switch	25V 5mA
PZFJ109	PZFJ109	JFETs N	Analog Switch	25V 5mA
PZFJ110	PZFJ110	JFETs N	Analog Switch	25V 10mA

JFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
BC264A	BC264A	JFETs N	Audio	30V 12mA
BC264B	BC264B	JFETs N	Audio	30V 12mA
BC264C	BC264C	JFETs N	Audio	30V 12mA
BC264D	BC264D	JFETs N	Audio	30V 12mA
2N5197	JN5197	JFETs N	Diff. Amp.	50V 50mA
2N5515	JN5515	JFETs N	Diff. Amp.	40V 10mA
BFQ10	BFQ10	JFETs N	Diff. Amp.	20V 10mA
M5911	M5911	JFETs N	Diff. Amp.	25V 50mA
U421	U421	JFETs N	Diff. Amp.	40V 10mA
U430	U430	JFETs N	Diff. Amp.	25V 10mA
2N4220	JN4220	JFETs N	Gen. Purpose	30V 10mA, Low Leakage
2N4221	JN4221	JFETs N	Gen. Purpose	30V 10mA, Low Leakage
2N4222	JN4222	JFETs N	Gen. Purpose	30V 10mA, Low Leakage
2N5457	JN5457	JFETs N	Gen. Purpose	25V 10mA
2N5458	JN5458	JFETs N	Gen. Purpose	25V 10mA
2N5459	JN5459	JFETs N	Gen. Purpose	25V 10mA
2SK117	J2SK117	JFETs N	Gen. Purpose	50V 20MA 35.3Ohm
2SK118	J2SK118	JFETs N	Gen. Purpose	50V 20MA 35.3Ohm
2SK147	J2SK147	JFETs N	Gen. Purpose	40V 20MA 35.3Ohm
2SK170	J2SK170	JFETs N	Gen. Purpose	40V 20MA 35.3Ohm
2SK184	J2SK184	JFETs N	Gen. Purpose	50V 20MA 35.3Ohm
2SK246	QSK246	JFETs N	Gen. Purpose	50V 10mA
2SK30	QSK30	JFETs N	Gen. Purpose	50V 10mA
2SK30AGR	QSK30AGR	JFETs N	Gen. Purpose	50 V 20mA
2SK330	J2SK330	JFETs N	Gen. Purpose	50V 20MA 320Ohm
2SK362	J2SK362	JFETs N	Gen. Purpose	50V 20MA 80Ohm
2SK389	QSK389	JFETs N	Gen. Purpose	50V 10mA
2SK389BL	QSK389BL	JFETs N	Gen. Purpose	25V 20mA
BF545A	BF545A	JFETs N	Gen. Purpose	
BF545B	BF545B	JFETs N	Gen. Purpose	
BF545C	BF545C	JFETs N	Gen. Purpose	
BFR30	BFR30	JFETs N	Gen. Purpose	25V 5mA
BFR31	BFR31	JFETs N	Gen. Purpose	25V 5mA
J201	J201	JFETs N	Gen. Purpose	40V 50mA
J202	J202	JFETs N	Gen. Purpose	40V 50mA
J203	J203	JFETs N	Gen. Purpose	40V 50mA
J204	J204	JFETs N	Gen. Purpose	40V 50mA
J210	J210	JFETs N	Gen. Purpose	25V 15mA
J211	J211	JFETs N	Gen. Purpose	25V 20mA
J212	J212	JFETs N	Gen. Purpose	25V 40mA
MMBF5459	MMBF5459	JFETs N	Gen. Purpose	25V 10mA
PMBFJ210	PMBFJ210	JFETs N	Gen. Purpose	20V 15mA
PMBFJ211	PMBFJ211	JFETs N	Gen. Purpose	20V 20mA
PMBFJ212	PMBFJ212	JFETs N	Gen. Purpose	20V 40mA
BFW10	BFW10	JFETs N	Low Noise	30V 20mA
BFW11	BFW11	JFETs N	Low Noise	30V 10mA
U401	U401	JFETs N	Low Noise	50V 10mA
BFW12	BFW12	JFETs N	Low Power	30V 5mA
BFW13	BFW13	JFETs N	Low Power	30V 1.5mA
2N3823	JN3823	JFETs N	VHF/UHF	30V 10mA
2N4416	JN4416	JFETs N	VHF/UHF	30V 10mA, Low Noise Figure
2N4416A	JN4416A	JFETs N	VHF/UHF	30V 10mA
2N5484	JN5484	JFETs N	VHF/UHF	25V 10mA, Low Noise
BF247A	BF247A	JFETs N	VHF/UHF	25V 10mA
BF247B	BF247B	JFETs N	VHF/UHF	25V 10mA
BF247C	BF247C	JFETs N	VHF/UHF	25V 10mA
BF256A	BF256A	JFETs N	VHF/UHF	30V 10mA
BF256B	BF256B	JFETs N	VHF/UHF	30V 10mA

JFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
BF410A	BF410A	JFETs N	VHF/UHF	20V 30mA
BF410B	BF410B	JFETs N	VHF/UHF	20V 30mA
BF410C	BF410C	JFETs N	VHF/UHF	20V 30mA
BF410D	BF410D	JFETs N	VHF/UHF	20V 30mA
BF510	BF510	JFETs N	VHF/UHF	20V 10mA, Low Noise Figure
BF511	BF511	JFETs N	VHF/UHF	20V 10mA, Low Noise Figure
BF512	BF512	JFETs N	VHF/UHF	20V 10mA, Low Noise Figure
BF513	BF513	JFETs N	VHF/UHF	20V 10mA, Low Noise Figure
BFU308	BFU308	JFETs N	VHF/UHF	25V 10mA
BFU309	BFU309	JFETs N	VHF/UHF	25V 10mA
BFU310	BFU310	JFETs N	VHF/UHF	25V 10mA
J308	J308	JFETs N	VHF/UHF	25V 10mA, High Gain
J308P	J308P	JFETs N	VHF/UHF	25V 10mA
J309	J309	JFETs N	VHF/UHF	25V 10mA, High Gain
J309P	J309P	JFETs N	VHF/UHF	25V 10mA
J310	J310	JFETs N	VHF/UHF	25V 10mA, High Gain
J310P	J310P	JFETs N	VHF/UHF	25V 10mA
PMB4416A	PMB4416A	JFETs N	VHF/UHF	30V 10mA
PMBF4416	PMBF4416	JFETs N	VHF/UHF	30V 10mA
PMBFJ308	PMBFJ308	JFETs N	VHF/UHF	25V 10mA
PMBFJ309	PMBFJ309	JFETs N	VHF/UHF	25V 10mA
PMBFJ310	PMBFJ310	JFETs N	VHF/UHF	25V 10mA

JFETs (P-Channel) [32]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2N3330	JN3330	JFETs P	Amplifier	20V 10mA
2N3331	JN3331	JFETs P	Amplifier	20V 10mA
2N3909	JN3909	JFETs P	Amplifier	20V 10mA
2N3909A	JN3909A	JFETs P	Amplifier	20V 10mA
2N3993	JN3993	JFETs P	Analog Switch	25V 10mA
2N3993A	JN3993A	JFETs P	Analog Switch	25V 10mA
2N3994	JN3994	JFETs P	Analog Switch	25V 10mA
BSJ174	BSJ174	JFETs P	Analog Switch	30V 50mA
BSJ175	BSJ175	JFETs P	Analog Switch	30V 50mA
BSJ176	BSJ176	JFETs P	Analog Switch	30V 50mA
BSJ177	BSJ177	JFETs P	Analog Switch	30V 50mA
J174	J174	JFETs P	Analog Switch	30V 50mA, Low Ron
J175	J175	JFETs P	Analog Switch	30V 50mA, Low Ron
J176	J176	JFETs P	Analog Switch	30V 50mA, Low Ron
J177	J177	JFETs P	Analog Switch	30V 50mA, Low Ron
PMBFJ174	PMBFJ174	JFETs P	Analog Switch	30V 50mA
PMBFJ175	PMBFJ175	JFETs P	Analog Switch	30V 50mA
PMBFJ176	PMBFJ176	JFETs P	Analog Switch	30V 50mA
PMBFJ177	PMBFJ177	JFETs P	Analog Switch	30V 50mA
2N5460	JN5460	JFETs P	Gen. Purpose	40V 10mA
2N5461	JN5461	JFETs P	Gen. Purpose	40V 10mA
2N5463	JN5463	JFETs P	Gen. Purpose	60V 10mA
2N5464	JN5464	JFETs P	Gen. Purpose	60V 10mA
2SJ103	J2SJ103	JFETs P	Gen. Purpose	50 V 20MA
2SJ104	J2SJ104	JFETs P	Gen. Purpose	25 V 20MA
2SJ105	J2SJ105	JFETs P	Gen. Purpose	50 V 14MA
2SJ106	J2SJ106	JFETs P	Gen. Purpose	50 V 14MA

JFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2SJ107	J2SJ107	JFETs P	Gen. Purpose	25 V 20MA
2SJ108	J2SJ108	JFETs P	Gen. Purpose	25 V 20MA
2SJ109	J2SJ109	JFETs P	Gen. Purpose	30V 20MA 35.3Ohm
2SJ72	J2SJ72	JFETs P	Gen. Purpose	25 V 30MA
2SJ74	J2SJ74	JFETs P	Gen. Purpose	25 V 20MA

MOSFETs

Small Signal MOSFETs (N-Channel) [93]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2N7000	MN7000	MOSFETs N	Gen. Purpose	60V .2A
2N7291	2N7291	MOSFETs N	Harris	
2N7292	2N7292	MOSFETs N	Harris	
2N7295	2N7295	MOSFETs N	Harris	
2SK213	QSK213	MOSFETs N	Gen. Purpose	140V 500mA
2SK216	QSK216	MOSFETs N	Gen. Purpose	200V 500mA
3N128	MN128	MOSFETs N	Amplifier	20V .05A
3N7104	MN7104	MOSFETs N	Gen. Purpose	30V 50mA
3N7105	MN7105	MOSFETs N	Gen. Purpose	30V 50mA
3N7106	MN7106	MOSFETs N	Gen. Purpose	10V 50mA
3N7107	MN7107	MOSFETs N	Gen. Purpose	10V 50mA
3N7108	MN7108	MOSFETs N	Gen. Purpose	20V 50mA
3N7109	MN7109	MOSFETs N	Gen. Purpose	20V 50mA
3N7116	MN7116	MOSFETs N	Gen. Purpose	20V 50mA
3N7117	MN7117	MOSFETs N	Gen. Purpose	10V 50mA
3N7118	MN7118	MOSFETs N	Gen. Purpose	15V 50mA
BS107	BS107	MOSFETs N	Switching	200V .12A
BS107A	BS107A	MOSFETs N	Switching	200V .25A
FRK150	FRK150	MOSFETs N	Harris	
FRK250	FRK250	MOSFETs N	Harris	
FRK254	FRK254	MOSFETs N	Harris	
FRL130	FRL130	MOSFETs N	Harris	
FRL230	FRL230	MOSFETs N	Harris	
IRF130	IRF130	MOSFETs N	Harris	
MPF990	MPF990	MOSFETs N	Switching	90V 2A
RF1K49086	R1K49086	MOSFETs N	Harris	
RF1K49088	R1K49088	MOSFETs N	Harris	
RF1K49090	R1K49090	MOSFETs N	Harris	
RF1K49092N	RK49092N	MOSFETs N	Harris	
RF1K49093	R1K49093	MOSFETs N	Harris	
RF1K49156	R1K49156	MOSFETs N	Harris	
RF1K49157	R1K49157	MOSFETs N	Harris	
RF1S45N03L	RS45N03L	MOSFETs N	Harris	30V 45A
RFA100N05E	RF100N05	MOSFETs N	Harris	50V 100A
RFD14N05	RD14N05	MOSFETs N	Harris	50V 14A
RFD16N03L	RD16N03L	MOSFETs N	Harris	30V 16A
RFD16N05	RD16N05	MOSFETs N	Harris	50V 16A
RFD16N06LE	RD16N6LE	MOSFETs N	Harris	50V 16A
RFD3055	RD3055	MOSFETs N	Harris	
RFD3055LE	RD3055LE	MOSFETs N	Harris	
RFD7N10LE	RD7N10LE	MOSFETs N	Harris	100V 7A
RFG45N06	RG45N06	MOSFETs N	Harris	60V 45A
RFG50N06	RG50N06	MOSFETs N	Harris	60V 50A
RFG70N06	RG70N06	MOSFETs N	Harris	60V 70A
RFG75N05E	RG75N05E	MOSFETs N	Harris	50V 75A
RFH75N05E	RFH75N05	MOSFETs N	Harris	50V 75A
RFM15N06	RFM15N06	MOSFETs N	Harris	60V 15A
RFP14N05	RP14N05	MOSFETs N	Harris	50V 14A
RFP14N06	RP14N06	MOSFETs N	Harris	60V 14A
RFP15N06	RFP15N06	MOSFETs N	Harris	50V 15A
RFP25N05	RP25N05	MOSFETs N	Harris	50V 25A
RFP25N06	RP25N06	MOSFETs N	Harris	60V 25A
RFP3055	RP3055	MOSFETs N	Harris	
RFP3055LE	RP3055LE	MOSFETs N	Harris	
RFP30N06LE	R30N06LE	MOSFETs N	Harris	60V 30A
RFP45N03L	RP45N03L	MOSFETs N	Harris	30V 45A

MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
RFP45N06	RP45N06	MOSFETs N	Harris	60V 45A
RFP50N06	RP50N06	MOSFETs N	Harris	60V 50A
RFP70N03	RFP70N03	MOSFETs N	Harris	30V 70A
RFP70N06	RFP70N06	MOSFETs N	Harris	60V 70A
RFP7N10LE	RP7N10LE	MOSFETs N	Harris	100V 7A
RLD03N06CLE	RL3N6CLE	MOSFETs N	Harris	60V 3A
RLP03N06CLE	R3N06CLE	MOSFETs N	Harris	60V 3A
RLP1N08LE	RLP1N08L	MOSFETs N	Harris	80V 1A
SD2100	SD2100	MOSFETs N	Depletion	25V 50mA
SD210DE	SD210DE	MOSFETs N	Gen. Purpose	30V 50mA
SD211DE	SD211DE	MOSFETs N	Gen. Purpose	30V 50mA
SD212DE	SD212DE	MOSFETs N	Gen. Purpose	10V 50mA
SD213DE	SD213DE	MOSFETs N	Gen. Purpose	10V 50mA
SD214DE	SD214DE	MOSFETs N	Gen. Purpose	20V 50mA
SD215DE	SD215DE	MOSFETs N	Gen. Purpose	20V 50mA
SD5000	SD5000	MOSFETs N	Gen. Purpose	20V 50mA
SD5001	SD5001	MOSFETs N	Gen. Purpose	10V 50mA
SD5002	SD5002	MOSFETs N	Gen. Purpose	15V 50mA
SD5400	SD5400	MOSFETs N	Gen. Purpose	20V 50mA
SD5401	SD5401	MOSFETs N	Gen. Purpose	10V 50mA
SD5402	SD5402	MOSFETs N	Gen. Purpose	15V 50mA
SST211	SST211	MOSFETs N	Switching	10V .05A
SST215	SST215	MOSFETs N	Switching	20V .05A
VN0300B	VN0300B	MOSFETs N	Gen. Purpose	30V 1.51A
VN0300L	VN0300L	MOSFETs N	Gen. Purpose	30V .64A
VN0300M	VN0300M	MOSFETs N	Gen. Purpose	30V .67A
VN0603L	VN0603L	MOSFETs N	Gen. Purpose	60V .3A
VN0603T	VN0603T	MOSFETs N	Gen. Purpose	60V .22A
VN0605T	VN0605T	MOSFETs N	Gen. Purpose	60V .18A
VN0610L	VN0610L	MOSFETs N	Gen. Purpose	60V .27A
VN0610LL	VN0610LL	MOSFETs N	Gen. Purpose	60V .28A
VN10KE	VN10KE	MOSFETs N	Gen. Purpose	60V .17A
VN10KM	VN10KM	MOSFETs N	Gen. Purpose	60V 0.31A
VN10LE	VN10LE	MOSFETs N	Gen. Purpose	60V .38A
VN10LM	VN10LM	MOSFETs N	Gen. Purpose	60V .32A
ZVN3310	ZVN3310	MOSFETs N	Gen. Purpose	
ZVN4424A	ZVN4424A	MOSFETs N	Gen. Purpose	

Small Signal MOSFETs (P-Channel) [36]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2SJ76	QSJ76	MOSFETs P	Gen. Purpose	140V 500mA
2SJ79	QSJ79	MOSFETs P	Gen. Purpose	200V 500mA
3N155	MN155	MOSFETs P	Switching	35V .03A
3N156	MN156	MOSFETs P	Switching	35V .03A
3N157	MN157	MOSFETs P	Switching	35V .03A
3N158	MN158	MOSFETs P	Switching	35V .03A
BS208	BS208	MOSFETs P	Gen. Purpose	200V 0.2A
BS250	BS250	MOSFETs P	Gen. Purpose	45V 0.18A
BSS84	BSS84	MOSFETs P	Gen. Purpose	
IRFU9110	IRU9110	MOSFETs P	Harris	
IRFU9120	IRU9120	MOSFETs P	Harris	
RF1K49092P	RK49092P	MOSFETs P	Harris	
RF1S30P05	R1S30P05	MOSFETs P	Harris	50V 30A
RF1S30P06	R1S30P06	MOSFETs P	Harris	60V 30A

MOSFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
RF1S60P03	R1S60P03	MOSFETs P	Harris	30V 60A
RFD10P03L	RD10P03L	MOSFETs P	Harris	30V 10A SCR.LIB
RFD15P05	RD15P05	MOSFETs P	Harris	50V 15A
RFD15P06	RD15P06	MOSFETs P	Harris	60V 15A
RFD8P06E	RD8P06E	MOSFETs P	Harris	60V 8A
RFF60P06	RF60P06	MOSFETs P	Harris	60V 60A
RFG30P05	RG30P05	MOSFETs P	Harris	50V 30A
RFG30P06	RG30P06	MOSFETs P	Harris	60V 30A
RFG60P03	RG60P03	MOSFETs P	Harris	30V 60A
RFG60P05E	RG60P05E	MOSFETs P	Harris	50V 60A
RFG60P06E	RG60P06E	MOSFETs P	Harris	60V 60A
RFP10P03L	RFP10P03	MOSFETs P	Harris	30V 10A
RFP15P05	RP15P05	MOSFETs P	Harris	50V 15A
RFP15P06	RP15P06	MOSFETs P	Harris	60V 15A
RFP30P05	RP30P05	MOSFETs P	Harris	50V 30A
RFP30P06	RP30P06	MOSFETs P	Harris	60V 30A
RFP60P03	RP60P03	MOSFETs P	Harris	30V 60A
RFP8P06E	RP8P06E	MOSFETs P	Harris	60V 8A
VP0610E	VP0610E	MOSFETs P	Gen. Purpose	60V .25A
VP0610L	VP0610L	MOSFETs P	Gen. Purpose	60V .18A
VP0610T	VP0610T	MOSFETs P	Gen. Purpose	60V .12A
ZVP4424A	ZVP4424A	MOSFETs P	Gen. Purpose	

Dual-Gate MOSFETs [14]

Part #	Part Name	Part Type	Part Sub Type	Description [Dm, Gate1, Gate2, Src.]
3N201	MN201	Dual Gate FETs		25V 50mA VHF
3N203	MN203	Dual Gate FETs		25V 50mA VHF
BF980A	BF980A	Dual Gate FETs		18V 30mA VHF
BF981	BF981	Dual Gate FETs		20V 20mA VHF
BF990A	BF990A	Dual Gate FETs		18V 30mA UHF
BF992	BF992	Dual Gate FETs		20V 40mA VHF
BF993	BF993	Dual Gate FETs		20V 50mA VHF
BF996S	BF996S	Dual Gate FETs		20V 30mA UHF
BF998	BF998	Dual Gate FETs		20V 30mA UHF
BFR84	BFR84	Dual Gate FETs		20V 50mA VHF
MFE130	MFE130	Dual Gate FETs		35V 30mA VHF
MPF201	MPF201	Dual Gate FETs		25V 50mA VHF
MPF203	MPF203	Dual Gate FETs		25V 50mA VHF
MPF521	MPF521	Dual Gate FETs		25V 50mA Enhancement

Power MOSFETs (N-Channel) [674]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2N6659	2N6659	MOSFETs N	Power <=100V	SUPERTEX 35V 2A 1.8ohm
2N6660	MN6660	MOSFETs N	Power <=100V	60V 2A
2N6661	MN6661	MOSFETs N	Power <=100V	90V 2A
2N6759	MN6759	MOSFETs N	Power >100V	350V 4.5A
2N6760	MN6760	MOSFETs N	Power >100V	400V 5.5A
2N6763	MN6763	MOSFETs N	Power <=100V	60V 31A
2N6764	MN6764	MOSFETs N	Power <=100V	100V 38A
2N6765	MN6765	MOSFETs N	Power >100V	150V 25A
2N6766	MN6766	MOSFETs N	Power >100V	200V 30A
2N6769	MN6769	MOSFETs N	Power >100V	450V 20A
2N6770	MN6770	MOSFETs N	Power >100V	500V 20A
2N6790	MN6790	MOSFETs N	Power >100V	200V 3.5A
2N7000Z	MN7000Z	MOSFETs N	Power <=100V	
2N7002	MN7002	MOSFETs N	Power <=100V	
2N7007	2N7007	MOSFETs N	Power >100V	SUPERTEX 240V 45ohm
2N7008	2N7008	MOSFETs N	Power <=100V	SUPERTEX 60V 7.5ohm
2SK1058	MSK1058	MOSFETs N	Power >100V	160V 7A
2SK135	MSK135	MOSFETs N	Power >100V	160V 7A
APT5540	APT5540	MOSFETs N	Power >100V	550V 15.5A
APT5545	APT5545	MOSFETs N	Power >100V	550V 14.5A
APT6040	APT6040	MOSFETs N	Power >100V	600V 15.5A
APT6045	APT6045	MOSFETs N	Power >100V	550V 14.5A
BS170	BS170	MOSFETs N	Power <=100V	60V .5A
BS170Z	BS170Z	MOSFETs N	Power <=100V	60V .5A
BSS123	BSS123	MOSFETs N	Power <=100V	SUPERTEX 100V 6ohm
BUZ11	BUZ11	MOSFETs N	Power <=100V	50V 30A
BUZ41A	BUZ41A	MOSFETs N	Power >100V	500V 4.5A
BUZ45	BUZ45	MOSFETs N	Power >100V	500V 9.6A
BUZ45A	BUZ45A	MOSFETs N	Power >100V	500V 8.3A
BUZ45B	BUZ45B	MOSFETs N	Power >100V	500V 10A
DN2530N3	DN2530N3	MOSFETs N	Power >100V	SUPERTEX 300V 12ohm
DN2530N8	DN2530N8	MOSFETs N	Power >100V	SUPERTEX 300V 12ohm
DN2535N2	DN2535N2	MOSFETs N	Power >100V	SUPERTEX 350V 17ohm
DN2535N3	DN2535N3	MOSFETs N	Power >100V	SUPERTEX 350V 17ohm
DN2535N5	DN2535N5	MOSFETs N	Power >100V	SUPERTEX 350V 17ohm
DN2540N2	DN2540N2	MOSFETs N	Power >100V	SUPERTEX 400V 17ohm
DN2540N3	DN2540N3	MOSFETs N	Power >100V	SUPERTEX 400V 17ohm
DN2540N5	DN2540N5	MOSFETs N	Power >100V	SUPERTEX 400V 17ohm
DN2540N8	DN2540N8	MOSFETs N	Power >100V	SUPERTEX 400V 17ohm
DN2620N3	DN2620N3	MOSFETs N	Power >100V	SUPERTEX 200V 4ohm
DN2624N3	DN2624N3	MOSFETs N	Power >100V	SUPERTEX 240V 4ohm
DN2640N3	DN2640N3	MOSFETs N	Power >100V	SUPERTEX 400V 6ohm
F1007	F1007	MOSFETs N	Power <=100V	28V 4A
F1008	F1008	MOSFETs N	Power <=100V	28V 8A
F1072	F1072	MOSFETs N	Power <=100V	28V 12A
F1074	F1074	MOSFETs N	Power <=100V	28V 16A
F2001	F2001	MOSFETs N	Power <=100V	28V .8A
F2002	F2002	MOSFETs N	Power <=100V	28V 1.6A
F2012	F2012	MOSFETs N	Power <=100V	28V 3.2A
F2021	F2021	MOSFETs N	Power <=100V	28V 2.4A
IRF1010	IRF1010	MOSFETs N	Power <=100V	55V 75A 0.014ohm
IRF140	IRF140	MOSFETs N	Power <=100V	100V 27A
IRF141	IRF141	MOSFETs N	Power <=100V	60V 27A
IRF142	IRF142	MOSFETs N	Power <=100V	100V 24A
IRF143	IRF143	MOSFETs N	Power <=100V	60V 24A
IRF150	IRF150	MOSFETs N	Power <=100V	100V 28A
IRF151	IRF151	MOSFETs N	Power <=100V	60V 28A
IRF152	IRF152	MOSFETs N	Power <=100V	100V 24A

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRF153	IRF153	MOSFETs N	Power <=100V	60V 24A
IRF220	IRF220	MOSFETs N	Power >100V	200V 4A
IRF221	IRF221	MOSFETs N	Power >100V	150V 4A
IRF222	IRF222	MOSFETs N	Power >100V	200V 3.5
IRF223	IRF223	MOSFETs N	Power >100V	150V 3.5A
IRF230	IRF230	MOSFETs N	Power >100V	200V 7A
IRF231	IRF231	MOSFETs N	Power >100V	150V 7A
IRF232	IRF232	MOSFETs N	Power >100V	200V 6A
IRF233	IRF233	MOSFETs N	Power >100V	150V 6A
IRF240	IRF240	MOSFETs N	Power >100V	200V 18A
IRF241	IRF241	MOSFETs N	Power >100V	150V 18A
IRF242	IRF242	MOSFETs N	Power >100V	200V 16A
IRF243	IRF243	MOSFETs N	Power >100V	150V 16A
IRF244	IRF244	MOSFETs N	Power >100V	250V 14A
IRF245	IRF245	MOSFETs N	Power >100V	250V 13A
IRF246	IRF246	MOSFETs N	Power >100V	275V 14A
IRF247	IRF247	MOSFETs N	Power >100V	275V 13A
IRF250	IRF250	MOSFETs N	Power >100V	200V 20A
IRF251	IRF251	MOSFETs N	Power >100V	150V 20.A
IRF252	IRF252	MOSFETs N	Power >100V	200V 17A
IRF253	IRF253	MOSFETs N	Power >100V	150V 17A
IRF320	IRF320	MOSFETs N	Power >100V	400V 2.5A
IRF321	IRF321	MOSFETs N	Power >100V	350V 2.5A
IRF322	IRF322	MOSFETs N	Power >100V	400V 2A
IRF323	IRF323	MOSFETs N	Power >100V	350V 2A
IRF330	IRF330	MOSFETs N	Power >100V	400V 4A
IRF331	IRF331	MOSFETs N	Power >100V	350V 4A
IRF332	IRF332	MOSFETs N	Power >100V	400V 3.5A
IRF333	IRF333	MOSFETs N	Power >100V	350V 3.5A
IRF340	IRF340	MOSFETs N	Power >100V	400V 10A
IRF341	IRF341	MOSFETs N	Power >100V	350V 10A
IRF342	IRF342	MOSFETs N	Power >100V	400V 8A
IRF343	IRF343	MOSFETs N	Power >100V	350V 8A
IRF350	IRF350	MOSFETs N	Power >100V	400V 11A
IRF351	IRF351	MOSFETs N	Power >100V	350V 11A
IRF352	IRF352	MOSFETs N	Power >100V	400V 10A
IRF353	IRF353	MOSFETs N	Power >100V	350V 10A
IRF420	IRF420	MOSFETs N	Power >100V	500V 2A
IRF421	IRF421	MOSFETs N	Power >100V	450V 2A
IRF422	IRF422	MOSFETs N	Power >100V	400V 1.5A
IRF423	IRF423	MOSFETs N	Power >100V	350V 1.5A
IRF430	IRF430	MOSFETs N	Power >100V	500V 3.5A
IRF431	IRF431	MOSFETs N	Power >100V	450V 3.5A
IRF432	IRF432	MOSFETs N	Power >100V	500V 3A
IRF433	IRF433	MOSFETs N	Power >100V	450V 3A
IRF440	IRF440	MOSFETs N	Power >100V	500V 8A
IRF441	IRF441	MOSFETs N	Power >100V	450V 8A
IRF442	IRF442	MOSFETs N	Power >100V	500V 7A
IRF443	IRF443	MOSFETs N	Power >100V	450V 7A
IRF450	IRF450	MOSFETs N	Power >100V	500V 10A
IRF451	IRF451	MOSFETs N	Power >100V	450V 10A
IRF452	IRF452	MOSFETs N	Power >100V	500V 8A
IRF453	IRF453	MOSFETs N	Power >100V	450V 8A
IRF510	IRF510	MOSFETs N	Power <=100V	100V 3A
IRF511	IRF511	MOSFETs N	Power <=100V	60V 3A
IRF512	IRF512	MOSFETs N	Power <=100V	100V 2.5A
IRF513	IRF513	MOSFETs N	Power <=100V	60V 2.5A
IRF520	IRF520	MOSFETs N	Power <=100V	100V 5A

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRF521	IRF521	MOSFETs N	Power <=100V	60V 5A
IRF522	IRF522	MOSFETs N	Power <=100V	100V 4A
IRF523	IRF523	MOSFETs N	Power <=100V	60V 4A
IRF530	IRF530	MOSFETs N	Power <=100V	100V 10A
IRF531	IRF531	MOSFETs N	Power <=100V	60V 10A
IRF532	IRF532	MOSFETs N	Power <=100V	100V 8A
IRF533	IRF533	MOSFETs N	Power <=100V	60V 8A
IRF540	IRF540	MOSFETs N	Power <=100V	IR 100V 28A 0.077ohm
IRF610	IRF610	MOSFETs N	Power >100V	200V 2A
IRF611	IRF611	MOSFETs N	Power >100V	150V 2A
IRF612	IRF612	MOSFETs N	Power >100V	200V 1.5A
IRF613	IRF613	MOSFETs N	Power >100V	150V 1.5A
IRF614	IRF614	MOSFETs N	Power >100V	IR 250V 3A 2ohm
IRF620	IRF620	MOSFETs N	Power >100V	200V 3.5A
IRF621	IRF621	MOSFETs N	Power >100V	150V 3.5A
IRF622	IRF622	MOSFETs N	Power >100V	200V 3A
IRF623	IRF623	MOSFETs N	Power >100V	150V 3A
IRF624	IRF624	MOSFETs N	Power >100V	IR 250V 4A 1.1ohm
IRF630	IRF630	MOSFETs N	Power >100V	200V 6A
IRF631	IRF631	MOSFETs N	Power >100V	150V 6A
IRF632	IRF632	MOSFETs N	Power >100V	200V 5A
IRF633	IRF633	MOSFETs N	Power >100V	150V 5A
IRF640	IRF640	MOSFETs N	Power >100V	IR 200V 18A 0.18ohm
IRF644	IRF644	MOSFETs N	Power >100V	IR 250V 14A 0.28ohm
IRF710	IRF710	MOSFETs N	Power >100V	400V 1.5A
IRF7101	IRF7101	MOSFETs N	Power <=100V	IR 20V 4A 0.1ohm SO8 DUAL
IRF7102	IRF7102	MOSFETs N	Power <=100V	IR 50V 2A 0.3ohm SO8 DUAL
IRF711	IRF711	MOSFETs N	Power >100V	350V 1.5A
IRF712	IRF712	MOSFETs N	Power >100V	400V 1.3A
IRF713	IRF713	MOSFETs N	Power >100V	350V 1.3A
IRF720	IRF720	MOSFETs N	Power >100V	400V 2.5A
IRF721	IRF721	MOSFETs N	Power >100V	350V 2.5A
IRF722	IRF722	MOSFETs N	Power >100V	400V 2A
IRF723	IRF723	MOSFETs N	Power >100V	350V 2A
IRF730	IRF730	MOSFETs N	Power >100V	400V 3.5A
IRF731	IRF731	MOSFETs N	Power >100V	350V 3.5A
IRF732	IRF732	MOSFETs N	Power >100V	400V 3A
IRF733	IRF733	MOSFETs N	Power >100V	350V 3A
IRF740	IRF740	MOSFETs N	Power >100V	400V 10A
IRF741	IRF741	MOSFETs N	Power >100V	350V 10A
IRF820	IRF820	MOSFETs N	Power >100V	500V 1.5A
IRF821	IRF821	MOSFETs N	Power >100V	450V 1.5A
IRF822	IRF822	MOSFETs N	Power >100V	500V 1A
IRF823	IRF823	MOSFETs N	Power >100V	450V 1A
IRF830	IRF830	MOSFETs N	Power >100V	500V 3A
IRF831	IRF831	MOSFETs N	Power >100V	450V 3A
IRF832	IRF832	MOSFETs N	Power >100V	500V 2.5A
IRF833	IRF833	MOSFETs N	Power >100V	450V 2.5A
IRF840	IRF840	MOSFETs N	Power >100V	500V 8A
IRF841	IRF841	MOSFETs N	Power >100V	450V 8A
IRF842	IRF842	MOSFETs N	Power >100V	500V 7A
IRF843	IRF843	MOSFETs N	Power >100V	450V 7A
IRFAG20	IRFAG20	MOSFETs N	Power >100V	1000V 1.3A
IRFAG22	IRFAG22	MOSFETs N	Power >100V	1000V 1.2A
IRFBC20	IRFBC20	MOSFETs N	Power >100V	IR 600V 2A 4.4ohm
IRFBC30	IRFBC30	MOSFETs N	Power >100V	IR 600V 4A 2.2ohm
IRFBC40	IRFBC40	MOSFETs N	Power >100V	IR 600V 6A 1.2ohm
IRFBE20	IRFBE20	MOSFETs N	Power >100V	IR 800V 2A 6.5ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRFBE30	IRFBE30	MOSFETs N	Power >100V	IR 800V 4A 3ohm
IRFBF20	IRFBF20	MOSFETs N	Power >100V	IR 900V 2A 8ohm
IRFBF30	IRFBF30	MOSFETs N	Power >100V	IR 900V 4A 3.7ohm
IRFBG20	IRFBG20	MOSFETs N	Power >100V	IR 1000V 1A 11ohm
IRFBG30	IRFBG30	MOSFETs N	Power >100V	IR 1000V 3A 5ohm
IRFD014	IRFD014	MOSFETs N	Power <=100V	IR 60V 2A 0.2ohm
IRFD024	IRFD024	MOSFETs N	Power <=100V	IR 60V 2A 0.1ohm
IRFD110	IRFD110	MOSFETs N	Power <=100V	IR 100V 1A 0.54ohm
IRFD120	IRFD120	MOSFETs N	Power <=100V	IR 100V 1A 0.27ohm
IRFD1Z0	IRFD1Z0	MOSFETs N	Power <=100V	IR 100V 0A 2.4ohm
IRFD210	IRFD210	MOSFETs N	Power >100V	IR 200V 1A 1.5ohm
IRFD220	IRFD220	MOSFETs N	Power >100V	IR 200V 1A 0.8ohm
IRFD221	IRFD221	MOSFETs N	Power >100V	150V 0.8A
IRFD222	IRFD222	MOSFETs N	Power >100V	200V 0.7A
IRFD223	IRFD223	MOSFETs N	Power >100V	150V 0.7A
IRFF110	IRFF110	MOSFETs N	Power <=100V	100V 3.5A
IRFF111	IRFF111	MOSFETs N	Power <=100V	60V 3.5A
IRFF112	IRFF112	MOSFETs N	Power <=100V	100V 3A
IRFF113	IRFF113	MOSFETs N	Power <=100V	60V 3A
IRFF210	IRFF210	MOSFETs N	Power >100V	200V 2.2A
IRFF211	IRFF211	MOSFETs N	Power >100V	150V 2.2A
IRFF212	IRFF212	MOSFETs N	Power >100V	200V 1.8A
IRFF213	IRFF213	MOSFETs N	Power >100V	150V 1.8A
IRFF220	IRFF220	MOSFETs N	Power >100V	200V 3.5A
IRFF221	IRFF221	MOSFETs N	Power >100V	150V 3.5A
IRFF222	IRFF222	MOSFETs N	Power >100V	200V 3.0A
IRFF223	IRFF223	MOSFETs N	Power >100V	150V 3.0A
IRFF230	IRFF230	MOSFETs N	Power >100V	200V 5.5A
IRFF231	IRFF231	MOSFETs N	Power >100V	150V 5.5A
IRFF232	IRFF232	MOSFETs N	Power >100V	200V 4.5A
IRFF233	IRFF233	MOSFETs N	Power >100V	150V 4.5A
IRFF310	IRFF310	MOSFETs N	Power >100V	400V 1.35A
IRFF311	IRFF311	MOSFETs N	Power >100V	350V 1.35A
IRFF312	IRFF312	MOSFETs N	Power >100V	400V 1.15A
IRFF313	IRFF313	MOSFETs N	Power >100V	350V 1.15A
IRFF320	IRFF320	MOSFETs N	Power >100V	400V 2.5A
IRFF321	IRFF321	MOSFETs N	Power >100V	350V 2.5A
IRFF322	IRFF322	MOSFETs N	Power >100V	400V 2.0A
IRFF323	IRFF323	MOSFETs N	Power >100V	350V 2.0A
IRFF330	IRFF330	MOSFETs N	Power >100V	400V 3.5A
IRFF331	IRFF331	MOSFETs N	Power >100V	350V 3.5A
IRFF332	IRFF332	MOSFETs N	Power >100V	400V 3.0A
IRFF333	IRFF333	MOSFETs N	Power >100V	250V 3.0A
IRFF420	IRFF420	MOSFETs N	Power >100V	500V 1.6A
IRFF421	IRFF421	MOSFETs N	Power >100V	450V 1.6A
IRFF422	IRFF422	MOSFETs N	Power >100V	500V 1.4A
IRFF423	IRFF423	MOSFETs N	Power >100V	450V 1.4A
IRFF430	IRFF430	MOSFETs N	Power >100V	500V 2.75A
IRFF431	IRFF431	MOSFETs N	Power >100V	450V 2.75A
IRFF432	IRFF432	MOSFETs N	Power >100V	500V 2.25A
IRFF433	IRFF433	MOSFETs N	Power >100V	450V 2.25A
IRFI0140	IRFI0140	MOSFETs N	Power <=100V	IR 100V 23A 0.077ohm
IRFI510G	IRFI510G	MOSFETs N	Power <=100V	IR 100V 4A 0.54ohm
IRFI520G	IRFI520G	MOSFETs N	Power <=100V	IR 100V 7A 0.27ohm
IRFI530G	IRFI530G	MOSFETs N	Power <=100V	IR 100V 10A 0.16ohm
IRFI540G	IRFI540G	MOSFETs N	Power <=100V	IR 100V 17A 0.077ohm
IRFI614G	IRFI614G	MOSFETs N	Power >100V	IR 250V 2A 2ohm
IRFI620G	IRFI620G	MOSFETs N	Power >100V	IR 200V 4A 0.8ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRFI624G	IRFI624G	MOSFETs N	Power >100V	IR 250V 3A 1.1ohm
IRFI630G	IRFI630G	MOSFETs N	Power >100V	IR 200V 6A 0.4ohm
IRFI634G	IRFI634G	MOSFETs N	Power >100V	IR 250V 6A 0.45ohm
IRFI640G	IRFI640G	MOSFETs N	Power >100V	IR 200V 10A 0.18ohm
IRFI644G	IRFI644G	MOSFETs N	Power >100V	IR 250V 8A 0.28ohm
IRFI720G	IRFI720G	MOSFETs N	Power >100V	IR 400V 3A 1.8ohm
IRFI730G	IRFI730G	MOSFETs N	Power >100V	IR 400V 4A 1ohm
IRFI740G	IRFI740G	MOSFETs N	Power >100V	IR 400V 5A 0.55ohm
IRFI820G	IRFI820G	MOSFETs N	Power >100V	IR 500V 2A 3ohm
IRFI830G	IRFI830G	MOSFETs N	Power >100V	IR 500V 3A 1.5ohm
IRFI840G	IRFI840G	MOSFETs N	Power >100V	500V 5A 0.85ohm
IRFIBC20G	IRFIBC20G	MOSFETs N	Power >100V	ir 600V 2A 4.4ohm
IRFIBC30G	IRFIBC30G	MOSFETs N	Power >100V	ir 600V 2A 2.2ohm
IRFIBC40G	IRFIBC40G	MOSFETs N	Power >100V	ir 600V 4A 1.2ohm
IRFIBE20G	IRFIBE20G	MOSFETs N	Power >100V	ir 800V 1A 1.4ohm
IRFIBE30G	IRFIBE30G	MOSFETs N	Power >100V	ir 800V 2A 3ohm
IRFIBF20G	IRFIBF20G	MOSFETs N	Power >100V	ir 900V 1A 8ohm
IRFIBF30G	IRFIBF30G	MOSFETs N	Power >100V	ir 900V 2A 3.7ohm
IRFIP044	IRFIP044	MOSFETs N	Power <=100V	ir 60V 43A 0.028ohm
IRFIP054	IRFIP054	MOSFETs N	Power <=100V	ir 60V 64A 0.014ohm
IRFIP150	IRFIP150	MOSFETs N	Power <=100V	IR 100V 31A 0.055ohm
IRFIP240	IRFIP240	MOSFETs N	Power >100V	IR 200V 14A 0.18ohm
IRFIP244	IRFIP244	MOSFETs N	Power >100V	IR 250V 11A 0.28ohm
IRFIP250	IRFIP250	MOSFETs N	Power >100V	IR 200V 22A 0.085ohm
IRFIP254	IRFIP254	MOSFETs N	Power >100V	IR 250V 17A 0.14ohm
IRFIP340	IRFIP340	MOSFETs N	Power >100V	IR 400V 8A 0.55ohm
IRFIP350	IRFIP350	MOSFETs N	Power >100V	IR 400V 11A 0.3ohm
IRFIP440	IRFIP440	MOSFETs N	Power >100V	IR 500V 6A 0.85ohm
IRFIP448	IRFIP448	MOSFETs N	Power >100V	IR 500V 7A 0.6ohm
IRFIP450	IRFIP450	MOSFETs N	Power >100V	IR 500V 10A 0.4ohm
IRFIZ14G	IRFIZ14G	MOSFETs N	Power <=100V	IR 60V 8A 0.2ohm
IRFIZ24G	IRFIZ24G	MOSFETs N	Power <=100V	IR 60V 14A 0.1ohm
IRFIZ34G	IRFIZ34G	MOSFETs N	Power <=100V	IR 60V 20A 0.05ohm
IRFIZ44G	IRFIZ44G	MOSFETs N	Power <=100V	IR 60V 30A 0.028ohm
IRFIZ48G	IRFIZ48G	MOSFETs N	Power <=100V	IR 60V 37A 0.018ohm
IRFL014	IRFL014	MOSFETs N	Power <=100V	IR 60V 3A 0.2ohm
IRFL110	IRFL110	MOSFETs N	Power <=100V	IR 100V 2A 0.54ohm
IRFL210	IRFL210	MOSFETs N	Power >100V	IR 200V 1A 1.5ohm
IRFL214	IRFL214	MOSFETs N	Power >100V	IR 250V 1A 2ohm
IRFP044	IRFP044	MOSFETs N	Power <=100V	IR 60V 57A 0.028ohm
IRFP048	IRFP048	MOSFETs N	Power <=100V	IR 60V 70A 0.018ohm
IRFP054	IRFP054	MOSFETs N	Power <=100V	IR 60V 70A 0.014ohm
IRFP064	IRFP064	MOSFETs N	Power <=100V	IR 60V 70A 0.009ohm
IRFP140	IRFP140	MOSFETs N	Power <=100V	IR 100V 31A 0.077ohm
IRFP150	IRFP150	MOSFETs N	Power <=100V	100V 40A
IRFP151	IRFP151	MOSFETs N	Power <=100V	60V 40A
IRFP152	IRFP152	MOSFETs N	Power <=100V	100V 34A
IRFP153	IRFP153	MOSFETs N	Power <=100V	60V 34A
IRFP240	IRFP240	MOSFETs N	Power >100V	200V 20A 0.18ohm
IRFP244	IRFP244	MOSFETs N	Power >100V	IR 250V 15A 0.28ohm
IRFP250	IRFP250	MOSFETs N	Power >100V	IR 200V 30A 0.085ohm
IRFP254	IRFP254	MOSFETs N	Power >100V	IR 250V 23A 0.14ohm
IRFP260	IRFP260	MOSFETs N	Power >100V	IR 200V 46A 0.055ohm
IRFP264	IRFP264	MOSFETs N	Power >100V	IR 250V 38A 0.075ohm
IRFP340	IRFP340	MOSFETs N	Power >100V	IR 400V 11A 0.55ohm
IRFP350	IRFP350	MOSFETs N	Power >100V	IR 400V 16A 0.3ohm
IRFP360	IRFP360	MOSFETs N	Power >100V	IR 400V 23A 0.2ohm
IRFP440	IRFP440	MOSFETs N	Power >100V	IR 500V 9A 0.85ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRFP448	IRFP448	MOSFETs N	Power >100V	IR 500V 11A 0.6ohm
IRFP450	IRFP450	MOSFETs N	Power >100V	IR 500V 14A 0.4ohm
IRFP460	IRFP460	MOSFETs N	Power >100V	IR 500V 20A 0.27ohm
IRFPC30	IRFPC30	MOSFETs N	Power >100V	IR 600V 4A 2.2ohm
IRFPC40	IRFPC40	MOSFETs N	Power >100V	IR 600V 7A 1.2ohm
IRFPC50	IRFPC50	MOSFETs N	Power >100V	IR 600V 11A 0.6ohm
IRFPC60	IRFPC60	MOSFETs N	Power >100V	IR 600V 16A 0.4ohm
IRFPE30	IRFPE30	MOSFETs N	Power >100V	IR 800V 4A 3ohm
IRFPE40	IRFPE40	MOSFETs N	Power >100V	IR 800V 5A 2ohm
IRFPE50	IRFPE50	MOSFETs N	Power >100V	IR 800V 8A 1.2ohm
IRFPF30	IRFPF30	MOSFETs N	Power >100V	IR 900V 4A 3.7ohm
IRFPF40	IRFPF40	MOSFETs N	Power >100V	IR 900V 5A 2.5ohm
IRFPF50	IRFPF50	MOSFETs N	Power >100V	IR 900V 7A 1.6ohm
IRFPG30	IRFPG30	MOSFETs N	Power >100V	IR 1000V 3A 5ohm
IRFPG40	IRFPG40	MOSFETs N	Power >100V	IR 1000V 4A 3.5ohm
IRFPG50	IRFPG50	MOSFETs N	Power >100V	IR 1000V 6A 2ohm
IRFR014	IRFR014	MOSFETs N	Power <=100V	IR 60V 8A 0.2ohm
IRFR024	IRFR024	MOSFETs N	Power <=100V	IR 60V 14A 0.1ohm
IRFR110	IRFR110	MOSFETs N	Power <=100V	IR 100V 4A 0.54ohm
IRFZ14S	IRFZ14S	MOSFETs N	Power <=100V	IR 60V 10A 0.2ohm
IRFZ20	IRFZ20	MOSFETs N	Power <=100V	50V 15A
IRFZ22	IRFZ22	MOSFETs N	Power <=100V	50V 14A
IRFZ24	IRFZ24	MOSFETs N	Power <=100V	IR 60V 17A 0.1ohm
IRFZ24S	IRFZ24S	MOSFETs N	Power <=100V	IR 60V 17A 0.1ohm
IRFZ34	IRFZ34	MOSFETs N	Power <=100V	IR 60V 30A 0.05ohm
IRFZ34S	IRFZ34S	MOSFETs N	Power <=100V	IR 60V 30A 0.05ohm
IRFZ44	IRFZ44	MOSFETs N	Power <=100V	IR 60V 50A 0.028ohm
IRFZ44S	IRFZ44S	MOSFETs N	Power <=100V	IR 60V 50A 0.028ohm
IRFZ46	IRFZ46	MOSFETs N	Power <=100V	IR 50V 50A 0.024ohm
IRFZ46S	IRFZ46S	MOSFETs N	Power <=100V	IR 50V 50A 0.024ohm
IRFZ48	IRFZ48	MOSFETs N	Power <=100V	IR 60V 50A 0.018ohm
IRFZ48S	IRFZ48S	MOSFETs N	Power <=100V	IR 60V 50A 0.018ohm
IRL510	IRL510	MOSFETs N	Power <=100V	IR 100V 6A 0.54ohm
IRL510S	IRL510S	MOSFETs N	Power <=100V	IR 100V 6A 0.54ohm
IRL520	IRL520	MOSFETs N	Power <=100V	IR 100V 9A 0.27ohm
IRL520S	IRL520S	MOSFETs N	Power <=100V	IR 100V 9A 0.27ohm
IRL530	IRL530	MOSFETs N	Power <=100V	IR 100V 15A 0.16ohm
IRL530S	IRL530S	MOSFETs N	Power <=100V	IR 100V 15A 0.16ohm
IRL540	IRL540	MOSFETs N	Power <=100V	IR 100V 28A 0.077ohm
IRLD014	IRLD014	MOSFETs N	Power <=100V	IR 60V 2A 0.2ohm
IRLD024	IRLD024	MOSFETs N	Power <=100V	IR 60V 2A 0.1ohm
IRLD110	IRLD110	MOSFETs N	Power <=100V	IR 100V 1A 0.54ohm
IRLD120	IRLD120	MOSFETs N	Power <=100V	IR 100V 1A 0.27ohm
IRLI520G	IRLI520G	MOSFETs N	Power <=100V	IR 100V 7A 0.27ohm220
IRLI530G	IRLI530G	MOSFETs N	Power <=100V	IR 100V 10A 0.16ohm
IRLI540G	IRLI540G	MOSFETs N	Power <=100V	IR 100V 17A 0.077ohm
IRLIZ14G	IRLIZ14G	MOSFETs N	Power <=100V	IR 60V 8A 0.2ohm
IRLIZ24G	IRLIZ24G	MOSFETs N	Power <=100V	IR 60V 14A 0.1ohm
IRLIZ34G	IRLIZ34G	MOSFETs N	Power <=100V	IR 60V 20A 0.05ohm
IRLIZ44G	IRLIZ44G	MOSFETs N	Power <=100V	IR 60V 30A 0.028ohm
IRLL014	IRLL014	MOSFETs N	Power <=100V	IR 60V 3A 0.2ohm
IRLL110	IRLL110	MOSFETs N	Power <=100V	IR 100V 2A 0.54ohm
IRLR014	IRLR014	MOSFETs N	Power <=100V	IR 60V 8A 0.2ohm
IRLR024	IRLR024	MOSFETs N	Power <=100V	IR 60V 14A 0.1ohm
IRLR110	IRLR110	MOSFETs N	Power <=100V	IR 100V 4A 0.54ohm
IRLR120	IRLR120	MOSFETs N	Power <=100V	IR 100V 8A 0.27ohm
IRLU014	IRLU014	MOSFETs N	Power <=100V	IR 60V 8A 0.2ohm
IRLU024	IRLU024	MOSFETs N	Power <=100V	IR 60V 14A 0.1ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRLU110	IRLU110	MOSFETs N	Power <=100V	IR 100V 4A 0.54ohm
IRLU120	IRLU120	MOSFETs N	Power <=100V	IR 100V 8A 0.27ohm
IRLZ14	IRLZ14	MOSFETs N	Power <=100V	IR 60V 10A 0.2ohm
IRLZ14S	IRLZ14S	MOSFETs N	Power <=100V	IR 60V 10A 0.2ohm
IRLZ24	IRLZ24	MOSFETs N	Power <=100V	IR 60V 17A 0.1ohm
IRLZ24S	IRLZ24S	MOSFETs N	Power <=100V	IR 60V 17A 0.1ohm
IRLZ34	IRLZ34	MOSFETs N	Power <=100V	IR 60V 30A 0.05ohm
IRLZ34S	IRLZ34S	MOSFETs N	Power <=100V	IR 60V 30A 0.05ohm
IRLZ44	IRLZ44	MOSFETs N	Power <=100V	IR 60V 50A 0.028ohm
IRLZ44S	IRLZ44S	MOSFETs N	Power <=100V	IR 60V 50A 0.028ohm
IXTH10N60	ITH10N60	MOSFETs N	Power >100V	600V 10A
IXTH15N45A	ITH1545A	MOSFETs N	Power >100V	450V 15A
IXTH15N50A	ITH1550A	MOSFETs N	Power >100V	500V 15A
IXTH5N100	ITH5N100	MOSFETs N	Power >100V	1000V 5A
IXTH5N95	ITH5N95	MOSFETs N	Power >100V	950V 5A
IXTH6N80	ITH6N80	MOSFETs N	Power >100V	800V 6A
IXTH6N90	ITH6N90	MOSFETs N	Power >100V	900V 6A
IXTP2N100	ITP2N100	MOSFETs N	Power >100V	1000V 2A
IXTP2N95	ITP2N95	MOSFETs N	Power >100V	950V 2A
IXTP4N80	ITP4N80	MOSFETs N	Power >100V	800V 4A
IXTP4N90	ITP4N90	MOSFETs N	Power >100V	900V 4A
LND150N3	LND150N3	MOSFETs N	Power >100V	SUPERTEX 500V 0A 850ohm
LND150N8	LND150N8	MOSFETs N	Power >100V	SUPERTEX 500V 0A 850ohm
LND250K1	LND250K1	MOSFETs N	Power >100V	SUPERTEX 500V 0A 850ohm
LNE150	LNE150	MOSFETs N	Power >100V	SUPERTEX 500V 0A 1000ohm
MPF6660	MPF6660	MOSFETs N	Power <=100V	60V 2A
MPF6661	MPF6661	MOSFETs N	Power <=100V	90V 2A
MTB15N06E	MB15N06E	MOSFETs N	Power <=100V	60V 15A
MTB20N20	MTB20N20	MOSFETs N	Power >100V	200V 20A
MTB30N06EL	MB30N6EL	MOSFETs N	Power <=100V	60V 30A
MTB50N06E	MB50N06E	MOSFETs N	Power <=100V	60V 50A
MTD1N40	MTD1N40	MOSFETs N	Power >100V	400V 1A
MTD2955E	MTD2955E	MOSFETs N	Power <=100V	60V 12A
MTD2N20	MTD2N20	MOSFETs N	Power >100V	200V 2A
MTD2N50E	MTD2N50E	MOSFETs N	Power >100V	500V 2A
MTD3055E	MTD3055E	MOSFETs N	Power <=100V	60V 8A
MTD3N25E	MTD3N25E	MOSFETs N	Power <=100V	250V 3A
MTD5N05	MTD5N05	MOSFETs N	Power <=100V	50V 5A
MTD5N06	MTD5N06	MOSFETs N	Power <=100V	60V 5A
MTM15N40E	MM15N40E	MOSFETs N	Power >100V	400V 15A
MTM3P25	MTM3P25	MOSFETs N	Power >100V	250V 3A
MTM40N20	MTM40N20	MOSFETs N	Power >100V	200V 40A
MTM55N10	MTM55N10	MOSFETs N	Power <=100V	100V 55A
MTM5N35	MTM5N35	MOSFETs N	Power >100V	350V 5A
MTM5N40	MTM5N40	MOSFETs N	Power >100V	400V 5A
MTM60N06	MTM60N06	MOSFETs N	Power <=100V	60V 60A
MTP10N10E	MP10N10E	MOSFETs N	Power <=100V	100V 10A
MTP10N15	MTP10N15	MOSFETs N	Power >100V	150V 10A
MTP10N25	MTP10N25	MOSFETs N	Power >100V	250V 10A
MTP10N40E	MP10N40E	MOSFETs N	Power >100V	400V 10A
MTP12N05E	MP12N05E	MOSFETs N	Power <=100V	50V 12A
MTP12N10E	MP12N10E	MOSFETs N	Power <=100V	100V 12A
MTP12N20	MTP12N20	MOSFETs N	Power >100V	200V 12A
MTP15N05	MTP15N05	MOSFETs N	Power <=100V	50V 15A
MTP15N05E	MP15N05E	MOSFETs N	Power <=100V	50V 15A
MTP15N05EL	MP15N5EL	MOSFETs N	Power <=100V	50V 15A
MTP15N06	MTP15N06	MOSFETs N	Power <=100V	60V 15A
MTP15N06E	MP15N06E	MOSFETs N	Power <=100V	60V 15A

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
MTP15N08EL	MP15N8EL	MOSFETs N	Power <=100V	80V 15A
MTP15N15	MTP15N15	MOSFETs N	Power >100V	150V 15A
MTP2955	MTP2955	MOSFETs N	Power <=100V	60V 12A
MTP2N60E	MTP2N60E	MOSFETs N	Power >100V	600V 2A
MTP3055E	MTP3055E	MOSFETs N	Power <=100V	60V 12A
MTP3055EL	MP3055EL	MOSFETs N	Power <=100V	60V 12A
MTP30N06EL	MP30N6EL	MOSFETs N	Power <=100V	60V 30A
MTP33N10E	MP33N10E	MOSFETs N	Power <=100V	100V 33A
MTP3N100	MTP3N100	MOSFETs N	Power >100V	1000V 3A
MTP3N50	MTP3N50	MOSFETs N	Power >100V	500V 3A
MTP3N60E	MTP3N60E	MOSFETs N	Power >100V	600V 3A
MTP3N95	MTP3N95	MOSFETs N	Power >100V	950V 3A
MTP4N08E	MTP4N08E	MOSFETs N	Power <=100V	80V 4A
MTP4N50	MTP4N50	MOSFETs N	Power >100V	500V 4A
MTP4N85	MTP4N85	MOSFETs N	Power >100V	850V 4A
MTP4N90	MTP4N90	MOSFETs N	Power >100V	900V 4A
MTP50N05E	MP50N05E	MOSFETs N	Power <=100V	50V 50A
MTP50N06E	MP50N06E	MOSFETs N	Power <=100V	60V 50A
MTP5N20	MTP5N20	MOSFETs N	Power >100V	200V 4A
MTP5N35	MTP5N35	MOSFETs N	Power >100V	350V 5A
MTP5N40	MTP5N40	MOSFETs N	Power >100V	400V 5A
MTP6N10	MTP6N10	MOSFETs N	Power <=100V	100V 6A
MTP6N60E	MP6N60E	MOSFETs N	Power >100V	600V 6A
MTP75N05	MTP75N05	MOSFETs N	Power <=100V	50V 75A
MTP7N20	MTP7N20	MOSFETs N	Power >100V	200V 7A
MTP8N45	MTP8N45	MOSFETs N	Power >100V	450V 8A
MTP8N50	MTP8N50	MOSFETs N	Power >100V	500V 8A
MTW14N50E	MW14N50E	MOSFETs N	Power >100V	500V 14A
MTW20N50E	MW20N50E	MOSFETs N	Power >100V	500V 20A
MTW32N20E	MW32N20E	MOSFETs N	Power >100V	200V 32A
RF1S25N06	RF1S25N06	MOSFETs N	Power <=100V	harris 60V 25A 0.047ohm
RF1S45N06	RF1S45N06	MOSFETs N	Power <=100V	harris 60V 45A 0.028ohm
RF1S50N06	RF1S50N06	MOSFETs N	Power <=100V	harris 60V 50A 0.022ohm
RF1S70N03	RF1S70N03	MOSFETs N	Power <=100V	harris 30V 70A 0.01ohm
RF1S70N06	RF1S70N06	MOSFETs N	Power <=100V	harris 60V 70A 0.014ohm
RFD16N06	RFD16N06	MOSFETs N	Power <=100V	harris 60V 16A 0.047ohm
RFF70N06	RFF70N06	MOSFETs N	Power <=100V	harris 25V 25A 0.025ohm
RFG50N06	RFG50N06	MOSFETs N	Power <=100V	harris 60V 50A 0.022ohm
RFL2N05	RFL2N05	MOSFETs N	Power <=100V	50V 2A
RFL2N06	RFL2N06	MOSFETs N	Power <=100V	60V 2A
RFL4N12	RFL4N12	MOSFETs N	Power >100V	120V 4A
RFL4N15	RFL4N15	MOSFETs N	Power >100V	150V 4A
RFP14N05	RFP14N05	MOSFETs N	Power <=100V	harris 50V 14A 0.0857ohm
RFP14N06	RFP14N06	MOSFETs N	Power <=100V	harris 60V 14A 0.0857ohm
RFP4N05	RFP4N05	MOSFETs N	Power <=100V	50V 4A
RFP4N06	RFP4N06	MOSFETs N	Power <=100V	60V 4A
RFP50N06	RFP50N06	MOSFETs N	Power <=100V	harris 60V 50A 0.022ohm
SDF9N100	SDF9N100	MOSFETs N	Power >100V	1000V 9A
SI4410N	SI4410N	MOSFETs N	SILICONIX	30V 13.5mohms 10A
SI4412N	SI4412N	MOSFETs N	SILICONIX	30V 28mohms 7A
SI6426N	SI6426N	MOSFETs N	SILICONIX	20V 35mohms 5.4A
SI6434N	SI6434N	MOSFETs N	SILICONIX	30V 28mohms 7A
SI6436N	SI6436N	MOSFETs N	SILICONIX	30V 45MOHM 4.4A
SI6542N	SI6542N	MOSFETs N	SILICONIX	20V 2.5A 90MOHM
SI6552N	SI6552N	MOSFETs N	SILICONIX	20V 2.8A 80MOHM
SI6801N	SI6801N	MOSFETs N	SILICONIX	20V 1.9A 160MOHM
SI6946N	SI6946N	MOSFETs N	SILICONIX	20V 2.8A 80MOHM

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
SI6954N	SI6954N	MOSFETs N	SILICONIX	30V 3.9A 65MOHM
SI6956N	SI6956N	MOSFETs N	SILICONIX	20V 2.5A 90MOHM
SI9410N	SI9410N	MOSFETs N	SILICONIX	30V 7A .03
SI9426N	SI9426N	MOSFETs N	SILICONIX	20V 10A 135MOHM
SI9925N	SI9925N	MOSFETs N	Siliconix	20V 5A 50mOhm
SI9928N	SI9928N	MOSFETs N	SILICONIX	20V 2A 50MOHM
SI9936N	SI9936N	MOSFETs N	Siliconix	30V 5A 50mOhm
SI9939N	SI9939N	MOSFETs N	SILICONIX	30V 3.5A 50mOHM
SI9940N	SI9940N	MOSFETs N	SILICONIX	20V 5.3A.042
SI9942N	SI9942N	MOSFETs N	SILICONIX	20V 2.5A .11
SI9945N	SI9945N	MOSFETs N	SILICONIX	20V 3.3A .1
SI9952N	SI9952N	MOSFETs N	SILICONIX	25V 3.5A 0.1 OHM
SI9955N	SI9955N	MOSFETs N	SILICONIX	50V 3A .11
SI9956N	SI9956N	MOSFETs N	SILICONIX	20V 3.5A .08
SI9958N	SI9958N	MOSFETs N	SILICONIX	20V 3.5A .1
SI9959N	SI9959N	MOSFETs N	SILICONIX	20V 2A.23
SMP60N10	SMP60N10	MOSFETs N	SILICONIX	60V 60A 10MOHM
SUD_30N	SUD_30N	MOSFETs N	SILICONIX	30V 30A 30MOHM
SUP_06N	SUP_06N	MOSFETs N	SILICONIX	60V 75A 6MOHM
SUP_08N	SUP_08N	MOSFETs N	SILICONIX	60V 75A 8MOHM
SUP_14N	SUP_14N	MOSFETs N	SILICONIX	60V 70A 14MOHM
SUP_18N	SUP_18N	MOSFETs N	SILICONIX	60V 60A 18MOHM
SUP60N18	SUP60N18	MOSFETs N	Siliconix	60V 60A 18mOhm trench
SUP70N14	SUP70N14	MOSFETs N	Siliconix	60V 70A 14mOhm trench
SUP75N08	SUP75N08	MOSFETs N	Siliconix	60V 75A 8mOhm trench
TD9944	TD9944	MOSFETs N	Power >100V	SUPERTEX 240V 3A 4ohm
TN0102N2	TN0102N2	MOSFETs N	Power <=100V	20V 1.25A
TN0102N3	TN0102N3	MOSFETs N	Power <=100V	20V 0.8A
TN0104N2	TN0104N2	MOSFETs N	Power <=100V	40V 1.25A
TN0104N3	TN0104N3	MOSFETs N	Power <=100V	40V 0.8A
TN0104N8	TN0104N8	MOSFETs N	Power <=100V	40V 0.42A
TN0106N2	TN0106N2	MOSFETs N	Power <=100V	SUPERTEX 60V 3A 1.6ohm
TN0106N3	TN0106N3	MOSFETs N	Power <=100V	SUPERTEX 60V 3A 1.6ohm
TN0110N2	TN0110N2	MOSFETs N	Power <=100V	SUPERTEX 100V 3A 1.6ohm
TN0110N3	TN0110N3	MOSFETs N	Power <=100V	SUPERTEX 100V 3A 1.6ohm
TN0520N2	TN0520N2	MOSFETs N	Power >100V	SUPERTEX 200V 1A 7ohm
TN0520N3	TN0520N3	MOSFETs N	Power >100V	SUPERTEX 200V 1A 7ohm
TN0524N2	TN0524N2	MOSFETs N	Power >100V	SUPERTEX 240V 1A 7ohm
TN0524N3	TN0524N3	MOSFETs N	Power >100V	SUPERTEX 240V 1A 7ohm
TN0535	TN0535	MOSFETs N	Power >100V	SUPERTEX 350V 1A 19ohm
TN0540	TN0540	MOSFETs N	Power >100V	SUPERTEX 400V 1A 19ohm
TN0602N2	TN0602N2	MOSFETs N	Power <=100V	20V 2.5A
TN0602N3	TN0602N3	MOSFETs N	Power <=100V	20V 1A
TN0604N2	TN0604N2	MOSFETs N	Power <=100V	40V 2.5A
TN0604N3	TN0604N3	MOSFETs N	Power <=100V	40V 1A
TN0606N2	TN0606N2	MOSFETs N	Power <=100V	SUPERTEX 60V 7A 1ohm
TN0606N3	TN0606N3	MOSFETs N	Power <=100V	SUPERTEX 60V 7A 1ohm
TN0606N5	TN0606N5	MOSFETs N	Power <=100V	SUPERTEX 60V 7A 1ohm
TN0606N6	TN0606N6	MOSFETs N	Power <=100V	SUPERTEX 60V 7A 1ohm
TN0610N2	TN0610N2	MOSFETs N	Power <=100V	SUPERTEX 100V 7A 1ohm
TN0610N3	TN0610N3	MOSFETs N	Power <=100V	SUPERTEX 100V 7A 1ohm
TN0610N5	TN0610N5	MOSFETs N	Power <=100V	SUPERTEX 100V 7A 1ohm
TN0610N6	TN0610N6	MOSFETs N	Power <=100V	SUPERTEX 100V 7A 1ohm
TN0620N2	TN0620N2	MOSFETs N	Power >100V	SUPERTEX 200V 1A 4ohm
TN0620N3	TN0620N3	MOSFETs N	Power >100V	SUPERTEX 200V 1A 4ohm
TN0624N2	TN0624N2	MOSFETs N	Power >100V	SUPERTEX 240V 1A 4ohm
TN0624N3	TN0624N3	MOSFETs N	Power >100V	SUPERTEX 240V 1A 4ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
TN0635	TN0635	MOSFETs N	Power >100V	SUPERTEX 350V 2A 7ohm
TN0640	TN0640	MOSFETs N	Power >100V	SUPERTEX 400V 2A 7ohm
TN0702	TN0702	MOSFETs N	Power <=100V	SUPERTEX 20V 1A 1ohm
TN2101	TN2101	MOSFETs N	Power <=100V	SUPERTEX 15V 0A 7ohm
TN2106K1	TN2106K1	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 2.5ohm
TN2106N3	TN2106N3	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 2.5ohm
TN2124	TN2124	MOSFETs N	Power >100V	SUPERTEX 240V 0A 10ohm
TN2130	TN2130	MOSFETs N	Power >100V	SUPERTEX 300V 0A 25ohm
TN2501	TN2501	MOSFETs N	Power <=100V	SUPERTEX 18V 1A 2.5ohm
TN2502	TN2502	MOSFETs N	Power <=100V	SUPERTEX 20V 4A 0.8ohm
TN2504	TN2504	MOSFETs N	Power <=100V	SUPERTEX 40V 4A 0.8ohm
TN2506	TN2506	MOSFETs N	Power <=100V	SUPERTEX 60V 6A 1ohm
TN2510	TN2510	MOSFETs N	Power <=100V	SUPERTEX 100V 6A 1ohm
TN2520	TN2520	MOSFETs N	Power >100V	SUPERTEX 200V 3A 4ohm
TN2524	TN2524	MOSFETs N	Power >100V	SUPERTEX 240V 3A 4ohm
TN2535	TN2535	MOSFETs N	Power >100V	SUPERTEX 350V 1A 8ohm
TN2540	TN2540	MOSFETs N	Power >100V	SUPERTEX 400V 1A 8ohm
TN2635	TN2635	MOSFETs N	Power >100V	SUPERTEX 350V 4A 3ohm
TN2640LG	TN2640LG	MOSFETs N	Power >100V	SUPERTEX 400V 4A 3ohm
TN2640N3	TN2640N3	MOSFETs N	Power >100V	SUPERTEX 400V 4A 3ohm
V30061	V30061	MOSFETs N	SILICONIX	30V 9A 16.5MOHM
VN0104N2	VN0104N2	MOSFETs N	Power <=100V	SUPERTEX 40V 2A 2.5ohm
VN0104N3	VN0104N3	MOSFETs N	Power <=100V	SUPERTEX 40V 2A 2.5ohm
VN0104N5	VN0104N5	MOSFETs N	Power <=100V	SUPERTEX 40V 2A 2.5ohm
VN0104N6	VN0104N6	MOSFETs N	Power <=100V	SUPERTEX 40V 2A 2.5ohm
VN0104N9	VN0104N9	MOSFETs N	Power <=100V	SUPERTEX 40V 2A 2.5ohm
VN0106N2	VN0106N2	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 2.5ohm
VN0106N3	VN0106N3	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 2.5ohm
VN0106N5	VN0106N5	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 2.5ohm
VN0106N6	VN0106N6	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 2.5ohm
VN0106N9	VN0106N9	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 2.5ohm
VN0109N2	VN0109N2	MOSFETs N	Power <=100V	SUPERTEX 90V 2A 2.5ohm
VN0109N3	VN0109N3	MOSFETs N	Power <=100V	SUPERTEX 90V 2A 2.5ohm
VN0109N5	VN0109N5	MOSFETs N	Power <=100V	SUPERTEX 90V 2A 2.5ohm
VN0109N9	VN0109N9	MOSFETs N	Power <=100V	SUPERTEX 90V 2A 2.5ohm
VN0335N1	VN0335N1	MOSFETs N	Power >100V	SUPERTEX 350V 6A 1.8ohm
VN0335N2	VN0335N2	MOSFETs N	Power >100V	SUPERTEX 350V 6A 1.8ohm
VN0335N5	VN0335N5	MOSFETs N	Power >100V	SUPERTEX 350V 6A 1.8ohm
VN0340N1	VN0340N1	MOSFETs N	Power >100V	SUPERTEX 400V 6A 1.8ohm
VN0340N2	VN0340N2	MOSFETs N	Power >100V	SUPERTEX 400V 6A 1.8ohm
VN0340N5	VN0340N5	MOSFETs N	Power >100V	SUPERTEX 400V 6A 1.8ohm
VN0345N1	VN0345N1	MOSFETs N	Power >100V	SUPERTEX 450V 6A 2.8ohm
VN0345N2	VN0345N2	MOSFETs N	Power >100V	SUPERTEX 450V 6A 2.8ohm
VN0345N5	VN0345N5	MOSFETs N	Power >100V	SUPERTEX 450V 6A 2.8ohm
VN0350N1	VN0350N1	MOSFETs N	Power >100V	SUPERTEX 500V 6A 2.8ohm
VN0350N2	VN0350N2	MOSFETs N	Power >100V	SUPERTEX 500V 6A 2.8ohm
VN0350N5	VN0350N5	MOSFETs N	Power >100V	SUPERTEX 500V 6A 2.8ohm
VN0355N1	VN0355N1	MOSFETs N	Power >100V	SUPERTEX 550V 3A 4ohm
VN0355N5	VN0355N5	MOSFETs N	Power >100V	SUPERTEX 550V 3A 4ohm
VN0360N1	VN0360N1	MOSFETs N	Power >100V	SUPERTEX 600V 3A 4ohm
VN0360N5	VN0360N5	MOSFETs N	Power >100V	SUPERTEX 600V 3A 4ohm
VN0535N2	VN0535N2	MOSFETs N	Power >100V	SUPERTEX 350V 0A 25ohm
VN0535N3	VN0535N3	MOSFETs N	Power >100V	SUPERTEX 350V 0A 25ohm
VN0540N2	VN0540N2	MOSFETs N	Power >100V	SUPERTEX 400V 0A 25ohm
VN0540N3	VN0540N3	MOSFETs N	Power >100V	SUPERTEX 400V 0A 25ohm
VN0545N2	VN0545N2	MOSFETs N	Power >100V	SUPERTEX 450V 0A 40ohm
VN0545N3	VN0545N3	MOSFETs N	Power >100V	SUPERTEX 450V 0A 40ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
VN0550N2	VN0550N2	MOSFETs N	Power >100V	SUPERTEX 500V 0A 40ohm
VN0550N3	VN0550N3	MOSFETs N	Power >100V	SUPERTEX 500V 0A 40ohm
VN0606	VN0606	MOSFETs N	Power <=100V	SUPERTEX 60V 2A 3ohm
VN0610	VN0610	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 5ohm
VN0635N2	VN0635N2	MOSFETs N	Power >100V	SUPERTEX 350V 1A 8ohm
VN0635N3	VN0635N3	MOSFETs N	Power >100V	SUPERTEX 350V 1A 8ohm
VN0635N5	VN0635N5	MOSFETs N	Power >100V	SUPERTEX 350V 1A 8ohm
VN0640N2	VN0640N2	MOSFETs N	Power >100V	SUPERTEX 400V 1A 8ohm
VN0640N3	VN0640N3	MOSFETs N	Power >100V	SUPERTEX 400V 1A 8ohm
VN0640N5	VN0640N5	MOSFETs N	Power >100V	SUPERTEX 400V 1A 8ohm
VN0645N2	VN0645N2	MOSFETs N	Power >100V	SUPERTEX 450V 1A 11ohm
VN0645N3	VN0645N3	MOSFETs N	Power >100V	SUPERTEX 450V 1A 11ohm
VN0645N5	VN0645N5	MOSFETs N	Power >100V	SUPERTEX 450V 1A 11ohm
VN0650N2	VN0650N2	MOSFETs N	Power >100V	SUPERTEX 500V 1A 11ohm
VN0650N3	VN0650N3	MOSFETs N	Power >100V	SUPERTEX 500V 1A 11ohm
VN0650N5	VN0650N5	MOSFETs N	Power >100V	SUPERTEX 500V 1A 11ohm
VN0655N2	VN0655N2	MOSFETs N	Power >100V	SUPERTEX 550V 1A 16ohm
VN0655N3	VN0655N3	MOSFETs N	Power >100V	SUPERTEX 550V 1A 16ohm
VN0655N5	VN0655N5	MOSFETs N	Power >100V	SUPERTEX 550V 1A 16ohm
VN0660N2	VN0660N2	MOSFETs N	Power >100V	SUPERTEX 600V 1A 16ohm
VN0660N3	VN0660N3	MOSFETs N	Power >100V	SUPERTEX 600V 1A 16ohm
VN0660N5	VN0660N5	MOSFETs N	Power >100V	SUPERTEX 600V 1A 16ohm
VN0808	VN0808	MOSFETs N	Power <=100V	SUPERTEX 80V 2A 4ohm
VN10KN3	VN10KN3	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 5ohm
VN10KN9	VN10KN9	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 5ohm
VN10LF	VN10LF	MOSFETs N	Power <=100V	
VN1206B	VN1206B	MOSFETs N	Power >100V	SUPERTEX 120V 1A 6ohm
VN1206L	VN1206L	MOSFETs N	Power >100V	SUPERTEX 120V 1A 6ohm
VN1210L	VN1210L	MOSFETs N	Power >100V	SUPERTEX 120V 1A 10ohm
VN1304N2	VN1304N2	MOSFETs N	Power <=100V	SUPERTEX 40V 1A 5ohm
VN1304N3	VN1304N3	MOSFETs N	Power <=100V	SUPERTEX 40V 1A 5ohm
VN1306N2	VN1306N2	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 5ohm
VN1306N3	VN1306N3	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 5ohm
VN1310N2	VN1310N2	MOSFETs N	Power <=100V	SUPERTEX 100V 1A 5ohm
VN1310N3	VN1310N3	MOSFETs N	Power <=100V	SUPERTEX 100V 1A 5ohm
VN1310N8	VN1310N8	MOSFETs N	Power <=100V	SUPERTEX 100V 1A 5ohm
VN1706B	VN1706B	MOSFETs N	Power >100V	SUPERTEX 170V 1A 6ohm
VN1706D	VN1706D	MOSFETs N	Power >100V	SUPERTEX 170V 1A 6ohm
VN1706L	VN1706L	MOSFETs N	Power >100V	SUPERTEX 170V 1A 6ohm
VN1710L	VN1710L	MOSFETs N	Power >100V	SUPERTEX 170V 1A 10ohm
VN2010L	VN2010L	MOSFETs N	Power >100V	SUPERTEX 200V 0A 10ohm
VN2106N3	VN2106N3	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 3ohm
VN2110K1	VN2110K1	MOSFETs N	Power <=100V	SUPERTEX 100V 1A 3ohm
VN2110N3	VN2110N3	MOSFETs N	Power <=100V	SUPERTEX 100V 1A 3ohm
VN2206N2	VN2206N2	MOSFETs N	Power <=100V	SUPERTEX 60V 17A 0.27ohm
VN2206N3	VN2206N3	MOSFETs N	Power <=100V	SUPERTEX 60V 17A 0.27ohm
VN2210N2	VN2210N2	MOSFETs N	Power <=100V	SUPERTEX 100V 17A .27ohm
VN2210N3	VN2210N3	MOSFETs N	Power <=100V	SUPERTEX 100V 17A .27ohm
VN2220N2	VN2220N2	MOSFETs N	Power >100V	SUPERTEX 200V 10A 0.9ohm
VN2220N3	VN2220N3	MOSFETs N	Power >100V	SUPERTEX 200V 10A 0.9ohm
VN2222LL	VN2222LL	MOSFETs N	Power <=100V	SUPERTEX 60V 1A 7.5ohm
VN2222NC	VN2222NC	MOSFETs N	Power >100V	SUPERTEX 220V 10A 0.9ohm
VN2224N2	VN2224N2	MOSFETs N	Power >100V	SUPERTEX 240V 10A 0.9ohm
VN2224N3	VN2224N3	MOSFETs N	Power >100V	SUPERTEX 240V 10A 0.9ohm
VN2406B	VN2406B	MOSFETs N	Power >100V	SUPERTEX 240V 1A 6ohm
VN2406D	VN2406D	MOSFETs N	Power >100V	SUPERTEX 240V 1A 6ohm
VN2406L	VN2406L	MOSFETs N	Power >100V	SUPERTEX 240V 1A 6ohm

Power MOSFETs (N-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
VN2410L	VN2410L	MOSFETs N	Power >100V	SUPERTEX 240V 1A 10ohm
VN2780LG	VN2780LG	MOSFETs N	Power >100V	SUPERTEX 800V 0A 16ohm
VN3012L	VN3012L	MOSFETs N	Power >100V	SUPERTEX 300V 0A 12ohm
VN3205N3	VN3205N3	MOSFETs N	Power <=100V	SUPERTEX 50V 14A 0.3ohm
VN3205N6	VN3205N6	MOSFETs N	Power <=100V	SUPERTEX 50V 14A 0.3ohm
VN3205N8	VN3205N8	MOSFETs N	Power <=100V	SUPERTEX 50V 14A 0.3ohm
VN3515L	VN3515L	MOSFETs N	Power >100V	350V .15A
VN4012B	VN4012B	MOSFETs N	Power >100V	400V .18A
VN4012L	VN4012L	MOSFETs N	Power >100V	400V .16A
ZVN0124	ZVN0124	MOSFETs N	Power <=100V	
ZVN2106	ZVN2106	MOSFETs N	Power <=100V	
ZVN2106G	ZVN2106G	MOSFETs N	Power <=100V	
ZVN3306	ZVN3306	MOSFETs N	Power <=100V	
ZVN3306F	ZVN3306F	MOSFETs N	Power <=100V	
ZVN4106	ZVN4106	MOSFETs N	Power <=100V	
ZVN4210	ZVN4210	MOSFETs N	Power <=100V	
ZVN4310	ZVN4310	MOSFETs N	Power <=100V	

Power MOSFETs (P-Channel) [235]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
2SJ162	MSJ162	MOSFETs P	Power	160V 7A
2SJ50	MSJ50	MOSFETs P	Power	160V 7A
IRF9130	IRF9130	MOSFETs P	Power	100V 13A
IRF9131	IRF9131	MOSFETs P	Power	60V 13A
IRF9132	IRF9132	MOSFETs P	Power	100V 11A
IRF9133	IRF9133	MOSFETs P	Power	60V 11A
IRF9510	IRF9510	MOSFETs P	Power <=100V	IR 100V 4A 1.2ohm
IRF9520	IRF9520	MOSFETs P	Power <=100V	IR 100V 7A 0.6ohm
IRF9530	IRF9530	MOSFETs P	Power	100V 7A
IRF9531	IRF9531	MOSFETs P	Power	60V 7A
IRF9532	IRF9532	MOSFETs P	Power	100V 6A
IRF9533	IRF9533	MOSFETs P	Power	60V 6A
IRF9540	IRF9540	MOSFETs P	Power <=100V	IR 100V 19A 0.2ohm
IRF9610	IRF9610	MOSFETs P	Power >100V	IR 200V 2A 3ohm
IRF9610S	IRF9610S	MOSFETs P	Power >100V	IR 200V 2A 3ohm
IRF9620	IRF9620	MOSFETs P	Power >100V	IR 200V 4A 1.5ohm
IRF9620S	IRF9620S	MOSFETs P	Power >100V	IR 200V 4A 1.5ohm
IRF9630	IRF9630	MOSFETs P	Power >100V	IR 200V 6A 0.8ohm
IRF9630S	IRF9630S	MOSFETs P	Power >100V	IR 200V 6A 0.8ohm
IRF9640	IRF9640	MOSFETs P	Power >100V	IR 200V 11A 0.5ohm
IRF9640S	IRF9640S	MOSFETs P	Power >100V	IR 200V 11A 0.5ohm
IRF9Z14	IRF9Z14	MOSFETs P	Power <=100V	IR 60V 7A 0.5ohm
IRF9Z14S	IRF9Z14S	MOSFETs P	Power <=100V	IR 60V 7A 0.5ohm
IRF9Z24	IRF9Z24	MOSFETs P	Power <=100V	IR 60V 11A 0.28ohm
IRF9Z24S	IRF9Z24S	MOSFETs P	Power <=100V	IR 60V 11A 0.28ohm
IRF9Z34	IRF9Z34	MOSFETs P	Power <=100V	IR 60V 18A 0.14ohm
IRF9Z34S	IRF9Z34S	MOSFETs P	Power <=100V	IR 60V 18A 0.14ohm
IRFD9014	IRFD9014	MOSFETs P	Power <=100V	IR 60V 1A 0.5ohm
IRFD9024	IRFD9024	MOSFETs P	Power <=100V	IR 60V 2A 0.28ohm
IRFD9110	IRFD9110	MOSFETs P	Power <=100V	IR 100V 1A 1.2ohm
IRFD9120	IRFD9120	MOSFETs P	Power <=100V	IR 100V 1A 0.6ohm
IRFD9210	IRFD9210	MOSFETs P	Power >100V	IR 200V 0A 3ohm
IRFD9220	IRFD9220	MOSFETs P	Power >100V	IR 200V 1A 1.5ohm
IRFI9520G	IRFI9520G	MOSFETs P	Power <=100V	ir 100V 5A 0.6ohm

Power MOSFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
IRFI9530G	IRFI9530G	MOSFETs P	Power <=100V	ir 100V 8A 0.3ohm
IRFI9540G	IRFI9540G	MOSFETs P	Power <=100V	ir 100V 11A 0.2ohm
IRFI9620G	IRFI9620G	MOSFETs P	Power >100V	ir 200V 3A 1.5ohm
IRFI9630G	IRFI9630G	MOSFETs P	Power >100V	ir 200V 4A 0.8ohm
IRFI9640G	IRFI9640G	MOSFETs P	Power >100V	ir 200V 6A 0.5ohm
IRFI9Z14G	IRFI9Z14G	MOSFETs P	Power <=100V	ir 60V 5A 0.5ohm
IRFI9Z24G	IRFI9Z24G	MOSFETs P	Power <=100V	ir 60V 8A 0.28ohm
IRFI9Z34G	IRFI9Z34G	MOSFETs P	Power <=100V	ir 60V 12A 0.14ohm
IRFIP9140	IRFIP9140	MOSFETs P	Power <=100V	IR 100V 15A 0.2ohm
IRFIP9240	IRFIP9240	MOSFETs P	Power >100V	IR 200V 9A 0.5ohm
IRFL9014	IRFL9014	MOSFETs P	Power <=100V	IR 60V 2A 0.5ohm
IRFL9110	IRFL9110	MOSFETs P	Power <=100V	IR 100V 1A 1.2ohm
IRFP9140	IRFP9140	MOSFETs P	Power <=100V	IR 100V 21A 0.2ohm
IRFP9240	IRFP9240	MOSFETs P	Power	200V 12A 0.5ohm
IRFR9014	IRFR9014	MOSFETs P	Power <=100V	IR 60V 5A 0.5ohm
IRFR9024	IRFR9024	MOSFETs P	Power <=100V	IR 60V 9A 0.28ohm
IRFR9110	IRFR9110	MOSFETs P	Power <=100V	IR 100V 3A 1.2ohm
IRFR9120	IRFR9120	MOSFETs P	Power <=100V	IR 100V 6A 0.6ohm
IRFR9210	IRFR9210	MOSFETs P	Power >100V	IR 200V 2A 3ohm
IRFR9220	IRFR9220	MOSFETs P	Power >100V	IR 200V 4A 1.5ohm
IRFU9014	IRFU9014	MOSFETs P	Power <=100V	IR 60V 5A 0.5ohm
IRFU9024	IRFU9024	MOSFETs P	Power <=100V	IR 60V 9A 0.28ohm
IRFU9110	IRFU9110	MOSFETs P	Power <=100V	IR 100V 3A 1.2ohm
IRFU9210	IRFU9210	MOSFETs P	Power >100V	IR 200V 2A 3ohm
IRFU9220	IRFU9220	MOSFETs P	Power >100V	harris 200V 4A 0.333ohm
LP0701LG	LP0701LG	MOSFETs P	Power <=100V	SUPERTEX 16V 2A 1.3ohm
LP0701N3	LP0701N3	MOSFETs P	Power <=100V	SUPERTEX 16V 2A 1.3ohm
LP0801	LP0801	MOSFETs P	Power <=100V	SUPERTEX 16V 12ohm
MTD4P05	MTD4P05	MOSFETs P	Power	50V 4A
MTD4P06	MTD4P06	MOSFETs P	Power	60V 4A
MTM12P10	MTM12P10	MOSFETs P	Power	100V 12A
MTM2P45	MTM2P45	MOSFETs P	Power	450V 2A
MTM2P50	MTM2P50	MOSFETs P	Power	500V 2A
MTM8P08	MTM8P08	MOSFETs P	Power	80V 8A
MTM8P10	MTM8P10	MOSFETs P	Power	100V 8A
MTP12P06	MTP12P06	MOSFETs P	Power	60V 12A
MTP12P10	MTP12P10	MOSFETs P	Power	100V 12A
MTP2P45	MTP2P45	MOSFETs P	Power	450V 2A
MTP2P50	MTP2P50	MOSFETs P	Power	500V 2A
MTP3P25	MTP3P25	MOSFETs P	Power	250V 3A
MTP5P25	MTP5P25	MOSFETs P	Power	250V 5A
MTP7P06	MTP7P06	MOSFETs P	Power	60V 7A
MTP8P08	MTP8P08	MOSFETs P	Power	80V 8A
MTP8P10	MTP8P10	MOSFETs P	Power	100V 8A
RFD15P05	RFD15P05	MOSFETs P	Power <=100V	Harris 50V 15A 0.08ohm
RFD15P06	RFD15P06	MOSFETs P	Power <=100V	Harris 60V 15A 0.08ohm
RFD30P06	RFD30P06	MOSFETs P	Power <=100V	Harris 60V 30A 0.04ohm
RFD8P06	RFD8P06	MOSFETs P	Power <=100V	Harris 60V 8A 0.15ohm
RFG30P05	RFG30P05	MOSFETs P	Power <=100V	Harris 50V 30A 0.04ohm
RFG60P05	RFG60P05	MOSFETs P	Power <=100V	Harris 50V 60A 0.02ohm
RFG60P06	RFG60P06	MOSFETs P	Power <=100V	Harris 60V 60A 0.02ohm
RFP15P05	RFP15P05	MOSFETs P	Power <=100V	Harris 50V 15A 0.08ohm
RFP15P06	RFP15P06	MOSFETs P	Power <=100V	Harris 60V 15A 0.08ohm
RFP30P05	RFP30P05	MOSFETs P	Power <=100V	Harris 50V 30A 0.04ohm
RFP30P06	RFP30P06	MOSFETs P	Power <=100V	Harris 60V 30A 0.04ohm
RFP8P06	RFP8P06	MOSFETs P	Power <=100V	harris 60V 8A 0.15ohm
SI4425P	SI4425P	MOSFETs P	SILICONIX	30V 14mohms 10A

Power MOSFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
SI4431P	SI4431P	MOSFETs P	SILICONIX	30V 40mohms 5.8A
SI4435P	SI4435P	MOSFETs P	SILICONIX	30V 20mohms 8A
SI6433P	SI6433P	MOSFETs P	SILICONIX	12V 60mohms 4A
SI6447P	SI6447P	MOSFETs P	SILICONIX	20V 3A 90MOHM
SI6542P	SI6542P	MOSFETs P	SILICONIX	20V 1.9A 175MOHM
SI6552P	SI6552P	MOSFETs P	SILICONIX	12V 2.5A 100MOHM
SI6801P	SI6801P	MOSFETs P	SILICONIX	20V 1.7A 190MOHM
SI6943p	SI6943P	MOSFETs P	SILICONIX	12V 2.5A 100MOHM
SI6953P	SI6953P	MOSFETs P	SILICONIX	20V 1.9A 170MOHM
SI9400P	SI9400P	MOSFETs P	SILICONIX	20V 2.5A .16
SI9405P	SI9405P	MOSFETs P	SILICONIX	20V 4.3A .07
SI9407P	SI9407P	MOSFETs P	SILICONIX	60V 3A 150MOHM
SI9424P	SI9424P	MOSFETs P	SILICONIX	12V 7.7A 25MOHM
SI9430P	SI9430P	MOSFETs P	SILICONIX	20V 5.8A .05
SI9434P	SI9434P	MOSFETs P	SILICONIX	12V 6.4A .04 OHM
SI9435P	SI9435P	MOSFETs P	SILICONIX	30V 5.5A 55MOHM
SI9529N	SI9529N	MOSFETs P	SILICONIX	20V 6A 30MOHM
SI9529P	SI9529P	MOSFETs P	SILICONIX	12V 5A 50MOHM
SI9928P	SI9928P	MOSFETs P	SILICONIX	20V 3.4A 110MOHM
SI9933P	SI9933P	MOSFETs P	SILICONIX	20V 3.4A 110MOHM
SI9934P	SI9934P	MOSFETs P	SILICONIX	12V 5A 50MOHM
SI9939P	SI9939P	MOSFETs P	SILICONIX	30V 3.5A 100MOHM
SI9948P	SI9948P	MOSFETs P	Siliconix	60V 2A .28
SI9950P	SI9950P	MOSFETs P	SILICONIX	20V 2A .3
SI9952P	SI9952P	MOSFETs P	SILICONIX	25V 2.3A 0.25 OHM
SI9953P	SI9953P	MOSFETs P	SILICONIX	20V 2.3A .16
SI9958P	SI9958P	MOSFETs P	Siliconix	20V 3.5A .1
SUP_20P	SUP_20P	MOSFETs P	SILICONIX	60V 65A 20MOHM
SUP65P20	SUP65P20	MOSFETs P	Siliconix	60V 65A 20mOhm trench
TP0102N2	TP0102N2	MOSFETs P	Power <=100V	SUPERTEX 20V 2A 2.5ohm
TP0102N3	TP0102N3	MOSFETs P	Power <=100V	SUPERTEX 20V 2A 2.5ohm
TP0104N2	TP0104N2	MOSFETs P	Power <=100V	SUPERTEX 40V 2A 2.5ohm
TP0104N3	TP0104N3	MOSFETs P	Power <=100V	SUPERTEX 40V 2A 2.5ohm
TP0104N8	TP0104N8	MOSFETs P	Power <=100V	SUPERTEX 40V 2A 2.5ohm
TP0602N2	TP0602N2	MOSFETs P	Power <=100V	SUPERTEX 20V 3A 1.5ohm
TP0602N3	TP0602N3	MOSFETs P	Power <=100V	SUPERTEX 20V 3A 1.5ohm
TP0604N2	TP0604N2	MOSFETs P	Power <=100V	SUPERTEX 40V 3A 1.5ohm
TP0604N3	TP0604N3	MOSFETs P	Power <=100V	SUPERTEX 40V 3A 1.5ohm
TP0604WG	TP0604WG	MOSFETs P	Power <=100V	SUPERTEX 40V 3A 1.5ohm
TP0606N2	TP0606N2	MOSFETs P	Power <=100V	SUPERTEX 60V 2A 3ohm
TP0606N3	TP0606N3	MOSFETs P	Power <=100V	SUPERTEX 60V 2A 3ohm
TP0606N5	TP0606N5	MOSFETs P	Power <=100V	SUPERTEX 60V 2A 3ohm
TP0606N6	TP0606N6	MOSFETs P	Power <=100V	SUPERTEX 60V 2A 3ohm
TP0610N2	TP0610N2	MOSFETs P	Power <=100V	SUPERTEX 100V 2A 3ohm
TP0610N3	TP0610N3	MOSFETs P	Power <=100V	SUPERTEX 100V 2A 3ohm
TP0610N5	TP0610N5	MOSFETs P	Power <=100V	SUPERTEX 100V 2A 3ohm
TP0610P	TP0610P	MOSFETs P	Siliconix	60V, 0.18A, 10ohm
TP0610T	TP0610T	MOSFETs P	Power <=100V	SUPERTEX 60V 0A 25ohm
TP0616N2	TP0616N2	MOSFETs P	Power >100V	SUPERTEX 160V 1A 7ohm
TP0616N3	TP0616N3	MOSFETs P	Power >100V	SUPERTEX 160V 1A 7ohm
TP0616N5	TP0616N5	MOSFETs P	Power >100V	SUPERTEX 160V 1A 7ohm
TP0620N2	TP0620N2	MOSFETs P	Power >100V	SUPERTEX 200V 1A 7ohm
TP0620N3	TP0620N3	MOSFETs P	Power >100V	SUPERTEX 200V 1A 7ohm
TP0620N5	TP0620N5	MOSFETs P	Power >100V	SUPERTEX 200V 1A 7ohm
TP2105K1	TP2105K1	MOSFETs P	Power <=100V	SUPERTEX 50V 1A 6ohm
TP2105N3	TP2105N3	MOSFETs P	Power <=100V	SUPERTEX 50V 1A 6ohm
TP2502	TP2502	MOSFETs P	Power <=100V	SUPERTEX 20V 3A 1.5ohm

Power MOSFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
TP2504	TP2504	MOSFETs P	Power <=100V	SUPERTEX 40V 3A 1.5ohm
TP2506	TP2506	MOSFETs P	Power <=100V	SUPERTEX 60V 2A 2ohm
TP2510	TP2510	MOSFETs P	Power <=100V	SUPERTEX 100V 2A 2ohm
TP2516	TP2516	MOSFETs P	Power >100V	SUPERTEX 160V 2A 8ohm
TP2520	TP2520	MOSFETs P	Power >100V	SUPERTEX 200V 2A 8ohm
TP2535N3	TP2535N3	MOSFETs P	Power >100V	SUPERTEX 350V 1A 19ohm
TP2540N3	TP2540N3	MOSFETs P	Power >100V	SUPERTEX 400V 1A 19ohm
TP2540N8	TP2540N8	MOSFETs P	Power >100V	SUPERTEX 400V 1A 19ohm
TP2635N3	TP2635N3	MOSFETs P	Power >100V	SUPERTEX 350V 1A 11ohm
TP2640LG	TP2640LG	MOSFETs P	Power >100V	SUPERTEX 400V 1A 11ohm
TP2640N3	TP2640N3	MOSFETs P	Power >100V	SUPERTEX 400V 1A 11ohm
VP0104N2	VP0104N2	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 6ohm
VP0104N3	VP0104N3	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 6ohm
VP0104N5	VP0104N5	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 6ohm
VP0104N6	VP0104N6	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 6ohm
VP0104N9	VP0104N9	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 6ohm
VP0106N2	VP0106N2	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 6ohm
VP0106N3	VP0106N3	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 6ohm
VP0106N5	VP0106N5	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 6ohm
VP0106N6	VP0106N6	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 6ohm
VP0106N9	VP0106N9	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 6ohm
VP0109N2	VP0109N2	MOSFETs P	Power <=100V	SUPERTEX 90V 1A 6ohm
VP0109N5	VP0109N5	MOSFETs P	Power <=100V	SUPERTEX 90V 1A 6ohm
VP0109N9	VP0109N9	MOSFETs P	Power <=100V	SUPERTEX 90V 1A 6ohm
VP0116N2	VP0116N2	MOSFETs P	Power >100V	SUPERTEX 160V 1A 15ohm
VP0116N3	VP0116N3	MOSFETs P	Power >100V	SUPERTEX 160V 1A 15ohm
VP0116N5	VP0116N5	MOSFETs P	Power >100V	SUPERTEX 160V 1A 15ohm
VP0120N2	VP0120N2	MOSFETs P	Power >100V	SUPERTEX 200V 1A 15ohm
VP0120N3	VP0120N3	MOSFETs P	Power >100V	SUPERTEX 200V 1A 15ohm
VP0120N5	VP0120N5	MOSFETs P	Power >100V	SUPERTEX 200V 1A 15ohm
VP0300B	VP0300B	MOSFETs P	Power <=100V	SUPERTEX 30V 2A 2.5ohm
VP0300L	VP0300L	MOSFETs P	Power <=100V	SUPERTEX 30V 2A 2.5ohm
VP0335N1	VP0335N1	MOSFETs P	Power >100V	SUPERTEX 350V 4A 4.5ohm
VP0335N2	VP0335N2	MOSFETs P	Power >100V	SUPERTEX 350V 4A 4.5ohm
VP0335N5	VP0335N5	MOSFETs P	Power >100V	SUPERTEX 350V 4A 4.5ohm
VP0340N1	VP0340N1	MOSFETs P	Power >100V	SUPERTEX 400V 4A 4.5ohm
VP0340N2	VP0340N2	MOSFETs P	Power >100V	SUPERTEX 400V 4A 4.5ohm
VP0340N5	VP0340N5	MOSFETs P	Power >100V	SUPERTEX 400V 4A 4.5ohm
VP0345N1	VP0345N1	MOSFETs P	Power >100V	SUPERTEX 450V 3A 5.5ohm
VP0345N2	VP0345N2	MOSFETs P	Power >100V	SUPERTEX 450V 3A 5.5ohm
VP0345N5	VP0345N5	MOSFETs P	Power >100V	SUPERTEX 450V 3A 5.5ohm
VP0350N1	VP0350N1	MOSFETs P	Power >100V	SUPERTEX 500V 3A 5.5ohm
VP0350N2	VP0350N2	MOSFETs P	Power >100V	SUPERTEX 500V 3A 5.5ohm
VP0350N5	VP0350N5	MOSFETs P	Power >100V	SUPERTEX 500V 3A 5.5ohm
VP0535N2	VP0535N2	MOSFETs P	Power >100V	SUPERTEX 350V 0A 45ohm
VP0535N3	VP0535N3	MOSFETs P	Power >100V	SUPERTEX 350V 0A 45ohm
VP0540N2	VP0540N2	MOSFETs P	Power >100V	SUPERTEX 400V 0A 45ohm
VP0540N3	VP0540N3	MOSFETs P	Power >100V	SUPERTEX 400V 0A 45ohm
VP0545N2	VP0545N2	MOSFETs P	Power >100V	SUPERTEX 450V 0A 80ohm
VP0545N3	VP0545N3	MOSFETs P	Power >100V	SUPERTEX 450V 0A 80ohm
VP0550N2	VP0550N2	MOSFETs P	Power >100V	SUPERTEX 500V 0A 80ohm
VP0550N3	VP0550N3	MOSFETs P	Power <=100V	SUPERTEX 500V 0A 80ohm
VP0635	VP0635	MOSFETs P	Power >100V	SUPERTEX 350V 1A 19ohm
VP0635N3	VP0635N3	MOSFETs P	Power >100V	SUPERTEX 350V 1A 19ohm
VP0635N5	VP0635N5	MOSFETs P	Power >100V	SUPERTEX 350V 1A 19ohm
VP0640N2	VP0640N2	MOSFETs P	Power >100V	SUPERTEX 400V 1A 19ohm
VP0640N3	VP0640N3	MOSFETs P	Power >100V	SUPERTEX 400V 1A 19ohm
VP0640N5	VP0640N5	MOSFETs P	Power >100V	SUPERTEX 400V 1A 19ohm

Power MOSFETs (P-Channel) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Drain, Gate, Source]
VP0645N2	VP0645N2	MOSFETs P	Power >100V	SUPERTEX 450V 1A 22ohm
VP0645N3	VP0645N3	MOSFETs P	Power >100V	SUPERTEX 450V 1A 22ohm
VP0645N5	VP0645N5	MOSFETs P	Power >100V	SUPERTEX 450V 1A 22ohm
VP0650N2	VP0650N2	MOSFETs P	Power >100V	SUPERTEX 500V 1A 22ohm
VP0650N3	VP0650N3	MOSFETs P	Power >100V	SUPERTEX 500V 1A 22ohm
VP0650N5	VP0650N5	MOSFETs P	Power >100V	SUPERTEX 500V 1A 22ohm
VP0808B	VP0808B	MOSFETs P	Power <=100V	SUPERTEX 80V 1A 5ohm
VP0808L	VP0808L	MOSFETs P	Power <=100V	SUPERTEX 80V 1A 5ohm
VP1008B	VP1008B	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 5ohm
VP1008L	VP1008L	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 5ohm
VP1304N2	VP1304N2	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 19ohm
VP1304N3	VP1304N3	MOSFETs P	Power <=100V	SUPERTEX 40V 1A 19ohm
VP1306N2	VP1306N2	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 19ohm
VP1306N3	VP1306N3	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 19ohm
VP1310N2	VP1310N2	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 19ohm
VP1310N3	VP1310N3	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 19ohm
VP1310N8	VP1310N8	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 19ohm
VP2106N3	VP2106N3	MOSFETs P	Power <=100V	SUPERTEX 60V 1A 9ohm
VP2110K1	VP2110K1	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 9ohm
VP2110N3	VP2110N3	MOSFETs P	Power <=100V	SUPERTEX 100V 1A 9ohm
VP2206N2	VP2206N2	MOSFETs P	Power <=100V	SUPERTEX 60V 9A 0.75ohm
VP2206N3	VP2206N3	MOSFETs P	Power <=100V	SUPERTEX 60V 9A 0.75ohm
VP2210N2	VP2210N2	MOSFETs P	Power <=100V	SUPERTEX 100V 9A 0.75ohm
VP2210N3	VP2210N3	MOSFETs P	Power <=100V	SUPERTEX 100V 9A 0.75ohm
VP3203N3	VP3203N3	MOSFETs P	Power <=100V	SUPERTEX 30V 14A 0.6ohm
VP3203N8	VP3203N8	MOSFETs P	Power <=100V	SUPERTEX 30V 14A 0.6ohm
ZVP2106	ZVP2106	MOSFETs P	Power	
ZVP2106G	ZVP2106G	MOSFETs P	Power	
ZVP3306	ZVP3306	MOSFETs P	Power	

SCRs [271]

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Gate, Cath.]
2N1595	SN1595	SCRs	General	50V 1.6A
2N1596	SN1596	SCRs	General	100V 1.6A
2N1597	SN1597	SCRs	General	200V 1.6A
2N1599	SN1599	SCRs	General	400V 1.6A
2N1843	SN1843	SCRs	General	50V 14A
2N1844	SN1844	SCRs	General	100V 14A
2N1846	SN1846	SCRs	General	200V 14A
2N1849	SN1849	SCRs	General	400V 14A
2N2322	SN2322	SCRs	General	25V 1.6A
2N2323	SN2323	SCRs	General	50V 1.6A
2N2324	SN2324	SCRs	General	100V 1.6A
2N2326	SN2326	SCRs	General	200V 1.6A
2N2329	SN2329	SCRs	General	400V 1.6A
2N2574	SN2574	SCRs	General	50V 25A
2N3027	SN3027	SCRs	General	30V .5A
2N3870	SN3870	SCRs	General	100V 35A
2N3871	SN3871	SCRs	General	200V 35A
2N3872	SN3872	SCRs	General	400V 35A
2N3873	SN3873	SCRs	General	600V 35A
2N3884	SN3884	SCRs	General	50V 50A
2N5060	SN5060	SCRs	General	30V .8A
2N5061	SN5061	SCRs	General	60V .8A
2N5062	SN5062	SCRs	General	100V .8A
2N5063	2N5063	SCRs	TECCOR	150V 0.8A
2N5064	2N5064	SCRs	TECCOR	200V 0.8A
2N5724	SN5724	SCRs	General	60V 1.6A
2N6171	SN6171	SCRs	General	100V 35A
2N6172	SN6172	SCRs	General	200V 35A
2N6173	SN6173	SCRs	General	400V 35A
2N6174	SN6174	SCRs	General	600V 35A
2N6397	SN6397	SCRs	General	450V 12A
2N6564	2N6564	SCRs	TECCOR	300V 0.8A
2N6565	2N6565	SCRs	TECCOR	400V 0.8A
2N682	SN682	SCRs	General	50V 25A
2N683	SN683	SCRs	General	100V 25A
2N685	SN685	SCRs	General	200V 25A
2N688	SN688	SCRs	General	400V 25A
2N690	SN690	SCRs	General	600V 25A
2N692	SN692	SCRs	General	800V 25A
BTW38-600R	BTW38	SCRs	General	600V 16A
BTW68-100	BTW68100	SCRs	General	1000V 30A
BTW68-120	BTW68120	SCRs	General	1200V 30A
BTW68-200	BTW68200	SCRs	General	200V 30A
BTW68-400	BTW68400	SCRs	General	400V 30A
BTW68-600	BTW68600	SCRs	General	600V 30A
BTW68-800	BTW68800	SCRs	General	800V 30A
C180A	C180	SCRs	General	100V 150A
EC103A	EC103A	SCRs	TECCOR	100V 0.8A
EC103A1	EC103A1	SCRs	TECCOR	100V 0.8A
EC103A2	EC103A2	SCRs	TECCOR	100V 0.8A
EC103A3	EC103A3	SCRs	TECCOR	100V 0.8A
EC103B	EC103B	SCRs	TECCOR	200V 0.8A
EC103B1	EC103B1	SCRs	TECCOR	200V 0.8A
EC103B2	EC103B2	SCRs	TECCOR	200V 0.8A
EC103B3	EC103B3	SCRs	TECCOR	200V 0.8A
EC103C	EC103C	SCRs	TECCOR	300V 0.8A
EC103C1	EC103C1	SCRs	TECCOR	300V 0.8A
EC103C2	EC103C2	SCRs	TECCOR	300V 0.8A

SCRs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Gate, Cath.]
EC103C3	EC103C3	SCRs	TECCOR	300V 0.8A
EC103D	EC103D	SCRs	TECCOR	400V 0.8A
EC103D1	EC103D1	SCRs	TECCOR	400V 0.8A
EC103D2	EC103D2	SCRs	TECCOR	400V 0.8A
EC103D3	EC103D3	SCRs	TECCOR	400V 0.8A
EC103E	EC103E	SCRs	TECCOR	500V 0.8A
EC103E1	EC103E1	SCRs	TECCOR	500V 0.8A
EC103E2	EC103E2	SCRs	TECCOR	500V 0.8A
EC103E3	EC103E3	SCRs	TECCOR	500V 0.8A
EC103M	EC103M	SCRs	TECCOR	600V 0.8A
EC103M1	EC103M1	SCRs	TECCOR	600V 0.8A
EC103M2	EC103M2	SCRs	TECCOR	600V 0.8A
EC103M3	EC103M3	SCRs	TECCOR	600V 0.8A
EC113A	EC113A	SCRs	TECCOR	100V 0.8A
EC113A3	EC113A3	SCRs	TECCOR	100V 0.8A
EC113B	EC113B	SCRs	TECCOR	200V 0.8A
EC113B3	EC113B3	SCRs	TECCOR	200V 0.8A
EC113C	EC113C	SCRs	TECCOR	300V 0.8A
EC113C3	EC113C3	SCRs	TECCOR	300V 0.8A
EC113D	EC113D	SCRs	TECCOR	400V 0.8A
EC113D3	EC113D3	SCRs	TECCOR	400V 0.8A
EC113E	EC113E	SCRs	TECCOR	500V 0.8A
EC113E3	EC113E3	SCRs	TECCOR	500V 0.8A
EC113M	EC113M	SCRs	TECCOR	600V 0.8A
EC113M3	EC113M3	SCRs	TECCOR	600V 0.8A
GA300	GA300	SCRs	General	60V 100A
GA301	GA301	SCRs	General	100V 100A
MCR22-2	MCR222	SCRs	General	50V 1.5A
MCR3896	MCR3896	SCRs	General	100V 35A
MCR3897	MCR3897	SCRs	General	200V 35A
MCR3898	MCR3898	SCRs	General	400V 35A
MCR3899	MCR3899	SCRs	General	600V 35A
MCR65-6	MCR65_6	SCRs	General	400V 55A
MCR703	MCR703	SCRs	General	100V 4A
MCTA75P60E1	M75P60E1	SCRs	MOS Controlled	
MCTV75P60E	MCT75P60	SCRs	MOS Controlled	600V 75A
S0503LS1	S0503LS1	SCRs	TECCOR	50V 3A
S0503LS2	S0503LS2	SCRs	TECCOR	50V 3A
S0503LS3	S0503LS3	SCRs	TECCOR	50V 3A
S0504F1	S0504F1	SCRs	TECCOR	50V 4A
S0506L	S0506L	SCRs	TECCOR	50V 6A
S0506LS2	S0506LS2	SCRs	TECCOR	50V 6A
S0506LS3	S0506LS3	SCRs	TECCOR	50V 6A
S0508L	S0508L	SCRs	TECCOR	50V 8A
S0508LS2	S0508LS2	SCRs	TECCOR	50V 8A
S0508LS3	S0508LS3	SCRs	TECCOR	50V 8A
S0510L	S0510L	SCRs	TECCOR	50V 10A
S0510LS2	S0510LS2	SCRs	TECCOR	50V 10A
S0510LS3	S0510LS3	SCRs	TECCOR	50V 10A
S0510R	S0510R	SCRs	TECCOR	50V 10A
S0512R	S0512R	SCRs	TECCOR	50V 12A
S0515L	S0515L	SCRs	TECCOR	50V 15A
S0516R	S0516R	SCRs	TECCOR	50V 16A
S051E	S051E	SCRs	TECCOR	50V 1A
S0520L	S0520L	SCRs	TECCOR	50V 20A
S0525L	S0525L	SCRs	TECCOR	50V 25A
S0535J	S0535J	SCRs	TECCOR	50V 35A
S0540R	S0540R	SCRs	TECCOR	50V 40A
S0555R	S0555R	SCRs	TECCOR	50V 55A

SCRs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Gate, Cath.]
S0565J	S0565J	SCRs	TECCOR	50V 65A
S0570W	S0570W	SCRs	TECCOR	50V 70A
S1003LS1	S1003LS1	SCRs	TECCOR	100V 3A
S1003LS2	S1003LS2	SCRs	TECCOR	100V 3A
S1003LS3	S1003LS3	SCRs	TECCOR	100V 3A
S1004F1	S1004F1	SCRs	TECCOR	100V 4A
S1006L	S1006L	SCRs	TECCOR	100V 6A
S1006LS2	S1006LS2	SCRs	TECCOR	100V 6A
S1006LS3	S1006LS3	SCRs	TECCOR	100V 6A
S1008L	S1008L	SCRs	TECCOR	100V 8A
S1008LS2	S1008LS2	SCRs	TECCOR	100V 8A
S1008LS3	S1008LS3	SCRs	TECCOR	100V 8A
S1010L	S1010L	SCRs	TECCOR	100V 10A
S1010LS2	S1010LS2	SCRs	TECCOR	100V 10A
S1010LS3	S1010LS3	SCRs	TECCOR	100V 10A
S1010R	S1010R	SCRs	TECCOR	100V 10A
S1012R	S1012R	SCRs	TECCOR	100V 12A
S1015L	S1015L	SCRs	TECCOR	100V 15A
S1016R	S1016R	SCRs	TECCOR	100V 16A
S101E	S101E	SCRs	TECCOR	100V 1A
S1020L	S1020L	SCRs	TECCOR	100V 20A
S1025L	S1025L	SCRs	TECCOR	100V 25A
S1035J	S1035J	SCRs	TECCOR	100V 35A
S1040R	S1040R	SCRs	TECCOR	100V 40A
S1055R	S1055R	SCRs	TECCOR	100V 55A
S1065J	S1065J	SCRs	TECCOR	100V 65A
S1070W	S1070W	SCRs	TECCOR	100V 70A
S2003LS1	S2003LS1	SCRs	TECCOR	200V 3A
S2003LS2	S2003LS2	SCRs	TECCOR	200V 3A
S2003LS3	S2003LS3	SCRs	TECCOR	200V 3A
S2004F1	S2004F1	SCRs	TECCOR	200V 4A
S2006L	S2006L	SCRs	TECCOR	200V 6A
S2006LS2	S2006LS2	SCRs	TECCOR	200V 6A
S2006LS3	S2006LS3	SCRs	TECCOR	200V 6A
S2008L	S2008L	SCRs	TECCOR	200V 8A
S2008LS2	S2008LS2	SCRs	TECCOR	200V 8A
S2008LS3	S2008LS3	SCRs	TECCOR	200V 8A
S2010L	S2010L	SCRs	TECCOR	200V 10A
S2010LS2	S2010LS2	SCRs	TECCOR	200V 10A
S2010LS3	S2010LS3	SCRs	TECCOR	200V 10A
S2010R	S2010R	SCRs	TECCOR	200V 10A
S2012R	S2012R	SCRs	TECCOR	200V 12A
S2015L	S2015L	SCRs	TECCOR	200V 15A
S2016R	S2016R	SCRs	TECCOR	200V 16A
S201E	S201E	SCRs	TECCOR	200V 1A
S2020L	S2020L	SCRs	TECCOR	200V 20A
S2025L	S2025L	SCRs	TECCOR	200V 25A
S2035J	S2035J	SCRs	TECCOR	200V 35A
S2040R	S2040R	SCRs	TECCOR	200V 40A
S2055R	S2055R	SCRs	TECCOR	200V 55A
S2065J	S2065J	SCRs	TECCOR	200V 65A
S2070W	S2070W	SCRs	TECCOR	200V 70A
S3701M	S3701M	SCRs	General	600V 5A
S4003LS1	S4003LS1	SCRs	TECCOR	400V 3A
S4003LS2	S4003LS2	SCRs	TECCOR	400V 3A
S4003LS3	S4003LS3	SCRs	TECCOR	400V 3A
S4004F1	S4004F1	SCRs	TECCOR	400V 4A
S4006L	S4006L	SCRs	TECCOR	400V 6A
S4006LS2	S4006LS2	SCRs	TECCOR	400V 6A

SCRs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Gate, Cath.]
S4006LS3	S4006LS3	SCRs	TECCOR	400V 6A
S4008L	S4008L	SCRs	TECCOR	400V 8A
S4008LS2	S4008LS2	SCRs	TECCOR	400V 8A
S4008LS3	S4008LS3	SCRs	TECCOR	400V 8A
S4010L	S4010L	SCRs	TECCOR	400V 10A
S4010LS2	S4010LS2	SCRs	TECCOR	400V 10A
S4010LS3	S4010LS3	SCRs	TECCOR	400V 10A
S4010R	S4010R	SCRs	TECCOR	400V 10A
S4012R	S4012R	SCRs	TECCOR	400V 12A
S4013PH	S4013PH	SCRs	General	1000V 40A
S4013VH	S4013VH	SCRs	General	1200V 40A
S4015L	S4015L	SCRs	TECCOR	400V 15A
S4016R	S4016R	SCRs	TECCOR	400V 16A
S401E	S401E	SCRs	TECCOR	400V 1A
S4020L	S4020L	SCRs	TECCOR	400V 20A
S4025L	S4025L	SCRs	TECCOR	400V 25A
S4035J	S4035J	SCRs	TECCOR	400V 35A
S4040R	S4040R	SCRs	TECCOR	400V 40A
S4055R	S4055R	SCRs	TECCOR	400V 55A
S4060A	S4060A	SCRs	General	100V 10A
S4065J	S4065J	SCRs	TECCOR	400V 65A
S4070W	S4070W	SCRs	TECCOR	400V 70A
S6003LS1	S6003LS1	SCRs	TECCOR	600V 3A
S6003LS2	S6003LS2	SCRs	TECCOR	600V 3A
S6003LS3	S6003LS3	SCRs	TECCOR	600V 3A
S6004F1	S6004F1	SCRs	TECCOR	600V 4A
S6006L	S6006L	SCRs	TECCOR	600V 6A
S6006LS2	S6006LS2	SCRs	TECCOR	600V 6A
S6006LS3	S6006LS3	SCRs	TECCOR	600V 6A
S6008L	S6008L	SCRs	TECCOR	600V 8A
S6008LS2	S6008LS2	SCRs	TECCOR	600V 8A
S6008LS3	S6008LS3	SCRs	TECCOR	600V 8A
S6010L	S6010L	SCRs	TECCOR	600V 10A
S6010LS2	S6010LS2	SCRs	TECCOR	600V 10A
S6010LS3	S6010LS3	SCRs	TECCOR	600V 10A
S6010R	S6010R	SCRs	TECCOR	600V 10A
S6012R	S6012R	SCRs	TECCOR	600V 12A
S6015L	S6015L	SCRs	TECCOR	600V 15A
S6016R	S6016R	SCRs	TECCOR	600V 16A
S601E	S601E	SCRs	TECCOR	600V 1A
S6020L	S6020L	SCRs	TECCOR	600V 20A
S6025L	S6025L	SCRs	TECCOR	600V 25A
S6035J	S6035J	SCRs	TECCOR	600V 35A
S6040R	S6040R	SCRs	TECCOR	600V 40A
S6055R	S6055R	SCRs	TECCOR	600V 55A
S6065J	S6065J	SCRs	TECCOR	600V 65A
S6070W	S6070W	SCRs	TECCOR	600V 70A
S8006L	S8006L	SCRs	TECCOR	800V 6A
S8008L	S8008L	SCRs	TECCOR	800V 8A
S8010L	S8010L	SCRs	TECCOR	800V 10A
S8010R	S8010R	SCRs	TECCOR	800V 10A
S8012R	S8012R	SCRs	TECCOR	800V 12A
S8015L	S8015L	SCRs	TECCOR	800V 15A
S8016R	S8016R	SCRs	TECCOR	800V 16A
S8020L	S8020L	SCRs	TECCOR	800V 20A
S8025L	S8025L	SCRs	TECCOR	800V 25A
S8035J	S8035J	SCRs	TECCOR	800V 35A
S8040R	S8040R	SCRs	TECCOR	800V 40A

SCRs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: Anode, Gate, Cath.]
S8055R	S8055R	SCRs	TECCOR	800V 55A
S8065J	S8065J	SCRs	TECCOR	800V 65A
S8070W	S8070W	SCRs	TECCOR	800V 70A
T106A1	T106A1	SCRs	TECCOR	100V 4A
T106B1	T106B1	SCRs	TECCOR	200V 4A
T106C1	T106C1	SCRs	TECCOR	300V 4A
T106D1	T106D1	SCRs	TECCOR	400V 4A
T106E1	T106E1	SCRs	TECCOR	500V 4A
T106F1	T106F1	SCRs	TECCOR	50V 4A
T106M1	T106M1	SCRs	TECCOR	600V 4A
T107A1	T107A1	SCRs	TECCOR	100V 4A
T107B1	T107B1	SCRs	TECCOR	200V 4A
T107C1	T107C1	SCRs	TECCOR	300V 4A
T107D1	T107D1	SCRs	TECCOR	400V 4A
T107E1	T107E1	SCRs	TECCOR	500V 4A
T107F1	T107F1	SCRs	TECCOR	50V 4A
T107M1	T107M1	SCRs	TECCOR	600V 4A
T76004	T76004	SCRs	General	400V 300A
TCR222	TCR222	SCRs	TECCOR	50V 1.5A
TCR223	TCR223	SCRs	TECCOR	100V 1.5A
TCR224	TCR224	SCRs	TECCOR	200V 1.5A
TCR226	TCR226	SCRs	TECCOR	400V 1.5A
TCR228	TCR228	SCRs	TECCOR	600V 1.5A
TIC106A	TIC106A	SCRs	General	100V 3.2A
TIC106B	TIC106B	SCRs	General	200V 3.2A
TIC106C	TIC106C	SCRs	General	300V 3.2A
TIC106D	TIC106D	SCRs	General	400V 3.2A
TIC106E	TIC106E	SCRs	General	500V 3.2A
TIC106F	TIC106F	SCRs	General	50V 3.2A
TIC106M	TIC106M	SCRs	General	600V 3.2A
TN023RH02	S023RH02	SCRs	General	200V 48A
TN023RH04	S023RH04	SCRs	General	400V 48A
TN023RH06	S023RH06	SCRs	General	600V 48A
TN023RH08	S023RH08	SCRs	General	800V 48A
TN023RH10	S023RH10	SCRs	General	1000V 48A
TN023RH12	S023RH12	SCRs	General	1200V 48A
TN023RH15	S023RH15	SCRs	General	1500V 48A

Part #	Subcircuit Name & SPICENET Symbol	[Connections] & PRESPICE Parameters
SCR	SCR	[A, G, K]
SCRG	SCRG	[A, K, G]
		RON On Resistance in ohms
		ROFF Off Resistance in ohms
		IH - Holding Current in Amps
		IGT - Gate Turn-On Current in Amp
		ALPHA Firing Time in Degrees
		PER - Period for firing pulse in sec
		PW Firing pulse width in sec
		ICGATE Initial Gate voltage in volts
MBS4991	MBS4991	Motorola silicon bilateral switch
DIAC	DIAC	Generic DIAC Model

All of the SCR models arein the SCR.LIB file.

Triacs [252]

TRIAC	TRIAC			[MT2, MT1, Gate] **IH** Holding current in amps **IGT** Gate current in amp **VON** VAK min in volts

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: MT2, Gate, MT1]
2N5444	2N5444	TRIACS	MOTOROLA	200V 40A
2N5445	2N5445	TRIACS	MOTOROLA	400V 40A
2N5446	2N5446	TRIACS	MOTOROLA	600V 40A
2N5567	2N5567	TRIACS	MOTOROLA	200V 10A
2N5568	2N5568	TRIACs	MOTOROLA	400V 10A
2N5571	2N5571	TRIACS	MOTOROLA	200V 15A
2N5572	2N5572	TRIACS	MOTOROLA	400V 15A
2N6147	2N6147	TRIACS	MOTOROLA	600V 15A
2N6157	2N6157	TRIACS	MOTOROLA	200V 30A
2N6158	2N6158	TRIACS	MOTOROLA	400V 30A
2N6159	2N6159	TRIACS	MOTOROLA	600V 30A
2N6342	2N6342	TRIACS	MOTOROLA	200V 8A
2N6342A	2N6342A	TRIACS	MOTOROLA	200V 12A
2N6343	2N6343	TRIACS	MOTOROLA	400V 8A
2N6343A	2N6343A	TRIACS	MOTOROLA	400V 12A
2N6344	2N6344	TRIACS	MOTOROLA	600V 8A
2N6344A	2N6344A	TRIACS	MOTOROLA	600V 12A
2N6345	2N6345	TRIACS	MOTOROLA	800V 8A
2N6345A	2N6345A	TRIACS	MOTOROLA	800V 12A
BT134-500	BT134-500	TRIACS	PHILIPS	500V 4A
BT134-600	BT134-600	TRIACS	PHILIPS	600V 4A
BT134-700	BT134-700	TRIACS	PHILIPS	700V 4A
BT134-800	BT134-800	TRIACS	PHILIPS	800V 4A
BT134W-500	BT134W-500	TRIACS	PHILIPS	500V 1A
BT134W-600	BT134W-600	TRIACS	PHILIPS	600V 1A
BT134W-700	BT134W-700	TRIACS	PHILIPS	700V 1A
BT134W-800	BT134W-800	TRIACS	PHILIPS	800V 1A
BT136-500	BT136-500	TRIACS	PHILIPS	500V 4A
BT136-600	BT136-600	TRIACS	PHILIPS	600V 4A
BT136-700	BT136-700	TRIACS	PHILIPS	700V 4A
BT136-800	BT136-800	TRIACS	PHILIPS	800V 4A
BTA4400A	BTA4400A	TRIACS	SGS-THOMSON	400V 4A
BTA4400D	BTA4400D	TRIACS	SGS-THOMSON	400V 4A
BTA4400S	BTA4400S	TRIACS	SGS-THOMSON	400V 4A
BTA4400T	BTA4400T	TRIACS	SGS-THOMSON	400V 4A
BTA4600A	BTA4600A	TRIACS	SGS-THOMSON	600V 4A
BTA4600D	BTA4600D	TRIACS	SGS-THOMSON	600V 4A
BTA4600S	BTA4600S	TRIACS	SGS-THOMSON	600V 4A
BTA4600T	BTA4600T	TRIACS	SGS-THOMSON	600V 4A
BTA4700A	BTA4700A	TRIACS	SGS-THOMSON	700V 4A
BTA4700D	BTA4700D	TRIACS	SGS-THOMSON	700V 4A
BTA4700S	BTA4700S	TRIACS	SGS-THOMSON	700V 4A
BTA4700T	BTA4700T	TRIACS	SGS-THOMSON	700V 4A
L2002L8	L2002L8	TRIACS	TECCOR	200V 8A
L2004L3	L2004L3	TRIACS	TECCOR	200V 4A
L2004L5	L2004L5	TRIACS	TECCOR	200V 4A
L2004L6	L2004L6	TRIACS	TECCOR	200V 4A
L2004L8	L2004L8	TRIACS	TECCOR	200V 4A
L2006L5	L2006L5	TRIACS	TECCOR	200V 6A
L2006L6	L2006L6	TRIACS	TECCOR	200V 6A
L2006L8	L2006L8	TRIACS	TECCOR	200V 6A
L2008L6	L2008L6	TRIACS	TECCOR	200V 8A

Triacs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: MT2, Gate, MT1]
L201E3	L201E3	TRIACS	TECCOR	200V 1A
L201E5	L201E5	TRIACS	TECCOR	200V 1A
L201E6	L201E6	TRIACS	TECCOR	200V 1A
L201E8	L201E8	TRIACS	TECCOR	200V 1A
L4004L3	L4004L3	TRIACS	TECCOR	400V 4A
L4004L5	L4004L5	TRIACS	TECCOR	400V 4A
L4004L6	L4004L6	TRIACS	TECCOR	400V 4A
L4004L8	L4004L8	TRIACS	TECCOR	400V 4A
L4006L5	L4006L5	TRIACS	TECCOR	400V 6A
L4006L6	L4006L6	TRIACS	TECCOR	400V 6A
L4006L8	L4006L8	TRIACS	TECCOR	400V 6A
L4008L6	L4008L6	TRIACS	TECCOR	400V 8A
L4008L8	L4008L8	TRIACS	TECCOR	600V 8A
L401E3	L401E3	TRIACS	TECCOR	400V 1A
L401E5	L401E5	TRIACS	TECCOR	400V 1A
L401E6	L401E6	TRIACS	TECCOR	400V 1A
L401E8	L401E8	TRIACS	TECCOR	400V 1A
L6004L3	L6004L3	TRIACS	TECCOR	600V 4A
L6004L5	L6004L5	TRIACS	TECCOR	600V 4A
L6004L6	L6004L6	TRIACS	TECCOR	400V 4A
L6004L8	L6004L8	TRIACS	TECCOR	600V 4A
L6006L5	L6006L5	TRIACS	TECCOR	600V 6A
L6006L6	L6006L6	TRIACS	TECCOR	600V 6A
L6006L8	L6006L8	TRIACS	TECCOR	600V 6A
L6008L6	L6008L6	TRIACS	TECCOR	800V 8A
L601E3	L601E3	TRIACS	TECCOR	600V 1A
L601E5	L601E5	TRIACS	TECCOR	600V 1A
L601E6	L601E6	TRIACS	TECCOR	600V 1A
L601E8	L601E8	TRIACS	TECCOR	600V 1A
MAC1518	MAC1518	TRIACS	MOTOROLA	600V 15A
MAC15A10	MAC15A10	TRIACS	MOTOROLA	800V 15A
MAC15A4	MAC15A4	TRIACS	MOTOROLA	200V 15A
MAC15A6	MAC15A6	TRIACS	MOTOROLA	400V 15A
MAC15A6F	MAC15A6F	TRIACS	MOTOROLA	400V 15A
MAC15A8	MAC15A8	TRIACS	MOTOROLA	600V 15A
MAC15A8F	MAC15A8F	TRIACS	MOTOROLA	600V 15A
MAC16-10	MAC16-10	TRIACS	MOTOROLA	800V 15A
MAC16-4	MAC16-4	TRIACS	MOTOROLA	200V 15A
MAC16-6	MAC16-6	TRIACS	MOTOROLA	400V 15A
MAC16-8	MAC16-8	TRIACS	MOTOROLA	600V 15A
MAC210-10	MAC210-10	TRIACS	MOTOROLA	800V 10A
MAC210-4	MAC210-4	TRIACS	MOTOROLA	200V 10A
MAC210-6	MAC210-6	TRIACS	MOTOROLA	400V 10A
MAC210-8	MAC210-8	TRIACS	MOTOROLA	600V 10A
MAC212-10	MAC212-10	TRIACS	MOTOROLA	800V 12A
MAC212-4	MAC212-4	TRIACS	MOTOROLA	200V 12A
MAC212-6	MAC212-6	TRIACS	MOTOROLA	400V 12A
MAC212-8	MAC212-8	TRIACS	MOTOROLA	600V 12A
MAC218-10	MAC218-10	TRIACS	MOTOROLA	800V 8A
MAC218-4	MAC218-4	TRIACS	MOTOROLA	200V 8A
MAC218-6	MAC218-6	TRIACS	MOTOROLA	400V 8A
MAC218-8	MAC218-8	TRIACS	MOTOROLA	600V 8A
MAC218A10	MAC218A10	TRIACS	MOTOROLA	800V 8A
MAC218A4	MAC218A4	TRIACS	MOTOROLA	200V 8A
MAC218A6	MAC218A6	TRIACS	MOTOROLA	400V 8A
MAC218A8	MAC218A8	TRIACS	MOTOROLA	600V 8A
MAC219-10	MAC219-10	TRIACS	MOTOROLA	800V 8A
MAC219-4	MAC219-4	TRIACS	MOTOROLA	200V 8A

Triacs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: MT2, Gate, MT1]
MAC219-6	MAC219-6	TRIACS	MOTOROLA	400V 8A
MAC219-8	MAC219-8	TRIACS	MOTOROLA	600V 8A
MAC223-10	MAC223-10	TRIACS	MOTOROLA	800V 25A
MAC223-4	MAC223-4	TRIACS	MOTOROLA	200V 25A
MAC223-6	MAC223-6	TRIACS	MOTOROLA	400V 25A
MAC223-8	MAC223-8	TRIACS	MOTOROLA	600V 25A
MAC224-10	MAC224-10	TRIACS	MOTOROLA	800V 40A
MAC224-4	MAC224-4	TRIACS	MOTOROLA	200V 40A
MAC224-6	MAC224-6	TRIACS	MOTOROLA	400V 40A
MAC224-8	MAC224-8	TRIACS	MOTOROLA	600V 40A
MAC228-10	MAC228-10	TRIACS	MOTOROLA	800V 8A
MAC228-4	MAC228-4	TRIACS	MOTOROLA	200V 8A
MAC228-6	MAC228-6	TRIACS	MOTOROLA	400V 8A
MAC228-8	MAC228-8	TRIACS	MOTOROLA	600V 8A
MAC229-10	MAC229-10	TRIACS	MOTOROLA	800V 8A
MAC229-4	MAC229-4	TRIACS	MOTOROLA	200V 8A
MAC229-6	MAC229-6	TRIACS	MOTOROLA	400V 8A
MAC229-8	MAC229-8	TRIACS	MOTOROLA	600V 8A
MAC245B	MAC245B	TRIACS	MOTOROLA	200V 10A
MAC245D	MAC245D	TRIACS	MOTOROLA	400V 10A
MAC245M	MAC245M	TRIACS	MOTOROLA	600V 10A
MAC245N	MAC245N	TRIACS	MOTOROLA	800V 10A
MAC250B	MAC250B	TRIACS	MOTOROLA	200V 15A
MAC250D	MAC250D	TRIACS	MOTOROLA	400V 15A
MAC250M	MAC250M	TRIACS	MOTOROLA	600V 15A
MAC250N	MAC250N	TRIACS	MOTOROLA	800V 15A
MAC301-8	MAC301-8	TRIACS	MOTOROLA	600V 10A
MAC310-4	MAC310-4	TRIACS	MOTOROLA	200V 10A
MAC310-6	MAC310-6	TRIACS	MOTOROLA	400V 10A
MAC320-10	MAC320-10	TRIACS	MOTOROLA	800V 20A
MAC320-4	MAC320-4	TRIACS	MOTOROLA	200V 20A
MAC320-6	MAC320-6	TRIACS	MOTOROLA	400V 20A
MAC320-8	MAC320-8	TRIACS	MOTOROLA	600V 20A
MAC321-10	MAC321-10	TRIACS	MOTOROLA	800V 20A
MAC321-4	MAC321-4	TRIACS	MOTOROLA	200V 20A
MAC321-6	MAC321-6	TRIACS	MOTOROLA	400V 20A
MAC321-8	MAC321-8	TRIACS	MOTOROLA	600V 20A
MAC4111M	MAC4111M	TRIACS	MOTOROLA	600V 10A
MAC4120B	MAC4120B	TRIACS	MOTOROLA	200V 15A
MAC4120D	MAC4120D	TRIACS	MOTOROLA	400V 15A
MAC4120M	MAC4120M	TRIACS	MOTOROLA	600V 15A
MAC4120N	MAC4120N	TRIACS	MOTOROLA	800V 15A
MAC4121N	MAC4121N	TRIACS	MOTOROLA	800V 10A
MAC625-4	MAC625-4	TRIACS	MOTOROLA	200V 25A
MAC625-6	MAC625-6	TRIACS	MOTOROLA	400V 25A
MAC625-8	MAC625-8	TRIACS	MOTOROLA	600V 25A
MAC635-4	MAC635-4	TRIACS	MOTOROLA	200V 35A
MAC635-6	MAC635-6	TRIACS	MOTOROLA	400V 35A
MAC635-8	MAC635-8	TRIACS	MOTOROLA	600V 35A
MAC6400B	MAC6400B	TRIACS	MOTOROLA	200V 40A
MAC6400D	MAC6400D	TRIACS	MOTOROLA	400V 40A
MAC6400M	MAC6400M	TRIACS	MOTOROLA	600V 40A
MAC6400N	MAC6400N	TRIACS	MOTOROLA	800V 40A
MAC6401B	MAC6401B	TRIACS	MOTOROLA	200V 30A
MAC6401D	MAC6401D	TRIACS	MOTOROLA	400V 30A
MAC6401M	MAC6401M	TRIACS	MOTOROLA	600V 30A
MAC6401N	MAC6401N	TRIACS	MOTOROLA	800V 30A
MAC97-4	MAC97-4	TRIACS	MOTOROLA	200V 0.6A

Triacs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: MT2, Gate, MT1]
MAC97-6	MAC97-6	TRIACS	MOTOROLA	400V 0.6A
MAC97-8	MAC97-8	TRIACS	MOTOROLA	600V 0.6A
Q2004L3	Q2004L3	TRIACS	TECCOR	200V 4A
Q2004L4	Q2004L4	TRIACS	TECCOR	200V 4A
Q2006L4	Q2006L4	TRIACS	TECCOR	200V 6A
Q2008L4	Q2008L4	TRIACS	TECCOR	200V 8A
Q2010L5	Q2010L5	TRIACS	TECCOR	200V 10A
Q2015L5	Q2015L5	TRIACS	TECCOR	200V 15A
Q201E3	Q201E3	TRIACS	TECCOR	200V 1A
Q201E4	Q201E4	TRIACS	TECCOR	200V 1A
Q2025R5	Q2025R5	TRIACS	TECCOR	200V 25A
Q4004L3	Q4004L3	TRIACS	TECCOR	400V 4A
Q4004L4	Q4004L4	TRIACS	TECCOR	400V 4A
Q4006L4	Q4006L4	TRIACS	TECCOR	400V 6A
Q4008L4	Q4008L4	TRIACS	TECCOR	400V 8A
Q4010L5	Q4010L5	TRIACS	TECCOR	400V 10A
Q4015L5	Q4015L5	TRIACS	TECCOR	400V 15A
Q401E3	Q401E3	TRIACS	TECCOR	400V 1A
Q401E4	Q401E4	TRIACS	TECCOR	400V 1A
Q4025R5	Q4025R5	TRIACS	TECCOR	400V 25A
Q5004L3	Q5004L3	TRIACS	TECCOR	500V 4A
Q5004L4	Q5004L4	TRIACS	TECCOR	500V 4A
Q5006L4	Q5006L4	TRIACS	TECCOR	500V 6A
Q5008L4	Q5008L4	TRIACS	TECCOR	500V 8A
Q5010L5	Q5010L5	TRIACS	TECCOR	500V 10A
Q5015L5	Q5015L5	TRIACS	TECCOR	500V 15A
Q501E3	Q501E3	TRIACS	TECCOR	500V 1A
Q501E4	Q501E4	TRIACS	TECCOR	500V 1A
Q5025R5	Q5025R5	TRIACS	TECCOR	500V 25A
Q6004L3	Q6004L3	TRIACS	TECCOR	600V 4A
Q6004L4	Q6004L4	TRIACS	TECCOR	600V 4A
Q6006L5	Q6006L5	TRIACS	TECCOR	600V 6A
Q6008L5	Q6008L5	TRIACS	TECCOR	600V 8A
Q6010L5	Q6010L5	TRIACS	TECCOR	600V 10A
Q6015L5	Q6015L5	TRIACS	TECCOR	600V 15A
Q601E3	Q601E3	TRIACS	TECCOR	600V 1A
Q601E4	Q601E4	TRIACS	TECCOR	600V 1A
Q6025R5	Q6025R5	TRIACS	TECCOR	600V 25A
Q7004L4	Q7004L4	TRIACS	TECCOR	700V 4A
Q7006L5	Q7006L5	TRIACS	TECCOR	700V 6A
Q7008L5	Q7008L5	TRIACS	TECCOR	700V 8A
Q7010L5	Q7010L5	TRIACS	TECCOR	700V 10A
Q7015L5	Q7015L5	TRIACS	TECCOR	700V 15A
Q7025R5	Q7025R5	TRIACS	TECCOR	700V 25A
Q8004L4	Q8004L4	TRIACS	TECCOR	800V 4A
Q8006L5	Q8006L5	TRIACS	TECCOR	800V 6A
Q8008L5	Q8008L5	TRIACS	TECCOR	800V 8A
Q8010L5	Q8010L5	TRIACS	TECCOR	800V 10A
Q8015L5	Q8015L5	TRIACS	TECCOR	800V 15A
Q8025R5	Q8025R5	TRIACS	TECCOR	800V 25A
T08-2A	T08-2A	TRIACS	SGS-THOMSON	200V 0.8A
T08-4A	T08-4A	TRIACS	SGS-THOMSON	400V 0.8A
T08-6A	T08-6A	TRIACS	SGS-THOMSON	600V 0.8A
T110-400	T110-400	TRIACS	SGS-THOMSON	400V 1A
T110-600	T110-600	TRIACS	SGS-THOMSON	600V 1A
T410-400	T410-400	TRIACS	SGS-THOMSON	400V 4A
T410-600	T410-600	TRIACS	SGS-THOMSON	600V 4A
T410-700	T410-700	TRIACS	SGS-THOMSON	700V 4A

Triacs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connect: MT2, Gate, MT1]
T410-800	T410-800	TRIACS	SGS-THOMSON	800V 4A
T435-400	T435-400	TRIACS	SGS-THOMSON	400V 4A
T435-600	T435-600	TRIACS	SGS-THOMSON	600V 4A
T435-700	T435-700	TRIACS	SGS-THOMSON	700V 4A
T435-800	T435-800	TRIACS	SGS-THOMSON	800V 4A
TAC210-8	TAC2108	TRIACs		
TLC116A	TLC116A	TRIACS	SGS-THOMSON	200V 1.3A
TLC116B	TLC116B	TRIACS	SGS-THOMSON	200V 1.3A
TLC116D	TLC116D	TRIACS	SGS-THOMSON	200V 1.3A
TLC116S	TLC116S	TRIACS	SGS-THOMSON	200V 1.3A
TLC116T	TLC116T	TRIACS	SGS-THOMSON	200V 1.3A
TLC226A	TLC226A	TRIACS	SGS-THOMSON	400V 1.3A
TLC226B	TLC226B	TRIACS	SGS-THOMSON	400V 1.3A
TLC226D	TLC226D	TRIACS	SGS-THOMSON	400V 1.3A
TLC226S	TLC226S	TRIACS	SGS-THOMSON	400V 1.3A
TLC226T	TLC226T	TRIACS	SGS-THOMSON	400V 1.3A
TLC336A	TLC336A	TRIACS	SGS-THOMSON	600V 1.3A
TLC336B	TLC336B	TRIACS	SGS-THOMSON	600V 1.3A
TLC336D	TLC336D	TRIACS	SGS-THOMSON	600V 1.3A
TLC336S	TLC336S	TRIACS	SGS-THOMSON	600V 1.3A
TLC336T	TLC336T	TRIACS	SGS-THOMSON	600V 1.3A
TLC386A	TLC386A	TRIACS	SGS-THOMSON	700V 1.3A
TLC386B	TLC386B	TRIACS	SGS-THOMSON	700V 1.3A
TLC386D	TLC386D	TRIACS	SGS-THOMSON	700V 1.3A
TLC386S	TLC386S	TRIACS	SGS-THOMSON	700V 1.3A
TLC386T	TLC386T	TRIACS	SGS-THOMSON	700V 1.3A

Alternistors [42]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: MT2, Gate, MT1]
Q2006LH4	Q2006LH4	TRIACS	TECCOR	ALTERNISTOR 200V 6A
Q2008LH4	Q2008LH4	TRIACS	TECCOR	ALTERNISTOR 200V 8A
Q2010LH5	Q2010LH5	TRIACS	TECCOR	ALTERNISTOR 200V 10A
Q2012LH5	Q2012LH5	TRIACS	TECCOR	ALTERNISTOR 200V 12A
Q2015L6	Q2015L6	TRIACS	TECCOR	ALTERNISTOR 200V 15A
Q2025K6	Q2025K6	TRIACS	TECCOR	ALTERNISTOR 200V 25A
Q2040K7	Q2040K7	TRIACS	TECCOR	ALTERNISTOR 200V 40A
Q4006LH4	Q4006LH4	TRIACS	TECCOR	ALTERNISTOR 400V 6A
Q4008LH4	Q4008LH4	TRIACS	TECCOR	ALTERNISTOR 400V 8A
Q4010LH5	Q4010LH5	TRIACS	TECCOR	ALTERNISTOR 400V 10A
Q4012LH5	Q4012LH5	TRIACS	TECCOR	ALTERNISTOR 400V 12A
Q4015L6	Q4015L6	TRIACS	TECCOR	ALTERNISTOR 400V 15A
Q4025K6	Q4025K6	TRIACS	TECCOR	ALTERNISTOR 400V 25A
Q4040K7	Q4040K7	TRIACS	TECCOR	ALTERNISTOR 400V 40A
Q5006LH4	Q5006LH4	TRIACS	TECCOR	ALTERNISTOR 500V 6A
Q5008LH4	Q5008LH4	TRIACS	TECCOR	ALTERNISTOR 500V 8A
Q5010LH5	Q5010LH5	TRIACS	TECCOR	ALTERNISTOR 500V 10A
Q5012LH5	Q5012LH5	TRIACS	TECCOR	ALTERNISTOR 500V 12A
Q5015L6	Q5015L6	TRIACS	TECCOR	ALTERNISTOR 500V 15A
Q5025K6	Q5025K6	TRIACS	TECCOR	ALTERNISTOR 500V 25A
Q5040K7	Q5040K7	TRIACS	TECCOR	ALTERNISTOR 500V 40A
Q6006LH4	Q6006LH4	TRIACS	TECCOR	ALTERNISTOR 600V 6A
Q6008LH4	Q6008LH4	TRIACS	TECCOR	ALTERNISTOR 600V 8A
Q6010LH5	Q6010LH5	TRIACS	TECCOR	ALTERNISTOR 600V 10A
Q6012LH5	Q6012LH5	TRIACS	TECCOR	ALTERNISTOR 600V 12A

Alternistors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: MT2, Gate, MT1]
Q6015L6	Q6015L6	TRIACS	TECCOR	ALTERNISTOR 600V 15A
Q6025K6	Q6025K6	TRIACS	TECCOR	ALTERNISTOR 600V 25A
Q6040K7	Q6040K7	TRIACS	TECCOR	ALTERNISTOR 600V 40A
Q7006LH4	Q7006LH4	TRIACS	TECCOR	ALTERNISTOR 700V 6A
Q7008LH4	Q7008LH4	TRIACS	TECCOR	ALTERNISTOR 700V 8A
Q7010LH5	Q7010LH5	TRIACS	TECCOR	ALTERNISTOR 700V 10A
Q7012LH5	Q7012LH5	TRIACS	TECCOR	ALTERNISTOR 700V 12A
Q7015L6	Q7015L6	TRIACS	TECCOR	ALTERNISTOR 700V 15A
Q7025K6	Q7025K6	TRIACS	TECCOR	ALTERNISTOR 700V 25A
Q7040K7	Q7040K7	TRIACS	TECCOR	ALTERNISTOR 700V 40A
Q8006LH4	Q8006LH4	TRIACS	TECCOR	ALTERNISTOR 800V 6A
Q8008LH4	Q8008LH4	TRIACS	TECCOR	ALTERNISTOR 800V 8A
Q8010LH5	Q8010LH5	TRIACS	TECCOR	ALTERNISTOR 800V 10A
Q8012LH5	Q8012LH5	TRIACS	TECCOR	ALTERNISTOR 800V 12A
Q8015L6	Q8015L6	TRIACS	TECCOR	ALTERNISTOR 800V 15A
Q8025K6	Q8025K6	TRIACS	TECCOR	ALTERNISTOR 800V 25A
Q8040K7	Q8040K7	TRIACS	TECCOR	ALTERNISTOR 800V 40A

Sidacs [13]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: MT1, MT2]
K1050E70	K1050E70	Sidacs	TECCOR	113V 1A
K1100E70	K1100E70	Sidacs	TECCOR	118V 1A
K1200E70	K1200E70	Sidacs	TECCOR	125V 1A
K1300E70	K1300E70	Sidacs	TECCOR	138V 1A
K1400E70	K1400E70	Sidacs	TECCOR	146V 1A
K1500E70	K1500E70	Sidacs	TECCOR	170V 1A
K2000F1	K2000F1	Sidacs	TECCOR	215V 1A
K2200F1	K2200F1	Sidacs	TECCOR	230V 1A
K2400F1	K2400F1	Sidacs	TECCOR	250V 1A
K2401F1	K2401F1	Sidacs	TECCOR	250V 1A
K2500F1	K2500F1	Sidacs	TECCOR	280V 1A
K2501F1	K2501F1	Sidacs	TECCOR	280V 1A
K3000F1	K3000F1	Sidacs	TECCOR	330V 1A

Sidactors [59]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: MT1, MT2]
P0300EA70	P0300EA70	Sidactors	TECCOR	36V 1A
P0300SA	P0300SA	Sidactors	TECCOR	36V 1A
P0602AA	P0602AA	Sidactors	TECCOR	36V 1A
P0640EA70	P0640EA70	Sidactors	TECCOR	70V 1A
P0640SA	P0640SA	Sidactors	TECCOR	70V 1A
P0720EA70	P0720EA70	Sidactors	TECCOR	80V 1A
P0720SA	P0720SA	Sidactors	TECCOR	80V 1A
P0800EA70	P0800EA70	Sidactors	TECCOR	95V 1A
P0800SA	P0800SA	Sidactors	TECCOR	95V 1A
P1100EA70	P1100EA70	Sidactors	TECCOR	125V 1A
P1100SA	P1100SA	Sidactors	TECCOR	125V 1A
P1300EA70	P1300EA70	Sidactors	TECCOR	145V 1A
P1300SA	P1300SA	Sidactors	TECCOR	145V 1A
P1500EA70	P1500EA70	Sidactors	TECCOR	165V 1A
P1500SA	P1500SA	Sidactors	TECCOR	165V 1A
P1553AA	P1553AA	Sidactors	TECCOR	170V 1A

Sidactors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: MT1, MT2]
P1553AB	P1553AB	Sidactors	TECCOR	170V 1A
P1602AA	P1602AA	Sidactors	TECCOR	95V 1A
P1602AB	P1602AB	Sidactors	TECCOR	95V 1A
P2000AA61	P2000AA61	Sidactors	TECCOR	215V 1A
P2103AA	P2103AA	Sidactors	TECCOR	240V 1A
P2103AB	P2103AB	Sidactors	TECCOR	240V 1A
P2200AA61	P2200AA61	Sidactors	TECCOR	230V 1A
P2202AA	P2202AA	Sidactors	TECCOR	125V 1A
P2202AB	P2202AB	Sidactors	TECCOR	125V 1A
P2300BA70	P2300BA70	Sidactors	TECCOR	265V 1A
P2300EA70	P2300EA70	Sidactors	TECCOR	265V 1A
P2300SA	P2300SA	Sidactors	TECCOR	265V 1A
P2300SB	P2300SB	Sidactors	TECCOR	265V 1A
P2353AA	P2353AA	Sidactors	TECCOR	265V 1A
P2353AB	P2353AB	Sidactors	TECCOR	265V 1A
P2400AA61	P2400AA61	Sidactors	TECCOR	250V 1A
P2500AA61	P2500AA61	Sidactors	TECCOR	280V 1A
P2600BA70	P2600BA70	Sidactors	TECCOR	300V 1A
P2600EA70	P2600EA70	Sidactors	TECCOR	300V 1A
P2600SA	P2600SA	Sidactors	TECCOR	300V 1A
P2600SB	P2600SB	Sidactors	TECCOR	300V 1A
P2702AA	P2702AA	Sidactors	TECCOR	150V 1A
P2702AB	P2702AB	Sidactors	TECCOR	150V 1A
P2703AA	P2703AA	Sidactors	TECCOR	300V 1A
P2703AB	P2703AB	Sidactors	TECCOR	300V 1A
P3000AA61	P3000AA61	Sidactors	TECCOR	330V 1A
P3002AA	P3002AA	Sidactors	TECCOR	160V 1A
P3002AB	P3002AB	Sidactors	TECCOR	160V 1A
P3100BA70	P3100BA70	Sidactors	TECCOR	350V 1A
P3100EA70	P3100EA70	Sidactors	TECCOR	350V 1A
P3100SA	P3100SA	Sidactors	TECCOR	350V 1A
P3100SB	P3100SB	Sidactors	TECCOR	350V 1A
P3203AA	P3203AA	Sidactors	TECCOR	350V 1A
P3203AB	P3203AB	Sidactors	TECCOR	350V 1A
P3300AA61	P3300AA61	Sidactors	TECCOR	360V 1A
P3403AA	P3403AA	Sidactors	TECCOR	380V 1A
P3403AB	P3403AB	Sidactors	TECCOR	380V 1A
P3500BA70	P3500BA70	Sidactors	TECCOR	400V 1A
P3500EA70	P3500EA70	Sidactors	TECCOR	400V 1A
P3500SA	P3500SA	Sidactors	TECCOR	400V 1A
P3500SB	P3500SB	Sidactors	TECCOR	400V 1A
P4802AB	P4802AB	Sidactors	TECCOR	290V 1A
P6002AB	P6002AB	Sidactors	TECCOR	360V 1A

IGBTs [180]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: Col., Gate, Emit.]
2N6975	IN6975	IGBTs	No Diode	400V 5A
2N6976	IN6976	IGBTs	No Diode	500V 5A
2N6977	2N6977	IGBTs	No Diode	HARRIS 400V 5A 125NS
2N6978	2N6978	IGBTs	No Diode	HARRIS 500V 5A 125NS
APT100G200EFN	APT100G2	IGBTs	No Diode	1000V 200A
APT30G100BN	APT30G10	IGBTs	No Diode	100V 30A
APT35G60BN	APT35G60	IGBTs	No Diode	600V 35A
APT40G100AN	APT40G10	IGBTs	No Diode	1000V 40A
APT45G100BN	APT45G10	IGBTs	No Diode	1000V 45A

IGBTs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: Col., Gate, Emit.]
APT50G60BN	APT50G60	IGBTs	No Diode	600V 50A
APT90G200EFN	APT90G20	IGBTs	No Diode	900V 200A
CM1000HA2	CM1000HA2	IGBTs	w/Diode	Powerex 1200V 1000A
CM100DY12	CM100DY12	IGBTs	w/Diode	Powerex 600V 100A
CM100DY24	CM100DY24	IGBTs	w/Diode	Powerex 1200V 100A
CM100TF12	CM100TF12	IGBTs	w/Diode	Powerex 600V 100A
CM100TF24	CM100TF24	IGBTs	w/Diode	Powerex 1200V 100A
CM150DY12	CM150DY12	IGBTs	w/Diode	Powerex 600V 150A
CM150DY24	CM150DY24	IGBTs	w/Diode	Powerex 1200V 150A
CM150TF12	CM150TF12	IGBTs	w/Diode	Powerex 600V 150A
CM15TF12H	CM15TF12H	IGBTs	w/Diode	Powerex 600V 15A
CM15TF24H	CM15TF24H	IGBTs	w/Diode	Powerex 1200V 15A
CM200DY12	CM200DY12	IGBTs	w/Diode	Powerex 600V 200A
CM200DY24	CM200DY24	IGBTs	w/Diode	Powerex 1200V 200A
CM200HA24	CM200HA24	IGBTs	w/Diode	Powerex 1200V 200A
CM20TF12H	CM20TF12H	IGBTs	w/Diode	Powerex 600V 20A
CM20TF24H	CM20TF24H	IGBTs	w/Diode	Powerex 1200V 20A
CM300DY12	CM300DY12	IGBTs	w/Diode	Powerex 600V 300A
CM300DY24	CM300DY24	IGBTs	w/Diode	Powerex 1200V 300A
CM300DY28	CM300DY28	IGBTs	w/Diode	Powerex 1400V 300A
CM300HA12	CM300HA12	IGBTs	w/Diode	Powerex 600V 300A
CM300HA24	CM300HA24	IGBTs	w/Diode	Powerex 1200V 300A
CM30TF12H	CM30TF12H	IGBTs	w/Diode	Powerex 600V 30A
CM30TF24H	CM30TF24H	IGBTs	w/Diode	Powerex 1200V 30A
CM400DY12	CM400DY12	IGBTs	w/Diode	Powerex 600V 400A
CM400HA12	CM400HA12	IGBTs	w/Diode	Powerex 600V 400A
CM400HA24	CM400HA24	IGBTs	w/Diode	Powerex 1200V 400A
CM400HA28	CM400HA28	IGBTs	w/Diode	Powerex 1400V 400A
CM400HA34	CM400HA34	IGBTs	w/Diode	Powerex 1700V 400A
CM50DY12H	CM50DY12H	IGBTs	w/Diode	Powerex 600V 50A
CM50DY24H	CM50DY24H	IGBTs	w/Diode	Powerex 1200V 50A
CM50DY28H	CM50DY28H	IGBTs	w/Diode	Powerex 1400V 50A
CM50TF12H	CM50TF12H	IGBTs	w/Diode	Powerex 600V 50A
CM50TF24H	CM50TF24H	IGBTs	w/Diode	Powerex 1200V 50A
CM600HA12	CM600HA12	IGBTs	w/Diode	Powerex 600V 600A
CM600HA24	CM600HA24	IGBTs	w/Diode	Powerex 1200V 600A
CM600HA28	CM600HA28	IGBTs	w/Diode	Powerex 1400V 600A
CM75DY12H	CM75DY12H	IGBTs	w/Diode	Powerex 600V 75A
CM75DY24H	CM75DY24H	IGBTs	w/Diode	Powerex 1200V 75A
CM75DY28H	CM75DY28H	IGBTs	w/Diode	Powerex 1400V 75A
CM75TF12H	CM75TF12H	IGBTs	w/Diode	Powerex 600V 75A
CM75TF24H	CM75TF24H	IGBTs	w/Diode	Powerex 1200V 75A
GTG20N100	GTG20N100	IGBTs	No Diode	HARRIS 1000V 34A 130NS
HGTD10N40	HGTD10N40	IGBTs	No Diode	HARRIS 400V 12A 350NS
HGTD10N50	HGTD10N50	IGBTs	No Diode	HARRIS 500V 12A 350NS
HGTD6N40	HGTD6N40	IGBTs	No Diode	HARRIS 400V 8A 250NS
HGTD6N40S	HGTD6N40S	IGBTs	No Diode	HARRIS 400V 8A 250NS
HGTD6N50	HGTD6N50	IGBTs	No Diode	HARRIS 500V 8A 250NS
HGTD6N50S	HGTD6N50S	IGBTs	No Diode	HARRIS 500V 8A 250NS
HGTG24N60	HGTG24N60	IGBTs	No Diode	HARRIS 600V 40A 113NS
HGTG32N60	HGTG32N60	IGBTs	No Diode	HARRIS 600V 50A 155NS
HGTH12N40	HGTH12N40	IGBTs	No Diode	HARRIS 400V 12A 170NS
HGTH12N50	HGTH12N50	IGBTs	No Diode	HARRIS 500V 12A 170NS
HGTH20N40	HGTH20N40	IGBTs	No Diode	HARRIS 400V 20A 170NS
HGTH20N50	HGTH20N50	IGBTs	No Diode	HARRIS 500V 20A 170NS
HGTM12N40	HGTM12N40	IGBTs	No Diode	HARRIS 400V 12A 170NS
HGTM12N50	HGTM12N50	IGBTs	No Diode	HARRIS 500V 12A 170NS
HGTM12N60	HGTM12N60	IGBTs	No Diode	HARRIS 600V 21A 108NS
HGTM20N40	HGTM20N40	IGBTs	No Diode	HARRIS 400V 20A 170NS

IGBTs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: Col., Gate, Emit.]
HGTM20N50	HGTM20N50	IGBTs	No Diode	HARRIS 500V 20A 170NS
HGTM24N60	HGTM24N60	IGBTs	No Diode	HARRIS 600V 40A 113NS
HGTP10N40	HGTP10N40	IGBTs	No Diode	HARRIS 400V 12A 170NS
HGTP10N40C1D	IGTP104D	IGBTs	No Diode	400V 17.5A
HGTP10N50	HGTP10N50	IGBTs	No Diode	HARRIS 500V 10A 170NS
HGTP10N50E1D	P10N50E1	IGBTs	w/Diode	500V 17.5A
HGTP12N40C1D	IGTH124C	IGBTs	No Diode	400V 12A
HGTP12N60	HGTP12N60	IGBTs	No Diode	HARRIS 600V 21A 108NS
HGTP15N40	HGTP15N40	IGBTs	No Diode	HARRIS 400V 15A 170NS
HGTP15N50	HGTP15N50	IGBTs	No Diode	HARRIS 500V 15A 170NS
I1MBI30L	I1MBI30L	IGBTs	No Diode	600V 30A 50NS
I1MBI50L	I1MBI50L	IGBTs	No Diode	600V 50A 50NS
I1MBI75L	I1MBI75L	IGBTs	No Diode	600V 75A 50NS
I6MBI10F	I6MBI10F	IGBTs	w/Diode	600V 10A 75NS
I6MBI10L	I6MBI10L	IGBTs	w/Diode	600V 10A 37.5NS
I6MBI10S	I6MBI10S	IGBTs	w/Diode	600V 10A 35NS
I6MBI15F	I6MBI15F	IGBTs	w/Diode	600V 15A 75NS
I6MBI15L	I6MBI15L	IGBTs	w/Diode	600V 15A 42.5NS
I6MBI20F	I6MBI20F	IGBTs	w/Diode	600V 20A 75NS
I6MBI20L	I6MBI20L	IGBTs	w/Diode	600V 20A 37.5NS
I6MBI30F	I6MBI30F	IGBTs	w/Diode	600V 30A 75NS
I6MBI30L	I6MBI30L	IGBTs	w/Diode	600V 30A 72.5NS
ID221205	ID221205	IGBTs	w/Diode	1200V 50A
ID2212A2	ID2212A2	IGBTs	w/Diode	1200V 25A
ID221K05	ID221K05	IGBTs	w/Diode	1000V 50A
ID221KA2	ID221KA2	IGBTs	w/Diode	1000V 25A
ID226005	ID226005	IGBTs	w/Diode	600V 50A
ID2260A2	ID2260A2	IGBTs	w/Diode	600V 25A
IGT4D10	IGT4D10	IGBTs	No Diode	400V 18A
IGT4D11	IGT4D11	IGBTs	No Diode	400V 18A
IGT4E10	IGT4E10	IGBTs	No Diode	500V 18A
IGT4E11	IGT4E11	IGBTs	No Diode	500V 18A
IGT6D10	IGT6D10	IGBTs	No Diode	400V 18A
IGT6D11	IGT6D11	IGBTs	No Diode	400V 18A
IGT6D20	IGT6D20	IGBTs	No Diode	400V 32A
IGT6D21	IGT6D21	IGBTs	No Diode	400V 32A
IGT6E10	IGT6E10	IGBTs	No Diode	500V 18A
IGT6E11	IGT6E11	IGBTs	No Diode	500V 18A
IGT6E20	IGT6E20	IGBTs	No Diode	500V 32A
IGT6E21	IGT6E21	IGBTs	No Diode	500V 32A
IGT8D20	IGT8D20	IGBTs	No Diode	400V 32A
IGT8D21	IGT8D21	IGBTs	No Diode	400V 32A
IGT8E20	IGT8E20	IGBTs	No Diode	500V 32A
IGT8E21	IGT8E21	IGBTs	No Diode	500V 32A
IGTH10N40	IGTH104	IGBTs	No Diode	400V 10A
IGTH10N40D	IGTH104D	IGBTs	w/Diode	400V 10A
IGTH10N50	IGTH105	IGBTs	No Diode	500V 10A
IGTH10N50D	IGTH105D	IGBTs	w/Diode	500V 10A
IGTH20N40	IGTH204	IGBTs	No Diode	400V 20A
IGTH20N40D	IGTH204D	IGBTs	No Diode	400V 20A
IGTH20N50	IGTH205	IGBTs	No Diode	500V 20A
IGTH20N50D	IGTH205D	IGBTs	w/Diode	500V 20A
IRGBC20F	IRGBC20F	IGBTs	w/Diode	600V 16A
IRGBC20S	IRGBC20S	IGBTs	No Diode	600V 19A
IRGBC20U	IRGBC20U	IGBTs	No Diode	600V 13A
IRGBC30F	IRGBC30F	IGBTs	No Diode	600V 31A
IRGBC30S	IRGBC30S	IGBTs	No Diode	600V 34A
IRGBC30U	IRGBC30U	IGBTs	No Diode	600V 23A
IRGBC40F	IRGBC40F	IGBTs	No Diode	600V 49A

IGBTs (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
IRGBC40S	IRGBC40S	IGBTs	No Diode	600V 50A
IRGBC40U	IRGBC40U	IGBTs	No Diode	600V 40A
IRGPC50F	IRGPC50F	IGBTs	No Diode	600V 70A
IRGPC50U	IRGPC50U	IGBTs	No Diode	600V 55A
IS621220	IS621220	IGBTs	w/Diode	1200V 200A
IS621230	IS621230	IGBTs	w/Diode	1200V 300A
IS621K30	IS621K30	IGBTs	w/Diode	1000V 300A
IS626030	IS626030	IGBTs	w/Diode	600V 300A
IS626040	IS626040	IGBTs	w/Diode	600V 400A
IXGH10N60	IXH10N6	IGBTs	No Diode	600V 20A
IXGH10N60A	IXH10N6A	IGBTs	No Diode	600V 20A
IXGH20N60	IXH20N6	IGBTs	No Diode	600V 40A
IXGH20N60A	IXH20N6A	IGBTs	No Diode	600V 40A
IXGH30N60	IXH30N6	IGBTs	No Diode	600V 50A
IXGH30N60A	IXH30N6A	IGBTs	No Diode	600V 50A
IXGH40N60	IXH40N6	IGBTs	No Diode	600V 75A
IXGH40N60A	IXH40N6A	IGBTs	No Diode	600V 75A
IXGM20N60	IXM20N6	IGBTs	No Diode	600V 40A
IXGM20N60A	IXM20N6A	IGBTs	No Diode	600V 40A
IXGM30N60	IXM30N6	IGBTs	No Diode	600V 50A
IXGM30N60A	IXM30N6A	IGBTs	No Diode	600V 50A
IXGM40N60	IXM40N6	IGBTs	No Diode	600V 75A
IXGM40N60A	IXM40N6A	IGBTs	No Diode	600V 75A
MGM20N45	MGM20N45	IGBTs	No Diode	450V 20A
MGM20N50	MGM20N50	IGBTs	No Diode	500V 20A
MGM5N45	MGM5N45	IGBTs	No Diode	450V 5A
MGM5N50	MGM5N50	IGBTs	No Diode	500V 5A
OM6501ST	OM6501ST	IGBTs	No Diode	500V 5A
OM6502ST	OM6502ST	IGBTs	No Diode	500V 10A
OM6503SC	OM6503SC	IGBTs	No Diode	500V 20A
OM6504SC	OM6504SC	IGBTs	No Diode	500V 30A
OM6505SA	OM6505SA	IGBTs	No Diode	500V 15A
OM6506SA	OM6506SA	IGBTs	No Diode	500V 20A
OM6507SA	OM6507SA	IGBTs	No Diode	1000V 8A
OM6508SA	OM6508SA	IGBTs	No Diode	500V 5A
OM6509SA	OM6509SA	IGBTs	No Diode	500V 10A
OM6510SC	OM6510SC	IGBTs	No Diode	500V 20A
OM6511SC	OM6511SC	IGBTs	No Diode	500V 30A
OM6512SC	OM6512SC	IGBTs	No Diode	1000V 8A
OM6513SC	OM6513SC	IGBTs	w/Diode	1000V 8A
OM6516SC	OM6516SC	IGBTs	No Diode	1000V 25A
OM6517SA	OM6517SA	IGBTs	No Diode	1000V 20A
OM6520SC	OM6520SC	IGBTs	w/Diode	1000V 25A
OM6524ST	OM6524ST	IGBTs	No Diode	1000V 8A
OM6525SA	OM6525SA	IGBTs	w/Diode	1000V 8A
OM6526SA	OM6526SA	IGBTs	No Diode	1000V 15A
OM6527SC	OM6527SC	IGBTs	No Diode	1000V 15A
OM6528SC	OM6528SC	IGBTs	w/Diode	1000V 15A
OM6533SF	OM6533SF	IGBTs	No Diode	1000V 50A
OM6534SF	OM6534SF	IGBTs	No Diode	1000V 50A
SKM15GD100D	SKM15GD	IGBTs	w/Diode	1000V 15A
SKM25GB	SKM25GB	IGBTs	w/Diode	1000V 25A
SKM50GB	SKM50GB	IGBTs	w/Diode	1000V 50A

All IGBT models are in IGBT.LIB

UJTs, PUTs [7]

Part #	Part Name	Part Type	Part Sub Type	Description
2N2646	UN2646	UJTS		35V 300mW
2N2647	UN2647	UJTS		35V 300mW
2N4851	UN4851	UJTs		35V 300mW
2N4870	UN4870	UJTs		35V 300mW
2N4871	UN4871	UJTs		35V 300mW

[UJT Connections: Emitter, Base1, Base2]

Part #	Part Name	Part Type	Part Sub Type	Description
2N6027	PN6027	PUTs		40V 300mW
2N6028	PN6028	PUTs		40V 300mW

[PUT Connections: Anode, Gate, Cathode]

Regulators [50]

Part Name	Subcircuit Name	IsSpice Letter	SpiceNet Symbol	Library Name	[Connections] & PreSpice Parameters
Generic Buck Regulator w/PWM	BUCK	X	BUCK	Device2	[Control, In Out] **FREQ** Frequency in Hz **LFIL** Filter Inductance in Henries **Vflyback** Diode Voltage in Volts

Part #	Part Name	Part Type	Part Sub Type	Description
BOOSTAVG	BOOSTAVG	PWM Models	Average	Boost Reg.
BUCKAVG	BUCKAVG	PWM Models	Average	Buck Reg.
FLYAVG	FLYAVG	PWM Models	Average	Flyback Reg.
FLYBACK	FLYBACK	PWM Models	Average	Generic
FORWARD	FORWARD	PWM Models	Average	Generic
LT1242S	LT1242S	PWM Models	Average	
LT1243S	LT1243S	PWM Models	Average	
LT1244S	LT1244S	PWM Models	Average	
LT1245S	LT1245S	PWM Models	Average	
PWM	PWM	PWM Models	Average	Pulse Width Modulator
PWMBBSCD	PWMBBSCD	PWM Models	Average	Buck-Boost, Step-Up Cont_Disc
PWMBBSD	PWMBBSD	PWM Models	Average	Buck-Boost, Step-Up Xfmr Disc
PWMBBSD0	PWMBBSD0	PWM Models	Average	Buck-Boost, Step-Up Xfmr Disc
PWMBBSDX	PWMBBSDX	PWM Models	Average	Buck-Boost, Step-Up Xfmr Disc
PWMBCK	PWMBCK	PWM Models	Average	Buck Step-Down Xfmr
PWMBCKCD	PWMBCKCD	PWM Models	Average	Buck Step-Up Xfmr Cont_Disc
PWMBCKD	PWMBCKD	PWM Models	Average	Buck Step-Up Xfmr Disc
PWMBCKD0	PWMBCKD0	PWM Models	Average	Buck Step-Up Xfmr Disc
PWMBCKDX	PWMBCKDX	PWM Models	Average	Buck Step-Up Xfmr Disc
PWMBST	PWMBST	PWM Models	Average	Boost Step-Up Xfmr
PWMBSTCD	PWMBSTCD	PWM Models	Average	Boost Step-Up Xfmr Cont_Disc
PWMBSTD	PWMBSTD	PWM Models	Average	Boost Step-Up Xfmr Disc
PWMBSTD0	PWMBSTD0	PWM Models	Average	Boost Step-Up Xfmr Disc
PWMBSTDX	PWMBSTDX	PWM Models	Average	Boost Step-Up Xfmr Disc
PWMCCM	PWMCCM	PWM Models	Average	CC Mod w/ext Ramp Cont
PWMCCMD	PWMCCMD	PWM Models	Average	CC Mod w/ext Ramp Disc
PWMCCMX	PWMCCMX	PWM Models	Average	CC Mod w/ext Ramp Cont
PWMCCMY	PWMCCMY	PWM Models	Average	CC Mod w/ext Ramp Cont
PWMCCMZ	PWMCCMZ	PWM Models	Average	CC Mod w/ext Ramp Cont

Part #	Part Name	Part Type	Part Sub Type	Description
PWMCCMZ1	PWMCCMZ1	PWM Models	Average	CC Mod w/ext Ramp Cont
PWMXFM	PWMXFM	PWM Models	Average	w/Transformer
SG1524	SG1524	PWM Models	Average	Volt. Reg.
SG1524A	SG1524A	PWM Models	Average	Volt. Reg. Error Amp +-100UA
SG1524FF	SG1524FF	PWM Models	Average	w/FeedFwd Error Amp +-100UA
SG1525	SG1525	PWM Models	Average	Volt. Reg.
SG1525A	SG1525A	PWM Models	Average	Volt. Reg. Error Amp +-100UA
SG1525FF	SG1525FF	PWM Models	Average	w/FeedFwd Error Amp +-100UA
SG1526	SG1526	PWM Models	Average	Volt. Reg.
SG1526A	SG1526A	PWM Models	Average	Volt. Reg. Error Amp +-100UA
UC1842AS	UC1842AS	PWM Models	Average	
UC1842S	UC1842S	PWM Models	Average	
UC1843AS	UC1843AS	PWM Models	Average	
UC1843S	UC1843S	PWM Models	Average	
UC1844AS	UC1844AS	PWM Models	Average	
UC1844S	UC1844S	PWM Models	Average	
UC1845AS	UC1845AS	PWM Models	Average	
UC1845S	UC1845S	PWM Models	Average	
UC1846	UC1846	PWM Models	Average	Current Mode Controller
UC1854	UC1854	PFC		

See the PWM.Lib file for subcircuit connections and the required parameters.

Power Supply Designer Library Contents
Power MOS Drivers [4]

Part #	Part Name	Part Type	Part Sub Type	Description
IR2110	IR2110	Drivers	Power Mosfet	LSTTL/CMOS Input
TC426	TC426	Drivers	Power Mosfet	Dual High Speed
TC427	TC427	Drivers	Power Mosfet	Dual High Speed
TC428	TC428	Drivers	Power Mosfet	Dual High Speed

Nonlinear Magnetic Cores [853]

Description

Magnetics MPP 55 and 58 Series Cores
MPP	Generic 55xx series
MPP2	Generic 58xx series
MAGF	F material
MAGR	R material
TLMAG	C type

PWM ICs [34]

(Switch Level with and without the output drivers modeled)

Part #	Part Name	Part Type	Part Sub Type	Description
78S40	78S40	PWM Models	National	
CS322	CS322	PWM Models	Cherry	
CS324	CS324	PWM Models	Cherry	
FLYBCK77AC		FLYBCK77AC	PWM Models	National AC Analysis
FLYBCK87AC		FLYBCK87AC	PWM Models	National AC analysis
GLUEAC	GLUEAC	PWM Models	National	AC analysis
L4990	L4990	PWM Models	SGS-Thomson	
LATCHCMP	LATCHCMP	PWM Models	Unitrode	Latching Comparator
LM1587AC	LM1587AC	PWM Models	National	AC analysis
LM1587TR	LM1587TR	PWM Models	National	Transient analysis
LT1242	LT1242	PWM Models	Linear Tech	
LT1242ND	LT1242ND	PWM Models	Linear Tech	Reduced Complexity
LT1243	LT1243	PWM Models	Linear Tech	
LT1243ND	LT1243ND	PWM Models	Linear Tech	Reduced Complexity
LT1244	LT1244	PWM Models	Linear Tech	
LT1244ND	LT1244ND	PWM Models	Linear Tech	Reduced Complexity
LT1245	LT1245	PWM Models	Linear Tech	
LT1245ND	LT1245ND	PWM Models	Linear Tech	Reduced Complexity
RECTBR	RECTBR	PWM Models	Unitrode	Bridge Rectifier
SI9145	SI9145	PWM Models	Siliconix	Siliconix Version
SI9145I	SI9145I	PWM Models	Siliconix	Intusoft Version
SI9145ND	SI9145ND	PWM Models	Siliconix	Reduced Complexity
UC1524	UC1524	PWM Models	Unitrode	
UC1524A	UC1524A	PWM Models	Unitrode	
UC1524AND	UC1524AND	PWM Models	Unitrode	Reduced Complexity
UC1524ND	UC1524ND	PWM Models	Unitrode	Reduced Complexity
UC1525A	UC1525A	PWM Models	Unitrode	
UC1525AND	UC1525AND	PWM Models	Unitrode	Reduced Complexity
UC1527A	UC1527A	PWM Models	Unitrode	
UC1527AND	UC1527AND	PWM Models	Unitrode	Reduced Complexity
UC1823	UC1823	PWM Models	Unitrode	
UC1823ND	UC1823ND	PWM Models	Unitrode	Reduced Complexity
UC1825	UC1825	PWM Models	Unitrode	
UC1825ND	UC1825ND	PWM Models	Unitrode	Reduced Complexity

PWM ICs [16] (State Space)

UC1842	UC1842	PWM Models	Unitrode	
UC1842A	UC1842A	PWM Models	Unitrode	
UC1842AND	UC1842AND	PWM Models	Unitrode	Reduced Complexity
UC1842ND	UC1842ND	PWM Models	Unitrode	Reduced Complexity
UC1843	UC1843	PWM Models	Unitrode	
UC1843A	UC1843A	PWM Models	Unitrode	
UC1843AND	UC1843AND	PWM Models	Unitrode	Reduced Complexity
UC1843ND	UC1843ND	PWM Models	Unitrode	Reduced Complexity
UC1844	UC1844	PWM Models	Unitrode	
UC1844A	UC1844A	PWM Models	Unitrode	
UC1844AND	UC1844AND	PWM Models	Unitrode	Reduced Complexity
UC1844ND	UC1844ND	PWM Models	Unitrode	Reduced Complexity
UC1845	UC1845	PWM Models	Unitrode	
UC1845A	UC1845A	PWM Models	Unitrode	
UC1845AND	UC1845AND	PWM Models	Unitrode	Reduced Complexity
UC1845ND	UC1845ND	PWM Models	Unitrode	Reduced Complexity

Other ICs [2]

Part #	Part Name	Part Type	Part Sub Type	Description
UC1637	UC1637	Controller		Motor
UC1637ND	UC1637ND	Controller		Motor, Reduced Complexity

Transformers [4]

Part #	Part Name	Part Type	Part Sub Type	Description
2CTXFMR	2CTXFMR	Transformers		Dual input, 2CT Outputs
3CTXFMR	3CTXFMR	Transformers		Dual input, 3CT Outputs
4CTXFMR	4CTXFMR	Transformers		Dual input, 4CT Outputs
5CTXFMR	5CTXFMR	Transformers		Dual+CT In, 4CT Out

Magnetic Cores

The core models below can be used to build complete transformer models. The cores use the parameter passing feature to allow data sheet values to be used for IsSPICE model creation. In order to create a transformer model, the core must be coupled to the TURNS subcircuit. Depending on the topology of the transformer, various goemetric parasitic elements may also be needed. The generic CORE subcircuit, the core definitions, and the TURNS subcircuit are located in the Magnetic.Lib file.

Miniature Tape Wound Cores

Magnetics Co. Square Permalloy and Orthonal Materials

Core #	Subcircuit Name
*80521	M80521-(∗)TMA
*80550	M80550-(∗)TMA
*80505	M80505-(∗)TMA
*80512	M80512-(∗)TMA
*80529	M80529-(∗)TMA
*80544	M80544-(∗)TMA
*80523	M80523-(∗)TMA
*80530	M80530-(∗)TMA
*80524	M80524-(∗)TMA
*80531	M80531-(∗)TMA
*80608	M80608-(∗)TMA
*80609	M80609-(∗)TMA
*80558	M80558-(∗)TMA
*80581	M80581-(∗)TMA
*80610	M80610-(∗)TMA
*80611	M80611-(∗)TMA
*80598	M80598-(∗)TMA
*80516	M80516-(∗)TMA
*80612	M80612-(∗)TMA
*80588	M80588-(∗)TMA
*80613	M80613-(∗)TMA
*80606	M80606-(∗)TMA
*80614	M80614-(∗)TMA
*80615	M80615-(∗)TMA
*80560	M80560-(∗)TMA
*80539	M80539-(∗)TMA
*80517	M80517-(∗)TMA
*80616	M80616-(∗)TMA
*80617	M80617-(∗)TMA
*80600	M80600-(∗)TMA
*80618	M80618-(∗)TMA
*80619	M80619-(∗)TMA
*80525	M80525-(∗)TMA

Magnetics Tape Wound Cores

Magnetics Co. Square Permalloy and Orthonal Materials

Core #	Subcircuit Name
*5_056	M52056-(∗)T
*5_000	M52000-(∗)T
*5_002	M52002-(∗)T
*5_011	M52011-(∗)T
*5_061	M52061-(∗)T
*5_004	M52004-(∗)T
*5_076	M52076-(∗)T
*5_106	M52106-(∗)T
*5_007	M52007-(∗)T
*5_029	M52029-(∗)T
*5_168	M52168-(∗)T
*5_032	M52032-(∗)T
*5_030	M52030-(∗)T
*5_026	M52026-(∗)T
*5_038	M52038-(∗)T
*5_035	M52035-(∗)T
*5_017	M52017-(∗)T
*5_031	M52031-(∗)T
*5_425	M52425-(∗)T
*5_001	M52001-(∗)T
*5_103	M52103-(∗)T
*5_128	M52128-(∗)T
*5_022	M52022-(∗)T
*5_042	M52042-(∗)T
*5_100	M52100-(∗)T
*5_112	M52112-(∗)T
*5_426	M52426-(∗)T

Ferrite Pot Cores

Ferroxcube 3C8 Material

Core #	Subcircuit Name
*704 series	P704
*905 series	P905
*1107 series	P1107
*1408 series	P1408
*1811 series	P1811
*2213 series	P2213
*2616 series	P2616
*3019 series	P3019
*3622 series	P3622
*4229 series	P4299
*6659 series	P6659

SEI   GENALEX
TELMAG   C Cores

Parameters

BI:	Initial Flux Density
N:	Number of Turns
ACore:	Magnetic Cross Section Area
LM:	Magnetic Path Length

For Miniature Tape Wound Cores: (∗) is the Tape Width in mils and equal to 1/8, 1/4, 1/2, or 1. T is the material type with Permalloy = D and Orthonol = A. For example, for a 1/8 mil tape wound permalloy core, use the model name M80610-1/4DMA. For a 1mil orthonol core, use the name M80610-1AMA.

For Magnetics Tape Wound Cores: (∗) is the Tape Width in mils, and equal to 1/2, 1, 2, or 4. T is the material type with Permalloy = D and Orthonol = A. For example, for a 1/2 mil tape wound permalloy core, use the model name M52426-1/2D. For a 2 mil orthonol core, use the name M52426-2A.

The permalloy core uses the COREY subcircuit. The orthonol core uses the COREZ subcircuit. The ferrite core uses the COREW subcircuit. All are located in the Magnetic.Lib file.

Intusoft Op-Amp Models

The Intusoft custom op-amp model greatly surpasses the accuracy of the outdated Boyle op-amp model still used by many CAE software vendors. Two levels of op-amp modeling complexity are available. For AC and linear transient analyses, the op-amps in the LIN.LIB file should be used. For nonlinear transient analyses, the op-amps in the NONLIN.LIB file should be used. The library name in the ∗INCLUDE statement will determine which library is accessed. In addition to the generic Bipolar, JFET, and current feedback op-amp models explained under Generic Models, ICAP also contains the following predefined models:

Bipolar and FET Op-Amps [26]

Part #	Subcircuit Name	SPICENET Symbol	Library Name	Description
AD711	AD711	ADOPAMP	Nonlin	JFET, Analog Devices
AD820	AD820	ADOPAMP	Nonlin	JFET, Analog Devices
AD844	AD844	ADOPAMP	Nonlin	Bipolar, Analog Devices
AD845	AD845	ADOPAMP	Nonlin	JFET, Analog Devices
EL2020	EL2020e	ELOPAMP	Nonlin	Bipolar, Elantec
HA-2540	HA2540	HA2540	Nonlin	Harris
LF156	LF156	LF156	Nonlin/Lin	JFET
LM324	LM324n	NATOPAMP	Nonlin	Bipolar, National
MC3403	MC3403	ADOPAMP	Nonlin	JFET, Motorola
TLC272	TLC272	TLC272	Nonlin	JFET
TLC27M2	TLC27M2	TLC27M2	Nonlin	JFET
OP07	OP07	OP07	Nonlin	Bipolar
OP19	OP19	OP19	Nonlin	Bipolar
LMC660AM	LMC660n	NATOPAMP	Nonlin	CMOS, National
OP27	OP27	OP27	Nonlin	Bipolar
OPA77	OPA77eb	BBOPAMP	Nonlin	Bipolar, Burr-Brown
OP97	OP97a	ADOPAMP	Nonlin	Bipolar, Analog Devices
OP200	OP200a	ADOPAMP	Nonlin	Bipolar, Analog Devices
OP215	OP215a	ADOPAMP	Nonlin	JFET, Analog Devices
OP400	OP400a	ADOPAMP	Nonlin	Bipolar, Analog Devices
UA709	UA709	UA709	Nonlin	Bipolar Actual IC Topology
UA741	UA741	UA741	Nonlin/Lin	Bipolar

Transimpedance Op-Amps [20]

Part #	Subcircuit Name	SPICENET Symbol	Library Name	Description
AD9610	AD9610	AMPC15	Nonlin	Analog Devices
AD9611	AD9611	AMPC5	Nonlin	Analog Devices
CLC103	CLC103	AMPC15	Nonlin	Comlinear
CLC200	CLC200	AMPC15	Nonlin	Comlinear
CLC203	CLC203	AMPC15	Nonlin	Comlinear
CLC205	CLC205	AMPC15	Nonlin	Comlinear
CLC206	CLC206	AMPC15	Nonlin	Comlinear
CLC220	CLC220	AMPC15	Nonlin	Comlinear
CLC221	CLC221	AMPC15	Nonlin	Comlinear
CLC231	CLC231	AMPC15	Nonlin	Comlinear
CLC300	CLC300	AMPC15	Nonlin	Comlinear
CLC400	CLC400	AMPC5	Nonlin	Comlinear
CLC401	CLC401	AMPC5	Nonlin	Comlinear
CLC404	CLC404	AMPC5	Nonlin	Comlinear
CLC500	CLC500	AMPC5	Nonlin	Comlinear
CLC501	CLC501	AMPC5	Nonlin	Comlinear
CLC505	CLC505	AMPC5	Nonlin	Comlinear
EL2020	EL2020	AMPC15	Nonlin	Elantec
EL2022	EL2022	AMPC15	Nonlin	Elantec
OP260	OP260	AMPC15	Nonlin	AD

Note: All Intusoft op-amp models have the same connections: In-, In+, Out, Vcc, Vee

Comparators [8]

Part #	Part Name	Part Type	Part Sub Type	Description
CMP04	CMP04	Comparators	Intusoft	Complementary +/-15V
LM111	LM111	Comparators	Intusoft	Common Emitter +/-18V
LM139	LM139	Comparators	Intusoft	Common Emitter 2-36V
LM193	LM193	Comparators	Intusoft	Common Emitter 2-36V
LM306	LM306	Comparators	Intusoft	Common Emitter +/-15V
LM311	LM311	Comparators	Intusoft	Common Emitter +/-18V
NE527	NE527	Comparators	Intusoft	Complementary +/-15V
UA710	UA710	Comparators	Intusoft	Emitter Follower +/-15V

Other ICs [4]

Part #	Subcircuit Name	SPICENET Symbol	Library Name	Description
AD620	AD620	AD620	Nonlin	Inst. Amp, Analog Devices
AD734	AD734	ADMUL	Nonlin	Multiplier, Analog Devices
REF10	REF10	ADREF	Nonlin	Voltage Ref., Analog Devices
INA120	INA120e	INA120	Nonlin	Inst. Amp, Burr-Brown

In addition to the specific and generic op-amp models in ICAP, the following list of 1314 devices is available directly from Intusoft. These models were originally supplied by various hardware vendors. Intusoft has converted these models into true SPICE format (ASCII netlists) usable with any Berkeley SPICE compatible program including all versions of IsSpice. For SpiceNet users, schematic symbols are also provided. The libraries are grouped by vendor. The model libraries may be purchased separately or all together. They are included as part of the ICAPS Deluxe upgrade option.

Important Note: The part numbers which are shown under each vendor are the numbers used and understood by the SpiceNet schematic entry database. These database part numbers correspond to the particular vendor's part number, however, unique suffix characters may be added.

Advanced Linear Devices (34)

Op-amp Models
The Part #, IsSpice subcircuit name and the SpiceNet symbol name are all the same. All Advanced Linear Devices parts are stored in the library file: ADV_ISP.Lib.

ALD1701	ALD2706/SB	ALD1704/SA
ALD1702	ALD1701/PA	ALD1706/DA
ALD1703	ALD1701/DA	ALD1706/PA
ALD1704	ALD1701/SA	ALD1706/SA
ALD1706	ALD1702/DA	ALD4701/PB
ALD2701/SB	ALD1702/PA	ALD4701/DB
ALD2701/PA	ALD1702/SA	ALD4701/SF
ALD2701/DA	ALD1703/PA	ALD4706/PB
ALD2701/SA	ALD1703/SA	ALD4706/DB
ALD2706/DA	ALD1703/DA	ALD4706/SF
ALD2706/PA	ALD1704/DA	
ALD2706/SA	ALD1704/PA	

Analog Devices and PMI (563)

IMPORTANT NOTE: Analog Devices op-amps beginning with the letters OP, PM, or SSM, have the suffix letter "a" appended to both their part numbers and their IsSpice model names in order to make them unique.

AD1580	AD630A	AD712T	AD8001AR	AD840S
AD22050N	AD630B	AD713	AD8002A	AD843
AD22050T	AD630J	AD713A	AD8002AN	AD843A
AD22057N	AD630K	AD713B	AD8002AR	AD843B
AD22057T	AD630S	AD713J	AD8004A	AD843J
AD581	AD633	AD713K	AD8009	AD843K
AD581J	AD633J	AD713S	AD8023	AD843S
AD581K	AD645	AD713T	AD8031	AD844
AD581L	AD645A	AD734	AD8031A	AD844A
AD581S	AD645B	AD734A	AD8041A	AD844B
AD581T	AD645J	AD734B	AD8072JN	AD844S
AD581U	AD645K	AD734S	AD810	AD845
AD584	AD645S	AD743	AD810A	AD845A
AD584J	AD680	AD743A	AD810S	AD845B
AD584K	AD680A	AD743B	AD811	AD845J
AD584L	AD680J	AD743J	AD812	AD845K
AD584S	AD680JT	AD743K	AD812A	AD845S
AD584T	AD704	AD743S	AD813	AD846
AD587	AD704A	AD744	AD813A	AD846A
AD587J	AD704B	AD744A	AD815	AD846B
AD587K	AD704J	AD744B	AD816AN	AD846S
AD587L	AD704K	AD744C	AD817	AD847
AD587S	AD704T	AD744J	AD817A	AD847A
AD587T	AD705	AD744K	AD818	AD847J
AD587U	AD705A	AD744S	AD818A	AD847S
AD588	AD705B	AD744T	AD820A	AD848
AD588A	AD705J	AD745	AD820B	AD848A
AD588B	AD705K	AD745A	AD822	AD848J
AD588J	AD705T	AD745B	AD822A	AD848S
AD588K	AD706	AD745J	AD822B	AD8531
AD588S	AD706A	AD745K	AD822S	AD8532
AD588T	AD706B	AD745S	AD823AN	AD8534
AD600	AD706J	AD746	AD824	AD9617
AD600J	AD706K	AD746A	AD824A	AD9618
AD602	AD706T	AD746B	AD824B	AD9621
AD602J	AD711	AD746J	AD826	AD9622
AD603	AD711A	AD746S	AD826A	AD9623
AD603A	AD711B	AD780	AD828	AD9624
AD620A	AD711C	AD780A	AD828A	AD9630
AD620B	AD711J	AD780B	AD829	AD9631AN
AD620S	AD711K	AD780S	AD829A	AD9632AN
AD624	AD711S	AD795	AD829J	ADG406
AD624A	AD711T	AD795J	AD829S	ADG406B
AD624B	AD712	AD795K	AD830	ADG407
AD624C	AD712A	AD797	AD830A	ADG407B
AD624S	AD712B	AD797A	AD830J	ADG408
AD626	AD712C	AD797B	AD830S	ADG408B
AD626A	AD712J	AD797S	AD840	ADG408T
AD626B	AD712K	AD8001A	AD840J	ADG409
AD630	AD712S	AD8001AN	AD840K	ADG409B

Analog Devices and PMI (cont'd) (cont'd)

ADG409T	MLT04G	OP221BA	OP37AA	OP490A
ADG411	OP08	OP221CA	OP37BA	OP490AA
ADG411B	OP113	OP221EA	OP37CA	OP490EA
ADG411T	OP113E	OP221GA	OP37EA	OP490FA
ADG412	OP113F	OP249A	OP37FA	OP490GA
ADG412B	OP160A	OP249AA	OP37GA	OP491
ADG412T	OP160AA	OP249EA	OP400A	OP491G
ADG413	OP160FA	OP249FA	OP400AA	OP492A
ADG413B	OP160GA	OP249GA	OP400EA	OP492GA
ADG413T	OP176A	OP260A	OP400FA	OP493A
ADG426	OP176GA	OP275A	OP400GA	OP493EA
ADG426B	OP177A	OP275GA	OP400HA	OP493FA
ADG441	OP177AA	OP279	OP413	OP495A
ADG441B	OP177BA	OP279G	OP413E	OP495AA
ADG441BS	OP177EA	OP27A	OP413F	OP495GA
ADG441S	OP177FA	OP27AA	OP41A	OP496A
ADG441T	OP177GA	OP27BA	OP41AA	OP496GA
ADG441TS	OP183G	OP27CA	OP41BA	OP497A
ADG442	OP191	OP27EA	OP41EA	OP497AA
ADG442B	OP191G	OP27FA	OP41FA	OP497BA
ADG442BS	OP200AA	OP27GA	OP41GA	OP497CA
ADG442S	OP200EA	OP282A	OP420A	OP497FA
ADG444	OP200FA	OP282GA	OP420BA	OP497GA
ADG444B	OP200GA	OP283	OP420CA	OP61A
ADG444BS	OP20A	OP283A	OP420FA	OP64A
ADG444S	OP20BA	OP283G	OP420GA	OP77A
ADG508F	OP20CA	OP284	OP420HA	OP77AA
ADG508FB	OP20FA	OP284E	OP421A	OP77BA
ADG508FT	OP20GA	OP284F	OP421BA	OP77EA
ADG509F	OP20HA	OP285A	OP421CA	OP77FA
ADG509FB	OP213A	OP285GA	OP421FA	OP77GA
ADG509FT	OP213E	OP290A	OP421GA	OP80A
ADG511_3	OP213F	OP290AA	OP421HA	OP80BA
ADG511_5	OP215A	OP290EA	OP42A	OP80EA
ADG511+-5	OP215AA	OP290FA	OP42AA	OP80FA
ADG512_3	OP215BA	OP290GA	OP42EA	OP80GA
ADG512_5	OP215CA	OP291	OP42FA	OP90A
ADG512+-5	OP215EA	OP291G	OP42GA	OP90AA
ADG513_3	OP215FA	OP292A	OP43A	OP90EA
ADG513_5	OP215GA	OP292GA	OP43AA	OP90FA
ADG513+-5	OP21A	OP293A	OP43BA	OP90GA
ADG528F	OP21AA	OP293EA	OP43EA	OP97A
ADG528FB	OP21EA	OP293FA	OP43FA	OP97AA
ADG528FT	OP21FA	OP295A	OP43GA	OP97EA
AMP-01	OP21GA	OP295AA	OP44A	OP97FA
AMP-02	OP21HA	OP295GA	OP467A	PM1012A
AMP04	OP220A	OP296A	OP467CA	REF01
AMP04E	OP220AA	OP296GA	OP467GA	REF01A
AMP04F	OP220CA	OP297A	OP470A	REF01C
BUF04	OP220EA	OP297AA	OP482A	REF01E
MAT-02	OP220FA	OP297EA	OP482GA	REF01H
MAT-03	OP220GA	OP297FA	OP484A	REF02
MAT-04	OP221A	OP297GA	OP484EA	REF02A
MLT04	OP221AA	OP37A	OP484FA	REF02C

Analog Devices and PMI (cont'd)

REF02D	REF191E	REF194	REF196G	SSM2017
REF02E	REF191F	REF194E	REF198	SSM2017P
REF02H	REF191G	REF194F	REF198E	SSM2131A
REF05	REF192	REF194G	REF198F	SSM2135
REF05A	REF192E	REF195	REF198G	SSM2135P
REF05B	REF192F	REF195E	REF43	SSM2210
REF10A	REF192G	REF195F	REF43B	SSM2220
REF10B	REF193	REF195G	REF43F	
REF191	REF193G	REF196	REF43G	

Apex Microtechnology (27)

PA01	PA08	PA25	PA84	PB58A
PA02	PA09	PA30	PA85	WA01
PA03	PA10	PA41	PA88	WB05
PA04	PA12	PA51	PA89	
PA05	PA19	PA81	PB50	
PA07	PA21	PA83	PB58	

Burr-Brown (165)

MPORTANT NOTE: Burr-Brown op-amps have the suffix letter "b" appended to their part numbers to make them unique. The IsSPICE model names also have the b letter suffix unless the addition of the letter caused the name to be greater than 8 characters.

OPA1013B	INA118E	OPA130B	OPA27MB	OPA604B
OPA1013EB	INA120	OPA131B	OPA37B	OPA604EB
ACF2101M	INA131	OPA131EB	OPA37EB	OPA604MB
BUF600X1	INA131E	OPA132B	OPA404B	OPA606B
BUF600X2	ISO120X	OPA177B	OPA404EB	OPA606EB
BUF601X1	ISO121X	OPA177EB	OPA4130B	OPA620B
BUF601X2	ISO130X	OPA2107B	OPA4131B	OPA620EB
BUF634X	IVC102M	OPA2107E	OPA4131EB	OPA620XB
INA101	LOG100M	OPA2111B	OPA4132B	OPA621B
INA101E	MPC100X1	OPA2111E	OPA4234B	OPA621EB
INA102	MPC100X2	OPA2130B	OPA4234EB	OPA621XB
INA102E	MPC102X1	OPA2131B	OPA445B	OPA622X1
INA103	MPC104X1	OPA2131EB	OPA445EB	OPA622X2
INA103E	OPA1013B	OPA2132B	OPA4658X	OPA623X1
INA105	OPA1013E	OPA2234B	OPA501B	OPA623X2
INA105E	OPA101B	OPA2234EB	OPA501EB	OPA627B
INA106	OPA101EB	OPA234B	OPA502B	OPA627EB
INA106E	OPA102B	OPA234EB	OPA502EB	OPA628M
INA110	OPA102EB	OPA2541B	OPA511B	OPA637B
INA110E	OPA111B	OPA2541E	OPA511EB	OPA637EB
INA111	OPA111EB	OPA2544B	OPA512B	OPA640X
INA111E	OPA121B	OPA2604B	OPA512EB	OPA641X
INA114	OPA121EB	OPA2604E	OPA541B	OPA642X
INA114E	OPA124	OPA2604M	OPA541EB	OPA643X
INA115	OPA124E	OPA2658X	OPA544B	OPA644X
INA115E	OPA128B	OPA27B	OPA602B	OPA646X
INA117	OPA128EB	OPA27EB	OPA602EB	OPA648X
INA117E	OPA129B	OPA27HB	OPA603B	OPA650X
INA118	OPA129EB	OPA27HEB	OPA603X	OPA651M

Burr Brown (cont'd)

OPA651X	OPA660X2	OPA77B	OPT209	PGA207
OPA655M	OPA671MB	OPT101	OPT211	UAF42B
OPA658X	OPA675MB	OPT201KP	OPT301	UAF42EB
OPA660X1	OPA676MB	OPT202	PGA206	VCA610

Comlinear(28)

Library file: COMLNR.Lib, SPICENET symbol: See the *SYM line in the COMLNR.Lib file.

CLC109	CLC400	CLC410	CLC428	CLC505
CLC111	CLC401	CLC414	CLC430	CLC520
CLC205	CLC402	CLC415	CLC431	CLC522
CLC206	CLC404	CLC420	CLC432	CLC532
CLC220	CLC406	CLC425	CLC501	
CLC231	CLC409	CLC426	CLC502	

Elantec (76)

IMPORTANT NOTE: All Elantec op-amps have the suffix letter "e" appended to both their partnumbers and their IsSPICE model names to make them unique.

EHA2500E	EL2012	EL2074E	EL2232E	EL4393E
EHA2520E	EL2018E	EL2075E	EL2242E	EL4430E
EHA2539E	EL2019E	EL2082C	EL2243E	EL7144E
EHA2540E	EL2022E	EL2090E	EL2244E	EL7212E
EHA2600E	EL2028E	EL2099C	EL2245E	EL7242E
EHA2620E	EL2029E	EL2120E	EL2252E	EL7243E
EHA5190E	EL2030E	EL2157E	EL2260E	EL7661E
EL1501E	EL2038E	EL2160E	EL2423E	ELH0002
EL2001	EL2039E	EL2175E	EL2424E	ELH0032E
EL2002	EL2040E	EL2176E	EL2444E	ELH0033
EL2003	EL2041E	EL2186E	EL2445E	ELH0101E
EL2004	EL2044CE	EL2190E	EL2460E	EN2016
EL2005	EL2045E	EL2210E	EL400E	EP2015
EL2006E	EL2070E	EL2211E	EL4089E	
EL2008E	EL2071CE	EL2223E	EL4094E	
EL2009E	EL2073E	EL2224E	EL4095E	

Harris (55)

CA158	HA2512	HA2840	HA5127	HFA0005
CA3086	HA2520	HA2841	HA5137	HFA1100
CA3046	HA2522	HA2842	HA5147	HIP2500
CA3127	HA2539	HA2850	HA5190	HMM2541
CA3083	HA2544	HA5002	HA5190TK	HMM2542
CA3096	HA2548	HA5020	HA5221	HMM5004
CA3096	HA2600	HA5033	HA5222	HMM5101
CA3127	HA2602	HA5102	HA5509	HMM5102
HA2500	HA2620	HA5104	HC5509B	HMM5104
HA2502	HA2622	HA5112	HFA0001	HMM5112
HA2510	HA2839	HA5114	HFA0002	HMM5114

Linear Technology (164)

IMPORTANT NOTE: Linear Technology op-amps have the suffix letter "L" appended to their part numbers to make them unique. The IsSPICE model names also have the L letter suffix unless the addition of the letter caused the name to be greater than 8 characters.

LF155AL	LT1006AL	LT1055S8	LT1193	LT1254	OP16CL
LF155L	LT1006L	LT1056L	LT1194	LT318AL	OP16EL
LF156AL	LT1006S8	LT1056S8	LT1195	LTC1049L	OP16FL
LF156L	LT1007AL	LT1057AL	LT1200	LTC1050A	OP16GL
LF355AL	LT1007CS	LT1057L	LT1201	LTC1050L	OP215AL
LF355L	LT1007L	LT1057SL	LT1202	LTC1051L	OP215CL
LF356AL	LT1008L	LT1058AL	LT1208	LTC1052C	OP215EL
LF356L	LT1012AL	LT1058L	LT1209	LTC1052L	OP215GL
LF412AL	LT1012DL	LT1077L	LT1211	LTC1053L	OP227AL
LF412L	LT1012L	LT1078AL	LT1212	LTC1150L	OP227CL
LH2108AL	LT1012S8	LT1078L	LT1213	LTC7652L	OP227EL
LH2108L	LT1013AL	LT1079AL	LT1214	OP05AL	OP227GL
LM101AL	LT1013DL	LT1079L	LT1215	OP05CL	OP237AL
LM107L	LT1013L	LT1097L	LT1216	OP05EL	OP237CL
LM108L	LT1014AL	LT1101L	LT1217	OP05L	OP237EL
LM10C	LT1014DL	LT1115L	LT1220	OP07AL	OP237GL
LM118L	LT1014L	LT1122	LT1221	OP07CL	OP27AL
LM301AL	LT1022AL	LT1178AL	LT1222	OP07CS8L	OP27CL
LM307L	LT1022L	LT1178L	LT1223	OP07EL	OP27EL
LM308AL	LT1024AL	LT1179AL	LT1224	OP07L	OP27GL
LM308L	LT1024L	LT1179L	LT1225	OP15AL	OP37AL
LM318L	LT1028AL	LT1187	LT1226	OP15BL	OP37CL
LM318S8L	LT1028CS	LT1189	LT1227	OP15CL	OP37EL
LT1001AL	LT1028L	LT118A	LT1228	OP15EL	OP37GL
LT1001L	LT1037AL	LT118AL	LT1229	OP15FL	OP97L
LT1001S8	LT1037CS	LT1190	LT1230	OP15GL	
LT1002AL	LT1037L	LT1191	LT1252	OP16AL	
LT1002L	LT1055AL	LT1192	LT1253	OP16BL	

Maxim (69)

MAX402	MAX4107	MAX417	MAX47815	MAX923
MAX403	MAX4108	MAX418	MAX4783	MAX924
MAX406Ac	MAX4109	MAX419	MAX4785	MAX931
MAX406Ad	MAX4112	MAX427	MAX47915	MAX932
MAX406Bc	MAX4113	MAX4278	MAX4793	MAX933
MAX406Bd	MAX4122	MAX435	MAX4795	MAX934
MAX407	MAX4124	MAX436	MAX492	MAX941
MAX409A	MAX4130	MAX437	MAX494	MAX942
MAX409B	MAX4147	MAX438	MAX495	MAX944
MAX410	MAX4178	MAX439	MAX907	MAX951
MAX4100	MAX412	MAX473	MAX909	MAX952
MAX410B	MAX412B	MAX474	MAX912	MAX953
MAX4101	MAX414	MAX475	MAX921	MAX954
MAX4106	MAX414B	MAX477	MAX922	

Motorola (50)

MPORTANT NOTE: Morotola op-amps have the suffix letter "m" appended to some of their part numbers and model names to make them unique.

LF351M	LM348M	MC4741	MC33174	MC33284
LF356M	LM358M	MC33071	MC33178	MC34001
LF411M	LM833M	MC33072	MC33179	MC34084
LF412M	LM2902M	MC33074	MC33181	MC34184
LF441M	LM2904M	MC33076	MC33182	TCA0372
LF442M	MC1458	MC33077	MC33184	TL061M
LF444M	MC1536	MC33078	MC33204	TL062M
LM11M	MC1747	MC33079	MC33272	TL064M
LM307M	MC3458	MC33171	MC33274	TL071M
LM324M	MC4558	MC33172	MC33282	TL081M

National Semiconductor (146)

IMPORTANT NOTE: National op-amps have the suffix letter "n" appended to their part numbers to make them unique. The IsSPICE model names also have the n letter suffix unless the addition of the letter caused the name to be greater than 8 characters.

LF155N	LM218N	LM6164N	LMC6032N	LMC662AN
LF156N	LM224N	LM6165N	LMC6034N	LMC662N
LF157N	LM258N	LM6171A	LMC6041N	LMC6681A
LF255N	LM2902N	LM6171B	LMC6042N	LMC6681B
LF256N	LM2904N	LM6172	LMC6044N	LMC6682A
LF257N	LM318N	LM6181N	LMC6061N	LMC6682B
LF351N	LM358N	LM6218N	LMC6062N	LMC6684A
LF353N	LM359	LM6261N	LMC6064N	LMC6684B
LF355N	LM4250CN	LM6262N	LMC6081N	LMC6762A
LF356N	LM6001AN	LM6264N	LMC6082N	LMC6762B
LF357N	LM6041AN	LM6265N	LMC6084N	LMC6772A
LF400N	LM6042AN	LM627N	LMC6462A	LMC6772B
LF411N	LM6044AN	LM6310	LMC6462B	LMC7101A
LF412N	LM6061AN	LM6311	LMC6464A	LMC7101B
LF441AN	LM6062AN	LM6317	LMC6464B	LMC7111A
LF441N	LM6064AN	LM6361N	LMC6482N	LMC7111B
LF442AN	LM607N	LM6362N	LMC6484N	LMC7211A
LF442N	LM6081AN	LM6364N	LMC6492A	LMC7211B
LF444AN	LM6082AN	LM6365N	LMC6492B	LMC7221A
LF444N	LM6084AN	LM637N	LMC6494A	LMC7221B
LF451N	LM6118N	LM6685	LMC6494B	LPC660AN
LF453N	LM6121N	LM7121	LMC6572A	LPC660N
LH4161N	LM6132A	LM7131A	LMC6572B	LPC661AN
LH4162N	LM6132B	LM7131B	LMC6574A	LPC661N
LM111N	LM6142A	LM7171A	LMC6574B	LPC662AN
LM118N	LM6142B	LM7171B	LMC6582A	LPC662N
LM124N	LM6152A	LM741N	LMC6582B	
LM13600N	LM6152B	LMC6001N	LMC6584A	
LM13700N	LM6161N	LMC6022N	LMC6584B	
LM158N	LM6162N	LMC6024N	LMC660AN	

SGS-Thomson (48)

LF351S	LM193S	MC1458S	TL071S	TS555L
LF355S	LM2901S	MC33078S	TL081S	TS555M
LF356S	LM2902S	MC33171S	TS271LS	TS912S
LF357S	LM2903S	MC34001S	TS274S	TSH150S
LM101S	LM2904S	MC3403S	TS27M4S	TSH151S
LM124S	LM311S	MC4558S	TS339S	UA741S
LM139S	LM319S	OP07S	TS3702S	UA748S
LM146S	LM833S	TDA7910S	TS372S	UA776S
LM148S	LS204MS	TEB1033S	TS393S	
LM158S	LS404MS	TL061S	TS555H	

Texas Instruments (516)

IMPORTANT NOTE: TI op-amps have the suffix letter "t" appended to their part numbers to make them unique. The IsSPICE model names also have a t letter suffix unless the addition of the letter caused the name to be greater than 8 characters. Some parts and IsSPICE model names may also have a suffix letter which identify the voltage rails. For example, t4=+/-20V, t3 = +/-15V, t1=+/-5V, t5=5V, t10=10V, t14=1.4V. All TLV parts are either 3V, IA suffix, or 5V , IB suffix.

ICL7652T	LP111T3	RC4558T	T2322IA	T252CT14
LF347T	LP211T3	RC4559T	T2322IB	T254CT1
LF351T	LP239T	T1078T1	T2324IA	T254CT10
LF353T	LP239T5A	T1078T10	T2324IB	T254CT14
LF411CT	LP2901T	T1078T5	T2332IA	T25L2CT0
LF412CT	LP2901T5A	T1079T1	T2332IB	T25L2CT1
LM101AT	LP311T	T1079T10	T2334IA	T25L2CT4
LM107T	LP311T3	T1079T5	T2334IB	T25L4CT0
LM111T	LP339T	T2021T3	T2341HA	T25L4CT1
LM139AT	LP339T5A	T2021T5	T2341HB	T25L4CT4
LM139T	LT1001T	T2022T3	T2341LA	T25M2CT0
LM193T	LT1007T	T2022T5	T2341LB	T25M2CT1
LM211T	LT1008T	T2024T3	T2341MA	T25M2CT4
LM239AT	LT1011A	T2024T5	T2341MB	T25M4CT0
LM239T	LT1011T	T2061T1	T2342IA	T25M4CT1
LM2901T	LT1012T	T2061T3	T2342IB	T25M4CT4
LM2903T	LT1013T3	T2061T4	T2344IA	T271HT1
LM293AT	LT1013T5	T2062T1	T2344IB	T271HT10
LM293T	LT1016T	T2062T3	T2420T3	T271HT5
LM301AT	LT1028T	T2062T4	T2420T5	T271LT1
LM307T	LT1037T	T2064T1	T2421T3	T271LT10
LM308T	LTC1052T	T2064T3	T2421T5	T271LT5
LM311T	MC1458T	T2064T4	T2422T3	T271MT1
LM318T	MC3403T3	T2141T3	T2422T5	T271MT10
LM324T	MC3403T5	T2141T5	T251HT1	T271MT5
LM3302T	NE5534T	T2142T3	T251HT10	T272T1
LM339AT	OP-07CT	T2142T5	T251HT14	T272T10
LM339T	OP-07DT	T2144T3	T251LT1	T272T5
LM348T	OP-07ET	T2144T5	T251LT10	T274T1
LM358T	OP-27CT	T2161T1	T251LT14	T274T10
LM393AT	OP-27ET	T2161T3	T251MT1	T274T5
LM393T	OP-27GT	T2161T4	T251MT10	T277T1
LP111P	OP-37AT	T2201T1	T252CT1	T277T10
LP211T	RC4136T	T2201T5	T252CT10	T277T5

T279T1	TL072T3	TLC2272T5B	TLC271MT1	TLC339T5A
T279T10	TL074T	TLC2274T1	TLC271MT1B	TLC352T
T279T5	TL074T3	TLC2274T1B	TLC271MT5A	TLC352T5A
T27L2T0	TL075T	TLC2274T5A	TLC271MT5B	TLC354T
T27L2T1	TL080T	TLC2274T5B	TLC272T1	TLC354T5A
T27L2T5	TL081T	TLC251HT1	TLC272T1B	TLC3702T
T27L4T0	TL081T3	TLC251HT14A	TLC272T5A	TLC3702T5A
T27L4T1	TL082T	TLC251HT14B	TLC272T5B	TLC3704T
T27L4T5	TL082T3	TLC251HT1B	TLC274T1	TLC3704T5A
T27L7T0	TL083T	TLC251LT1	TLC274T1B	TLC372T
T27L7T1	TL084T	TLC251LT14A	TLC274T5A	TLC372T5A
T27L7T5	TL084T3	TLC251LT14B	TLC274T5B	TLC374T
T27L9T0	TL085T	TLC251LT1B	TLC277T1	TLC374T5A
T27L9T1	TL087T	TLC251MT1	TLC277T1B	TLC393T
T27L9T5	TL088T	TLC251MT1B	TLC277T5A	TLC393T5A
T27M2T0	TL136T	TLC252CT1	TLC277T5B	TLE2021T3
T27M2T1	TL287T	TLC252CT14A	TLC279T1	TLE2021T3B
T27M2T5	TL288T	TLC252CT14B	TLC279T1B	TLE2021T5A
T27M4T0	TL321T	TLC252CT1B	TLC279T5A	TLE2021T5B
T27M4T1	TL322T3	TLC254CT1	TLC279T5B	TLE2022T3
T27M4T5	TL322T5	TLC254CT14A	TLC27L2T1	TLE2022T3B
T27M7T0	TL331T	TLC254CT14B	TLC27L2T1B	TLE2022T5A
T27M7T1	TLC1078T1	TLC254CT1B	TLC27L2T5A	TLE2022T5B
T27M7T5	TLC1078T1B	TLC25L2CT1	TLC27L2T5B	TLE2024T3
T27M9T0	TLC1078T5A	TLC25L2CT14A	TLC27L4T1	TLE2024T3B
T27M9T1	TLC1078T5B	TLC25L2CT14B	TLC27L4T1B	TLE2024T5A
T27M9T5	TLC1079T1	TLC25L2CT1B	TLC27L4T5A	TLE2024T5B
TL022CT	TLC1079T1B	TLC25L4CT1	TLC27L4T5B	TLE2027T
TL031T1	TLC1079T5A	TLC25L4CT14A	TLC27L7T1	TLE2027T3
TL031T3	TLC1079T5B	TLC25L4CT14B	TLC27L7T1B	TLE2027T3B
TL032T1	TLC2201T1	TLC25L4CT1B	TLC27L7T5A	TLE2037T
TL032T3	TLC2201T1B	TLC25M2CT1	TLC27L7T5B	TLE2037T3
TL034T1	TLC2201T5A	TLC25M2CT14A	TLC27L9T1	TLE2037T3B
TL034T3	TLC2201T5B	TLC25M2CT14B	TLC27L9T1B	TLE2061T1
TL044CT	TLC2252T1	TLC25M2CT1B	TLC27L9T5A	TLE2061T1B
TL051T1	TLC2252T1B	TLC25M4CT1	TLC27L9T5B	TLE2061T3
TL051T3	TLC2252T5A	TLC25M4CT14A	TLC27M2T1	TLE2061T3B
TL052T1	TLC2252T5B	TLC25M4CT14B	TLC27M2T1B	TLE2061T4A
TL052T3	TLC2254T1	TLC25M4CT1B	TLC27M2T5A	TLE2061T4B
TL054T1	TLC2254T1B	TLC2652T	TLC27M2T5B	TLE2062T1
TL054T3	TLC2254T5A	TLC2652T1	TLC27M4T1	TLE2062T1B
TL060T	TLC2254T5B	TLC2652T1B	TLC27M4T1B	TLE2062T3
TL061T	TLC2262T1	TLC2654T	TLC27M4T5A	TLE2062T3B
TL061T3	TLC2262T1B	TLC2654T1	TLC27M4T5B	TLE2062T4A
TL062T	TLC2262T5A	TLC2654T1B	TLC27M7T1	TLE2062T4B
TL062T3	TLC2262T5B	TLC271HT1	TLC27M7T1B	TLE2064T1
TL064T	TLC2264T1	TLC271HT1B	TLC27M7T5A	TLE2064T1B
TL064T3	TLC2264T1B	TLC271HT5A	TLC27M7T5B	TLE2064T3
TL066T	TLC2264T5A	TLC271HT5B	TLC27M9T1	TLE2064T3B
TL070T	TLC2264T5B	TLC271LT1	TLC27M9T1B	TLE2064T4A
TL071T	TLC2272T1	TLC271LT1B	TLC27M9T5A	TLE2064T4B
TL071T3	TLC2272T1B	TLC271LT5A	TLC27M9T5B	TLE2071T3
TL072T	TLC2272T5A	TLC271LT5B	TLC339T	TLE2071T3B

TLE2072T3	TLE2142T5A	TLE2237T3B	TLV2254T03B	TLV2341MT03A
TLE2072T3B	TLE2142T5B	TLE2425	TLV2254T5A	TLV2341MT5A
TLE2074T3	TLE2144T3	TLE2425A	TLV2254T5B	TLV2342IT03A
TLE2074T3B	TLE2144T3B	TLE2425T	TLV2262T03A	TLV2342IT5A
TLE2081T3	TLE2144T5A	TLE2425T5A	TLV2264T03A	TLV2344IT03A
TLE2081T3B	TLE2144T5B	TLE2425T5B	TLV2322IT03A	TLV2344IT5A
TLE2082T1	TLE2161T1	TLE2426	TLV2322IT5A	TLV2352IT03A
TLE2082T3	TLE2161T1B	TLE2426A	TLV2324IT03A	TLV2352IT5A
TLE2082T3B	TLE2161T3	TLE2426T	TLV2324IT5A	TLV2354IT03A
TLE2084T3	TLE2161T3B	TLE2426T5A	TLV2332IT03A	TLV2354IT5A
TLE2084T3B	TLE2161T4A	TLE2426T5B	TLV2332IT5A	UA741T
TLE2141T3	TLE2161T4B	TLE2427T	TLV2334IT03A	UA747T
TLE2141T3B	TLE2227T	TLV2252T03A	TLV2334IT5A	UA748T
TLE2141T5A	TLE2227T3	TLV2252T03B	TLV2341HT03A	
TLE2141T5B	TLE2227T3B	TLV2252T5A	TLV2341HT5A	
TLE2142T3	TLE2237T	TLV2252T5B	TLV2341LT03A	
TLE2142T3B	TLE2237T3	TLV2254T03A	TLV2341LT5A	

Opto-Isolators [38]

Part #	Part Name	Part Type	Part Sub Type	Description
4N22	ON22	Opto-Isolators	Bipolar Output	High Gain 1kV 40%
4N23	ON23	Opto-Isolators	Bipolar Output	High Gain 1kV 80%
4N24	ON24	Opto-Isolators	Bipolar Output	High Gain 1kV 150%
4N25	ON25	Opto-Isolators	Bipolar Output	High Speed 2.5kV 50%
4N26	ON26	Opto-Isolators	Bipolar Output	High Speed 1.5kV 50%
4N27	ON27	Opto-Isolators	Bipolar Output	High Speed 1.5kV 30%
4N28	ON28	Opto-Isolators	Bipolar Output	High Speed 500V 30%
4N35	ON35	Opto-Isolators	Bipolar Output	High Speed 3.55kV 100%
4N36	ON36	Opto-Isolators	Bipolar Output	High Speed 2.5kV 100%
4N37	ON37	Opto-Isolators	Bipolar Output	High Speed 1.5kV 100%
4N39	ON39	Opto-Isolators	SCR Output	7.5kV
4N40	ON40	Opto-Isolators	SCR Output	7.5kV
4N47	ON47	Opto-Isolators	Bipolar Output	High CTR 1kV 50%
4N48	ON48	Opto-Isolators	Bipolar Output	High CTR 1kV 100%
4N49	ON49	Opto-Isolators	Bipolar Output	High CTR 1kV 200%
4N55	ON55	Opto-Isolators	Bipolar Output	High Speed 500V 20%
6N135	ON135	Opto-Isolators	TTL Comp.	TTL Comp. 3kV 18%
6N136	ON136	Opto-Isolators	TTL Comp.	TTL Comp. 3kV 24%
H11A1	H11A1	Opto-Isolators	Bipolar Output	High Speed 500V 100%
H11A2	H11A2	Opto-Isolators	Bipolar Output	High Speed 500V 70%
H11A3	H11A3	Opto-Isolators	Bipolar Output	High Speed 500V 70%
H11B1	H11B1	Opto-Isolators	Darlington	Darlington 500kV 500%
H11B2	H11B2	Opto-Isolators	Darlington	Darlington 500V 200%
H11B3	H11B3	Opto-Isolators	Darlington	Darlington 500V 100%
H11L1	H11L1	Opto-Isolators	Schmitt Trig	Schmitt Trig. 500V
H11L2	H11L2	Opto-Isolators	Schmitt Trig	Schmitt Trig. 500V
HCNR200	HCNR200	Isolation Amps	H-P	Temp Insensitive
HCPL4502	HCPL4502	Opto-Isolators	TTL Comp.	TTL Comp. 3kV 24%
HCPL4506	HCPL4506	Opto-Isolators	H-P	High CMR
HCPL7820	HCPL7820	Isolation Amps	H-P	High CMR
IL300	IL300	Opto-Isolators	Dual	C.P.Clare Linear
LOC110	LOC110	Opto-Isolators	Dual	Siemens Linear
MCT6	MCT6	Opto-Isolators	Dual	GI High Gain 500V 50%
MCT66	MCT66	Opto-Isolators	Dual	GI High Gain 500V 15%
O66092	O66092	Opto-Isolators	Bipolar Output	Micropac
TIL186-1	TIL186-1	Opto-Isolators	Bipolar Output	AC Input 2.5kV 10%
TIL186-2	TIL186-2	Opto-Isolators	Bipolar Output	AC Input 2.5kV 20%
TIL186-3	TIL186-3	Opto-Isolators	Bipolar Output	AC Input 2.5kV 50%
TIL186-4	TIL186-4	Opto-Isolators	Bipolar Output	AC Input 2.5kV 100%

[Connections: OPTO Anode, Cathode, Collector, Base, Emitter]
[Connections: OPTONB Anode, Cathode, Collector, Emitter]: No Base Connection
[Connections: OPTOD Anode, Cathode, Collector, Base, Emitter]: Darlington Output
[Connections: OPTOST Anode, Cathode, Vcc, Gnd, Out]: Schmitt Trigger Output
[Connections: OPTOAC Anode, Cathode, Collector, Base, Emitter]: AC Input
[Connections: MCT6 Anode1, Cathode1, Anode2, Cathode2, Emitter2, Collector2, Collector1, Emitter1]

Varistors (MOVs) [479]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
B25K130	B25K130	Varistors		
B25K250	B25K250	Varistors		
B25K420	B25K420	Varistors		
B25K75	B25K75	Varistors		
B32K130	B32K130	Varistors		
B32K150	B32K150	Varistors		
B32K230	B32K230	Varistors		
B32K250	B32K250	Varistors		
B32K275	B32K275	Varistors		
B32K320	B32K320	Varistors		
B32K385	B32K385	Varistors		
B32K420	B32K420	Varistors		
B32K440	B32K440	Varistors		
B32K460	B32K460	Varistors		
B32K550	B32K550	Varistors		
B32K680	B32K680	Varistors		
B32K75	B32K75	Varistors		
B32K750	B32K750	Varistors		
B40K130	B40K130	Varistors		
B40K150	B40K150	Varistors		
B40K230	B40K230	Varistors		
B40K250	B40K250	Varistors		
B40K275	B40K275	Varistors		
B40K320	B40K320	Varistors		
B40K385	B40K385	Varistors		
B40K420	B40K420	Varistors		
B40K440	B40K440	Varistors		
B40K460	B40K460	Varistors		
B40K550	B40K550	Varistors		
B40K680	B40K680	Varistors		
B40K75	B40K75	Varistors		
B40K750	B40K750	Varistors		
B60K1000	B60K1000	Varistors		
B60K130	B60K130	Varistors		
B60K150	B60K150	Varistors		
B60K230	B60K230	Varistors		
B60K250	B60K250	Varistors		
B60K275	B60K275	Varistors		
B60K320	B60K320	Varistors		
B60K385	B60K385	Varistors		
B60K420	B60K420	Varistors		
B60K440	B60K440	Varistors		
B60K460	B60K460	Varistors		
B60K550	B60K550	Varistors		
B60K680	B60K680	Varistors		
B60K75	B60K75	Varistors		
B60K750	B60K750	Varistors		
B80K1100	B80K1100	Varistors		
B80K130	B80K130	Varistors		
B80K150	B80K150	Varistors		
B80K230	B80K230	Varistors		
B80K250	B80K250	Varistors		
B80K275	B80K275	Varistors		
B80K320	B80K320	Varistors		
B80K385	B80K385	Varistors		
B80K420	B80K420	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
B80K440	B80K440	Varistors		
B80K460	B80K460	Varistors		
B80K550	B80K550	Varistors		
B80K680	B80K680	Varistors		
B80K750	B80K750	Varistors		
CN1210L8G	CN1210L8G	Varistors		
CN1210M4G	CN1210M4G	Varistors		
CN1210M6G	CN1210M6G	Varistors		
CN1210S14BG	CN1210S14BG	Varistors		
CN2220L8G	CN2220L8G	Varistors		
CN2220M4G	CN2220M4G	Varistors		
CN2220M6G	CN2220M6G	Varistors		
CN2220S14BG	CN2220S14BG	Varistors		
CU3225K115G	CU3225K115G	Varistors		
CU3225K11G	CU3225K11G	Varistors		
CU3225K130G	CU3225K130G	Varistors		
CU3225K140G	CU3225K140G	Varistors		
CU3225K14G	CU3225K14G	Varistors		
CU3225K14G	CU3225K14G	Varistors		
CU3225K150G	CU3225K150G	Varistors		
CU3225K175G	CU3225K175G	Varistors		
CU3225K17G	CU3225K17G	Varistors		
CU3225K17G	CU3225K17G	Varistors		
CU3225K20G	CU3225K20G	Varistors		
CU3225K230G	CU3225K230G	Varistors		
CU3225K250G	CU3225K250G	Varistors		
CU3225K25G	CU3225K25G	Varistors		
CU3225K275G	CU3225K275G	Varistors		
CU3225K300G	CU3225K300G	Varistors		
CU3225K30G	CU3225K30G	Varistors		
CU3225K30G	CU3225K30G	Varistors		
CU3225K35G	CU3225K35G	Varistors		
CU3225K40G	CU3225K40G	Varistors		
CU3225K50G	CU3225K50G	Varistors		
CU3225K60G	CU3225K60G	Varistors		
CU3225K75G	CU3225K75G	Varistors		
CU3225K95G	CU3225K95G	Varistors		
CU4032K115G	CU4032K115G	Varistors		
CU4032K11G	CU4032K11G	Varistors		
CU4032K130G	CU4032K130G	Varistors		
CU4032K140G	CU4032K140G	Varistors		
CU4032K14G	CU4032K14G	Varistors		
CU4032K14G	CU4032K14G	Varistors		
CU4032K150G	CU4032K150G	Varistors		
CU4032K175G	CU4032K175G	Varistors		
CU4032K17G	CU4032K17G	Varistors		
CU4032K17G	CU4032K17G	Varistors		
CU4032K20G	CU4032K20G	Varistors		
CU4032K230G	CU4032K230G	Varistors		
CU4032K250G	CU4032K250G	Varistors		
CU4032K25G	CU4032K25G	Varistors		
CU4032K275G	CU4032K275G	Varistors		
CU4032K300G	CU4032K300G	Varistors		
CU4032K30G	CU4032K30G	Varistors		
CU4032K30G	CU4032K30G	Varistors		
CU4032K35G	CU4032K35G	Varistors		
CU4032K40G	CU4032K40G	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
CU4032K50G	CU4032K50G	Varistors		
CU4032K60G	CU4032K60G	Varistors		
CU4032K75G	CU4032K75G	Varistors		
CU4032K95G	CU4032K95G	Varistors		
592A14	M592A14	Varistors		14 Volts
592A17	M592A17	Varistors		17 Volts
592A20	M592A20	Varistors		20 Volts
592A25	M592A25	Varistors		25 Volts
592B30	M592B30	Varistors		30 Volts
592B35	M592B35	Varistors		35 Volts
592B40	M592B40	Varistors		40 Volts
592C460	M592C460	Varistors		40 Volts
LS40K130QP	LS40K130QP	Varistors		
LS40K150QP	LS40K150QP	Varistors		
LS40K230QP	LS40K230QP	Varistors		
LS40K250QP	LS40K250QP	Varistors		
LS40K275QP	LS40K275QP	Varistors		
LS40K320QP	LS40K320QP	Varistors		
LS40K385QP	LS40K385QP	Varistors		
LS40K420QP	LS40K420QP	Varistors		
LS40K440QP	LS40K440QP	Varistors		
LS40K460QP	LS40K460QP	Varistors		
LS40K550QP	LS40K550QP	Varistors		
LS40K680QP	LS40K680QP	Varistors		
LS40K750QP	LS40K750QP	Varistors		
S05K11	S05K11	Varistors		
S05K115	S05K115	Varistors		
S05K130	S05K130	Varistors		
S05K14	S05K14	Varistors		
S05K140	S05K140	Varistors		
S05K150	S05K150	Varistors		
S05K17	S05K17	Varistors		
S05K175	S05K175	Varistors		
S05K20	S05K20	Varistors		
S05K230	S05K230	Varistors		
S05K25	S05K25	Varistors		
S05K250	S05K250	Varistors		
S05K275	S05K275	Varistors		
S05K30	S05K30	Varistors		
S05K300	S05K300	Varistors		
S05K35	S05K35	Varistors		
S05K385	S05K385	Varistors		
S05K40	S05K40	Varistors		
S05K420	S05K420	Varistors		
S05K440	S05K440	Varistors		
S05K460	S05K460	Varistors		
S05K50	S05K50	Varistors		
S05K60	S05K60	Varistors		
S05K75	S05K75	Varistors		
S05K95	S05K95	Varistors		
S07K11	S07K11	Varistors		
S07K115	S07K115	Varistors		
S07K130	S07K130	Varistors		
S07K14	S07K14	Varistors		
S07K140	S07K140	Varistors		
S07K150	S07K150	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
S07K17	S07K17	Varistors		
S07K175	S07K175	Varistors		
S07K20	S07K20	Varistors		
S07K230	S07K230	Varistors		
S07K25	S07K25	Varistors		
S07K250	S07K250	Varistors		
S07K275	S07K275	Varistors		
S07K30	S07K30	Varistors		
S07K300	S07K300	Varistors		
S07K35	S07K35	Varistors		
S07K385	S07K385	Varistors		
S07K40	S07K40	Varistors		
S07K420	S07K420	Varistors		
S07K440	S07K440	Varistors		
S07K460	S07K460	Varistors		
S07K50	S07K50	Varistors		
S07K60	S07K60	Varistors		
S07K75	S07K75	Varistors		
S07K95	S07K95	Varistors		
S10K11	S10K11	Varistors		
S10K115	S10K115	Varistors		
S10K130	S10K130	Varistors		
S10K14	S10K14	Varistors		
S10K140	S10K140	Varistors		
S10K14AUTO	S10K14AUTO	Varistors		
S10K150	S10K150	Varistors		
S10K17	S10K17	Varistors		
S10K175	S10K175	Varistors		
S10K17AUTO	S10K17AUTO	Varistors		
S10K20	S10K20	Varistors		
S10K230	S10K230	Varistors		
S10K25	S10K25	Varistors		
S10K250	S10K250	Varistors		
S10K275	S10K275	Varistors		
S10K30	S10K30	Varistors		
S10K300	S10K300	Varistors		
S10K320	S10K320	Varistors		
S10K35	S10K35	Varistors		
S10K385	S10K385	Varistors		
S10K40	S10K40	Varistors		
S10K420	S10K420	Varistors		
S10K440	S10K440	Varistors		
S10K460	S10K460	Varistors		
S10K50	S10K50	Varistors		
S10K510	S10K510	Varistors		
S10K550	S10K550	Varistors		
S10K60	S10K60	Varistors		
S10K625	S10K625	Varistors		
S10K680	S10K680	Varistors		
S10K75	S10K75	Varistors		
S10K95	S10K95	Varistors		
S14K1000	S14K1000	Varistors		
S14K11	S14K11	Varistors		
S14K115	S14K115	Varistors		
S14K130	S14K130	Varistors		
S14K14	S14K14	Varistors		
S14K140	S14K140	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
S14K14AUTO	S14K14AUTO	Varistors		
S14K150	S14K150	Varistors		
S14K17	S14K17	Varistors		
S14K175	S14K175	Varistors		
S14K17AUTO	S14K17AUTO	Varistors		
S14K20	S14K20	Varistors		
S14K230	S14K230	Varistors		
S14K25	S14K25	Varistors		
S14K250	S14K250	Varistors		
S14K275	S14K275	Varistors		
S14K30	S14K30	Varistors		
S14K300	S14K300	Varistors		
S14K30AUTO	S14K30AUTO	Varistors		
S14K320	S14K320	Varistors		
S14K35	S14K35	Varistors		
S14K385	S14K385	Varistors		
S14K40	S14K40	Varistors		
S14K420	S14K420	Varistors		
S14K440	S14K440	Varistors		
S14K460	S14K460	Varistors		
S14K50	S14K50	Varistors		
S14K510	S14K510	Varistors		
S14K550	S14K550	Varistors		
S14K60	S14K60	Varistors		
S14K625	S14K625	Varistors		
S14K680	S14K680	Varistors		
S14K75	S14K75	Varistors		
S14K95	S14K95	Varistors		
S18K130	S18K130	Varistors		
S18K140	S18K140	Varistors		
S18K150	S18K150	Varistors		
S18K175	S18K175	Varistors		
S18K230	S18K230	Varistors		
S18K250	S18K250	Varistors		
S18K275	S18K275	Varistors		
S18K300	S18K300	Varistors		
S18K320	S18K320	Varistors		
S18K385	S18K385	Varistors		
S18K420	S18K420	Varistors		
S18K440	S18K440	Varistors		
S18K460	S18K460	Varistors		
S20K1000	S20K1000	Varistors		
S20K11	S20K11	Varistors		
S20K115	S20K115	Varistors		
S20K130	S20K130	Varistors		
S20K14	S20K14	Varistors		
S20K140	S20K140	Varistors		
S20K14AUTO	S20K14AUTO	Varistors		
S20K150	S20K150	Varistors		
S20K17	S20K17	Varistors		
S20K175	S20K175	Varistors		
S20K17AUTO	S20K17AUTO	Varistors		
S20K20	S20K20	Varistors		
S20K230	S20K230	Varistors		
S20K25	S20K25	Varistors		
S20K250	S20K250	Varistors		
S20K25AUTO	S20K25AUTO	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
S20K275	S20K275	Varistors		
S20K30	S20K30	Varistors		
S20K300	S20K300	Varistors		
S20K30AUTO	S20K30AUTO	Varistors		
S20K320	S20K320	Varistors		
S20K35	S20K35	Varistors		
S20K385	S20K385	Varistors		
S20K40	S20K40	Varistors		
S20K420	S20K420	Varistors		
S20K440	S20K440	Varistors		
S20K460	S20K460	Varistors		
S20K50	S20K50	Varistors		
S20K510	S20K510	Varistors		
S20K550	S20K550	Varistors		
S20K60	S20K60	Varistors		
S20K625	S20K625	Varistors		
S20K680	S20K680	Varistors		
S20K75	S20K75	Varistors		
S20K95	S20K95	Varistors		
SIMENSVAR	SIMENSVAR	Varistors	Generic Version	
SR1210L8S	SR1210L8S	Varistors		
SR1210M4S	SR1210M4S	Varistors		
SR1210M6S	SR1210M6S	Varistors		
SR1210S14B	SR1210S14B	Varistors		
SR2220L8S	SR2220L8S	Varistors		
SR2220M4S	SR2220M4S	Varistors		
SR2220M6S	SR2220M6S	Varistors		
SR2220S14B	SR2220S14B	Varistors		
SR2K20M105Z	SR2K20M105Z	Varistors		
SR2K20M155Z	SR2K20M155Z	Varistors		
SR2K20M474X	SR2K20M474X	Varistors		
SR2S14BM105Z	SR2S14BM105Z	Varistors		
SR2S14BM155Z	SR2S14BM155Z	Varistors		
SR2S14BM474X	SR2S14BM474X	Varistors		
V1000L16	V1000L16	Varistors		
V1000L80	V1000L80	Varistors		
V100RA8	V100RA8	Varistors		
V112BB60	V112BB60	Varistors		
V112CA60	V112CA60	Varistors		
V120RA8	V120RA8	Varistors		
V130L10A	V130L10A	Varistors		
V130L10C	V130L10C	Varistors		
V130L20A	V130L20A	Varistors		
V130L20B	V130L20B	Varistors		
V130L20C	V130L20C	Varistors		
V130LA1	V130LA1	Varistors		
V130LA2	V130LA2	Varistors		
V130LA20	V130LA20	Varistors		130V
V130LA5	V130LA5	Varistors		
V130P20A	V130P20A	Varistors		
V130P20C	V130P20C	Varistors		
V131BA60	V131BA60	Varistors		130V
V131DB40	V131DB40	Varistors		
V131HA32	V131HA32	Varistors		130V
V131HA40	V131HA40	Varistors		130V
V140L10A	V140L10A	Varistors		
V140L10C	V140L10C	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
V140L20C	V140L20C	Varistors		
V140LA2	V140LA2	Varistors		
V140LA5	V140LA5	Varistors		
V142BB60	V142BB60	Varistors		
V142CA60	V142CA60	Varistors		
V150L10A	V150L10A	Varistors		
V150L10C	V150L10C	Varistors		
V150L20A	V150L20A	Varistors		
V150L20B	V150L20B	Varistors		
V150L20C	V150L20C	Varistors		
V150LA1	V150LA1	Varistors		
V150LA2	V150LA2	Varistors		
V150LA20	V150LA20	Varistors		150V
V150LA5	V150LA5	Varistors		
V150P20A	V150P20A	Varistors		
V150P20C	V150P20C	Varistors		
V150RA8	V150RA8	Varistors		
V151BA60	V151BA60	Varistors		150V
V151DB40	V151DB40	Varistors		
V151HA32	V151HA32	Varistors		150V
V151HA40	V151HA40	Varistors		150V
V172BB60	V172BB60	Varistors		
V172CA60	V172CA60	Varistors		
V175L10A	V175L10A	Varistors		
V175L10C	V175L10C	Varistors		
V175L20A	V175L20A	Varistors		
V175L20C	V175L20C	Varistors		
V175LA2	V175LA2	Varistors		
V175LA5	V175LA5	Varistors		
V180RA8	V180RA8	Varistors		
V200RA8	V200RA8	Varistors		
V202BB60	V202BB60	Varistors		
V202CA60	V202CA60	Varistors		
V220RA8	V220RA8	Varistors		
V230L20A	V230L20A	Varistors		
V230L20C	V230L20C	Varistors		
V230L40C	V230L40C	Varistors		
V230LA10	V230LA10	Varistors		
V230LA4	V230LA4	Varistors		
V240RA8	V240RA8	Varistors		
V242BB60	V242BB60	Varistors		
V242CA60	V242CA60	Varistors		
V250L20A	V250L20A	Varistors		
V250L20C	V250L20C	Varistors		
V250L40A	V250L40A	Varistors		
V250L40B	V250L40B	Varistors		
V250L40C	V250L40C	Varistors		
V250LA10	V250LA10	Varistors		
V250LA2	V250LA2	Varistors		
V250LA4	V250LA4	Varistors		
V250LA40	V250LA40	Varistors		250V
V250P40A	V250P40A	Varistors		
V250P40C	V250P40C	Varistors		
V251BA60	V251BA60	Varistors		
V251DB40	V251DB40	Varistors		
V251HA32	V251HA32	Varistors		250V
V251HA40	V251HA40	Varistors		250V

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
V270RA8	V270RA8	Varistors		
V271BA60	V271BA60	Varistors		
V271DB40	V271DB40	Varistors		
V271HA32	V271HA32	Varistors		270V
V271HA40	V271HA40	Varistors		270V
V275L20A	V275L20A	Varistors		
V275L20C	V275L20C	Varistors		
V275L40A	V275L40A	Varistors		
V275L40B	V275L40B	Varistors		
V275L40C	V275L40C	Varistors		
V275LA10	V275LA10	Varistors		
V275LA2	V275LA2	Varistors		
V275LA4	V275LA4	Varistors		
V275LA40	V275LA40	Varistors		275V
V275P40A	V275P40A	Varistors		
V275P40C	V275P40C	Varistors		
V282BB60	V282BB60	Varistors		
V282CA60	V282CA60	Varistors		
V300L20C	V300L20C	Varistors		
V300L40C	V300L40C	Varistors		
V300LA2	V300LA2	Varistors		
V300LA4	V300LA4	Varistors		
V320L40B	V320L40B	Varistors		
V320P40A	V320P40A	Varistors		
V320P40C	V320P40C	Varistors		
V321BA60	V321BA60	Varistors		
V321DB40	V321DB40	Varistors		
V321HA32	V321HA32	Varistors		320V
V321HA40	V321HA40	Varistors		320V
V360RA8	V360RA8	Varistors		
V36ZA80	V36ZA80	Varistors		36V
V390RA8	V390RA8	Varistors		
V420L10A	V420L10A	Varistors		
V420L20A	V420L20A	Varistors		
V420L80B	V420L80B	Varistors		
V420LA10	V420LA10	Varistors		
V420P80A	V420P80A	Varistors		
V420P80C	V420P80C	Varistors		
V421BA60	V421BA60	Varistors		
V421DB40	V421DB40	Varistors		
V421HA32	V421HA32	Varistors		420V
V421HA40	V421HA40	Varistors		420V
V430RA8	V430RA8	Varistors		
V480L40A	V480L40A	Varistors		
V480L80B	V480L80B	Varistors		
V480P80A	V480P80A	Varistors		
V480P80C	V480P80C	Varistors		
V481BA60	V481BA60	Varistors		
V481DB40	V481DB40	Varistors		
V481HA32	V481HA32	Varistors		480V
V481HA40	V481HA40	Varistors		480V
V510L40A	V510L40A	Varistors		
V510L80B	V510L80B	Varistors		
V510P80A	V510P80A	Varistors		
V510P80C	V510P80C	Varistors		
V511BA60	V511BA60	Varistors		
V511DB40	V511DB40	Varistors		

Varistors (MOVs) (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
V511HA32	V511HA32	Varistors		510V
V511HA40	V511HA40	Varistors		510V
V571BA60	V571BA60	Varistors		
V571DB40	V571DB40	Varistors		
V571HA32	V571HA32	Varistors		570V
V571HA40	V571HA40	Varistors		570V
V575L40A	V575L40A	Varistors		
V575L80B	V575L80B	Varistors		
V575P80A	V575P80A	Varistors		
V575P80C	V575P80C	Varistors		
V660L10B	V660L10B	Varistors		
V660L50A	V660L50A	Varistors		
V660P100	V660P100	Varistors		
V660P80A	V660P80A	Varistors		
V661BA60	V661BA60	Varistors		
V661DB40	V661DB40	Varistors		
V661HA32	V661HA32	Varistors		660V
V661HA40	V661HA40	Varistors		660V
V751BA60	V751BA60	Varistors		
V751DB40	V751DB40	Varistors		
V751HA32	V751HA32	Varistors		750V
V751HA40	V751HA40	Varistors		750V
V82RA8	V82RA8	Varistors		
V881BA60	V881BA60	Varistors		

Vacuum Tubes [16]

Part #	Part Name	Part Type	Part Sub Type	Description
12AT7	T12AT7	Tubes	Simple	300V 2.5W Triode
12AU7A2	T12AU7A2	Tubes	Complex	Triode, No Heater
12AX7A	T12AX7A	Tubes	Simple	250V 1W Triode
12AX7WA	T12AX7WA	Tubes	Simple	330V 1W Triode
12BY7A	T12BY7A	Tubes	Simple	330 V 6.5W Pentode
6AQ5-A	T6AQ5-A	Tubes	Simple	275V 10W Triode
6AQ6	T6AQ6	Tubes	Simple	300V Triode
6AV6	T6AV6	Tubes	Simple	330V .55W Triode
6SN7GTB	T6SN7	Tubes	Simple	450V 5W Triode
BW1185J2	BW1185J2	Tubes	Simple	16.8kV 120kW Triode
BW1608F	BW1608F	Tubes	Simple	13kV 30kW Triode
BW1609	BW1609	Tubes	Simple	17kV 200kW Triode
EL9000_2	EL9000_2	Tubes	Complex	Pentode, No Heater
GL-807	GL-807	Tubes	Simple	400V 25W Triode

[Triode Connections: Grid, Plate, Cathode]
[Pentode Connections: Grid1, Grid2, Plate, Cathode]

Part #	Part Name	Part Type	Part Sub Type	Description
6AW8-A	T6AW8-AP	Tubes	Simple	330V 1.1W Pentode/Triode

[Connections: Grid1, Gride2, Plate, Cathode, T_Grid, T_Plate, T_Cathode]

Part #	Part Name	Part Type	Part Sub Type	Description
12AU7A	T12AU7A	Tubes	Complex	250V 3W Triode

[Connections: Anode, Grid, Cathode, F F']

Part #	Part Name	Part Type	Part Sub Type	Description
EL9000	EL9000	Tubes	Complex	Pentode

[Connections: Anode, Grid2, Gride1, Cathode, F F']

TRIODE   TRIO1   Vacuum   [Anode Grid Cathode ISAT]

SFS Shape factor of the saturation law
VBIG Contact potential of the grid
(voltage above which grid current may start to flow)
VBIA Contact potential of the anode
MU Amplification factor at slighly negative grid voltage
RMU Reduction factor for MU at very negative grid voltage
VMU Grid voltage for mid-range MU (negative)
SFMU Shape factor for MU reduction law
K Perveance at slightly negative grid voltage
RK Perveance reduction factor at very negative grid voltage
VK Grid voltage for mid-range perveance (negative)
SFK Shape factor for perveance reduction law
SIGMAG Effective cross-section of the grid relative to the anode
ALPHAG Grid current amplification factor
SFG Shape factor of the grid current law

HEATER   HEAT1   Tubes   Generic   Heater model [F F' Isat]

INOM Nominal heater current, at nominal voltage
VNOM Nominal heater voltage (causing nominal temperature)
LAMBDA Temperature coefficient of the heater resistance
(normalized to the nominal temperature)
RCOOL Resistance of the cold heater
TCTE The time constant for the heater temperature
TNOM The nominal heater temperature in K
INIT% Initial heater temperature in % of TNOM
W Work function of the heater, in eV
ISAT The saturation current at nominal heater voltage

Vacuum Tubes (cont'd)

PENTODE	PENT1	Vacuum	[Anode Grid2 Grid1 Cathode ISAT]

SFS Shape factor of the saturation law
VBIG Contact potential of the grid Grid1
(voltage above which grid current may start to flow)
VBIA Contact potential of the anode
MUG2 Amplification factor for Grid2 at slighly negative Grid1 voltage
MUGA Amplification factor for Anode at slighly negative Grid1 voltage
RMU Reduction factor for MU at very negative Grid1 voltage
VMU Grid voltage for mid-range MU (negative)
SFMU Shape factor for MU reduction law
K Perveance at slightly negative Grid1 voltage
RK Perveance reduction factor at very negative Grid1 voltage
VK Grid voltage for mid-range perveance (negative)
SFK Shape factor for perveance reduction law
SIGMAG1 Effective cross-section of Grid1 relative to the anode and Grid2
ALPHAG1 Grid1 current amplification factor
SFG1 Shape factor of the Grid1 current law
SIGMAG2 Effective cross-section of Grid2 relative to the anode
ALPHAG2 Grid2 current amplification factor
SFG2 Shape factor of the Grid2 current law
VCCR Virtual cathode current ratio
SFVC Shape factor of the virtual cathode current law

TRIODEG	TRIODEG	Vacuum	**KT, MU, K1, K2, CGP, CGC, CPC**

[Connections: Grid, Plate, Cathode] See App. Note Feb. 89 for more info.

Miscellaneous [12]

Part #	Part Name	Part Type	Part Sub Type	Description
POT100K	POT100K	Potentiometers		100 kOhm
POT10K	POT10K	Potentiometers		10 kOhm
POT1MEG	POT1MEG	Potentiometers		1 MEGOhm
POT50K	POT50K	Potentiometers		50 kOhm

[Connections: Top, Bottom, Wiper, Control +, Control -], Control Voltage 0 -> 1Volt

XT100K	XT100K	Crystals		100 kHz
XT10K	XT10K	Crystals		10 kHz
XT10MEG	XT10MEG	Crystals		10 MEGHz
XT3_5MEG	XT3_5MEG	Crystals		3.5 MEGHz
XT32768K	XT32768K	Crystals		32.768 kHz
XT32MEG	XT32MEG	Crystals		32 MEGHz
XT8MEG	XT8MEG	Crystals		8 MEGHz

[Connections: In, Out]

PLATRES	PLATRES	Sensors	Thermal	10 kOhm Platinum

[Connections: In+, In-, Temperature(Vin)]

Capacitors [8]

Part #	Part Name	Part Type	Part Sub Type	Description [Connections: In, Out]
CAPC0G	CAPC0G	Capacitors	Ceramic	Generic C0G
CAPNP0	CAPNP0	Capacitors	Ceramic	Generic NP0
CAPX7R	CAPX7R	Capacitors	Ceramic	Generic X7R
CAPX7R1206	CX7R1206	Capacitors	Ceramic	.22uF
CAPY5V	CAPY5V	Capacitors	Ceramic	Generic Y5V
CAPZ5U	CAPZ5U	Capacitors	Ceramic	Generic Z5U
CAPTANT	CAPTANT	Capacitors	Tantulum	Generic
T491D476M010	T491476	Capacitors	Tantulum 22uF	

Analog Behavioral Models [20]

Mathematical Functions

Description		Subcircuit Name & SPICENET Symbol	[Connections] & PRESPICE Parameters
Absolute Value	Vout = |Vin|	ABS	[In, Out]
Add/Subtract 2 Inputs	Vout=K1∗Vin1+K2∗Vin2	SUM2	[In1, In2, Out] **K1** Gain from Vin1 in Volts/Volt **K2** Gain from Vin2 in Volts/Volt
Add/Subtract 3 Inputs	Vout=K1∗Vin1+K2∗Vin2 +K3∗Vin3	SUM3	[In1, In2, In3, Out] **K1** Gain from Vin1 in Volts/Volt **K2** Gain from Vin2 in Volts/Volt **K3** Gain from Vin3 in Volts/Volt
Cosine	Vout = Cos(Vin)COS		[In, Out]
Bessel	J0 &J1 for 0<Vin<5	BESSEL	[In, J0, J1]
Differentiation	Vout = d(Vin)/dt	SDIFF	[In, Out] **K** Gain from Vin in Volts/Volt/Sec
Divide	Vout = Vin1/Vin2	DIV	[In1, In2, Out]
e^x	Vout = $e^{(Vin)}$	EXP	[In, Out]
Gain	Vout = K ∗ Vin	GAIN	[In, Out] **K** Gain from Vin in Volts/Volt
Hyperbolic Tan	Vout = Htan(Vin)	HTAN	[In, Out]
Integration	Vout = ∫Vin	SINT	[In, Out] **K** Gain from Vin in Volts/Volt
Log	Vout = Log(Vin)	LOG	[In, Out]
Multiply (2)	Vout = K∗Vin1∗Vin2	MUL	[In1, In2, Out] **K** Gain in Volts/Volt
Multiply (3)	Vout = K∗Vin1∗Vin2∗Vin3	MUL3	[In1, In2, In3, Out] **K** Gain in Volts/Volt
Sin	Vout = Sin(Vin)	SIN	[In, Out]

Analog Behavioral Models (cont'd)

Signum	Vout = ±1, +1 if Vin<0	SIGNUM	[In, Out]
Square Cube	Vout = K1∗Vin^2, K2∗Vin^3	SQ-CUBE	[In, Out^2, Out^3] **K1** Gain from (Vin)^2 in Volts/Volt **K2** Gain from (Vin)^3 in Volts/Volt
Square Root	Vout (Vin)$^{.5}$	SQROOT	[In, Out]
Tan	Vout = Tan(Vin)	TAN	[In, Out]
Variable Exp.	Vout = (Vin1)^{Vin2}	VAREXP	[In1, In2, Out]

All the Mathematical functions are listed in the SYS.Lib file.

Function Blocks [25]

Description	Subcircuit Name	[Connections] & PRESPICE
*Current limiter	ILIMIT_DEF	[In, Out]
*Table model piece-wise linear transfer function	PWL_DEF	[In, Out]
*Differentiation K * s	DIFF_DEF	[In1, Out]
*Slew rate follower	SLEW_DEF	[In1, Out]
*Hysteresis function block	HYST_DEF	[In1, Out]

Laplace & Z Domain Functions [11]

Description	Subcircuit Name & SPICENET Symbol	[Connections] & Parameters
*Laplace transfer function	S_XFER_DEF & s_xfer	[In, Out]
Integrator K * In / s	SINT	[In, Out] **K** Gain in Volts/Sec/Volt
Integrator with Initial Conditions and Limits K * In / s	NTGR8	[In, Out] **K** Gain in Volts/Sec/Volt **PLIM** Positive Limit in Volts **NLIM** Negative Limit in Volts **INIT** Initial Condition in Volts
Limiter K * In	LIMIT	[In, Out] **K** Gain in Volts/Volt **PLIM** Positive Limit in Volts **NLIM** Negative Limit in Volts
Differentiator K * In * s	SDIFF	[In, Out] **K** Gain in Volts/Volt/Sec
First Order Pole and Zero	$\dfrac{K*In * (s / (2*\pi*FO) + 1))}{(s / (2*\pi*FP) + 1)}$ PZ	[In, Out] **K** Gain in Volts/Volt **FO** Zero Frequency in Hz **FP** Pole Frequency in Hz
First Order Pole	$\dfrac{K * In * \omega n}{(s + \omega n)}$ POLE	[In, Out] **K** Gain in Volts/Volt **FP** Pole Frequency in Hz
Second Order Pole	$\dfrac{K * In * \omega n^2}{(s^2 + 2Z * \omega n * s + \omega n^2)}$ POLE2	[In, Out] **K** Gain in Volts/Volt **FN** Natural Frequency in Hz **Z** Damping Factor
Z Transform Integrator	$\dfrac{K * TD * In}{(1 - Z^{-1})}$ ZCINT	[In, Out] **TD** Time Delay in Sec. **K** Gain in Volts/Sec./Volt

*These XDL (C Code) models are located in CM1.LIB

Analog Behavioral Models (cont'd)

Z Transform	$\dfrac{K * TD * In * Z^{-1}}{(1 - Z^{-1})}$	ZCINTD	[In, Out]
Integrator			**TD** Time Delay in Sec.
			K Gain in Volts/Sec./Volt
Z Transform	K / TD * In * $(1 - Z^{-1})$	ZDIFF	**TD** Time Delay in Sec.
Differentiator			**K** Gain in Volts/Volt/Sec.

*These models are located in CM1.LIB

Fuzzy Logic Functions [4]

Description		Subcircuit Name & SPICENET Symbol	[Connections]
Max	Vout = Max(V1, V2)	MAX	[In1, In2, Out]
Min	Vout = Min(V1, V2)	MIN	[In1, In2, Out]
Max3	Vout = Max(V1, V2, V3)	MAX3	[In1, In2, In3, Out]
Min3	Vout = Min(V1, V2, V3)	MIN3	[In1, In2, In3, Out]

Basic Mechanical Functions [10]

Description		Subcircuit Name & SPICENET Symbol	[Connections] & PRESPICE Parameters
Servo Motor	$\dfrac{KT * In / F}{s (J / F * s + 1)}$	SERVO	[In, Out, Rate]
Load			**KT** Torque Constant
Note: use any consistent set of units,			**J** Inertia
for example, Volts, Ft-lbs., Slugs			**F** Friction, **ANGLE** Initial Condition
			RATE Initial Condition
Gears	Gear Ratio	GEARS	[In, Out] **RATIO** Input to Output
Motor	V/I in -> Speed/Torque Out	MOTOR	[Hi, Lo, Shaft] **KS** in Radians/Sec.
Static Friction		SFRCTN	[Load] **TRQ** in Nt-m
Dynamic Friction		DFRCTN	[Load] **D** in Radians/Sec.
Torsion Spring		TSPRNG	[In, Out] **K** in Nt-m/Radians
Inertia		INRTA	[In, Out] **J** in Kg-m^2/Sec.
Inertia with test point		INRTA2	[In, Out] **J** in Kg-m^2/Sec.
Slipage		SLIP	[In, Out] **D** in Radians/Sec.
Rate-to-Angle	(1/Sec. ->1 Radian)	RTOA	[Rate, Angle]

All the Mechanical functions are listed in the MECH.Lib file.

Neural Networks [2]

Axon	Voltage In, Current Summation In, Back Propagation Out, Weights Out	AXON	[Vaxon, Iaxon, Vdelin, Ibout, Weight, Gain, ClockP1, ClockP2]
Cell	Current summation, Back propagation In and Out	CELL	[IJ, Out Y, Idelin, Vdelout]
RSUM		RSUM	Neural Networks
VTOI		VTOI	Neural Networks

All of the Neural functions are listed in the NEURAL.Lib file.

Switched Capacitor Filters and Elements [37]

Part #	Part Name	Part Type	Part Sub Type	Description
CRES	CRES	Switched Cap	SC Elements	Resistor Proportional to C
LTC1059H1	LT59H100	Switched Cap	Single Filter	Sa-H, Sum to LP, Gain=100
LTC1059H5	LT59H50	Switched Cap	Single Filter	Sa-H, Sum to LP, Gain=50
LTC1059L1	LT59L100	Switched Cap	Single Filter	Sa-L, Sum to AGND, Gain=100
LTC1059L5	LT59L50	Switched Cap	Single Filter	Sa-L, Sum to AGND, Gain=50
LTC1060H1	LT60H100	Switched Cap	Dual Filter	Sab-H, Sum to LP, Gain=100
LTC1060H1D	LT60H10D	Switched Cap	Dip Package	Sab-H, Sum to LP, Gain=100
LTC1060H5	LT60H50	Switched Cap	Dual Filter	Sab-H, Sum to LP, Gain=50

Switched Capacitor Filters and Elements (cont'd)

LTC1060H5D	LT60H50D	Switched Cap	Dip Package	Sab-H, Sum to LP, Gain=50
LTC1060L1	LT60L100	Switched Cap	Dual Filter	Sab-L, Sum to AGND, Gain=100
LTC1060L1D	LT60L10D	Switched Cap	Dip Package	Sab-L, Sum to AGND,Gain=100
LTC1060L5	LT60L50	Switched Cap	Dual Filter	Sab-L, Sum to AGND, Gain=50
LTC1060L5D	LT60L50D	Switched Cap	Dip Package	Sab-L, Sum to AGND, Gain=50
LTC10641	LT64100	Switched Cap	Quad Filter	Gain=100
LTC10641D	LT6410D	Switched Cap	Dip Package	Gain=100
LTC10645	LT6450	Switched Cap	Quad Filter	Gain=50
LTC10645D	LT6450D	Switched Cap	Dip Package	Gain=50
MF10H1	MF10H100	Switched Cap	Dual Filter	Sab-H, Sum to LP, Gain=100
MF10H5	MF10H50	Switched Cap	Dual Filter	Sab-H, Sum to LP, Gain=50
MF10HZ1	MF10HZ10	Switched Cap	Z-Transform	Sab-H, Sum to LP, Gain=100
MF10HZ5	MF10HZ50	Switched Cap	Z-Transform	Sab-H, Sum to LP, Gain=50
MF10L1	MF10L100	Switched Cap	Dual Filter	Sab-L, Sum to AGND,Gain=100
MF10L5	MF10L50	Switched Cap	Dual Filter	Sab-L, Sum to AGND, Gain=50
MF10LZ1	MF10LZ10	Switched Cap	Z-Transform	Sab-L, Sum to AGND,Gain=100
MF10LZ5	MF10LZ50	Switched Cap	Z-Transform	Sab-L, Sum to AGND, Gain=50
MF5H1	MF5H100	Switched Cap	Single Filter	Sa-H, Sum to LP, Gain=100
MF5H5	MF5H50	Switched Cap	Single Filter	Sa-H, Sum to LP, Gain=50
MF5L1	MF5L100	Switched Cap	Single Filter	Sa-L, Sum to AGND, Gain=100
MF5L5	MF5L50	Switched Cap	Single Filter	Sa-L, Sum to AGND, Gain=50
NSTR	NSTR	Switched Cap	SC Elements	Negative Storistor
PSTR	PSTR	Switched Cap	SC Elements	Positive Storistor
TSWITCH	TSWITCH	Switched Cap	SC Elements	Toggle Switch
UTD	UTD	Switched Cap	SC Elements	Unit Time Delay
ZCAP	ZCAP	Switched Cap	SC Elements	Floating Capacitor
ZINT	ZINT	Switched Cap	SC Elements	SCN Integrator
ZOH	ZOH	Switched Cap	SC Elements	Zero Order Hold
ZSUM	ZSUM	Switched Cap	SC Elements	Simplified Toggle Switch

For connections and listings of the subcircuits, please see the SCN.Lib file. The part numbers listed above have suffix letters added in order to make them unique.

Switched Capacitor Elements [9]

Part #	Subcircuit Name	IsSpice Letter	SpiceNet Symbol	Library Name	Description
Zero Order Hold	ZOH	X	ZOH	Scn	[In, Out] **TD** Delay Time **K** Gain
Unit Time Delay	UTD	X	UTD	Scn	[In, Out] **TD** Delay Time **K** Gain
Resistor Proportional to C	CRES	X	CRES	Scn	[Term1, Term2] **C** Capacitor Value
Negative Storistor	NSTR	X	NSTR	Scn	[Term1, Term2] **TD** Delay Time **C** Capacitor Value
Positive Storistor	PSTR	X	PSTR	Scn	[Term1, Term2] **TD** Delay Time **C** Capacitor Value
SCN Integrator	ZINT	X	ZINT	Scn	[InOdd, InEven, OutOdd, OutEven] **TD** Delay Time **C** Capacitor Value
Toggle Switch	TSWITCH	X	TSWITCH	Scn	[Phase1 Hi, Phase1 Lo, Phase2 Hi, Phase2 Lo] **TD** Delay Time **C** Capacitor Value
Simplified Toggle Switch for Integrator Summing	ZSUM	X	ZSUM	Scn	[In, Out] **TD** Delay Time **C** Capacitor Value
Floating Capacitor	ZCAP	X	ZCAP	Scn	[Inodd, Ineven, Outodd, Outeven] **TD** Delay Time **C** Capacitor Value

Digital Logic and Mixed Mode Simulation Elements [793]

Part #	Subcircuit Name	Library Name	Description	[Connections] & PRESPICE Parameters
			Generic Logic Gates	
Flip-Flop	DLFOP	Digital	D Flip-Flop	[ClearN, D Input, Clock, PresetN, Q, QN]
SR	SR	Digital	Shift Register	[In, Out1, Out2, Clk1, Clk2] **IC1** First Stage Initial Condition **IC2** Sec. Stage Initial Condition
DCLATCH	DCLATCH	Digital	D Latch/Clk	[D, Clk, QN, Q]
DCLATPC	DCLATPC	Digital	D Latch/Pre Clr Clk	[Clr, D, Clk, Pre, Q, QN]
DFFPC	DFFPC	Digital	D Flip-Flop	[Clr, D, Clk, Pre, Q, QN]
JKFFPC	JKFFPC	Digital	JK Flip-Flop	[J, Clk, K, Clr, QN, Q, Pre]
MSSR	MSSR	Digital	Master-Slave SR	[S, Clk, R, Pre, Clr, Q, QN]
SRCLATCH	SRCLATCH	Digital	SR Latch/Clk	[S, Clk, R, Q, QN]
SRCLATPC	SRCLATPC	Digital	SR Latch/Pre Clr Clk	[S, Clk, R, Pre, Clr, Q, QN]
SRLATCH	SRLATCH	Digital	SR Latch	[S, R, Q, QN]
Ior	IOR	Digital	Inclusive OR	[In1, In2, Out]
Inv	INV	Digital	Inverter	[In, Out]
Mux	MUX2	Digital	Multiplexor	[In1, In2, Control]
A/D	LIMITER	Digital	1 Bit A/D	[In+, In-, Out]
D/A	LSWITCH	Digital	1 Bit D/A	[In1, In2, Control]
Delay	DELAY	Digital	Time Delay	[In, Out] **TD** Time Delay in Sec.

Generic Digital Primitives

Part #	Subcircuit Name	Library Name	Description	[Connections]
Oneshot	ONESHOT	CM1	Controlled Oneshot	[Clk, In, Clr, Out]
DVCO	Dosc_DEF	CM2	Digital oscillator	[Out]
MIDI_OSC	MIDI_DEF	CM2	MIDI oscillator	[In0-7, Out]
BUFFER	Buf_DEF	CM2	Buffer	[In, Out]
INVERTER	Inv_DEF	CM2	Inverter	[In, Out]
XOR	Xor_DEF	CM2	Exclusive OR	[In1, In2, Out]
XNOR	Xnor_DEF	CM2	Exclusive NOR	[In1, In2, Out]
OR2	Or_DEF	CM2	2 input OR	[In1, In2, Out]
OR3	Or_DEF	CM2	3 input OR	[In1, In2, In3, Out]
OR4	Or_DEF	CM2	4 input OR	[In1, In2, In3, In4, Out]
NOR2	Nor_DEF	CM2	2 input NOR	[In1, In2, Out]
NOR3	Nor_DEF	CM2	3 input NOR	[In1, In2, In3, Out]
NOR4	Nor_DEF	CM2	4 input NOR	[In1, In2, In3, In4, Out]
AND2	And_DEF	CM2	2 input AND	[In1, In2, Out]
AND3	And_DEF	CM2	3 input AND	[In1, In2, In3, Out]
AND4	And_DEF	CM2	4 input AND	[In1, In2, In3, In4, Out]
NAND2	Nand_DEF	CM2	2 input NAND	[In1, In2, Out]
NAND3	Nand_DEF	CM2	3 input NAND	[In1, In2, In3, Out]
NAND4	Nand_DEF	CM2	4 input NAND	[In1, In2, In3, In4, Out]
TRISTATE	Tris_DEF	CM2	Tristate block	[In, Ena, Out]
OPENC	OpenC_DEF	CM2	Open collector block	[In, Out]
OPENE	OpenE_DEF	CM2	Open emitter block	[In, Out]
LOGIC0	L0_DEF	CM2	Constant logic high	[Out]
LOGIC1	L1_DEF	CM2	Constant Logic Low	[Out]
DFF	Dff_DEF	CM2	D Flip-flop	[D, Clk, NSet, NReset, Q, QN]
TFF	Tff_DEF	CM2	Toggle Flip-flop	[T, Clk, Set, Reset, Q, QN]
JKFF	JKff_DEF	CM2	JK Flip-flop	[J, K, Clk, Set, Reset, Q, QN]
SRFF	SRff_DEF	CM2	SR Flip-flop	[S, R, Clk, Set, Reset, Q, QN]
DLATCH	Dlat_DEF	CM2	D Latch	[D, Ena, Set, Reset, Q, QN]
SRLATCH	SRlatch_DEF	CM2	SR Latch	[S, R, Ena, Set, Reset, Q, QN]
FREQDIV	Fdiv_DEF	CM2	Frequency divider	[In, Out]
DSRC1	Ds1_DEF	CM2	1 output digital src.	[Out]
DSRC2	Ds2_DEF	CM2	2 output digital src.	[Out1, Out2]
DSRC3	Ds3_DEF	CM2	3 output digital src.	[Out1, Out2, Out3]

Digital Logic and Mixed Mode Simulation Elements (cont'd)

Part #	Subcircuit Name	Library Name	Description	[Connections] & PRESPICE Parameters
DSRC7	Ds7_DEF	CM2	7 output digital src.	[Out1-Out7]
DSRC8	Ds8_DEF	CM2	8 output digital src.	[Out0-Out7]
STATE2	St2_DEF	CM2	2 Bit up/down counter using a state machine model	[In1, In2, Clk, Reset, Out1, Out2]
RAM2_1	Ram21_DEF	CM2	1 data bit 2 address bits Digital RAM model	[D1, Out1, A1, A2, W_Ena, Select]
CLK	CLK	CM2	Digital clock using the digital oscillator model	[Out]
				DUTY - duty cycle in %
DSRC	DSRC	CM2	Generic digital source	[Out]
				INIT - inital voltage
				PULSE - peak voltage
				DELAY - time delay
				WIDTH - pulse width
				PERIOD - period
BCNT	BCNT	CM2	3-bit Binary counter using the digital state machine model	[In, Clk, Reset, Out1, Out2, Out3]

CMOS Gates

Part #	Part Name	Part Type	Part Sub Type	Description
74AC00	AC00_Def	CMOS	74ACxx	2 input NAND gate
74AC08	AC08_Def	CMOS	74ACxx	2 input AND gate
74AC10	AC10_Def	CMOS	74ACxx	3 input NAND gate
74AC11	AC11_Def	CMOS	74ACxx	3 input AND gate
74AC20	AC20_Def	CMOS	74ACxx	4 input NAND gate
74AC32	AC32_Def	CMOS	74ACxx	2 input OR gate
74ACT00	ACT00_Def	CMOS	74ACTxx	2 input NAND gate
74ACT10	ACT10_Def	CMOS	74ACTxx	3 input NAND gate
74ACT20	ACT20_Def	CMOS	74ACTxx	4 input NAND gate
74ACT32	ACT32_Def	CMOS	74ACTxx	2 input OR gate
74HC00	74HC00	CMOS	74HCxx	2 input NAND gate
74HC02	74HC02	CMOS	74HCxx	2 input NOR gate
74HC03	74HC03	CMOS	74HCxx	2 input NAND gate
74HC04	74HC04	CMOS	74HCxx	inverter
74HC05	74HC05	CMOS	74HCxx	inverter
74HC08	74HC08	CMOS	74HCxx	2 input AND gate
74HC10	74HC10	CMOS	74HCxx	3 input NAND gate
74HC11	74HC11	CMOS	74HCxx	3 input AND gate
74HC125	74HC125	CMOS	74HCxx	Bus buffer
74HC126	74HC126	CMOS	74HCxx	Bus buffer
74HC132	74HC132	CMOS	74HCxx	Nand Schmitt
74HC138	74HC138	CMOS	74HCxx	3-to-8 Decoders
74HC139	74HC139	CMOS	74HCxx	2-to-4 Decoders
74HC14	74HC14	CMOS	74HCxx	inverter Schmitt
74HC148	74HC148	CMOS	74HCxx	Priority encoder
74HC151	74HC151	CMOS	74HCxx	Multiplexer
74HC153	74HC153	CMOS	74HCxx	Multiplexer
74HC157	74HC157	CMOS	74HCxx	Multiplexer
74HC158	74HC158	CMOS	74HCxx	Multiplexer
74HC161	74HC161	CMOS	74HCxx	4-bit counter
74HC163	74HC163	CMOS	74HCxx	4-bit counter
74HC164	74HC164	CMOS	74HCxx	8-bit shift register
74HC174	74HC174	CMOS	74HCxx	D-type Flip-Flop
74HC175	74HC175	CMOS	74HCxx	D-type Flip-Flop

CMOS Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
74HC20	74HC20	CMOS	74HCxx	4 input NAND gate
74HC21	74HC21	CMOS	74HCxx	4 input AND gate
74HC251	74HC251	CMOS	74HCxx	Multiplexer
74HC259	74HC259	CMOS	74HCxx	8-bit latch
74HC27	74HC27	CMOS	74HCxx	3 input NOR gate
74HC273	74HC273	CMOS	74HCxx	D-type Flip-Flop
74HC32	74HC32	CMOS	74HCxx	2 input OR gate
74HC365	74HC365	CMOS	74HCxx	Bus driver
74HC367	74HC367	CMOS	74HCxx	Bus driver
74HC368	74HC368	CMOS	74HCxx	Bus driver
74HC393	74HC393	CMOS	74HCxx	Binary counter
74HC42	74HC42	CMOS	74HCxx	BCD/Decimal
74HC74	74HC74	CMOS	74HCxx	D Flip-Flop
74HC86	74HC86	CMOS	74HCxx	2 input XOR
74HCT00	HCT00_Def	CMOS	74HCTxx	2 input NAND gate
74HCT08	HCT08_Def	CMOS	74HCTxx	2 input AND gate
74HCT32	HCT32_Def	CMOS	74HCTxx	2 input OR gate
74VHC00	VHC00_Def	CMOS	74VHCxx	2 input NAND gate
74VHC08	VHC08_Def	CMOS	74VHCxx	2 input AND gate
74VHC32	VHC32_Def	CMOS	74VHCxx	2 input OR gate
CD4001B	CD4001B	CMOS	CD4xxx	2-In Nor, MOS Level
CD4001UB	CD4001UB	CMOS	CD4xxx	2-In Nor, MOS Level
CD4011	C4011_DEF	CMOS	CD4xxx	2 input NAND gate
CD4011B	CD4011B	CMOS	CD4xxx	2-In Nand, MOS Level
CD4012	C4012_Def	CMOS	CD4xxx	4 input NAND gate
CD4023	C4023_Def	CMOS	CD4xxx	3 input NAND gate
CD4025B	CD4025B	CMOS	CD4xxx	3-In Nor, MOS Level
CD4049UB	CD4049UB	CMOS	CD4xxx	Inverter, MOS Level
CD4050B	CD4050B	CMOS	CD4xxx	Buffer, MOS Level
CD4069UB	CD4069UB	CMOS	CD4xxx	Inverter, MOS Level
CD4071	C4071_Def	CMOS	CD4xxx	2 input OR gate
CD4072	C4072_Def	CMOS	CD4xxx	4 input OR gate
CD4073	C4073_Def	CMOS	CD4xxx	3 input AND gate
CD4075	C4075_Def	CMOS	CD4xxx	3 input OR gate
CD4081	C4081_Def	CMOS	CD4xxx	2 input AND gate
CD4082	C4082_Def	CMOS	CD4xxx	4 input AND gate
CD4093B	CD4093B	CMOS	CD4xxx	Nand Schmitt Trig, MOS
ESCI00I	ESCI00I	CMOS	IBIS(I Only)	82374SB Pin139 SPICE3
HC00	HC00	CMOS	74HCxx	NAND Gate, MOS Level
HC02	HC02	CMOS	74HCxx	NOR Gate, MOS Level
HC04	HC04	CMOS	74HCxx	Inverter, MOS Level
HC125	HC125	CMOS	74HCxx	Bus Buffer 3-st., MOS Level
HC126	HC126	CMOS	74HCxx	Bus Buffer 3-st., MOS Level
HCT00	HCT00	CMOS	74HCTxx	NAND Gate, MOS Level
HCT02	HCT02	CMOS	74HCTxx	NOR Gate, MOS Level
HCT04	HCT04	CMOS	74HCTxx	Inverter, MOS Level
PB06122I	PB06122I	CMOS	IBIS(I Only)	82375EB Pin3 SPICE2
PB06122O	PB06122O	CMOS	IBIS(O Only)	82375EB Pin3 SPICE2
PB0612I	PB0612I	CMOS	IBIS(I Only)	82375EB Pin3 SPICE3
PB0612O	PB0612O	CMOS	IBIS(O Only)	82375EB Pin3 SPICE3
PB7777I	PB7777I	CMOS	IBIS(I Only)	82375EB Pin167 SPICE3
PB7777I2	PB7777I2	CMOS	IBIS(I Only)	82375EB Pin167 SPICE2
PC0808OT	PC0808OT	CMOS	IBIS(O Only)	82430 PCMC CLK SPICE3
PCEBB2I	PCEBB2I	CMOS	IBIS(I Only)	82375SB Pin3 SPICE2
PCEBB2O	PCEBB2O	CMOS	IBIS(O Only)	82375SB Pin3 SPICE2
PCEBBCO	PCEBBCO	CMOS	IBIS(O Only)	82375SB Pin3 SPICE3
PCEBBI	PCEBBI	CMOS	IBIS(I Only)	82375SB Pin3 SPICE3

CMOS Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
PCEBI000	PCEBI000	CMOS	IBIS(I Only)	82375SB Pin167 SPICE3
PCEBI002	PCEBI002	CMOS	IBIS(I Only)	82375SB Pin167 SPICE2
PCIIB	PCIIB	CMOS	IBIS(I Only)	A0-A31, DRVPCI Best Case
PCIIW	PCIIW	CMOS	IBIS(I Only)	A0-A31, DRVPCI Worst Case
PCIOB	PCIOB	CMOS	IBIS(O Only)	A0-A31, DRVPCI Best Case
PCIOW	PCIOW	CMOS	IBIS(O Only)	A0-A31, DRVPCI Worst Case
PCMC1IB	PCMC1IB	CMOS	IBIS(I Only)	A0-A31, DRVPCI Best Case
PCMC1IW	PCMC1IW	CMOS	IBIS(I Only)	A0-A31, DRVPCI Worst Case
PCMC1OB	PCMC1OB	CMOS	IBIS(O Only)	A0-A31, DRVPCI Best Case
PCMC1OW	PCMC1OW	CMOS	IBIS(O Only)	A0-A31, DRVPCI Worst Case
PCMC2IB	PCMC2IB	CMOS	IBIS(I Only)	PIG0-3 Best Case
PCMC2IW	PCMC2IW	CMOS	IBIS(I Only)	PIG0-3 Worst Case
PCMC2OB	PCMC2OB	CMOS	IBIS(O Only)	PIG0-3 Best Case
PCMC2OW	PCMC2OW	CMOS	IBIS(O Only)	PIG0-3 Worst Case
PCMC4IB	PCMC4IB	CMOS	IBIS(I Only)	CALE Best Case
PCMC4IW	PCMC4IW	CMOS	IBIS(I Only)	CALE Worst Case
PCMC4OB	PCMC4OB	CMOS	IBIS(O Only)	CALE Best Case
PCMC4OW	PCMC4OW	CMOS	IBIS(O Only)	CALE Worst Case
PCMC5IB	PCMC5IB	CMOS	IBIS(I Only)	BRDY# Best Case
PCMC5IW	PCMC5IW	CMOS	IBIS(I Only)	BRDY# Worst Case
PCMC6IB	PCMC6IB	CMOS	IBIS(I Only)	MA[0-10] Best Case
PCMC6IW	PCMC6IW	CMOS	IBIS(I Only)	MA[0-10] Worst Case
PCMC6OB	PCMC6OB	CMOS	IBIS(O Only)	MA[0-10] Best Case
PCMC6OW	PCMC6OW	CMOS	IBIS(O Only)	MA[0-10] Worst Case
PCMC7IB	PCMC7IB	CMOS	IBIS(I Only)	TRDY# Best Case
PCMC7IW	PCMC7IW	CMOS	IBIS(I Only)	TRDY# Worst Case
PCMC7OB	PCMC7OB	CMOS	IBIS(O Only)	TRDY# Best Case
PCMC7OW	PCMC7OW	CMOS	IBIS(O Only)	TRDY# Worst Case
PCMC8IB	PCMC8IB	CMOS	IBIS(I Only)	BE#[0-7] Best Case
PCMC8IW	PCMC8IW	CMOS	IBIS(I Only)	BE#[0-7] Worst Case

Note: The following suffixes apply to the models listed below;
O - Output, I - Input, B - Best case, W - Worst case, T - Typical
Therefore, a best case output would have the suffix OB. All output parts have the following connections: Input, Output, Vcc, Vee, Enable. All input parts have the following connections: Input, Vcc, Vee

TTL Gates

Part #	Part Name	Part Type	Part Sub Type	Description
5400	5400	TTL	54xx	2 input NAND gate
5402	5402	TTL	54xx	2 input NOR gate
5404	5404	TTL	54xx	inverter
5405	5405	TTL	54xx	inverter
5406	5406	TTL	54xx	inverter buffer
5407	5407	TTL	54xx	buffer/driver
5408	5408	TTL	54xx	2 input AND gate
5409	5409	TTL	54xx	2 input AND gate
5410	5410	TTL	54xx	3 input NAND gate
54100	54100	TTL	54xx	8-bit latch
54107	54107	TTL	54xx	J-K Flip-Flop
54109	54109	TTL	54xx	J-K Flip-Flop
5411	5411	TTL	54xx	3 input AND gate
54110	54110	TTL	54xx	J-K Flip-Flop

Part #	Part Name	Part Type	Part Sub Type	Description
54111	54111	TTL	54xx	J-K Flip-Flop
5412	54L12	TTL	54xx	3 input NAND gate
54121	54121	TTL	54xx	Monostable multivibrator
54123	54123	TTL	54xx	Monostable multivibrator
54125	54125	TTL	54xx	Bus buffer
54126	54126	TTL	54xx	Bus buffer
54128	54128	TTL	54xx	Line driver
5413	5413	TTL	54xx	NAND Schmitt trigger
54132	54132	TTL	54xx	Nand Schmitt
5414	5414	TTL	54xx	inverter Schmitt
54147	54147	TTL	54xx	Priority encoder
54148	54148	TTL	54xx	Priority encoder
54151A	54151A	TTL	54xx	Multiplexer
54152A	54152A	TTL	54xx	2 input NAND
54154	54154	TTL	54xx	Demultiplexer
54155	54155	TTL	54xx	Demultiplexer
54156	54156	TTL	54xx	Demultiplexer
54157	54157	TTL	54xx	Multiplexer
54159	54159	TTL	54xx	Multiplexer
5416	5416	TTL	54xx	inverter buffer
54160	54160	TTL	54xx	Decade counter needs review
54161	54161	TTL	54xx	Decade counter needs review
54164	54164	TTL	54xx	8-bit shift register
5417	5417	TTL	54xx	buffer/driver
54175	54175	TTL	54xx	D-type Flip-Flop
54176	54176	TTL	54xx	Decade/Binary counter
54180	54180	TTL	54xx	Parity generator
54184	54184	TTL	54xx	BCD/Binary converter
54185A	54185A	TTL	54xx	Binary/BCD converter
54197	54197	TTL	54xx	Binary counter/latch
5422	5422	TTL	54xx	4 input NAND gate
5423	5423	TTL	54xx	4 input NOR gate
5425	5425	TTL	54xx	4 input NOR gate
54251	54251	TTL	54xx	Multiplexer
54259	54259	TTL	54xx	8-bit latch
54265	54265	TTL	54xx	Complementary outputs
54273	54273	TTL	54xx	D-type Flip-Flop
54276	54276	TTL	54xx	J-K Flip-Flop
54279	54279	TTL	54xx	Sbar-Rbar latch
5428	5428	TTL	54xx	2 input NOR gate
5430	5430	TTL	54xx	8 input NAND gate
5432	5432	TTL	54xx	2 input OR gate
54367A	54367A	TTL	54xx	Bus driver
54368A	54368A	TTL	54xx	Bus driver
5437	5437	TTL	54xx	2 input NAND gate
54376	54376	TTL	54xx	J-K Flip-Flop
5438	5438	TTL	54xx	2 input NAND gate
5439	5439	TTL	54xx	2 input NAND
5440	5440	TTL	54xx	4 input NAND gate
5443A	5443A	TTL	54xx	Excess3/Decimal
5444A	5444A	TTL	54xx	Gray/Decimal
5445	5445	TTL	54xx	BCD/Decimal
5446A	5446A	TTL	54xx	BCD/7-segment
5448	5448	TTL	54xx	BCD/7-segment
5449	5449	TTL	54xx	BCD/7-segment
5450	5450	TTL	54xx	AND-OR-INVERT gate
5453	5453	TTL	54xx	AND-OR-INVERT gate

Part #	Part Name	Part Type	Part Sub Type	Description
5460	5460	TTL	54xx	4 input expander
5470	5470	TTL	54xx	J-K Flip-Flop
5472	5472	TTL	54xx	J-K Flip-Flop
5473	5473	TTL	54xx	J-K Flip-Flop
5474	5474	TTL	54xx	D Flip-Flop
5476	5476	TTL	54xx	J-K Flip-Flop
5477	5477	TTL	54xx	4-bit bistable latch
5482	5482	TTL	54xx	2-bit full adder
5483A	5483A	TTL	54xx	4-bit full adder
5486	5486	TTL	54xx	2 input XOR
5494	5494	TTL	54xx	4-bit shift register
5496	5496	TTL	54xx	5-bit shift register
54ALS00A	54ALS00A	TTL	54ALSxx	2 input NAND gate
54ALS02A	54ALS02A	TTL	54ALSxx	2 input NOR gate
54ALS03B	54ALS03B	TTL	54ALSxx	2 input NAND gate
54ALS04B	54ALS04B	TTL	54ALSxx	inverter
54ALS05A	54ALS05A	TTL	54ALSxx	inverter
54ALS08	54ALS08	TTL	54ALSxx	2 input AND gate
54ALS09	54ALS09	TTL	54ALSxx	2 input AND gate
54ALS109A	54ALS109A	TTL	54ALSxx	J-K Flip-Flop
54ALS10A	54ALS10A	TTL	54ALSxx	3 input NAND gate
54ALS11A	54ALS11A	TTL	54ALSxx	3 input AND gate
54ALS133	54ALS133	TTL	54ALSxx	13-input Nand
54ALS137	54ALS137	TTL	54ALSxx	3-to-8 Decoders
54ALS138	54ALS138	TTL	54ALSxx	3-to-8 Decoders
54ALS139	54ALS139	TTL	54ALSxx	2-to-4 Decoders
54ALS151	54ALS151	TTL	54ALSxx	Multiplexer
54ALS153	54ALS153	TTL	54ALSxx	Multiplexer
54ALS157A	54ALS157A	TTL	54ALSxx	Multiplexer
54ALS158	54ALS158	TTL	54ALSxx	Multiplexer
54ALS161B	54ALS161B	TTL	54ALSxx	4-bit counter
54ALS163B	54ALS163B	TTL	54ALSxx	4-bit counter
54ALS174	54ALS174	TTL	54ALSxx	D-type Flip-Flop
54ALS175	54ALS175	TTL	54ALSxx	D-type Flip-Flop
54ALS20A	54ALS20A	TTL	54ALSxx	4 input NAND gate
54ALS21A	54ALS21A	TTL	54ALSxx	4 input AND gate
54ALS251	54ALS251	TTL	54ALSxx	Multiplexer
54ALS259	54ALS259	TTL	54ALSxx	8-bit latch
54ALS27	54ALS27	TTL	54ALSxx	3 input NOR gate
54ALS273	54ALS273	TTL	54ALSxx	D-type Flip-Flop
54ALS30A	54ALS30A	TTL	54ALSxx	8 input NAND gate
54ALS32	54ALS32	TTL	54ALSxx	2 input OR gate
54ALS33A	54ALS33A	TTL	54ALSxx	2 input NOR gate
54ALS37A	54ALS37A	TTL	54ALSxx	2 input NAND gate
54ALS38A	54ALS38A	TTL	54ALSxx	2 input NAND gate
54ALS74A	74ALS74A	TTL	54ALSxx	D Flip-Flop
54ALS86	54ALS86	TTL	54ALSxx	2 input XOR
54AS00	54AS00	TTL	54ASxx	2 input NAND gate
54AS02	54AS02	TTL	54ASxx	2 input NOR gate
54AS04	54AS04	TTL	54ASxx	inverter
54AS08	54AS08	TTL	54ASxx	2 input AND gate
54AS10	54AS10	TTL	54ASxx	3 input NAND gate
54AS109	54AS109	TTL	54ASxx	J-K Flip-Flop
54AS11	54AS11	TTL	54ASxx	3 input AND gate
54AS161	54AS161	TTL	54ASxx	4-bit counter
54AS163	54AS163	TTL	54ASxx	4-bit counter
54AS174	54AS174	TTL	54ASxx	D-type Flip-Flop

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
54AS175A	54AS175A	TTL	54ASxx	D-type Flip-Flop
54AS194	54AS194	TTL	54ASxx	4-bit shift register
54AS20	54AS20	TTL	54ASxx	4 input NAND gate
54AS21	54AS21	TTL	54ASxx	4 input AND gate
54AS27	54AS27	TTL	54ASxx	3 input NOR gate
54AS30	54AS30	TTL	54ASxx	8 input NAND gate
54AS32	54AS32	TTL	54ASxx	2 input OR gate
54AS74	54AS74	TTL	54ASxx	D Flip-Flop
54AS86A	54AS86A	TTL	54ASxx	2 input XOR
54LS00	54LS00	TTL	54LSxx	2 input NAND gate
54LS01	54LS01	TTL	54LSxx	2 input NAND gate
54LS02	54LS02	TTL	54LSxx	2 input NOR gate
54LS03	54LS03	TTL	54LSxx	2 input NAND gate
54LS04	54LS04	TTL	54LSxx	inverter
54LS05	54LS05	TTL	54LSxx	inverter
54LS06	54LS06	TTL	54LSxx	inverter buffer
54LS07	54LS07	TTL	54LSxx	buffer/driver
54LS08	54LS08	TTL	54LSxx	2 input AND gate
54LS09	54LS09	TTL	54LSxx	2 input AND gate
54LS10	54LS10	TTL	54LSxx	3 input NAND gate
54LS107A	54LS107A	TTL	54LSxx	J-K Flip-Flop
54LS109A	54LS109A	TTL	54LSxx	J-K Flip-Flop
54LS11	54LS11	TTL	54LSxx	3 input AND gate
54LS122	54LS122	TTL	54LSxx	Monostable multivibrator
54LS123	54LS123	TTL	54LSxxx	Monostable multivibrator
54LS125A	54LS125A	TTL	54LSxx	Bus buffer
54LS126A	54LS126A	TTL	54LSxx	Bus buffer
54LS132	54LS132	TTL	54LSxx	Nand Schmitt
54LS136	54LS136	TTL	54LSxx	2 input XOR
54LS14	54LS14	TTL	54LSxx	inverter Schmitt
54LS148	54LS148	TTL	54LSxx	Priority encoder
54LS151	54LS151	TTL	54LSxx	Multiplexer
54LS153	54LS153	TTL	54LSxx	Multiplexer
54LS155A	54LS155A	TTL	54LSxx	Demultiplexer
54LS156	54LS156	TTL	54LSxx	Demultiplexer
54LS157	54LS157	TTL	54LSxx	Multiplexer
54LS164	54LS164	TTL	54LSxx	8-bit shift register
54LS173A	54LS173A	TTL	54LSxx	4-bit register
54LS174	54LS174	TTL	54LSxx	D-type Flip-Flop
54LS175	54LS175	TTL	54LSxx	D-type Flip-Flop
54LS181	54LS181	TTL	54LSxx	Function generator
54LS194A	54LS194A	TTL	54LSxx	4-bit shift register
54LS195A	54LS195A	TTL	54LSxx	4-bit shift register
54LS20	54LS20	TTL	54LSxx	4 input NAND gate
54LS246	54LS246	TTL	54LSxx	BCD/7-segment
54LS248	54LS248	TTL	54LSxx	BCD/7-segment
54LS249	54LS249	TTL	54LSxx	BCD/7-segment
54LS251	54LS251	TTL	54LSxx	Multiplexer
54LS259B	54LS259B	TTL	54LSxx	8-bit latch
54LS273	54LS273	TTL	54LSxx	D-type Flip-Flop
54LS278	54LS278	TTL	54LSxx	Priority register
54LS279A	54LS279A	TTL	54LSxx	Sbar-Rbar latch
54LS283	54LS283	TTL	54LSxx	4-bit full adder
54LS290	54LS290	TTL	54LSxx	Decade/4-bit counter
54LS293	54LS293	TTL	54LSxx	Binary counter
54LS298	54LS298	TTL	54LSxx	2 input multiplexer
54LS30	54LS30	TTL	54LSxx	8 input NAND gate

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
54LS32	54LS32	TTL	54LSxx	2 input OR gate
54LS33	54LS33	TTL	54LSxx	2 input NOR gate
54LS351	54LS351	TTL	54LSxx	Multiplexer
54LS365A	54LS365A	TTL	54LSxx	Bus driver
54LS366A	54LS366A	TTL	54LSxx	Bus driver
54LS367A	54LS367A	TTL	54LSxx	Bus driver
54LS368A	54LS368A	TTL	54LSxx	Bus driver
54LS37	54LS37	TTL	54LSxx	2 input NAND gate
54LS38	54LS38	TTL	54LSxx	2 input NAND gate
54LS390	54LS390	TTL	54LSxx	Decade/4-bit counter
54LS393	54LS393	TTL	54LSxx	Binary counter
54LS42	54LS42	TTL	54LSxx	BCD/Decimal
54LS490	54LS490	TTL	54LSxx	Decade/4-bit counter
54LS51	54LS51	TTL	54LSxx	AND-OR-INVERT
54LS54	54LS54	TTL	54LSxx	AND-OR-INVERT
54LS73A	54LS73A	TTL	54LSxx	J-K Flip-Flop
54LS74A	54LS74A	TTL	54LSxx	D Flip-Flop
54LS75	54LS75	TTL	54LSxx	4-bit latch
54LS76A	54LS76A	TTL	54LSxx	J-K Flip-Flop
54LS85	54LS85	TTL	54LSxx	4-bit comparator
54LS86A	54LS86A	TTL	54LSxx	2 input XOR
54LS92	54LS92	TTL	54LSxx	divide/12 counter
54LS93	54LS93	TTL	54LSxx	4 bit counter
54LS96	54LS96	TTL	54LSxx	5-bit shift register
54S00	54S00	TTL	54Sxx	2 input NAND gate
54S02	54S02	TTL	54Sxx	2 input NOR gate
54S03	54S03	TTL	54Sxx	2 input NAND gate
54S04	54S04	TTL	54Sxx	inverter
54S05	54S05	TTL	54Sxx	inverter
54S08	54S08	TTL	54Sxx	2 input AND gate
54S09	54S09	TTL	54Sxx	2 input AND gate
54S10	54S10	TTL	54Sxx	3 input NAND gate
54S11	54S11	TTL	54Sxx	3 input AND gate
54S132	54S132	TTL	54Sxx	Nand Schmitt
54S133	54S133	TTL	54Sxx	13-Input Nand
54S135	54S135	TTL	54Sxx	Quad xor/xnor
54S140	54S140	TTL	54Sxx	4-Input Nand
54S151	54S151	TTL	54Sxx	Multiplexer
54S153	54S153	TTL	54Sxx	Multiplexer
54S157	54S157	TTL	54Sxx	Multiplexer
54S163	54S163	TTL	54Sxx	4-bit counter
54S174	54S174	TTL	54Sxx	D-type Flip-Flop
54S175	54S175	TTL	54Sxx	D-type Flip-Flop
54S181	54S181	TTL	54Sxx	Function generator
54S182	54S182	TTL	54Sxx	Carry generator
54S194	54S194	TTL	54Sxx	4-bit shift register
54S195	54S195	TTL	54Sxx	4-bit shift register
54S196	54S196	TTL	54Sxx	Decade Counter/latch
54S20	54S20	TTL	54Sxx	4 input NAND gate
54S251	54S251	TTL	54Sxx	Multiplexer
54S260	54S260	TTL	54Sxx	5-Input Nor
54S283	54S283	TTL	54Sxx	4-bit full adder
54S30	54S30	TTL	54Sxx	8 input NAND gate
54S32	54S32	TTL	54Sxx	2 input OR gate
54S37	74LS37	TTL	54Sxx	2 input NAND gate
54S38	54S38	TTL	54Sxx	2 input NAND gate
54S51	54S51	TTL	54Sxx	AND-OR-INVERT

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
54S64	54S64	TTL	54Sxx	AND-OR-INVERT
54S74	54S74	TTL	54Sxx	D Flip-Flop
54S85	54S85	TTL	54Sxx	4-bit comparator
54S86	54S86	TTL	54Sxx	2 input XOR
7400	7400	TTL	74xx	2 input NAND gate
7402	7402	TTL	74xx	2 input NOR gate
7403B	SN03	TTL	74xx	Behavioral
7404	7404	TTL	74xx	inverter
7405	7405	TTL	74xx	inverter
7406	7406	TTL	74xx	inverter buffer
7407	7407	TTL	74xx	buffer/driver
7408	7408	TTL	74xx	2 input AND gate
7409	7409	TTL	74xx	2 input AND gate
7410	7410	TTL	74xx	3 input NAND gate
74100	74100	TTL	74xx	8-bit latch
74107	74107	TTL	74xx	J-K Flip-Flop
74109	74109	TTL	74xx	J-K Flip-Flop
7411	7411	TTL	74xx	3 input AND gate
74110	74110	TTL	74xx	J-K Flip-Flop
74111	74111	TTL	74xx	J-K Flip-Flop
7412	74L12	TTL	74xx	3 input NAND gate
74121	74121	TTL	74xx	Monostable multivibrator
74123	74123	TTL	74xx	Monostable multivibrator
74125	74125	TTL	74xx	Bus buffer
74126	74126	TTL	74xx	Bus buffer
74128	74128	TTL	74xx	Line driver
7413	7413	TTL	74xx	NAND Schmitt trigger
74132	74132	TTL	74xx	Nand Schmitt
7413B	SN13	TTL	74xx	Behavioral
7414	7414	TTL	74xx	inverter Schmitt
74147	74147	TTL	74xx	Priority encoder
74148	74148	TTL	74xx	Priority encoder
74151A	74151A	TTL	74xx	Multiplexer
74154	74154	TTL	74xx	Demultiplexer
74155	74155	TTL	74xx	Demultiplexer
74156	74156	TTL	74xx	Demultiplexer
74157	74157	TTL	74xx	Multiplexer
74159	74159	TTL	74xx	Multiplexer
7416	7416	TTL	74xx	inverter buffer
74160	74160	TTL	74xx	Decade counter
74161	74161	TTL	74xx	4-bit counter
74164	74164	TTL	74xx	8-bit shift register
7417	7417	TTL	74xx	buffer/driver
74175	74175	TTL	74xx	D-type Flip-Flop
74176	74176	TTL	74xx	Decade/Binary counter
74180	74180	TTL	74xx	Parity generator
74184	74184	TTL	74xx	BCD/Binary converter
74185A	74185A	TTL	74xx	Binary/BCD converter
74197	74197	TTL	74xx	Binary counter/latch
7420	7420	TTL	74xx	4 input NAND gate
7422	7422	TTL	74xx	4 input NAND gate
7423	7423	TTL	74xx	4 input NOR gate
7425	7425	TTL	74xx	4 input NOR gate
74251	74251	TTL	74xx	Multiplexer
74259	74259	TTL	74xx	8-bit latch
74265	74265	TTL	74xx	Complementary outputs
74273	74273	TTL	74xx	D-type Flip-Flop

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
74276	74276	TTL	74xx	J-K Flip-Flop
74279	74279	TTL	74xx	Sbar-Rbar latch
7428	7428	TTL	74xx	2 input NOR gate
7430	7430	TTL	74xx	8 input NAND gate
7432	7432	TTL	74xx	2 input OR gate
74367A	74367A	TTL	74xx	Bus driver
74368A	74368A	TTL	74xx	Bus driver
7437	7437	TTL	74xx	2 input NAND gate
74376	74376	TTL	74xx	J-K Flip-Flop
7438	7438	TTL	74xx	2 input NAND gate
7439	7439	TTL	74xx	2 input NAND
7440	7440	TTL	74xx	4 input NAND gate
7443A	7443A	TTL	74xx	Excess3/Decimal
7444A	7444A	TTL	74xx	Gray/Decimal
7445	7445	TTL	74xx	BCD/Decimal
7446A	7446A	TTL	74xx	BCD/7-segment
7448	7448	TTL	74xx	BCD/7-segment
7449	7449	TTL	74xx	BCD/7-segment
7450	7450	TTL	74xx	AND-OR-INVERT gate
7453	7453	TTL	74xx	AND-OR-INVERT gate
7460	7460	TTL	74xx	4 input expander
7470	7470	TTL	74xx	J-K Flip-Flop
7472	7472	TTL	74xx	J-K Flip-Flop
7473	7473	TTL	74xx	J-K Flip-Flop
7474	7474	TTL	74xx	D Flip-Flop
7476	7476	TTL	74xx	J-K Flip-Flop
7477	7477	TTL	74xx	4-bit bistable latch
7482	7482	TTL	74xx	2-bit full adder
7483A	7483A	TTL	74xx	4-bit full adder
7486	7486	TTL	74xx	2 input XOR
748AS6A	74AS86A	TTL	74ASxx	2 input XOR
7494	7494	TTL	74xx	4-bit shift register
7496	7496	TTL	74xx	5-bit shift register
74ALS00A	74ALS00A	TTL	74ALSxx	2 input NAND gate
74ALS02	74ALS02	TTL	74ALSxx	2 input NOR gate
74ALS03B	74ALS03B	TTL	74ALSxx	2 input NAND gate
74ALS04B	74ALS04B	TTL	74ALSxx	inverter
74ALS05A	74ALS05A	TTL	74ALSxx	inverter
74ALS08	74ALS08	TTL	74ALSxx	2 input AND gate
74ALS09	74ALS09	TTL	74ALSxx	2 input AND gate
74ALS109A	74ALS109A	TTL	74ALSxx	J-K Flip-Flop
74ALS10A	74ALS10A	TTL	74ALSxx	3 input NAND gate
74ALS11A	74ALS11A	TTL	74ALSxx	3 input AND gate
74ALS133	74ALS133	TTL	74ALSxx	13-input Nand
74ALS137	74ALS137	TTL	74ALSxx	3-to-8 Decoders
74ALS138	74ALS138	TTL	74ALSxx	3-to-8 Decoders
74ALS139	74ALS139	TTL	74ALSxx	2-to-4 Decoders
74ALS151	74ALS151	TTL	74ALSxx	Multiplexer
74ALS153	74ALS153	TTL	74ALSxx	Multiplexer
74ALS156	74ALS156	TTL	74ALSxx	Demultiplexer
74ALS157A	74ALS157A	TTL	74ALSxx	Multiplexer
74ALS158	74ALS158	TTL	74ALSxx	Multiplexer
74ALS161B	74ALS161B	TTL	74ALSxx	4-bit counter
74ALS163B	74ALS163B	TTL	74Sxx	4-bit counter
74ALS164	74ALS164	TTL	74ALSxx	8-bit shift register
74ALS174	74ALS174	TTL	74ALSxx	D-type Flip-Flop
74ALS175	74ALS175	TTL	74ALSxx	D-type Flip-Flop

Part #	Part Name	Part Type	Part Sub Type	Description
74ALS20A	74ALS20A	TTL	74ALSxx	4 input NAND gate
74ALS21A	74ALS21A	TTL	74ALSxx	4 input AND gate
74ALS251	74ALS251	TTL	74ALSxx	Multiplexer
74ALS259	74ALS259	TTL	74ALSxx	8-bit latch
74ALS27	74ALS27	TTL	74ALSxx	3 input NOR gate
74ALS273	74ALS273	TTL	74ALSxx	D-type Flip-Flop
74ALS30A	74ALS30A	TTL	74ALSxx	8 input NAND gate
74ALS32	74ALS32	TTL	74ALSxx	2 input OR gate
74ALS33A	74ALS33A	TTL	74ALSxx	2 input NOR gate
74ALS37A	74ALS37A	TTL	74ALSxx	2 input NAND gate
74ALS38A	74ALS38A	TTL	74ALSxx	2 input NAND gate
74ALS74A	74ALS74A	TTL	74ALSxx	D Flip-Flop
74ALS86	74ALS86	TTL	74ALSxx	2 input XOR
74AS00	74AS00	TTL	74ASxx	2 input NAND gate
74AS02	74AS02	TTL	74ASxx	2 input NOR gate
74AS04	74AS04	TTL	74ASxx	inverter
74AS08	74AS08	TTL	74ASxx	2 input AND gate
74AS10	74AS10	TTL	74ASxx	3 input NAND gate
74AS109	74AS109	TTL	74ASxx	J-K Flip-Flop
74AS11	74AS11	TTL	74ASxx	3 input AND gate
74AS131A	74AS131A	TTL	74ASxx	3to8 Decoders
74as161	74as161	TTL	74ASxx	4-bit counter
74as162	74as162	TTL	74ASxx	4-bit decade counter
74AS163	74AS163	TTL	74ASxx	4-bit counter
74AS174	74AS174	TTL	74ASxx	D-type Flip-Flop
74AS175A	74AS175A	TTL	74ASxx	D-type Flip-Flop
74AS194	74AS194	TTL	74ASxx	4-bit shift register
74AS195	74AS195	TTL	74ASxx	4-bit shift register
74AS20	74AS20	TTL	74AS Series	4 input NAND gate
74AS21	74AS21	TTL	74AS Series	4 input AND gate
74AS27	74AS27	TTL	74AS Series	3 input NOR gate
74AS298	74AS298	TTL	74ASxx	2 input multiplexer
74AS30	74AS30	TTL	74ASxx	8 input NAND gate
74AS32	74AS32	TTL	74ASxx	2 input OR gate
74AS74	74AS74	TTL	74ASxx	D Flip-Flop
74F00	F00_Def	TTL	74Fxx	2 input NAND gate
74F08	F08_Def	TTL	74Fxx	2 input AND gate
74F10	F10_Def	TTL	74Fxx	3 input NAND gate
74F11	F11_Def	TTL	74Fxx	3 input AND gate
74F20	F20_Def	TTL	74Fxx	4 input NAND gate
74F32	F32_Def	TTL	74Fxx	2 input OR gate
74L04	LTTL7404	TTL	74Lxx	Inverter, BJT Level
74LS00	74LS00	TTL	74LSxx	2 input NAND gate
74LS01	74LS01	TTL	74LSxx	2 input NAND gate
74LS02	74LS02	TTL	74LSxx	2 input NOR gate
74LS03	74LS03	TTL	74LSxx	2 input NAND gate
74LS04	74LS04	TTL	74LSxx	inverter
74LS05	74LS05	TTL	74LSxx	inverter
74LS06	74LS06	TTL	74LSxx	inverter buffer
74LS07	74LS07	TTL	74LSxx	buffer/driver
74LS08	74LS08	TTL	74LSxx	2 input AND gate
74LS09	74LS09	TTL	74LSxx	2 input AND gate
74LS10	74LS10	TTL	74LSxx	3 input NAND gate
74LS107A	74LS107A	TTL	74LSxx	J-K Flip-Flop
74LS109A	74LS109A	TTL	74LSxx	J-K Flip-Flop
74LS11	74LS11	TTL	74LSxx	3 input AND gate
74LS122	74LS122	TTL	74LSxx	Monostable multivibrator

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
74LS123	74LS123	TTL	74LSxx	Monostable multivibrator
74LS125A	74LS125A	TTL	74LSxx	Bus buffer
74LS126A	74LS126A	TTL	74LSxx	Bus buffer
74LS132	74LS132	TTL	74LSxx	Nand Schmitt
74LS136	74LS136	TTL	74LSxx	2 input XOR
74LS14	74LS14	TTL	74LSxx	inverter Schmitt
74LS148	74LS148	TTL	74LSxx	Priority encoder
74LS151	74LS151	TTL	74LSxx	Multiplexer
74LS153	74LS153	TTL	74LSxx	Multiplexer
74LS155A	74LS155A	TTL	74LSxx	Demultiplexer
74LS156	74LS156	TTL	74LSxx	Demultiplexer
74LS157	74LS157	TTL	74LSxx	Multiplexer
74LS164	74LS164	TTL	74LSxx	8-bit shift register
74LS173A	74LS173A	TTL	74LSxx	4-bit register
74LS174	74LS174	TTL	74LSxx	D-type Flip-Flop
74LS175	74LS175	TTL	74LSxx	D-type Flip-Flop
74LS181	74LS181	TTL	74LSxx	Function generator
74LS194A	74LS194A	TTL	74LSxx	4-bit shift register
74LS195A	74LS195A	TTL	74LSxx	4-bit shift register
74LS20	74LS20	TTL	74LSxx	4 input NAND gate
74LS21	74LS21	TTL	74LSxx	4 input AND gate
74LS246	74LS246	TTL	74LSxx	BCD/7-segment
74LS248	74LS248	TTL	74LSxx	BCD/7-segment
74LS249	74LS249	TTL	74LSxx	BCD/7-segment
74LS251	74LS251	TTL	74LSxx	Multiplexer
74LS259B	74LS259B	TTL	74LSxx	8-bit latch
74LS273	74LS273	TTL	74LSxx	D-type Flip-Flop
74LS278	74LS278	TTL	74LSxx	Priority register
74LS279A	74LS279A	TTL	74LSxx	Sbar-Rbar latch
74LS283	74LS283	TTL	74LSxx	4-bit full adder
74LS290	74LS290	TTL	74LSxx	Decade/4-bit counter
74LS293	74LS293	TTL	74LSxx	Binary counter
74LS298	74LS298	TTL	74LSxx	2 input multiplexer
74LS30	74LS30	TTL	74LSxx	8 input NAND gate
74LS32	74LS32	TTL	74LSxx	2 input OR gate
74LS33	74LS33	TTL	74LSxx	2 input NOR gate
74LS351	74LS351	TTL	74LSxx	Multiplexer
74LS365A	74LS365A	TTL	74LSxx	Bus driver
74LS366A	74LS366A	TTL	74LSxx	Bus driver
74LS367A	74LS367A	TTL	74LSxx	Bus driver
74LS368A	74LS368A	TTL	74LSxx	Bus driver
74LS37	74LS37	TTL	74LSxx	2 input NAND gate
74LS38	74LS38	TTL	74LSxx	2 input NAND gate
74LS390	74LS390	TTL	74LSxx	Decade/4-bit counter
74LS393	74LS393	TTL	74LSxx	Binary counter
74LS42	74LS42	TTL	74LSxx	BCD/Decimal
74LS490	74LS490	TTL	74LSxx	Decade/4-bit counter
74LS51	74LS51	TTL	74LSxx	AND-OR-INVERT
74LS54	74LS54	TTL	74LSxx	AND-OR-INVERT
74LS73A	74LS73A	TTL	74LSxx	J-K Flip-Flop
74LS74A	74LS74A	TTL	74LSxx	D Flip-Flop
74LS75	74LS75	TTL	74LSxx	4-bit latch
74LS76A	74LS76A	TTL	74LSxx	J-K Flip-Flop
74LS85	74LS85	TTL	74LSxx	4-bit comparator
74LS86A	74LS86A	TTL	74LSxx	2 input XOR
74LS92	74LS92	TTL	74LSxx	divide/12 counter
74LS93	74LS93	TTL	74LSxx	4 bit counter

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
74LS96	74LS96	TTL	74LSxx	5-bit shift register
74S00	74S00	TTL	74Sxx	2 input NAND gate
74S02	74S02	TTL	74Sxx	2 input NOR gate
74S03	74S03	TTL	74Sxx	2 input NAND gate
74S04	74S04	TTL	74Sxx	inverter
74S05	74S05	TTL	74Sxx	inverter
74S08	74S08	TTL	74Sxx	2 input AND gate
74S09	74S09	TTL	74Sxx	2 input AND gate
74S10	74S10	TTL	74Sxx	3 input NAND gate
74S11	74S11	TTL	74Sxx	3 input AND gate
74S132	74S132	TTL	74Sxx	Nand Schmitt
74S133	74S133	TTL	74Sxx	13-Input Nand
74S135	74S135	TTL	74Sxx	Quad xor/xnor
74S140	74S140	TTL	74Sxx	4-Input Nand
74S151	74S151	TTL	74Sxx	Multiplexer
74S153	74S153	TTL	74Sxx	Multiplexer
74S157	74S157	TTL	74Sxx	Multiplexer
74S163	74S163	TTL	74Sxx	4-bit counter
74S174	74S174	TTL	74Sxx	D-type Flip-Flop
74S175	74S175	TTL	74Sxx	D-type Flip-Flop
74S181	74S181	TTL	74Sxx	Function generator
74S182	74S182	TTL	74Sxx	Carry generator
74S194	74S194	TTL	74Sxx	4-bit shift register
74S195	74S195	TTL	74Sxx	4-bit shift register
74S196	74S196	TTL	74Sxx	Decade Counter/latch
74S20	74S20	TTL	74Sxx	4 input NAND gate
74S251	74S251	TTL	74Sxx	Multiplexer
74S260	74S260	TTL	74Sxx	5-Input Nor
74S283	74S283	TTL	74Sxx	4-bit full adder
74S30	74S30	TTL	74Sxx	8 input NAND gate
74S32	74S32	TTL	74Sxx	2 input OR gate
74S37	74LS37	TTL	74Sxx	2 input NAND gate
74S38	74S38	TTL	74Sxx	2 input NAND gate
74S51	74S51	TTL	74Sxx	AND-OR-INVERT
74S64	74S64	TTL	74Sxx	AND-OR-INVERT
74S74	74S74	TTL	74Sxx	D Flip-Flop
74S85	74S85	TTL	74Sxx	4-bit comparator
74S86	74S86	TTL	74Sxx	2 input XOR
74STTL	STTL7404	TTL	74Sxx	Inverter, BJT Level
74TTL	TTL7404	TTL	74xx	Inverter, BJT Level
9200TTL	TTL9200	TTL	92xx	Inverter, BJT Level
ALS00A	ALS00A	TTL	ALS Series	I/O Only
ALS151	ALS151	TTL	ALS Series	I/O Only
ALS240A-1	ALS240A1	TTL	ALS Series	I/O Only
F00	F00	TTL	FAST Series	I/O Only
F06	F06	TTL	FAST Series	I/O Only
F125	F125	TTL	FAST Series	I/O Only
F168	F168	TTL	FAST Series	I/O Only
F173	F173	TTL	FAST Series	I/O Only
F181OC	F181_OC	TTL	FAST Series	I/O Only
F240	F240	TTL	FAST Series	I/O Only
F3037	F3037	TTL	FAST Series	I/O Only
F3038	F3038	TTL	FAST Series	I/O Only
F37	F37	TTL	FAST Series	I/O Only
F543_64	F543_64	TTL	FAST Series	I/O Only
F595	F595	TTL	FAST Series	I/O Only
F595_3S	F595_3S	TTL	FAST Series	I/O Only
F620_24	F620_24	TTL	FAST Series	I/O Only

TTL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
F621_24	F621_24	TTL	FAST Series	I/O Only
F621_64	F621_64	TTL	FAST Series	I/O Only
F646A	F646A	TTL	FAST Series	I/O Only
F711	F711	TTL	FAST Series	I/O Only
F723_1	F723_1	TTL	FAST Series	I/O Only
SN7401	SN7401	TTL	74xx	2-In NAND OC, BJT Level
SN7402	SN7402	TTL	74xx	2-In NOR, BJT Level
SN7403	SN7403	TTL	74xx	2-In NAND OC, BJT Level
SN7405	SN7405	TTL	74xx	Inverter OC, BJT Level
SN7406	SN7406	TTL	74xx	Inverter HV, BJT Level
SN7407	SN7407	TTL	74xx	Buffer HV, BJT Level
SN7422	SN7422	TTL	74xx	4-In NAND OC, BJT Level
TTL	STTLGATE	TTL	74Sxx	Inverter, BJT Level

I/O Stages (Input-Output Only)

Part #	Part Name	Part Type	Part Sub Type	Description
ECL	ECLGATE	Digital	ECL Inverter	[In1, In2, Out]
MECL III	MECLIII	Digital	MECLIII Inverter	[In, Out]
TTL	STTLGATE	Digital	Schottky Inverter	[In, Out]
ABT00	ABT00	BiCMOS	ABT Series	I/O Only
ABT125	ABT125	BiCMOS	ABT Series	I/O Only
ABT240	ABT240	BiCMOS	ABT Series	I/O Only
ABT240_1	ABT240_1	BiCMOS	ABT Series	I/O Only
ABT241	ABT241	BiCMOS	ABT Series	I/O Only
ABT241A	ABT241A	BiCMOS	ABT Series	I/O Only
ABT241A1	ABT241A1	BiCMOS	ABT Series	I/O Only
ABT244_1	ABT244_1	BiCMOS	ABT Series	I/O Only
ABT273	ABT273	BiCMOS	ABT Series	I/O Only
ABT373	ABT373	BiCMOS	ABT Series	I/O Only
ABT377	ABT377	BiCMOS	ABT Series	I/O Only
ABT543	ABT543	BiCMOS	ABT Series	I/O Only
ABT544	ABT544	BiCMOS	ABT Series	I/O Only
ABT573	ABT573	BiCMOS	ABT Series	I/O Only
ABT657	ABT657	BiCMOS	ABT Series	I/O Only
ABT821_1	ABT821_1	BiCMOS	ABT Series	I/O Only
ABT899	ABT899	BiCMOS	ABT Series	I/O Only
MB2052	MB2052	BiCMOS	Multibyte	I/O Only
MB2053	MB2053	BiCMOS	Multibyte	I/O Only
MB2240	MB2240	BiCMOS	Multibyte	I/O Only
MB2241	MB2241	BiCMOS	Multibyte	I/O Only
MB2374	MB2374	BiCMOS	Multibyte	I/O Only

ECL Gates

Part #	Part Name	Part Type	Part Sub Type	Description
10H131	M10H131	ECL	MC10H	D-FF
10H135	M10H135	ECL	MC10H	JK-FF
2XOUT	2XOUT	ECL	ECLinPS	
3XOUT	3XOUT	ECL	ECLinPS	
BUSOUT	BUSOUT	ECL	ECLinPS	
ECL	ECLGATE	ECL	Generic	ECL Inverter, BJT Level
ECLIN	ECLIN	ECL	MC10/100H6xx	ECL Clock Driver input
ECLINPUT	ECLINPUT	ECL	MC10/100H6xx	Translator input
ECLPAD	ECLPAD	ECL	MC10/100H6xx	
ESD	ESD	ECL	MC10/100H6xx	ESD circuit
ESDLITE	ESDLITE	ECL	ECLinPS	
ESDSTD	ESDSTD	ECL	ECLinPS	

ECL Gates (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
FPS009EX	FPS009EX	ECL	MC10/100H6xx	ESD circuit
H124IO	H124IO	ECL	MECL10KH	Translator I/O
H125IO	H125IO	ECL	MECL10KH	Translator I/O
H350IO	H350IO	ECL	MECL10KH	Translator I/O
H351IO	H351IO	ECL	MECL10KH	Translator I/O
H352IO	H352IO	ECL	MECL10KH	Translator I/O
H600OUT	H600OUT	ECL	MC10/100H6xx	Translator output
H601ECL	H601ECL	ECL	MC10/100H6xx	Translator input
H601IO	H601IO	ECL	MC10/100H6xx	Translator I/O
H602ECL	H602ECL	ECL	MC10/100H6xx	Translator input
H602OUT	H602OUT	ECL	MC10/100H6xx	Translator output
H603OUT	H603OUT	ECL	MC10/100H6xx	Translator output
H604OUT	H604OUT	ECL	MC10/100H6xx	Translator output
H605OUT	H605OUT	ECL	MC10/100H6xx	Translator output
H606OUT	H606OUT	ECL	MC10/100H6xx	Translator output
H606TTL	H606TTL	ECL	MC10/100H6xx	Translator input
H607OUT	H607OUT	ECL	MC10/100H6xx	Translator output
H640OUT	H640OUT	ECL	MC10/100H6xx	Clock Driver output
H641OUT	H641OUT	ECL	MC10/100H6xx	Clock Driver output
H642OUT	H642OUT	ECL	MC10/100H6xx	Clock Driver output
H643OUT	H643OUT	ECL	MC10/100H6xx	Clock Driver output
H645OUT	H645OUT	ECL	MC10/100H6xx	Clock Driver output
H646OUT	H646OUT	ECL	MC10/100H6xx	Clock Driver output
MC10H124	MC10H124	ECL	MC10H	Quad TTL-MECL Translator
MC10H125	MC10H125	ECL	MC10H	Quad MECL-TTL Translator
MC10H131	MC10H131	ECL	MC10H	D F-F, BJT Level
MC10H164	MC10H164	ECL	MC10H	8 Line Mux, BJT Level
MC1648	MC1648	ECL	MECLIII	Multivibrator
MECLIII	MECLIII	ECL	Generic	MECLIII Buffer, BJT Level
MULTIOUT	MULTIOUT	ECL	ECLinPS	
PKG16	PKG16	ECL	ECLinPS	
PKG20	PKG20	ECL	ECLinPS	
PKG28	PKG28	ECL	ECLinPS	
PKG28A	PKG28A	ECL	MC10/100H6xx	
PKG8	PKG8	ECL	ECLinPS	
PKGTYP	PKGTYP	ECL	ECLinPS	
TTLIN	TTLIN	ECL	MC10/100H6xx	TTL Clock Driver input
TTLINPUT	TTLINPUT	ECL	MC10/100H6xx	Translator input
TYPIN	TYPIN	ECL	ECLinPS	
TYPOUT	TYPOUT	ECL	ECLinPS	

Digital Potentiometers [10]

Part #	Part Name	Part Type	Part Sub Type	Description
X9312T	X9312T	Potentiometers		100 kOhm Digital
X9312U	X9312U	Potentiometers		50 kOhm Digital
X9312W	X9312W	Potentiometers		10 kOhm Digital
X9312Z	X9312Z	Potentiometers		1 kOhm Digital
X9313W	X9313W	Potentiometers		10 kOhm Digital
X9313Z	X9313Z	Potentiometers		1 kOhm Digital
X9C102	X9C102	Potentiometers		1 kOhm Digital
X9C103	X9C103	Potentiometers		10 kOhm Digital
X9C104	X9C104	Potentiometers		100 kOhm Digital
X9C503	X9C503	Potentiometers		50 kOhm Digital

Voltage Regulators & References [80]

Part #	Part Name	Part Type	Part Sub Type	Description
AD581	AD581	Voltage Ref.	Analog Devices	10V
AD581J	AD581J	Voltage Ref.	Analog Devices	10V
AD581K	AD581K	Voltage Ref.	Analog Devices	10V
AD581L	AD581L	Voltage Ref.	Analog Devices	10V
AD581S	AD581S	Voltage Ref.	Analog Devices	10V
AD581T	AD581T	Voltage Ref.	Analog Devices	10V
AD581U	AD581U	Voltage Ref.	Analog Devices	10V
AD584	AD584	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD584J	AD584J	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD584K	AD584K	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD584L	AD584L	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD584S	AD584S	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD584T	AD584T	Voltage Ref.	Analog Devices	10V, 5V, 2.5V
AD587	AD587	Voltage Ref.	Analog Devices	10V
AD587J	AD587J	Voltage Ref.	Analog Devices	10V
AD587K	AD587K	Voltage Ref.	Analog Devices	10V
AD587L	AD587L	Voltage Ref.	Analog Devices	10V
AD587S	AD587S	Voltage Ref.	Analog Devices	10V
AD587T	AD587T	Voltage Ref.	Analog Devices	10V
AD587U	AD587U	Voltage Ref.	Analog Devices	10V
AD588	AD588	Voltage Ref.	Analog Devices	
AD588A	AD588A	Voltage Ref.	Analog Devices	
AD588B	AD588B	Voltage Ref.	Analog Devices	
AD588J	AD588J	Voltage Ref.	Analog Devices	
AD588K	AD588K	Voltage Ref.	Analog Devices	
AD588S	AD588S	Voltage Ref.	Analog Devices	
AD588T	AD588T	Voltage Ref.	Analog Devices	
LM136	LM136	Voltage Ref.		2.5V
LM317MOT	LM317MOT	Voltage Reg.		Motorola
LM317NC	LM317NC	Voltage Reg.		Motorola
LM317TI	LM317TI	Voltage Reg.		TI
LM337K	LM337K	Voltage Reg.		
REF01	REF01	Voltage Ref.	Analog Devices	10V
REF01A	REF01A	Voltage Ref.	Analog Devices	10V
REF01C	REF01C	Voltage Ref.	Analog Devices	10V
REF01E	REF01E	Voltage Ref.	Analog Devices	10V
REF01H	REF01H	Voltage Ref.	Analog Devices	10V
REF02	REF02	Voltage Ref.	Analog Devices	5V
REF02A	REF02A	Voltage Ref.	Analog Devices	5V
REF02C	REF02C	Voltage Ref.	Analog Devices	5V
REF02D	REF02D	Voltage Ref.	Analog Devices	5V
REF02E	REF02E	Voltage Ref.	Analog Devices	5V
REF02H	REF02H	Voltage Ref.	Analog Devices	5V
REF05	REF05	Voltage Ref.	Analog Devices	5V
REF05A	REF05A	Voltage Ref.	Analog Devices	5V
REF05B	REF05B	Voltage Ref.	Analog Devices	5V
REF10	REF10	Voltage Ref.		10V
REF10A	REF10A	Voltage Ref.	Analog Devices	10V
REF10B	REF10B	Voltage Ref.	Analog Devices	10V
REF191	REF191	Voltage Ref.		
REF191E	REF191E	Voltage Ref.		
REF191F	REF191F	Voltage Ref.		
REF191G	REF191G	Voltage Ref.		10V
REF192	REF192	Voltage Ref.		
REF192E	REF192E	Voltage Ref.		
REF192F	REF192F	Voltage Ref.		
REF192G	REF192G	Voltage Ref.		

Voltage Regulators & References (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
REF193	REF193	Voltage Ref.		
REF193G	REF193G	Voltage Ref.		
REF194	REF194	Voltage Ref.		
REF194E	REF194E	Voltage Ref.		
REF194F	REF194F	Voltage Ref.		
REF194G	REF194G	Voltage Ref.		
REF195	REF195	Voltage Ref.		5V
REF195E	REF195E	Voltage Ref.		5V
REF195F	REF195F	Voltage Ref.		5V
REF195G	REF195G	Voltage Ref.		5V
REF196	REF196	Voltage Ref.		
REF196G	REF196G	Voltage Ref.		
REF198	REF198	Voltage Ref.		
REF198E	REF198E	Voltage Ref.		
REF198F	REF198F	Voltage Ref.		
REF198G	REF198G	Voltage Ref.		
TL431	TL431	Voltage Ref.		
TLE2425	TLE2425	Voltage Ref.	Texas Inst.	2.5 V virtual ground generator
TLE2425A	TLE2425A	Voltage Ref.	Texas Inst.	2.5 V virtual ground generator
TLE2426	TLE2426	Voltage Ref.	Texas Inst.	Rail-splitter virtual ground
TLE2426A	TLE2426A	Voltage Ref.	Texas Inst.	Rail-splitter virtual ground
UA723	UA723	Voltage Reg.		TI
UA723M	UA723M	Voltage Reg.		macro model

Analog Switches [31]

Part #	Part Name	Part Type	Part Sub Type	Description
ADG411	ADG411	Analog Switch		
ADG411B	ADG411B	Analog Switch		
ADG411T	ADG411T	Analog Switch		
ADG412	ADG412	Analog Switch		
ADG412B	ADG412B	Analog Switch		
ADG412T	ADG412T	Analog Switch		
ADG413	ADG413	Analog Switch		
ADG413B	ADG413B	Analog Switch		
ADG413T	ADG413T	Analog Switch		
CD4066B	CD4066B	Analog Switch		
DG200	DG200	Analog Switch		
DG201	DG201	Analog Switch		
ADG441	ADG441	Analog Switch	Analog Devices	Quad SPST Switches
ADG441B	ADG441B	Analog Switch	Analog Devices	Quad SPST Switches
ADG441S	ADG441S	Analog Switch	Analog Devices	Quad SPST Switches
ADG441T	ADG441T	Analog Switch	Analog Devices	Quad SPST Switches
ADG442	ADG442	Analog Switch	Analog Devices	Quad SPST Switches
ADG442B	ADG442B	Analog Switch	Analog Devices	Quad SPST Switches
ADG442S	ADG442S	Analog Switch	Analog Devices	Quad SPST Switches
ADG444	ADG444	Analog Switch	Analog Devices	Quad SPST Switches
ADG444B	ADG444B	Analog Switch	Analog Devices	Quad SPST Switches
ADG444S	ADG444S	Analog Switch	Analog Devices	Quad SPST Switches
ADG511±5	ADG511±5	Analog Switch	Analog Devices	Quad SPST Switches
ADG511_3	ADG511_3	Analog Switch	Analog Devices	Quad SPST Switches
ADG511_5	ADG511_5	Analog Switch	Analog Devices	Quad SPST Switches
ADG512±5	ADG512±5	Analog Switch	Analog Devices	Quad SPST Switches
ADG512_3	ADG512_3	Analog Switch	Analog Devices	Quad SPST Switches

Analog Switches (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
ADG512_5	ADG512_5	Analog Switch	Analog Devices	Quad SPST Switches
ADG513±5	ADG513±5	Analog Switch	Analog Devices	Quad SPST Switches
ADG513_3	ADG513_3	Analog Switch	Analog Devices	Quad SPST Switches
ADG513_5	ADG513_5	Analog Switch	Analog Devices	Quad SPST Switches

Relays [2]

Part #	Part Name	Part Type	Part Sub Type	Description
RELAY2S	RELAY2S	Relays		Simple
RELAY2	RELAY2	Relays		

Drivers [10]

Part #	Part Name	Part Type	Part Sub Type	Description
EL1501E	EL1501E	Line Drivers	Elantec	Differential 2MHz
EL2003	EL2003	Line Drivers	Elantec	Video 100MHz
EL7661E	EL7661E	Drivers	Bridge	Full
EL7243E	EL7243E	Drivers	CCD	High Speed
EL7144E	EL7144E	Drivers	Power Mosfet	
EL7212E	EL7212E	Drivers	Power Mosfet	
EL7242E	EL7242E	Drivers	Power Mosfet	
HC-5509B	HC5509B	Line Drivers	Harris	SLIC
HIP2500	HIP2500	Drivers	Power Mosfet	
ICL7667	ICL7667	Drivers	Power Mosfet	TTL/CMOS Input

PLLs [1]

Part #	Part Name	Part Type	Part Sub Type	Description
CD4046B	PL4046B	PLLs	National	

Timers [5]

Part #	Part Name	Part Type	Part Sub Type	Description
LM555	LM555	Timers		National (Behavioral <2kHz)
TS555H	TS555H	Timers		SGS-Thomson
TS555L	TS555L	Timers		SGS-Thomson
TS555M	TS555M	Timers		SGS-Thomson
UA555	UA555	Timers		Fairchild (Transistor)

Bridges [9]

Part #	Part Name	Part Type	Part Sub Type	Description
A2D	A2D_Def	Bridges		Analog-to-digital bridge
A2ECL10H	A2ECL10H_Def	Bridges		Analog-to-ECL bridge
A2ECL10K	A2ECL10K_Def	Bridges		Analog-to-ECL bridge
A2R	A2R_Def	Bridges		analog to real bridge
D2A	D2A_Def	Bridges		Digital-to-analog bridge
D2R	D2R_Def	Bridges		Digital to real bridge
ECL10H2A	ECL10H2A_Def	Bridges		ECL-to-analog bridge
ECL10K2A	ECL10K2A_Def	Bridges		ECL-to-analog bridge
R2A	R2A_Def	Bridges		Real to analog bridge

Thermal Models [6]

Part #	Subcircuit Name	SPICENET Name	Library	[Connections] & PRESPICE Parameters
NPN BJT	TNBJT	TNBJT	Thermal	[Collector, Base, Emitter, Thermal]
PNP BJT	TPBJT	TPBJT	Thermal	**COB** Col-Base Cap. in Farads at 10V
				FT Gain Bandwidth Product in Hz
				TS Storage Time in Sec.
				IMAX Max. Collector Current in Amps
				ICBO Col-Base Leakage Cur. @25°C
				HC Thermal Resistance in Deg K per W
				TAU Thermal Time Constant in Sec.
				TINF Thermal Boundary Temp in DegK
Diode	TDIODE	TDIODE	Thermal	[Anode, Cathode, Thermal]
				IMAX Max. Continuous I in Amps
				TRR Reverse Recovery Time in Sec.
				VMAX Max. Cont. Rev. Voltage in V
				ICO Leakage Current @ 25°C
				HC Thermal Resistance in Deg K per W
				TAU Thermal Time Constant in Sec.
				TINF Thermal Boundary Temp in DegK
Tungsten Lamp	LAMP	LAMP	Thermal	[In+, In-, Thermal]
				V Rated Voltage in Volts
				P Max. Power Dissipation in Watts
Thermistor	THRMSTR	THRMSTR	Thermal	[In+, In-, Thermal]
				RO Resistance at 300°K in Ω
				BETA Coefficient from Res vs. Temp.
				HC Thermal resistance in Deg K per W
				TAU Thermal Time Constant in Sec.
				TINF Thermal Boundary Temp in DegK
Thermal Cell	TCELL	TCELL	Thermal	[Thermal]
				HC Thermal resistance in Deg K per W
				TAU Thermal Time Constant in Sec.
				TINF Thermal Boundary Temp in DegK

For the T0 parameter to be used, UIC must be present — **T0** Initial Temp if diff. from 27 deg.

Fuse Models [48]

Part #	Part Name	Part Type	Part Sub Type	Description
225.1	F2251	Fuses	Fast Blow	250V .1A
225.125	F225125	Fuses	Fast Blow	250V .125A
225.25	F22525	Fuses	Fast Blow	250V .25A
225.375	F225375	Fuses	Fast Blow	250V .375A
225.5	F2255	Fuses	Fast Blow	250V .5A
225.75	F22575	Fuses	Fast Blow	250V .75A
225001	F225001	Fuses	Fast Blow	250V 1A
225002	F225002	Fuses	Fast Blow	250V 2A
225003	F225003	Fuses	Fast Blow	250V 3A
225004	F225004	Fuses	Fast Blow	125V 4A
225005	F225005	Fuses	Fast Blow	125V 5A
225006	F225006	Fuses	Fast Blow	125V 6A
225007	F225007	Fuses	Fast Blow	125V 7A
225008	F225008	Fuses	Fast Blow	125V 8A
22501.5	F225015	Fuses	Fast Blow	250V 1.5A
225010	F225010	Fuses	Fast Blow	125V 10A
22502.5	F225025	Fuses	Fast Blow	250V 2.5A
22503.5	F225035	Fuses	Fast Blow	250V 3.5A
229.25	F22925	Fuses	Slow Blow	250V .25A
229.375	F229375	Fuses	Slow Blow	250V .375A
229.5	F2295	Fuses	Slow Blow	250V .5A
229.6	F2296	Fuses	Slow Blow	250V .6A
229.75	F22975	Fuses	Slow Blow	250V .75A
229001	F229001	Fuses	Slow Blow	250V 1A
229002	F229002	Fuses	Slow Blow	250V 2A
229003	F229003	Fuses	Slow Blow	250V 3A
229004	F229004	Fuses	Slow Blow	125V 4A
229005	F229005	Fuses	Slow Blow	125V 5A
229007	F229007	Fuses	Slow Blow	125V 7A
22901.5	F229015	Fuses	Slow Blow	250V 1.5A
22902.5	F229025	Fuses	Slow Blow	250V 2.5A
22903.5	F229035	Fuses	Slow Blow	250V 3.5A
2292.25	F229225	Fuses	Slow Blow	250V 2.25A
8AG1	F8AG1	Fuses	Normal Blow	250V 1A
8AG1.5	F8AG15	Fuses	Normal Blow	250V 1.5A
8AG100	F8AG100	Fuses	Normal Blow	250V .1A
8AG125	F8AG125	Fuses	Normal Blow	250V .125A
8AG2	F8AG2	Fuses	Normal Blow	250V 2A
8AG2.5	F8AG25	Fuses	Normal Blow	125V 2.5A
8AG250	F8AG250	Fuses	Normal Blow	250V .25A
8AG3	F8AG3	Fuses	Normal Blow	125V 3A
8AG375	F8AG375	Fuses	Normal Blow	250V .375A
8AG4	F8AG4	Fuses	Normal Blow	125V 4A
8AG5	F8AG5	Fuses	Normal Blow	125V 5A
8AG500	F8AG500	Fuses	Normal Blow	250V .5A
8AG6	F8AG6	Fuses	Normal Blow	125V 6A
8AG7	F8AG7	Fuses	Normal Blow	125V 7A
8AG750	F8AG750	Fuses	Normal Blow	250V .75A

Part #	Subcircuit Name	SPICENET Name	Library	[Connections] & PRESPICE Parameters
FUSEG	FUSEG	FUSEG	Thermal	[Fuse+, Fuse-]
See April 1991 Newsletter for parameter definition				Rcolde, HCTE, KS, TB

All fuses are modeled using a subcircuit representation.

Enhanced Signal Sources [21]

Part #	Subcircuit Name & SpiceNet Symbol		Library Name	[Connections] & Parameters and Comments
Sine	SINE	Signal		[Plus, Minus] **OFFSET** Offset in Volts **AMP** Amplitude in Volts **FREQ** Frequency in Hz **DELAY** Starting delay in Sec **DAMP** Damping Coefficient
Pulse	PULSE	Signal		[Plus, Minus] **INITIAL** Initial Voltage in Volts **PULSE** Pulsed Value in Volts **DELAY** Starting Delay in Sec **RISE** Rise time 0-100% in Sec **FALL** Fall time 0-100% in Sec **DUTY** Duty cylce **PERIOD** Period in Sec
Sawtooth	SAW	Signal		[Plus, Minus] **INITIAL** Initial Voltage in Volts **PULSE** Pulsed Value in Volts **DELAY** Starting Delay in Sec **SKEW** Ratio Rise/Fall Time **DUTY** Duty cylce **PERIOD** Period in Sec
VCO	VCO	Signal		[In, Out] **VPK** Peak Voltage in Volts **FREQ** Frequency per Volt
AM	AM	Signal		[Plus, Minus] **CARAMP** Carrier Amplitude in Volts **CARFQ** Carrier Frequency in Hz **MODFQ** Modulation Frequency in Hz **PCTMOD** Percent Modulation
FM	FM	Signal		[Plus, Minus] **OFFSET** Offset in Volts **AMP** Amplitude in Volts **FREQ** Frequency in Hz **MOD** Modulation Index **SIGFREQ** Signal Frequency in Hz
Power Supply	PSUPPLY	Signal		[Vcc+, Vcc-, Vee+, Vee-, Vbias+, Vbias-] **VCC** Output Voltage **VEE** Output Voltage **VBIAS** Output Voltage
Three Phaser Generator	GEN3	Signal		[V(0°), V(120°), V(240°), Neutral] **FREQ** Generator Frequency in Hz **VGEN** P-N Peak Amplitude in Volts **PHASE** Phase Disturbance in Degrees **MAGERR** Amplitude unbalance in Volts
Variable Phase Generator	PHASE	Signal		[Delay Sine Out, Sine Out, Cosine Out] **FREQ** Generator Frequency in Hz **VGEN** P-N Peak Amplitude in Volts

Enhanced Signal Sources (cont'd)

Part #	Subcircuit Name & SPICENET Symbol	Library Name	[Connections] & Parameters and Comments
			ANGLE Phase Angle Delay in Degrees
Random Noise Sources	RAN1 RAN2 RAN3 RAN4 RAN5	Random	[Out] **TIM** Total Time Span equal to TSTOP **MAG** RMS Magnitude in Volts
Variable phase	PHASE2	Signal	[Delayed Sin Out, Sin Out, Cosin Out, Angle in Deg] **VGEN** P-N Peak Amplitude in Volts **FREQ** Frequency in Hz **VOFFSET** Offset in Volts
Variable phase for UIC	PHASE3	Signal	[Delayed Sin Out, Sin Out, Cosin Out, Angle in Deg] **VGEN** P-N Peak Amplitude in Volts **FREQ** Frequency in Hz **VOFFSET** Offset in Volts
VCOSQ	VCOSQ	Signal	**FREQ** Frequency in Hz **VLO** **VHI**
FSK	FSK	Signal2	**EB** Energy per Bit **NC** Integer Constant **TB** Bit Duration
PSK	PSK	Signal2	**EB** Energy per Bit **NC** Integer Constant **TB** Bit Duration
RWAVE	RWAVE	Signal2	0.5μs 100kHz Ring Wave **VP** Peak Voltage
RWAVE5K	RWAVE5K	Signal2	5K Ring Wave **VP** Peak Voltage
WAVE101K	WAVE101K	Signal2	10μs/1000μs Waveform **IP** Peak Current
WAVE1250	WAVE1250	Signal2	1.2μs/50μs Waveform **VP** Peak Voltage
WAVE820	WAVE820	Signal2	8μs/20μs Waveform **IP** Peak Current
WAVEEFT	WAVEEFT	Signal2	EFT Waveform **VP** Peak Voltage
NTSC	NTSC	NTSC	**FC** Color Burst Frequency in Hz **VBLANK** Blanking Level **VRFL** Reference White Level
SVCO	SVCO & CVCO	CM1	Sine wave VCO
TVCO	TVCO & CVCO	CM1	Triangle wave VCO
SQVCO	SQVCO & CVCO	CM1	Square wave VCO
TIME	TIME	Signal2	UIC required
TIME_2	TIME_2	Signal2	No UIC required

Coaxial Cables [140]

Library File: Coax.Lib, Connections: [In+, In-, Out+, Out-]. Note: The LEN (cable length in Feet) value must be passed into the coaxial cable subcircuit. Data contained in the library file includes the capacitance in F/FT, characteristic impedance, and the attenuation in DB/100Ft. at a specific frequency, normally 400MegHz. If the simulation frequency is different, you may have to adjust the attenuation value or use the generic coaxial cable subcircuit.

Part #

RG4	RG19A	RG58	RG81	RG124
RG5	RG20	RG58A	RG82	RG133
RG5A	RG20A	RG58B	RG83	RG133A
RG5B	RG21	RG58C	RG84A	RG140
RG6	RG21A	RG59	RG85A	RG141
RG6A	RG25A	RG59A	RG87A	RG141A
RG7	RG26A	RG59B	RG88	RG142
RG8	RG27A	RG62	RG88A	RG142A
RG8A	RG28B	RG62A	RG88B	RG142B
RG9	RG29	RG62B	RG89	RG143
RG10	RG34	RG63	RG90	RG143A
RG100	RG34A	RG63A	RG93	RG144
RG10A	RG34B	RG63B	RG94	RG147
RG11	RG35	RG64	RG94A	RG148
RG11A	RG35A	RG64A	RG9A	RG149
RG12	RG35B	RG65	RG9B	RG150
RG12A	RG36	RG65A	RG114	RG156
RG13	RG37	RG71	RG114A	RG157
RG13A	RG38	RG71A	RG115	RG158
RG14	RG39	RG71B	RG115A	RG159
RG14A	RG40	RG73	RG116	RG161
RG15	RG41	RG74	RG117	RG164
RG16	RG42	RG74A	RG117A	RG165
RG17	RG54	RG77A	RG118	RG166
RG17A	RG54A	RG78A	RG118A	RG174
RG18	RG55	RG79	RG119	RG174A
RG18A	RG55A	RG79A	RG120	RG176
RG19	RG55B	RG79B	RG122	RG177

Part #	Subcircuit Name & SPICENET Symbol	Library Name	[Connections] & Passed Parameters
COAX	COAXG	Coax	[In+, In-, Out+, Out -] **C** Capacitance in F/FT **ZO** Characteristic impedance in Ω **LEN** Length of transmission line in FT **ALPHA** Attenuation in DB/100FT
MSTRIP **Microstrip**	MSTRIP	Strip	[In+, In-, Out+, Out -] **SIGMA** Resistivity in Ω-m **LTH** Length in m **WTH** Width in m **HTH** Thickness in m **D** Height above ground plane in m **ER** Dielectric constant **LEN** Line length in m
O2LINE **2 Coupled Microstrip**	O2LINE	COUPLED	[In1, In2, Out1, Out2]
O3LINE **3 Coupled Microstrip**	O3LINE	COUPLED	[In1, In2, In3, Out1, Out2, Out3]

Coaxial Cables (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
BLINE	BLINE	Interconnects	PCI Bus	Surface stripline
BLINE1	BLINE1	Interconnects	PCI Bus	Burried microstrip
GWIRE	GWIRE	Interconnects	Generic	Ground Plane Coupling
MWIRE	MWIRE	Interconnects	Generic	Crosstalk Model
WIRE	WIRE	Interconnects	Generic	Single LC section
WIRE4	WIRE4	Interconnects	Generic	4 LC sections
WIREA	WIREA	Interconnects	Generic	LC section w/dielectric

Thermistors [133]

These models are found in the Thermist.Lib library file.

Part #	Part Name	Part Type	Part Sub Type	Description
D200A101L	D200A101	Sensors	Thermistor	Thermometrics NTC 15% 248MA
D200A121L	D200A121	Sensors	Thermistor	Thermometrics NTC 15% 226MA
D200A151L	D200A151	Sensors	Thermistor	Thermometrics NTC 15% 202MA
D200A201L	D200A201	Sensors	Thermistor	Thermometrics NTC 15% 176MA
D200A221L	D200A221	Sensors	Thermistor	Thermometrics NTC 15% 168MA
D200A251L	D200A251	Sensors	Thermistor	Thermometrics NTC 15% 157MA
D200A271L	D200A271	Sensors	Thermistor	Thermometrics NTC 15% 152MA
D200A301L	D200A301	Sensors	Thermistor	Thermometrics NTC 15% 146MA
D200A401L	D200A401	Sensors	Thermistor	Thermometrics NTC 15% 120MA
D200A501L	D200A501	Sensors	Thermistor	Thermometrics NTC 15% 111MA
D200A700L	D200A700	Sensors	Thermistor	Thermometrics NTC 15% 290MA
D200A900L	D200A900	Sensors	Thermistor	Thermometrics NTC 15% 261MA
D200B102L	D200B102	Sensors	Thermistor	Thermometrics NTC 15% 105MA
D200B103L	D200B103	Sensors	Thermistor	Thermometrics NTC 15% 39MA
D200B104L	D200B104	Sensors	Thermistor	Thermometrics NTC 15% 15MA
D200B152L	D200B152	Sensors	Thermistor	Thermometrics NTC 15% 85MA
D200B202L	D200B202	Sensors	Thermistor	Thermometrics NTC 15% 74MA
D200B203L	D200B203	Sensors	Thermistor	Thermometrics NTC 15% 27MA
D200B252L	D200B252	Sensors	Thermistor	Thermometrics NTC 15% 69MA
D200B302L	D200B302	Sensors	Thermistor	Thermometrics NTC 15% 63MA
D200B303L	D200B303	Sensors	Thermistor	Thermometrics NTC 15% 17MA
D200B402L	D200B402	Sensors	Thermistor	Thermometrics NTC 15% 54MA
D200B502L	D200B502	Sensors	Thermistor	Thermometrics NTC 15% 49MA
D200B651L	D200B651	Sensors	Thermistor	Thermometrics NTC 15% 130MA
D200B682L	D200B682	Sensors	Thermistor	Thermometrics NTC 15% 42MA
D320A130M	D320A130	Sensors	Thermistor	Thermometrics NTC 20% 850MA
D320A131K	D320A131	Sensors	Thermistor	Thermometrics NTC 15% 271MA
D320A200M	D320A200	Sensors	Thermistor	Thermometrics NTC 20% 690MA
D320A252L	D320A252	Sensors	Thermistor	Thermometrics NTC 15% 61MA
D320A300M	D320A300	Sensors	Thermistor	Thermometrics NTC 20% 560MA
D320A400L	D320A400	Sensors	Thermistor	Thermometrics NTC 15% 480MA
D320A500L	D320A500	Sensors	Thermistor	Thermometrics NTC 15% 387MA
D320A600L	D320A600	Sensors	Thermistor	Thermometrics NTC 15% 353MA
D320A800L	D320A800	Sensors	Thermistor	Thermometrics NTC 15% 345MA
NT7332K102	332K102	Sensors	Thermistor	KOA NTC 10%
NT7332L102	332L102	Sensors	Thermistor	KOA NTC 15%
NT7332M102	332M102	Sensors	Thermistor	KOA NTC 20%
NT7333K471	333K471	Sensors	Thermistor	KOA NTC 10%
NT7333L471	333L471	Sensors	Thermistor	KOA NTC 15%
NT7333M471	333M471	Sensors	Thermistor	KOA NTC 20%
NT7335K222	335K222	Sensors	Thermistor	KOA NTC 10%
NT7335K332	335K332	Sensors	Thermistor	KOA NTC 10%

Thermistors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
NT7335K472	335K472	Sensors	Thermistor	KOA NTC 10%
NT7335L222	335L222	Sensors	Thermistor	KOA NTC 15%
NT7335L332	335L332	Sensors	Thermistor	KOA NTC 15%
NT7335L472	335L472	Sensors	Thermistor	KOA NTC 15%
NT7335M222	335M222	Sensors	Thermistor	KOA NTC 20%
NT7335M332	335M332	Sensors	Thermistor	KOA NTC 20%
NT7335M472	335M472	Sensors	Thermistor	KOA NTC 20%
NT7338K103	338K103	Sensors	Thermistor	KOA NTC 10%
NT7338K104	338K104	Sensors	Thermistor	KOA NTC 10%
NT7338K223	338K223	Sensors	Thermistor	KOA NTC 10%
NT7338K333	338K333	Sensors	Thermistor	KOA NTC 10%
NT7338K473	338K473	Sensors	Thermistor	KOA NTC 10%
NT7338K682	338K682	Sensors	Thermistor	KOA NTC 10%
NT7338K683	338K683	Sensors	Thermistor	KOA NTC 10%
NT7338L103	338L103	Sensors	Thermistor	KOA NTC 15%
NT7338L104	338L104	Sensors	Thermistor	KOA NTC 15%
NT7338L223	338L223	Sensors	Thermistor	KOA NTC 15%
NT7338L333	338L333	Sensors	Thermistor	KOA NTC 15%
NT7338L473	338L473	Sensors	Thermistor	KOA NTC 15%
NT7338L682	338L682	Sensors	Thermistor	KOA NTC 15%
NT7338L683	338L683	Sensors	Thermistor	KOA NTC 15%
NT7338M103	338M103	Sensors	Thermistor	KOA NTC 20%
NT7338M104	338M104	Sensors	Thermistor	KOA NTC 20%
NT7338M223	338M223	Sensors	Thermistor	KOA NTC 20%
NT7338M333	338M333	Sensors	Thermistor	KOA NTC 20%
NT7338M473	338M473	Sensors	Thermistor	KOA NTC 20%
NT7338M682	338M682	Sensors	Thermistor	KOA NTC 20%
NT7338M683	338M683	Sensors	Thermistor	KOA NTC 20%
RTH22/8102J	R228102J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8102K	R228102K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH22/8122J	R228122J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8122K	R228122K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH22/8152J	R228152J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8152K	R228152K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH22/8182J	R228182J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8182K	R228182K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH22/8222J	R228222J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8222K	R228222K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH22/8821J	R228821J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH22/8821K	R228821K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8102J	R428102J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8102K	R428102K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8122J	R428122J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8122K	R428122K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8152J	R428152J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8152K	R428152K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8182J	R428182J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8182K	R428182K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8222J	R428222J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8222K	R428222K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
RTH42/8821J	R428821J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
RTH42/8821K	R428821K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8102J	TG18102J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TG1/8102K	TG18102K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8122J	TG18122J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TG1/8122K	TG18122K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8152J	TG18152J	Sensors	Thermistor	Unitrode PTC 5% 1/8W

Thermistors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
TG1/8152K	TG18152K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8182J	TG18182J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TG1/8182K	TG18182K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8222J	TG18222J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TG1/8222K	TG18222K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TG1/8821J	TG18821J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TG1/8821K	TG18821K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/4102J	TM14102J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4102K	TM14102K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/4122J	TM14122J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4122K	TM14122K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/4152J	TM14152J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4152K	TM14152K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/4182J	TM14182J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4182K	TM14182K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/4222J	TM14222J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4222K	TM14222K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/4821J	TM14821J	Sensors	Thermistor	Unitrode PTC 5% 1/4W
TM1/4821K	TM14821K	Sensors	Thermistor	Unitrode PTC 10% 1/4W
TM1/8102J	TM18102J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8102K	TM18102K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/8122J	TM18122J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8122K	TM18122K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/8152J	TM18152J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8152K	TM18152K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/8182J	TM18182J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8182K	TM18182K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/8222J	TM18222J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8222K	TM18222K	Sensors	Thermistor	Unitrode PTC 10% 1/8W
TM1/8821J	TM18821J	Sensors	Thermistor	Unitrode PTC 5% 1/8W
TM1/8821K	TM18821K	Sensors	Thermistor	Unitrode PTC 10% 1/8W

Part #	Subcircuit Name & SPICENET Symbol	[Connections] & PRESPICE Parameters
POSTHERM	POSTHERM	[In+,In-,Temperature]
NEGTHERM	NEGTHERM	**R25C** Resistance at 25C
		BETA Temperature coefficient

Hall Effect Sensors [10]

These models are found in the Hsensor.Lib library file.

Part #	Part Name	Part Type	Part Sub Type	Description
BH200	BH200	Sensors	Hall Effect	Transverse, 15mV/kG
BH203	BH203	Sensors	Hall Effect	Axial, 10mV/kG
BH208	BH208	Sensors	Hall Effect	Ultra-Thin Axial, 10mV/kG
BH700	BH700	Sensors	Hall Effect	Transverse, 50mV/kG
BH705	BH705	Sensors	Hall Effect	Transverse, 10mV/kG
BHA910	BHA910	Sensors	Hall Effect	High Linearity, 0.8mV/kG
BHT910	BHT910	Sensors	Hall Effect	High Linearity, 0.8mV/kG
FH301	FH301	Sensors	Hall Effect	Low Current, 10mV/kG
FH540	FH540	Sensors	Hall Effect	Low Current, 12mV/kG
GH600	GH600	Sensors	Hall Effect	High Freq., 50mV/kG

Pressure Sensors [55]

These models are found in the PSensor.Lib library file.

Part #	Part Name	Part Type	Part Sub Type	Description
MP2010MC	MP2010MC	Sensors	Pressure	Comp/Cal 0-1.45 PSI/10 kPa
MP2012MC	MP2012MC	Sensors	Pressure	Comp/Cal 0-1.5 PSI/10 kPa
MP2050MC	MP2050MC	Sensors	Pressure	Comp/Cal 0-7.3 PSI/50 kPa
MP2051MC	MP2051MC	Sensors	Pressure	Comp/Cal 0-7.3 PSI/50 kPa
MP2052MC	MP2052MC	Sensors	Pressure	Comp/Cal 0-7.3 PSI/50 kPa
MP2100MC	MP2100MC	Sensors	Pressure	Comp/Cal 0-14.5 PSI/100 kPa
MP2101MC	MP2101MC	Sensors	Pressure	Comp/Cal 0-14.5 PSI/100 kPa
MP2200MC	MP2200MC	Sensors	Pressure	Comp/Cal 0-29 PSI/200 kPa
MP2201MC	MP2201MC	Sensors	Pressure	Comp/Cal 0-29 PSI/200 kPa
MP4100MC	MP4100MC	Sensors	Pressure	SigCond 0-15.2 PSI/20-105 kPa
MP4101MC	MP4101MC	Sensors	Pressure	SigCond 0-14.7 PSI/15-102 kPa
MP4115MC	MP4115MC	Sensors	Pressure	SigCond 0-16.6 PSI/115 kPa
MP4250MC	MP4250MC	Sensors	Pressure	SigCond 0-36.2 PSI/0-250 kPa
MP5050MC	MP5050MC	Sensors	Pressure	SigCond 0-7.3 PSI/50 kPa
MP7050MC	MP7050MC	Sensors	Pressure	HiImp 0-7.3 PSI/50 kPa
MP7100MC	MP7100MC	Sensors	Pressure	HiImp 0-14.5 PSI/100 kPa
MP7200MC	MP7200MC	Sensors	Pressure	HiImp 0-29 PSI/200 kPa
MPX100MC	MPX100MC	Sensors	Pressure	Uncomp 0-14.5 PSI/ 100 kPa
MPX10MC	MPX10MC	Sensors	Pressure	Uncomp 0-1.45 PSI/10 kPa
MPX12MC	MPX12MC	Sensors	Pressure	Uncomp 0-1.5 PSI
MPX200MC	MPX200MC	Sensors	Pressure	Uncomp 0-29 PSI/200 kPa
MPX50MC	MPX50MC	Sensors	Pressure	Uncomp 0-7.3 PSI/ 50 kPa
MPX5100A	MPX5100A	Sensors	Pressure	SigCond 0-16.6 PSI/115 kPa
MPX5100D	MPX5100D	Sensors	Pressure	SigCond 0-14.5 PSI/100 kPa
MPX700MC	MPX700MC	Sensors	Pressure	Uncomp 0-100 PSI/700 kPa
SCC05A	SCC05A	Sensors	Pressure	Absolute 5 psia
SCC05D	SCC05D	Sensors	Pressure	Differential 5 psid(g)
SCC100A	SCC100A	Sensors	Pressure	Absolute 100 psia
SCC100G	SCC100G	Sensors	Pressure	Gage 100 psig
SCC15A	SCC15A	Sensors	Pressure	Absolute 15 psia
SCC15D	SCC15D	Sensors	Pressure	Differential 15 psid(g)
SCC300A	SCC300A	Sensors	Pressure	Absolute 300 psia
SCC30D	SCC30D	Sensors	Pressure	Differential 30 psid(g)
SPX100A	SPX100A	Sensors	Pressure	Absolute 100kPa
SPX100D	SPX100D	Sensors	Pressure	Differential 100kPa
SPX200A	SPX200A	Sensors	Pressure	Absolute 200kPa
SPX200D	SPX200D	Sensors	Pressure	Differential 200kPa
SPX50A	SPX50A	Sensors	Pressure	Absolute 50kPa
SPX50D	SPX50D	Sensors	Pressure	Differential 50kPa
SSX100G	SSX100G	Sensors	Pressure	Gage 100 psig
SSX150G	SSX150G	Sensors	Pressure	Gage 150 psig
SSX15G	SSX15G	Sensors	Pressure	Gage 15 psig
SSX300G	SSX300G	Sensors	Pressure	Gage 300 psig
SSX30G	SSX30G	Sensors	Pressure	Gage 3 psig
SSX500G	SSX500G	Sensors	Pressure	Gage 500 psig
SX01	SX01	Sensors	Pressure	Diff/Gage 1 psid(g)
SX05	SX05	Sensors	Pressure	Diff/Gage 5 psid(g)
SX100A	SX100A	Sensors	Pressure	Absolute 100 psia
SX100D	SX100D	Sensors	Pressure	Differential 100 psid
SX150A	SX150A	Sensors	Pressure	Absolute 150 psia
SX150D	SX150D	Sensors	Pressure	Differential 150 psid
SX15A	SX15A	Sensors	Pressure	Absolute 15 psia
SX15D	SX15D	Sensors	Pressure	Differential 15 psid
SX30A	SX30A	Sensors	Pressure	Absolute 30 psia
SX30D	SX30D	Sensors	Pressure	Differential 30psid

Connectors [802]

Note: All models in Contrzra.Lib are Impedance Controlled Right Angle connector models. All models in Contrzs.Lib are Impedance Controlled Parallel connector models. All models in Crdedge.Lib are card edge connectors. All models in Oppinra.Lib are open pin field connectors. All models in Oppins are open pin vertical connectors. Model names ending in an "L" represent transmission line equivalent models.

Part #	Part Name	Part Type	Part Sub Type	Description
A5RCBA	A5RCBA	Connectors	Open Pin	Amplimite 50 Row A
A5RCBAL	A5RCBAL	Connectors	Open Pin	Amplimite 50 Row A
A5RCBB	A5RCBB	Connectors	Open Pin	Amplimite 50 Row B
A5RCBBL	A5RCBBL	Connectors	Open Pin	Amplimite 50 Row B
A5RCBC	A5RCBC	Connectors	Open Pin	Amplimite 50 Row C
A5RCBCL	A5RCBCL	Connectors	Open Pin	Amplimite 50 Row C
A5RCBD	A5RCBD	Connectors	Open Pin	Amplimite 50 Row D
A5RCBDL	A5RCBDL	Connectors	Open Pin	Amplimite 50 Row D
A5RCBM	A5RCBM	Connectors	Open Pin	Amplimite 50 Median
A5RCBML	A5RCBML	Connectors	Open Pin	Amplimite 50 Median
A5RCBNDA	A5RCBNDA	Connectors	Open Pin	Amplimite 50 Row A
A5RCBNDAL	A5RCBNDAL	Connectors	Open Pin	Amplimite 50 Row A
A5RCBNDB	A5RCBNDB	Connectors	Open Pin	Amplimite 50 Row B
A5RCBNDBL	A5RCBNDBL	Connectors	Open Pin	Amplimite 50 Row B
A5RCBNDC	A5RCBNDC	Connectors	Open Pin	Amplimite 50 Row C
A5RCBNDCL	A5RCBNDCL	Connectors	Open Pin	Amplimite 50 Row C
A5RCBNDD	A5RCBNDD	Connectors	Open Pin	Amplimite 50 Row D
A5RCBNDDL	A5RCBNDDL	Connectors	Open Pin	Amplimite 50 Row D
A5RCBNDM	A5RCBNDM	Connectors	Open Pin	Amplimite 50 Median
A5RCBNDML	A5RCBNDML	Connectors	Open Pin	Amplimite 50 Median
ADCG4A	ADCG4A	Connectors	Open Pin	Docking, Row A
ADCG4AL	ADCG4AL	Connectors	Open Pin	Docking, Row A
ADCG4B	ADCG4B	Connectors	Open Pin	Docking, Row B
ADCG4BL	ADCG4BL	Connectors	Open Pin	Docking, Row B
ADCG4C	ADCG4C	Connectors	Open Pin	Docking, Row C
ADCG4CL	ADCG4CL	Connectors	Open Pin	Docking, Row C
ADCG4D	ADCG4D	Connectors	Open Pin	Docking, Row D
ADCG4DL	ADCG4DL	Connectors	Open Pin	Docking, Row D
ADCG4M	ADCG4M	Connectors	Open Pin	Docking, Median
ADCG4ML	ADCG4ML	Connectors	Open Pin	Docking, Median
ADCGA	ADCGA	Connectors	Open Pin	Docking, Row A
ADCGAL	ADCGAL	Connectors	Open Pin	Docking, Row A
ADCGB	ADCGB	Connectors	Open Pin	Docking, Row B
ADCGBL	ADCGBL	Connectors	Open Pin	Docking, Row B
ADCGC	ADCGC	Connectors	Open Pin	Docking, Row C
ADCGCL	ADCGCL	Connectors	Open Pin	Docking, Row C
ADCGD	ADCGD	Connectors	Open Pin	Docking, Row D
ADCGDL	ADCGDL	Connectors	Open Pin	Docking, Row D
ADCGM	ADCGM	Connectors	Open Pin	Docking, Median Value
ADCGML	ADCGML	Connectors	Open Pin	Docking, Median Value
AM50A	AM50A	Connectors	Open Pin	Amplimite, Row A
AM50AL	AM50AL	Connectors	Open Pin	Amplimite, Row A
AM50B	AM50B	Connectors	Open Pin	Amplimite, Row B
AM50BL	AM50BL	Connectors	Open Pin	Amplimite, Row B
AM50C	AM50C	Connectors	Open Pin	Amplimite, Row C
AM50CL	AM50CL	Connectors	Open Pin	Amplimite, Row C
AM50D	AM50D	Connectors	Open Pin	Amplimite, Row D
AM50DL	AM50DL	Connectors	Open Pin	Amplimite, Row D
AM50M	AM50M	Connectors	Open Pin	Amplimite, Median
AM50ML	AM50ML	Connectors	Open Pin	Amplimite, Median
AMODU1A	AMODU1A	Connectors	Open Pin	Ampmodu RA Row A
AMODU1AL	AMODU1AL	Connectors	Open Pin	Ampmodu RA Row A
AMODU1B	AMODU1B	Connectors	Open Pin	Ampmodu RA Row B

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
AMODU1BL	AMODU1BL	Connectors	Open Pin	Ampmodu RA Row B
AMODU1M	AMODU1M	Connectors	Open Pin	Ampmodu RA Median
AMODU1ML	AMODU1ML	Connectors	Open Pin	Ampmodu RA Median
AMODU2	AMODU2	Connectors	Open Pin	Ampmodu SM Row A/B
AMODU2L	AMODU2L	Connectors	Open Pin	Ampmodu SM Row A/B
AMODU3	AMODU3	Connectors	Open Pin	Ampmodu Vert Row A/B
AMODU3L	AMODU3L	Connectors	Open Pin	Ampmodu Vert Row A/B
C5FR09A	C5FR09A	Connectors	Open Pin	Champ 9mm, Row A
C5FR09AL	C5FR09AL	Connectors	Open Pin	Champ 9mm, Row A
C5FR09B	C5FR09B	Connectors	Open Pin	Champ 9mm, Row B
C5FR09BL	C5FR09BL	Connectors	Open Pin	Champ 9mm, Row B
C5FR09C	C5FR09C	Connectors	Open Pin	Champ 9mm, Row C
C5FR09CL	C5FR09CL	Connectors	Open Pin	Champ 9mm, Row C
C5FR09D	C5FR09D	Connectors	Open Pin	Champ 9mm, Row D
C5FR09DL	C5FR09DL	Connectors	Open Pin	Champ 9mm, Row D
C5FR09M	C5FR09M	Connectors	Open Pin	Champ 9mm, Median Value
C5FR09ML	C5FR09ML	Connectors	Open Pin	Champ 9mm, Median Value
C5FR13A	C5FR13A	Connectors	Open Pin	Champ 13mm, Row A
C5FR13AL	C5FR13AL	Connectors	Open Pin	Champ 13mm, Row A
C5FR13B	C5FR13B	Connectors	Open Pin	Champ 13mm, Row B
C5FR13BL	C5FR13BL	Connectors	Open Pin	Champ 13mm, Row B
C5FR13C	C5FR13C	Connectors	Open Pin	Champ 13mm, Row C
C5FR13CL	C5FR13CL	Connectors	Open Pin	Champ 13mm, Row C
C5FR13D	C5FR13D	Connectors	Open Pin	Champ 13mm, Row D
C5FR13DL	C5FR13DL	Connectors	Open Pin	Champ 13mm, Row D
C5FR13M	C5FR13M	Connectors	Open Pin	Champ 13mm, Median Value
C5FR13ML	C5FR13ML	Connectors	Open Pin	Champ 13mm, Median Value
C5FR18A	C5FR18A	Connectors	Open Pin	Champ 18mm, Row A
C5FR18AL	C5FR18AL	Connectors	Open Pin	Champ 18mm, Row A
C5FR18B	C5FR18B	Connectors	Open Pin	Champ 18mm, Row B
C5FR18BL	C5FR18BL	Connectors	Open Pin	Champ 18mm, Row B
C5FR18C	C5FR18C	Connectors	Open Pin	Champ 18mm, Row C
C5FR18CL	C5FR18CL	Connectors	Open Pin	Champ 18mm, Row C
C5FR18D	C5FR18D	Connectors	Open Pin	Champ 18mm, Row D
C5FR18DL	C5FR18DL	Connectors	Open Pin	Champ 18mm, Row D
C5FR18M	C5FR18M	Connectors	Open Pin	Champ 18mm, Median Value
C5FR18ML	C5FR18ML	Connectors	Open Pin	Champ 18mm, Median Value
C5FR8A	C5FR8A	Connectors	Open Pin	Champ .05 FH Row A
C5FR8AL	C5FR8AL	Connectors	Open Pin	Champ .05 FH Row A
C5FR8B	C5FR8B	Connectors	Open Pin	Champ .05 FH Row B
C5FR8BL	C5FR8BL	Connectors	Open Pin	Champ .05 FH Row B
C5FR8C	C5FR8C	Connectors	Open Pin	Champ .05 FH Row C
C5FR8CL	C5FR8CL	Connectors	Open Pin	Champ .05 FH Row C
C5FR8D	C5FR8D	Connectors	Open Pin	Champ .05 FH Row D
C5FR8DL	C5FR8DL	Connectors	Open Pin	Champ .05 FH Row D
C5FR8M	C5FR8M	Connectors	Open Pin	Champ .05 FH Median
C5FR8ML	C5FR8ML	Connectors	Open Pin	Champ .05 FH Median
C5FV09A	C5FV09A	Connectors	Open Pin	Champ FH, Row A
C5FV09AL	C5FV09AL	Connectors	Open Pin	Champ FH, Row A
C5FV09B	C5FV09B	Connectors	Open Pin	Champ FH, Row B
C5FV09BL	C5FV09BL	Connectors	Open Pin	Champ FH, Row B
C5FV09C	C5FV09C	Connectors	Open Pin	Champ FH, Row C
C5FV09CL	C5FV09CL	Connectors	Open Pin	Champ FH, Row C
C5FV09D	C5FV09D	Connectors	Open Pin	Champ FH, Row D
C5FV09DL	C5FV09DL	Connectors	Open Pin	Champ FH, Row D
C5FV09M	C5FV09M	Connectors	Open Pin	Champ FH, Median Value
C5FV09ML	C5FV09ML	Connectors	Open Pin	Champ FH, Median Value
C5FV13A	C5FV13A	Connectors	Open Pin	Champ FH, Row A

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
C5FV13AL	C5FV13AL	Connectors	Open Pin	Champ FH, Row A
C5FV13B	C5FV13B	Connectors	Open Pin	Champ FH, Row B
C5FV13BL	C5FV13BL	Connectors	Open Pin	Champ FH, Row B
C5FV13C	C5FV13C	Connectors	Open Pin	Champ FH, Row C
C5FV13CL	C5FV13CL	Connectors	Open Pin	Champ FH, Row C
C5FV13D	C5FV13D	Connectors	Open Pin	Champ FH, Row D
C5FV13DL	C5FV13DL	Connectors	Open Pin	Champ FH, Row D
C5FV13M	C5FV13M	Connectors	Open Pin	Champ FH, Median Value
C5FV13ML	C5FV13ML	Connectors	Open Pin	Champ FH, Median Value
C5FV18A	C5FV18A	Connectors	Open Pin	Champ FH, Row A
C5FV18AL	C5FV18AL	Connectors	Open Pin	Champ FH, Row A
C5FV18B	C5FV18B	Connectors	Open Pin	Champ FH, Row B
C5FV18BL	C5FV18BL	Connectors	Open Pin	Champ FH, Row B
C5FV18C	C5FV18C	Connectors	Open Pin	Champ FH, Row C
C5FV18CL	C5FV18CL	Connectors	Open Pin	Champ FH, Row C
C5FV18D	C5FV18D	Connectors	Open Pin	Champ FH, Row D
C5FV18DL	C5FV18DL	Connectors	Open Pin	Champ FH, Row D
C5FV18M	C5FV18M	Connectors	Open Pin	Champ FH, Median Value
C5FV18ML	C5FV18ML	Connectors	Open Pin	Champ FH, Median Value
C5FV8AD	C5FV8AD	Connectors	Open Pin	Champ .05FH, Row A/D
C5FV8ADL	C5FV8ADL	Connectors	Open Pin	Champ .05FH, Row A/D
C5FV8BC	C5FV8BC	Connectors	Open Pin	Champ .05FH, Row B/C
C5FV8BCL	C5FV8BCL	Connectors	Open Pin	Champ .05FH, Row B/C
C5FV8M	C5FV8M	Connectors	Open Pin	Champ .05FH, Median
C5FV8ML	C5FV8ML	Connectors	Open Pin	Champ .05FH, Median
C8LMA	C8LMA	Connectors	Open Pin	0.8mm Champ LPM, Row A
C8LMAL	C8LMAL	Connectors	Open Pin	0.8mm Champ LPM, Row A
C8LMB	C8LMB	Connectors	Open Pin	0.8mm Champ LPM, Row B
C8LMBL	C8LMBL	Connectors	Open Pin	0.8mm Champ LPM, Row B
C8LMM	C8LMM	Connectors	Open Pin	0.8mm Champ LPM, Median Value
C8LMML	C8LMML	Connectors	Open Pin	0.8mm Champ LPM, Median Value
CBSMRA	CBSMRA	Connectors	Open Pin	Champ Blindmate Row A
CBSMRAL	CBSMRAL	Connectors	Open Pin	Champ Blindmate Row A
CBSMRB	CBSMRB	Connectors	Open Pin	Champ Blindmate Row B
CBSMRBL	CBSMRBL	Connectors	Open Pin	Champ Blindmate Row B
CBSMRC	CBSMRC	Connectors	Open Pin	Champ Blindmate Row C
CBSMRCL	CBSMRCL	Connectors	Open Pin	Champ Blindmate Row C
CBSMRD	CBSMRD	Connectors	Open Pin	Champ Blindmate Row D
CBSMRDL	CBSMRDL	Connectors	Open Pin	Champ Blindmate Row D
CBSMRL	CBSMRL	Connectors	Open Pin	Champ Blindmate Median
CBSMRM	CBSMRM	Connectors	Open Pin	Champ Blindmate Median
CBSMVSA	CBSMVSA	Connectors	Open Pin	Champ Blindmate Row A
CBSMVSAL	CBSMVSAL	Connectors	Open Pin	Champ Blindmate Row A
CBSMVSB	CBSMVSB	Connectors	Open Pin	Champ Blindmate Row B
CBSMVSBL	CBSMVSBL	Connectors	Open Pin	Champ Blindmate Row B
CBSMVSC	CBSMVSC	Connectors	Open Pin	Champ Blindmate Row C
CBSMVSCL	CBSMVSCL	Connectors	Open Pin	Champ Blindmate Row C
CBSMVSD	CBSMVSD	Connectors	Open Pin	Champ Blindmate Row D
CBSMVSDL	CBSMVSDL	Connectors	Open Pin	Champ Blindmate Row D
CBSMVSM	CBSMVSM	Connectors	Open Pin	Champ Blindmate Median
CBSMVSML	CBSMVSML	Connectors	Open Pin	Champ Blindmate Median
CBSMVXA	CBSMVXA	Connectors	Open Pin	Champ Blindmate Row A
CBSMVXAL	CBSMVXAL	Connectors	Open Pin	Champ Blindmate Row A
CBSMVXB	CBSMVXB	Connectors	Open Pin	Champ Blindmate Row B
CBSMVXBL	CBSMVXBL	Connectors	Open Pin	Champ Blindmate Row B
CBSMVXC	CBSMVXC	Connectors	Open Pin	Champ Blindmate Row C
CBSMVXCL	CBSMVXCL	Connectors	Open Pin	Champ Blindmate Row C
CBSMVXD	CBSMVXD	Connectors	Open Pin	Champ Blindmate Row D

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
CBSMVXDL	CBSMVXDL	Connectors	Open Pin	Champ Blindmate Row D
CBSMVXL	CBSMVXL	Connectors	Open Pin	Champ Blindmate Median
CBSMVXM	CBSMVXM	Connectors	Open Pin	Champ Blindmate Median
CEE	CEE	Connectors	Card-Edge	Computerbus, Burndy
CHDVA	CHDVA	Connectors	Open Pin	Champ HD Vert Row A
CHDVAL	CHDVAL	Connectors	Open Pin	Champ HD Vert Row A
CHDVB	CHDVB	Connectors	Open Pin	Champ HD Vert Row B
CHDVBL	CHDVBL	Connectors	Open Pin	Champ HD Vert Row B
CHDVC	CHDVC	Connectors	Open Pin	Champ HD Vert Row C
CHDVCL	CHDVCL	Connectors	Open Pin	Champ HD Vert Row C
CHDVD	CHDVD	Connectors	Open Pin	Champ HD Vert Row D
CHDVDL	CHDVDL	Connectors	Open Pin	Champ HD Vert Row D
CHDVE	CHDVE	Connectors	Open Pin	Champ HD Vert Row E
CHDVEL	CHDVEL	Connectors	Open Pin	Champ HD Vert Row E
CHDVF	CHDVF	Connectors	Open Pin	Champ HD Vert Row F
CHDVFL	CHDVFL	Connectors	Open Pin	Champ HD Vert Row F
CHDVG	CHDVG	Connectors	Open Pin	Champ HD Vert Row G
CHDVGL	CHDVGL	Connectors	Open Pin	Champ HD Vert Row G
CHDVH	CHDVH	Connectors	Open Pin	Champ HD Vert Row H
CHDVHL	CHDVHL	Connectors	Open Pin	Champ HD Vert Row H
CHDVM	CHDVM	Connectors	Open Pin	Champ HD Vert Median
CHDVML	CHDVML	Connectors	Open Pin	Champ HD Vert Median
CHHDSA	CHHDSA	Connectors	Open Pin	Champ HD, Row A
CHHDSAL	CHHDSAL	Connectors	Open Pin	Champ HD, Row A
CHHDSB	CHHDSB	Connectors	Open Pin	Champ HD, Row B
CHHDSBL	CHHDSBL	Connectors	Open Pin	Champ HD, Row B
CHHDSC	CHHDSC	Connectors	Open Pin	Champ HD, Row C
CHHDSCL	CHHDSCL	Connectors	Open Pin	Champ HD, Row C
CHHDSD	CHHDSD	Connectors	Open Pin	Champ HD, Row D
CHHDSDL	CHHDSDL	Connectors	Open Pin	Champ HD, Row D
CHHDSE	CHHDSE	Connectors	Open Pin	Champ HD, Row E
CHHDSEL	CHHDSEL	Connectors	Open Pin	Champ HD, Row E
CHHDSF	CHHDSF	Connectors	Open Pin	Champ HD, Row F
CHHDSFL	CHHDSFL	Connectors	Open Pin	Champ HD, Row F
CHHDSG	CHHDSG	Connectors	Open Pin	Champ HD, Row G
CHHDSGL	CHHDSGL	Connectors	Open Pin	Champ HD, Row G
CHHDSH	CHHDSH	Connectors	Open Pin	Champ HD, Row H
CHHDSHL	CHHDSHL	Connectors	Open Pin	Champ HD, Row H
CHHDSM	CHHDSM	Connectors	Open Pin	Champ HD, Median Value
CHHDSML	CHHDSML	Connectors	Open Pin	Champ HD, Median Value
CHS1A	CHS1A	Connectors	Open Pin	Champ 1, Row A
CHS1AL	CHS1AL	Connectors	Open Pin	Champ 1, Row A
CHS1B	CHS1B	Connectors	Open Pin	Champ 1, Row B
CHS1BL	CHS1BL	Connectors	Open Pin	Champ 1, Row B
CHS1C	CHS1C	Connectors	Open Pin	Champ 1, Row C
CHS1CL	CHS1CL	Connectors	Open Pin	Champ 1, Row C
CHS1D	CHS1D	Connectors	Open Pin	Champ 1, Row D
CHS1DL	CHS1DL	Connectors	Open Pin	Champ 1, Row D
CHS1M	CHS1M	Connectors	Open Pin	Champ 1, Median Value
CHS1ML	CHS1ML	Connectors	Open Pin	Champ 1, Median Value
CHS1SA	CHS1SA	Connectors	Open Pin	Champ I, Row A
CHS1SAL	CHS1SAL	Connectors	Open Pin	Champ I, Row A
CHS1SB	CHS1SB	Connectors	Open Pin	Champ I, Row B
CHS1SBL	CHS1SBL	Connectors	Open Pin	Champ I, Row B
CHS1SC	CHS1SC	Connectors	Open Pin	Champ I, Row C
CHS1SCL	CHS1SCL	Connectors	Open Pin	Champ I, Row C
CHS1SD	CHS1SD	Connectors	Open Pin	Champ I, Row D

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
CHS1SDL	CHS1SDL	Connectors	Open Pin	Champ I, Row D
CHS1SM	CHS1SM	Connectors	Open Pin	Champ I, Median Value
CHS1SML	CHS1SML	Connectors	Open Pin	Champ I, Median Value
CR2RA	CR2RA	Connectors	Open Pin	Champ RA Row A
CR2RAL	CR2RAL	Connectors	Open Pin	Champ RA Row A
CR2RB	CR2RB	Connectors	Open Pin	Champ RA Row B
CR2RBL	CR2RBL	Connectors	Open Pin	Champ RA Row B
CR2RC	CR2RC	Connectors	Open Pin	Champ RA Row C
CR2RCL	CR2RCL	Connectors	Open Pin	Champ RA Row C
CR2RD	CR2RD	Connectors	Open Pin	Champ RA Row D
CR2RDL	CR2RDL	Connectors	Open Pin	Champ RA Row D
CR2RM	CR2RM	Connectors	Open Pin	Champ RA Median
CR2RML	CR2RML	Connectors	Open Pin	Champ RA Median
CVP2RRA	CVP2RRA	Connectors	Open Pin	Champ Vert Row A
CVP2RRAL	CVP2RRAL	Connectors	Open Pin	Champ Vert Row A
CVP2RRB	CVP2RRB	Connectors	Open Pin	Champ Vert Row B
CVP2RRBL	CVP2RRBL	Connectors	Open Pin	Champ Vert Row B
CVP2RRC	CVP2RRC	Connectors	Open Pin	Champ Vert Row C
CVP2RRCL	CVP2RRCL	Connectors	Open Pin	Champ Vert Row C
CVP2RRD	CVP2RRD	Connectors	Open Pin	Champ Vert Row D
CVP2RRDL	CVP2RRDL	Connectors	Open Pin	Champ Vert Row D
CVP2RRM	CVP2RRM	Connectors	Open Pin	Champ Vert Median
CVP2RRML	CVP2RRML	Connectors	Open Pin	Champ Vert Median
CVP2VRA	CVP2VRA	Connectors	Open Pin	Champ Vert Plug Row A
CVP2VRAL	CVP2VRAL	Connectors	Open Pin	Champ Vert Plug Row A
CVP2VRB	CVP2VRB	Connectors	Open Pin	Champ Vert Plug Row B
CVP2VRBL	CVP2VRBL	Connectors	Open Pin	Champ Vert Plug Row B
CVP2VRC	CVP2VRC	Connectors	Open Pin	Champ Vert Plug Row C
CVP2VRCL	CVP2VRCL	Connectors	Open Pin	Champ Vert Plug Row C
CVP2VRD	CVP2VRD	Connectors	Open Pin	Champ Vert Plug Row D
CVP2VRDL	CVP2VRDL	Connectors	Open Pin	Champ Vert Plug Row D
CVP2VRM	CVP2VRM	Connectors	Open Pin	Champ Vert Plug Median
CVP2VRML	CVP2VRML	Connectors	Open Pin	Champ Vert Plug Median
DCWOSA	DCWOSA	Connectors	Open Pin	Docking Row A
DCWOSAL	DCWOSAL	Connectors	Open Pin	Docking Row A
DCWOSALA	DCWOSALA	Connectors	Open Pin	Docking Row A
DCWOSALAL	DCWOSALAL	Connectors	Open Pin	Docking Row A
DCWOSALB	DCWOSALB	Connectors	Open Pin	Docking Row B
DCWOSALBL	DCWOSALBL	Connectors	Open Pin	Docking Row B
DCWOSALC	DCWOSALC	Connectors	Open Pin	Docking Row C
DCWOSALCL	DCWOSALCL	Connectors	Open Pin	Docking Row C
DCWOSALD	DCWOSALD	Connectors	Open Pin	Docking Row D
DCWOSALDL	DCWOSALDL	Connectors	Open Pin	Docking Row D
DCWOSALM	DCWOSALM	Connectors	Open Pin	Docking Median
DCWOSALML	DCWOSALML	Connectors	Open Pin	Docking Median
DCWOSB	DCWOSB	Connectors	Open Pin	Docking Row B
DCWOSBL	DCWOSBL	Connectors	Open Pin	Docking Row B
DCWOSC	DCWOSC	Connectors	Open Pin	Docking Row C
DCWOSCL	DCWOSCL	Connectors	Open Pin	Docking Row C
DCWOSD	DCWOSD	Connectors	Open Pin	Docking Row D
DCWOSDL	DCWOSDL	Connectors	Open Pin	Docking Row D
DCWOSM	DCWOSM	Connectors	Open Pin	Docking Median
DCWOSML	DCWOSML	Connectors	Open Pin	Docking Median
DCWSA	DCWSA	Connectors	Open Pin	Docking Row A
DCWSAL	DCWSAL	Connectors	Open Pin	Docking Row A
DCWSALA	DCWSALA	Connectors	Open Pin	Docking Row A
DCWSALAL	DCWSALAL	Connectors	Open Pin	Docking Row A

Part #	Part Name	Part Type	Part Sub Type	Description
DCWSALB	DCWSALB	Connectors	Open Pin	Docking Row B
DCWSALBL	DCWSALBL	Connectors	Open Pin	Docking Row B
DCWSALC	DCWSALC	Connectors	Open Pin	Docking Row C
DCWSALCL	DCWSALCL	Connectors	Open Pin	Docking Row C
DCWSALD	DCWSALD	Connectors	Open Pin	Docking Row D
DCWSALDL	DCWSALDL	Connectors	Open Pin	Docking Row D
DCWSALM	DCWSALM	Connectors	Open Pin	Docking Median
DCWSALML	DCWSALML	Connectors	Open Pin	Docking Median
DCWSB	DCWSB	Connectors	Open Pin	Docking Row B
DCWSBL	DCWSBL	Connectors	Open Pin	Docking Row B
DCWSC	DCWSC	Connectors	Open Pin	Docking Row C
DCWSCL	DCWSCL	Connectors	Open Pin	Docking Row C
DCWSD	DCWSD	Connectors	Open Pin	Docking Row D
DCWSDL	DCWSDL	Connectors	Open Pin	Docking Row D
DCWSM	DCWSM	Connectors	Open Pin	Docking Median
DCWSML	DCWSML	Connectors	Open Pin	Docking Median
DRSM	DRSM	Connectors	Card-Edge	DRS, All Rows
DRSML	DRSML	Connectors	Card-Edge	DRS, All Rows
DTYPE	DTYPE	Connectors	D-Type	Full connector
EEC4A	EEC4A	Connectors	Open Pin	Enh. Euro(ss), Row A
EEC4AL	EEC4AL	Connectors	Open Pin	Enh. Euro(ss), Row A
EEC4B	EEC4B	Connectors	Open Pin	Enh. Euro(ss), Row B
EEC4BL	EEC4BL	Connectors	Open Pin	Enh. Euro(ss), Row B
EEC4C	EEC4C	Connectors	Open Pin	Enh. Euro(ss), Row C
EEC4CL	EEC4CL	Connectors	Open Pin	Enh. Euro(ss), Row C
EEC4M	EEC4M	Connectors	Open Pin	Enh. Euro(ss), Median Value
EEC4ML	EEC4ML	Connectors	Open Pin	Enh. Euro(ss), Median Value
EEC5A	EEC5A	Connectors	Open Pin	Enh. Eurocard, Row A
EEC5AL	EEC5AL	Connectors	Open Pin	Enh. Eurocard, Row A
EEC5B	EEC5B	Connectors	Open Pin	Enh. Eurocard, Row B
EEC5BL	EEC5BL	Connectors	Open Pin	Enh. Eurocard, Row B
EEC5C	EEC5C	Connectors	Open Pin	Enh. Eurocard, Row C
EEC5CL	EEC5CL	Connectors	Open Pin	Enh. Eurocard, Row C
EEC5M	EEC5M	Connectors	Open Pin	Enh. Eurocard, Median Value
EEC5ML	EEC5ML	Connectors	Open Pin	Enh. Eurocard, Median Value
ETCA	ETCA	Connectors	Open Pin	Eurocard, Row A
ETCAL	ETCAL	Connectors	Open Pin	Eurocard, Row A
ETCB	ETCB	Connectors	Open Pin	Eurocard, Row B
ETCBL	ETCBL	Connectors	Open Pin	Eurocard, Row B
ETCC	ETCC	Connectors	Open Pin	Eurocard, Row C
ETCCL	ETCCL	Connectors	Open Pin	Eurocard, Row C
ETCM	ETCM	Connectors	Open Pin	Eurocard, Median Value
ETCML	ETCML	Connectors	Open Pin	Eurocard, Median Value
FB2MA	FB2MA	Connectors	Open Pin	Z-Pack FB, Row A
FB2MAL	FB2MAL	Connectors	Open Pin	Z-Pack FB, Row A
FB2MB	FB2MB	Connectors	Open Pin	Z-Pack FB, Row B
FB2MBL	FB2MBL	Connectors	Open Pin	Z-Pack FB, Row B
FB2MC	FB2MC	Connectors	Open Pin	Z-Pack FB, Row C
FB2MCL	FB2MCL	Connectors	Open Pin	Z-Pack FB, Row C
FB2MD	FB2MD	Connectors	Open Pin	Z-Pack FB, Row D
FB2MDL	FB2MDL	Connectors	Open Pin	Z-Pack FB, Row D
FB2MM	FB2MM	Connectors	Open Pin	Z-Pack FB, Median Value
FB2MML	FB2MML	Connectors	Open Pin	Z-Pack FB, Median Value
FB4A	FB4A	Connectors	Open Pin	2MM FutureBus Row A
FB4AL	FB4AL	Connectors	Open Pin	2MM FutureBus Row A
FB4B	FB4B	Connectors	Open Pin	2MM FutureBus Row B
FB4BL	FB4BL	Connectors	Open Pin	2MM FutureBus Row B

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
FB4C	FB4C	Connectors	Open Pin	2MM FutureBus Row C
FB4CL	FB4CL	Connectors	Open Pin	2MM FutureBus Row C
FB4D	FB4D	Connectors	Open Pin	2MM FutureBus Row D
FB4DL	FB4DL	Connectors	Open Pin	2MM FutureBus Row D
FB4M	FB4M	Connectors	Open Pin	2MM FutureBus Median
FB4ML	FB4ML	Connectors	Open Pin	2MM FutureBus Median
FHBTB11	FHBTB11	Connectors	Open Pin	.8MM FH Row A/B
FHBTB11L	FHBTB11L	Connectors	Open Pin	.8MM FH Row A/B
FHBTB14	FHBTB14	Connectors	Open Pin	.8MM FH Row A/B
FHBTB14L	FHBTB14L	Connectors	Open Pin	.8MM FH Row A/B
FHBTB16	FHBTB16	Connectors	Open Pin	.8MM FH Row A/B
FHBTB16L	FHBTB16L	Connectors	Open Pin	.8MM FH Row A/B
FHBTB5	FHBTB5	Connectors	Open Pin	.8MM FH Row A/B
FHBTB5L	FHBTB5L	Connectors	Open Pin	.8MM FH Row A/B
FHBTB8	FHBTB8	Connectors	Open Pin	.8MM FH Row A/B
FHBTB8L	FHBTB8L	Connectors	Open Pin	.8MM FH Row A/B
HDI3A	HDI3A	Connectors	Open Pin	HDI 3, Row A
HDI3AL	HDI3AL	Connectors	Open Pin	HDI 3, Row A
HDI3B	HDI3B	Connectors	Open Pin	HDI 3, Row B
HDI3BL	HDI3BL	Connectors	Open Pin	HDI 3, Row B
HDI3C	HDI3C	Connectors	Open Pin	HDI 3, Row C
HDI3CL	HDI3CL	Connectors	Open Pin	HDI 3, Row C
HDI3M	HDI3M	Connectors	Open Pin	HDI 3, Median Value
HDI3ML	HDI3ML	Connectors	Open Pin	HDI 3, Median Value
HDI3SA	HDI3SA	Connectors	Open Pin	HDI 3 Row, Row A
HDI3SAL	HDI3SAL	Connectors	Open Pin	HDI 3 Row, Row A
HDI3SB	HDI3SB	Connectors	Open Pin	HDI 3 Row, Row B
HDI3SBL	HDI3SBL	Connectors	Open Pin	HDI 3 Row, Row B
HDI3SC	HDI3SC	Connectors	Open Pin	HDI 3 Row, Row C
HDI3SCL	HDI3SCL	Connectors	Open Pin	HDI 3 Row, Row C
HDI3SM	HDI3SM	Connectors	Open Pin	HDI 3 Row, Median Value
HDI3SML	HDI3SML	Connectors	Open Pin	HDI 3 Row, Median Value
HDI4A	HDI4A	Connectors	Open Pin	HDI 4, Row A
HDI4AL	HDI4AL	Connectors	Open Pin	HDI 4, Row A
HDI4B	HDI4B	Connectors	Open Pin	HDI 4, Row B
HDI4BL	HDI4BL	Connectors	Open Pin	HDI 4, Row B
HDI4C	HDI4C	Connectors	Open Pin	HDI 4, Row C
HDI4CL	HDI4CL	Connectors	Open Pin	HDI 4, Row C
HDI4D	HDI4D	Connectors	Open Pin	HDI 4, Row D
HDI4DL	HDI4DL	Connectors	Open Pin	HDI 4, Row D
HDI4M	HDI4M	Connectors	Open Pin	HDI 4, Median Value
HDI4ML	HDI4ML	Connectors	Open Pin	HDI 4, Median Value
HDI4SA	HDI4SA	Connectors	Open Pin	HDI 4 Row, Row A
HDI4SAL	HDI4SAL	Connectors	Open Pin	HDI 4 Row, Row A
HDI4SB	HDI4SB	Connectors	Open Pin	HDI 4 Row, Row B
HDI4SBL	HDI4SBL	Connectors	Open Pin	HDI 4 Row, Row B
HDI4SC	HDI4SC	Connectors	Open Pin	HDI 4 Row, Row C
HDI4SCL	HDI4SCL	Connectors	Open Pin	HDI 4 Row, Row C
HDI4SD	HDI4SD	Connectors	Open Pin	HDI 4 Row, Row D
HDI4SDL	HDI4SDL	Connectors	Open Pin	HDI 4 Row, Row D
HDI4SM	HDI4SM	Connectors	Open Pin	HDI 4 Row, Median Value
HDI4SML	HDI4SML	Connectors	Open Pin	HDI 4 Row, Median Value
HDI6AF	HDI6AF	Connectors	Open Pin	HDI 6 Out Row A/F
HDI6AFL	HDI6AFL	Connectors	Open Pin	HDI 6 Out Row A/F
HDI6BE	HDI6BE	Connectors	Open Pin	HDI 6 In Row B/E
HDI6BEL	HDI6BEL	Connectors	Open Pin	HDI 6 In Row B/F
HDI6CD	HDI6CD	Connectors	Open Pin	HDI 6 Inner Row C/D

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
HDI6CDL	HDI6CDL	Connectors	Open Pin	HDI 6 Inner Row C/D
HDI6M	HDI6M	Connectors	Open Pin	HDI 6 Median
HDI6ML	HDI6ML	Connectors	Open Pin	HDI 6 Median
HM5A	HM5A	Connectors	Open Pin	2mm HM 5, Row A
HM5AL	HM5AL	Connectors	Open Pin	2mm HM 5, Row A
HM5B	HM5B	Connectors	Open Pin	2mm HM 5, Row B
HM5BL	HM5BL	Connectors	Open Pin	2mm HM 5, Row B
HM5C	HM5C	Connectors	Open Pin	2mm HM 5, Row C
HM5CL	HM5CL	Connectors	Open Pin	2mm HM 5, Row C
HM5D	HM5D	Connectors	Open Pin	2mm HM 5, Row D
HM5DL	HM5DL	Connectors	Open Pin	2mm HM 5, Row D
HM5E	HM5E	Connectors	Open Pin	2mm HM 5, Row E
HM5EL	HM5EL	Connectors	Open Pin	2mm HM 5, Row E
HM5M	HM5M	Connectors	Open Pin	2mm HM 5, Median Value
HM5ML	HM5ML	Connectors	Open Pin	2mm HM 5, Median Value
HM5SA	HM5SA	Connectors	Open Pin	2MM HM 5 Row A
HM5SAL	HM5SAL	Connectors	Open Pin	2MM HM 5 Row A
HM5SB	HM5SB	Connectors	Open Pin	2MM HM 5 Row B
HM5SBL	HM5SBL	Connectors	Open Pin	2MM HM 5 Row B
HM5SC	HM5SC	Connectors	Open Pin	2MM HM 5 Row C
HM5SCL	HM5SCL	Connectors	Open Pin	2MM HM 5 Row C
HM5SD	HM5SD	Connectors	Open Pin	2MM HM 5 Row D
HM5SDL	HM5SDL	Connectors	Open Pin	2MM HM 5 Row D
HM5SE	HM5SE	Connectors	Open Pin	2MM HM 5 Row E
HM5SEL	HM5SEL	Connectors	Open Pin	2MM HM 5 Row E
HM5SM	HM5SM	Connectors	Open Pin	2MM HM 5 Median
HM5SML	HM5SML	Connectors	Open Pin	2MM HM 5 Median
HM74A	HM74A	Connectors	Open Pin	2mm HM 74, Row A
HM74AL	HM74AL	Connectors	Open Pin	2mm HM 74, Row A
HM74B	HM74B	Connectors	Open Pin	2mm HM 74, Row B
HM74BL	HM74BL	Connectors	Open Pin	2mm HM 74, Row B
HM74C	HM74C	Connectors	Open Pin	2mm HM 74, Row C
HM74CL	HM74CL	Connectors	Open Pin	2mm HM 74, Row C
HM74D	HM74D	Connectors	Open Pin	2mm HM 74, Row D
HM74DL	HM74DL	Connectors	Open Pin	2mm HM 74, Row D
HM74E	HM74E	Connectors	Open Pin	2mm HM 74, Row E
HM74EL	HM74EL	Connectors	Open Pin	2mm HM 74, Row E
HM74M	HM74M	Connectors	Open Pin	2mm HM 74, Median Value
HM74ML	HM74ML	Connectors	Open Pin	2mm HM 74, Median Value
HM7A	HM7A	Connectors	Open Pin	2mm HM 7, Row A
HM7AL	HM7AL	Connectors	Open Pin	2mm HM 7, Row A
HM7B	HM7B	Connectors	Open Pin	2mm HM 7, Row B
HM7BL	HM7BL	Connectors	Open Pin	2mm HM 7, Row B
HM7C	HM7C	Connectors	Open Pin	2mm HM 7, Row C
HM7CL	HM7CL	Connectors	Open Pin	2mm HM 7, Row C
HM7D	HM7D	Connectors	Open Pin	2mm HM 7, Row D
HM7DL	HM7DL	Connectors	Open Pin	2mm HM 7, Row D
HM7E	HM7E	Connectors	Open Pin	2mm HM 7, Row E
HM7EL	HM7EL	Connectors	Open Pin	2mm HM 7, Row E
HM7M	HM7M	Connectors	Open Pin	2mm HM 7, Median Value
HM7ML	HM7ML	Connectors	Open Pin	2mm HM 7, Median Value
HM8A	HM8A	Connectors	Open Pin	2MM HM 8 Row A
HM8AL	HM8AL	Connectors	Open Pin	2MM HM 8 Row A
HM8B	HM8B	Connectors	Open Pin	2MM HM 8 Row B
HM8BL	HM8BL	Connectors	Open Pin	2MM HM 8 Row B
HM8C	HM8C	Connectors	Open Pin	2MM HM 8 Row C
HM8CL	HM8CL	Connectors	Open Pin	2MM HM 8 Row C

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
HM8D	HM8D	Connectors	Open Pin	2MM HM 8 Row D
HM8DL	HM8DL	Connectors	Open Pin	2MM HM 8 Row D
HM8E	HM8E	Connectors	Open Pin	2MM HM 8 Row E
HM8EL	HM8EL	Connectors	Open Pin	2MM HM 8 Row E
HM8F	HM8F	Connectors	Open Pin	2MM HM 8 Row F
HM8FL	HM8FL	Connectors	Open Pin	2MM HM 8 Row F
HM8G	HM8G	Connectors	Open Pin	2MM HM 8 Row G
HM8GL	HM8GL	Connectors	Open Pin	2MM HM 8 Row G
HM8H	HM8H	Connectors	Open Pin	2MM HM 8 Row H
HM8HL	HM8HL	Connectors	Open Pin	2MM HM 8 Row H
HM8M	HM8M	Connectors	Open Pin	2MM HM 8 Median
HM8ML	HM8ML	Connectors	Open Pin	2MM HM 8 Median
HM8SA	HM8SA	Connectors	Open Pin	2MM HM 8 Row A
HM8SAL	HM8SAL	Connectors	Open Pin	2MM HM 8 Row A
HM8SB	HM8SB	Connectors	Open Pin	2MM HM 8 Row B
HM8SBL	HM8SBL	Connectors	Open Pin	2MM HM 8 Row B
HM8SC	HM8SC	Connectors	Open Pin	2MM HM 8 Row C
HM8SCL	HM8SCL	Connectors	Open Pin	2MM HM 8 Row C
HM8SD	HM8SD	Connectors	Open Pin	2MM HM 8 Row D
HM8SDL	HM8SDL	Connectors	Open Pin	2MM HM 8 Row D
HM8SE	HM8SE	Connectors	Open Pin	2MM HM 8 Row E
HM8SEL	HM8SEL	Connectors	Open Pin	2MM HM 8 Row E
HM8SF	HM8SF	Connectors	Open Pin	2MM HM 8 Row F
HM8SFL	HM8SFL	Connectors	Open Pin	2MM HM 8 Row F
HM8SG	HM8SG	Connectors	Open Pin	2MM HM 8 Row G
HM8SGL	HM8SGL	Connectors	Open Pin	2MM HM 8 Row G
HM8SH	HM8SH	Connectors	Open Pin	2MM HM 8 Row H
HM8SHL	HM8SHL	Connectors	Open Pin	2MM HM 8 Row H
HM8SM	HM8SM	Connectors	Open Pin	2MM HM 8 Median
HM8SML	HM8SML	Connectors	Open Pin	2MM HM 8 Median
HSCEM	HSCEM	Connectors	Card-Edge	ISA, Median/Row A/B
HSCEML	HSCEML	Connectors	Card-Edge	ISA, Median/Row A/B
HSSEM	HSSEM	Connectors	Card-Edge	High Speed, Median values
HSSEML	HSSEML	Connectors	Card-Edge	High Speed, Median values
ISAM	ISAM	Connectors	Card-Edge	ISA, Median/Row A/B
ISAML	ISAML	Connectors	Card-Edge	ISA, Median/Row A/B
J508A	J508A	Connectors	Imped. Cntrl.	Right Angle, Row A
J508AL	J508AL	Connectors	Imped. Cntrl.	Right Angle, Row A
J508B	J508B	Connectors	Imped. Cntrl.	Right Angle, Row B
J508BL	J508BL	Connectors	Imped. Cntrl.	Right Angle, Row B
J508C	J508C	Connectors	Imped. Cntrl.	Right Angle, Row C
J508CL	J508CL	Connectors	Imped. Cntrl.	Right Angle, Row C
J508D	J508D	Connectors	Imped. Cntrl.	Right Angle, Row D
J508DL	J508DL	Connectors	Imped. Cntrl.	Right Angle, Row D
J508E	J508E	Connectors	Imped. Cntrl.	Right Angle, Row E
J508EL	J508EL	Connectors	Imped. Cntrl.	Right Angle, Row E
J508F	J508F	Connectors	Imped. Cntrl.	Right Angle, Row F
J508FL	J508FL	Connectors	Imped. Cntrl.	Right Angle, Row F
J508G	J508G	Connectors	Imped. Cntrl.	Right Angle, Row G
J508GL	J508GL	Connectors	Imped. Cntrl.	Right Angle, Row G
J508H	J508H	Connectors	Imped. Cntrl.	Right Angle, Row H
J508HL	J508HL	Connectors	Imped. Cntrl.	Right Angle, Row H
J508M	J508M	Connectors	Imped. Cntrl.	Right Angle, Median Value
J508ML	J508ML	Connectors	Imped. Cntrl.	Right Angle, Median Values
LPG27A	LPG27A	Connectors	Sockets	LIF PGA, Type A Inner Pos.
LPG27AL	LPG27AL	Connectors	Sockets	LIF PGA, Type A Inner Pos.
LPG27B	LPG27B	Connectors	Sockets	LIF PGA, Type B Outer Pos.

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
LPG27BL	LPG27BL	Connectors	Sockets	LIF PGA, Type B Outer Pos.
LPG27C	LPG27C	Connectors	Sockets	Low Force, Type C Corner Pos.
LPG27CL	LPG27CL	Connectors	Sockets	LIF PGA, Type C Corner Pos.
LPSLISA	LPSLISA	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISAL	LPSLISAL	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISB	LPSLISB	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISBL	LPSLISBL	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISC	LPSLISC	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISCL	LPSLISCL	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISM	LPSLISM	Connectors	Sockets	LP SL ZIF Interstitial
LPSLISML	LPSLISML	Connectors	Sockets	LP SL ZIF Interstitial
LPSLS36A	LPSLS36A	Connectors	Sockets	LP SL ZIF Socket
LPSLS36AL	LPSLS36AL	Connectors	Sockets	LP SL ZIF Socket
LPSLS36B	LPSLS36B	Connectors	Sockets	LP SL ZIF Socket
LPSLS36BL	LPSLS36BL	Connectors	Sockets	LP SL ZIF Socket
LPSLS36C	LPSLS36C	Connectors	Sockets	LP SL ZIF Socket
LPSLS36CL	LPSLS36CL	Connectors	Sockets	LP SL ZIF Socket
LPSLS36M	LPSLS36M	Connectors	Sockets	LP SL ZIF Socket
LPSLS36ML	LPSLS36ML	Connectors	Sockets	LP SL ZIF Socket
M5V3AB	M5V3AB	Connectors	Open Pin	.8MM Ampmodu Row A/B
M5V3ABL	M5V3ABL	Connectors	Open Pin	.8MM Ampmodu Row A/B
M5V4AB	M5V4AB	Connectors	Open Pin	.8MM Ampmodu Row A/B
M5V4ABL	M5V4ABL	Connectors	Open Pin	.8MM Ampmodu Row A/B
M5V6AB	M5V6AB	Connectors	Open Pin	.8MM Ampmodu Row A/B
M5V6ABL	M5V6ABL	Connectors	Open Pin	.8MM Ampmodu Row A/B
M64A	M64A	Connectors	Card-Edge	Memory Card, Row A
M64AL	M64AL	Connectors	Card-Edge	Memory Card, Row A
M64B	M64B	Connectors	Card-Edge	Memory Card, Row B
M64BL	M64BL	Connectors	Card-Edge	Memory Card, Row B
M64C	M64C	Connectors	Card-Edge	Memory Card, Row C
M64CL	M64CL	Connectors	Card-Edge	Memory Card, Row C
M64D	M64D	Connectors	Card-Edge	Memory Card, Row D
M64DL	M64DL	Connectors	Card-Edge	Memory Card, Row D
M64LPA	M64LPA	Connectors	Card-Edge	Memory Card, Row A
M64LPAL	M64LPAL	Connectors	Card-Edge	Memory Card, Row A
M64LPB	M64LPB	Connectors	Card-Edge	Memory Card, Row B
M64LPBL	M64LPBL	Connectors	Card-Edge	Memory Card, Row B
M64LPC	M64LPC	Connectors	Card-Edge	Memory Card, Row C
M64LPCL	M64LPCL	Connectors	Card-Edge	Memory Card, Row C
M64LPD	M64LPD	Connectors	Card-Edge	Memory Card, Row D
M64LPDL	M64LPDL	Connectors	Card-Edge	Memory Card, Row D
M64LPM	M64LPM	Connectors	Card-Edge	Memory Card, Median
M64LPML	M64LPML	Connectors	Card-Edge	Memory Card, Median
M64M	M64M	Connectors	Card-Edge	Memory Card, Median
M64ML	M64ML	Connectors	Card-Edge	Memory Card, Median
MCA	MCA	Connectors	Card-Edge	Memory Card, Row A
MCAL	MCAL	Connectors	Card-Edge	Memory Card, Row A
MCB	MCB	Connectors	Card-Edge	Memory Card, Row B
MCBL	MCBL	Connectors	Card-Edge	Memory Card, Row B
MCC	MCC	Connectors	Card-Edge	Memory Card, Row C
MCCL	MCCL	Connectors	Card-Edge	Memory Card, Row C
MCD	MCD	Connectors	Card-Edge	Memory Card, Row D
MCDL	MCDL	Connectors	Card-Edge	Memory Card, Row D
MCM	MCM	Connectors	Card-Edge	Memory Card, Median
MCML	MCML	Connectors	Card-Edge	Memory Card, Median
MD5S25M	MD5S25M	Connectors	Open Pin	Modu 50/50 Median
MD5S25ML	MD5S25ML	Connectors	Open Pin	Modu 50/50 Median

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
MD5S32M	MD5S32M	Connectors	Open Pin	Modu 50/50 Median
MD5S32ML	MD5S32ML	Connectors	Open Pin	Modu 50/50 Median
MDRRA	MDRRA	Connectors	Open Pin	1MM Micro Row A
MDRRAL	MDRRAL	Connectors	Open Pin	1MM Micro Row A
MDRRB	MDRRB	Connectors	Open Pin	1MM Micro Row B
MDRRBL	MDRRBL	Connectors	Open Pin	1MM Micro Row B
MDRRC	MDRRC	Connectors	Open Pin	1MM Micro Row C
MDRRCL	MDRRCL	Connectors	Open Pin	1MM Micro Row C
MDRRM	MDRRM	Connectors	Open Pin	1MM Micro Median
MDRRML	MDRRML	Connectors	Open Pin	1MM Micro Median
MEPGA	MEPGA	Connectors	Sockets	Low Force, Type A Inner Pos.
MEPGAL	MEPGAL	Connectors	Sockets	Low Force, Type A Inner Pos.
MEPGB	MEPGB	Connectors	Sockets	Low Force, Type B Outer Pos.
MEPGBL	MEPGBL	Connectors	Sockets	Low Force, Type B Outer Pos.
MEPGC	MEPGC	Connectors	Sockets	Low Force, Type C Corner Pos.
MEPGCL	MEPGCL	Connectors	Sockets	Low Force, Type C Corner Pos.
MEZ11	MEZ11	Connectors	Open Pin	1MM Mezz Row A/B
MEZ11L	MEZ11L	Connectors	Open Pin	1MM Mezz Row A/B
MEZ13	MEZ13	Connectors	Open Pin	1MM Mezz Row A/B
MEZ13L	MEZ13L	Connectors	Open Pin	1MM Mezz Row A/B
MEZ15	MEZ15	Connectors	Open Pin	1MM Mezz Row A/B
MEZ15L	MEZ15L	Connectors	Open Pin	1MM Mezz Row A/B
MEZ8	MEZ8	Connectors	Open Pin	1MM Mezz Row A/B
MEZ8L	MEZ8L	Connectors	Open Pin	1MM Mezz Row A/B
MI25M	MI25M	Connectors	Imped. Cntrl.	Right Angle, Row A/B/Median
MI25ML	MI25ML	Connectors	Imped. Cntrl.	Right Angle, Row A/B/Median
MI2S20M	MI2S20M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S20ML	MI2S20ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S26M	MI2S26M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S26ML	MI2S26ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S43M	MI2S43M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S43ML	MI2S43ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S49M	MI2S49M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S49ML	MI2S49ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S70M	MI2S70M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI2S70ML	MI2S70ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MI50M	MI50M	Connectors	Imped. Cntrl.	Right Angle, Row A/B/Median
MI50ML	MI50ML	Connectors	Imped. Cntrl.	Right Angle, Row A/B/Median
MI5S20M	MI5S20M	Connectors	Imped. Cntrl.	Parallel, Median Value
MI5S20ML	MI5S20ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MMS10M	MMS10M	Connectors	Open Pin	Meristak, Median Row A/B
MMS10ML	MMS10ML	Connectors	Open Pin	Meristak, Median Row A/B
MODU39M	MODU39M	Connectors	Open Pin	Modu 50/50 Median
MODU39ML	MODU39ML	Connectors	Open Pin	Modu 50/50 Median
MPSM5A	MPSM5A	Connectors	Sockets	Micropitch SM, All lines
MPSM5AL	MPSM5AL	Connectors	Sockets	Micropitch SM, All lines
MPSMT25	MPSMT25	Connectors	Surface Mount	Berg Micropax
MS43A	MS43A	Connectors	Imped. Cntrl.	Parallel, Row A
MS43AL	MS43AL	Connectors	Imped. Cntrl.	Parallel, Row A
MS43B	MS43B	Connectors	Imped. Cntrl.	Parallel, Row B
MS43BL	MS43BL	Connectors	Imped. Cntrl.	Parallel, Row B
MS43C	MS43C	Connectors	Imped. Cntrl.	Parallel, Row C
MS43CL	MS43CL	Connectors	Imped. Cntrl.	Parallel, Row C
MS43D	MS43D	Connectors	Imped. Cntrl.	Parallel, Row D
MS43DL	MS43DL	Connectors	Imped. Cntrl.	Parallel, Row D
MS43M	MS43M	Connectors	Imped. Cntrl.	Parallel, Median Value
MS43ML	MS43ML	Connectors	Imped. Cntrl.	Parallel, Median Value

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
MS5RA	MS5RA	Connectors	Open Pin	ModuSys 50, Row A
MS5RAL	MS5RAL	Connectors	Open Pin	ModuSys 50, Row A
MS5RB	MS5RB	Connectors	Open Pin	ModuSys 50, Row B
MS5RBL	MS5RBL	Connectors	Open Pin	ModuSys 50, Row B
MS5RM	MS5RM	Connectors	Open Pin	ModuSys 50, Median Value
MS5RML	MS5RML	Connectors	Open Pin	ModuSys 50, Median Value
MS5VSM	MS5VSM	Connectors	Open Pin	Modu 50sm, Median Row A/B
MS5VSML	MS5VSML	Connectors	Open Pin	Modu 50sm, Median Row A/B
MS5VTM	MS5VTM	Connectors	Open Pin	Modu 50v, Median Row A/B
MS5VTML	MS5VTML	Connectors	Open Pin	Modu 50v, Median Row A/B
MS73A	MS73A	Connectors	Imped. Cntrl.	Parallel, Row A
MS73AL	MS73AL	Connectors	Imped. Cntrl.	Parallel, Row A
MS73B	MS73B	Connectors	Imped. Cntrl.	Parallel, Row B
MS73BL	MS73BL	Connectors	Imped. Cntrl.	Parallel, Row B
MS73C	MS73C	Connectors	Imped. Cntrl.	Parallel, Row C
MS73CL	MS73CL	Connectors	Imped. Cntrl.	Parallel, Row C
MS73D	MS73D	Connectors	Imped. Cntrl.	Parallel, Row D
MS73DL	MS73DL	Connectors	Imped. Cntrl.	Parallel, Row D
MS73M	MS73M	Connectors	Imped. Cntrl.	Parallel, Median Value
MS73ML	MS73ML	Connectors	Imped. Cntrl.	Parallel, Median Value
MSRAA	MSRAA	Connectors	Imped. Cntrl.	Right Angle, Row A
MSRAAL	MSRAAL	Connectors	Imped. Cntrl.	Right Angle, Row A
MSRAB	MSRAB	Connectors	Imped. Cntrl.	Right Angle, Row B
MSRABL	MSRABL	Connectors	Imped. Cntrl.	Right Angle, Row B
MSRAC	MSRAC	Connectors	Imped. Cntrl.	Right Angle, Row C
MSRACL	MSRACL	Connectors	Imped. Cntrl.	Right Angle, Row C
MSRAD	MSRAD	Connectors	Imped. Cntrl.	Right Angle, Row D
MSRADL	MSRADL	Connectors	Imped. Cntrl.	Right Angle, Row D
MSRAM	MSRAM	Connectors	Imped. Cntrl.	Right Angle, Median Values
MSRAML	MSRAML	Connectors	Imped. Cntrl.	Right Angle, Median Values
P6ISA	P6ISA	Connectors	Sockets	Interstitial Row A Internal
P6ISAL	P6ISAL	Connectors	Sockets	Interstitial Row A Internal
P6ISB	P6ISB	Connectors	Sockets	Interstitial Row B Edge
P6ISBL	P6ISBL	Connectors	Sockets	Interstitial Row B Edge
P6ISC	P6ISC	Connectors	Sockets	Interstitial Row C Corner
P6ISCL	P6ISCL	Connectors	Sockets	Interstitial Row C Corner
P6ISM	P6ISM	Connectors	Sockets	Interstitial, Median
P6ISML	P6ISML	Connectors	Sockets	Interstitial, Median
PC68A	PC68A	Connectors	Open Pin	PCMCIA 68, Row A
PC68AL	PC68AL	Connectors	Open Pin	PCMCIA 68, Row A
PC68B	PC68B	Connectors	Open Pin	PCMCIA 68, Row B
PC68BL	PC68BL	Connectors	Open Pin	PCMCIA 68, Row B
PC68C	PC68C	Connectors	Open Pin	PCMCIA 68, Row C
PC68CL	PC68CL	Connectors	Open Pin	PCMCIA 68, Row C
PC68D	PC68D	Connectors	Open Pin	PCMCIA 68, Row D
PC68DL	PC68DL	Connectors	Open Pin	PCMCIA 68, Row D
PC68M	PC68M	Connectors	Open Pin	PCMCIA 68, Median Value
PC68ML	PC68ML	Connectors	Open Pin	PCMCIA 68, Median Value
PC88A	PC88A	Connectors	Open Pin	PCMCIA 88, Row A
PC88AL	PC88AL	Connectors	Open Pin	PCMCIA 88, Row A
PC88B	PC88B	Connectors	Open Pin	PCMCIA 88, Row B
PC88BL	PC88BL	Connectors	Open Pin	PCMCIA 88, Row B
PC88C	PC88C	Connectors	Open Pin	PCMCIA 88, Row C
PC88CL	PC88CL	Connectors	Open Pin	PCMCIA 88, Row C
PC88D	PC88D	Connectors	Open Pin	PCMCIA 88, Row D
PC88DL	PC88DL	Connectors	Open Pin	PCMCIA 88, Row D
PC88M	PC88M	Connectors	Open Pin	PCMCIA 88, Median Value

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
PC88ML	PC88ML	Connectors	Open Pin	PCMCIA 88, Median Value
PLCC	PLCC	Connectors	Sockets	0.8mm Pitch 50J
PLCCL	PLCCL	Connectors	Sockets	0.8mm Pitch 50J
S5ISA	S5ISA	Connectors	Sockets	Interstital, Row A Internal
S5ISAL	S5ISAL	Connectors	Sockets	Interstital, Row A Internal
S5ISB	S5ISB	Connectors	Sockets	Interstital, Row B Edge
S5ISBL	S5ISBL	Connectors	Sockets	Interstital, Row B Edge
S5ISC	S5ISC	Connectors	Sockets	Interstital, Row C Corner
S5ISCL	S5ISCL	Connectors	Sockets	Interstital, Row C Corner
S5ISM	S5ISM	Connectors	Sockets	Interstital, Median
S5ISML	S5ISML	Connectors	Sockets	Interstital, Median
SEA	SEA	Connectors	Card-Edge	Standard, Row A
SEAL	SEAL	Connectors	Card-Edge	Standard, Row A
SEB	SEB	Connectors	Card-Edge	Standard, Row B
SEBL	SEBL	Connectors	Card-Edge	Standard, Row B
SEE	SEE	Connectors	Card-Edge	Standard, Row E
SEEL	SEEL	Connectors	Card-Edge	Standard, Row E
SEF	SEF	Connectors	Card-Edge	Standard, Row F
SEFL	SEFL	Connectors	Card-Edge	Standard, Row F
SEM	SEM	Connectors	Card-Edge	Standard, Row M
SEME	SEME	Connectors	Card-Edge	Standard, Mean
SEMEL	SEMEL	Connectors	Card-Edge	Standard, Mean
SEML	SEML	Connectors	Card-Edge	Standard, Row M
SES5M	SES5M	Connectors	Card-Edge	Std. Edge, Median/Row A/B
SES5ML	SES5ML	Connectors	Card-Edge	Std. Edge, Median/Row A/B
SESCO	SESCO	Connectors	Card-Edge	Standard, Open
SESCOL	SESCOL	Connectors	Card-Edge	Standard, Open
SESCS	SESCS	Connectors	Card-Edge	Standard, Shorted
SESCSL	SESCSL	Connectors	Card-Edge	Standard, Shorted
SPGAA	SPGAA	Connectors	Sockets	SL ZIF PGA, Row A Internal
SPGAAL	SPGAAL	Connectors	Sockets	SL ZIF PGA, Row A Internal
SPGAB	SPGAB	Connectors	Sockets	SL ZIF PGA, Row B Edge
SPGABL	SPGABL	Connectors	Sockets	SL ZIF PGA, Row B Edge
SPGAC	SPGAC	Connectors	Sockets	SL ZIF PGA, Row C Corner
SPGACL	SPGACL	Connectors	Sockets	SL ZIF PGA, Row C Corner
SPGAM	SPGAM	Connectors	Sockets	SL ZIF PGA, Median
SPGAML	SPGAML	Connectors	Sockets	SL ZIF PGA, Median
TBC44A	TBC44A	Connectors	Open Pin	TBC 44, Row A
TBC44AL	TBC44AL	Connectors	Open Pin	TBC 44, Row A
TBC44B	TBC44B	Connectors	Open Pin	TBC 44, Row B
TBC44BL	TBC44BL	Connectors	Open Pin	TBC 44, Row B
TBC44C	TBC44C	Connectors	Open Pin	TBC 44, Row C
TBC44CL	TBC44CL	Connectors	Open Pin	TBC 44, Row C
TBC44D	TBC44D	Connectors	Open Pin	TBC 44, Row D
TBC44DL	TBC44DL	Connectors	Open Pin	TBC 44, Row D
TBC44M	TBC44M	Connectors	Open Pin	TBC 44, Median Value
TBC44ML	TBC44ML	Connectors	Open Pin	TBC 44, Median Value
TBC4A	TBC4A	Connectors	Open Pin	TBC 4, Row A
TBC4AL	TBC4AL	Connectors	Open Pin	TBC 4, Row A
TBC4B	TBC4B	Connectors	Open Pin	TBC 4, Row B
TBC4BL	TBC4BL	Connectors	Open Pin	TBC 4, Row B
TBC4C	TBC4C	Connectors	Open Pin	TBC 4, Row C
TBC4CL	TBC4CL	Connectors	Open Pin	TBC 4, Row C
TBC4D	TBC4D	Connectors	Open Pin	TBC 4, Row D
TBC4DL	TBC4DL	Connectors	Open Pin	TBC 4, Row D
TBC4M	TBC4M	Connectors	Open Pin	TBC 4, Median Value
TBC4ML	TBC4ML	Connectors	Open Pin	TBC 4, Median Value

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
TBC5A	TBC5A	Connectors	Open Pin	TBC 5, Row A
TBC5AL	TBC5AL	Connectors	Open Pin	TBC 5, Row A
TBC5B	TBC5B	Connectors	Open Pin	TBC 5, Row B
TBC5BL	TBC5BL	Connectors	Open Pin	TBC 5, Row B
TBC5C	TBC5C	Connectors	Open Pin	TBC 5, Row C
TBC5CL	TBC5CL	Connectors	Open Pin	TBC 5, Row C
TBC5D	TBC5D	Connectors	Open Pin	TBC 5, Row D
TBC5DL	TBC5DL	Connectors	Open Pin	TBC 5, Row D
TBC5E	TBC5E	Connectors	Open Pin	TBC 5, Row E
TBC5EL	TBC5EL	Connectors	Open Pin	TBC 5, Row E
TBC5M	TBC5M	Connectors	Open Pin	TBC 5, Median Value
TBC5ML	TBC5ML	Connectors	Open Pin	TBC 5, Row ATBC 5, Median Value
TBC64A	TBC64A	Connectors	Open Pin	TBC 64, Row A
TBC64AL	TBC64AL	Connectors	Open Pin	TBC 64, Row A
TBC64B	TBC64B	Connectors	Open Pin	TBC 64, Row B
TBC64BL	TBC64BL	Connectors	Open Pin	TBC 64, Row B
TBC64C	TBC64C	Connectors	Open Pin	TBC 64, Row C
TBC64CL	TBC64CL	Connectors	Open Pin	TBC 64, Row C
TBC64D	TBC64D	Connectors	Open Pin	TBC 64, Row D
TBC64DL	TBC64DL	Connectors	Open Pin	TBC 64, Row D
TBC64E	TBC64E	Connectors	Open Pin	TBC 64, Row E
TBC64EL	TBC64EL	Connectors	Open Pin	TBC 64, Row E
TBC64F	TBC64F	Connectors	Open Pin	TBC 64, Row F
TBC64FL	TBC64FL	Connectors	Open Pin	TBC 64, Row F
TBC64M	TBC64M	Connectors	Open Pin	TBC 64, Median Value
TBC64ML	TBC64ML	Connectors	Open Pin	TBC 64, Median Value
TBC6A	TBC6A	Connectors	Open Pin	TBC 6, Row A
TBC6AL	TBC6AL	Connectors	Open Pin	TBC 6, Row A
TBC6B	TBC6B	Connectors	Open Pin	TBC 6, Row B
TBC6BL	TBC6BL	Connectors	Open Pin	TBC 6, Row B
TBC6C	TBC6C	Connectors	Open Pin	TBC 6, Row C
TBC6CL	TBC6CL	Connectors	Open Pin	TBC 6, Row C
TBC6D	TBC6D	Connectors	Open Pin	TBC 6, Row D
TBC6DL	TBC6DL	Connectors	Open Pin	TBC 6, Row D
TBC6E	TBC6E	Connectors	Open Pin	TBC 6, Row E
TBC6EL	TBC6EL	Connectors	Open Pin	TBC 6, Row E
TBC6F	TBC6F	Connectors	Open Pin	TBC 6, Row F
TBC6FL	TBC6FL	Connectors	Open Pin	TBC 6, Row F
TBC6M	TBC6M	Connectors	Open Pin	TBC 6, Median Value
TBC6ML	TBC6ML	Connectors	Open Pin	TBC 6, Median Value
TPG35A	TPG35A	Connectors	Sockets	TAZ, Type A Inner Pos.
TPG35AL	TPG35AL	Connectors	Sockets	TAZ, Type A Inner Pos.
TPG35B	TPG35B	Connectors	Sockets	TAZ, Type B Outer Pos.
TPG35BL	TPG35BL	Connectors	Sockets	TAZ, Type B Outer Pos.
TPG35C	TPG35C	Connectors	Sockets	TAZ, Type C Corner Pos.
TPG35CL	TPG35CL	Connectors	Sockets	TAZ, Type C Corner Pos.
TPI35A	TPI35A	Connectors	Sockets	TAZ, Type A Inner Pos.
TPI35AL	TPI35AL	Connectors	Sockets	TAZ, Type A Inner Pos.
TPI35B	TPI35B	Connectors	Sockets	TAZ, Type B Outer Pos.
TPI35BL	TPI35BL	Connectors	Sockets	TAZ, Type B Outer Pos.
TPI35C	TPI35C	Connectors	Sockets	TAZ, Type C Corner Pos.
TPI35CL	TPI35CL	Connectors	Sockets	TAZ, Type C Corner Pos.
WCEEBUS	WCEEBUS	Connectors	Card-Edge	Computerbus, Burndy
ZPSLA	ZPSLA	Connectors	Imped. Cntrl.	Right Angle, Row A
ZPSLAL	ZPSLAL	Connectors	Imped. Cntrl.	Right Angle, Row A
ZPSLB	ZPSLB	Connectors	Imped. Cntrl.	Right Angle, Row B
ZPSLBL	ZPSLBL	Connectors	Imped. Cntrl.	Right Angle, Row B

Connectors (cont'd)

Part #	Part Name	Part Type	Part Sub Type	Description
ZPSLC	ZPSLC	Connectors	Imped. Cntrl.	Right Angle, Row C
ZPSLCL	ZPSLCL	Connectors	Imped. Cntrl.	Right Angle, Row C
ZPSLD	ZPSLD	Connectors	Imped. Cntrl.	Right Angle, Row D
ZPSLDL	ZPSLDL	Connectors	Imped. Cntrl.	Right Angle, Row D
ZPSLM	ZPSLM	Connectors	Imped. Cntrl.	Right Angle, Median Value
ZPSLML	ZPSLML	Connectors	Imped. Cntrl.	Right Angle, Median Value

Manufacturer and Description Legend

APT - Advanced Power Technology
Bel - Bel Fuse Inc.
English - English Electric Valve Co.
GI - Gen. Instruments
Hit - Hitachi
HP - Hewlett-Packard
I.R. - Intl. Rectifier
KOA - KOA/Speer Electronics, Inc.
Little - Little Fuse
Mat - Matsushita
Mot - Motorola
Nat - National
NInta - Nippon Inta Co. Inc.
Phil - Philips
Power - Powerex
Sem - Semikron
SGS - SGS Thomson
Siem - Siemens
Sili - Siliconix
Super - Supertex
Tele - Telefunken
Ther - Thermometrics
TI - Texas Instruments
Tosh - Toshiba
Tung - Tung-Sol
Uni - Unitrode
West - Westcode

Component Description
Zener Description - Maximum Voltage and Maximum Power
Diode Description - Maximum Voltage and Maximum Current
Varactor Description - Maximum Voltage and Capacitance
BJT Description - Maximum Voltage and Current
RF BJT Description - Maximum Voltage and Bias Point
Jfet Description - Maximum Gate-Drain Voltage and Maximum Gate Current
Mosfet Description - Min. Drain- Source Voltage, rDS(on), and Max. Drain Current
SCR Description - VDRM and IT
IGBT Description - VCES and Maximum IC
UJT Description -Maximum Voltage and Power
Vacuum Tube Description - Maximum Plate Voltage and Dissipation
Opto-Isolator Description - VinOut (Isolation) and CTR%
Varistor Description - RMS Voltage
Fuse Description - Rated Voltage and Current

Modeling Semiconductors

Introduction

Designing circuits using computer simulation requires that models accurately reflect device behavior within a specific circuit context. Models with excessive detail will obscure the circuit designer's insight and will quickly reach both run-time and complexity limitations of the simulation program. Overly simple models will fail to predict key circuit performance parameters and may lead to costly design mistakes.

Device modeling is one of the most difficult steps in the circuit simulation process. It requires not only an understanding of the device's physical and electrical properties, but also an intimate knowledge of the particular circuit application. Each IsSpice4 primitive element carries with it a list of parameters which effect its behavior. A great deal of practice and experience is needed in order to know which parameters are important and when.

Nevertheless, the problems of device modeling are not insurmountable and a good first cut model can be made quickly, giving the designer an accurate device model for a wide range of applications.

The level of detail that is used in a design task begins with the simplest model to test various concepts. Models then become progressively more complex as the design is refined. The simulation must be tested by comparing results with experience

and real hardware performance. An experienced designer can ferret out the simulation errors with very little laboratory verification, while the novice should test the design at each step. These tests do not have to be based on first-hand laboratory data. Frequently, it is possible to compare simulation results with published data found in vendor data sheets, magazine articles, and other designer's handbooks.

Data sheet information is generally conservative, yet it provides information which is useful for a good first cut at a device model. Laboratory measurements and methods for gathering data from test setups is beyond the scope of this guide, and will not be covered except in a few passing notes. However, a test setup which provides data similar to that supplied by a data sheet will be applicable to the methods discussed.

IsSpice4 models have default values that produce reasonable first order predictions. More complex models can be created either by supplying additional model parameters for the built-in models or by creating subcircuits that represent analogs of the device. A capacitor, for example, could be represented as a simple capacitance value for the first cut of an analysis. Later on, it could be replaced by a subcircuit which contains parasitic inductance, series and parallel resistance, and nonlinear voltage coefficients for a more detailed model.

To model more complex electronic devices, such as operational amplifiers, it is best to use the basic set of IsSpice4 primitives in a subcircuit. This type of modeling is called macro modeling. It is well suited to the electrical engineer because it produces a behavioral model which is understood by circuit designers, rather than forcing the designer to learn a new programming language.

The chapters that follow will get you going in the right direction. They contain a review of the majority of the parameters which are associated with the diode, bipolar transistor, JFET, MOSFET and other electrical components, and example modeling sessions. They also contain numerous macro models and explain how they were developed and how to use them.

Diodes

Syntax: DNAME Anode Cathode Modelname <OFF> <IC=VD>

Example: DRECT 1 2 DN4148
.MODEL DN4148 D(RS=.8 CJO=4PF IS=7E-09
+N=2 VJ=.6V TT=6E-09 M=.45 BV=100V)

The diode is the most fundamental semiconductor element. An understanding of its parameters and their effects can be further extended to the transistor models. Applicable to both junction diodes and Schottky barrier diodes, the equivalent circuit shown in Figure 1 describes the IsSPICE4 diode model.

The behavior of the IsSPICE4 diode relies heavily on a pre-scribed set of parameters. These parameters govern the over-all characteristics of the model. Some of the parameters are available from manufacturer's data sheets, while others must be calculated or measured in the laboratory. Virtually all of the parameters come into play when modeling the diode.
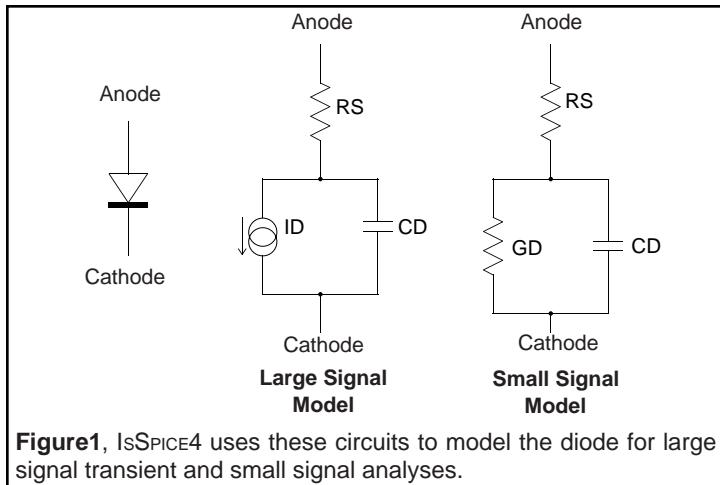
Figure1, IsSPICE4 uses these circuits to model the diode for large signal transient and small signal analyses.

IsSPICE4 does not supply defaults for dynamic parameters. For reasonable simulation results, the capacitance parameters CJO, VJ, and M should be specified. Generally speaking, if the diode model reflects the actual device, convergence perfor-mance will be good. Diodes which are used in switching applications must also specify TT, the transit time parameter.

Default Diode Limitations

There are 3 regions where the default diode characteristic differs from the real life response. These differences are described by the I/V curves given on the following page.

Turn On region: where the carrier generation/recombination in the space charge layer affects behavior. The default diode will turn on as soon as it is forward biased.
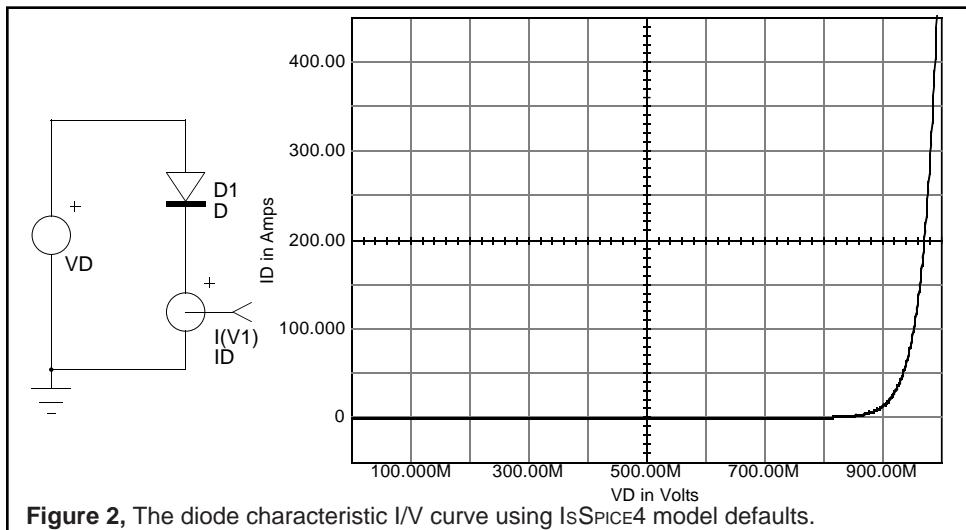
Figure 2, The diode characteristic I/V curve using ISSPICE4 model defaults.

High level injection region: due to series resistance. The default diode curve will not bend at higher voltages; current will increase linearly with voltage.

Breakdown region: due to internal breakdown associated with high reverse voltage. The default diode will not breakdown at any value of reverse voltage.

Additionally, junction capacitance (CJO), and transit time (TT) are zero.

Other Diode Model Limitations

The ISSPICE4 diode model gives good results in most applications; however, the following parameters are not accurately modeled:

Reverse breakdown temperature coefficient.

Reverse recovery variations due to junction grading such as in step recovery diodes.

Forward recovery time
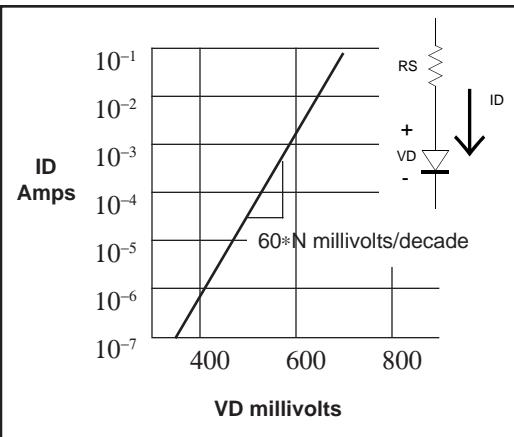
Thermal feedback that causes junction temperature to change as a function of power dissipation.

Notes About Using The Default Diode Model

Avoid using the default diode model; it can cause a variety of convergence problems due to the diode's strong nonlinearity in the turn-on region. As a rule, a diode model should always have a value for the junction capacitance, "CJO".

Diode leakage can be simulated by placing a large-valued resistor (100 megohms) across the diode. This will also help alleviate convergence problems.

Forward Conduction

The foundation of the diode model is the diode equation (Eq. 2.1) which describes conduction in the forward direction (usually LOG ID vs. VD on most data sheets). This data yields three important IsSPICE4 parameters, N, IS, and RS.

$$ID = IS \left(e^{\frac{VD}{N*VT}} - 1\right) \qquad \text{Eq. 2.1}$$

where: VT = Thermal voltage
= K ∗ T / q, .026 Volts at room temperature, 27 °C

IS and N are IsSPICE4 model parameters.
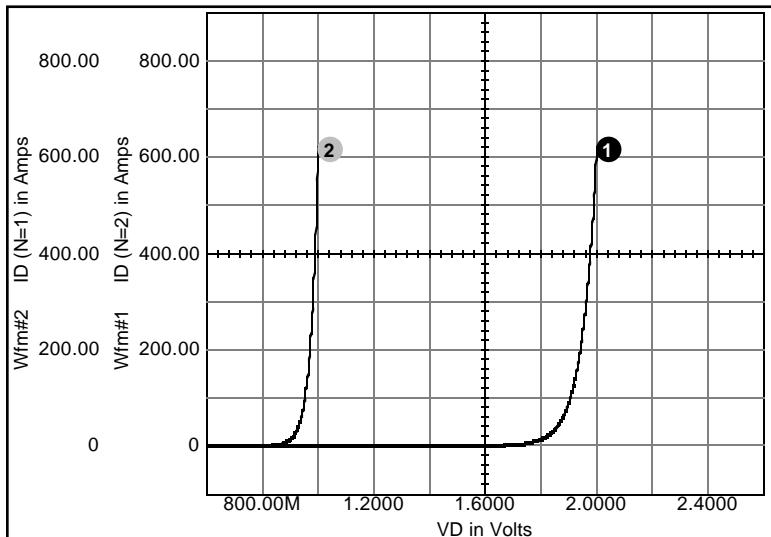
Figure 3, I/V characteristics using different emission coefficients.

N: Emission coefficient, default = 1

The emission coefficient controls the slope of the I/V curve, especially in the high injection region. The emission coefficient is 1 when diffusion current dominates and 2 when recombination current dominates and for high injection. The default value of N is good for most integrated circuits; however, most discrete devices have N values which are nearer to 2. Measuring the change in diode voltage for several decade changes in current will yield 60 mv/decade if N is unity, and 120 mv/decade if N is 2. This is equivalent to plotting LOG(ID) vs VD and measuring the slope in the linear region.

The basic diode equation gives gross first order I/V characteristics. In circuits where the details of the diode response are important for proper operation, additional model parameters must be included to simulate second order effects.

IS: Saturation current, default=1E-14

The reverse saturation current, IS, is the amount of current an ideal diode will conduct over a large range of reverse bias

voltage. IS is determined from ID vs. VD measurements with the diode forward biased. Determination of IS using reverse biased measurements is discouraged because parasitic leakage is generally much larger than IS. IS should be calculated in the forward biased region where the plot of log(ID) vs. VD is a straight line. Note that IS must be increased exponentially as the emission coefficient, N, is increased in order to maintain the same operating point.
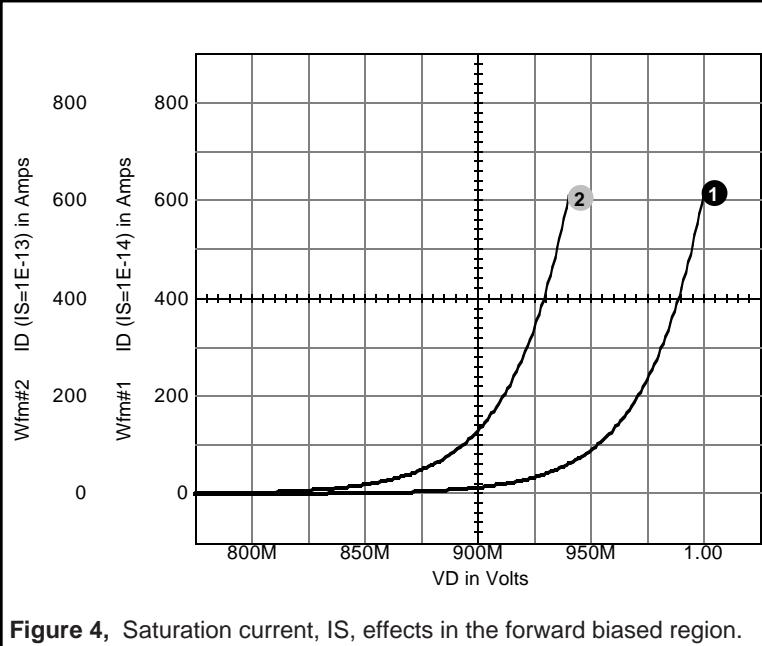
Figure 4, Saturation current, IS, effects in the forward biased region.

RS: Series resistance, default=0

Series resistance is used to model both the ohmic resistance and the diode transition to the high injection region. RS accounts for the diode deviation from ideal voltage predicted from IS and N at high bias levels. It may be determined from two points on the forward current (LOG ID) vs. voltage (VD) curve at high current levels. One point is chosen directly on the I/V curve. The second point is located at the intersection of the first points' current level and the extrapolation of the straight line portion of the curve. Both points should have the same current

level, but different voltage values. The voltage difference divided by the current is the series resistance:

$$RS = \frac{(VD1 - VD2)}{ID}$$ Eq. 2.2

Typical values for RS are less than 1 ohm.
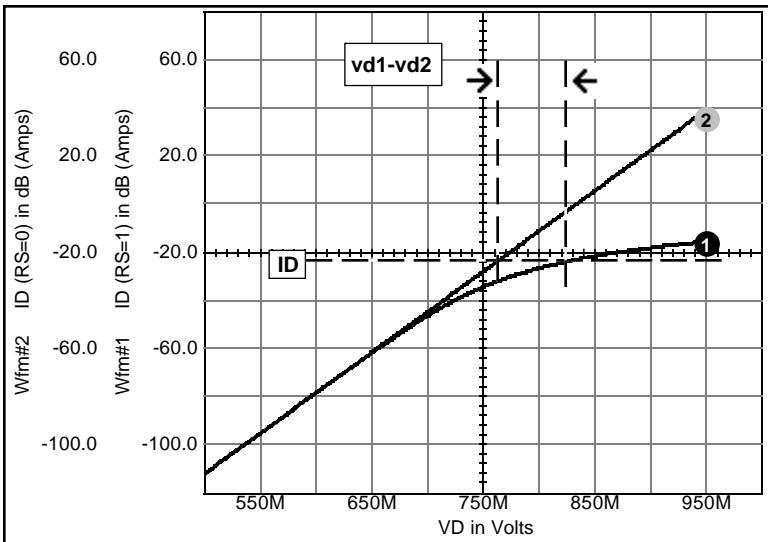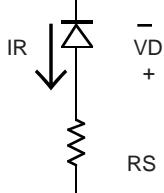
Figure 5, Deviation of diode current due to RS.

Diode Reverse Conduction

Conduction in the reverse direction is governed by the breakdown voltage, BV, and the current at breakdown, IBV, according to the following equation:

$$IR = IBV * exp\left(\frac{(-VD - BV)}{VT}\right)$$ Eq. 2.3

BV: Breakdown Voltage, default=infinity
IBV: Current at Breakdown, default=0

191
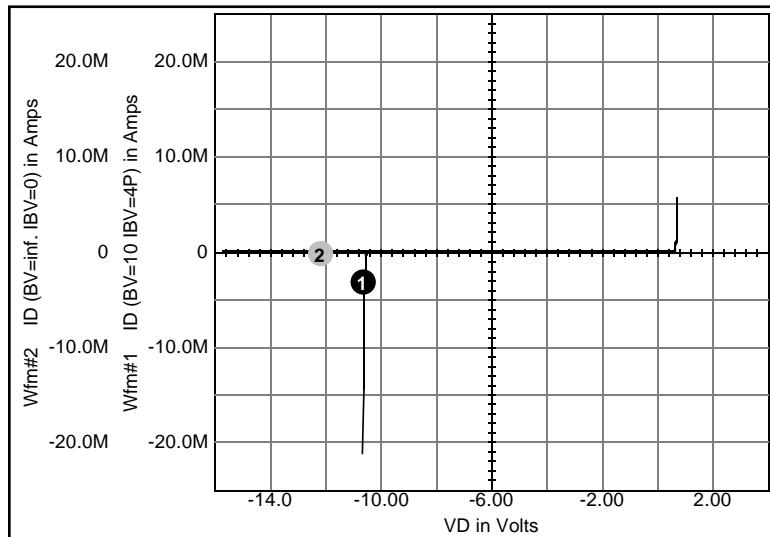
Figure 6, Including BV and IBV yeilds familiar reverse voltage behavior.

If reverse data is available, BV and IBV can be estimated using a piece-wise linear best-fit line. Data sheets usually give minimum values for breakdown voltage; typical breakdown is generally 50% higher. Measurements of these parameters are not recommended for breakdown ratings above several hundred volts because of the danger of damaging the device by arcing across the surface.

Diode Charge Storage

Parameters CJO, VJ, M, and FC model charge storage in the junction depletion region and can be obtained from capacitance bridge measurements at several values of reverse bias, or from data sheet curves. The values for CJO are usually in the

picofarad range for normal PN diodes, but may be in the nanofarad range for larger power diodes. Experience with ISSPICE4 has shown that using a reasonable value for CJO will substantially improve convergence in transient simulations.

CJO: Zero Bias Junction Capacitance, default = 0
VJ: Junction Potential, default = 1V
M: Grading Coefficient, default = 0.5
FC   Coefficient for Forward Bias Depletion Capacitance , default = 0.5

It is recommended that a CJO value of at least 2 PF is used in all discrete diode models. Typically, VJ varies between 0.2 and 1Volt and M ranges from 0.3 for a linearly graded junction to 0.5 for an abrupt junction. FC determines how the forward biased depletion capacitance will be calculated. Reverse bias capacitance is given by the equation:

$$CD = CJO * \left(1 - \frac{VD}{VJ}\right)^{-M} \qquad\qquad \text{Eq. 2.4}$$

Forward bias capacitance reverts to:

$$CD = CJO * (1 - FC)^{-(1-M)} * \left(1\ FC * (1 + M) + M * \frac{VD}{VJ}\right)$$

$$\text{when}\quad VD \rangle FC * VJ \qquad\qquad \text{Eq. 2.5}$$

Charge storage due to minority carrier injection is given by:

$$QS = TT * IS \left(e^{\frac{VD}{N*VT}} - 1 \right)$$ Eq. 2.6

and is estimated from pulsed delay time data or measurement in order to find the parameter TT. Notice that the measurement will also include the contribution from CJO.

TT: Transit Time, default=0

When a forward biased diode is abruptly reverse biased, there is a discrete amount of time which elapses before the diode is no longer conducting. This amount of time is called the reverse recovery time, (TRR). A large part of the recovery time is the device storage time. Storage time is normally provided by vendors for switching type diodes.

TT can be computed from the diode storage time, TS, using the following equation:

$$TT = \frac{Ts}{\ln \left[1 + \frac{IF}{IR} \right]}$$ Eq. 2.7

where IF is the forward current and IR is the reverse current.

Variation With Temperature

There are four diode parameters that are modified in IsSPICE4 to reflect changes in temperature. They are IS, VJ, CJO, and FC. The saturation current, IS, causes the greatest effect upon temperature dependence.

Temperature Coefficient: The temperature dependence of saturation current, IS, is proportional to:

$$IS\,(\,T_{NEW}) = IS\,\,(\,T_{NOM}\,) * T^{\frac{XTI}{N}} * \exp \left[\left(\frac{-q * EG}{N * k * T_{NEW}} \right) * (1 - T\,) \right]$$

$$\text{where } T = \frac{T_{NEW}}{T_{NOM}} \qquad\qquad\qquad \text{Eq. 2.8}$$

EG : Energy Gap , default = 1.11eV
XTI : Saturation current temperature exponent, default = 3.0

The parameters XTI and EG will describe the saturation current behavior as a function of temperature when temperature, T, is varied from the nominal. Representations which are more accurate than the default are unnecessary unless different materials, for example, Gallium Arsenide, are used or if more exact temperature behavior is needed to model circuits such as a bandgap reference.

Typical values for XTI are 3 for a PN diode, and 2 for a Schottky diode. Values for EG at room temperature are 1.11 for a PN diode and 0.69 for a Schottky diode.

Note that IsSPICE4 can only simulate a circuit at one temperature at a time. The default temperature is 27 degrees. To change the temperature, use the .TEMP command. It is possible using advanced modeling techniques to create an analog of temperature in an analysis and thus have temperature become a variable.

Diode Noise

KF: Flicker noise coefficient, default = 0
AF: Flicker noise exponent, default = 1

Shot and flicker noise are modeled as:

$$ID^2 = \left(2 * q * ID + \frac{(KF * ID^{AF})}{f}\right) * (Df) \qquad\qquad \text{Eq. 2.9}$$

Thermal noise is modeled as:

$$I_{RS} = \frac{4kT}{RS} * (Df) \qquad\qquad\qquad \text{Eq. 2.10}$$

Diode noise is not significant for most circuits, however, the diodes associated with transistors behave in a similar fashion and are responsible for most noise associated with electronic circuits. The typical values for KF and AF are 10^{-16} and 1, respectively, for silicon diodes.

Area Dependence

The area factor in the diode call statement determines the number of equivalent parallel devices which will be created. The area parameter affects IS, RS, and CJO.

Example of Modeling From A Data Sheet

When possible, data extraction from the manufacturer's data sheet is recommended since this data is a mean over a large number of components, and will be able to yield either a MIN, MAX, or typical model. Laboratory measurements can also be made in order to verify model accuracy. The data in Figure 8 is typical of that provided in a vendor data sheet for a 1N4001 rectifier diode. Remember, when modeling a component, that initial guesses or calculations of parameters may need to be tweaked. After simulating, the newly created model parameters may be adjusted accordingly to provide a superior fit to the data sheet curves.

Designers Data Sheet

•MAXIMUM RATINGS

Rating	Symbol	1N4001	1N4002	1N4003	1N4004	1N4005	1N4006	1N4007	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	50	100	200	400	600	800	1000	Volts
Non-Repetitive Peak Reverse Voltage (halfwave, single phase, 60 Hz)	V_{RSM}	60	120	240	480	720	1000	1200	Volts
RMS Reverse Voltage	$V_{R(RMS)}$	35	70	140	280	420	560	700	Volts
Average Rectified Forward Current (single phase, resistive load, 60 Hz, see Figure 8, $T_A = 75^oC$)	I_O	1.0							Amp
Non-Repetitive Peak Surge Current (surge applied at rated load conditions, see Figure 2)	I_{FSM}	30 (for 1 cycle)							Amp
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +175							^oC

•ELECTRICAL CHARACTERISTICS

Characteristic and Conditions	Symbol	Typ	Max	Unit
Maximum Instantaneous Forward Voltage Drop ($i_F = 1.0$ Amp, $T_J = 25^oC$) Figure 1	v_F	0.93	1.1	Volts
Maximum Full-Cycle Average Forward Voltage Drop ($I_O = 1.0$ Amp, $T_L = 75^oC$, 1 inch leads)	$V_{F(AV)}$	--	0.8	Volts
Maximum Reverse Current (rated dc voltage) $T_J = 25^oC$ $T_J = 100^oC$	I_R	0.05 1.0	10 50	µA
Maximum Full-Cycle Average Reverse Current ($I_O = 1.0$ Amp, $T_L = 75^oC$, 1 inch leads)	$I_{R(AV)}$	--	30	µA

Figure 8, Typical data sheet for the 1N400X rectifier diodes

Determination of Parameters From Data Sheets

As you look through vendor data sheets, you will notice that some diodes have plots of LOG(ID) vs VD, and some do not. Generally speaking, the vendor that first registered the JEDEC part will provide the necessary data. Unfortunately, the data is sometimes omitted in later catalogues, so you must either make measurements or dig up the old data sheets. Frequently, the data sheet specification is loose enough for different vendors to have considerable margin in part fabrication, so be careful!

Data sheets usually give average measurements of device performance. Depending on the application, one or more parameters could be changed to investigate worst-case performance. In a diode model, changing the value of IS, RS, or TT will provide real life performance variations.
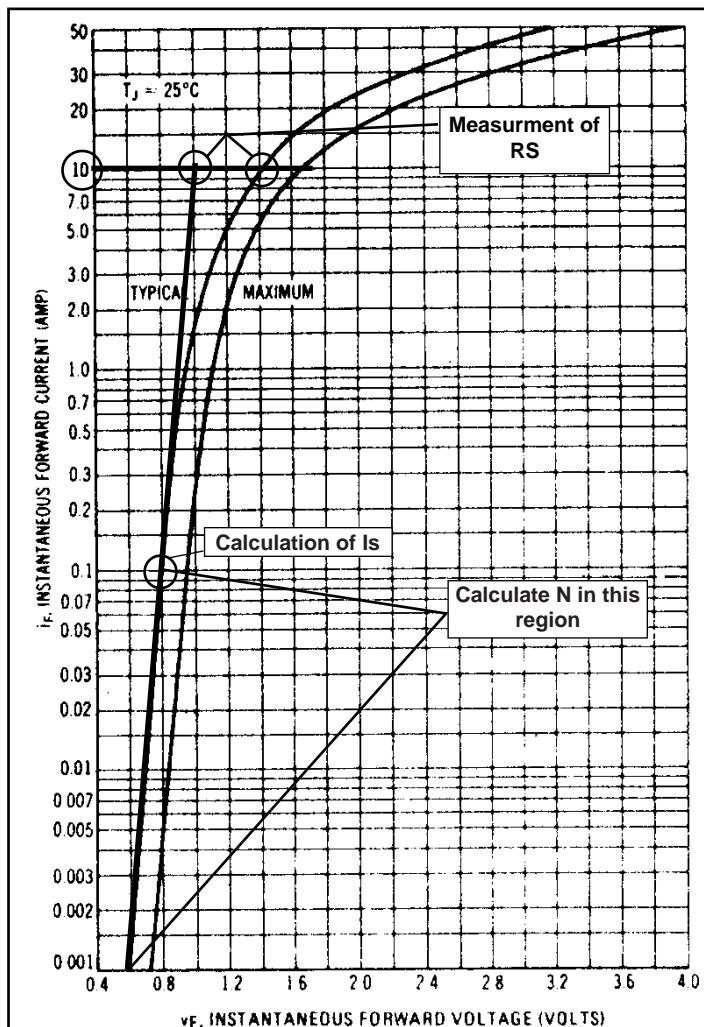
Figure 9, 1N4001 I/V Data showing how the data in the preceding equations are found.

The emission coefficient, N, is computed by measuring the slope of the LOG(ID) vs VD curve from Figure 9.

$$N = \frac{VD1 - VD2}{\left(2.3 * VT * \log\left(\frac{ID2}{ID1}\right)\right)} = 1.7 \qquad\qquad \text{Eq. 2.11}$$

RS is computed at ID = 10 Amps by taking the voltage deviation, .4 volts, along the straight line shown on Figure 9.

$$RS = \frac{(V2 - V1)}{I} = \frac{0.4\ V}{10\ A} = 0.04\Omega \qquad\qquad \text{Eq. 2.12}$$

IS can be computed anywhere along the straight line portion of the curve.

$$IS = \frac{ID}{\exp\left(\frac{VD}{N * VT}\right)} = \frac{0.1A}{\exp\left(\frac{0.8V}{1.7 * 0.026}\right)} = 1.38E\text{-}9 \qquad\qquad \text{Eq. 2.13}$$

Breakdown voltage and current are typically:

BV = 75 V and IBV = 0.05 μA

The junction capacitance parameters, M, CJO, and VJ are computed from the reverse bias C-V curve. A best-fit line, shown in Figure 10 above the two curves, is used to compute M. VJ should be small compared to VD over the region of the best-fit. Using (100P,0.1V) and (7P,100V);
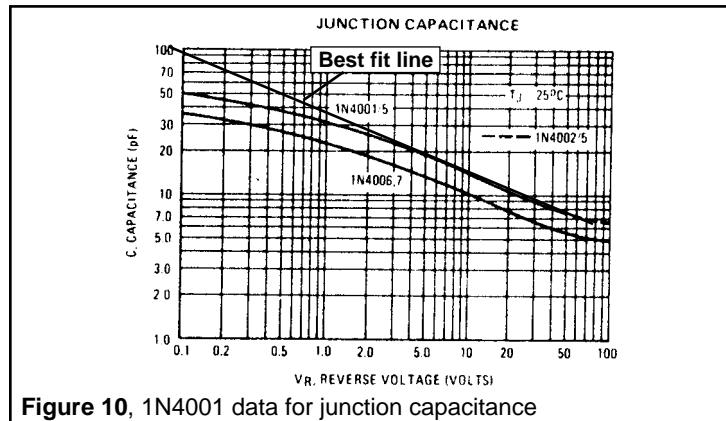
Figure 10, 1N4001 data for junction capacitance

$$M = \frac{\log\left(\frac{C1}{C2}\right)}{\log\left(\frac{V2}{V1}\right)} = \frac{\log\left(\frac{100p}{7p}\right)}{3} = 0.38 \qquad \text{Eq. 2.14}$$

Next, VJ is computed using 2 data points, one of which is near VD = 0. Using (50p,0.1V) and (15p,10V);

$$VJ = \frac{\left(V2 * \left(\frac{C1}{C2}\right)^{-\frac{1}{M}} - V1\right)}{\left(1 - \left(\frac{C1}{C2}\right)^{-\frac{1}{M}}\right)} = \frac{\left(10 * \left(\frac{50}{15}\right)^{-2.63} - 0.1\right)}{(1 - 0.4215)} = 0.34V \qquad \text{Eq. 2.15}$$
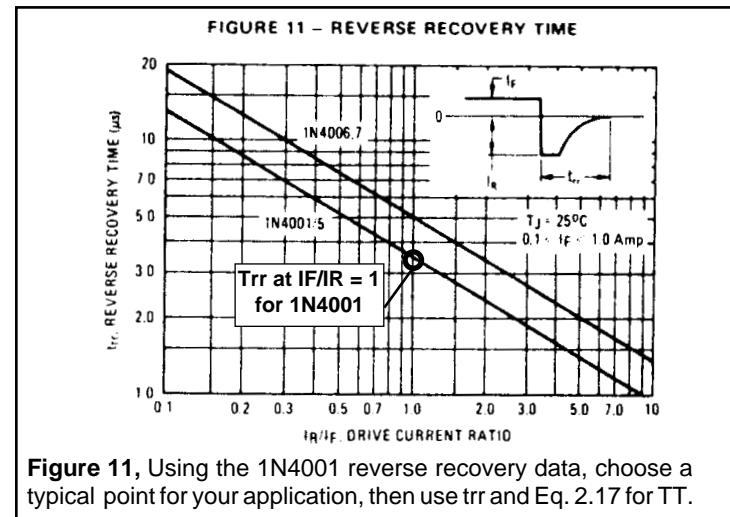
Finally, CJO is computed at one of the points (50p,0.1V).

$$CJO = \frac{C1}{\left(\left(1 + \frac{V1}{VJ}\right)^{-M}\right)} = \frac{50p}{(1.294^{-0.38})} = 55p \qquad \text{Eq. 2.16}$$

The built-in voltage, VJ, is not within the region predicted by the device's physical properties. Remember that the diode equation is a simplified representation of the semiconductor's physics and that fitting experimental data may result in unusual values. Radical departures should be confirmed via testing.

Diode reverse recovery time is a combination of transit time and depletion region charge removal, and is usually dominated by the transit time parameter. Using IR/IF = 1 from the data sheet gives a recovery time of 3.5USEC for IF = .1 to 1 Amps. When the diode current reverses polarity, charge is removed from the diode terminals as a linear function of time, and minority carrier recombination reduces the stored charge with the time constant, TT. When forward current equals reverse current, the transit time, TT is 1.44 * TS, the diode storage time. For the 1N4001,

$$TT = 1.44 * 3.5\mu s = 5\mu s \qquad \text{Eq. 2.17}$$

FIGURE 11 – REVERSE RECOVERY TIME

Figure 11, Using the 1N4001 reverse recovery data, choose a typical point for your application, then use trr and Eq. 2.17 for TT.

Generic Diodes

Modeling diodes is not always easy. Manufacturers rarely give junction capacitance values, and some don't even give forward conduction characteristics. The generic diode lets you create a model simply by providing maximum current (IMAX), maximum voltage (VMAX) and a reverse recovery time (TRR) parameter.

The generic model can be found in the DEVICE.LIB file. The concept of a generic component is simple. Using simple approximations based on semiconductor physics and basic principles surrounding the fabrication of semiconductors, it is possible to construct a model for a diode that is a function of data sheet parameters. Though usually incomplete, data sheet parameters can be converted into ISSPICE4 parameters. There are 14 ISSPICE4 diode parameters, 9 of which have unacceptable defaults. The model below uses data sheet parameters to alter these defaults and create a reasonable model.

Syntax: XNAME 1 2 DIODE {IMAX=# VMAX=# TRR=#}
Example: XD1 2 5 DIODE {IMAX=3 VMAX=100 TRR=3N}

Forward characteristics and capacitance are estimated from the parameters IMAX, VMAX, and TRR. Reverse recovery time is relatively independent of the current and voltage characteristics, and must be specified explicitly. If reverse recovery time is not given, you can assume that the diode is slow and use a value of 5 USEC. Junction capacitance is proportional to area, which is also proportional to current-carrying capability, IMAX. Breakdown voltage, storage time and manufacturing process also control capacitance. Unfortunately, the manufacturing process has a stronger influence than other electrical parameters, so the best estimate for CJO is IMAX. Actual capacitance data, either from measurements or the data sheet, is preferable to the default calculation which is based on IMAX values. Ohmic resistance increases with breakdown voltage, however, the vendor current and voltage specifications take this into account. IMAX will usually signal an increase in forward voltage over the ideal diode by .075 volts. The generic model will generally be within the range permitted by the JEDEC specification. Our usual caveat about designing with unspecified parameters applies; however, with diodes we take our chances! The following equations are used in the generic model:

$$CJO = 30P * IMAX$$
$$IS = 5N * IMAX$$
$$TT = 1.44 * TRR$$
$$BV = 1.5 * VMAX \qquad\qquad EQ.\ 2.18$$
$$IBV = 1UA$$
$$N = 2$$
$$M = .5$$
$$VJ = 1$$
$$RS = .075 / IMAX$$

The subcircuit is listed in the library as follows:

```
*************************************************
GENERIC DIODE, PARAMS ARE IMAX,TRR,VMAX
.SUBCKT DIODE 1 2
D1 1 2 DIODE
.MODEL DIODE D(CJO={30P*IMAX} IS={5N*IMAX}+TT={1.44*TRR}
+ BV={1.5*VMAX} IBV=1UA N=2 RS={.075/IMAX})
.ENDS
*************************************************
```

The generic model uses the parameter passing feature to pass parameters from the subcircuit call line "X" into the subcircuit. To use the generic subcircuit model, call the subcircuit with the proper command line extensions.

For example, placing the following line in your netlist will call the generic diode subcircuit and pass the IMAX, TRR, and VMAX parameters into the subcircuit. The parameters below are from a 1N4001 data sheet.

  X1 5 6 DIODE {IMAX=1 TRR=3.5U VMAX=35}
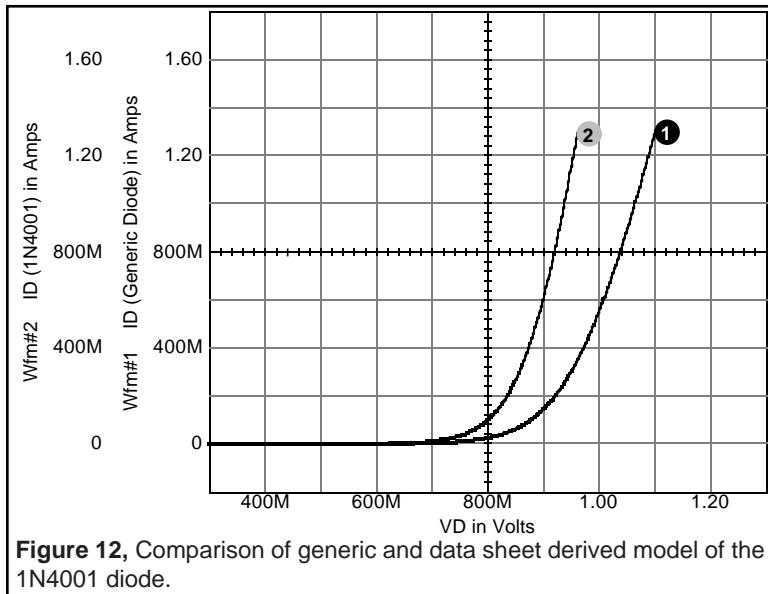
Param will then evaluate the expressions that are in curly braces using the passed parameters, and then replace the expressions with numbers. The following subcircuit netlist will result:

```
.SUBCKT DIODE 1 2
D1 1 2 DIODE
.MODEL DIODE D(CJO=30.000P  IS=5.0000N  TT=5.0400U
+ BV=52.500   IBV=1UA  N=2  RS=75.000M)
.ENDS
```

Recalling our earlier study of modeling, the 1N4001 diode model looks something like this:

```
.MODEL  DN4001  D(N=1.7  RS=0.04  IS=1.38E-9  BV=75
IBV=.05U +M=.38 VJ=.34 CJO=55PF TT=5U)
```

For comparison, a simulation of forward bias current versus voltage for both models is shown in the graph below. You will notice that the derived model has a bit more current at the same level of voltage bias. Careful examination of both models reveals that all the parameters except for RS are quite close. The parameter RS will have an effect on the data you see in the figure. Referring back to Figure 9, the actual data predicts that the current should be around 10 amps for a forward voltage of 1.5. The generic model is not far off at about 6 amps, and provides an excellent model quickly and easily without complex calculations. The generic calculation for RS is conservative and

Figure 12, Comparison of generic and data sheet derived model of the 1N4001 diode.

must be reduced for the model to behave more like the real device. Parameter tweaking is not uncommon when modeling any device; in fact, it's encouraged.

Modeling Schottky Barrier or Germanium Diodes

For Schottky barrier diodes, EG, the energy gap should be .69. For germanium diodes, EG should be .67. For Schottky barrier diodes, XTI, the saturation current temperature exponent, should be 2.0. The emission coefficient is closer to 2.0 for Schottky barrier diodes, in contrast with the average PN diode which is closer to 1.0. Additionally, the saturation current, IS, will be one to two orders of magnitude higher than IS in the junction diode. The rest of the diode parameters are calculated as before.

Generic Zener Diodes

A simple zener diode can be simulated by making the breakdown voltage parameter, BV, equal to the Zener voltage, VZ, and making the current at breakdown, IBV, equal to the Zener current, IZT. However, this approximation leaves out some other important parameters. By using the enhanced generic zener model, all relevant parameters will be taken into account.

Two zener diode families have been modeled. They are in DEVICE.LIB and DEVICE2.LIB, and are modeled as subcircuits called LZEN and HZEN in order to distinguish between the low and high voltage families. The only parameter you need to enter is the breakdown voltage, BV.

Syntax: XNAME 1 2 LZEN {ZV=#}
Example: XD1 8 3 LZEN {ZV=9.1}

LZEN models the 1N746-759 and 1N4370-4372 family for voltages from 2.4 to 12.0 volts. HZEN models the 1N957-992 family for voltages ranging from 6.8 to 200 Volts. Zener impedance is computed using a polynomial function, and the typical values are 50% of the data sheet maximum. Temperature coefficients are not modeled. Dynamic parameters and forward conduction characteristics are estimated, however, these parameters are not given in vendor data sheets. Circuit dependence on these unspecified parameters is risky because different vendors are free to use any process to produce parts that meet only JEDEC specifications.

Zener Diode breakdown voltage and impedance are related because of the test circuit specification. The families modeled here have relatively high test currents. If a device is supplied that also has maximum impedance, your typical operating point will be substantially lower than the diode breakdown voltage. We have used the series resistance to compute the breakdown voltage at the lower current which is used in the simulation via the following equation:

$$IBV = ITEST, BV = ZV - ITEST * RS \qquad \text{Eq. 2.19}$$

where RS is a polynomial function of ZV, and ITEST is 20mA for LZEN and .125/ZV for HZEN.

Note that the polynomial function in DEVICE.LIB is scaled by .5 to account for the nominal versus maximum specification. Changing this scaling constant for both the breakdown and series resistance equations in DEVICE.LIB will show how "worst case" devices change your circuit behavior.

Junction capacitance can be calculated as a function of breakdown voltage, based on Sze [7-1, chapter 2, eq. 18, 22, 79]. For abrupt junctions, $CJO = KA(VB)^{-.665}$ and linear junctions give $CJO=KL(VB)^{-.825}$. The information given in Sze [7-1, figure 26 and 28] leads to the conclusion that high voltage zeners are more likely to use abrupt junctions (M=.5) and low voltage devices would use linearly graded junctions (M=.33), hence the choice of the capacitance exponent and grading coefficients in the two models. Both Zener diode models, LZEN and HZEN, are shown below.

```
**********************************
*MODEL FOR 1N746-1N759 AND 1N4370-4372 ZENERS
.SUBCKT LZEN 1 2
D1 1 2 DZEN
.MODEL DZEN D(N=1.27IBV=20MA RS={0.5*(3.8263+27.7*ZV-
+ 9.0796*ZV^2+.9678*ZV^3-.03237*ZV^4)}
+ BV={ZV-0.5*.02*(3.8263+27.7*
+ ZV-9.0796*ZV^2+.9678*ZV^3-.03237*ZV^4)}
+ CJO={1560P*ZV^-.825} TT=50N M=.33 VJ=.75 IS=1E-11)
.ENDS
**********************************
.SUBCKT HZEN 1 2
D1 1 2 DZEN
.MODEL DZEN D(RS= {0.5*(-2.883224E0 + 7.217979E-1*ZV
+ 5.562566E-2*ZV^2-1.139204E-3*ZV^3+1.793862E-5*
+ ZV^4-8.529727E-8*ZV^5+1.226089E-10*ZV^6)}
+ BV={ZV-0.5*.125/ZV*(-2.883224E0 + 7.217979E-1*ZV +
+ 5.562566E-2*ZV^2+ -1.139204E-3*ZV^3 + 1.793862E-
+ 5*ZV^4 -8.529727E-8*ZV^5 +1.226089E-10*ZV^6)}
+ CJO={3500P*ZV^-.665} TT=20N N=2 IS=1E-9 IBV={.125/ZV})
.ENDS
**********************************
```

BJTs

Bipolar Junction Transistors

Syntax: QNAME Collector Base Emitter <Substrate> Modelname
+ AREA OFF IC=VBE, VCE

Example: QPWR 1 2 3 QN3055A
.MODEL QN3055A NPN IS=4.66P BF=360 XTB=1 TR=2.55U
+TF=80N CJC=212P CJE=580P IKF=.25 PTF=120 XTF=1
+ITF=3ISE=33.4P ISC=15N RB=3 IRB=1M RBM=.4 RC=.04
+NE=1.5 MJC=.4 MJE=.4 VJC=1.8 VJE=.75 BR=2 VAF=100

The IsSPICE4 BJT is based on the Gummel-Poon [3-1] integral charge control model. The IsSPICE4 model actually extends the original Gummel-Poon model to include several effects at high bias levels. It reverts to the Ebers-Moll [3-2] model when certain parameters are not specified. The large and small signal models, shown schematically on the next page, are described more fully by Nagel, [3-3].

Default BJT Limitations

Like the diode, the forward and reverse storage transit time are zero (TF, TR). Charge storage (CJE, CJC) is also neglected. The forward and reverse short circuit current gains (BF, BR) do

not vary with the operating point. The ohmic resistances (RE, RB, RC) are ignored. The effect of the saturation current (IS) on VBC (early effect) is ignored. Other effects that are not modeled include large geometry effects, forward or reverse second breakdown, and thermal feedback that causes junction temperature to rise as a function of power dissipation.
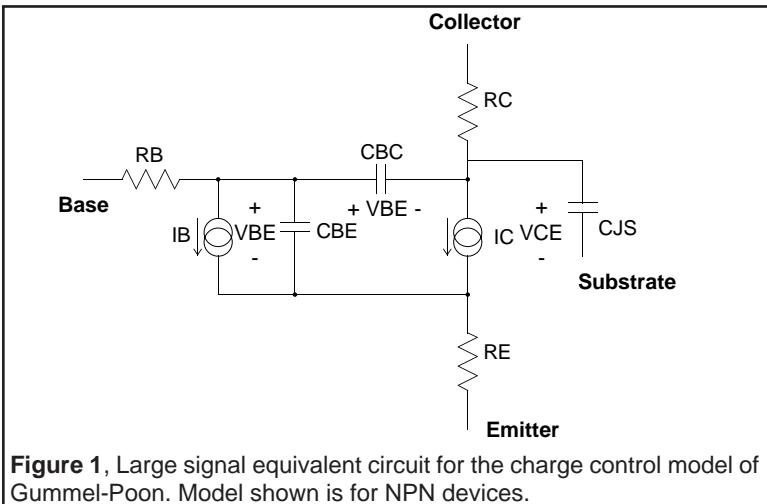
Figure 1, Large signal equivalent circuit for the charge control model of Gummel-Poon. Model shown is for NPN devices.
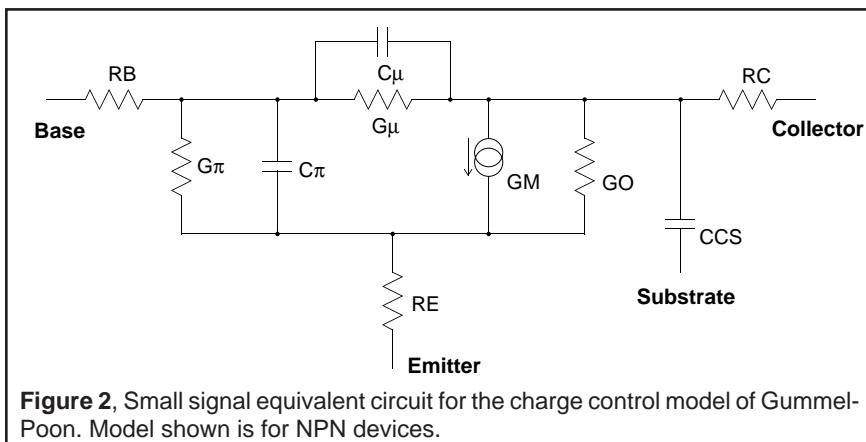
Figure 2, Small signal equivalent circuit for the charge control model of Gummel-Poon. Model shown is for NPN devices.

The ISSPICE4 BJT Model

The ISSPICE4 BJT large signal (Transient, Nonlinear DC analyses) and small signal (AC analysis) models are shown in Figures 1 and 2, respectively. The ohmic resistance of the collector, base and emitter regions are modeled by the linear resistors, RC, RB, RE. When these resistors are given values, nodes are added to the model, which causes longer simulation run time and reduces the available memory for the simulation. Some Intusoft ISSPICE4 models for transistors only use the collector resistance in order to minimize the model's memory requirements. The two nonlinear current sources, IC and IB, determine the BJT DC characteristics.

The value of IC and IB are defined by the following equations:

$$IC = \frac{IS}{QB}\left(e^{\frac{VBE}{NF*VT}} - e^{\frac{VBC}{NR*VT}}\right) - \frac{IS}{BR}\left(e^{\frac{VBC}{NR*VT}} - 1\right) - ISC\left(e^{\frac{VBC}{NC*VT}} - 1\right) \qquad \text{Eq. 3.1}$$

$$IB = \frac{IS}{BF}\left(e^{\frac{VBE}{NF*VT}} - 1\right) - ISE\left(e^{\frac{VBE}{NE*VT}} - 1\right) + \frac{IS}{BR}\left(e^{\frac{VBC}{NR*VT}} - 1\right) + ISC\left(e^{\frac{VBC}{NC*VT}} - 1\right)$$
$$\text{Eq. 3.2}$$

While these equations and the evaluation of their coefficients appear formidable, you should remember that most applications will reverse bias the collector-base junction, which effectively eliminates all terms involving VBC (shaded areas).

QB is approximated by the following equation:

$$QB = .5*Q1(1 + \sqrt{1 + 4Q2}) \qquad \text{Eq. 3.3}$$

where Q1 is the depletion layer stored charge and Q2 is the excess majority carrier base charge that results from injected minority carriers. Q1 and Q2 are defined in the following equations:

$$Q1 = \frac{1}{1 - \frac{VBC}{VAF} - \frac{VBE}{VAR}} \qquad \text{Eq. 3.4}$$
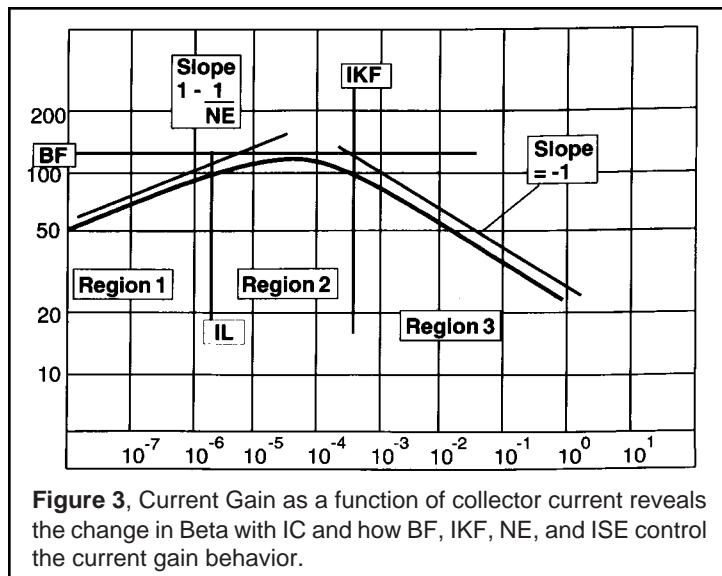
$$Q2 = \frac{IS}{IKF}\left(e^{\frac{VBE}{NF*VT}} - 1\right) + \frac{IS}{IKR}\left(e^{\frac{VBC}{NR*VT}} - 1\right)$$ Eq. 3.5

If the terms ISC and ISE are zero and VAF, VAR, IKF and IKR are infinite, then the model reverts to the Ebers-Moll model, which is the ISSPICE4 default.

The terms IS,NF,ISE,NE,IKF,BF and VAF can all be evaluated with the base-emitter forward biased and the base-collector reverse biased. The reverse counterparts NR,ISC,NC,IKR,BR and VAR can be found by exchanging the collector and emitter of the transistor, or by making measurements. The latter method describes the saturation characteristics of the device, and is usually all that is available from data sheets.

Figure 3, Current Gain as a function of collector current reveals the change in Beta with IC and how BF, IKF, NE, and ISE control the current gain behavior.

This model provides three regions of operation that are a function of collector current. Both high and low current regions will exhibit a fall-off in current gain that is controlled by IKF for high currents, and the combination of NE and ISE for low current behavior. In the mid region, behavior is determined by BF, NF and IS. All of the parameters except for VAF can be determined from plots of log(IC,IB) vs. VBE. VAF is the small

signal output resistance multiplied by the collector current in the mid region. Figure 3 shows the parameter relationships in the forward active region when the log(IC,IB) vs. VBE data is available.

Base Resistance

The base resistance, RB, can be modeled as a nonlinear function of the DC operating point using the following equations by also specifying RBM or both RBM and IRB.

If IRB is not specified:

$$RBB = RBM + \frac{RB \text{ - } RBM}{QB}$$

Eq. 3.6

If IRB and RBM are specified:

$$RBB = 3\,(RB \text{ - } RBM)\,\frac{\tan\,(Z) \text{ - } Z}{Z * \tan\,(Z)^2}$$

Eq. 3.7

where:

$$Z = \frac{-1 + \sqrt{1 + \dfrac{144 * IB}{\pi^2 * IRB}}}{24\pi^2\,\sqrt{\dfrac{IB}{IRB}}}$$

Eq. 3.8

Determining DC Model Parameters from Data Sheets

Vendor data sheets usually don't provide sufficient detail to define the DC model parameters from the plot of Figure 4; however, data is generally available to calculate model parameters, based on the procedures outlined in this section. The following data is the minimum required to extract DC parameters.

HFE as a function of collector current
VBE as a function of base or collector current at or near maximum HFE and with the base-collector reverse biased
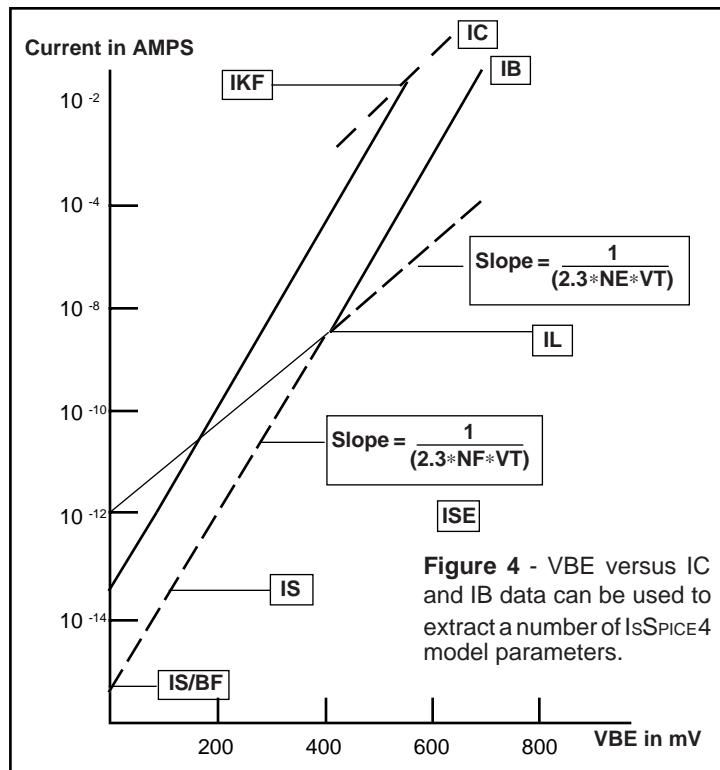
IS: Saturation Current, Default=1E-16
NF: Forward Current Emission Coefficient, Default=1
BF: Ideal Maximum Forward Bias Beta, Default=100

Figure 4 - VBE versus IC and IB data can be used to extract a number of IsSPICE4 model parameters.

BF is the maximum HFE value as a function of current.

IS and NF are found using the techniques used to find IS and N in the Diodes section . Be sure to multiply IS by BF if you use base current instead of collector current.

VAF: Forward Early Voltage, Default=∞

VAF will usually range between 50 and 200 volts. If you have small signal parameters available,

$$VAF = \frac{IC}{hoe(IC)}$$ otherwise, set VAF = 100

IKF: Corner for BF High Current Rolloff, Default=∞

IKF is the collector current at which HFE is 50% below its maximum value, in the high injection region.

NE: B-E Leakage Emission Coefficient, Default=1.5
ISE: B-E Leakage Saturation Current, Default=0

The second term in equation 3.2 causes an increase in base current at low base-emitter voltage. The current at which the first 2 terms are equal is the 50% HFE fall-off on the low current side of the HFE vs IC curve. The slope is given by:

$$\frac{d(HFE)}{d(\log(IC))} = 1 - \frac{NF}{NE}$$

For integrated circuits, NE is usually near 2 and NF is near 1.

$$ISE = \frac{IC(50\%)}{\left(BF * e^{\left(\frac{VBE}{(NE * VT)}\right)}\right)}$$

RB: Zero Bias Base Resistance, Default=0
RC: Collector Resistance, Default=0
RE: Emitter Resistance, Default=0

In most applications, it is sufficient to model the ohmic collector resistance, RC. RC is used to account for the increase in saturation voltage at high current.

$$RC = \frac{(VCE - VSAT)}{IC}$$

where VCE and IC are data sheet specifications and VSAT is the value predicted by the model with RC = 0.

Many small signal applications have a relatively high value of base resistance compared to the value calculated using the curves of Figure 4. If this higher value causes incorrect large signal behavior, then it will be necessary to specify RBM, causing the base resistance to become lower at high currents.

To shape the nonlinearity further, you can specify IRB, the current at which RB falls to half its zero bias value. Beware of device models that contain large values (> 10 Ohms) for RB without the specification of IRB and RBM. Their small signal behavior may be correct, but they will be incorrectly biased.

Reverse Parameters

The reverse parameters, BR,VAR,IKR,NR and ISC will not affect operation in the forward linear region. With the exception of VAR, these parameters will cause changes in saturation voltage. RC is usually dominant for high currents, and BR can be used to establish a saturation voltage at low currents, while leaving the other parameters at their default values. Specialized applications, such as chopper switches that operate the transistor with the collector and emitter interchanged, will require that experimental data be taken.

BJT Dynamic Parameters

The nonlinear capacitances (CBE and CBC) account for charge storage in the BJT model. The following equations express the relationship of the model parameters to these capacitances:

Junction Capacitance

$$CBE = TFF \frac{IS}{QB*VT*NF} e^{\frac{VBE}{NF*VT}} + \frac{CJE}{\left(1 - \frac{VBE}{VJE}\right)^{MJE}} \qquad \text{Eq. 3.9}$$

$$CBC = TR \frac{IS}{VT*NR} e^{\frac{VBC}{NR*VT}} + \frac{CJC}{\left(1 - \frac{VBC}{VJC}\right)^{MJC}} \qquad \text{Eq. 3.10}$$

$$CSS = \frac{CJC}{\left(1 - \frac{VCS}{VJS}\right)^{MJS}} \qquad \text{Eq. 3.11}$$

where:

$$TFF = TF\left(1 + VTF\left(\frac{IF^2}{(IF+ITF)^2} e^{\frac{VBC}{(1.44*VT)}}\right)\right) \qquad \text{Eq. 3.12}$$

$$IF = IS\left(e^{\frac{VBE}{NF*VT}} - 1\right) \qquad \text{Eq. 3.13}$$

Forward Biased Capacitance:

All capacitances of the form: $\qquad \dfrac{CO}{\left(1 - \frac{V}{\Phi}\right)^M}$ $\qquad$ Eq. 3.14

revert to the form:

$$\frac{CO}{(1 - FC)^{1+M}}\left\{1 - FC(1+M) + M\frac{V}{\Phi}\right\} \qquad \text{Eq. 3.15}$$

when V > FC, and FC taken as 0 for CSS.

Determining Dynamic Parameters from Data Sheets

The first terms of equations 3.9 and 3.10 describe stored charge from minority carrier injection, and the second terms represent voltage dependent depletion layer capacitance. You can refer to the Diodes section for determining the ISSPICE4 parameters for depletion layer capacitance.

TF: Forward Transit Time, Default=0

The forward transit time determines the transistor gain band-width product in the forward active region. The transistor gain bandwidth product in the forward active region is:

$$\frac{1}{2\pi F_t} = TF*QB + \frac{VT}{IC}\left(\frac{CJE}{\left(1 - \frac{VBE}{VJE}\right)^{MJE}} + \frac{CJC}{\left(1 - \frac{VBC}{VJC}\right)^{MJC}}\right) \qquad \text{Eq. 3.16}$$

Maximum Ft occurs when operating at collector current below IKF and for high VCB. Under these conditions, the above equation simplifies to:

$$TF = \frac{1}{2\pi F_t}$$

Eq. 3.17

Maximum Ft is usually found in the data sheet.

TR: Reverse Transit Time, Default=0

Reverse transit time (TR) is primarily responsible for transistor storage time and is determined from pulsed turn-off tests, [3-4].

$$TR = \frac{\dfrac{Ts}{BR}}{\ln\left(\dfrac{IB1 + IB2}{\dfrac{IC1}{IF} + IB2}\right)}$$

Eq. 8.18

where:

Ts   is the storage time

IC1   is the initial collector current when the transistor is saturated

IB1   is the forward base current used to turn the transistor on.

IB2   is the reverse base current used to turn the transistor off.

For the IsSPICE4 default of BR = 1, BF = 100 and for the typical test condition of IB1 = IB2, the equation simplifies to:

$$TR = 0.6 * Ts$$

BJT AC Parameters

Several additional parameters are used for the IsSPICE4 AC analysis to model transistor noise. The resistors RC, RB and RE are each given an equivalent noise current of:

Bulk resistor Noise:

$$I^2 = 4*K*T*\frac{B}{R}$$

Eq. 3.19

where   I is the spectral noise, Amps/RTHz

K is Boltzman's constant, 1.38E-23 Joules/Kelvin

T is temperature in Deg. Kelvin

B is Bandwidth in Hz

The AC analysis will sum the square of the noise currents, and assume a noise bandwidth, B, of 1 Hz. Shot and flicker noise are modeled for the base and collector currents by:

Shot and Flicker Noise:

$$In^2 = 2*q*I*B + KF*B*(I)^{\frac{AF}{F}}$$ Eq. 3.20

where In is the spectral noise, $Amps/\sqrt{Hz}$. F is the analysis frequency, q is the charge of an electron, 1.6E-19 Coulombs.

AF and KF can be estimated from data sheets when information is available, otherwise assume the two terms are equal at about 1KHz, and solve for KF with AF=1, the default value. This estimate yields KF = 3.2E-16.

In the AC analysis, phase is a linear function of frequency, with PTF specifying the phase, in degrees, at Ft.

BJT Temperature Parameters

$$\frac{IS(T)}{IS(T_{NOM})} = \left(\frac{T}{T_{NOM}}\right)^{\frac{XTI}{NF}} \exp\left[\left(\frac{EG}{NF*VT}\right)\left(\frac{T - T_{NOM}}{T_{NOM}}\right)\right]$$ Eq 3.21

For ISE and ISC, NF =1.

$$\frac{ISE(T)}{ISE(T_{NOM})} = \left(\frac{T}{T_{NOM}}\right)^{\frac{XTI}{NE} - XTB} \exp\left[\left(\frac{EG}{NE*VT}\right)\left(\frac{T - T_{NOM}}{T_{NOM}}\right)\right]$$ Eq 3.22

$$\frac{ISC(T)}{ISC(T_{NOM})} = \left(\frac{T}{T_{NOM}}\right)^{\frac{XTI}{NC} - XTB} \exp\left[\left(\frac{EG}{NC*VT}\right)\left(\frac{T - T_{NOM}}{T_{NOM}}\right)\right]$$ Eq 3.23

$$BF(T) = BF*\left(\frac{T}{T_{NOM}}\right)^{XTB}$$ Eq 3.24

$$BR(T) = BR*\left(\frac{T}{T_{NOM}}\right)^{XTB}$$ Eq 3.25

For both the Collector (VJC) and Emmiter (VJE) junctions;

$$VJ(T) = VJ*\left(\frac{T}{T_{NOM}}\right) - 2*VT*\ln\left(\frac{T}{T_{NOM}}\right)^{1.5} - \left[\left(\frac{T}{T_{NOM}}\right)*EG(T_{NOM}) - EG(T)\right]$$ Eq 3.26,27

217

An Enhanced BJT Default

The BJT default in IsSPICE4 gives first order, Ebers-Moll, DC parameters; but it does not provide parameters for Transient or AC analysis. The following default can be used when minimal data sheet specifications are available by using the PARAM program to evaluate the equations in curly braces. This model will create a good transistor model from virtually any data sheet. The parameters you must specify are:

IMAX	Maximum collector current
COB	Collector-base capacitance
FT	Gain bandwidth product in Hz
TS	Storage time

The equation-based model is shown below:

```
.MODEL NBJT NPN (CJC={2.2*COB} TF={.16/FT} TR={1.7*TS}
+CJE={7*COB} RC={.5/IMAX} VAF=100 IKF={.7*IMAX}
+ IS={2E-15*MAX} )
```

This subcircuit-based macro model makes use of the default model parameters so that it is not permissible to change default values without reevaluating the parameters which are given here.

Model Limitations

The IsSPICE4 BJT model limitations include the limitations listed for diodes as well as:

Neither forward nor reverse bias second breakdown is modeled.

Large geometry effects are not modeled.

Power Transistors

The turn-off behavior of the power BJT can be approximated by
paralleling BJTs and using a base resistor to connect the bases
of the transistors. The topology shown in the subcircuit below
will produce the turn-off tail associated with quasi-saturation.
The value of RB and IKF will tend to control the turn-off tail.

```
.SUBCKT NPWR 1 2 3
Q1 1 2 3 QPWR AREA=.67
Q2 1 4 3 QPWR AREA=.33
RB 2 4 {RB}
.MODEL NPWR NPN(...IKF=...)
.ENDS
```

The generic power transistor subcircuit, "NPWR" can be found
in DEVICE.LIB.

For medium power BJTs (40-200V, 5-50 Amps) the standard
Gummel-Poon model may be used. Modeling more complex
effects such as the nonlinear variation of collector resistance
with current will require the use of nonlinear resistors in the
collector and base regions.

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[3-2] LARGE SIGNAL BEHAVIOR OF JUNCTION TRANSIS-
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[3-3] SPICE2: A COMPUTER PROGRAM TO SIMULATE
       SEMICONDUCTOR CIRCUITS
       L.W. Nagel, Memorandum No. ERL-M520, May 1975,
       Electronics Research Laboratory, College of Engineer-
       ing, University of California, Berkeley

[3-4] PARAMETER DETERMINATION TECHNIQUES FOR
       THE GUMMEL-POON CAD TRANSISTOR MODEL
       J.C.Bowers, N. English and H.A.Nienhaus, Power Elec-
       tronics Specialists Conference Proceedings pp 83-90,
       June 1980

JFETs

Junction Field Effect Transistors

Syntax: JNAME Drain Gate Source Modname
            +<Area> <Off> <IC=Vds, Vgs>
Example: JRES 1 2 3 JFET
            .MODEL JFET NJF (VTO=-1.1 BETA= 15M LAMBDA=.001
            +RS=.5 RD=1.5 CGS=50P CGD=50P PB=.2 IS=1E-15)

Overview

The JFET is a device that allows a current to flow which is proportional to an electric field, basically emulating a voltage controlled resistor. It has a variety of applications in analog switching, high input impedance amplifiers and various integrated circuits. The IsSPICE4 JFET model is taken from the quadratic FET model of Shichman and Hodges, [4-1]. The large and small signal IsSPICE4 models for an n-channel JFET are shown in figure 1. The p-channel model is schematically identical, except that all polarities are reversed. RD and RS are linear resistors that model the ohmic resistance of the drain and source. The pn junctions between the gate and source and gate and drain terminals are modeled by the two parasitic diodes. Charge storage is modeled by two nonlinear depletion layer capacitors, CGS and CGD, and model parameter PB.
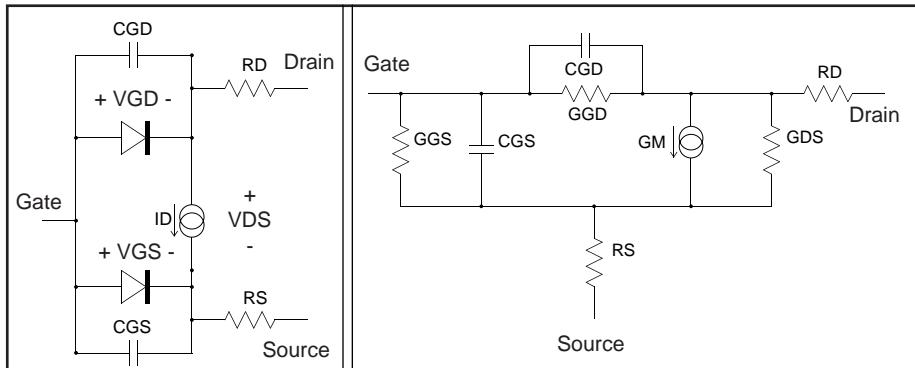
Figure 1, Large signal model, left, has diodes modeled similar to the standard diode, Except N = 1 and PB replaces VJ. Small signal model shown to the right. Models shown are for N channel devices.

DC Characteristics

The DC characteristics which are determined by VTO, BETA, LAMBDA, and IS, are shown below and are modeled as follows:

Forward Region, VDS > 0   Eq. 4.1

VG - VTO $\langle$ 0:   ID = 0

0 $\langle$ VGS - VTO $\langle$ VDS: ID = BETA $*$ (VGS - VTO)^2 * (1 + LAMBDA $*$ VDS)

0 $\langle$ VDS $\langle$ VGS - VTO: ID = BETA$*$VDS$*$(2$*$(VGS - VTO) - VDS)$*$(1 + LAMBDA$*$VDS)

| **Reverse Region, VDS < 0**   Eq. 4.2

VG - VTO $\langle$ 0:   ID = 0

0 $\langle$ VGS - VTO $\langle$ - VDS: ID = - BETA $*$ (VGS - VTO)^2 * (1 - LAMBDA $*$ VDS)

0 $\langle$ - VDS $\langle$ VGS - VTO: ID = BETA$*$VDS$*$(2$*$(VGS - VTO) - VDS)$*$(1 - LAMBDA$*$VDS)

When dealing with FETs, the region of linear circuit operation is known as the forward saturated region, (VGS - VTO) < VDS, and the linear region is named for the linear relation between drain current and gate voltage when VDS < (VGS - VTO). This reversal of names between the physical and circuit behavior may lead to confusion when circuit designers deal with the physics of semiconductor devices. N-channel JFETs usually

have a negative threshold, and by convention the p-channel JFET threshold is also negative for IsSPICE4. Positive values of VTO are used when enhancement mode behavior is required.

The diodes in the JFET are described in the same manner as in equation 4.1 except that the emission coefficient, N, is taken as 1; it cannot be varied in the JFET model. The PN junctions between the gate and the channel of a real JFET are subject to breakdown, however, this effect is not modeled in IsSPICE4.

Dynamic Behavior

JFET dynamic parameters are determined by the nonlinear capacitors, CGS and CGD. The capacitance values are computed using the same equations as for diodes with PB replacing the term VJ in equations 2.3 and 2.4. The junction grading coefficient (M) is set to .5 and cannot be varied in the IsSPICE4 JFET.

Noise

Thermal, shot, and flicker noise are modeled in the JFET.

Resistor Noise (RS and RD):

$$I^2 = 4 * k * T * \frac{B}{RS} \qquad\qquad \text{Eq. 4.3}$$

$$I^2 = 4 * k * T * \frac{B}{RD} \qquad\qquad \text{Eq. 4.4}$$

Shot and Flicker Noise:

$$ID^2 = 8 * k * T * \frac{gm}{3} + KF * ID\frac{AF}{f} \qquad\qquad \text{Eq. 4.5}$$

where gm is the small signal transconductance of the JFET, k is Boltzman's constant and T is temperature in degrees Kelvin.

Temperature Dependence

IsSPICE4 accounts for the temperature dependence of the parameters related to the parasitic diodes, IS, FC, PB, CGS, and CGD. The IsSPICE4 TEMP options parameter is used to vary the simulation temperature.

Determining JFET Parameters from Data Sheets

VTO: Threshold Voltage, Default = -2

The threshold voltage is usually given explicitly. Sometimes a closely related parameter, the gate-source cutoff voltage, VGS(off), is specified. The threshold is usually somewhat greater than the cutoff voltage; however, it is close enough for most applications. VTO is negative for both N and P channel depletion JFETs. VTO is positive for enhancement mode JFETs (See Figure 2).

BETA: Transconductance, Default = 1E-4

BETA is related to transconductance in the forward saturated region by:

$$gm = 2 * BETA * (VGS - VTO) \qquad \text{Eq. 4.6}$$
or equivalently by:
$$BETA = \frac{IDSS}{VTO^2} \text{ when VGS = 0} \qquad \text{Eq. 4.7}$$

In the forward linear region, the ON conductance is:

$$gon = 2 * BETA * (CGS - VTO) \text{ when VDS = 0} \qquad \text{Eq. 4.8}$$

Data sheet specifications will usually allow one of the above forms to be used to obtain BETA. JFETs used as amplifiers will usual specify tranconductance and equation 4.6 will give BETA. Switching devices will specify IDSS and power devices Gon or Ron, making equation 4.7 or 4.8 appropriate (See Figure 3).

LAMBDA: Channel Length Modulation Parameter, Default = 0

The output conductance, Gds, is related to LAMBDA in the forward saturated region as follows:

$$gds = BETA * LAMBDA * (VGS - VTO)^2 = LAMBDA * ID \qquad Eq.\ 4.9$$

Amplifier data sheets will usually specify the small signal output conductance and will either give ID or specify that VGS = 0. LAMBDA's value is typically between 0.1 and 0.01 V^{-1}. This parameter plays the same role as VAF for BJTs, except its units are reciprocal volts. LAMBDA = .02 is a good default if insufficient information is given (See Figure 4).

RS and RD: Source and Drain Ohmic Resistances, Default=0

The resistance RS should be included in the model to account for the variation in output conductance in the saturation region. Normally, as VGS is decreased in value, the value of current will rise exponentially. RS is the slope of the ID vs VGS curve in the saturation region. To change the rate at which the current rises with decreasing VGS, increase the value of RS.

The resistance RD is used to vary the response in the linear region. Without RD, the linear region characteristic curves will tend to be overly steep. Adding RD will decrease the slope of the linear region characteristic as shown in Figure 5.

CGS and CGD: Nonlinear Junction Capacitors, Default = 0
PB: Gate Junction Potential, Default = 1
M: Junction Grading Coefficient, Set at .5

CGS and CGD are voltage dependent depletion region capacitors having the same response as that of the diode capacitance, CJO. Calculation of CGS and CGD should proceed in the same manner as for the diode capacitance. If reverse voltage data is not available, however, commonly supplied values for Ciss (input capacitance) and Crss (reverse transfer capacitance) may be used.

CGS = Ciss - Crss	Eq. 4.9
CGD = Crss	Eq. 4.10

The value of M is set to .5 and cannot be changed. PB is equivalent to the diode VJ parameter, and is found using similar methods (Eq. 2.15) Other parameters can be determined in the same manner as described for diodes.

Parameter Tweaking

The graphs on the following page can be used as a guide when creating a JFET model. The graphs will give you an idea of how to vary or tweak important parameters in order to achieve the correct device response.

The following test circuit may be used to generate a set of DC characteristic curves. The accuracy of the parameter set can then be determined, and any appropriate variables may be tweaked to refine the model.
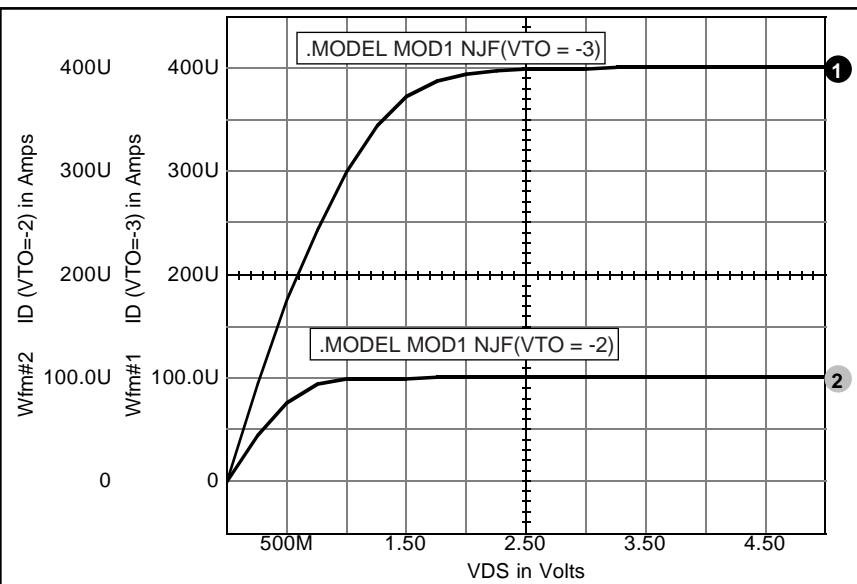
Figure 2, ID vs. VDS for various values of Threshold, VTO.
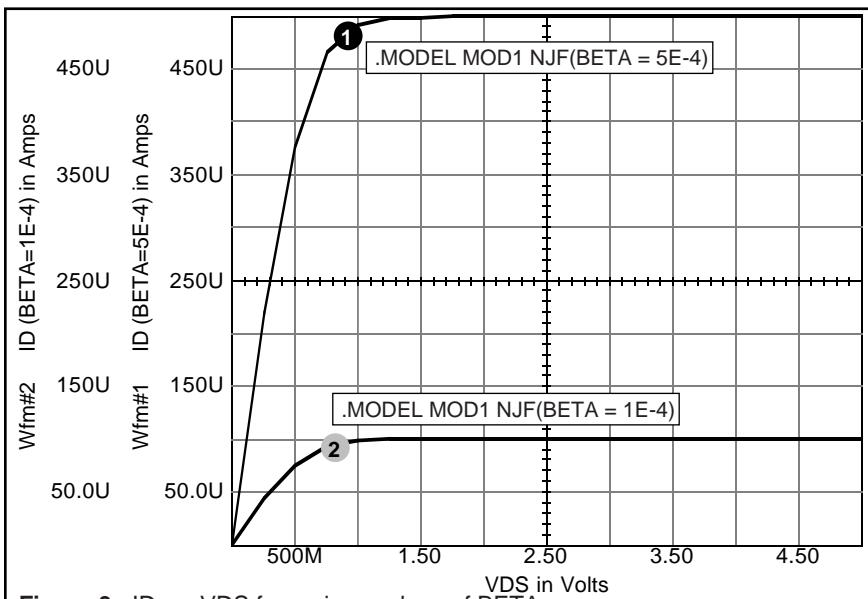
Figure 3 , ID vs. VDS for various values of BETA.
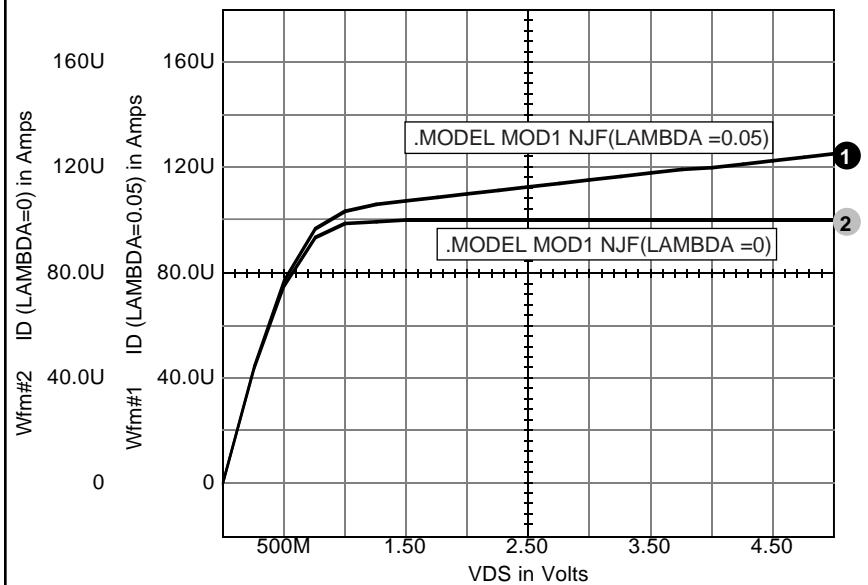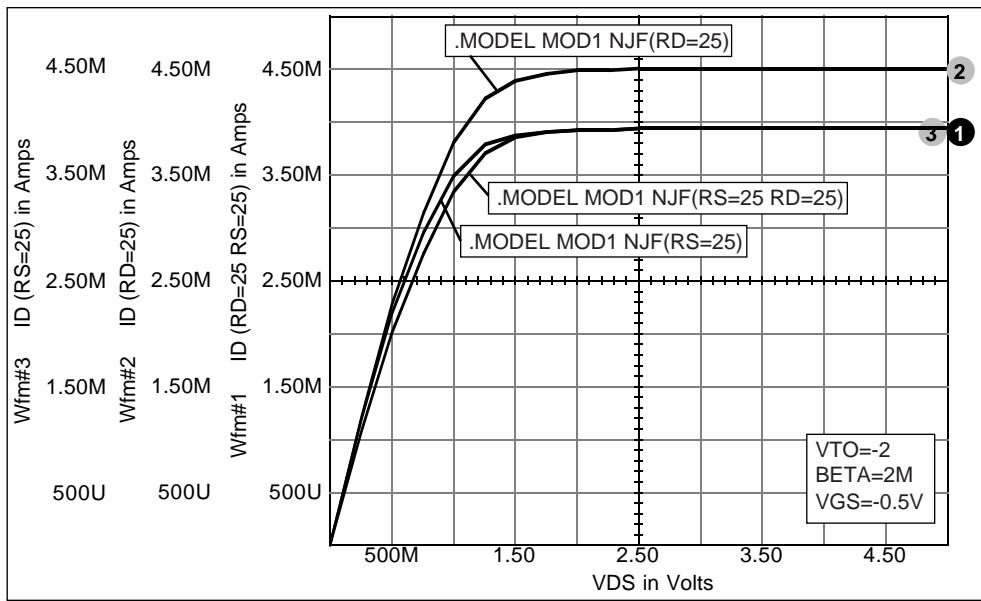
Figure 4, ID vs. VDS for various values of the channel length modulation parameter, Lambda.

The graph axes and labels:

Wfm#3 ID (RS=25) in Amps: 4.50M, 3.50M, 2.50M, 1.50M, 500U

Wfm#2 ID (RD=25) in Amps: 4.50M, 3.50M, 2.50M, 1.50M, 500U

Wfm#1 ID (RD=25 RS=25) in Amps: 4.50M, 3.50M, 2.50M, 1.50M, 500U

.MODEL MOD1 NJF(RD=25)

.MODEL MOD1 NJF(RS=25 RD=25)

.MODEL MOD1 NJF(RS=25)

VTO=-2
BETA=2M
VGS=-0.5V

VDS in Volts: 500M, 1.50, 2.50, 3.50, 4.50

```
JFET CHARACTERISTICS
.DC VDS 0 5 .25
.MODEL MOD1 NJF
*VIDS measures ID. Could have
*used VDS, but ID would
*be negative
.PRINT DC  I(VIDS)
VIDS  1  2
VDS  1  0
J1  2  7  0  MOD1
VGS  7  0 -1
.END
```

I(VIDS)
ID

VDS

J1
MOD1

VGS
-1
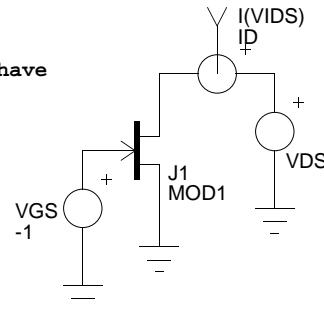
Figure 6, The simple circuit shown above can be used to generate a characteristic set of curves. The line ".MODEL MOD1 NJF ..." should contain the model under investigation.

Gallium Arsenide FET: (GaAsFET)

In addition to the built-in GaAsFET model in IsSPICE4, a GaAsFet subcircuit can be built using an equivalent circuit with either a JFET or a MOSFET. Like the MOSFET, the GaAsFET has the "rear" electrode replaced by a substrate. Unlike the MOSFET, the substrate is nearly a perfect insulator. The gate contact is either a junction diode, or in the case of the MESFET, a Schottky barrier diode. The JFET is most commonly used as the starting point for GaAsFET models. The gate diodes are removed by making IS very small, and then discrete diodes are added so that the emission coefficient can be controlled. The threshold modulation in the GaAsFET which is caused by backgating through the stray capacitance causes the gain of amplifier circuits to be much higher at DC than even at a few KHz. Most GaAsFET applications are for either microwave amplifiers or high speed current mode logic, and require the DC bias effects to be modeled. The model shown in Figure 7 will take this effect into account for linear circuits, but does not give good predictions for "saturated" switching circuits. GaAsFET technology is new, so you will have to determine model parameters experimentally rather than from data sheets.
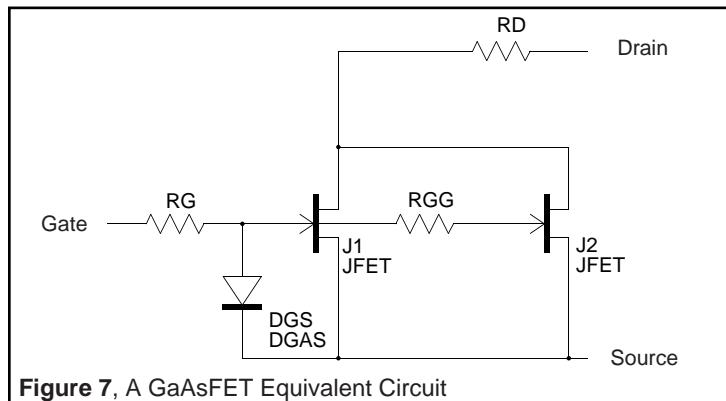
Figure 7, A GaAsFET Equivalent Circuit

Listed below is the GaAsFET subcircuit model and test circuit. The GaAsFET model requires the parameters, L, W, KP, RHOG, RHOD, DC, VT and N to be passed to the subcircuit.

```
*********  GASFET MODEL AND TEST CIRCUIT *************
*        PARAMS ARE L=CHANNEL LENGTH IN MICRONS
*           W=CHANNEL WIDTH IN MICRONS
*           KP=KPRIME, ID=KP*W/L(VG-VT)^2
*           RHOG=GATE METAL OHMS/MICRON
*           RHOD=DRAIN METAL OHMS/MICRON
*           DC=CAPACITANCE/MICRON
*           VT=THRESHOLD
*           N=NUMBER OF DEVICES DEFINED BY W AND L THAT ARE IN PARALLEL
* YOU WILL PROBABLY WANT TO BUILD SOME OF THESE INTO THE MODEL
* SO THAT THEY DON'T HAVE TO BE IN THE PARAMETER LIST ALL OF THE TIME
* SUBSTRATE CAPACITIVE COUPLING IS IGNORED.
.SUBCKT GAS 1 2 3
RG 2 4 {W*RHOG/N}
RD 1 5 {W*RHOD/N}
DGS 4 3 DGAS
* THE GATE DRAIN DIODE IS NOT MODELED SINCE IT IS ALWAYS REVERSE BIASED
* THIS IS AN ESTIMATE OF A GAS JFET, SET N=1 FOR A MESFET
* FOR MORE DETAIL, SEE THE CHAPTER ON DIODE MODELS
.MODEL DGAS D(N=2)
RGG 4 6 1E10
J1 5 4 3 JFET
J2 5 6 3 JFET AREA=.33
* THE ABOVE AREA PARAMETER MUST BE DETERMINED EXPERIMENTALLY
* TO MATCH THE DEVICE SATURATION SLOPES AT HIGH FREQUENCY
.MODEL JFET NJF(BETA={KP*W/L*N} LAMBDA=.15 IS=1E-30 CGS={DC*W*N}
+  CGD={DC*W*N} VTO={VT} )
.ENDS
**************************
GASFET TEST CIRCUIT WITH EXAMPLE GASFET CALL.
.PRINT AC V(2) VP(2)
.AC DEC 10 10 100MEG
VIN 1 0 .4 AC 1
X1 2 1 0 GAS {VT=.3 KP=90U N=8 W=40 L=1 RHOD=.3 RHOG=1 DC=.25F }
RD 2 3 10K
VCC 3 0 3
*INCLUDE DEVICE.LIB
.END
```

References

[4-1]   MODELING AND SIMULATION OF INSULATED GATE FIELD EFFECT TRANSISTOR SWITCHING CIRCUITS
H. Shichman and D. A. Hodges, IEEE J. Solid State Circuits, vol. SC-3, 1968

MESFETs

Metal Semiconductor Field Effect Transistors

IsSPICE4 Semiconductor Primitive: **MESFET**
Call Letter: **Z**
Device Type: **N (NMF) or P (PMF) Channel**

Syntax: ZNAME Drain Gate Source Modname
+<Area> <Off> <IC=Vds, Vgs>
Example: ZRES 1 2 3 MESFET
.MODEL MESFET NMF ()

Overview

The GaAs MESFET is a Schottky-barrier gate device. Its basic operation is like the JFET. The IsSPICE4 GaAs MESFET model is based on the research efforts of H. Statz, [5-1]. The large and small signal equivalent circuits for an n-channel MESFET is shown in Figure 1. The p-channel model is schematically identical except that all polarities are reversed.
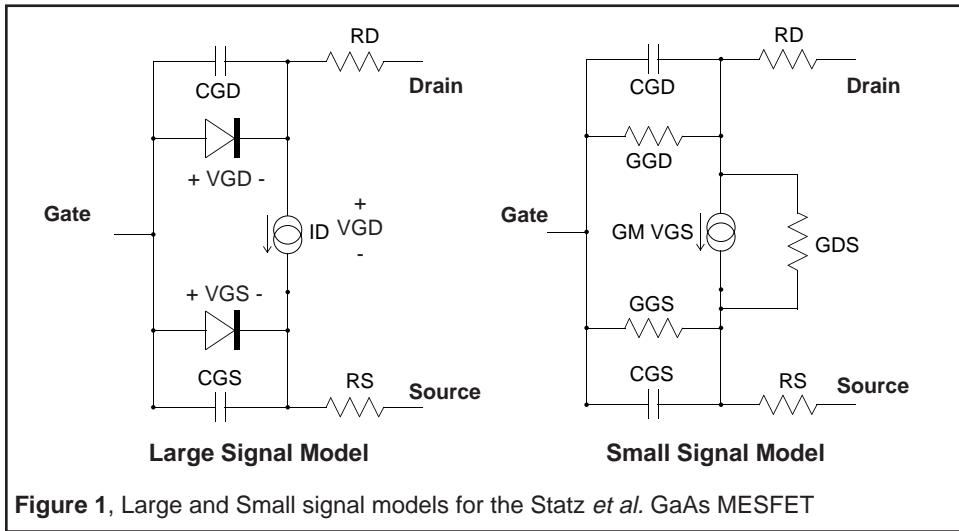
Figure 1, Large and Small signal models for the Statz *et al.* GaAs MESFET

DC Characteristics

The DC characteristics are governed by VTO, B, BETA (β), ALPHA (α), LAMBDA (λ), IS, RS, and RD as described by the following equations:

Forward Region, $0 > V_{ds} > \dfrac{3}{\alpha}$

$$I_d = \frac{\beta\,(V_{gs}\text{-}V_{TO})^2}{1+b(V_{gs}\text{-}V_{TO})}\left[1-\left[1\text{-}\alpha\frac{V_{ds}}{3}\right]^3\right](1+\lambda\,V_{ds})$$

$$g_m = \left[1\text{-}\left(1\text{-}\frac{\alpha V_{ds}}{3}\right)^3\right](1+\lambda V_{ds})\left[\frac{2\beta(V_{gs}\text{-}V_{TO})}{1\text{-}b(V_{gs}\text{-}V_{TO})}\right]-\frac{b\beta(V_{gs}\text{-}V_{TO})^2}{\left[1+b(V_{gs}\text{-}V_{TO})\right]^2}$$

$$g_{ds} = \left[1\text{-}\left(1\text{-}\frac{\alpha V_{ds}}{3}\right)^3\right]\lambda + \alpha(1+\lambda V_{ds})\left(1\text{-}\frac{\alpha V_{ds}}{3}\right)^2 * \frac{\beta(V_{gs}\text{-}V_{TO})^2}{1+b(V_{gs}\text{-}V_{TO})}$$

Reverse Region, $V_{ds} \geq \dfrac{3}{\alpha}$

$$I_d = \frac{\beta\,(V_{gs}\text{-}V_{TO})^2}{1+\ b(V_{gs}\text{-}V_{TO})}\,(1+\lambda\,V_{ds})$$

$$g_m = \frac{\left[1+b(V_{gs}\text{-}V_{TO})\right]2\beta(V_{gs}\text{-}V_{TO})\text{-}b\beta(V_{gs}\text{-}V_{TO})^2}{\left[1+b(V_{gs}\text{-}V_{TO})^2\right]}(1+\lambda V_{ds})$$

$$g_{ds} = \frac{\lambda\beta(V_{gs}\text{-}V_{TO})^2}{1+b(V_{gs}\text{-}V_{TO})}$$

Charge Storage

The charge storage effects are modeled by CGS, CGD, and PB, along with the constants δ and V_{max} and the DC parameter ALPHA (a) by the following equations:

$$C_{GS} = \frac{CGS}{\sqrt{1\text{-}\dfrac{V_n}{PB}}} * \frac{1}{2} * \left[1+\frac{V_e\text{-}V_{TO}}{\sqrt{(V_e\text{-}V_{TO})^2+\delta^2}}\right] * \frac{1}{2} * \left[1+\frac{V_{GS}\text{-}V_{GD}}{\sqrt{(V_{GS}\text{-}V_{GD})^2+\left(\frac{1}{\alpha}\right)^2}}\right]$$
$$+\ CGD * \frac{1}{2} * \left[1-\frac{V_{GS}\text{-}V_{GD}}{\sqrt{(V_{GS}\text{-}V_{GD})^2+\left(\frac{1}{\alpha}\right)^2}}\right]$$

$$C_{GS} = \frac{CGS}{\sqrt{1\text{-}\dfrac{V_n}{PB}}} * \frac{1}{2} * \left[1+\frac{V_e\text{-}V_{TO}}{\sqrt{(V_e\text{-}V_{TO})^2+\delta^2}}\right] * \frac{1}{2} * \left[1-\frac{V_{GS}\text{-}V_{GD}}{\sqrt{(V_{GS}\text{-}V_{GD})^2+\left(\frac{1}{\alpha}\right)^2}}\right]$$
$$+\ CGD * \frac{1}{2} * \left[1+\frac{V_{GS}\text{-}V_{GD}}{\sqrt{(V_{GS}\text{-}V_{GD})^2+\left(\frac{1}{\alpha}\right)^2}}\right]$$

where;
$$V_e = \frac{1}{2}\left[V_{GS}+V_{GD}+\sqrt{(V_{GS}\text{-}V_{GD})^2+\left(\frac{1}{\alpha}\right)^2}\right]$$

$$V_n = \frac{1}{2}\left[V_e+V_{TO}+\sqrt{(V_e\text{-}V_{TO})^2+\delta^2}\right] \quad \text{for } V_n \leq V_{max}$$
$$V_n = V_{max} \quad \text{for } V_n > V_{max}$$

Noise

The noise model for the MESFET can be taken directly from the JFET model. The model parameters AF, flicker noise exponent, and KF, flicker noise coefficient, define the noise characteristics of the MESFET.

References

[5-1]   Hermann Statz, Paul Newman, Irl W. Smith, Robert A Pucel, Hermann Haus, "GaAs FET Device and Circuit Simulation in SPICE", IEEE Trans. Electron Devices, Vol. ED-34, 1987, pp. 160-169

[5-2]   Giuseppe Massobrio, Paolo Antognetti, Semiconductor Device Modeling With SPICE, Second Edition, McGraw-Hill Inc., 1993

[5-3]   J. Michael Golio, Microwave MESFETs & HEMTs, Artech House, 1993

MOSFETs

Metal Oxide Semiconductor FETs

IsSPICE4 Semiconductor Primitive: **MOSFET**
Syntax: MNAME Drain Gate Source Substrate L= W= AD=
+ AS= PD= PS= NRD= NRS=   OFF
+ IC=VDS, VGS,VBS
Example: M1 10 7 0 0 MOD1   L=4U W=6U AD=10P AS=10P
.MODEL MOD1 NMOS VTO=-2 NSUB=1E15 UO=500
+ LEVEL=2

Overview

The MOSFET equivalent circuit is shown in Figures 1 and 2. It is similar to the JFET model, except that one of the gate electrodes has been replaced by a semiconductor substrate and the gate itself is insulated rather than made by using a P-N junction. The IsSPICE4 MOSFET models are applicable to any insulated-gate FET. The MOSFET model is the only semiconductor device that has several command line options. The options are for the L (length in meters, default=100U), W (width in meters, default =100U), AD/AS (drain/source area in square meters, default=0), PD/PS (drain/source perimeter in meters, default 0), and NRD/NRS (equivalent number of squares of drain/source diffusion, default=1). The number of squares is
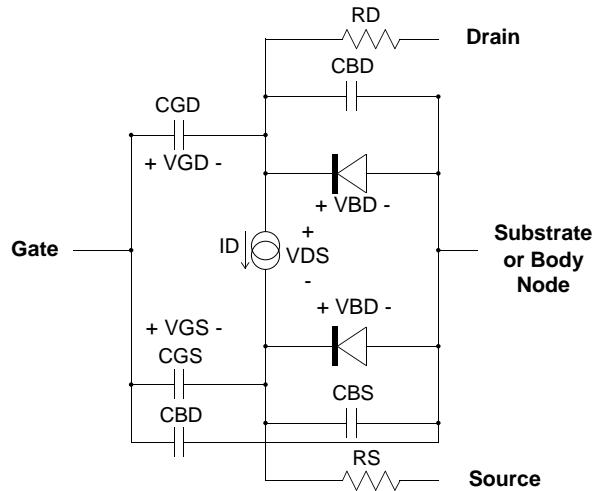
Figure 1, The IsSPICE4 large signal MOSFET model is shown for an N channel device. For a P channel device V_{GS}, V_{GD}, V_{DS}, V_{BS}, V_{BD}, the two substrate junctions and the nonlinear current source I_D are reversed.
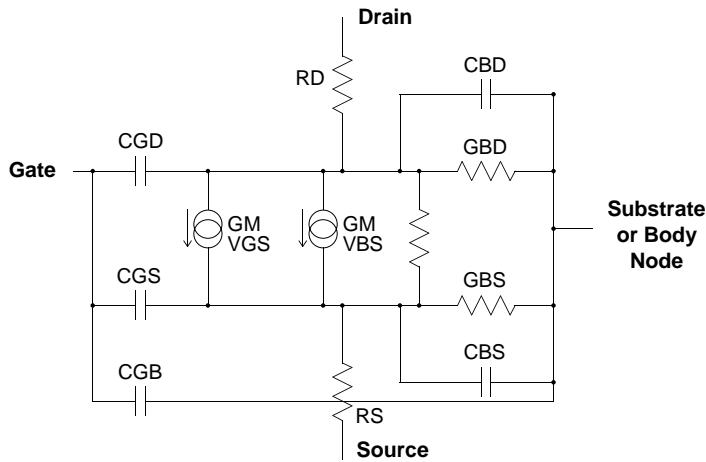
Figure 2 - The IsSPICE4 small signal MOSFET model is shown for an NMOS device.

multiplied by the model parameter RSH to find the drain and source resistances. Parameters which are not specified are left at their default values. The default value can be changed using the .OPTIONS command. Changing the defaults can simplify the input netlist, as well as the editing process. The command line parameters are very important and can dramatically effect device behavior, especially if they are specified incorrectly. If circuit behavior is erratic, the MOSFET call line is one of the first places to check.

Important Note: Be very careful when specifying the MOSFET command line parameters. The correct UNITS are essential to proper operation. L, W, PS, and PD are expressed in meters, while AD and AS are in square meters. Therefore, L, W, PS, and PD will usually have the units of "U", microns, while AD and AS will have the units of P (square-microns).

MOSFETs are fairly simple devices to build, but extremely complex devices to model. This contrasts bipolar transistors which are difficult to build, but can be modeled quite accurately in spite of the various topologies and material compositions used in bipolar technology. Because of various modeling limitations, no one model can be used for all MOSFETs. A number of models are now in use, each with its own set of restrictions and features.

Modeling a MOSFET is quite complicated. Each level has a different set of parameters and procedures for calculating IsSPICE4 parameter values. The required depth and breath of the resulting discussion is beyond the scope of this text. A designer using integrated MOSFETs can usually obtain the device models from the manufacturer. An exception to this rule concerns power MOSFETs which are explained in the SPICEMOD (SPICE modeling program) User's Guide. If you plan to model or characterize MOSFET devices, however, you should become intimately familiar with references [6-1] through [6-4].

Since SPICE's introduction, a number of new MOSFET levels have been added. The most popular version of SPICE, SPICE 2G.6, has three levels of model complexity. The newest version of SPICE from U.C. Berkeley, (at the time of this writing) SPICE 3F, has 7 levels. The first three are from SPICE 2G.6, plus BSIM1, 2, and 3 (levels 4, 5, and 7 or 8), and MOS6.

SPICE MOSFET Models

Level = 1 Shichman-Hodges
Level = 2 MOS2, Meyer's model [6-5, 11]
Level = 3 MOS3, Semiempirical model [6-1, 11]
Level = 4,5 BSIM, Berkeley short channel IGFET [6-6,7,9]
Level = 6 Sakurai-Newton [6-10]
Level = 7, 8 BSIM3 version 3.1

Level 1

The level 1 model is useful for quick and approximate measurements. It has the best simulation speed, but it is usually not precise enough because the theory is too approximate and the number of parameters is too small.

The DC characteristics are determined by the nonlinear current source, ID. The value of ID is obtained from the equation proposed by Shichman and Hodges reference [6-4]. The drain current equations are determined by the five model parameters VTO, Beta (KP*W/L), Lambda, Gamma, and Phi. The DC characteristics are the same as the JFET with the exception of the voltage dependent threshold voltage, VTE. Enhancement P and N channel models will have a positive threshold voltage. Depletion P and N channel models have a negative threshold voltage.

Forward Region, VDS > 0

VG - VTO $\langle$ 0: ID = 0

0 $\langle$ VGS - VTO $\langle$ VDS: $ID = KP*\dfrac{W}{L}*(VGS - VTE)^2*(1 + LAMBDA*VDS)$

0 $\langle$ VDS $\langle$ VGS - VTO: $ID = KP*\dfrac{W}{L}*VDS*(2*(VGS - VTE) - VDS)*(1 + LAMBDA*VDS)$

Reverse Region:

VG - VTO ⟨ 0:   ID = 0

$0 ⟨ VGS - VTO ⟨ - VDS:$ $ID = - KP * \dfrac{W}{L} * (VGS - VTE)^2 * (1 - LAMBDA * VDS)$

$0 ⟨ - VDS ⟨ VGS - VTO:$ $ID = KP * \dfrac{W}{L} * VDS * (2 * (VGS - VTE) - VDS) * (1 - LAMBDA * VDS)$

where:

$VTE = VTO + GAMMA * (\sqrt{PHI - VBS} - \sqrt{PHI})$

PHI typically ranges from .4 to .8 Volts and GAMMA ranges from .5 to 1.5. For discrete MOSFETs, the substrate is usually connected internally to the source, making the substrate modulation model unnecessary. The diodes in the MOSFET model are not coupled as in the BJT model, giving incorrect results when the substrate is forward biased, as might occur in discrete MOSFET power circuits. KP is used in the MOSFET parameter list, along with W and L, in place of BETA.

Dynamic parameters are determined by the capacitors. The capacitors across the diodes, CBD and CBS use the nonlinear diode equations. The three gate capacitors, CGD, CGS and CGB are linear capacitors in level 1 unless the parameter TOX is specified, in which case the capacitance model proposed by Meyer [6-5] is used. They are derived from the values of CGSO, CGDO, and CGBO which represent overlap capacitances. The level 1 model is usually not used to describe integrated circuit devices because it is too inaccurate.

Level 2

The level 2 model makes corrections to the level 1 model in order to account for effects which aren't in the basic theory. In SPICE 2, the level 2 and 3 MOSFETs contain two built-in models for charge storage effects. The first is the piece-wise linear voltage dependent capacitance model proposed by Meyer [6-5]. The second is the charge controlled model proposed by Ward and Dutton [6-8]. The XQC parameter is used to choose which model will be used. In IsSPICE4, which is based

on SPICE 3, there is only one model for charge storage effects [6-11]. The XQC parameter is not used or recognized.

The level 2 model uses the most CPU time and can cause a great deal of convergence problems, especially if not properly specified. But it provides correction to simulate effects which are not predicted in the basic model.

Level 3

The level 3 model is used to simulate short channel MOSFETs (up to 2um). The simulation time is slightly less than for level 2, but the average error is about the same. Model parameter calculations are quite complex.

Most silicon foundries will provide you with level 2 or 3 models if you plan to use their services. Virtually all of the parameters come into play when developing a MOSFET model. The DC parameters are usually easy to determine, however, the dynamic parameters are the real test of the model's validity.

Explanations of levels two and three can be found in [6-1] and you should become familiar with this reference if you wish to model MOSFET integrated circuits.

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[6-3]   FET MODELING FOR CIRCUIT SIMULATION
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          GATE FIELD EFFECT TRANSISTOR SWITCHING
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          FOR THE BSIM MODEL
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          cuits, SC-13, 1978

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          tronics Research Laboratory, U.C. Berkeley, Oct.
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[6-10]   A SIMPLE MOSFET MODEL FOR CIRCUIT ANALY-
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          T. Sakurai and A.R. Newton, ERL Memo No. ERL
          M90/19, ERL, U.C. Berkeley, March 1990

[6-11]   ANALYSIS OF PERFORMANCE AND CONVER-
GENCE ISSUES FOR CIRCUIT SIMULATION
Thomas L. Quarles, ERL Memo No. ERL M89/42,
Electronics Research Laboratory, U.C. Berkeley,
April 1989

Macromodels

Operational Amplifier Models

Operational Amplifiers, or Op-amps, can be modeled in a number of ways. The simplest op-amp is a voltage controlled voltage source which has the desired gain, while the most complex model uses the actual integrated or discrete circuit topology. The disadvantages of a complex model are that the analysis of a circuit with several amplifiers may use all the memory available in your computer, use excessive run time and require process information that the IC manufacturer holds proprietary. The simple model may not show important nonlinearities or other second order effects.

IsSpice4 accepts all commonly available vendor supplied op-amp and IC models.

Intusoft models are separated into libraries which represent two levels of complexity. The least complex models are good for a first cut analysis and require the smallest number of nodes. These models are in the LIN.LIB file. More complex models, in the NONLIN.LIB file, have more nodes. They require longer simulation time, while yielding a more complete description of the device. Refer to the Extended Syntax chapter of the IsSpice4 User's Guide to see how the different libraries can be included in your file.

The nonlinear models provided in NONLIN.LIB are hybrids. They duplicate part of the circuit topology to reproduce input and output nonlinearities, while simplifying the bias and interstage circuitry. Hybrid models are a compromise between the simple model and a complete simulation. The subcircuit

macro model which is used for op-amp simulation was developed by Intusoft. It is superior to the popular BOYLE op-amp model used by a number of SPICE model vendors. The Intusoft model solves a number of BOYLE model deficiencies, uses fewer components, is more easily adaptable to various op-amps, and simulates more efficiently and accurately.

Generic Op-amps

The Intusoft model libraries contain a number of models for commonly used op-amps. Other op-amp models are also available from various op-amp vendors. To obtain these models, contact Intusoft.

There are also several generic models. The generic models are equation-based subcircuit macros that can simulate hundreds of op-amps just by the specification of a few data sheet parameters. Generic models are possible because characteristics which are common to many op-amps can be modeled using similar techniques. There are generic models for op-amps that are constructed using bipolar and JFET technology, and for current feedback op-amps using 5 or 15 volts. These models are in the linear and nonlinear libraries. The library models for the generic op-amp subcircuits are called OPAMP (Bipolar front end), and FETAMP (JFET front end). The subcircuit names are the same in both libraries. This allows the designer to utilize either a complex or simple model just by altering the ∗INCLUDE statement. The current feedback op-amps are called AMPC5 (5 volt current feedback) and AMPC15 (15 volt current feedback) and are in the nonlinear library. Parameter passing is used to automatically calculate the IsSPICE4 model parameters, based on the following list of commonly available data sheet parameters:

Data Sheet Value	Parameter
Bandwidth	FT
*Slew Rate Limit	DVDT
Bias Current	IBIAS
Offset Current	IOS
Offset Voltage	VOS
DC Gain	GAIN
*Bandwidth (-3dB)	FC
*Feedback Resistor	RF

* Used for current feedback op-amp

Example: XAMP 1 2 3 4 5 OPAMP {FT=5MEGHz DVDT=5E6
+IBIAS=1NA IOS=1NA VOS=200UV GAIN=150E3}

The nonlinear JFET front end model requires FT, DVDT, VOS, and GAIN. The linear JFET model requires the parameters FT, VOS, and GAIN, while the Bipolar model requires specification of FT, IOS, VOS, IBIAS, and GAIN. The op-amp connections in the order that they must be specified are: (-) inverting input, (+) non-inverting input, output, VCC (+ supply), and VEE (- supply). The current feedback op-amps require the parameters FC, DVDT and RF. The connections as they appear in the subcircuit netlist are: (-) inverting input, (+) non-inverting input, output, VCC (+ supply), and VEE (- supply). See the "SPICE APPLICATIONS HANDBOOK" for a detailed explanation of the current feedback op-amp.
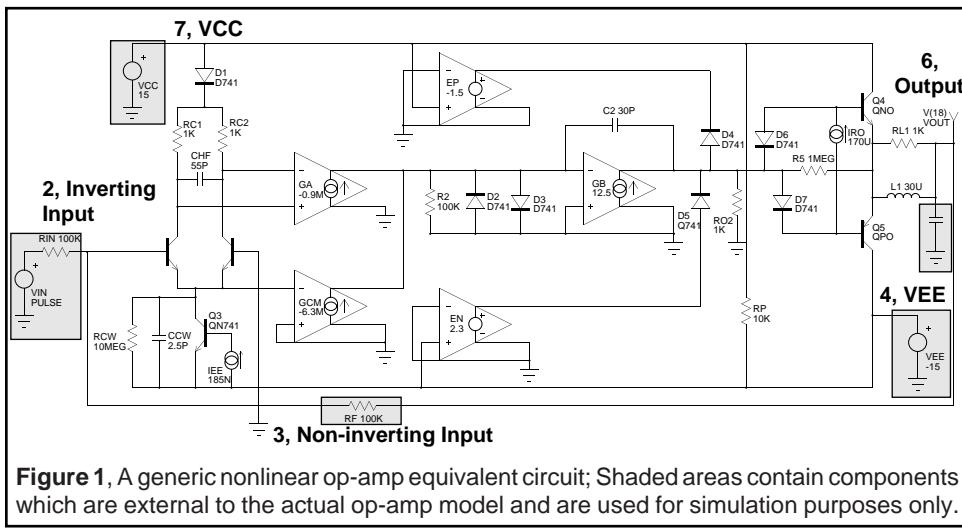
Many other parameters could have been specified, however a lengthy parameter list would discourage use of the generic model. These models have a strong technology and circuit design dependence which constrains meaningful parameter values to be in the neighborhood of those found in vendor data sheets.

Besides modeling the linear and DC transfer function, the nonlinear generic model includes the following characteristics:

- • Input Stage Nonlinearities
- • Input Voltage and Current Offsets and Bias
- • Slew Rate Limiting
- • Common Mode Gain
- • Power Supply Rejection
- • Output Current Limiting
- • Output Voltage Limiting
- • Reflection of Load Current to Power Input
- • Output Stage Nonlinearities

The equivalent circuit shown in Figure 1 takes advantage of the idealized device behavior which is possible through simulation. Parameters are defined for the three stages of the simulated amplifier.

Figure 1, A generic nonlinear op-amp equivalent circuit; Shaded areas contain components which are external to the actual op-amp model and are used for simulation purposes only.

Input Stage

The input nonlinearities are simulated using Q1, Q2, Q3 and D1. These are setup to simulate the topology for a 741 or similar amplifier with respect to bias and common mode range. The input transistors, Q1 and Q2, should be modeled to reflect the performance characteristics of the op-amp so that bias current,

offset current and offset voltage are modeled. Noise parameters can also be modeled in this stage by changing the values for AF and KF in the input BJT model QNI1. RCM and CCM will convert common mode signals to differential signals and also couple power line variations into the input. The high frequency pole is modeled with RC1, RC2 and CHF. Values of RC1 and RC2 must be small in order to get the input capacitance of Q1 and Q2 to provide reasonable high frequency behavior. Q1 and Q2 are made slightly different to develop input offsets, and their emission coefficients can be selected to simulate the effect of other transistor cascades in the input and slew rate limiting.

Slew rate limiting is set by this input stage. The large signal output voltage is limited to BETA3 ∗ IEE ∗ RC and the small signal gain is RC ∗ .5 ∗ BETA3 ∗ IEE / (N ∗ VT). If the small signal output is integrated to provide a unity gain crossover at the radian frequency, WT, then the slew rate is:

$$\text{Slew Rate, } \frac{dV}{dt} = 2 * N * VT * WT \qquad \text{Eq. 7.1}$$

The emission coefficient, N, then sets the slew rate limit. Alternatively, you could add emitter resistance as is done in some other models, however, modifying N uses fewer nodes. To make the slew limit unsymmetrical, you can unbalance the collector resistances RC1 and RC2. Note that slew rate limiting is closely related to physical parameters and front end topology as shown in equation 7.3. The emission coefficient of the front end is used to control bandwidth, while bias current controls the slew rate. Slew rate should be within an order of magnitude of the FT to prevent unusual circuit behavior.

Interstage

Controlled sources GA and GCM couple the differential and common mode signals to the interstage amplifier, GB. The DC gain is given by:

$$\text{Adiff} = RC*0.5*\left(\frac{BETA3*IEE}{N*VT}\right)*GA*R2*GB*RO2 \qquad \text{Eq. 7.2}$$

At frequencies below the pole at W = 1/(2 ∗ RC ∗ CHF), the gain is given by:

$$\text{Adiff(mid freq.)} = RC*0.5*\left(\frac{BETA3*IEE}{N*VT}\right)*\frac{GA}{jW*C2} \qquad \text{Eq. 7.3}$$

and the unity gain frequency is approximated by solving for W when Adiff = 1.

Two nonlinearities are modeled in the interstage. First, the large signal overshoot is limited by diodes D2 and D3. For amplifiers where this is caused by a pair of diodes, the emission coefficients of the diodes can be adjusted. The second nonlinearity is the output swing which is taken as a constant value subtracted from the power rails. D4, D5, EP and EN act as output limiters. It is important to return the limited current to the subcircuit ground node so that the source, GB, does not generate any apparent power. Static power dissipation is modeled using the resistor RP connected across the power lines.
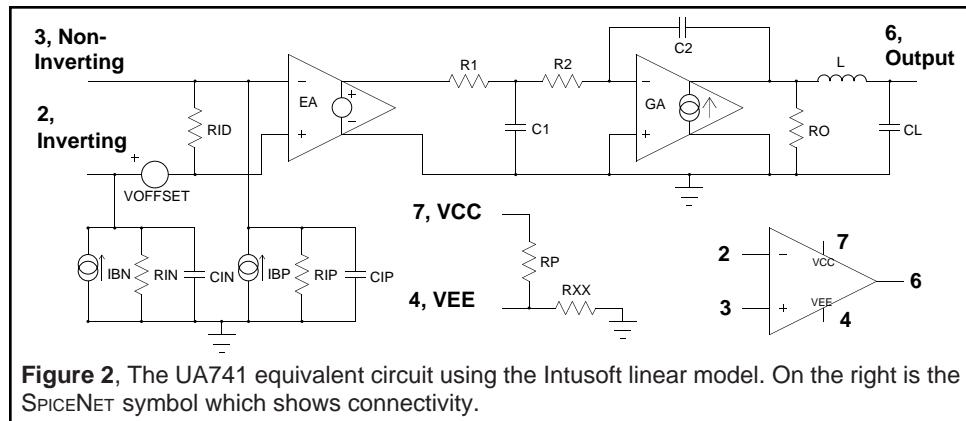
Output Stage

The output stage is modeled using D6, D7, Q4, Q5 and L. The transistors are not given any AC parameters. Instead, a discrete inductor simulates the AC performance while the transistors' (QNO and QPO) BETA and the source IRO account for both current limit and output resistance. This stage will return the load current to the power lines, enabling simulation of certain power stage configurations.

Example Bipolar and JFET Input Op-amps
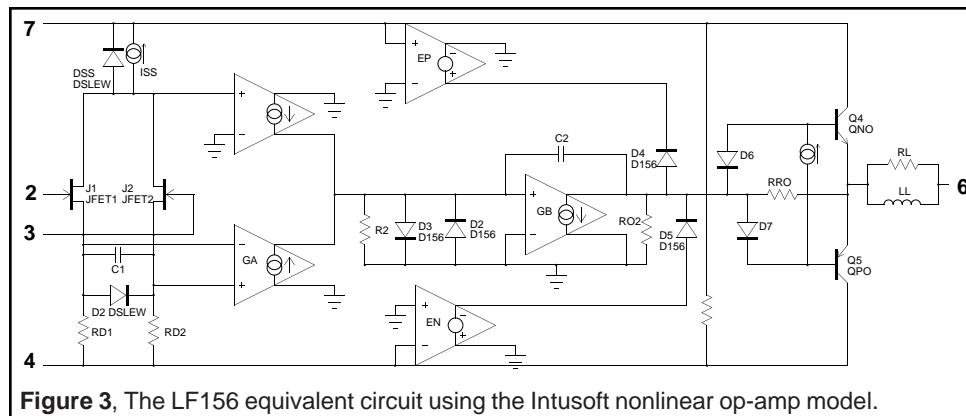
The 741 op-amp is a high performance monolithic operational amplifier which is used in many of today's electronic products. Fairchild first developed the UA741; the most comprehensive data sheets may be found in the Fairchild Linear Products catalog.

This amplifier model is based on the generic op-amp model. Models are in the LIN.LIB and NONLIN.LIB files. The linear model is shown in Figure 2.

Figure 2, The UA741 equivalent circuit using the Intusoft linear model. On the right is the SPICENET symbol which shows connectivity.

The 156 op-amp was first developed at National Semiconductor under the part number LF156, and features a high impedance JFET front end with relatively fast slew rate and high gain-bandwidth product. The low bias current makes it possible to eliminate bias current compensation resistors; however, its higher bandwidth requires extra care in layout.
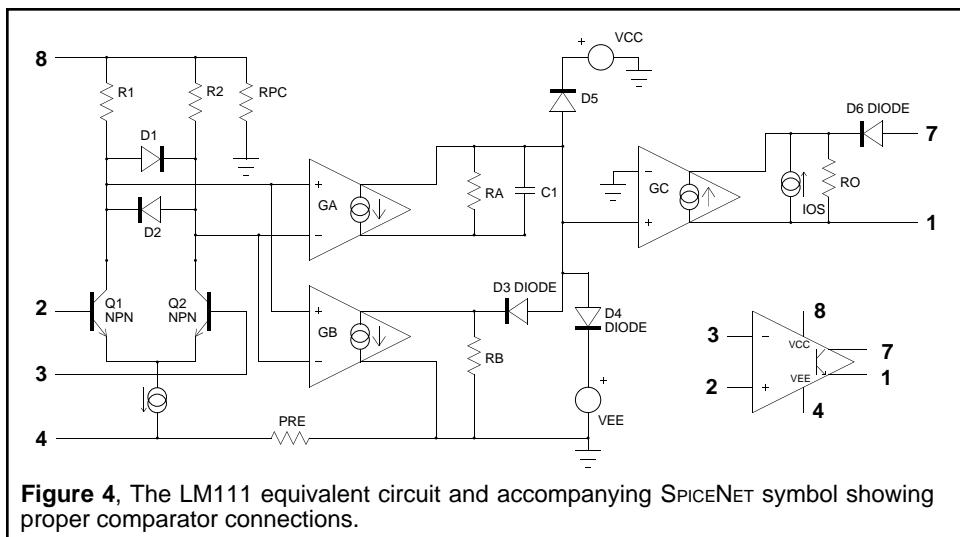
Figure 3 defines the topology, and the LIN.LIB and NONLIN.LIB files contain the subcircuit models.

Figure 3, The LF156 equivalent circuit using the Intusoft nonlinear op-amp model.

LM111 Comparator

Comparators are used to convert analog signals to binary levels and use circuitry similar to that used in op-amps. The main difference in circuitry is that stability compensation is eliminated and the output stage is capable of being adjusted to different levels to accommodate a wide range of binary levels. The hybrid models are very similar to op-amps and are therefore included in this section. The 111 comparator was first produced by National Semiconductor as the LM111.

Figure 4 shows the topology, while the parameters are detailed in the Compare.Lib file.

Figure 4, The LM111 equivalent circuit and accompanying SPICENET symbol showing proper comparator connections.

Generic Signal Generators

The signal generators listed below are derived from the standard IsSPICE4 transient signal generators. They are implemented as subcircuits and use the parameter passing feature to make them versatile and easy to use. These subcircuits have defaults for most of the parameters, and unlike the IsSPICE4 transient generators, you may specify the parameters in any order you choose. Shown below is a listing of each source's associated parameters with their defaults, if any, and an example. Parameters without defaults will be marked "ND" and must have a value passed to them.

SIN - *Continuous Sine Wave Voltage*
OFFSET=Voltage Offset (0V), AMP=Peak Amplitude (ND), FREQ=Frequency (ND), DELAY=Starting Delay (0s), DAMP =Damping Coefficient (0)
Example: X1 1 2 SIN {AMP=1 FREQ=10MEG}

PULSE - *Continuous Pulse Train Voltage*
INITIAL=Initial Value (0V), PULSE=Peak pulsed value (ND), DELAY=Starting Delay(0), RISE=Rise Time (ND), FALL=Fall Time (ND), DUTY=Duty Cycle (50%), PERIOD= Waveform Period (ND)
Example: X1 1 2 PULSE {RISE=10N FALL=20N PULSE=5
+ DUTY=60 PERIOD=10US}

SAW - *Continuous Sawtooth Voltage*
INITIAL=Initial Value (0V), PULSE=Peak pulsed value (ND), DELAY=Starting Delay (0s), SKEW=Ratio of Pulse rise time to fall time (50), DUTY=Pulse Duty Cycle (50), PERIOD= Waveform Period (ND)
Example: X1 1 2 PULSE {PULSE=10 SKEW=10 DUTY=30
+PERIOD=10K}

AM - *Amplitude Modulated Voltage Waveform*
CARAMP=Peak Carrier Amplitude (ND), CARFQ=Carrier Frequency (ND), MODFQ=Modulation Frequency (ND), PCTMOD =Percent Modulation (ND)
Example: X1 1 2 AM {CARAMP=1 CARFQ=1K MODFQ=10K
+PCTMOD=30}

FM - *Frequency Modulated Voltage Waveform*
OFFSET=Offset Voltage (0V), AMP=Peak Amplitude (ND), FREQ=Carrier Frequency (ND), MOD=Modulation index (ND), SIGFREQ=Signal Frequency (ND)
Example: X1 1 2 FM {AMP=5 FREQ=1MEG MOD=1
+SIGFREQ=1MEG}

PSUPPLY - *Power supply*
VCC=Voltage at VCC (12), VEE=Voltage at VEE (-12), VBIAS=Voltage at VBIAS (0)
Example: X1 1 0 2 0 3 0 PSUPPLY {VCC=15 VEE=-15}

VCO - *Voltage Controlled Oscillator*
VPK=Peak Output Voltage (ND), FREQ=Frequency per Volt of Input Control (ND)
Example: X1 1 2 VCO {VPK=10 FREQ=1MEG}

Important Note: In order to use the VCO element, the UIC (Use initial Conditions) keyword must be specified in the .TRAN statement. This allows elements in the subcircuit to be properly initialized. Otherwise, the VCO signal generator will not oscillate properly.

GEN3 - *Three Phase Generator*
FREQ=Output Frequency (ND), VGEN=Peak Output Voltage (ND), MAGERR=Amplitude Unbalance in Percent (ND), PHASE=Phase Disturbance in Degrees (ND)
Example: X1 1 2 3 0 GEN3 {VGEN=10 FREQ=1K MAGERR=0
+PHASE=0}

Phase - *Variable Phase Sin/Cosine Generator*
ANGLE=Sin Wave delay in degrees (0), VGEN=Output Voltage Level (1V), FREQ=Frequency of the output signals (1K)
Example: X1 1 2 3 {ANGLE=45 VGEN=170 FREQ=60}

Phase2 - *Voltage Controlled Phase Sin Generator*
VGEN=Output Voltage Level (1V), FREQ=Frequency of the output signals (1K)
Example: X1 1 2 3 4 {VGEN=170 FREQ=60}

The variable phase Sin/Cosine supply is a variation on the three phase generator macro model. It supplies simultaneous sine, cosine, and variable phase sine wave outputs. The voltage level, frequency, and static phase delay can all be specified by the user. Phase2 is similar to Phase, except that the phase of the sine wave can be varied over time by a user-defined voltage source. The model listings can be found in the SIGNAL.LIB file, along with the rest of the generic sources.
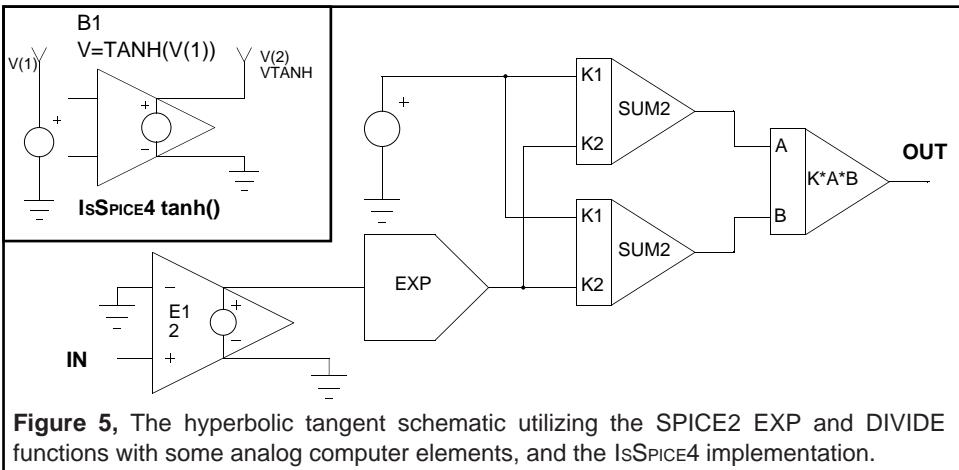
Generic Functions

The generic behavioral function blocks are simple to use. They perform the operation z=f(x,y) where x and y are the inputs, z is the output and f is the function. To use them, all you do is feed a signal in and use the resulting output. The DIVIDER function (voltage divider, z=x/y) is simply a nonlinear dependent source, B element. Be careful to keep the divisor input signal, y, away from the zero neighborhood, otherwise the circuit simulation may abort. The EXP function block, like the DIVIDE, takes advantage of the power of the B element. It performs the exponential function $z=(e^x)$.

A number of other behavioral transfer function blocks are included with your ICAPS package. Check your Model Library Listings booklet for a complete list.

One example using the EXP function is the TANH, hyperbolic tangent function, shown below in Figure 5. It implements the function VOUT = $(e^{(2*VIN)} - 1)/(e^{(2*VIN)} + 1)$. The subcircuit is listed under the name "TANH". This function can also be implemented using the B element as shown in Figure 5.

Figure 5, The hyperbolic tangent schematic utilizing the SPICE2 EXP and DIVIDE functions with some analog computer elements, and the IsSPICE4 implementation.

Analog Computer Functions

Analog computer functions, once an important part of computer operations, have given way to the digital computer. However, in terms of analog circuit simulation, analog computer elements have a great deal to offer the circuit designer. Analog computer functions can be used in a number of ways. First, with these functions, IsSPICE4 can be used to solve differential equations such as those encountered in common electrical, mechanical, and physics problems. Second, since the analog computer functions simulate efficiently, they can be used for system analyses. After verification of the system concepts, the various elements can be replaced with the actual circuit topology. Third, they can be used in places where certain functions are required, but the actual circuit topology need not be used. For example, the next time a summer, multiplier, or integrator function is needed in a design, but the actual circuit is not required, reach for your analog computer library.
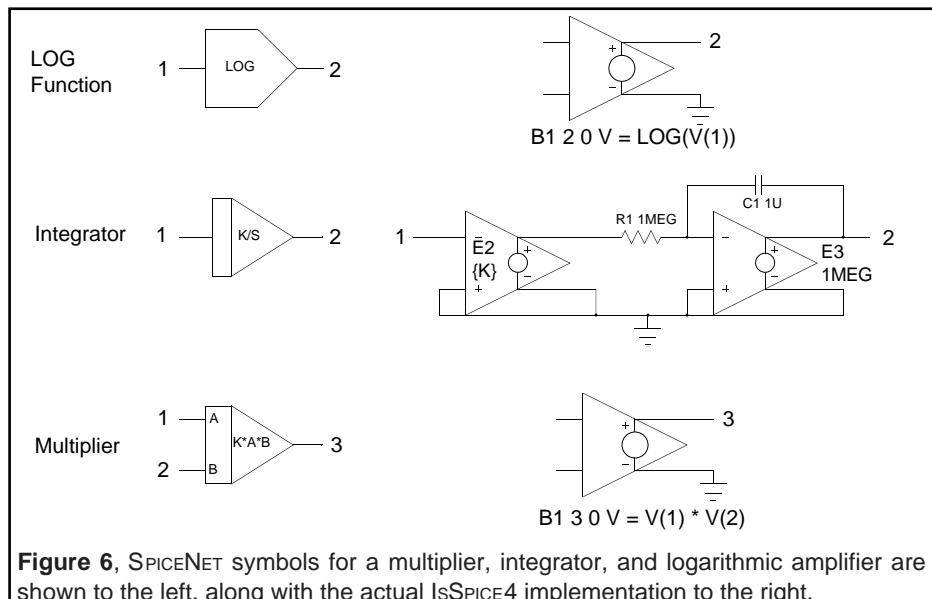
Figure 6, SPICENET symbols for a multiplier, integrator, and logarithmic amplifier are shown to the left, along with the actual ISSPICE4 implementation to the right.

The majority of these are constructed out of dependent sources and basic ISSPICE4 primitive elements. A quick glance at the variety of model listings in Sys.Lib will give you an idea of how useful these elements can be.

Generic Crystals

Example: XOSC 1 2 XTAL {Q=10K RS=10 CP=20PF
             + FREQ=10KHZ}
             X2 1 2 XT10

There are no default parameters.

This crystal may be used in oscillator and filter applications. The parameters that are passed to it are the frequency of oscillation (FREQ), Q of the crystal (Q), series resistance (RS) and the

parallel capacitance (CP). By specifying the proper param-
eters, virtually any crystal may be simulated.

$$L = \frac{Q * RS}{2\pi * FREQ}$$

$$C = \frac{1}{Q * 2\pi * FREQ * RS}$$
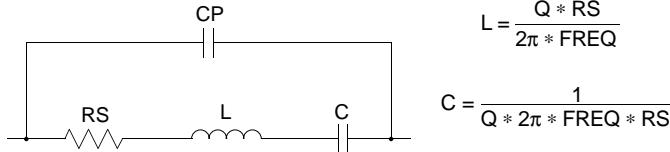
Figure 7, shows the generic crystal model, XTAL.

Generic Potentiometer

Example: X1 1 2 3 4 5 POT {RPOT=50K}
            Default RPOT=1K

The voltage controlled resistor uses one parameter, RPOT,
which is equal to the potentiometer's total resistance. The
output resistance ratio, R1/R2, is controlled by the voltage input
K=V(+) - V(-). The control voltage, K, should be kept between
0 and 1. The subcircuit connections are Resistor (+),
Resistor(Wiper), Resistor (-), Control (+), and Control (-).

R1 and R2 are variable resistors
R1+R2=RPOT (0<K<1)
R1=K*RPOT
R2=(1-K)*RPOT
K=Control voltage, V(+) - V(-)

SPICENET
Symbol
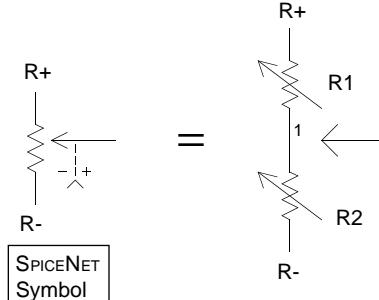
Figure 8, RPOT Model

Opto-Isolator

Example: XLAS 1 2 3 4 5 LN25

The subcircuit is listed in the OPTO.LIB file and the connections are Diode (Anode, Cathode), Transistor (Collector, Base, Emitter).

An OPTO-ISOLATOR consists of a Light Emitting Diode, LED, that is optically coupled to a Bipolar Junction Transistor, BJT. When a current is passed through the diode, light is focused on the base of a photo transistor, causing photo-generated hole electron pairs. We will assume that the light intensity is proportional to current in the diode forward direction, and that most nonlinearities are caused by the BJT current gain, BF. The following equivalent circuit will be used for the ISSPICE4 model. The current meter, VM, added in series with the light emitting diode, is used by ISSPICE4 to measure input current. The R-C network simulates the LED response.
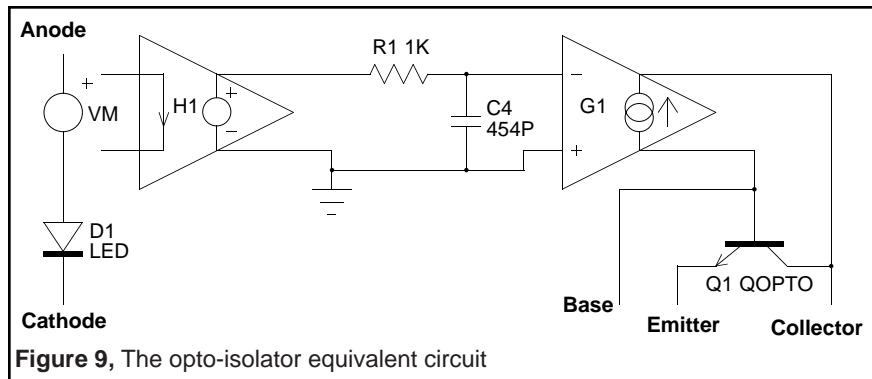
Figure 9, The opto-isolator equivalent circuit

The model parameters will be developed from a composite of the Motorola and Texas Instruments data sheets for the 4N25. First, the LED static parameters are modeled based on the data sheet forward characteristics. These parameters are computed using techniques discussed in the Diode chapter and are:

N = 2
RS = .7
IS = 2.5E-12

The phototransistor static parameters are computed based on a value of Hfe = 325 and a dark current of ID = 8NA given in the data sheet. First, the value of IS is computed as ID/Hfe. Then the value of NF is computed, based on an estimated transistor VBE = .6V and IC = 1MA which results in:

IS = 2.5E-11
NF = 1.3
BF = 325
IKF = 100MA
VAF = 100V

Note the rather unusual approach of computing IS based on reverse characteristics in order to make sure that dark current will be properly simulated. Dark current is very important in establishing the device noise parameters. IKF is used to reflect the loss in isolator gain at high currents. VAF is simply estimated since no data is available in the data sheets.

Next, the LED dynamic characteristics are estimated from data sheet values for CJO = 40PF and rise time, Tr, in the photodiode connected mode of 1USEC. The LED will be assumed to be responsible almost entirely for this parameter so that:

2.3 $*$ R1 $*$ C1 = Tr
R1 = 1K
C1 = 434PF
CJO = 40PF

Next, the phototransistor dynamic parameters are estimated from the phototransistor connected fall time, Tf = 2USEC, for unsaturated operation to compute Ft and then TF. Next, the saturated switching storage time, Ts = 4USEC, and fall time, Tfs=8USEC, are used to compute TR and Cob. BR plays an important part in storage time characteristics and is assumed to have a value of 10.

Ft = Hfe * 2.3 / Tf
TF = 1 / (2 * p * Ft) = .43NS
TR = 1 / BR * Ts / ln[BF/10] = 114NSEC
Cob = Tfs / (2.3 * BF * VCC / ICSAT) = 11PF
CJC = 2 * Cob = 22PF
CJE = 7 * Cob = 77PF

The model description is then:

```
.SUBCKT LN25 1 2 3 4 5
VM 1 6
D1 6 2  LED
H1 7 0  VM  .00154
R1 7 8  1K
C1 8 0  454PF
G1 3 4 8 0  1
Q1 3 4 5 QOPTO
.MODEL  LED  D(N=2 RS=.7 CJO=40PF IS=2.5E-12)
.MODEL  QOPTO  NPN(IS=2.5E-11 NF=1.3 CJC=22PF
+ CJE=77PF TF=.44NS TR=114NS BF=325 BR=10
+ IKF=100MA VAF=100)
.ENDS
```

Parameters VAF, NF, CJE and BR are estimates which could be improved by measurement. Figure 10 illustrates the response using the data sheet circuit for saturated switching. The parameters TR, CJC and CJE were adjusted using simulations to force agreement with the data sheet.
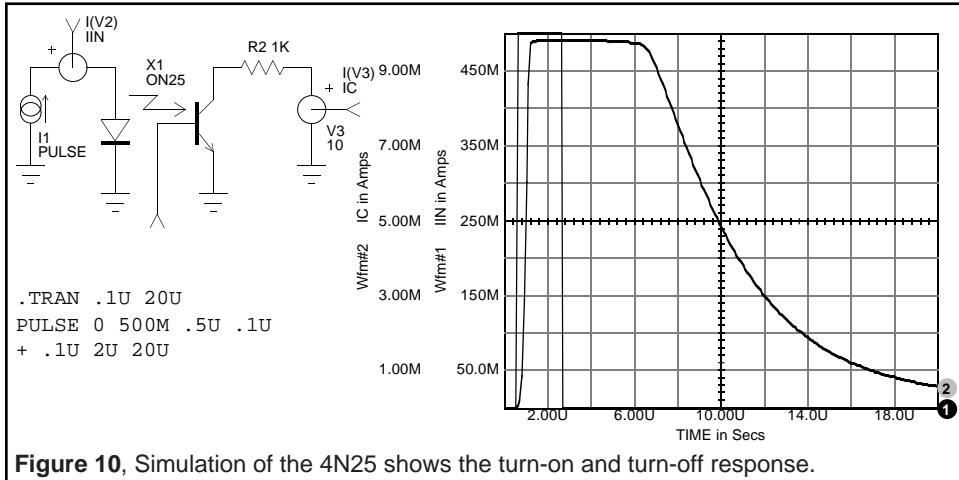
Figure 10, Simulation of the 4N25 shows the turn-on and turn-off response.

Generic Voltage Controlled Resistor

The subcircuit shown below is a model for a simple voltage controlled switch. The generic switch can be used for a wide variety of purposes, especially when general simulations to study circuit or system concepts is being performed. The switch is created using the IsSPICE4 primitive G (voltage controlled current source) tied back onto itself.


```
*OPEN WHEN V(3,0) = 0,
*CLOSED WHEN V(3,0) < > 0
*ON RESISTANCE IS 1 / V(3)
*OFF RESISTANCE IS 1E12
.SUBCKT SWITCH 1 2 3
R1 1 2 1E12
G1 1 2 POLY(2) 1 2 3 0 0 0 0 0 0 1
.ENDS
```
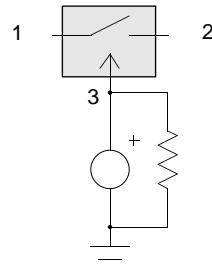
Figure 11, The generic switch netlist and SPICENET switch symbol in the shaded area. The voltage source value controls the resistance between nodes 1 and 2.

The switch is very simple to use. Applying zero volts to the control input opens the switch. The open resistance is 1E12 Ohms. It may be changed, if desired. Applying any voltage to the switch control input, V(3), closes the switch and gives it a resistance of 1/V(3). For example, applying a voltage pulse of 0 to 1 volt to the control input will change the resistance seen from port 1 to port 2 from 1E12 to 1 Ohm. This switch model does not have any hysteresis.

Generic Phase Locked Loop Models

The phase locked loop models are described in Chapter 9 of the "SPICE APPLICATIONS HANDBOOK" [7-7]. The listings for the phase locked loop models can be found in Random.Lib (Random Noise sources), Signal.Lib (Voltage Controlled Oscillator), and Sys.Lib (Filter Blocks) files.

Random Noise Sources

The random noise sources are used to provide a noise signal source for the transient analysis. The subcircuit has only one connection, the signal output. The parameters that must be specified are TIM, the total analysis time, usually TSTOP, and MAG, the RMS magnitude of the noise signal. The noise sources are comprised of piece wise linear (PWL) sources which are stacked in series. RAN1, RAN2 and RAN3 are 128 point noise sources. RAN4 is a 256 point noise source and RAN5 is a 512 point noise source. As more points are used, the the analysis will require more time. The larger point sources will have a higher frequency content than the smaller point sources for the same time span. The random noise sources were built using a random number generator in order to provide the time and voltage multiplication factors.

```
XNOISE 1 RAN4 {TIM=1U MAG=1}

.SUBCKT  RAN4  4
R1  0  1  1K
V1  1  0  PWL 0,{-1.7071*MAG},{0.00391*TIM},{0.7963*MAG},
```

Figure 12, Partial listing of the random noise source shows its generic nature.

Generic Thermal Models

The thermal models found in the THERMAL library are described in the July and October 1988 newsletters. Both *Intusoft Newsletters*, as well as the published paper "Modeling Thermal Effects Using Spice" by L. G. Meares [7-4] are available in the "SPICE APPLICATIONS HANDBOOK" [7-7].

Generic Interconnect

Example: X23 5 7 WIRE {L=1 Z=100}

where: L is the connect length in inches
        Z is the transmission line impedance in Ohms

Assumption: L * 125PSEC/inch is small compared to rise/fall time. Propagation velocity is 1 / 125 PSec/inch

The most frequently used element in electronic circuits, the interconnect or "wire", is rarely modeled. The most computationally efficient model for PC cards, backplanes and thick film substrates is an L-C section of a transmission line. Integrated circuits, with the exception of Microwave IC's, can be modeled with R-C sections. The generic interconnect presented here is for the L-C case and requires that circuit rise and fall times are long compared to the "wire" length, [7-2]. Microstrip propagation times of 125PSec per inch, [7-3], are built in to the model. Wire wrap backplanes may require several sections or the use of transmission lines. To make efficient use of computer memory, IsSPICE4 transmission lines should only be used when the delay time is a large fraction of the analysis time. You may use the

following equations to modify the built-in model for different materials and geometries. Impedance for PC cards and thick film substrates is approximated by:

$$Z = 377 * \left(\frac{h}{w}\right) * (Er)^{-0.5}$$

where   h is the height of the conductor above the ground plane
        w is the conductor width
        Er is the relative dielectric constant

Examples, A PC card has h=.007, w=.025, Er=2: Z=75

Thick film, Alumina: w=.010, h=.001, Er=10: Z=12
(t must be increased to 264 PSec/inch for Alumina)

The impedance for wire wrap is:

$$Z = 138 * (Er)^{-0.5} * \log\left(4 * \frac{h}{w}\right) \qquad\qquad [7\text{-}3]$$

Example: w = .1 (include insulation)
         h = .25 (average)
         Er = 2 (Avg of air and insulation)
         Z = 150

To construct a new model, calculate a new value for t based on Er and insert the value in the model. Use one of the above equations for Z which can be passed as a parameter. Alternatively, you can pass ER as a parameter, using the same model for all occasions.

   v, the propagation velocity, $= c * (Er)^{-.5}$
   t = 1 / v = 125 PSec/inch, built-in
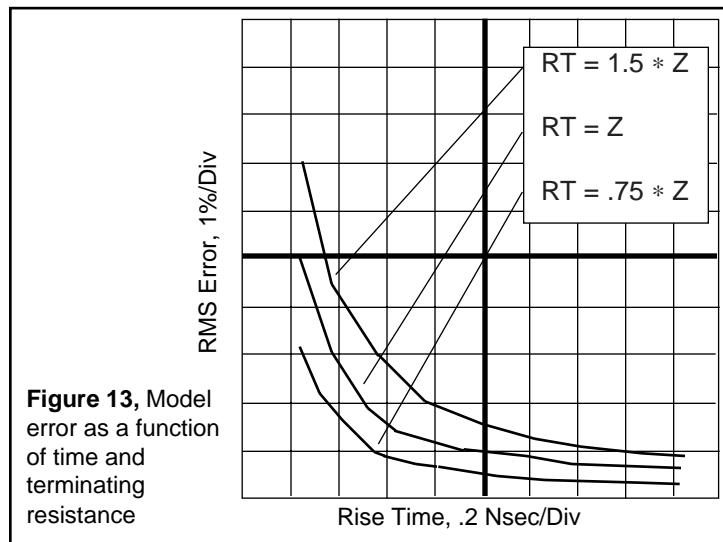
Then, for each L-C Section:

$$L1 = Z * L * t \qquad \text{or} \qquad = Z * L * t * (Er)^{0.5}$$
$$C1 = t * \frac{L}{Z} \qquad \text{or} \qquad = t0 * (Er)^{0.5} * \frac{L}{Z}$$

Closed form equations for impedance, given above, should be taken as approximations and supported by measured data. Capacitance is frequently higher than predicted because of fringing and additional dielectric encapsulation.

The validity of an LC approximation to a transmission line requires that the group delay (dPhase/dFreq) is linear for frequencies that contain useful information. Reference 7-2 uses a criteria of $3 * TD < trise/fall$. External circuit resistance and your accuracy expectations will also influence this criteria. The following figure shows how accuracy changes with terminating resistance and input rise time for an 8 section transmission line with a 1 nanosecond delay. In this example, each section has a 125 PSec delay. The error shown in the plot is an RMS value over 5 Nsec, resulting from a step input whose rise time is plotted in the X axis.

Figure 13, Model error as a function of time and terminating resistance

RMS Error, 1%/Div

RT = 1.5 * Z

RT = Z

RT = .75 * Z

Rise Time, .2 Nsec/Div

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        1980 Proceeding of the Hybrid Microcircuits
        Symposium,pp48-83
        U.S. Army, ERADCOM, Fort Monmouth, NJ

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        ITT, 5th edition, chapter 22, pp22-26
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        Hymowitz, C.E., Meares, L.G.
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Models For Power Electronics

Saturable Reactor Model

A saturable reactor is a magnetic circuit element consisting of a single coil wound around a magnetic core. The presence of a magnetic core drastically alters the behavior of the coil by increasing the magnetic flux and confining most of the flux to the core. The magnetic flux density, B, is a function of the applied MMF, which is proportional to ampere turns. The core consists of a number of tiny magnetic domains which are made up of magnetic dipoles. These domains setup a magnetic flux that adds to or subtracts from the flux which is setup by the magnetizing current. After overcoming initial friction, the domains rotate like small DC motors, to become aligned with the applied field. As the MMF is increased, the domains rotate until they are all in alignment and the core saturates. Eddy currents are induced as the flux changes, thereby causing added loss.

The saturable reactor cannot be modeled using a single Is-SPICE4 primitive element. Therefore, Intusoft has created a saturable core macro model which utilizes the IsSPICE4 subcircuit feature. The saturable core is capable of simulating nonlinear transformer behavior including saturation, hysteresis, and eddy current losses. To make the model even more useful, it has been parameterized. This is a technique which allows the characteristics of the core to be determined via the specification of a few key parameters. At the time of the simulation, the specified parameters are passed into the subcircuit. The equations in the subcircuit (inside the curly braces) are then evaluated and replaced with a value which makes the equation-based subcircuit compatible with IsSPICE4.

The parameters that must be passed to the subcircuit include:

Flux Capacity in Volt-Sec (VSEC)
Initial Flux Capacity in Volt-Sec (IVSEC)
Magnetizing Inductance in Henries (LMAG)
Saturation Inductance in Henries (LSAT)
Eddy current critical frequency in HZ (FEDDY)

The saturable core may be added to a model of an ideal transformer to create a complete transformer model. To use the model, just place the core across the transformer's input terminals and specify the parameters. A special subcircuit test point has been provided to allow the monitoring of the core flux. Placing a SPICENET test point symbol on the pin or supplying a dummy netlist node number will allow the designer to get a reading of the internal core flux. Since there are two connections in the subcircuit, no connection is required at the top subcircuit level other than the dummy node number.

A sample ISSPICE4 call to the saturable core subcircuit will look like the following:

X1 2 0 3 CORE { VSEC=50U IVSEC=-25U LMAG=10MHY
+ LSAT=20UHY FEDDY=20KHZ }

The generic saturable core model is listed below.
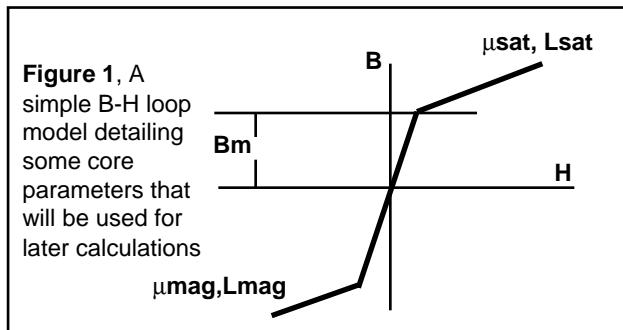
```
.SUBCKT CORE 1 2 3          RS 5 6 {LSAT*500/VSEC}
F1 1 2 VM1 1                VP 7 2 250
G2 2 3 1 2 1                D1 6 7 DCLAMP
E1 4 2 3 2 1                VN 2 8 250
VM1 4 5                     D2 8 6 DCLAMP
RX 3 2 1E12                 .MODEL DCLAMP D(CJO={3*VSEC/
CB 3 2 {VSEC/500}           + (6.28*FEDDY*500*LMAG)} VJ=25)
+ IC={IVSEC/VSEC*500}       .ENDS
RB 5 2 {LMAG*500/VSEC}
```

Subcircuit Netlist
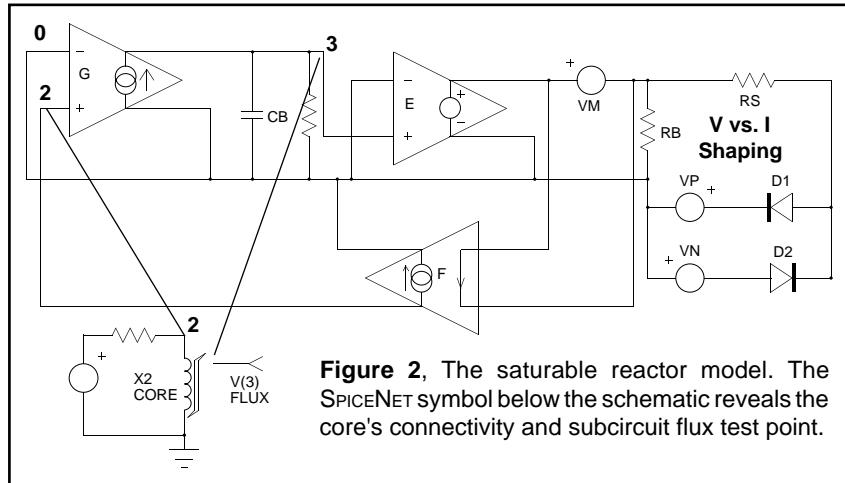
To make the netlist ISSPICE4 compatible, just replace all of the equations in the curly braces with numerical values.

How The Core Model Works

Modeling the physical process performed by a saturable core is most easily accomplished by developing an analog of the magnetic flux. This is done by integrating the voltage across the core and then shaping the flux analog with nonlinear elements to cause a current flow which is proportional to the desired function. This gives good results when there is no hysteresis, as illustrated in Figure 1.

Figure 1, A simple B-H loop model detailing some core parameters that will be used for later calculations

The input voltage is integrated using the voltage controlled current source, G, and the capacitor CB. An initial condition across the capacitor allows the core to have an initial flux. The output current from F is shaped as a function of flux using the

Figure 2, The saturable reactor model. The SPICENET symbol below the schematic reveals the core's connectivity and subcircuit flux test point.

voltage sources VN and VP and diodes D1 and D2. The inductance in the high permeability region is proportional to RB, while the inductance in the saturated region is proportional to RS. Voltage VP and VN represent the saturation flux. Core losses can be simulated by adding resistance across the input terminals; however, another equivalent method is to add capacitance across resistor RB in the simulation. Current in this capacitive element is differentiated in the model to produce the effect of resistance at the terminals. The capacitance can be made a nonlinear function of voltage which results in a loss term that is a function of flux. A simple but effective way of adding the nonlinear capacitance is to give the diode parameter, CJO, a value, as is done here. The other option is to use a nonlinear capacitor across nodes 2 and 6, however, the capacitor's polynomial coefficients are a function of saturation flux, causing their recomputation if VP and VN are changed.

Losses will increase linearly with frequency, simulating high frequency core behavior. A noticeable increase in MMF occurs when the core comes out of saturation, an effect that is more pronounced for square wave excitation than for sinusoidal excitation, as shown in Figure 3. These model properties agree closely with observed behavior [8-2]. The model is setup for orthonol and steel core materials which have a sharp transition from the saturated to the unsaturated region. For permalloy cores, the transition out of saturation is less pronounced. To account for the different response, the capacitance value in the diode model (CJO in DCLAMP), which affects core losses, should be scaled down. Also, scaling the voltage sources VN and VP down will soften the transition.

The DC B-H loop hysteresis, usually unnecessary for most applications, is not modeled because of the extra model complexity, causing a prediction of lower loss at low frequencies. The hysteresis, however, does appear as a frequency dependent function, as seen on the previous page, providing reasonable results for most applications, including magnetic amplifiers. The model shown in Figure 2 simulates the core characteristics and takes into account the high frequency losses associated with eddy currents and transient widening of

the B-H loop caused by magnetic domain angular momentum. Losses will increase linearly with frequency, simulating high frequency core behavior.
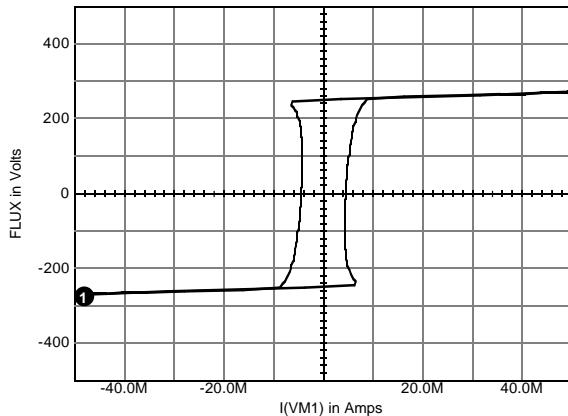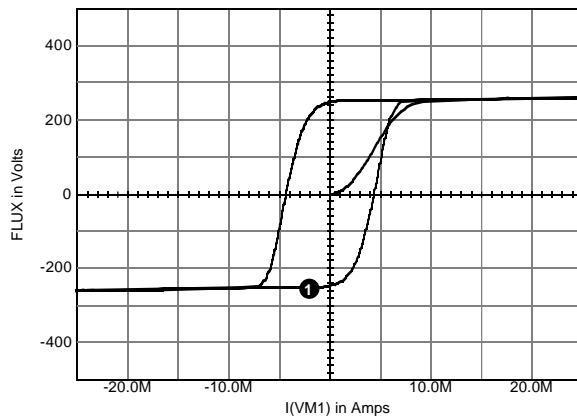
Figure 3, The saturable core model is capable of being used with both Sine (Below) and Square (Above) wave excitation.

Calculating Core Parameters

The saturable core model is setup to be described in electrical terms, thus allowing the engineer to design the circuitry without knowledge of the core's physical makeup. After the design is completed, the final electrical parameters can then be used to calculate the necessary core magnetic/size values. The core model could be altered to take as its input magnetic and size

parameters. The core could then be described in terms of N, Ac, MI, μ, and Bm and would be more useful for studying previously designed circuits. But the electrical based model is better suited to the natural design process. The saturable core model's behavior is defined by the set of electrical parameters, shown in Figure 1 and Figure 4. The core's magnetic/size values can be easily calculated from the following equations which utilize cgs units.

Parameters Passed To Model

VSEC	Core Capacity in Volt-Sec
IVSEC	Initial Condition in Volt-Sec
LMAG	Magnetizing Inductance in Henries
LSAT	Saturation Inductance in Henries
FEDDY	Frequency when LMAG Reactance = Loss Resistance in Hz

Equation Variables

Bm	Maximum Flux Density in Gauss
H	Magnetic Field Strength in Oersteds
Ac	Area of the Core in cm^2
N	Number of Turns
MI	Magnetic Path Length in cm
μ	Permeability

Faraday's law, which defines the relationship between flux and voltage is:

$$E = \frac{d\varphi}{dt} * 10^{-8} \qquad\qquad \text{Eq. 8.1}$$

where E is the desired voltage, N is the number of turns and j is the flux of the core in maxwells. The total flux may also be written as:

$$\varphi_T = 2 * Bm * Ac \qquad\qquad \text{Eq. 8.2}$$

Then, from 1& 2,

$$E = 4.44 * Bm * Ac * F * N * 10^{-8} \qquad\qquad \text{Eq. 8.3}$$

and

$$E = 4.0 * Bm * Ac * F * N * 10^{-8} \qquad\qquad \text{Eq. 8.4}$$

where Bm is the flux density of the material in Gauss, Ac is the effective core cross sectional area in cm^2, and F is the design frequency. Equation 8.3 is for sinusoidal conditions while equation 8.4 is for a square wave input. The parameter VSEC can then be determined by integrating the input voltage resulting in:

$$\int e\, dt = N\varphi_T = N * 2 * Bm * Ac * 10^{-8} = \textbf{VSEC} \qquad \text{Eq. 8.5}$$

also from E = L di/dt we have,

$$\int e\, dt = Li \qquad\qquad \text{Eq. 8.6}$$

The initial flux in the core is described by the parameter **IVSEC**. To use the IVSEC option, you must put the UIC keyword in the ".TRAN" statement. The relationship between the magnetizing force and current is defined by Ampere's law as

$$H = 0.4 * \pi * N * \frac{i}{Ml} \qquad\qquad \text{Eq. 8.7}$$

where H is the magnetizing force in oersteds, i is the current through N turns, and Ml is the magnetic path length in cm.

From equations 8.5, 8.6, and 8.7 we have

$$L = N^2 * Bm * Ac * \frac{(0.4 * \pi * 10^{-8})}{H * Ml} \qquad\qquad \text{Eq. 8.8}$$

with μ = B/H we have

$$\textbf{L(mag,sat)} = \mu(\text{mag,sat}) * N^2 * Bm * 0.4 * \pi * 10^{-8} * \frac{Ac}{Ml} \qquad \text{Eq. 8.9}$$

The values for LMAG and LSAT can be determined by using the proper value of μ in Eq. 8.9. The values of permeability can be found by looking at the B - H curve and choosing two values for the magnetic flux, one value in the linear region where the permeability will be maximum, and one value in the saturated region. Then, from a curve of permeability versus magnetic flux, the proper values of m may be chosen. The value of μ in the saturated region will have to be an average value over the range of interest. The value of FEDDY, the eddy current critical frequency, can be determined from a graph of permeability versus frequency, as shown in Figure 4. By choosing the approximate 3db point for μ, the corresponding frequency can be determined.
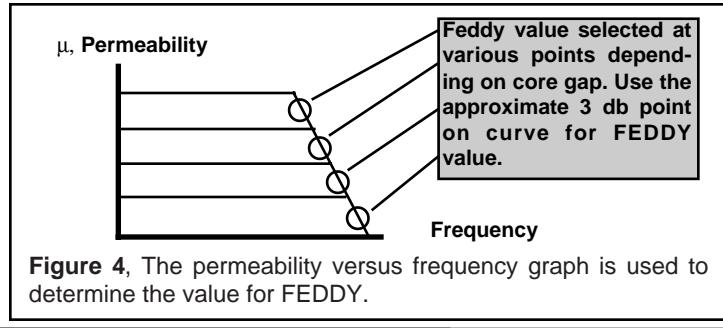
Figure 4, The permeability versus frequency graph is used to determine the value for FEDDY.

Using And Testing The Saturable Core
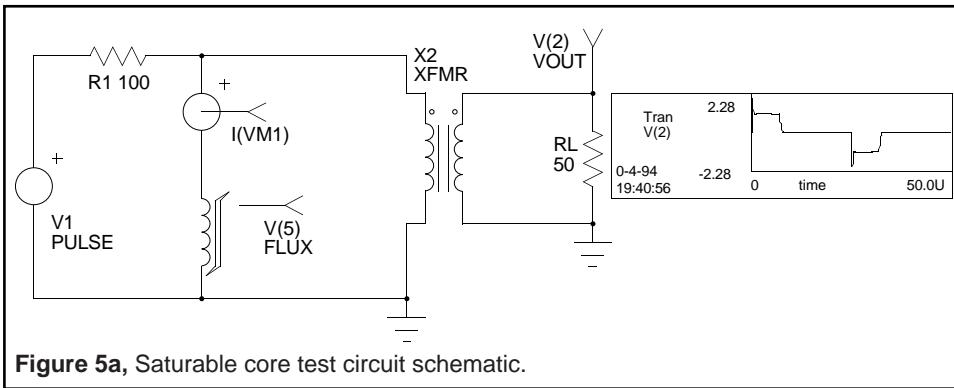
Figure 5a, Saturable core test circuit schematic.

```
Saturable core Test Circuit          + LSAT=20UHY FEDDY=25KHZ}
.OPTIONS LIMPTS=1000                 X2 2 0 3 0 XFMR  {RATIO=.3}
∗SPICE_NET                           VM1 2 1
.TRAN .1US 50US                      V2 4 0 PULSE -5 5 0US 0NS 0NS
∗INCLUDE DEVICE.LIB                  +25US
.OPTIONS LIMPTS=1000                 ∗Use the above statement for
∗ALIAS  V(3)=VOUT                    ∗Square wave excitation
∗ALIAS  V(5)=FLUX                    ∗V2 4 0 SIN 0 5 40K
∗ALIAS  V(4)=VIN                     ∗Use the above statement for Sin
.PRINT TRAN V(3)  V(5)  I(VM1) V(4)  ∗wave excitation
R1 4 2 100                           ∗Adjust Voltage levels to insure core
R2 3 0 50                            ∗saturation
X1 1 0 5 CORE {VSEC=25U              .END
+IVSEC=-25U LMAG=10MHY
```

Figure 5b, Saturable core test circuit netlist.

The test circuit shown in Figure 5 can be used to evaluate a saturable core model. Specify the core parameters in the curly braces and adjust the voltage levels in the "V2 4 0 PULSE" or "V2 4 0 SIN" statements to insure that the core will saturate. You can use Eq.8.3 and 8.4 to get an idea of the voltage levels which are necessary to saturate the core. The .TRAN statement may also need adjustment, depending on the frequency specified by the V2 source. You can use the preprocessing programs INCLUDE and PARAM to get the subcircuit out of the Intusoft device model library and evaluate the parameterized model, or it may be done manually. The core parameters must remain reasonable or the simulation may fail. After simulation, plotting V(5) versus I(VM1) (Flux vs. Current through the core) will result in a B-H plot.

Transformer Models

The usual method of simulating a transformer using IsSPICE4 is by specifying the open circuit inductance seen at each winding and then adding the coupling coefficients to a pair of coupled inductors. This technique tends to lose the physical meaning associated with leakage and magnetizing inductance and does not allow the insertion of a nonlinear core. It does, however, provide a transformer that is simple to create and simulates efficiently. The coupled inductor type of transformer, its related

equations and relationship to an ideal transformer with added leakage and magnetizing inductance is shown in Figure 6.

$$V1 = L1 \frac{di1}{dt} + M \frac{di2}{dt}$$

$$V2 = M \frac{di1}{dt} + L2 \frac{di2}{dt}$$

$$M = K \sqrt{L1 * L2}$$

If K = 1

$$L1 = LM$$

$$L2 = N^2 * L1$$

$$K = 1 - \frac{LE}{LM}$$
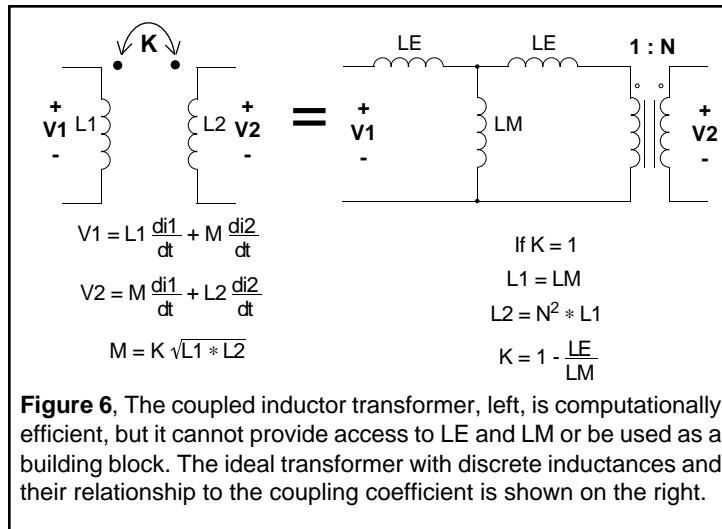
Figure 6, The coupled inductor transformer, left, is computationally efficient, but it cannot provide access to LE and LM or be used as a building block. The ideal transformer with discrete inductances and their relationship to the coupling coefficient is shown on the right.

In order to make a transformer model that more closely repre-sents the physical processes, it is necessary to construct an ideal transformer and model the magnetizing and leakage inductances separately. The ideal transformer is one that preserves the voltage and current relationships, shown in Figure 7, and has a unity coupling coefficient and infinite magnetizing inductance. The ideal transformer, unlike a real transformer, will operate at DC, a property which is useful for modeling the operation of DC-DC converters.

$$V2 = V1 * N2 / N1$$
$$I1 = I2 * N2 / N1$$
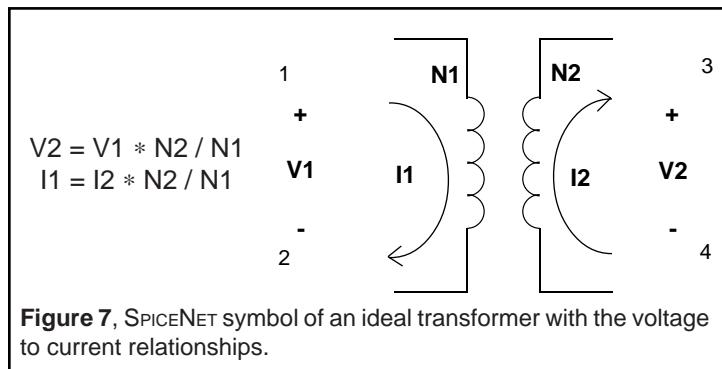
Figure 7, SPICENET symbol of an ideal transformer with the voltage to current relationships.

The coupling coefficient of a transformer wound on a magnetic core is nearly unity when the core is not saturated and depends on the winding topology when the core is saturated. The work of Hsu, Middlebrook and Cuk [8-3] develops the relationship of leakage inductance, showing that relatively simple measurements of input inductance with shorted outputs yield the necessary model information.

Multi-winding topologies can be simulated by using combinations of this 2 port representation. (See the *Intusoft Newsletter* Feb. 1989, Page 9). The IsSPICE4 equivalent circuit is shown in Figure 8 and implements the following equations:

$$V1 * RATIO = V2 \qquad\qquad I1 = I2 * RATIO$$

RP and RS are used to prevent singularities in applications where terminals 1,2 are open circuit or terminals 3,4 are connected to a voltage source. RATIO is the turns ratio from winding 1,2 to winding 3,4. Polarity "dots" are as shown on terminals 1 and 3.


```
.SUBCKT XFMR 1 2 3 4
E  5  4  1  2  {RATIO}
F  1  2  VM  {RATIO}
VM  5  6
RP  1  2  1MEG
RS  6  3  1U
.ENDS
```
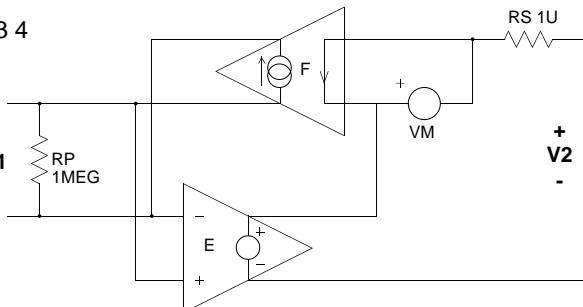
Figure 8, The Intusoft ideal transformer model allows operation at DC and the addition of magnetizing and leakage inductances, as well as a saturable core to make a complete transformer model. Parameter passing allows the transformer to simulate any turns ratio.

The magnetizing inductance is added by placing the saturable reactor model across any one of the windings. Coupling coefficients are inserted in the model by adding the series leakage inductance for each winding as shown in Figure 9.

The leakage inductances are measured by finding the short circuit input inductance at each winding and then solving for the individual inductance. These leakage inductances are independent of the core characteristic shown by ref [8-3]. The final model, incorporating the CORE and XFMR subcircuits along with the leakage inductance and winding resistance is shown in Figure 9.

IsSPICE4 models cannot represent all possible behavior because of the limits of computer memory and run time. This model, as most simulations, does not represent all cases.
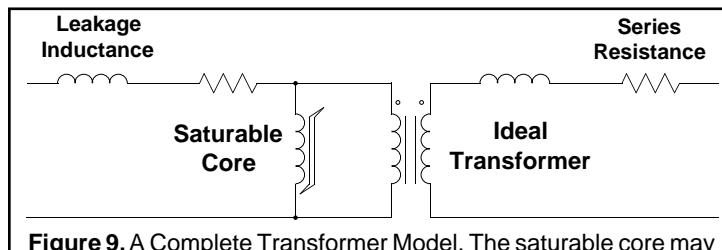
Figure 9, A Complete Transformer Model. The saturable core may be combined with the ideal transformer, XFMR, and some leakage inductance and series resistance to create a complete model of a transformer.

Modeling the core in Figure 9 as a single element referred to one of the windings works in most cases; however, some applications may experience saturation in a small region of the core, causing some windings to be decoupled faster than others, invalidating the model. Another limitation of this model is for topologies with magnetic shunts or multiple cores. Applications like this can frequently be solved by replacing the single magnetic structure with an equivalent structure using several transformers, each using the model presented here.

Small Signal AC Analysis of PWMs

SPICE has generally been perceived as being weak in its ability to model the small signal behavior of switching circuits. The AC analysis will reduce a circuit to a linear small signal representation about its large signal operating point. This process does not properly model the pulse width modulator in a switching power supply.

The ideal transformer that has been developed can be seen intuitively as a power supply model. Operating at DC, it will preserve the input-output relationships of filter networks and can be used for control simulation by adding the small signal control parameters. This has been done for Buck, Boost, Buck-Boost and Cuk topologies under the restriction of continuous conduction.

To develop the rationale for the PWM model, the state averaging technique of Middlebrook [8-4] is applied to a Buck regulator shown in Figure 10. In this approach, the nodal equations are used rather than the state equations in a manner that will cause the states, inductor current and capacitor voltage, to be averaged over the two switch positions.

These results are then rearranged to form the equivalent circuit shown in Figure 11. Lower case symbols in Figure 11 are used to represent small signal parameters and upper case symbols are used for large signal parameters.

$$V2 = D * V1, \text{ averaged by L}$$
$$I1 = D * i2, \text{ averaged by C}$$
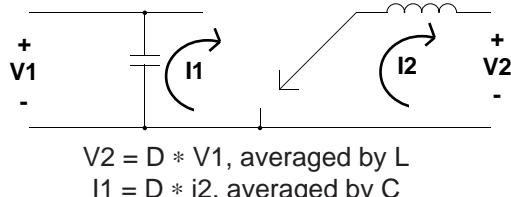
Figure 10, Buck regulator

$$v2 = D * v1 + d * V1$$
$$i1 = D * i2 + d * I2$$
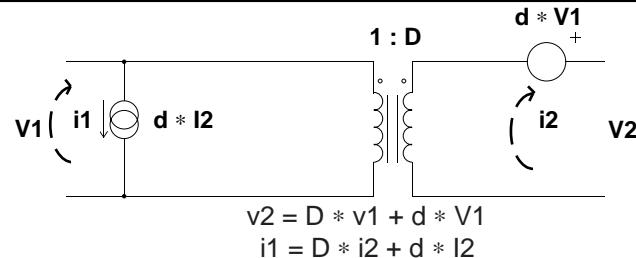
Figure 11, Small signal equivalent Buck regulator model.

The model shown in Figure 11 can be used to replace the pulse width modulator switches for the small signal analysis. Notice, however, that this model is exactly the small signal model of the ideal transformer if the turns ratio were used to replace the duty ratio.

The POLY directive in ISSPICE4 can be used to create a new transformer model in which turns ratio is a controlled variable. ISSPICE4 will then compute the small signal parameters and automatically make the small signal model. Moreover, this model produces correct large signal response, enabling the designer to study start up or pulsed line and load response without resorting to a complete pulse width modulator simulation.

The new ISSPICE4 model, shown in Figure 12a, is an electrically adjustable transformer, which is precisely the definition of the switching element used in pulse width modulators.

Large signal behavior can also be simulated with this new model as long as the continuous conduction restriction is applied. In the context of this model, continuous conduction is required to keep the switches in their predefined positions. For circuits using a free wheeling diode as a switch, it is necessary for the inductor current to continue in the same direction for the switch to behave as modeled. Forced switch commutation, for example, using a MOSFET switch instead of a diode, would remove the restriction.

Figure 13 is the schematic of a Cuk regulator. Other canonical forms are given in reference [8-5].
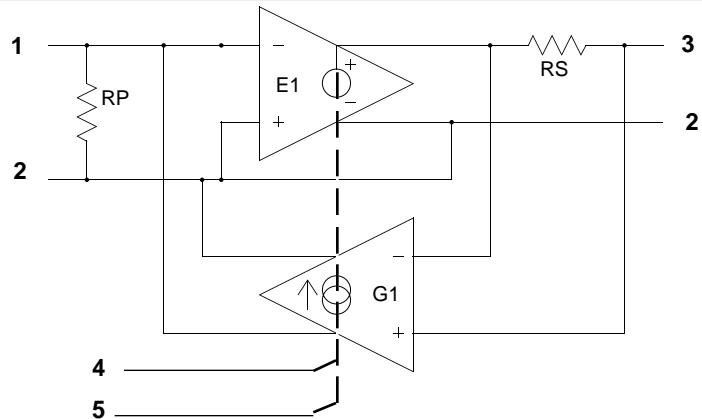
Figure 12a, Pulse Width Modulator (PWM) equivalent circuit. Dashed line indicates that the voltage V(4,5) controls the dependent sources G1 and E1.

```
*Pulse Width Modulator
.SUBCKT PWM 1 2 3 4 5
E 6 2 POLY(2) 1 2 4 5 0 0 0 0 1
G 1 2 POLY(2) 6 3 4 5 0 0 0 0 1K
RP 1 2 1MEG
RS 3 6 1M
.ENDS
```
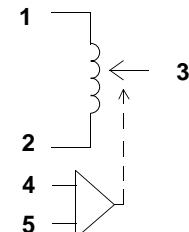

Figure 12b, Pulse Width Modulator (PWM) symbol and subcircuit netlist.
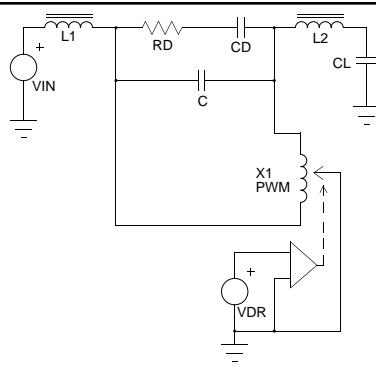
Figure 13, A Cuk regulator with coupled inductors and commutating capacitor damping using the newly developed SPICENET PWM symbol subcircuit model.

A Silicon Controlled Rectifier (SCR) Model

The equivalent SCR subcircuit shown in Figure 16 will be used for the SCR model. SCR's are difficult to model because the typical data sheet does not provide adequate information and the anode gate terminal is not available to generate test data. The approach presented here will focus on making a model that gives reasonable results for dv/dt sensitivity, holding current and storage time. The dv/dt sensitivity is defined as the rate of anode to cathode voltage which will turn the device on without any applied gate current. It varies with gate voltage bias; however, rate sensitive turn on will occur even when the cathode gate is shorted to the cathode. The extra NPN transistor in the model is used to model the lateral base resistance and account for this effect. The 2N6397 data sheet will be used for the sample calculations.
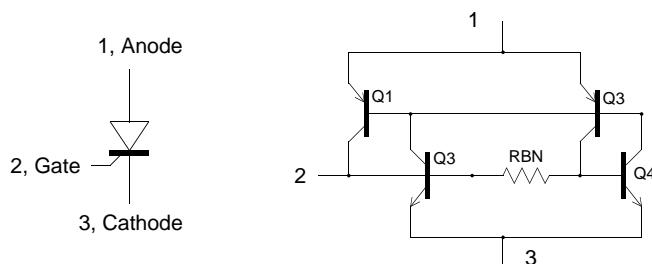
Figure 16, The Intusoft SCR equivalent circuit (Right) and SPICENET symbol, QN6397, (Left).

When the compound Hfe of the NPN and PNP transistors is greater than unity, the SCR will turn on. The 2N6397 data sheet shows the holding current and the DC trigger current to be nearly equal, suggesting the two transistors have about the same Hfe versus current behavior. Hfe will increase at higher currents so that the holding current must be a result of low current Hfe roll off which is modeled by selecting NE and ISE as described by the BJT equations resulting in NE=2 and ISE=4E-9. The value for IS and RBN are initially selected based on the generic power transistor.

The dv/dt specification is 50 v/usec, at 125 Degrees C, where Hfe is typically twice its room temperature value. The trigger

current should be one fourth its high temperature value since there is a cascade of two current gains. The SCR should then turn on when the current through the collector-base capacitance is 1.25ma.

i = C*dv/dt,   Eq. 8.10

Ctotal = Ih/dv/dt = 25PF   Eq. 8.11

This will give a value of about 100PF at zero bias so that the CJE and CJC of the two transistors can be set to 50PF. This capacitance will also affect circuit performance, so independent verification was also be made by laboratory test.

The 40 Ohms resistance connecting the two bases is chosen based on the generic power transistor model. When the gate is shorted, it will be necessary to have an additional 15ma of current through the capacitance, which will increase the dv/dt threshold by a factor of four. Predictions for a typical device at room temperature are then 200 V/USEC open gate and 800 V/USEC shorted gate. In order to obtain proper temperature sensitivity, it is necessary to also set XTB, the forward Beta temperature exponent, to 2.5.

Selecting BF, BR, TF and TR is more difficult. These parameters will describe the dynamic SCR behavior, which is a function of the current distribution when all junctions are forward biased. Experimental evaluation of the simulation parameters shows that the NPN must be slower and have higher gain than the PNP in order for the NPN base emitter to remain forward biased during turn off. If the NPN base emitter turns off first, then a large negative voltage transient is predicted for the gate, a condition that is not observed. Trial simulations were run to determine a reasonable set of gain and transit time parameters. The starting point used the generic power transistor parameters. The final set of parameters is in the SCR.LIB file. Simulations were run to verify DC trigger current, dv/dt, turn on and turn off characteristics. Figure 17 shows the simulation for turn on and turn off at 125 Degrees Celsius-. where dv/dt triggering is shown.
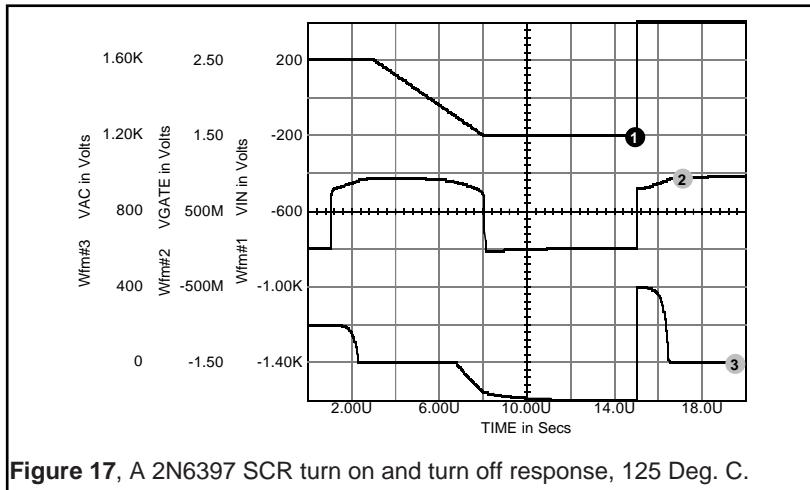
Figure 17, A 2N6397 SCR turn on and turn off response, 125 Deg. C.

Special Sources For Power Supply Designers

Included in the Signal.Lib file are several signal sources especially developed to assist the power supply designer. Two sources of special note are the 3 phase generator capable of supplying 3 phase voltages, with or without magnitude and phase error, and a variable phase Sin/Cosine source.

```
.SUBCKT GEN3 3 7 1 20
* FREQ = {FREQ} AMPLITUDE = {VGEN}
C1 2 20 {1/(6.28319K*FREQ)}
R1 2 20 1E6
I1 20 2 PULSE {VGEN*1U} 0
* MAKES UIC UNNECESSARY
E1 5 20 20 2 1
V1 3 20 SIN 0 {VGEN} {FREQ}
E2 7 20 POLY(2) 5 20 3 20 0 -866.00M -500.00M
E3 1 20 POLY(2) 5 20 3 20 0
+ {(1+.01*MAGERR)*(.866*(1-.5*(.0174533*PHASE)^2)
+ -.5*.0174533*PHASE*(1+.166667*
+ (.0174533*PHASE)^2))}
+ {(1+.01*MAGERR)*(-.5*(1-.5*(.0174533*PHASE)^2)
+ -.866*.0174533*PHASE*(1+.166667*(.0174533*PHASE)^2))}
G1 20 2 20 3 1M
R2 7 0 100MEG
R3 1 0 100MEG
R4 3 0 100MEG          3 Phase Generator
R5 5 0 100MEG          Subcircuit Listing
.ENDS
```

The 3 phase generator is made up of an integrator that converts the basic sine source to a cosine source. Summers are then used with varying weighting constants to give the desired output signals. The source allows the user to define the peak amplitude and frequency. Magnitude and phase unbalance has been added to the source in order make it possible to evaluate performance parameters that may not be seen in the laboratory.

284
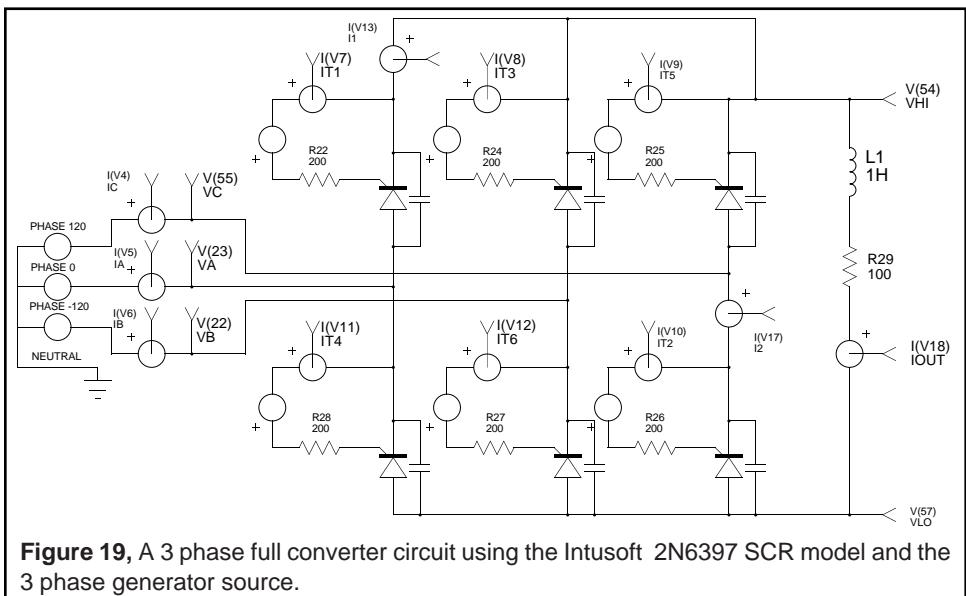
Figure 19, A 3 phase full converter circuit using the Intusoft 2N6397 SCR model and the 3 phase generator source.
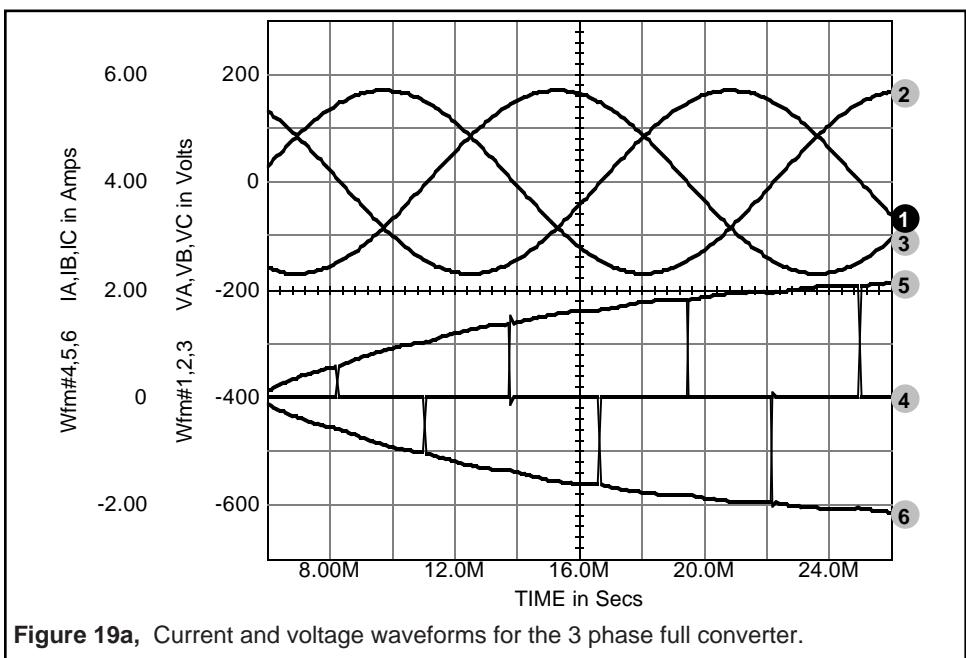
Figure 19a, Current and voltage waveforms for the 3 phase full converter.

Figure 19b, Output voltage for the 3 phase full converter.
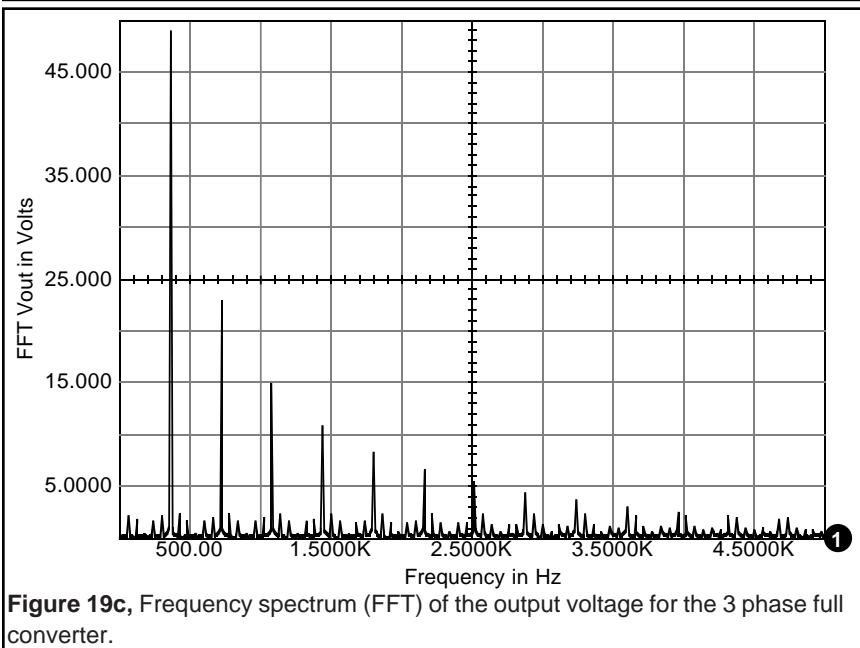
Figure 19c, Frequency spectrum (FFT) of the output voltage for the 3 phase full converter.

References

[8-1]   SPICE2, A COMPUTER PROGRAM TO SIMU-
         LATE SEMICONDUCTOR CIRCUITS
         Laurence W. Nagel, Memorandum No. ERL-M520,
         9 May 1975, Electronics Research Laboratory,
         College of Engineering, University of California,
         Berkeley, CA 94720

[8-2]   DESIGN MANUAL FEATURING TAPE WOUND
         CORES,
         Magnetics, Inc., Components Div., Box 391, Butler
         PA 16001

[8-3]   TRANSFORMER MODELING AND DESIGN FOR
         LEAKAGE CONTROL
         Shi Ping Hsu, R.D. Middlebrook and Slobodan
         Cuk, Powerconversion International, pg. 68, Feb,
         1982

[8-4]   ADVANCES IN SWITCHED-MODE POWER CON-
         VERSION
         Slobodan Cuk and R.D. Middlebrook, vol 2, copy-
         right 1981

[8-5]   NEW SIMULATION TECHNIQUES USING SPICE
         L.G. Meares, Applied Power Electronics Confer-
         ence, (c) IEEE, April-May, 1986.

REFERENCES

Appendices

Appendix A: Model References

For information on the models listed below please see the associated references. Technical papers are available directly from Intusoft. Other models are described in the IsSpice4 User's Guide and this manual. All Newsletters, numbered 1-34, are included in the Spice Applications Handbook (published by Intusoft). More recent newsletters can be obtained directly from Intusoft.

AM Generator (Signal.Lib) - Newsletter 32, Sept. 1993

Analog Switches (Hc.Lib) - Newsletter 25, June 1992

BiCMOS Models (Abtmbn.Lib) - Philips SPICE Modeling Series, "ABT and Multibyte™ Modeling Guide", April 1992

BJTs, Darlington (Bjtdar.Lib) - SpiceMod User's Guide

BJTs, Power (Powbjt.Lib) - SpiceMod User's Guide

Bridges (Cm2.Lib) - IsSpice4 User's Guide

Coax (Coax.Lib) - Newsletter 30, May 1993

Connectors (Conn.Lib/Conn2.Lib) - Newsletter 36/37, June/August 1994

Core Models (Device.Lib/Magnetic.Lib) - *Technical paper:* "Improved SPICE Model simulates Transformer's Physical Processes", L.G. Meares, C. Hymowitz, EDN August, 19 1993

Crosstalk Models (Device.Lib) - Newsletter 6, June 1987

Crystals with temperature effects (Device2.Lib) - Newsletter 16, Jan. 1990

Diodes, Photo (Diode5.Lib) - Newsletter 34, Jan. 1994

Diodes, Pin (RF.Lib) - Newsletter 31, July 1993

Diodes, Power Schottky (Diode5.Lib) - Newsletter 32, Sept. 1993

Diodes, Soft Recovery (Diode5.Lib) - Newsletter 32, Sept. 1993

Dual-Gate Mesfets (Dgmos.Lib) - Newsletter 22, August 1991

FAST Models (Abtmbn.Lib) - Philips SPICE Modeling Series, "Design Guide for SPICE Simulation of Philips Bipolar Logic", March 1990

APPENDIX A: MODEL REFERENCES

Fuses (Thermal.Lib) - Newsletter 21, April 1991

Fuzzy Logic (Fuzzy.Lib) - Newsletter 28, January 1993

ECL (Ecl.Lib) - Newsletter 36, June 1994

Ground Plane (Device.Lib) - Newsletter 6, June 1987

Hall Sensors (Hsensor.Lib) - Newsletter 33, November 1993

IBIS Models (Ibis1.Lib) - Newsletter 30/31, May/July 1993

IGBTs (Igbt.Lib) - Newsletter 25, June 1992, SPICEMOD User's Guide, *Technical paper:* "A SPICE Model for IGBTs", Charles Hymowitz, APEC 1995

Laplace Models (Sys.Lib, CM1.Lib, Scn.Lib) - Newsletter 19, March 1990 (SC Filters), Newsletter 19/28, Oct. 1990/Jan 1993 (Pole-Zero functions), Newsletter 39, Nov. 1994 (Laplace expressions)

Lasers (Diode.Lib) - Newsletter 14, July 1989

Mechanical Models (Mech.Lib) - Newsletter 19/20, Oct. 1990/Jan. 1991

Mosfets, Power (Powmos.Lib) - Newsletter 27, Nov. 1992, SPICEMOD User's Guide

Movs (Mov.Lib) - EDN Design Idea, "MOV Model Spoofs SPICE", Jim Honea, 3/28/91, pg. 35

Neural Networks (Neural.Lib) - Newsletter 13/14, April/July 1989

NTSC Generator (Signal2.Lib) - Newsletter 40, June 1995

Platinum Thermal Resistor (Device2.Lib) - Newsletter 24, Feb. 1992

PSK/FSK Generators (Signal2.Lib) - Newsletter 37, August 1994

Pressure Sensors (Psensor.Lib) - Newsletter 33, November 1993

PWM IC Models (Pwm.Lib) - "Circuit Simulation of Switching Regulators With Spice2", Dr. Vince Bello, Norden Systems, Norwalk CT 06856, 1994

RF Beads (RF.Lib) - Newsletter 23, Nov. 1991

SCR (Scr.Lib) - Newsletter 24, Feb. 1992, SPICEMOD User's Guide

Switched Capacitor Elements & Filters (Scn.Lib) - Newsletter 4, March 1987, Newsletter 17, March 1990

Test Generators (Signal2.Lib) - Newsletter 39, Nov. 1994

Thermistors (Thermal.Lib) - Newsletter 11, Oct. 1988

Time Dependent Elements (Device.Lib) - Paper

Tungsten Lamp (Thermal.Lib) - Newsletter 11, Oct. 1988

Transformer, Single/Center-Tap (Device.Lib) - Newsletter 12, Feb. 1989

Transimpedance Opamps (Nonlin.Lib) - Newsletter 15, Sept. 1989

Vacuum Tubes, Simple polynomial based models (Vacuum.Lib) - Newsletter 12, Feb. 1989

Vacuum Tubes, Complex B element based models (Vacuum.Lib) - Newsletter 34/35, Feb./April 1994

Variable Phase Generators (Signal2.Lib) - Newsletter 33, November 1993

Wire Models (Device.Lib) - Newsletter 6, June 1987

Z transform Elements (Sys.Lib/Scn.Lib) - Newsletter 4, Feb. 1987, Newsletter 17, March 1990

Appendix A: Model References

Index