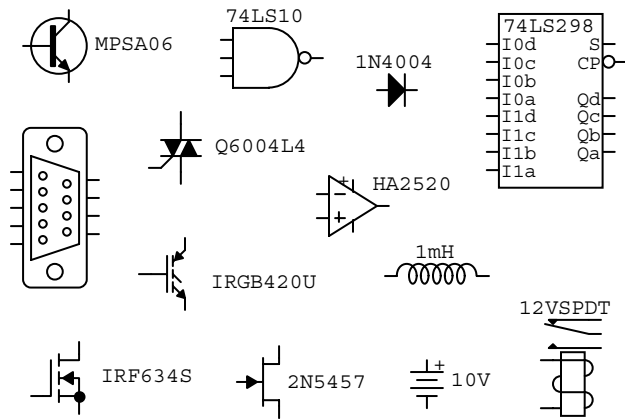


# CircuitMaker® 2000

the virtual electronics lab™



## Schematic & Simulation Library Guide

Revision A

# CircuitMaker Device Library

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# Device Symbols

The device symbols are stored in two files: DEVICE.LIB and USER.LIB. All macro devices created by the user are stored in USER.LIB.

Devices can be selected from the libraries in various ways (refer to *Chapter 4: Drawing and Editing Schematics* in the User Manual). Once you have selected a device, it will follow the mouse to any position within the drawing window. If the portion of the work area where you need to position the device is not currently visible, move the device to the border of the window and the circuit will automatically scroll.

To place the device, click the mouse and the device will be placed at its present position. To cancel placement of the device press the spacebar or double-click the mouse. Devices can be mirrored and/or rotated prior to placing them. To rotate a device, press the R key or click the right mouse button. To mirror a device, press the M key.

The “Auto Repeat” option in the Options menu determines whether the same device can be placed in the work area multiple times, or if you must select each device separately to place it (refer to *Chapter 12: Options Menu* in the User Manual).

The devices and instruments are described in this section. They are classified into the following categories:

<b>Analog Only</b>	Can only be used in Analog simulation mode.
<b>Digital Only</b>	Can only be used in Digital simulation mode.
<b>Analog/Digital</b>	Can be used in either Analog or Digital simulation modes.
<b>Schematic</b>	These devices are intended for drawing schematics and are not functional.

To assist you in finding the items in the library, each of the following device descriptions include the location in the parts browser. The location is displayed in the following format:

*[Major Device Class/Minor Device Class] (Default Hotkey)*

**CircuitMaker is by no means limited to the devices provided in the device library.** New devices can be created as macros or by importing Spice-compatible subcircuits. User defined devices are permanently stored in the library files and can be used just like any other device. Refer to *Chapter 16: Creating New Devices* in the user manual for more information.

## +V

*Analog/Digital [Analog/Power] (1)*

In analog simulation mode, this device provides a fully programmable DC power supply. It can be programmed for either a positive or negative voltage. It always uses the ground node as a reference. In digital simulation mode it provides a fixed High state. By removing the Spice Data and Spice Prefix, the Bus Data can be used to link nodes together. Example circuits: LOCK.CKT, ANALOG.CKT.



## .IC

*Analog Only [Analog/SPICE Controls] (1)*

Wire an .IC device to any node that needs .IC (Initial Conditions) programmed. Double-click on the device and set the Label-Value field to the desired initial value. Example circuit: 555.CKT.



## .NODESET

*Analog Only [Analog/SPICE Controls] (N)*

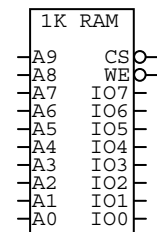
Wire a .NODESET device to any node that needs Nodeset programmed. Double-click on the device and set the Label-Value field to the desired Nodeset value. Example circuit: BISTABLE.CKT.



## 1K RAM

*Analog/Digital [Digital/RAM-PROM]*

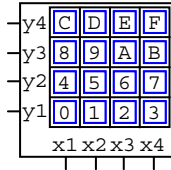
This is a 1024 x 8 Random Access Memory. Multiple RAM chips may be used in a single circuit or macro. However, RAM data is not saved with the circuit or macro. Both the CS and WE pins must be pulled low to write into the RAM. To read from the RAM, keep the WE pin high and pull the CS pin low. For debugging purposes, you can edit the contents of the RAM.



## 4x4 Switch

*Analog/Digital [Switches/Matrix]*

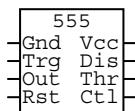
This is a 4x4 switch matrix. Clicking on one of the buttons closes a switch which connects one of the horizontal pins to one of the vertical pins. The switch remains closed until another button is clicked. If you try to activate the switch while running an analog simulation, CircuitMaker will ask if you want to rerun the simulation with the switch in the new position. Example circuit: 4X4.CKT.



## 555 Timer

*Analog Only [Linear ICs/Timers]*

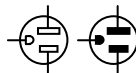
This device includes the SPICE data for simulating a 555 Timer. Timers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. When creating astable circuits, initial conditions will be required on the timing capacitor in order for SPICE to converge on a solution. For monostable operation, the component model subcircuit should be used rather than the macromodel subcircuit. Example circuit: 555.CKT.



## AC Outlet, AC Plug

*Analog Only/Schematic [Connectors/Misc]*

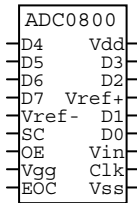
These devices are included for schematic purposes, however, the AC Outlet may be included during Analog simulations. Each contact is treated as having a very high shunt resistance ( $1E+12$ ) to ground.



## ADC0800

*Analog Only [Data Converters/A/D]*

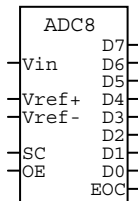
The ADC0800 includes a Digital Simcode model to simulate an ADC0800 Analog-to-Digital Converter. Conversion is performed using a successive approximation technique. The minimum and maximum voltage of  $V_{in}$  are determined by the  $V_{ref+}$  and  $V_{ref-}$  pins. The minimum resolution of the measurable voltage on  $V_{in}$  is determined by the Spice option ADCSTEP (by default, this is set to 10mV). When SC (Start Conversion) goes from low to high the conversion begins and, following a 200ns delay, EOC (End Of Conversion) goes low. Each conversion requires 40 clock cycles and the clock frequency must be in the range of 50kHz to 800kHz. When conversion is complete, EOC is set high. Example circuit: ADC0800.CKT.



## ADC8

*Analog Only [Data Converters/A/D]*

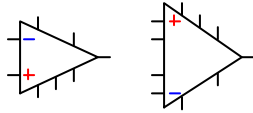
The ADC8 includes a Digital Simcode model to simulate a generic 8-bit Analog-to-Digital Converter. Conversion is performed using a successive approximation technique. The minimum and maximum voltage of  $V_{in}$  are determined by the  $V_{ref+}$  and  $V_{ref-}$  pins. The minimum resolution of the measurable voltage on  $V_{in}$  is determined by the Spice option ADCSTEP (by default, this is set to 10mV). When SC (Start Conversion) goes from low to high the conversion begins and, following a 200ns delay, EOC (End Of Conversion) goes low. After 1us, the conversion is complete and EOC is set high. Example circuit: ADC8.CKT.



## Amp8, Amp10

*Analog Only [Linear ICs/Buffers-Amps]*

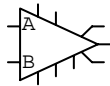
This device includes the SPICE data for simulating amplifiers. Amplifiers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Analog Mux2

*Analog Only [Linear ICs/Buffers-Amps]*

This device includes the SPICE data for simulating an analog multiplexer. Muxes may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Antenna

*Analog Only [Schematic Symbols/Antennas]*

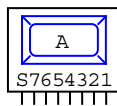
This device includes an internal 50 ohm resistor to ground. The resistance can be changed by editing its Label-Value field.



## ASCII Key

*Digital Only [Digital/Input Device] (A)*

The ASCII Key operates like the Hex Key with one addition: A strobe pulse (low, high, low level) is generated and appears on the pin labeled "S". The binary code for any ASCII character can be generated by this device. This device simulates a keyboard. Example circuit: DISPLAY.CKT.

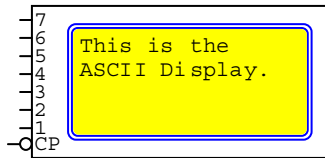




## ASCII Display

*Analog/Digital [Displays/Digital Only] (a)*

This represents a 16X4 LCD display intended mainly for use in Digital simulation mode. Up to 4 lines of 16 ASCII characters per line can be displayed on this device. The character, determined by the binary code applied to pins 1-7, is sent to the display when the level on the /CP pin changes from high to low. NOTE: <RETURN> will start a new line, <BACKSPACE> will delete a previously entered character, CTRL+G (bell) will send a beep to the PC's speaker, and CTRL+L (form-feed) will clear the display. The background color of the display can be changed. The text is always the Device Text color. This device can be used in Analog simulation mode as well, but no characters will be displayed. Example circuit: DISPLAY.CKT.



## Battery

*Analog/Digital [Analog/Power] (b)*

In analog simulation mode, this device includes the SPICE data for simulating a DC voltage source. The voltage is specified in the Label/Value field. In digital simulation mode it provides a fixed High state on the “+” pin and a fixed Low state on the “-” pin. Example circuit: CEAMP.CKT.



## Buffer/Amp

*Analog Only [Linear ICs/Buffers-Amps]*

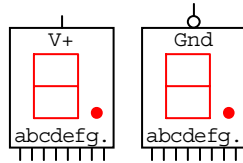
This device includes the SPICE data for simulating buffers and amplifiers. Buffers/amps may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## CA 7-Seg, CC 7-Seg

*Analog/Digital [Displays/7-Segment LEDs]*

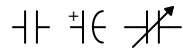
These are Common-anode and Common-cathode 7-Segment LED Displays intended mainly for use in Digital simulation mode. They will display each of 7 segments plus the decimal point, corresponding to the input pins as they are pulled low. Different colors can be selected for each display. If the Prop Delay for this device is set to greater than 1, the display will remain visible even when power is removed. This allows the display to be multiplexed without causing a flash each time the display is addressed. This allows the display to better simulate real-time operation. In a real circuit the flashes are not usually noticeable because of the high repetition rate of the multiplexing circuit. These devices can be used in Analog simulation mode as well, but the segments will not light up. Example circuit: DISPLAY.CKT.



## Capacitor, Polar Cap, Var Capacitor

*Analog Only [Passive Components/Capacitors] (c, C)*

These devices include the SPICE data for simulating a capacitor. The value of the capacitor is specified in the Label/Value field. It is drawn as a “variable” capacitor for schematic purposes only. Example circuit: 555.CKT.



## SemiCapacitor

*Analog Only [Passive Components/Capacitors]*

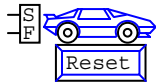
This device includes the SPICE data for simulating a semiconductor capacitor. Semiconductor capacitors may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Car

*Analog/Digital [Digital/Output Device]*

This is an animated device with a Start input, a Finish output and a Reset button. It is intended mainly for use in Digital simulation mode. Multiple cars may be placed in the circuit. The number of simulation ticks it takes for a car to reach the finish is random for each car. A new random number is generated each time the Reset button *in the Toolbar* is pressed. The reset button on the car returns the car to its starting position. Double-click on the car to program the travel distance (up to 1000 units). Different colors can be selected for each car. This device can also be used in Analog simulation mode, but there will be no animation and the Finish output will never go true. Example circuit: CARS.CKT.



## Caution

*Schematic [Schematic Symbols/Misc]*

This device is included for schematic purposes.



## CDA-5

*Analog Only [Linear ICs/Buffers-Amps]*

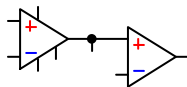
This device includes the SPICE data for simulating current differencing amplifiers. Amplifiers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## CFA-Amp8

*Analog Only [Linear ICs/Buffers-Amps]*

This device includes the SPICE data for simulating a current feedback amplifier. Amplifiers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Coax, TwinLead, TwistedPair

*Schematic [Schematic Symbols/Cables]*

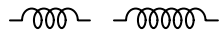
These devices are included for schematic purposes. SPICE data may be added by the user to simulate the lossless, lossy or URC transmission lines.



## Coil 3T, Coil 5T

*Analog Only [Passive Components/Inductors]*

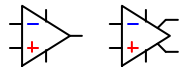
These devices include the SPICE data for simulating an inductor. The inductance of the coil is specified in the Label/Value field. Example circuit: RESONANT.CKT.



## Comparator5, Comparator6

*Analog Only [Linear ICs/Comparators]*

These devices include the SPICE data for simulating 5-pin and 6-pin voltage comparators. Comparators may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Connector

*Analog/Digital [Connectors/Misc]*

This device has an internal wire that connects the two sides, so it behaves just like a wire during simulation.



## Crystal

*Analog Only [Crystals/Standard]*

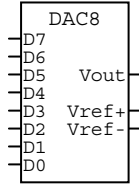
This device includes the SPICE data for simulating a crystal. Crystals may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: XTAL\_OSC.CKT.



## DAC8

*Analog Only [Data Converters/D/A]*

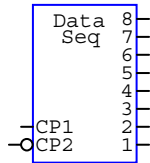
The DAC8 includes a Digital Simcode model to simulate a generic 8-bit Digital-to-Analog Converter. The minimum and maximum voltage of Vout are determined by the Vref+ and Vref- pins. Example circuit: DAC8.CKT.



## Data Seq

*Analog/Digital [Digital/Instrument]*

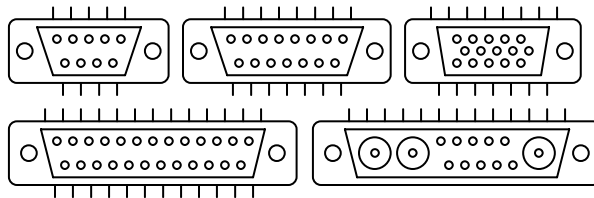
The Data Sequencer allows the user to specify up to 32k bytes which can be output in a defined sequence. Multiple Data Sequencers may be individually programmed. Refer to *Chapter 5: Digital Logic Simulation* in the user manual to program this device. Example circuit: BUSWIRE.CKT.



## DB-9, DB-15, DB-15HD, DB-25, 13W3

*Schematic [Connectors/DB Type, Misc]*

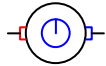
These devices are included for schematic purposes. Example circuit: DB9.CKT.



## DC Motor

*Analog/Digital [Motors/DC]*

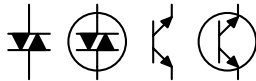
In digital simulation mode, the DC Motor is an animated device. The armature will rotate clockwise when there is a high on the positive terminal and a low on the negative terminal. It will rotate counter clockwise when there is a high on the negative terminal and a low on the positive terminal. In analog mode, the DC Motor is not animated, but it acts as an inductor and a resistor in series. Example circuit: LADDER.CKT.



## Diac:A, Diac:B, Diac:C, Diac:D

*Schematic [Schematic Symbols/Diacs]*

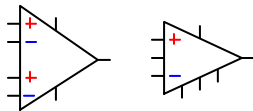
This device is included for schematic purposes.



## Diff-Amp7, Diff-Amp8

*Analog Only [Linear ICs/Buffers-Amps]*

This device includes the SPICE data for simulating differential amplifiers. Amplifiers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Diode

*Analog Only [Active Components/Diodes] (d)*

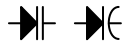
This device includes the SPICE data for simulating a junction diode. Diodes may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: ASTABLE.CKT.



## Varactor, Varactor:A

*Analog Only [Active Components/Diodes]*

This device includes the SPICE data for simulating a variable capacitance diode. Diodes may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## Zener Diode

*Analog Only [Active Components/Diodes] (D)*

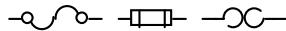
This device includes the SPICE data for simulating a zener diode. Diodes may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: PS1.CKT.



## Fuse, Fuse:A, Thermal Fuse

*Analog Only [Fuses/Electronic] (f) [Fuses/Thermal]*

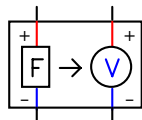
These devices include the SPICE data for simulating a current fuse. Fuses may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## F->V Source

*Analog Only [Analog/Power]*

This is a linear frequency-controlled voltage source. The voltage on the output (right-hand side) is controlled by the frequency of the signal on the input (left-hand side). Double-click on the device to change its characteristics. Adjustable characteristics include VIL, VIH and Cycles/Volt. Example circuit: FCVS.CKT.

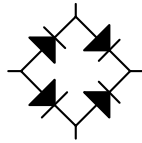


## FW Bridge

*Analog Only [Active Components/Diodes]*

This device includes the SPICE data for simulating a full-wave bridge rectifier. Bridges may be selected from a list of available subcircuits or new

subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: PS1.CKT.



## Ground

*Analog/Digital [Analog/Power], [Digital/Power] (0 (zero))*

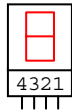
In analog simulation mode, this device provides a ground reference node for the circuit. **Every analog circuit must have a ground reference.** In digital simulation mode it provides a fixed Low state.



## Hex Display

*Analog/Digital [Displays/Digital Only] (h)*

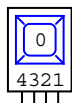
This is a Hexadecimal 7-Segment Display with a built in decoder. It is intended mainly for use in Digital simulation mode. It will display a hexadecimal number (0-9 and A-F) based on the binary code applied to the pins 1-4. Different colors can be selected for each display. This device can also be used in Analog simulation mode, but the segments will not light up. Example circuit: SIM.CKT.



## Hex Key

*Digital Only [Digital/Input Device] (H)*

This is a hexadecimal key. It will generate the binary code associated with the hexadecimal number displayed on the key. After the hex key has been selected (single click on the hex number shown in the middle of the device), the hex number displayed can be changed in two ways: 1) click on the number displayed to increment it, or 2) press a hexadecimal key (0-9 and A-F) on the keyboard. Multiple Keys may be used in a circuit; only the selected key will accept input from the keyboard. Example circuit: LOCK.CKT.

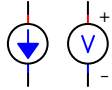




## I Source, V Source

*Analog/Digital [Analog/Power] (i, v)*

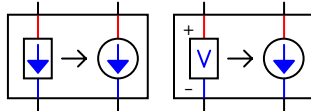
In analog simulation mode, these are independent DC current and voltage sources. Enter the current or voltage in the Label-Value field. In digital simulation mode, they provide a fixed High state on the “+” terminal and a fixed Low state on the “-” terminal (the arrow points away from the “+” terminal, toward the “-” terminal on the I Source). Example circuit: 741.CKT.



## I->I Source, V->I Source

*Analog Only [Analog/Power]*

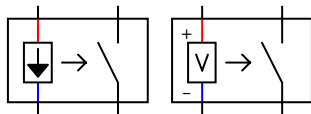
These are linear current-controlled and voltage controlled current sources. The current on the output (right-hand side) is controlled by the current or voltage on the input (left-hand side). Use the Label-Value to set the input-to-output transfer ratio. Example circuit: 741.CKT.



## I->Switch, V->Switch

*Analog Only [Switches/Controlled]*

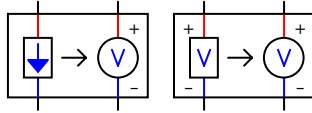
These devices include the SPICE data for simulating a current-controlled and voltage-controlled switch. Specific models may be added by the user. Example circuit: SWITCHES.CKT.



## I->V Source, V->V Source

*Analog Only [Analog/Power]*

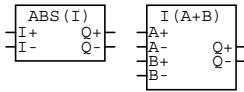
These are linear current-controlled and voltage-controlled voltage sources. The voltage on the output (right-hand side) is controlled by the current or voltage on the input (left-hand side). Use the Label-Value to set the input-to-output transfer ratio. Example circuit: 741.CKT.



## I-Math1, I-Math2

*Analog Only [Math Functions/Current]*

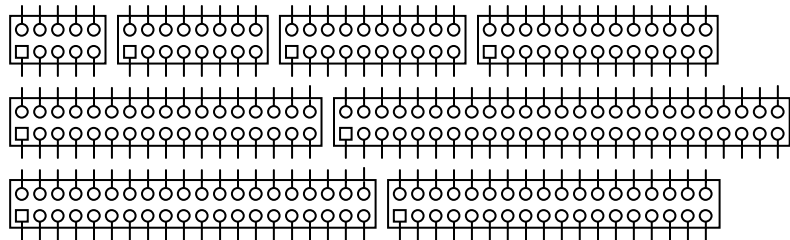
These devices provide direct access to SPICE's nonlinear dependent source math functions. They are set up in subcircuit format to provide easy selection of the math functions. I-Math1 provides access to the single-variable current functions (abs, cos, sqrt, etc.) I-Math2 provides access to the dual-variable current operations (+, -, \*, / and ^).



## IDC10, IDC16, IDC20, IDC26, IDC34, IDC36, IDC40, IDC50

*Schematic [Connectors/IDC Type]*

These devices are included for schematic purposes.



## Inductor, Var Inductor

*Analog Only [Passive Components/Inductors] (l, L)*

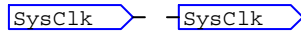
This device includes the SPICE data for simulating an inductor. The inductance of the coil is specified in the Label/Value field. It is drawn as a "variable" inductor for schematic purposes only.



## Input, Output

*Analog/Digital [Connectors/Misc]*

These are schematic symbols of page connectors in a circuit. All “Input” and “Output” devices that have the same name will operate as though they were connected together. Double-click on the device to edit the name. Example circuit: INOUTPUT.CKT.



## Lamp

*Analog/Digital [Displays/Incandescent]*

This device includes the SPICE data for simulating a resistor in analog mode. The value of the resistor is specified in the Label/Value field. In digital simulation mode, the lamp will light when one terminal is high and the other terminal is low. Each lamp may be a different color.



## LED

*Analog/Digital [Displays/Diode]*

This is a Light Emitting Diode. In digital mode, it will “light” when a low level is applied to its cathode and a high level is applied to its anode. Different colors can be selected for each LED. This device also includes the SPICE data for simulating an LED. LEDs may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: OPTO.CKT.



## Logic Display

*Analog/Digital [Displays/Digital Only]*

This is a simple logic state indicator intended for use mainly in Digital simulation mode. It has only one pin and indicates whether the state is low (display off) or high (display on). Double-click on the Logic Display to change its color. This device can also be used in Analog simulation mode, but it does not light. Example circuit: LED.CKT.



## Logic Switch

*Analog/Digital [Switches/Digital]*

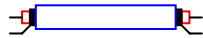
This is a switch which provides either a Low or a High logic level when in digital simulation mode and two programmable voltage levels while in analog simulation mode. When in analog mode, the default voltages levels are 0v and 5v. To change the voltage levels, select the switch by dragging a selection rectangle around it, double-click on it, and then enter a SPICE comment of the following form into the SPICE Data field: \*0=1v 1=10v. This comment will make the switch output 1v for a low level and 10v for a high level. While digital simulation is running a single click on the switch will cause its output to immediately change states. If you click on the switch while running an analog simulation, CircuitMaker will ask if you want to rerun the simulation with the switch in the new position. To move a switch to a new location you must first drag a selection rectangle over the switch to select it. Example circuit: SIM.CKT.



## LossLessLine

*Analog Only [Transmission Lines/SPICE Simulation]*

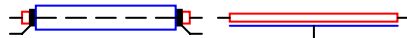
This device includes the SPICE data for simulating a lossless transmission line. Characteristic impedance is specified in the Label/Value field. Time delay or frequency/normalized length are specified in the Spice Data field. Example circuit: LLTRAN.CKT.



## LossyLine, URC-Line

*Analog Only [Transmission Lines/SPICE Simulation]*

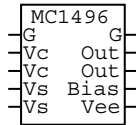
These devices include the SPICE data for simulating lossy and uniform distributed RC transmission lines. Specific models may be added by the user.



## MC1496

*Analog Only [Linear ICs/Modulators]*

This device includes the SPICE data for simulating an MC1496 Balanced Modulator/Demodulator. Devices may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: AMMOD.CKT.



## Mono Jack, Stereo Jack, Phone Jack, Phone Plug

*Schematic [Connectors/Misc]*

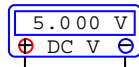
These devices are included for schematic purposes. Bus wires may be added internally to the macro to connect two of them together for simulation. Be sure to use a unique bus wire number for each pair of connectors.



## Multimeter

*Analog Only [Analog/Instruments]*

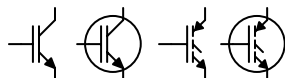
Multimeters can be wired directly into the circuit to measure resistance, voltage or current. DC voltage and current can only be measured if Operating Point Analysis is enabled. To measure DC AVG or AC RMS voltage or current, Transient Analysis must be enabled and must simulate enough cycles of transient data to make the measurements meaningful. Multiple multimeters may be individually programmed. Refer to *Chapter 6: Analog/Mixed-Signal Simulation* in the user manual to program this device. Example circuit: SWITCHES.CKT.



## N-IGBT, N-IGBT:A, N-IGBT:B, N-IGBT:C

*Analog Only [Active Components/IGBTs]*

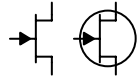
These devices include the SPICE data for simulating N-channel Insulated Gate Bipolar Transistors. Transistors may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## N-JFET, N-JFET:A

*Analog Only [Active Components/JFETs] (j)*

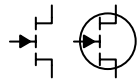
This device includes the SPICE data for simulating an N-channel junction field-effect transistor. JFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: CSJFAMP.CKT.



## N-MESFET, N-MESFET:A

*Analog Only [Active Components/MESFETs] (z)*

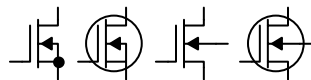
This device includes the SPICE data for simulating an N-channel MESFET (GaAsFET). MESFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## N-DMOS 3T, N-DMOS 3T:A, N-DMOS 4T, N-DMOS 4T:A

*Analog Only [Active Components/MOSFETs Depl]*

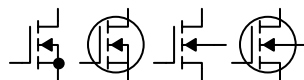
These devices include the SPICE data for simulating 3-terminal and 4-terminal N-channel Depletion Mode MOSFETs. MOSFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## N-EMOS 3T, N-EMOS 3T:A, N-EMOS 4T, N-EMOS 4T:A

*Analog Only [Active Components/MOSFETs Enh] (m)*

These devices include the SPICE data for simulating 3-terminal and 4-terminal N-channel Enhancement Mode MOSFETs. MOSFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## N-UJT

*Analog Only [Active Components/Unijunction]*

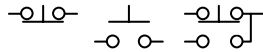
This device includes the SPICE data for simulating an N-channel unijunction transistor. Transistors may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. See also: Subcircuits.



## NC Push-button, NO Push-button, SPDT PB

*Analog/Digital [Switches/Push Button]*

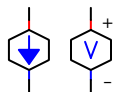
These are Normally-Closed, Normally-Open and Single-Pole Double-Throw Push-Button switches. While digital simulation is running, the switch may be activated by clicking on it with the left mouse button and will remain in the activated position as long as the mouse button is held down. Multiple switches *of the same type* may be activated simultaneously if they have the same label in the Label-Value field. These switches cannot be activated while running an analog simulation, but simply act as a short or an open. Example circuit: CARS.CKT.



## NLI Source, NLV Source

*Analog Only [Analog/Power]*

These are nonlinear current and voltage sources. Example circuit: 741.CKT.



## NPN Darling1, NPN Darling2, NPN Darling3

*Analog Only [Active Components/Darlington]*

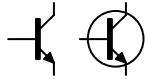
These devices include the SPICE data for simulating an NPN Darlington Transistor. Transistors may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## NPN Trans:B, NPN Trans:C

*Analog Only [Active Components/BJTs] (q)*

These devices include the SPICE data for simulating an NPN bipolar junction transistor. Transistors may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: CEAMP.CKT.



## Op-Amp3

*Analog Only [Linear ICs/OPAMPs]*

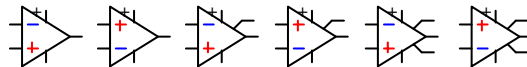
This device is primarily intended for schematic purposes, but it includes SPICE data for simulating an ideal operational amplifier.



## Op-Amp5, Op-Amp5:A, Op-Amp6, Op-Amp6:A, Op-Amp7, Op-Amp7:A

*Analog Only [Linear ICs/OPAMPs] (o)*

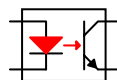
These devices include the SPICE data for simulating operational amplifiers. Op amps may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: ANALOG.CKT.



## Optoisolator

*Analog/Digital [Optical Devices/Coupler]*

This is an NPN optical isolator. In digital mode, the LED in this device operates exactly like a regular LED. When the LED is “on”, the logic level applied to the NPN transistor's emitter will appear on its collector. When the LED is “off”, a 3-state level will appear on the transistor's collector. In analog mode, the LED does not light, but the SPICE subcircuit information will be used for simulation. Double-click on the device to select the desired subcircuit. Example circuits: OPTO.CKT, STEPPER.CKT.

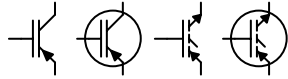




## P-IGBT, P-IGBT:A, P-IGBT:B, P-IGBT:C

*Analog Only [Active Components/IGBTs]*

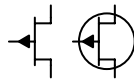
These devices include the SPICE data for simulating P-channel Insulated Gate Bipolar Transistors. Transistors may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## P-JFET, P-JFET:A

*Analog Only [Active Components/JFETs] (J)*

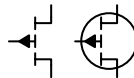
This device includes the SPICE data for simulating a P-channel junction field-effect transistor. JFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## P-MESFET, P-MESFET:A

*Analog Only [Active Components/MESFETs] (Z)*

These devices include the SPICE data for simulating a P-channel MESFET (GaAsFET). MESFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## P-DMOS 3T, P-DMOS 3T:A, P-DMOS 4T, P-DMOS 4T:A

*Analog Only [Active Components/MOSFETs Depl]*

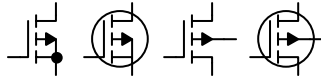
These devices include the SPICE data for simulating 3-terminal and 4-terminal P-channel Depletion Mode MOSFETs. MOSFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## P-EMOS 3T, P-EMOS 3T:A, P-EMOS 4T, P-EMOS 4T:A

*Analog Only [Active Components/MOSFETs Enh] (M)*

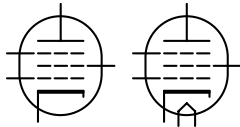
These devices include the SPICE data for simulating 3-terminal and 4-terminal P-channel Enhancement Mode MOSFETs. MOSFETs may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## Pentode, Pentode:H

*Schematic [Active Components/Vacuum Tubes]*

These devices are included for schematic purposes.



## Photo Diode

*Schematic [Optical Devices/Sensors]*

This device is included for schematic purposes.



## Photo NPN

*Schematic [Optical Devices/Sensors]*

This device is included for schematic purposes.



## Photo Resist

*Analog Only [Optical Devices/Sensors]*

This device includes the SPICE data for simulating a standard resistor. The value of the resistor is specified in the Label/Value field.



## PLL

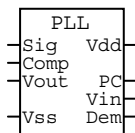
*Analog Only [Linear ICs/Phase-Locked Loops]*

This device includes Digital Simcode and XSpice data for simulating a Phase-Locked Loop (PLL). Double-click on the device to select an appropriate model based on the center frequency of the FM signal. The center frequency and frequency range of the model is determined by its Fc and Fr parameters, respectively. The PLL consists of a Voltage-Controlled Oscillator (VCO), and an XOR phase comparator. An external low pass filter is added by wiring a resistor and capacitor to the appropriate pins, as shown in the example circuit PLL.CKT.

The VCO outputs a square wave whose frequency corresponds to the input voltage at Vin. For example, suppose the center frequency (Fc) is set at 10kHz, and the range (Fr) is set at 5kHz, with Vdd and Vss at 5V and 0V respectively. Then a voltage of 2.5V at Vin would cause an output frequency of 10kHz at Vout, while 0V at Vin would result in 5kHz at Vout, and 5V at Vin would result in 15kHz at Vout. If the available PLL models do not cover the desired frequency range, you can edit one of the models, change the parameters, and save it with a new name. The PLL device can lock on frequencies that are within the range specified by Fc +/- Fr

To achieve phase lock, Vout is wired to Comp, which is one of the phase comparator inputs. The other phase comparator input (Sig) is wired to the incoming reference signal. A phase difference in the two signals will cause the phase compare output (PC) to be high more than it is low, which causes the external capacitor to be charged, more than it is discharged, resulting in a higher input voltage at Vin. This increases the frequency at Vout, thus bringing the two signals into phase. When in the locked state, the Vout will lag the input signal (Sig) by 0 degrees at the low end of the VCO's frequency range, 90 degrees at the center frequency (Fc), and 180 degrees at the high end.

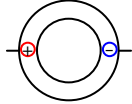
The Vin signal is internally connected to the Dem pin through a source follower. Thus the demodulated signal can be accessed at the Dem pin so that the Vin pin is not loaded down. Example circuit: PLL.CKT.



## Piezo Buzzer

*Analog/Digital [Transducers/Sound Device]*

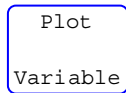
In digital simulation mode, the piezo buzzer will send a continuous stream of beeps to the PC's speaker when a low level is applied to its “-” terminal and a high level is applied to its “+” terminal. It contains SPICE data for use in analog mode as a capacitor. Example circuit: SOUND.CKT.



## Plot Var

*Analog Only [Analog/SPICE Controls]*

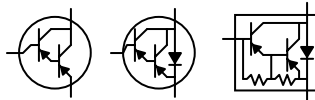
This device provides a list of all of the plot variables for which data has been collected for the circuit. Place this device anywhere in the drawing window; no wires are needed. Click on the device with the Probe Tool, then select the variable you wish to plot from the list. To view multiple waveforms, SHIFT-click on the Plot Var device.



## PNP Darling1, PNP Darling2, PNP Darling3

*Analog Only [Active Components/Darlington]*

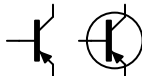
This device includes the SPICE data for simulating an PNP Darlington Transistor. Transistors may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## PNP Trans:B, PNP Trans:C

*Analog Only [Active Components/BJTs] (Q)*

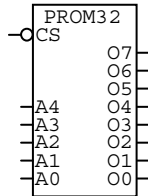
These devices include the SPICE data for simulating an PNP bipolar junction transistor. Transistors may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: PUSHPULL.CKT.



## PROM32

*Analog/Digital [Digital/RAM-PROM]*

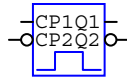
This is a 32 x 8 PROM. Multiple PROMs may be individually programmed. Refer to *Chapter 10: Edit Menu* in the user manual to program this device. PROM data is saved with the circuit and in macros. Example circuit: STEPPER.CKT.



## Pulser

*Digital Only [Digital/Instrument] (p)*

The Pulser is a programmable pulse generator. Multiple Pulsers may be individually programmed. Refer to *Chapter 5: Digital Logic Simulation* in the user manual to program this device. Example circuit: SIM.CKT.



## PUT

*Analog Only [Active Components/Unijunction]*

This device includes the SPICE data for simulating a programmable unijunction transistor. PUTs may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Reference3

*Analog Only [Linear ICs/References]*

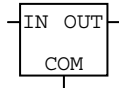
This device includes the SPICE data for simulating a 3-pin programmable reference. References may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Regulator3

*Analog Only [Linear ICs/Regulators]*

This device includes the SPICE data for simulating a 3-pin voltage regulator. Regulators may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.



## Relays

Relays are available in two forms. The SPDT Relay is a complete unit, containing both the coil and the contacts in a single device. Other relay devices are available in separate sections, allowing you to create your own relays with multiple pairs of contacts. By assigning the same text in the Description field of the coil and the contacts, the coil can be assigned to switch any number of contacts.

### SPDT Relay

*Analog/Digital [Relays/Complete]*

This device includes the SPICE data for simulating a Single-Pole Double-Throw relay. Relays may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. In digital mode, it switches the contact connections when a low level is applied to one terminal of the coil and a high level is applied to the other terminal. Example circuit: ALARM.CKT, ANRELAY.CKT.



### Circle, Polar Coil, Rectangle, Solenoid, Standard

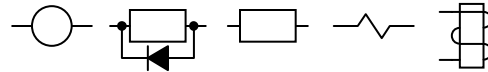
*Analog/Digital [Relays/Coil] (k)*

These relay coils can be used in conjunction with any of the relay contacts. In order to control contacts with a given coil, set the Description field to the same string for both the coil and all contacts which the coil should control.

In **digital** simulation mode, the coils switch when a low level is applied to one terminal of the coil and a high level is applied to the other terminal. The pickup and release times for a coil can be individually programmed. The

pickup time is the time delay following activation of the coil until the contacts close while the release time is the time following deactivation of the coil until the contacts open. To change the pickup and release times, double-click on a coil and then enter a SPICE comment of the following form into the SPICE Data field: \*p=2 r=3. This comment will set the digital simulation mode pickup time to be 2 ticks and the release time to be 3 ticks.

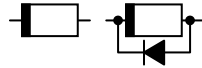
In **analog** simulation mode the coil may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Note: No SPICE data is included for the Latch Coil or the Polar Latch. Example circuit: LADDER.CKT.



### Latch Coil, Polar Latch

*Digital Only [Relays/Coil] (k)*

These relay coils are similar to those described above with the following exceptions: 1) they do not contain SPICE simulation data for use in analog simulation and 2) being latched coils, they latch the contacts into the opposite position with a single pulse.



### SPDT:A, SPDT:B, SPDT:C, SPST-NC, SPST-NO

*Analog/Digital [Relays/Contacts] (K)*

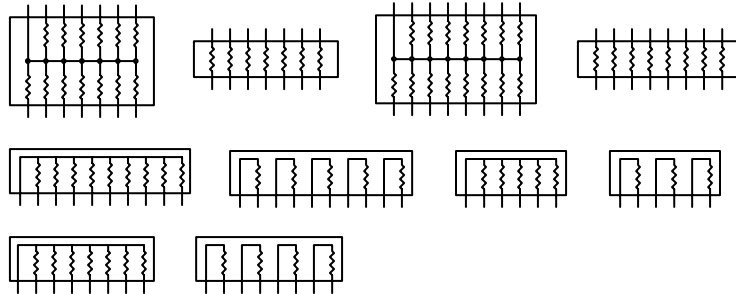
These relay contacts can be used in conjunction with any of the relay coils. In order to control contacts with a given coil, set the Description field to the same string for both the coil and all contacts which the coil should control. In analog simulation mode, the contacts may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model. Example circuit: LADDER.CKT.



**RDIP14, RDIP14:A, RDIP16, RDIP16:A**  
**RSIP10, RSIP10:A, RSIP6, RSIP6:A**  
**RSIP8, RSIP8:A**

*Analog Only [Passive Components/Resistors]*

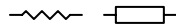
These devices include the SPICE data for simulating resistor packs. The value of the resistors is specified in the Label/Value field.



**Resistor, Resistor:A**

*Analog/Digital [Passive Components/Resistors] (r)*

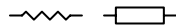
These devices include the SPICE data for simulating a resistor. The value of the resistor is specified in the Label/Value field. In digital simulation mode, when connected directly to a +V or a Ground, it acts like a standard pull-up or pull-down resistor. Otherwise, it acts as an open in digital simulation mode. Example circuits: ROCKET.CKT, ANALOG.CKT.



**SemiResistor, SemiResistorA**

*Analog Only [Passive Components/Resistors]*

This device includes the SPICE data for simulating a semiconductor resistor. Semiconductor resistors may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit.





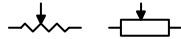
## Var Resistor, Var ResistorA

*Analog Only [Passive Components/Resistors] (R)*

These devices include the SPICE data for simulating two fixed resistors by setting the following defaults:

Label/Value:	10k 40%
Spice Data:	%DA %1 %2 4k %DB %2 %3 6k

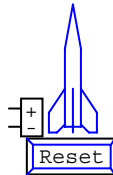
where the total resistance is  $4k + 6k = 10k$ . The values in the Spice Data field are adjusted automatically by changing the Label-Value.



## Rocket

*Analog/Digital [Digital/Output Devices]*

This is an animated device similar to the Car, but with + and - input pins. When a high state is placed on the + input and a low state is placed on the - input, the rocket will fire. The reset button on the rocket returns the rocket to its starting position. Double-click on the rocket to program the travel distance (up to 1000 units). Different colors can be selected for each rocket. This device can also be used in Analog simulation mode, but is not animated. In this mode, a 1kW resistor is placed across the + and - input pins. Example circuit: ROCKET.CKT.



## Schottky

*Analog Only [Active Components/Diodes]*

This device includes the SPICE data for simulating a schottky diode. Diodes may be selected from a list of available models or new models may be added by the user. Double-click on the device to select the desired model.



## SCOPE

*Digital Only [Digital/Instrument] (T)*

A “SCOPE” is actually a tool which allows you to look at simulation waveforms as they are charted in the Waveforms window. Connect a scope (each scope must have a unique name) at each point in the circuit where you wish to see the states charted. Double-click on the device to edit the name. SCOPes are also used to identify the connecting nodes when creating a subcircuit drawing for use in exporting a SPICE subcircuit. Example circuit: SCOPE.CKT.



## SCR

*Analog Only [Active Components/SCRs]*

This device includes the SPICE data for simulating an SCR (thyristor). SCRs may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: SCR.CKT.



## Shockley

*Schematic [Schematic Symbols/Diodes]*

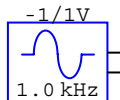
This device is included for schematic purposes.



## Signal Gen

*Analog Only [Analog/Instruments] (g)*

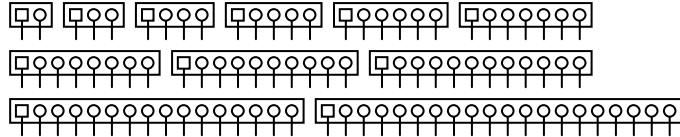
This is a fully programmable, multifunction analog signal generator which offers a variety of output waveforms. Multiple generators may be individually programmed. The minimum and maximum amplitudes of the waveform are stored in the Label-Value field and by default are displayed above the device symbol. Refer to *Chapter 6: Analog/Mixed-Signal Simulation* in the user manual to program this device. Example circuit: ANALOG.CKT.



## SIP2, SIP3, SIP4, SIP5, SIP6, SIP7, SIP8, SIP10, SIP12, SIP16, SIP20

*Schematic [Connectors/SIP Type]*

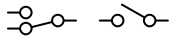
These devices are included for schematic purposes.



## SPDT Switch, SPST Switch

*Analog/Digital [Switches/Toggle] (S)*

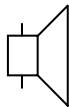
These are functional Single-Pole Double-Throw and Single-Pole Single-Throw switches. Multiple switches *of the same type* may be activated simultaneously (creating double-pole or triple-pole switches, etc.) if they have the same label in the Label-Value field. If you try to activate the switch while running an analog simulation, CircuitMaker will ask if you want to rerun the simulation with the switch in the new position. Example circuit: ALARM.CKT.



## Speaker

*Analog/Digital [Transducers/Sound Device]*

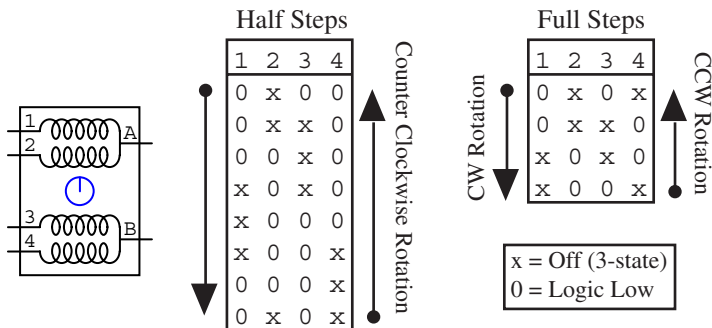
In digital simulation mode, the speaker will send a single beep to the PC's speaker when a low level is applied to one of its terminals and a high level is applied to its other terminal. It will also send a single beep each time the high and low level are reversed or removed and then applied. It contains SPICE data for use in analog mode as a resistor. Example circuit: SOUND.CKT.



## Stepper

*Analog/Digital [Digital/Output Device]*

This device simulates an eight position stepper motor. It is intended mainly for Digital simulation mode. It can be connected in unipolar or bipolar mode and can be driven in full or half steps. The following tables show how the motor is driven in unipolar mode with the A and B terminals connected to a logic high. In analog simulation mode, it is not animated, but treated as inductors and resistors in series. Example circuit: STEPPER.CKT.



## Stoplight

*Analog/Digital [Digital/Output Device]*

This device has 3 lights—red, yellow and green—with one input for each light. It is intended mainly for use in Digital simulation mode. The light will be on when its associated pin is in the high state and off when its pin is in the low state. In analog simulation mode, the lights do not light. Example circuit: DISPLAY.CKT.



## Terminal

*Analog/Digital [Connectors/Misc] (t)*

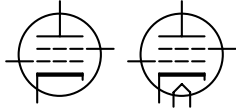
This is a schematic symbol of a generic connector terminal point. It can be used in Analog simulations to connect digital simcode devices to a power bus. To do so, enter the name of the bus as the name of the Terminal. The Terminal can also be used to connect a circuit node to any other circuit node by using giving multiple terminals the same name. See *Chapter 4: Drawing and Editing Schematics* in the user manual.



## Tetrode, Tetrode:H

*Schematic [Active Components/Vacuum Tubes]*

This device includes the SPICE data for simulating a vacuum tube tetrode. Tetrodes may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: VTPWRAMP.CKT.



## Transformers

CircuitMaker provides two different types of transformer simulation. The first method which most closely represents the functionality of actual transformers uses subcircuits, consisting of a voltage-controlled voltage supply, a current-controlled current supply, winding resistances and leakage and magnetization inductors. The turns ratios for these devices is determined by the voltage and current gains of the supplies. The Trans1, Trans2 and Trans3 devices use this method.

The second method uses coupled (mutual) inductors. This method is described in detail in the Analog Simulation chapter. The drawback to this method is that the impedance of the secondary winding is not reflected back into the primary. The Transformer and CTTransformer devices use this method. See Coupled Inductors for more information.

Note: For SPICE to operate properly, all nodes in a circuit require a DC path to ground. In circuits that use transformers, *both* sides of the transformer need a DC path to ground. This can be accomplished in various ways:

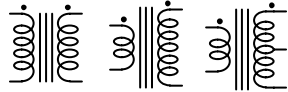
1. Ground can be connected directly to both sides of the transformer (see example circuit PS1.CKT).
2. Ground can be connected indirectly to both sides of the transformer through a resistor (see example circuit PS2.CKT).
3. Enable the RSHUNT option in the Analog Options dialog box which is accessed from the Options menu.

For in-depth information on creating your own SPICE subcircuit transformers, refer to the article *Improved Spice model simulates transformer's physical processes*, EDN Magazine, August 19, 1993, pg. 105.

## Trans1, Trans2, Trans3

*Analog Only [Transformers/Subcircuit]*

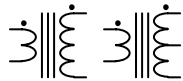
These devices include the SPICE data for simulating a transformer. Transformers may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuits: PS1.CKT, PS2.CKT.



## Transformer, CTTransformer

*Analog Only [Transformers/Coupled Inductors]*

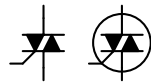
These devices include the SPICE data for simulating a pair and a trio of coupled inductors. Example circuit: VTPWRAMP.CKT.



## Triac:A, Triac:B

*Analog Only [Active Components/Triacs]*

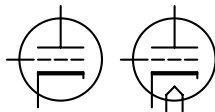
This device includes the SPICE data for simulating a triac (thyristor). Triacs may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: TRIAC.CKT.



## Triode, Triode:H

*Analog Only [Active Components/Vacuum Tubes]*

This device includes the SPICE data for simulating a vacuum tube triode. Triodes may be selected from a list of available subcircuits or new subcircuits may be added by the user. Double-click on the device to select the desired subcircuit. Example circuit: RIAAAMP.CKT.



## Tunnel

*Schematic [Schematic Symbols/Diodes]*

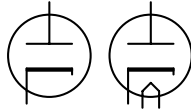
This device is included for schematic purposes.



## Vac Diode, Vac Diode:H

*Schematic [Active Components/Vacuum Tubes]*

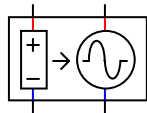
These devices are included for schematic purposes.



## VCO

*Analog Only [Analog/Power]*

This device includes XSpice data for simulating a Voltage-Controlled Oscillator. Output signal can be a sine, square or triangle wave. Double-click on the device to change its characteristics. Output frequency is controlled by the input voltage. Characteristics which can be adjusted by the user include low and high output voltage levels, duty cycle (for square and triangle waves), rise and fall times (for square waves) and the input control voltage vs. output frequency point arrays. The input control voltage vs. output frequency point arrays are used to define a line which, when extrapolated determines the frequency produced by any given input voltage. By default, a 1V DC input produces an 1kHz signal on the output; a 2V DC input produces an 2kHz signal on the output, etc. Example circuit: VCO.CKT.

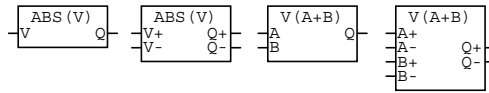


## V-Math1, V-Math1 Ref, V-Math2, V-Math2 Ref

*Analog Only [Math Functions/Voltage]*

These devices provide direct access to SPICE's nonlinear dependent source math functions. They are set up in subcircuit format to provide easy selection of the math functions. V-Math1 and V-Math1 Ref provides access to the single-variable voltage functions (abs, cos, sqrt, etc.) V-Math2 and V-Math2 Ref provides access to the dual-variable voltage operations (+, -, \*, / and ^). V-Math1 and V-Math2 require only a single input for each

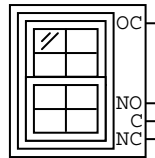
variable which is then referenced to ground. V-Math1 Ref and V-Math 2 Ref require both + and - inputs for each variable and provide both a + and - output. Example circuit: MATH1.CKT.



## Window

*Digital Only [Digital/I/O Device]*

This is an animated device which simulates the opening and closing of a window. It has a single input (OC) which opens the window when high and closes it when low, or, it can be opened or closed by clicking on the window pane with the mouse. It also contains a single-pole double-throw switch that is activated when the window is opened or closed. Example circuit: ALARM.CKT.



## Basic Logic Devices

*Analogue/Digital [Digital/the minor class varies]*

Basic logic devices include a variety of common gates and flip-flops. Most of the gates are provided with their DeMorgan equivalents. Example circuit: 4X4.CKT.

Buffers:	Output will follow the input.
3-State Buffers:	If the output is enabled, output will follow the input.
Inverters:	If the input is high, output will be low.
AND gates:	If all inputs high, output will be high. 2, 3 and 4 inputs.
OR gates:	If any input high, output will be high. 2, 3 and 4 inputs.
NAND gates:	If all inputs high, output will be low. 2, 3, 4 and 8 inputs.
NOR gates:	If any input high, output will be low. 2, 3, 4 and 8 inputs.
XOR gates:	If only one input is high, output will be high. 2 inputs.
XNOR gates:	If only one input is high, output will be low. 2 inputs.
D Flip-flops:	Output follows the input when clock occurs.
JK Flip-flops:	Output based on J and K inputs when the clock occurs.
SR Flip-flops:	Output is high when set, low when reset.



## Digital ICs

*Analog/Digital [Digital ICs by Number/the minor class varies]*

CircuitMaker provides a comprehensive library of commonly used Digital integrated circuits. Pin names are based on the HE4000 and 74LS00 families as defined by Philips Semiconductors, an international manufacturer of integrated circuits. The device number listed below indicates the logical function of the device. In digital simulation mode, the logic function of all families (74xx, 74LSxx, 74Sxx, 74Fxx, 74HCxx, etc.) is the same. In analog simulation mode, the characteristics of each family is unique. Characteristics of each part can be adjusted only within the min, max and typical databook values.

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**Note:** *O.C.* = *Open Collector outputs.*

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4000	Dual 3-Input NOR Gate and Inverter
4001	Quad 2-Input NOR Gate
4002	Dual 4-Input NOR Gate
4006	18-Stage Static Shift Register
4008	4-Bit Binary Full Adder
4011	Quad 2-Input NAND Gate
4012	Dual 4-Input NAND Gate
4013	Dual D Flip Flop
4014	8-Bit Static Shift Register
4015	Dual 4-bit Static Shift Register
4017	5-Stage Johnson Counter
4018	Presettable Divide-by-n Counter
4019	Quad 2-Input Multiplexer
4020	14-Stage Binary Counter
4021	8-Bit Static Shift Register
4022	4-Stage Divide-by-8 Johnson Counter
4023	Triple 3-Input NAND Gate
4024	7-Stage Binary Counter
4025	Triple 3-Input NOR Gate
4027	Dual JK Flip Flop
4028	1-of-10 Decoder
4029	Synchronous Up/Down Binary/Decade Counter
4030	Quad Exclusive-OR Gate
4031	64-Stage Static Shift Register
4035	4-Bit Universal Shift Register
4040	12-Stage Binary Counter
4041	Quad True/Complement Buffer
4042	Quad D-Latch
4043	Quad R/S Latch (3-State)
4044	Quad R/S Latch (3-State)
4049	Hex Inverter
4050	Hex Buffer
4068	8-Input NAND Gate
4069	Hex Inverter
4070	Quad Exclusive-OR Gate
4071	Quad 2-Input OR Gate
4072	Dual 4-Input OR Gate
4073	Triple 3-Input AND Gate

4075 Triple 3-Input OR Gate  
 4076 Quad D Register (3-State)  
 4077 Quad Exclusive-NOR Gate  
 4078 8-Input NOR Gate  
 4081 Quad 2-Input AND Gate  
 4082 Dual 4-Input AND Gate  
 4085 Dual 2-Wide 2-Input AND-OR-Invert Gate  
 4086 4-Wide 2-Input AND-OR-Invert Gate  
 4093 Quad 2-Input NAND Schmitt Trigger  
 4094 8-Stage Shift-and-Store Bus Register  
 4104 Quad Low-to-High Voltage Translator (3-State)  
 4502 Strobed Hex Inverter/Buffer  
 4505 64-Bit, 1-Bit per Word Random Access Read/Write Memory  
 4508 Dual 4-Bit Latch  
 4510 BCD Up/Down Counter  
 4511 BCD to 7-Segment Latch/Decoder/Driver  
 4512 8-Input Multiplexer (3-State)  
 4514 1-of-16 Decoder/Demultiplexer with Input Latches  
 4515 1-of-16 Decoder/Demultiplexer with Input Latches  
 4516 Binary Up/Down Counter  
 4517 Dual 64-Bit Static Shift Register  
 4518 Dual BCD Counter  
 4519 Quad 2-Input Multiplexer  
 4520 Dual 4-Bit Binary Counter  
 4522 Programmable 4-Bit BCD Down Counter  
 4526 Programmable 4-Bit Binary Down Counter  
 4531 13-Input Parity Checker/Generator  
 4532 8-Input Priority Encoder  
 4539 Dual 4-Input Multiplexer  
 4543 BCD to 7-Segment Latch/Decoder/Driver  
 4555 Dual 1-or-4 Decoder/Demultiplexer  
 4556 Dual 1-of-4 Decoder/Demultiplexer  
 4585 4-Bit Magnitude Comparator  
 4731 Quad 64-Bit Static Shift Register  
  
 7400 Quad 2-Input NAND Gate  
 7401 Quad 2-Input NAND Gate (O.C.)  
 7402 Quad 2-Input NOR Gate  
 7403 Quad 2-Input NAND Gate (O.C.)  
 7404 Hex Inverter  
 7405 Hex Inverter (O.C.)  
 7406 Hex Inverter Buffer/Driver (O.C.)  
 7407 Hex Inverter/Driver (O.C.)  
 7408 Quad 2-Input AND Gate  
 7409 Quad 2-Input AND Gate (O.C.)  
 7410 Triple 3-Input NAND Gate  
 7411 Triple 3-Input AND Gate  
 7412 Triple 3-Input NAND Gate (O.C.)  
 7413 Dual 4-Input NAND Schmitt Trigger  
 7414 Hex Inverter Schmitt Trigger  
 7415 Triple 3-Input AND Gate (O.C.)  
 7416 Hex Inverter Buffer/Driver (O.C.)  
 7417 Hex Buffer/Driver (O.C.)  
 7420 Dual 4-Input NAND Gate  
 7421 Dual 4-Input AND Gate  
 7422 Dual 4-Input NAND Gate (O.C.)

7425	Dual 4-Input NOR Gate with Strobe
7426	Quad 2-Input NAND Gate (O.C.)
7427	Triple 3-Input NOR Gate
7428	Quad 2-Input NOR Buffer
7430	8-Input NAND Gate
7432	Quad 2-Input OR Gate
7433	Quad 2-Input NOR Buffer (O.C.)
7437	Quad 2-Input NAND Buffer
7438	Quad 2-Input NAND Buffer (O.C.)
7439	Quad 2-Input NAND Buffer (O.C.)
7440	Dual 4-Input NAND Buffer
7442	BCD-to-Decimal Decoder (1-of-10)
7445	BCD-to-Decimal Decoder/Driver (O.C.)
7447	BCD-to-Seven-Segment Decoder/Driver (O.C.)
7448	BCD-to-Seven-Segment Decoder/Driver w/Pullups
7473	Dual J-K Flip-Flop
7474	Dual D Flip-Flop
7475	Quad Bistable Latch
7476	Dual J-K Flip-Flop
7483	4-Bit Full Adder
7485	4-Bit Magnitude Comparator
7486	Quad 2-Input Exclusive-OR Gate
7490	Decade Counter
7492	Divide-by-Twelve Counter
7493	4-Bit Binary Ripple Counter
7495	4-Bit Shift Register
7496	5-Bit Shift Register
74107	Dual J-K Flip-Flop
74109	Dual J-K Positive Edge-Trigger Flip-Flop
74112	Dual J-K Edge-Triggered Flip-Flop
74113	Dual J-K Edge-Triggered Flip-Flop
74125	Quad Buffer (3-State)
74126	Quad Buffer (3-State)
74133	13-Input NAND Gate
74136	Quad 2-Input Exclusive-OR Gate (O.C.)
74138	1-of-8 Decoder/Demultiplexer
74139	Dual 1-of-4 Decoder/Demultiplexer
74147	10-Line to 4-Line Priority Encoder
74148	8-Input Priority Encoder
74151	8-Input Multiplexer
74153	Dual 4-Line to 1-Line Multiplexer
74154	1-of-16 Decoder/Demultiplexer
74155	Dual 2-Line to 4-Line Decoder/Demultiplexer
74157	Quad 2-Input Data Selector/Multiplexer
74158	Quad 2-Input Data Selector/Multiplexer (Inverting)
74160A	BCD Decade Counter
74161A	4-Bit Binary Counter
74162A	BCD Decade Counter
74163A	4-Bit Binary Counter
74164	8-Bit Serial-In Parallel-Out Shift Register
74165	8-Bit Serial/Parallel-In, Serial-Out Shift Register
74166	8-Bit Serial/Parallel-In, Serial-Out Shift Register
74168	Synchronous BCD Decade Up/Down Counter
74169	Synchronous 4-Bit Binary Up/Down Counter
74173	Quad D Flip-Flop (3-State)
74174	Hex D Flip-Flop

74175	Quad D Flip-Flop
74181	4-Bit Arithmetic Logic Unit
7482	Lookahead Carry Generator
74190	Presetable BCD/Decade Up/Down Counter
74191	Presetable 4-Bit Binary Up/Down Counter
74192	Presetable BCD/Decade Up/Down Counter
74193	Presetable 4-Bit Binary Up/Down Counter
74194	4-Bit Bidirectional Universal Shift Register
74195	4-Bit Parallel Access Shift Register
74197	Presetable 4-Bit Binary Ripple Counter
74199	8-Bit Parallel Access Shift Register
74240	Octal Inverter Buffer (3-State)
74241	Octal Buffer (3-State)
74242	Quad Inverting Transceiver (3-State)
74243	Quad Bus Transceiver (3-State)
74244	Octal Buffer (3-State)
74245	Octal Bus Transceiver (3-State)
74247	BCD-to-Seven-Segment Decoder/Driver (O.C.)
74248	BCD-to-Seven-Segment Decoder/Driver w/Pullups
74251	8-Input Multiplexer (3-State)
74253	Dual 4-Input Multiplexer (3-State)
74256	Dual 4-Bit Addressable Latch
74257	Quad 2-Line to 1-Line Data Selector/Multiplexer (3-State)
74258	Quad 2-Line to 1-Line Data Selector/Multiplexer (3-State)
74259	8-Bit Addressable Latch
74266	Quad 2-Input Exclusive-NOR Gate (O.C.)
74273	Octal D Flip-Flop
74280	9-Bit Odd/Even Parity Generator/Checker
74283	4-Bit Full Adder with Fast Carry
74290	BCD Decade Counter
74293	4-Bit Binary Ripple Counter
74298	Quad 2-Port Register
74352	Dual 4-Line to 1-Line Multiplexer
74353	Dual 4-Input Multiplexer (3-State)
74373	Octal Transparent Latch (3-State)
74374	Octal D Flip-Flop (3-State)
74375	Quad Bistable Latch
74377	Octal D Flip-Flop with Clock Enable
74378	Hex D Flip-Flop with Clock Enable
74568	BCD Decade Up/Down Synchronous Counter (3-State)
74569	4-Bit Binary Up/Down Synchronous Counter (3-State)

# Spice Models

The Spice models listed on the following pages are for use in CircuitMaker's Analog simulation mode. The models in this section were created by the CircuitMaker development team. Those models marked with an asterisk (\*) are only available in CircuitMaker Professional Edition.

## Diodes

(785 Devices)

100HF100PV	150KS20	1N1187A	1N34	1N462A	25CTQ035	30CTQ050
100HF120PV	150KS40	1N1188	1N3670A	1N463A	25CTQ035S	30CTQ050S
100HF140PV	150KS5	1N1188A	1N3671A	1N4934	25CTQ040	30CTQ060
100HF160PV	150KS60	1N1189	1N3672A	1N4938	25CTQ045	30CTQ060S
100HF20PV	150KS80A	1N1189A	1N3673A	1N5162*	25CTQ045S	32CTQ030
100HF40PV	150L100A*	1N1190	1N3735*	1N5282	25F10	32CTQ030S
100HF60PV	150L10A*	1N1190A	1N3736*	1N5400	25F100	400CNQ035
100HF80PV	150L20A*	1N1199A	1N3737*	1N5401	25F120	400CNQ040
10CTQ150	150L40A*	1N1200A	1N3738*	1N5402	25F20	400CNQ045
10CTQ150S	150L5A*	1N1201A	1N3739*	1N5404	25F40	401CMQ045
12CTQ035	150L60A*	1N1202A	1N3740*	1N5406	25F60	401CNQ035
12CTQ035S	150L80A*	1N1203A	1N3741*	1N5407	25F80	401CNQ040
12CTQ040	151CMQ035	1N1204A	1N3742*	1N5408	300CNQ035	401CNQ045
12CTQ045	151CMQ040	1N1205A	1N3743*	1N914	300CNQ040	403CMQ100
12CTQ045S	151CMQ045	1N1206A	1N3765	1N914A	300CNQ045	403CNQ080
12F10	151CNQ045	1N2054*	1N3766	1N914B	300HF100*	403CNQ100
12F100	152CMQ030	1N2055*	1N3767	1N916	300HF120*	408CMQ060
12F100B	153CMQ080	1N2057*	1N3768	1N916A	300HF140*	408CNQ060
12F10B	153CMQ100	1N2059*	1N4001	1N916B	300HF160*	409CNQ150
12F120	153CNQ100	1N2061*	1N4002	200CNQ035	300HF20*	40CDQ035
12F120B	15CTQ035	1N2064*	1N4003	200CNQ040	300HF40*	40CDQ040
12F20	15CTQ035S	1N2066*	1N4004	200CNQ045	300HF60*	40CDQ045
12F20B	15CTQ040	1N2067*	1N4005	200HF100PV*	300HF80*	40CPQ035
12F40	15CTQ045	1N2068*	1N4006	200HF120PV*	300U100A*	40CPQ040
12F40B	15CTQ045S	1N2128A	1N4007	200HF140PV*	300U10A*	40CPQ045
12F60	160CMQ035	1N2129A	1N4044*	200HF160PV*	300U20A*	40CPQ050
12F60B	160CMQ040	1N2130	1N4045*	200HF20PV*	300U40A*	40CPQ060
12F80	160CMQ045	1N2131A	1N4046*	200HF40PV*	300U60A*	40CPQ080
12F80B	160CNQ045	1N2133A	1N4047*	200HF60PV*	300U80A*	40CPQ100
130HF100PV	161CMQ035	1N2135A	1N4048*	200HF80PV*	301CNQ035	40HF10
130HF120PV	161CMQ040	1N2137A	1N4049*	201CMQ045	301CNQ040	40HF100
130HF140PV	161CMQ045	1N2138A	1N4050*	201CNQ035	301CNQ045	40HF120
130HF160PV	161CNQ045	1N3064	1N4051*	201CNQ040	301CNQ050	40HF140
130HF20PV	162CMQ030	1N3070	1N4052*	201CNQ045	301U100 D	40HF160
130HF40PV	162CNQ030	1N3085*	1N4053*	201CNQ050	301U120*	40HF20
130HF60PV	163CMQ080	1N3086*	1N4054*	203CMQ100	301U140*	40HF40
130HF80PV	163CMQ100	1N3087*	1N4055*	203CNQ080	301U160*	40HF60
150CMQ035	163CNQ100	1N3088*	1N4056*	203CNQ100	301U180*	40HF80
150CMQ040	168CMQ060	1N3089*	1N4148	208CMQ060	301U200*	440CMQ030
150CMQ045	16CTQ080	1N3090*	1N4149	208CNQ060	301U220*	440CNQ030
150CNQ045	16CTQ080S	1N3091*	1N4150	209CMQ150	301U240*	444CNQ035
150HF100PV	16CTQ100	1N3092*	1N4151	209CNQ150	301U250*	444CNQ040
150HF120PV	16CTQ100S	1N3111*	1N4152	20CTQ035	301U80 D	444CNQ045
150HF140PV	16F10	1N3208	1N4153	20CTQ035S	303CNQ080	445CNQ015
150HF160PV	16F100	1N3209	1N4154	20CTQ040	303CNQ100	45L10*
150HF20PV	16F120	1N3210	1N4244	20CTQ045	309CNQ150	45L100*
150HF40PV	16F20	1N3211	1N4305	20CTQ045S	30CPQ035	45L120*
150HF60PV	16F40	1N3212	1N4446	21PT10	30CPQ040	45L140*
150HF80PV	16F60	1N3213	1N4447	21PT20	30CPQ045	45L160*
150K100A	16F80	1N3214	1N4448	21PT40	30CPQ050	45L20*
150K10A	1N1183	1N3288A	1N4454	21PT5	30CPQ060	45L40*
150K20A	1N1183A	1N3289A	1N456	21PT60	30CPQ080	45L60*
150K30A	1N1184	1N3290A	1N456A	220CMQ030	30CPQ100	45L80*
150K40A	1N1184A	1N3291A	1N457	220CNQ025	30CPQ150	470PDA10*
150K5A	1N1185	1N3292B	1N457A	220CNQ030	30CTQ035	470PDA20*
150K60A	1N1185A	1N3293A	1N458	224CNQ035	30CTQ035S	470PDA40*
150K80A	1N1186	1N3294A	1N458A	224CNQ040	30CTQ040	470PDA60*
150KS10	1N1186A	1N3295A	1N459	224CNQ045	30CTQ045	470PDAR10*
150KS100A	1N1187	1N3296A	1N459A	225CNQ015	30CTQ045S	470PDAR20*

470PDAR40*	80CNQ040	FDH333	SD1100C18L*	SD200N06PV*	SD400N12PV*
470PDAR60*	80CNQ045	FDH3595	SD1100C20C*	SD200N08PV*	SD400N14PV*
60CDQ035	80CNQ045SL	FDH400	SD1100C20L*	SD200N10PV*	SD400N16PV*
60CDQ040	80CNQ045SM	FDH444	SD1100C22C*	SD200N12PV*	SD400N18PC*
60CDQ045	81CNQ035	FDH600	SD1100C22L*	SD200N14PV*	SD400N20PC*
60CNQ035	81CNQ040	FJT1100	SD1100C24C*	SD200N16PV*	SD400N22PC*
60CNQ040	81CNQ045	FJT1101	SD1100C24L*	SD200N18PC*	SD400N24PC*
60CNQ045	81CNQ045SL	FJT1102	SD1100C25C*	SD200N20PC*	SD500N30PC*
60CNQ045	81CNQ045SM	MAD1108	SD1100C25L*	SD200N22PC*	SD500N32PC*
60CNQ045SL	81CNQ050	MAD1109	SD1100C26C*	SD200N24PC*	SD500N34PC*
60CNQ045SM	81CNQ050SL	MBR1535CT	SD1100C26L*	SD241	SD500N36PC*
61CNQ035	81CNQ050SM	MBR1545CT	SD1100C28C*	SD300C02C*	SD500N38PC*
61CNQ040	82CNQ030	MBR2035CT	SD1100C28L*	SD300C04C*	SD500N40PC*
61CNQ045	82CNQ030SL	MBR2045CT	SD1100C30C*	SD300C06C*	SD500N42PC*
61CNQ045SL	82CNQ030SM	MBR2080CT	SD1100C30L*	SD300C08C*	SD500N44PC*
61CNQ045SM	83CNQ080	MBR2090CT	SD1100C32C*	SD300C10C*	SD500N45PC*
62CNQ030	83CNQ100	MBR2100CT	SD1100C32L*	SD300C12C*	SD600N02PC*
62CNQ030SL	83CNQ100SL	MBR2535CT	SD1500C02L*	SD300C14C*	SD600N04PC*
62CNQ030SM	83CNQ100SM	MBR2545CT	SD1500C04L*	SD300C16C*	SD600N06PC*
63CNQ080	84CNQ035	MBR3035CT	SD1500C06L*	SD300C18C*	SD600N08PC*
63CNQ100	84CNQ040	MBR3035PT	SD1500C08L*	SD300C20C*	SD600N10PC*
63CNQ100SL	84CNQ045	MBR3045CT	SD1500C10L*	SD300C22C*	SD600N12PC*
63CNQ100SM	84CNQ045SL	MBR3045PT	SD1500C12L*	SD300C24C*	SD600N14PC*
6CWQ03F	84CNQ045SM	MBR4045PT	SD1500C14L*	SD300C25C*	SD600N16PC*
6CWQ04F	85CNQ015	MBR4060PT	SD1500C16L*	SD300C26C*	SD600N18PC*
6CWQ05F	85CNQ015SL	MBR6045WT	SD1500C18L*	SD300C28C*	SD600N20PC*
6CWQ06F	85CNQ015SM	MBRB1535CTS	SD1500C20L*	SD300C30C*	SD600N22PC*
6CWQ09F	85HF10	MBRB1545CTS	SD1500C22L*	SD300C32C*	SD600N24PC*
6CWQ10F	85HF100	MBRB2080CTS	SD1500C24L*	SD300N02PV*	SD600N25PC*
6F10	85HF120	MBRB2090CTS	SD150N02PV*	SD300N04PV*	SD600N26PC*
6F100	85HF140	MBRB2100CTS	SD150N04PV*	SD300N06PV*	SD600N28PC*
6F120	85HF160	MMAD1108	SD150N06PV*	SD300N08PV*	SD600N30PC*
6F20	85HF20	MMAD1109	SD150N08PV*	SD300N10PV*	SD600N32PC*
6F40	85HF40	MMBD2835	SD150N10PV*	SD300N12PV*	SD700C30L*
6F60	85HF60	MMBD2836	SD150N12PV*	SD300N14PV*	SD700C32L*
6F80	85HF80	MMBD6050	SD150N14PV*	SD300N16PV*	SD700C34L*
70HF10	88CNQ060	MMBD6100	SD150N16PV*	SD300N18PC*	SD700C36L*
70HF100	88HF10	MMBD7000	SD150N18PC*	SD300N20PC*	SD700C38L*
70HF120	88HF100	MMBD914	SD150N20PC*	SD300N22PC*	SD700C40L*
70HF140	88HF120	MSD6100	SD150N22PC*	SD300N24PC*	SD700C42L*
70HF160	88HF20	MSD6150	SD150N24PC*	SD300N25PC*	SD700C44L*
70HF20	88HF40	SC1500C25L*	SD150N25PC*	SD300N26PC*	SD700C45L*
70HF40	88HF60	SC1500C26L*	SD1700C24K*	SD300N28PC*	SD800C24L*
70HF60	88HF80	SC1500C28L*	SD1700C25K	SD300N30PC*	SD800C25L*
70HF80	89CNQ150	SC1500C30L*	SD1700C26K*	SD300N32PC*	SD800C26L*
70U10*	8AF05NPP	SD1100C02C*	SD1700C28K*	SD400C02C*	SD800C28L*
70U100*	8AF1NPP	SD1100C02L*	SD1700C30K*	SD400C04C*	SD800C30L*
70U120*	8AF2NPP	SD1100C04C*	SD1700C32K*	SD400C06C*	SD800C32L*
70U140*	8AF4NPP	SD1100C04L*	SD1700C34K*	SD400C08C*	SD800C34L*
70U160*	BAS116	SD1100C06C*	SD1700C36K*	SD400C10C*	SD800C36L*
70U20*	BAV170	SD1100C06L*	SD1700C38K*	SD400C12C*	SD800C38L*
70U40*	BAV199	SD1100C08C*	SD1700C40K*	SD400C14C*	SD800C40L*
70U60*	BAV70	SD1100C08L*	SD1700C42K*	SD400C16C*	SD800C42L*
70U80*	BAV74	SD1100C10C*	SD1700C44K*	SD400C18C*	SD800C44L*
73HF10	BAV99	SD1100C10L*	SD1700C45K*	SD400C20C*	SD800C45L*
73HF100	BAW156	SD1100C12C*	SD2000C02L*	SD400C22C*	SM4001TR
73HF120	BAW56	SD1100C12L*	SD2000C04L*	SD400C24C*	SM4002TR
73HF20	DIODE	SD1100C14C*	SD2000C06L*	SD400N02PV*	SM4003TR
73HF40	FD700	SD1100C14L*	SD2000C08L*	SD400N04PV*	SM4004TR
73HF60	FD777	SD1100C16C*	SD2000C10L*	SD400N06PV*	SM4005TR
73HF80	FDH300	SD1100C16L*	SD200N02PV*	SD400N08PV*	SM4006TR
80CNQ035	FDH300A	SD1100C18C*	SD200N04PV*	SD400N10PV*	SM4007TR

## Zener Diodes (730 Devices)

1N4728	1N4762A	1N5359B	1N969B	BZT52C3*	BZX84C30LT1	DL4740A*
1N4728A	1N4763	1N5360B	1N970B	BZT52C30*	BZX84C33LT1	DL4741A*
1N4729	1N4763A	1N5361B	1N971B	BZT52C33*	BZX84C36LT1	DL4742A*
1N4729A	1N4764	1N5362B	1N972B	BZT52C36*	BZX84C39LT1	DL4743A*
1N4730	1N4764A	1N5363B	1N973B	BZT52C39*	BZX84C3VOLT1	DL4744A*
1N4730A	1N5221B*	1N5364B	1N974B	BZT52C3V3*	BZX84C3V3LT1	DL4745A*
1N4731	1N5222B	1N5365B	BZG03C10*	BZT52C3V6*	BZX84C3V6LT1	DL4746A*
1N4731A	1N5223B*	1N5366B	BZG03C100*	BZT52C3V9*	BZX84C3V9LT1	DL4747A*
1N4732	1N5224B*	1N5367B	BZG03C11*	BZT52C43*	BZX84C43LT1	DL4748A*
1N4732A	1N5225B*	1N5368B	BZG03C110*	BZT52C47*	BZX84C47LT1	DL4749A*
1N4733	1N5226B	1N5369B	BZG03C12*	BZT52C4V3*	BZX84C4V3LT1	DL4750A*
1N4733A	1N5227B	1N5370B	BZG03C120*	BZT52C4V7*	BZX84C4V7LT1	DL4751A*
1N4734	1N5228B	1N5371B	BZG03C13*	BZT52C51*	BZX84C51LT1	DL4752A*
1N4734A	1N5229B	1N5372B	BZG03C130*	BZT52C5V1*	BZX84C56LT1	DL4753A*
1N4735	1N5230B	1N5373B	BZG03C15*	BZT52C5V6*	BZX84C5V6LT1	DL4754A*
1N4735A	1N5231B	1N5374B	BZG03C150*	BZT52C6V2*	BZX84C5V6LT1	DL4755A*
1N4736	1N5232B	1N5375B	BZG03C16*	BZT52C6V8*	BZX84C62L	DL4756A*
1N4736A	1N5233B	1N5376B	BZG03C160*	BZT52C7V5*	BZX84C68LT1	DL4757A*
1N4737	1N5234B	1N5377B	BZG03C18*	BZT52C8V2*	BZX84C6V2LT1	DL4758A*
1N4737A	1N5235B	1N5378B	BZG03C180*	BZT52C9V1*	BZX84C6V8LT1	DL4759A*
1N4738	1N5236B	1N5379B	BZG03C20*	BZX55C10*	BZX84C75LT1	DL4760A*
1N4738A	1N5237B	1N5380B	BZG03C200*	BZX55C11*	BZX84C7V5LT1	DL4761A*
1N4739	1N5238B	1N5381B	BZG03C22*	BZX55C12*	BZX84C8V2LT1	DL4762A*
1N4739A	1N5239B	1N5382B	BZG03C220*	BZX55C13*	BZX84C9V1LT1	DL4763A*
1N4740	1N5240B	1N5383B	BZG03C24*	BZX55C15*	BZX85C10*	DL4764A*
1N4740A	1N5241B	1N5384B	BZG03C240*	BZX55C16*	BZX85C11*	DL5226B*
1N4741	1N5242B	1N5385B	BZG03C27*	BZX55C18*	BZX85C12*	DL5227B*
1N4741A	1N5243B	1N5386B	BZG03C270*	BZX55C20*	BZX85C13*	DL5228B*
1N4742	1N5244B	1N5387B	BZG03C30*	BZX55C22*	BZX85C15*	DL5229B*
1N4742A	1N5245A	1N5388B	BZG03C33*	BZX55C24*	BZX85C16*	DL5230B*
1N4743	1N5245B	1N746	BZG03C36*	BZX55C27*	BZX85C18*	DL5231B*
1N4743A	1N5246B	1N746A	BZG03C39*	BZX55C2V4*	BZX85C20*	DL5232B*
1N4744	1N5247B	1N747	BZG03C43*	BZX55C27*	BZX85C22*	DL5233B*
1N4744A	1N5248B	1N747A	BZG03C47*	BZX55C30*	BZX85C24*	DL5234B*
1N4745	1N5249B	1N748	BZG03C51*	BZX55C33*	BZX85C27*	DL5235B*
1N4745A	1N5250B	1N748A	BZG03C56*	BZX55C36*	BZX85C2V7*	DL5236B*
1N4746	1N5251B	1N749	BZG03C62*	BZX55C39*	BZX85C30*	DL5237B*
1N4746A	1N5252B	1N749A	BZG03C68*	BZX55C47*	BZX85C33*	DL5238B*
1N4747	1N5253B	1N750	BZG03C75*	BZX55C3V3*	BZX85C36*	DL5239B*
1N4747A	1N5254B	1N750A	BZG03C82*	BZX55C3V6*	BZX85C39*	DL5240B*
1N4748	1N5255B	1N751	BZG03C91*	BZX55C3V9*	BZX85C3V0*	DL5241B*
1N4748A	1N5256B	1N751A	BZG05C10*	BZX55C43*	BZX85C3V3*	DL5242B*
1N4749	1N5257B	1N752	BZG05C11*	BZX55C47*	BZX85C3V6*	DL5243B*
1N4749A	1N5258B	1N752A	BZG05C12*	BZX55C4V3*	BZX85C3V9*	DL5244B*
1N4750	1N5259B	1N753	BZG05C13*	BZX55C4V7*	BZX85C43*	DL5245B*
1N4750A	1N5260B	1N753A	BZG05C15*	BZX55C51*	BZX85C47*	DL5246B*
1N4751	1N5261B	1N754	BZG05C3V3*	BZX55C56*	BZX85C4V3*	DL5247B*
1N4751A	1N5262B	1N754A	BZG05C3V6*	BZX55C5V1*	BZX85C4V7*	DL5248B*
1N4751B	1N5263B*	1N755	BZG05C3V9*	BZX55C5V6*	BZX85C51*	DL5249B*
1N4752	1N5264B*	1N755A	BZG05C4V3*	BZX55C62*	BZX85C56*	DL5250B*
1N4752A	1N5265B*	1N756	BZG05C4V7*	BZX55C68*	BZX85C5V1*	DL5251B*
1N4753	1N5266B*	1N756A	BZG05C5V1*	BZX55C6V2*	BZX85C5V6*	DL5252B*
1N4753A	1N5267B*	1N757	BZG05C5V6*	BZX55C6V8*	BZX85C62*	DL5253B*
1N4754	1N5342B	1N757A	BZG05C6V2*	BZX55C75*	BZX85C68*	DL5254B*
1N4754A	1N5343B	1N758	BZG05C6V8*	BZX55C7V5*	BZX85C6V2*	DL5255B*
1N4755	1N5344B	1N758A	BZG05C7V5*	BZX55C8V2*	BZX85C6V8*	DL5256B*
1N4755A	1N5345B	1N759	BZG05C8V2*	BZX55C9V1*	BZX85C75*	DL5257B*
1N4756	1N5346B	1N759A	BZG05C9V1*	BZX84C10LT1	BZX85C7V5*	DL5258B*
1N4756A	1N5347B	1N957B	BZT52C10*	BZX84C11LT1	BZX85C8V2*	DL5259B*
1N4757	1N5348B	1N958B	BZT52C11*	BZX84C12LT1	BZX85C9V1*	DL5260B*
1N4757A	1N5349B	1N959B	BZT52C12*	BZX84C13LT1	DL4730A*	DL5261B*
1N4758	1N5350B	1N960B	BZT52C13*	BZX84C15LT1	DL4731A*	DL5262B*
1N4758A	1N5351B	1N961B	BZT52C15*	BZX84C16LT1	DL4732A*	DZ23C10
1N4759	1N5352B	1N962B	BZT52C16*	BZX84C18LT1	DL4733A*	DZ23C11
1N4759A	1N5353B	1N963B	BZT52C18*	BZX84C20LT1	DL4734A*	DZ23C12
1N4760	1N5354B	1N964B	BZT52C20*	BZX84C22LT1	DL4735A*	DZ23C13
1N4760A	1N5355B	1N965B	BZT52C22*	BZX84C24LT1	DL4736A*	DZ23C15
1N4761	1N5356B	1N966B	BZT52C24*	BZX84C27LT1	DL4737A*	DZ23C16
1N4761A	1N5357B	1N967B	BZT52C27*	BZX84C2VALT1	DL4738A*	DZ23C18
1N4762	1N5358B	1N968B	BZT52C2V7*	BZX84C2V7LT1	DL4739A*	DZ23C20

DZ23C22	DZ89C22	MMBZ5234BLT1	MMSZ13T1	ZPU150*	ZY100*
DZ23C24	DZ89C24	MMBZ5235BLT1	MMSZ15T1	ZPU180*	ZY11*
DZ23C27	DZ89C27	MMBZ5236BLT1	MMSZ16T1	ZPY1*	ZY110*
DZ23C2V7	DZ89C30	MMBZ5237BLT1	MMSZ18T1	ZPY10*	ZY12*
DZ23C3	DZ89C33	MMBZ5240BLT1	MMSZ20T1	ZPY100*	ZY120*
DZ23C30	DZ89C36	MMBZ5241BLT1	MMSZ22T1	ZPY11*	ZY13*
DZ23C33	DZ89C39	MMBZ5242BLT1	MMSZ24T1	ZPY12*	ZY130*
DZ23C36	DZ89C3V9	MMBZ5243B	MMSZ27T1	ZPY13*	ZY15*
DZ23C39	DZ89C43	MMBZ5244BLT1	MMSZ2V4T1	ZPY15*	ZY150*
DZ23C3V3	DZ89C47	MMBZ5245BLT1	MMSZ2V7T1	ZPY16*	ZY16*
DZ23C3V6	DZ89C4V3	MMBZ5246BLT1	MMSZ30T1	ZPY18*	ZY160*
DZ23C3V9	DZ89C4V7	MMBZ5247BLT1	MMSZ33T1	ZPY20*	ZY18*
DZ23C43	DZ89C51	MMBZ5248BLT1	MMSZ36T1	ZPY22*	ZY180*
DZ23C47	DZ89C56	MMBZ5249BLT1	MMSZ39T1	ZPY24*	ZY20*
DZ23C4V4	DZ89C5V1	MMBZ5250BLT1	MMSZ3V3T1	ZPY27*	ZY200*
DZ23C4V7	DZ89C5V6	MMBZ5251BLT1	MMSZ3V6T1	ZPY3_9*	ZY22*
DZ23C51	DZ89C62	MMBZ5252BLT1	MMSZ3V9T1	ZPY30*	ZY24*
DZ23C5V1	DZ89C68	MMBZ5253BLT1	MMSZ43T1	ZPY33*	ZY27*
DZ23C5V6	DZ89C6V2	MMBZ5254BLT1	MMSZ47T1	ZPY36*	ZY3_9*
DZ23C6V2	DZ89C6V8	MMBZ5255BLT1	MMSZ4V3T1	ZPY39*	ZY30*
DZ23C6V8	DZ89C75	MMBZ5256BLT1	MMSZ4V7T1	ZPY4_3*	ZY33*
DZ23C7V5	DZ89C7V5	MMBZ5257BLT1	MMSZ51T1	ZPY4_7*	ZY36*
DZ23C8V2	DZ89C82	MMBZ5258BLT1	MMSZ56T1	ZPY43*	ZY39*
DZ23C9V1	DZ89C8V2	MMBZ5258BLT1	MMSZ5V1T1	ZPY47*	ZY4_3*
DZ89C10	DZ89C91	MMBZ5259BLT1	MMSZ5V6T1	ZPY5_1*	ZY4_7*
DZ89C100	DZ89C9V1	MMBZ5259BLT1	MMSZ62T1	ZPY5_6*	ZY43*
DZ89C11	MMBZ3V0T1	MMBZ5260BLT1	MMSZ68T1	ZPY51*	ZY5_1*
DZ89C110	MMBZ5221BLT1	MMBZ5261BLT1	MMSZ6V2T1	ZPY56*	ZY5_6*
DZ89C12	MMBZ5222BLT1	MMBZ5262BLT1	MMSZ6V8T1	ZPY6_2*	ZY51*
DZ89C120	MMBZ5223BLT1	MMBZ5263BLT1	MMSZ75T1	ZPY6_8*	ZY56*
DZ89C13	MMBZ5224BLT1	MMBZ5264BLT1	MMSZ7V5T1	ZPY62*	ZY6_2*
DZ89C130	MMBZ5225BLT1	MMBZ5265BLT1	MMSZ8V2T1	ZPY68*	ZY6_8*
DZ89C15	MMBZ5226BLT1	MMBZ5266BLT1	MMSZ9V1T1	ZPY7_5*	ZY62*
DZ89C150	MMBZ5227BLT1	MMBZ5267BLT1	ZENER	ZPY75*	ZY68*
DZ89C16	MMBZ5228BLT1	MMBZ5268BLT1	ZMU100*	ZPY8_2*	ZY7_5*
DZ89C160	MMBZ5229BLT1	MMBZ5269BLT1	ZMU120*	ZPY82*	ZY75*
DZ89C18	MMBZ5230BLT1	MMBZ5270BLT1	ZMU150*	ZPY9_1*	ZY8_2*
DZ89C180	MMBZ5231BLT1	MMSZ10T1	ZMU180*	ZPY91*	ZY82*
DZ89C20	MMBZ5232BLT1	MMSZ11T1	ZPU100*	ZY1*	ZY9_1*
DZ89C200	MMBZ5233BLT1	MMSZ12T1	ZPU120*	ZY10*	ZY91*

## Schottky Diodes (185 Devices)

10BQ015	122NQ030R*	181NQ045R*	20FQ035*	244NQ045*	31DQ10*	80SQ035*
10BQ040*	123NQ080*	182NQ030*	20FQ040*	244NQ045R*	50HQ035*	80SQ040*
10BQ060*	123NQ100*	182NQ030R*	20FQ045*	245NQ015*	50HQ040*	80SQ045*
10BQ100*	123NQ100R*	183NQ080*	20TQ035*	245NQ015R*	50HQ045*	85HQ035*
10MQ040*	124NQ035*	183NQ100*	20TQ035S*	248NQ060*	50SQ080*	85HQ040*
10MQ060*	124NQ040*	183NQ100R*	20TQ040*	248NQ060R*	50SQ100*	85HQ045*
10MQ090*	124NQ045*	185NQ015*	20TQ045*	249NQ150*	50WQ03F*	8TQ080*
10TQ035*	124NQ045R*	185NQ015R*	20TQ045S*	249NQ150R*	50WQ04F*	8TQ080S*
10TQ035S*	125NQ015*	188NQ060*	21FQ035*	30BQ015*	50WQ05F*	8TQ100*
10TQ040*	125NQ015R*	188NQ060R*	21FQ040*	30BQ040*	50WQ06F*	8TQ100S*
10TQ045*	128NQ060*	189NQ150*	21FQ045*	30BQ060*	50WQ09F*	90SQ035*
10TQ045S*	128NQ060R*	189NQ150R*	240NQ035*	30BQ100*	50WQ10F*	90SQ040*
11DQ03	129NQ150*	18TQ035*	240NQ040*	30FQ035*	51HQ035*	90SQ045*
11DQ04	129NQ150R*	18TQ035S*	240NQ045*	30FQ040*	51HQ040*	95HQ015*
11DQ05	12TQ035*	18TQ040*	240NQ045R*	30FQ045*	51HQ045*	95SQ015*
11DQ06	12TQ035S*	18TQ045*	241NQ035*	30WQ03F*	55HQ030*	MBR1035*
11DQ09	12TQ040*	18TQ045S*	241NQ040*	30WQ04F*	60HQ080*	MBR1045*
11DQ10	12TQ045*	19TQ015*	241NQ045*	30WQ05F*	60HQ100*	MBR1635*
120NQ035*	12TQ045S*	19TQ015S*	241NQ045R*	30WQ06F*	6TQ035*	MBR1645*
120NQ040*	15MQ040*	1N5828	242NQ030*	30WQ09F*	6TQ035S*	MBR735*
120NQ045*	180NQ035*	1N5834	242NQ030R*	30WQ10F*	6TQ040*	MBR745*
120NQ045R*	180NQ040*	1N6095	243NQ080*	31DQ03*	6TQ045*	MBR7535*
121NQ035*	180NQ045*	1N6096	243NQ100*	31DQ04*	6TQ045S*	MBR7545*
121NQ040*	180NQ045R*	1N6097	243NQ100R*	31DQ05*	75HQ035*	SD41*
121NQ045*	181NQ035*	1N6098	244NQ035*	31DQ06*	75HQ040*	SD51*
121NQ045R*	181NQ040*	1N6391	244NQ040*	31DQ09*	75HQ045*	SKYDIODE
122NQ030*	181NQ045*	1N6392				



## Diode Bridge Rectifiers

(53 Devices)

18DB05	1BQ40	2KBB10	2KBP01	DF01	KBPC101	KBPC601
18DB1	1KAB10	2KBB100	2KBP02	DF02	KBPC102	KBPC602
18DB10	1KAB100	2KBB20	2KBP04	DF04	KBPC104	KBPC604
18DB2	1KAB20	2KBB40	2KBP06	DF06	KBPC106	KBPC606
18DB4	1KAB40	2KBB5	2KBP08	DF08	KBPC108	KBPC608
18DB6	1KAB5	2KBB60	2KBP10	DF10	KBPC110	KBPC610
18DB8	1KAB60	2KBB80	BRIDGE	KBPC1005	KBPC6005	MDA2500
1BQ20	1KAB80	2KBP005	DF005			

## Bipolar Junction Transistors (NPN)

(507 Devices)

2N1893	BC368	BDC01D	ECG186*	ECG241	ECG26	ECG473*
2N2102	BC394	BDC05	ECG186A*	ECG2428*	ECG278	ECG474*
2N2218A	BC489	BF199	ECG188	ECG2430*	ECG280	ECG479*
2N2219	BC489A	BF224	ECG190*	ECG2501*	ECG283	ECG486*
2N2219A	BC489B	BF240	ECG191	ECG2503*	ECG284*	ECG487*
2N2222	BC546A	BF258	ECG194	ECG2504*	ECG286*	ECG488*
2N2222A	BC546B	BF374	ECG196*	ECG2505*	ECG287	ECG49*
2N2270	BC547A	BF391	ECG198	ECG2506*	ECG29*	ECG51
2N2369	BC547B	BF392	ECG199	ECG2507*	ECG291*	ECG52
2N2369A	BC547C	BF393	ECG20	ECG2508*	ECG295	ECG53
2N2484	BC548A	BF420	ECG210	ECG2510*	ECG300	ECG54*
2N2895	BC548B	BF422	ECG216	ECG2511*	ECG31	ECG56*
2N2896	BC548C	BF720	ECG22	ECG2513*	ECG311	ECG58
2N3019	BC635	BF844	ECG224*	ECG2515*	ECG313*	ECG60*
2N3020	BC637	BF959	ECG225	ECG2517*	ECG315	ECG63*
2N3053	BC639	BSP19AT1	ECG227	ECG2519*	ECG316*	ECG64*
2N3053A	BC817-16LT1	BSP20AT1	ECG228A	ECG2521*	ECG317*	ECG69
2N3055	BC817-25	BSS64LT1	ECG229	ECG2522*	ECG318*	ECG70*
2N3500	BC817-40	BSS71	ECG23	ECG2524*	ECG319P*	ECG71
2N3501	BC818-25	BSS72	ECG2300*	ECG2526*	ECG320*	ECG72
2N3507	BC818-40	BSS73	ECG2301*	ECG2528*	ECG320F*	ECG74
2N3700	BC846A	BSV52LT1	ECG2302*	ECG2530*	ECG321	ECG75*
2N3903	BC846ALT1	BSX20	ECG2303*	ECG2533*	ECG327*	ECG76*
2N3904	BC846BLT1	CV12253	ECG2304*	ECG2534*	ECG328*	ECG77
2N3947	BC847A	D44H8	ECG2305*	ECG2536*	ECG331*	ECG78
2N4014	BC847ALT1	ECG10	ECG2307*	ECG2538*	ECG340*	ECG79
2N4123	BC847BLT1	ECG101	ECG2308*	ECG2539*	ECG341*	ECG81
2N4124	BC847C	ECG103	ECG2309*	ECG255	ECG342*	ECG85
2N4264	BC847CLT1	ECG103A	ECG2310*	ECG2561*	ECG343*	ECG86
2N4265	BC848ALT1	ECG107	ECG2311*	ECG2562*	ECG346*	ECG87
2N4400	BC848BLT1	ECG108	ECG2312*	ECG2564*	ECG36*	ECG89
2N4401	BC848CLT1	ECG11	ECG2313*	ECG2566*	ECG360*	ECG90
2N4410	BC849ALT1	ECG123	ECG2318*	ECG2568*	ECG369*	ECG92*
2N5088	BC849BLT1	ECG123A	ECG2319*	ECG2570*	ECG373*	ECG94
2N5089	BC849C	ECG123AP	ECG2321*	ECG2572*	ECG375	ECG95
2N5209	BC850ALT1	ECG124	ECG2323*	ECG2574*	ECG376	ECG96*
2N5210	BC850BLT1	ECG128	ECG2324*	ECG2576*	ECG377*	MJE15030
2N5550	BC850CLT1	ECG128P	ECG2325*	ECG2578*	ECG379*	MJE340
2N5551	BCP54	ECG13	ECG2327*	ECG2579*	ECG382*	MM3001
2N6431	BCP56-10T1	ECG130*	ECG2328*	ECG2580*	ECG384*	MM3725
2N6515	BCP56-16T1	ECG15	ECG233	ECG2581*	ECG385*	MMBT100
2N6516	BCP56T1	ECG152*	ECG2330*	ECG2582*	ECG386*	MMBT100A
2N6517	BCP68T1	ECG154	ECG2331*	ECG2583*	ECG387*	MMBT2222ALT1
2N930	BCW31	ECG157*	ECG2333*	ECG2584*	ECG388	MMBT2222LT1
2N930A	BCW33	ECG16	ECG2337*	ECG2585*	ECG389*	MMBT2369ALT1
BC140-10	BCW60ALT1	ECG161	ECG2339*	ECG2586*	ECG390*	MMBT2369LT1
BC140-16	BCW60BLT1	ECG162	ECG2347*	ECG2588*	ECG392*	MMBT2484LT1
BC141-10	BCW60DLT1	ECG163A*	ECG2348*	ECG2590*	ECG394*	MMBT3904
BC141-16	BCW65C	ECG164	ECG2353*	ECG2591*	ECG396*	MMBT4124
BC337-16	BCW71	ECG165	ECG2354*	ECG2592*	ECG399*	MMBT4401
BC337-25	BCX19LT1	ECG171*	ECG2363*	ECG2593*	ECG40	MMBT5088
BC337-40	BCX20LT1	ECG175	ECG2365*	ECG2594*	ECG42	MMBT5089
BC338-16	BCX70GLT1	ECG18	ECG237*	ECG2596*	ECG44	MMBT5179
BC338-25	BCX70JLT1	ECG181	ECG238*	ECG2597*	ECG47	MMBT5550LT1
BC338-40	BCX70KLT1	ECG184*	ECG24	ECG2598	ECG472*	MMBT5551

MMBT6428LT1	MMPQ3904	MPS2713	MPS6571	MPSA43	MSC2295C	PBF259RS
MMBT6429LT1	MMPQ6842	MPS2714	MPS6595	MPSA44	MSC2404C	PBF259S
MMBT6517	MPQ2222	MPS3563	MPS6601	MPSH04	MSC3130	PN100
MMBT918	MPQ2222A	MPS3646	MPS6602	MPSH10	MSD1328R	PN100A
MMBTA05LT1	MPQ2369	MPS3866	MPS6714	MPSH11	MSD1819A-RT1	PN3563
MMBTA06	MPQ2483	MPS3904	MPS6715	MPSH20	MSD1819A-ST1	PN918
MMBTA20LT1	MPQ2484	MPS4123	MPS6717	MPSH24	MSD601R	PZT3904
MMBTA42	MPQ3725	MPS4124	MPS8050	MPSH34	MSD601-ST1	PZT651T1
MMBTA43	MPQ3904	MPS5179	MPS8098	MPSL01	MSD602R	PZTA06
MMBTA43LT1	MPQ7041	MPS650	MPS8099	MPSW01	NPN	PZTA42
MMBTH10	MPQ7042	MPS6507	MPS918	MPSW01A	NZT44H8	QPNP
MMBTH11	MPQ7043	MPS651	MPSA05	MPSW05	NZT651	TN3019A
MMBTH20	MPS2222	MPS6520	MPSA06	MPSW06	NZT6714	TN3440A
MMBTH24	MPS2222A	MPS6521	MPSA16	MPSW10	NZT6715	TN3725A
MMPQ2222	MPS2369	MPS6530	MPSA17	MPSW42	NZT6717	TN6714A
MMPQ2222A	MPS2369A	MPS6531	MPSA18	MSC1621	P2N2222A	TN6715A
MMPQ2369	MPS2711	MPS6560	MPSA42	MSC2295B	PBF259	TN6717A
MMPQ3725	MPS2712	MPS6568A				

## Bipolar Junction Transistors (PNP)

(341 Devices)

2N2904	BC177	BC858CLT1	ECG185*	ECG281*	MMBT5401	MPSA55
2N2904A	BC177A	BCP52	ECG187*	ECG285*	MMBT5771	MPSA56
2N2905	BC177B	BCP53T1	ECG187A*	ECG288*	MMBT6520	MPSA70
2N2905A	BC212	BCP69T1	ECG189	ECG292*	MMBT8599	MPSA92
2N2906	BC212B	BCW29LT1	ECG19*	ECG30*	MMBTAS55LT1	MPSA93
2N2906A	BC213	BCW30LT1	ECG193*	ECG307*	MMBTAS6	MPSH81
2N2907	BC214	BCW61BLT1	ECG193A*	ECG32*	MMBTA70LT1	MPSL51
2N2907A	BC307	BCW61CLT1	ECG197*	ECG332*	MMBTA92	MPSW51
2N2955*	BC307B	BCW61DLT1	ECG21*	ECG353*	MMBTA93LT1	MPSW51A
2N3244	BC307C	BCW68G	ECG211*	ECG354*	MMBTH81	MPSW55
2N3250	BC308C	BCW69LT1	ECG213*	ECG355*	MMPQ2907	MPSW56
2N3251	BC309B	BCW70LT1	ECG217*	ECG356*	MMPQ3467	MPSW92
2N3251A	BC327	BCX17LT1	ECG218	ECG37*	MMPQ3799	MSA1022B
2N3467	BC327-16	BCX18LT1	ECG219*	ECG374*	MMPQ3906	MSA1022C
2N3468	BC327-25	BCX71K	ECG2306*	ECG378*	MPQ2906	MSB1218A-RT1
2N3497	BC328	BCY70	ECG2314*	ECG38	MPQ2907	MSB1218A-ST1
2N3546	BC328-16	BCY71	ECG2322*	ECG381*	MPQ2907A	MSB709R
2N3634	BC328-25	BCY72	ECG2329*	ECG383*	MPQ3467	MSB709-ST1
2N3635	BC369	BDB02C	ECG234*	ECG39*	MPQ3762	MSB710-QT1
2N3636	BC393	BDB02D	ECG2364*	ECG391*	MPQ3798	MSB710R
2N3637	BC450	BDC02D	ECG2366*	ECG393*	MPQ3799	NZT45H8
2N3799	BC450A	BF421	ECG240	ECG395*	MPQ3906	NZT6726
2N3905	BC490	BF423	ECG242*	ECG397*	MPQ7091	NZT6728
2N3906	BC490A	BF492	ECG2429*	ECG398	MPQ7093	NZT6729
2N3963	BC556	BF493	ECG2431*	ECG41*	MPS2907	NZT751
2N3964	BC556B	BF493S	ECG25*	ECG43*	MPS2907A	P2N2907A
2N4032	BC557	BF721	ECG2502*	ECG45*	MPS3638	PBF493
2N4033	BC557A	BFW43	ECG2509*	ECG50*	MPS3638A	PBF493R
2N4036	BC557B	BSP16	ECG2512*	ECG55*	MPS3640	PBF493RS
2N4037	BC557C	BSS63LT1	ECG2514*	ECG59*	MPS3906	PBF493S
2N4125	BC558B	BSS74	ECG2516*	ECG61*	MPS404A	PN200
2N4126	BC559	BSS75	ECG2518*	ECG68	MPS4125	PN200A
2N4258	BC559B	BSS76	ECG2520*	ECG82*	MPS4126	PN2907A
2N4402	BC559C	BSV16-10	ECG2523*	ECG88	MPS4258	PN3640
2N4403	BC560B	D45H8	ECG2525*	ECG91*	MPS536	PN4356
2N4405	BC560C	ECG100*	ECG2527*	ECG93*	MPS5771	PNP
2N4407	BC636	ECG102*	ECG2529*	MM4001	MPS6523	PZT2907A
2N4931	BC638	ECG102A*	ECG2531*	MMBT200	MPS6562	PZT3906
2N5086	BC640	ECG106*	ECG2535*	MMBT200A	MPS6651	PZT751T1
2N5087	BC807-16	ECG12*	ECG2537*	MMBT2907A	MPS6652	PZTA56
2N5087	BC807-25	ECG126A*	ECG2563*	MMBT2907LT1	MPS6726	PZTA92
2N5400	BC807-40	ECG129*	ECG2565*	MMBT3640	MPS6727	PZTA96
2N5401	BC856ALT1	ECG129P*	ECG2567*	MMBT3906	MPS750	TN2905A
2N5771	BC856BLT1	ECG14*	ECG2569*	MMBT404A	MPS751	TN3467A
2N6433	BC857ALT1	ECG153*	ECG2571*	MMBT4126	MPS8093	TN4033A
2N6519	BC857B	ECG159*	ECG2575*	MMBT4258	MPS8550	TN6726A
2N6520	BC857C	ECG160*	ECG2577*	MMBT4403	MPS8598	TN6728A
BC160-16	BC858ALT1	ECG17*	ECG27*	MMBT5086	MPS8599	TN6729A
BC161-16	BC858BLT1	ECG180*	ECG28*	MMBT5087		

## Darlington BJTs

(106 Devices)

2N6040	ECG215*	ECG246*	ECG2547*	ECG265*	MPS6724	MPSW13
2N6042	ECG2316*	ECG247*	ECG2548*	ECG266*	MPS6725	MPSW14
2N6426	ECG2317*	ECG248*	ECG2551*	ECG267*	MPSA13	MPSW45
2N6427	ECG2326*	ECG249*	ECG2552*	ECG268*	MPSA14	MPSW45A
2N6427	ECG2343*	ECG250*	ECG2553*	ECG269*	MPSA25	MPSW63
2N7052	ECG2344*	ECG251*	ECG2554*	ECG272*	MPSA26	MPSW64
2N7053	ECG2345*	ECG252*	ECG2555*	ECG273*	MPSA27	NPN1
BC372	ECG2346*	ECG253*	ECG2556*	ECG274*	MPSA28	NPN2
BC373	ECG2349*	ECG254*	ECG2559*	ECG275*	MPSA29	NPN3
BC517	ECG2350*	ECG2540*	ECG2560*	MMBT6427LT1	MPSA62	PNP1
BC618	ECG2351*	ECG2541*	ECG258*	MMBT1A13LT1	MPSA63	PNP2
BCV26	ECG2352*	ECG2542*	ECG261*	MMBT1A14LT1	MPSA64	PNP3
BCV27	ECG243*	ECG2544*	ECG262*	MMBT1A63LT1	MPSA64	PZTA14T1
BSP52T1	ECG244*	ECG2545*	ECG263*	MMBT1A64LT1	MPSA75	PZTA64T1
BSP62T1	ECG245*	ECG2546*	ECG264*	MPQ6426	MPSA77	TIP141
ECG214*						

## Silicon-Controlled Rectifiers

(441 Devices)

10RIA10*	2N1794*	2N5207*	80RKI60*	EC113C	ST110C06C0*	ST180S12P0V*
10RIA100*	2N1795*	2N6237	80RKI80*	EC113C3	ST110C08C0*	ST180S14P0*
10RIA120*	2N1796*	2N6238	BRX44	EC113D	ST110C10C0*	ST180S16P0*
10RIA20*	2N1797*	2N6239	BRX45	EC113D3	ST110C12C0*	ST180S18P0*
10RIA40*	2N1798*	2N6240	BRX46	EC113E	ST110C14C0*	ST180S20P0*
10RIA60*	2N1799*	2N6241	BRX47	EC113E3	ST110C16C0*	ST1900C45R0*
10RIA80*	2N1800*	2N6564	BRX49	EC113M	ST110S02P0V*	ST1900C46R0*
110RKI10*	2N1801*	2N6565	BRY55-100	EC113M3	ST110S04P0V*	ST1900C48R0*
110RKI100*	2N1802*	2N6811	BRY55-200	MCR100-3	ST110S06P0V*	ST1900C50R0*
110RKI120*	2N1803*	2N682*	BRY55-30	MCR100-4	ST110S08P0V*	ST1900C52R0*
110RKI20*	2N1804*	2N683*	BRY55-400	MCR100-6	ST110S10P0V*	ST2100C35R0*
110RKI40*	2N1805*	2N684*	BRY55-500	MCR100-8	ST110S12P0V*	ST2100C36R0*
110RKI60*	2N1806*	2N685*	BRY55-60	MCR102	ST110S14P0*	ST2100C38R0*
110RKI80*	2N1807*	2N686*	BRY55-600	MCR103	ST110S16P0*	ST2100C40R0*
16RIA10*	2N1909*	2N687*	C106A	MCR106-2	ST1200C04K0*	ST2100C42R0*
16RIA100*	2N1910*	2N688*	C106B	MCR106-3	ST1200C06K0*	ST2100C44R0*
16RIA120*	2N1911*	2N689*	C106D	MCR106-4	ST1200C08K0*	ST2100C45R0*
16RIA140*	2N1912*	2N690*	C106F	MCR22-2	ST1200C10K0*	ST230C02C0*
16RIA160*	2N1913*	2N691*	C106M	MCR22-3	ST1200C12K0*	ST230C04C0*
16RIA20*	2N1914*	2N692*	C149M10	MCR22-4	ST1200C14K0*	ST230C06C0*
16RIA40*	2N1915*	50RIA10*	EC103A	MCR22-6	ST1200C16K0*	ST230C08C0*
16RIA60*	2N1916*	50RIA100*	EC103A1	MCR22-8	ST1200C18K0*	ST230C10C0*
16RIA80*	2N2023*	50RIA120*	EC103A2	MCR506-2	ST1200C20K0*	ST230C12C0*
180RKI100*	2N2024*	50RIA140*	EC103A3	MCR506-3	ST1230C04K0*	ST230C14C0*
180RKI20*	2N2025*	50RIA160*	EC103B	MCR506-4	ST1230C06K0*	ST230C16C0*
180RKI40*	2N2026*	50RIA20*	EC103B1	MCR506-6	ST1230C08K0*	ST230S02P0V*
180RKI60*	2N2027*	50RIA40*	EC103B2	MCR506-8	ST1230C10K0*	ST230S04P0V*
180RKI80*	2N2028*	50RIA60*	EC103B3	MRC106-6	ST1230C12K0*	ST230S06P0V*
22RIA10*	2N2029*	50RIA80*	EC103C	MRC106-8	ST1230C14K0*	ST230S08P0V*
22RIA100*	2N2030*	70RIA10*	EC103C1	S0503LS1	ST1230C16K0*	ST230S10P0V*
22RIA120*	2N2326	70RIA100*	EC103C2	S0503LS2	ST1280C02K0*	ST230S12P0V*
22RIA140*	2N3091*	70RIA120*	EC103C3	S0503LS3	ST1280C04K0*	ST230S14P0*
22RIA160*	2N3092*	70RIA20*	EC103D	S1003LS1	ST1280C06K0*	ST230S16P0*
22RIA20*	2N3093*	70RIA40*	EC103D1	S1003LS2	ST180C02C0*	ST2600C20R0*
22RIA40*	2N3094*	70RIA60*	EC103D2	S1003LS3	ST180C04C0*	ST2600C22R0*
22RIA60*	2N3095*	70RIA80*	EC103D3	S19CF	ST180C06C0*	ST2600C24R0*
22RIA80*	2N3096*	80RIA10*	EC103E	S2003LS1	ST180C08C0*	ST2600C26R0*
25RIA10*	2N3097*	80RIA100*	EC103E1	S2003LS2	ST180C10C0*	ST2600C28R0*
25RIA100*	2N3098*	80RIA120*	EC103E2	S2003LS3	ST180C12C0*	ST2600C30R0*
25RIA120*	2N4171	80RIA20*	EC103E3	S4003LS1	ST180C14C0*	ST280C02C0*
25RIA140*	2N5060	80RIA40*	EC103M	S4003LS2	ST180C16C0*	ST280C04C0*
25RIA160*	2N5061	80RIA60*	EC103M1	S4003LS3	ST180C18C0*	ST280C06C0*
25RIA20*	2N5062	80RIA80*	EC103M2	S6003LS1	ST180C20C0*	ST280CH02C0*
25RIA40*	2N5063	80RKI10*	EC103M3	S6003LS2	ST180S02P0V*	ST280CH04C0*
25RIA60*	2N5064	80RKI100*	EC113A	S6003LS3	ST180S04P0V*	ST280CH06C0*
25RIA80*	2N5204*	80RKI120*	EC113A3	SCR	ST180S06P0V*	ST280S02P0V*
2N1792*	2N5205*	80RKI20*	EC113B	ST110C02C0*	ST180S08P0V*	ST280S04P0V*
2N1793*	2N5206*	80RKI40*	EC113B3	ST110C04C0*	ST180S10P0V*	ST280S06P0V*

ST300C02C0*	ST300C20C0*	ST330C02L0*	ST330S08P0*	ST700C16L0*	T106C1
ST300C02L0*	ST300C20L0*	ST330C04C0*	ST330S10P0*	ST700C18L0*	T106D1
ST300C04C0*	ST300S02P0*	ST330C04L0*	ST330S12P0*	ST700C20L0*	T106E1
ST300C04L0*	ST300S04P0*	ST330C06C0*	ST330S14P0*	ST700C22L0*	T106F1
ST300C06C0*	ST300S06P0*	ST330C06L0*	ST330S16P0*	ST730C04L0*	T106M1
ST300C06L0*	ST300S08P0*	ST330C08C0*	ST380C02C0*	ST730C06L0*	T107A1
ST300C08C0*	ST300S10P0*	ST330C08L0*	ST380C04C0*	ST730C08L0*	T107B1
ST300C08L0*	ST300S12P0*	ST330C10C0*	ST380C06C0*	ST730C10L0*	T107C1
ST300C10C0*	ST300S14P0*	ST330C10L0*	ST380CH02C0*	ST730C12L0*	T107D1
ST300C10L0*	ST300S16P0*	ST330C12C0*	ST380CH04C0*	ST730C14L0*	T107E1
ST300C12C0*	ST300S18P0*	ST330C12L0*	ST380CH06C0*	ST730C16L0*	T107F1
ST300C12L0*	ST300S20P0*	ST330C14C0*	ST700C04L0*	ST730C18L0*	T107M1
ST300C14C0*	ST3230C10R0*	ST330C14L0*	ST700C06L0*	ST780C02L0*	TCR22-2
ST300C14L0*	ST3230C12R0*	ST330C16C0*	ST700C08L0*	ST780C04L0*	TCR22-3
ST300C16C0*	ST3230C14R0*	ST330C16L0*	ST700C10L0*	ST780C06L0*	TCR22-4
ST300C16L0*	ST3230C16R0*	ST330S02P0*	ST700C12L0*	T106A1	TCR22-6
ST300C18C0*	ST3230C18R0*	ST330S04P0*	ST700C14L0*	T106B1	TCR22-8
ST300C18L0*	ST330C02C0*	ST330S06P0*			

## Triacs

(54 Devices)

MAC15A6	Q2006L4	Q4004L4	Q5004L3	Q5025R5	Q601E4	Q7025R5
MAC15A8	Q2008L4	Q4006L4	Q5004L4	Q6004L3	Q6025R5	Q8004L4
MAC210-10	Q2010L5	Q4008L4	Q5006L4	Q6004L4	Q7004L4	Q8006L5
MAC210-4	Q2015L5	Q4010L5	Q5008L4	Q6006L5	Q7006L5	Q8008L5
MAC210-6	Q201E3	Q4015L5	Q5010L5	Q6008L5	Q7008L5	Q8010L5
MAC210-8	Q201E4	Q401E3	Q5015L5	Q6010L5	Q7010L5	Q8015L5
Q2004L3	Q2025R5	Q401E4	Q501E3	Q6015L5	Q7015L5	Q8025R5
Q2004L4	Q4004L3	Q4025R5	Q501E4	Q601E3		

## Junction Field-Effect Transistors

(167 Devices)

2N2608	2N3970*	2N4381*	2N5047*	2N5516*	2N5909*	J410*
2N2609*	2N3971*	2N4391*	2N5078*	2N5517*	2N5911*	J411*
2N3370*	2N3972*	2N4392*	2N5103*	2N5518*	2N5912*	J412*
2N3458*	2N4084*	2N4393	2N5105*	2N5519*	2N6483*	MPP3821*
2N3459*	2N4091*	2N4416	2N5114*	2N5520*	2N6484*	MPP3822*
2N3684*	2N4092*	2N4416A*	2N5115*	2N5521*	2N6485*	NDF9406*
2N3685*	2N4093*	2N4856*	2N5116*	2N5522*	BF244A	NDF9407*
2N3686*	2N4117*	2N4856A*	2N5196*	2N5523*	BF244B	NDF9409*
2N3687*	2N4117A*	2N4857*	2N5197*	2N5524*	BF244C	NDF9410*
2N3821*	2N4118*	2N4857A*	2N5199*	2N5545*	BF245*	NJFET
2N3822*	2N4118A*	2N4858*	2N5358*	2N5556*	BF245A*	PJFET
2N3823*	2N4119*	2N4858A*	2N5397*	2N5557*	BF245B*	U257*
2N3824*	2N4119A*	2N4859*	2N5398*	2N5558*	BF245C*	U308*
2N3921*	2N4220*	2N4859A*	2N5432*	2N5565*	BF246A*	U309*
2N3922*	2N4220A*	2N4860*	2N5433*	2N5566*	BF246B*	U310*
2N3954*	2N4221*	2N4860A*	2N5434*	2N5640	BF247B*	U401*
2N3954A*	2N4221A*	2N4861*	2N5452*	2N5668	BF256B*	U402*
2N3955*	2N4222*	2N4861A*	2N5454*	2N5669	BF256C*	U403*
2N3955A*	2N4222A*	2N5018*	2N5457	2N5670	J401*	U404*
2N3956*	2N4223*	2N5019*	2N5459	2N5902*	J402*	U405*
2N3957*	2N4338*	2N5020*	2N5460	2N5904*	J403*	U406*
2N3958*	2N4339*	2N5021*	2N5484	2N5905*	J404*	U440*
2N3966*	2N4340*	2N5045*	2N5486	2N5906*	J405*	U441*
2N3967*	2N4341*	2N5046*	2N5515*	2N5907*	J406*	

## IGBTs

(65 Devices)

ECG3300	ECG3322*	IRGB440U	IRGBC40U	IRGMC50F*	IRGPC50K	IRGPH40M
ECG3300*	ECG3323*	IRGBC20F	IRGBF20F	IRGMC50U*	IRGPC50M	IRGPH50M
ECG3301*	IRGAC30F*	IRGBC20S	IRGBF30F	IRGP420U	IRGPC50S	IRGPH50U
ECG3302*	IRGAC30U*	IRGBC20U	IRGBH50F	IRGP430U	IRGPC50U	IRGVH50F*
ECG3303*	IRGAC40F*	IRGBC30F	IRGIH50F*	IRGP440U	IRGPP20F	MGW12N120
ECG3310*	IRGAC40U*	IRGBC30S	IRGMC30F*	IRGPC40F	IRGPP30F	MGW20N120
ECG3311*	IRGAC50F*	IRGBC30U	IRGMC30U*	IRGPC40S	IRGPP40F	MGW30N60
ECG3312*	IRGAC50U*	IRGBC40F	IRGMC40F*	IRGPC40U	IRGPP50F	MGY25N120
ECG3320*	IRGB420U	IRGBC40S	IRGMC40U*	IRGPC50F	IRGPH40F	MGY40N60
ECG3321*	IRGB430U					PIGBT

## MOSFETs (N-Channel)

(682 Devices)

2N3796	IRF451*	IRF7201	IRFD313*	IRFI634G	IRFK3D450	IRFP253*
2N3797	IRF452*	IRF7205	IRFD320	IRFI640G	IRFK3DC50	IRFP254
2N4351	IRF453*	IRF721*	IRFD321*	IRFI644G	IRFK3F150	IRFP260
IRF1010	IRF510	IRF722*	IRFD322*	IRFI720G	IRFK3F250	IRFP264
IRF1010S	IRF510S	IRF723*	IRFD323*	IRFI730G	IRFK3F350	IRFP340
IRF120*	IRF511*	IRF730	IRFD420	IRFI734G	IRFK3F450	IRFP344
IRF121*	IRF512*	IRF730S	IRFD620	IRFI740G	IRFK3FC50	IRFP350
IRF122*	IRF513*	IRF731*	IRFDC10LC	IRFI744G	IRFK4H054	IRFP350LC
IRF123*	IRF520	IRF732*	IRFF110*	IRFI820G	IRFK4H150	IRFP351*
IRF130*	IRF520S	IRF733*	IRFF111*	IRFI830G	IRFK4H250	IRFP352*
IRF131*	IRF521*	IRF734	IRFF112*	IRFI840G	IRFK4H350	IRFP353*
IRF1310	IRF522*	IRF740	IRFF113*	IRFIBC20G	IRFK4H450	IRFP354
IRF1310S	IRF523*	IRF740LC	IRFF120*	IRFIBC30G	IRFK4HC50	IRFP360
IRF132*	IRF530	IRF740S	IRFF121*	IRFIBC40G	IRFK4HE50	IRFP360LC
IRF133*	IRF530S	IRF744	IRFF122*	IRFIBC40GLC	IRFK4J054	IRFP362*
IRF150*	IRF540	IRF820	IRFF123*	IRFIBB20G	IRFK4J150	IRFP440
IRF151*	IRF540S	IRF820S	IRFF130*	IRFIBB30G	IRFK4J250	IRFP448
IRF152*	IRF541*	IRF821*	IRFF131*	IRFIBF20G	IRFK4J350	IRFP450
IRF153*	IRF542*	IRF822*	IRFF132*	IRFIBF30G	IRFK4J450	IRFP450LC
IRF1740GLC	IRF543*	IRF823*	IRFF133*	IRFIP044	IRFK4JC50	IRFP451*
IRF1840GLC	IRF610	IRF830	IRFF210*	IRFIP054	IRFK4JE50	IRFP452*
IRF220*	IRF610S	IRF830S	IRFF211*	IRFIP140	IRFK6H054	IRFP453*
IRF221*	IRF611*	IRF840	IRFF212*	IRFIP150	IRFK6H150	IRFP460
IRF222*	IRF612*	IRF840LC	IRFF213*	IRFIP240	IRFK6H250	IRFP460LC
IRF223*	IRF613*	IRF840S	IRFF220*	IRFIP244	IRFK6H350	IRFP462*
IRF230*	IRF614	IRFAC40*	IRFF221*	IRFIP250	IRFK6H450	IRFPC30
IRF231*	IRF614S	IRFAC42*	IRFF222*	IRFIP254	IRFK6HC50	IRFPC40
IRF232*	IRF620	IRFBC10LC	IRFF223*	IRFIP340	IRFK6J054	IRFPC48
IRF233*	IRF620S	IRFBC20	IRFF230*	IRFIP350	IRFK6J150	IRFPC50
IRF234*	IRF621*	IRFBC30	IRFF231*	IRFIP440	IRFK6J250	IRFPC50LC
IRF235*	IRF622*	IRFBC40	IRFF232*	IRFIP448	IRFK6J350	IRFPC60LC
IRF236*	IRF623*	IRFBC40LC	IRFF233*	IRFIP450	IRFK6J450	IRFPE30
IRF237*	IRF624	IRFBC42*	IRFF230*	IRFIZ14G	IRFK6JC50	IRFPE40
IRF244*	IRF624S	IRFBE20	IRFF321*	IRFIZ24G	IRFL014	IRFPE50
IRF245*	IRF630	IRFBE30	IRFF322*	IRFIZ34G	IRFL110	IRFPF30
IRF246*	IRF630S	IRFBF20	IRFF323*	IRFIZ44G	IRFL210	IRFPF40
IRF247*	IRF634	IRFBF30	IRFF420*	IRFIZ48G	IRFL214	IRFPF50
IRF320*	IRF634S	IRFBG20	IRFF421*	IRFK20350	IRFP044	IRFPG30
IRF321*	IRF640	IRFBG30	IRFF422*	IRFK20450	IRFP048	IRFPG40
IRF322*	IRF640S	IRFD014	IRFF423*	IRFK2D054	IRFP054	IRFPG42*
IRF323*	IRF641*	IRFD024	IRFF430*	IRFK2D150	IRFP064	IRFPG50
IRF330*	IRF642*	IRFD110	IRFF431*	IRFK2D250	IRFP140	IRFPG60
IRF331*	IRF643*	IRFD120	IRFF432*	IRFK2DC50	IRFP141*	IRFR014
IRF332*	IRF644	IRFD1Z0	IRFF433*	IRFK2DE50	IRFP142*	IRFR024
IRF333*	IRF644S	IRFD210	IRFI1010G	IRFK2F054	IRFP143*	IRFR110
IRF420*	IRF645*	IRFD214	IRFI1310G	IRFK2F150	IRFP150	IRFR120
IRF421*	IRF646*	IRFD220	IRFI510G	IRFK2F250	IRFP240	IRFR210
IRF422*	IRF647*	IRFD221*	IRFI520G	IRFK2F350	IRFP241*	IRFR214
IRF423*	IRF710	IRFD222*	IRFI530G	IRFK2F450	IRFP242*	IRFR220
IRF430*	IRF7101	IRFD223*	IRFI540G	IRFK2FC50	IRFP243*	IRFR221*
IRF431*	IRF7102	IRFD224	IRFI614G	IRFK2FE50	IRFP244	IRFR222*
IRF432*	IRF7103	IRFD310	IRFI620G	IRFK3D150	IRFP254	IRFR224
IRF433*	IRF710S	IRFD311*	IRFI624G	IRFK3D250	IRFP251*	IRFR310
IRF450*	IRF720	IRFD312*	IRFI630G	IRFK3D350	IRFP252*	IRFR320

IRFR321*	IRL510S	IRLZ44	MTD1N80E	MTP35N06ZL	MTY14N100E	RFF70N06*
IRFR322*	IRL520	IRLZ44S	MTD20N03HDL	MTP36N06V	MTY16N80E	RFG40N10*
IRFR410*	IRL520S	MMDF1N05E	MTD20N06HD	MTP3N100E	MTY20N50E	RFG45N06*
IRFR420	IRL530	MMDF2N02E	MTD20N06HDL	MTP3N120E	MTY25N60E	RFG50N06*
IRFR421*	IRL530S	MMDF3N02HD	MTD20N06V	MTP3N50E	MTY30N50E	RFG70N06*
IRFR422*	IRL540	MMDF3N03HD	MTD2N40E	MTP3N60E	MTY55N20E	RFK70N06*
IRFR420	IRL540S	MMDF4N01HD	MTD2N50E	MTP4N40E	NMOS	RFL1N12*
IRFS1Z0	IRL620S	MMFT1N10E	MTD3055V	MTP4N50E	RF1S22N10*	RFL1N15*
IRFU014	IRL630S	MMFT2N02EL	MTD3055VL	MTP4N80E	RF1S22N10SM*	RFL1N18*
IRFU024	IRL640S	MMFT3055V	MTD3N25E	MTP52N06V	RF1S25N06*	RFL1N20*
IRFU110	IRL9705S	MMFT3055VL	MTD4N20E	MTP52N06VL	RF1S25N06SM*	RFL2N05*
IRFU120	IRLD014	MMSF5N02HD	MTD5N25E	MTP55N06Z	RF1S40N10*	RFL2N06*
IRFU210	IRLD024	MMSF5N03HD	MTD6N10E	MTP5N40E	RF1S40N10SM*	RFP14N05*
IRFU214	IRLD110	MMSF7N03HD	MTD6N15	MTP60N06HD	RF1S42N03*	RFP14N06*
IRFU220	IRLD120	MP15N06E	MTD6N20E	MTP6N60E	RF1S42N03L*	RFP22N10*
IRFU221*	IRLI2203G	MTB10N40E	MTD9N10E	MTP75N03HDL	RF1S42N03LSM*	RFP25N05*
IRFU222*	IRLI3705G	MTB15N06V	MTDF1N02HD	MTP75N05HD	RF1S42N03SM*	RFP25N06*
IRFU224	IRLI520G	MTB16N25E	MTDF1N03HD	MTP75N06HD	RF1S45N02L*	RFP3055*
IRFU310	IRLI530G	MTB1N100E	MTE125N20E	MTP7N20E	RF1S45N02LSM*	RFP40N10*
IRFU320	IRLI540G	MTB20N20E	MTE215N10E	MTP8N50E	RF1S45N06*	RFP42N03*
IRFU321*	IRLI620G	MTB2N40E	MTE30N50E	MTP9N25E	RF1S45N06SM*	RFP42N03L*
IRFU322*	IRLI630G	MTB2N60E	MTE53N50E	MTSF3N02HD	RF1S50N06*	RFP45N02L*
IRFU410*	IRLI640G	MTB30N06VL	MTP10N10E	MTSF3N03HD	RF1S50N06SM*	RFP45N06*
IRFU420	IRLIZ14G	MTB33N10E	MTP10N10EL	MTV10N100E	RF1S540*	RFP50N06*
IRFU421*	IRLIZ24G	MTB35N06ZL	MTP10N40E	MTV16N50E	RF1S540SM*	RFP70N03*
IRFU422*	IRLIZ34G	MTB36N06V	MTP12N10E	MTV20N50E	RF1S640*	RFP70N06*
IRFUC20	IRLIZ44G	MTB3N100E	MTP15N06V	MTV25N50E	RF1S640SM*	SI3442DY
IRFZ14	IRLL014	MTB3N120E	MTP15N06VL	MTV32N20E	RF1S644*	SI4420DV
IRFZ14S	IRLL110	MTB4N80E	MTP16N25E	MTV32N25E	RF1S644SM*	SI4450DY
IRFZ20	IRLR014	MTB52N06V	MTP1N100E	MTV6N100E	RF1S70N03*	SI4480DY
IRFZ24	IRLR024	MTB52N06VL	MTP1N50E	MTW10N100E	RF1S70N03SM*	SI4946EY
IRFZ24S	IRLR110	MTB55N06Z	MTP1N60E	MTW14N50E	RF1S70N06*	SI4980DY
IRFZ34	IRLR120	MTB60N06HD	MTP1N80E	MTW16N40E	RF1S70N06SM*	SI6331DQ
IRFZ34S	IRLS020	MTB6N60E	MTP20N06V	MTW20N50E	RFD14N05*	SI6434DQ
IRFZ44	IRLU014	MTB75N03HDL	MTP20N20E	MTW24N40E	RFD14N05SM*	SI6802DQ
IRFZ44S	IRLU024	MTB75N05HD	MTP27N10E	MTW32N20E	RFD14N06*	SI6925DQ
IRFZ46	IRLU110	MTB8N50E	MTP2N40E	MTW32N25E	RFD14N06SM*	SI6926DQ
IRFZ46S	IRLU120	MTB9N25E	MTP2N50E	MTW35N15E	RFD16N05*	SI6954DQ
IRFZ48	IRLZ14	MTD10N10EL	MTP2N60E	MTW45N10E	RFD16N05SM*	SI9426DY
IRFZ48S	IRLZ14S	MTD12N06EZL	MTP3055V	MTW6N100E	RFD16N06*	SI9802DY
IRL2203	IRLZ24	MTD15N06V	MTP3055VL	MTW7N80E	RFD16N06SM*	SI9804DY
IRL2203S	IRLZ24S	MTD15N06VL	MTP30N06VL	MTW8N60E	RFD3055*	SI9925DY
IRL3705	IRLZ34	MTD1N50E	MTP33N10E	MTY100N10E	RFD3055SM*	SI9926DY
IRL510	IRLZ34S	MTD1N60E				

## MOSFETs (P-Channel)

(166 Devices)

IRF7104	IRF9530S	IRF9Z34	IRFP9241*	MMSF3P02HD	RF1S30P05*	RFG60P03*
IRF7202	IRF9531*	IRF9Z34S	IRFP9242*	MMSF3P03HD	RF1S30P05SM*	RFG60P05E*
IRF7203	IRF9532*	IRFD9014	IRFP9243*	MMSF4P01HD	RF1S30P06*	RFG60P06E*
IRF7204	IRF9533*	IRFD9024	IRFR9014	MTB23P06V	RF1S30P06SM*	RFP15P05*
IRF7205	IRF9540	IRFD9110	IRFR9024	MTB2P50E	RF1S60P03*	RFP15P06*
IRF9140*	IRF9540S	IRFD9113*	IRFR9110	MTB30P06V	RF1S60P03SM*	RFP30P05*
IRF9141*	IRF9541*	IRFD9120	IRFR9120	MTB50P03HDL	RF1S9530*	RFP30P06*
IRF9142*	IRF9542*	IRFD9210	IRFR9210	MTD1P50E	RF1S9530SM*	RFP60P03*
IRF9143*	IRF9543*	IRFD9220	IRFR9220	MTD20P03HDL	RF1S9540	RFP8P06E*
IRF9230*	IRF9610	IRFI9520G	IRFU9014	MTD20P06HDL	RF1S9540SM*	RFP8P06LE*
IRF9231*	IRF9610S	IRFI9530G	IRFU9024	MTD2955V	RF1S9640*	RFT1P06E*
IRF9232*	IRF9620	IRFI9540G	IRFU9110*	MTD5P06V	RF1S9640SM*	SI3455DV
IRF9233*	IRF9620S	IRFI9620G	IRFU9110*	MTD6P10E	RF1S95P05*	SI3457DV
IRF9240*	IRF9630	IRFI9630G	IRFU9120*	MTP12P10	RFD15P05SM*	SI4425DY
IRF9241*	IRF9630S	IRFI9640G	IRFU9120*	MTP23P06V	RF1S95P06*	SI4925DY
IRF9242*	IRF9640	IRFI9Z14G	IRFU9210	MTP2955V	RFD15P06SM*	SI4948EY
IRF9243*	IRF9640S	IRFI9Z24G	IRFU9220*	MTP2P50E	RFD8P06E*	SI6332DQ
IRF9510	IRF9641*	IRFI9Z34G	IRFU9220*	MTP30P06V	RFD8P06ESM*	SI6415DQ
IRF9510S	IRF9642*	IRFIP9140	MMDF2P01HD	MTP50P03HDL	RFD8P06LE*	SI6459DQ
IRF9511*	IRF9643*	IRFIP9240	MMDF2P02E	MTP5P06V	RFD8P06LES*	SI6933DQ
IRF9512*	IRF9Z14	IRFL9014	MMDF2P02HD	MTP6P20E	RFP60P06*	SI9424DY
IRF9513*	IRF9Z14S	IRFL9110	MMDF2P03HD	MTSF1P02HD	RFG30P05*	SI9803DY
IRF9520	IRF9Z24	IRFP9140	MMFT2955E	MTSF2P02HD	RFG30P06*	SI9934DY
IRF9520S	IRF9Z24S	IRFP9240	MMSF2P02E	PMOS		

## Operational Amplifiers

(46 Devices)

LF347	LM324	OPAMP5	TL052	TL070	TL081	TL088
LF351	LM348	TL022C	TL054	TL071	TL082	TL321
LF353	LM358	TL031	TL060	TL072	TL083	TL322
LF411C	LM3900	TL032	TL061	TL074	TL084	UA741
LF412C	MC1458	TL034	TL062	TL075	TL085	UA747
LM2902	MC3403	TL044C	TL064	TL080	TL087	UA748
LM307	NE5534	TL051	TL066			

## Voltage Comparators

(5 Devices)

LM111	LP111	LP211	LM339	SWCOMP
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## Crystals

(103 Devices)

1.000MHZ	6.144MHZ	ECS-200-20-1	ECS-35-17-1	ECS-42-12-1	ECS-60-32-1
1.8432MHZ	8.000MHZ	ECS-200-20-4	ECS-35-17-4	ECS-42-12-4	ECS-60-32-4
10.000MHZ	ECS.3271213	ECS-200-20-7	ECS-35-17-7	ECS-44-20-1	ECS-61-32-1
11.000MHZ	ECS.327814	ECS-20-20-1	ECS-35-2	ECS-44-20-4	ECS-61-32-4
12.000MHZ	ECS-10-13-1	ECS-20-20-2	ECS36.4322P	ECS-44-20-7	ECS-61-32-7
15.000MHZ	ECS-10-13-2	ECS-21-32-2	ECS-36-18-1	ECS-44-32-2P	ECS-65-12-1
16.000MHZ	ECS-10-8-14	ECS-240-16-4	ECS-36-18-4	ECS-49-20-1	ECS-65-20-4
2.000MHZ	ECS110.5201	ECS-240-16-7	ECS-36-20-7	ECS-49-20-4	ECS-73-20-1
2.4576MHZ	ECS110.5204	ECS-240-20-1	ECS-37-32-2P	ECS-49-20-7	ECS-73-20-4
20.000MHZ	ECS110.5207	ECS-240-20-4	ECS38.59202	ECS498.6201	ECS76.8201
24.000MHZ	ECS-120-32-1	ECS-240-20-7	ECS-39-17-1	ECS-50-20-1	ECS-80-20-1
3.000MHZ	ECS129.6184	ECS-24-32-1	ECS-3X8	ECS-50-20-4	ECS98.3201
3.2768MHZ	ECS-153-20-4	ECS-24-32-2	ECS40.3201	ECS-51-20-1	ECS98.3207
3.5795MHZ	ECS162.5204	ECS25.6322P	ECS-40-20-1	ECS-51-20-4	R145-32.768
3.6864MHZ	ECS-18-13-1	ECS-29.4322P	ECS-40-20-4	ECS-52-32-1	R26-32.768
4.000MHZ	ECS-18-13-2	ECS-30-32-2	ECS-40-20-7	ECS-52-32-4	R38-32.768
5.000MHZ	ECS196.6201	ECS-32-17-1	ECS-41-20-1	ECS59.9201	RSM200S32.76
6.000MHZ					

## Vacuum Tubes

(7 Devices)

12AU7	12AX7	5879	6L6GC	6SN7	7199P	7199T
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## Transformers

(11 Devices)

10to1	1to1	1to1CT	1to5	2to1CT	5to1	5to1CT
10to1CT	1to10	1to2	2to1			

## Math Functions

(63 Devices)

ABSI	ADDI	ATANHI	COSI	LNI	SINHI	SUBI
ABSV	ADDV	ATANHV	COSV	LNv	SINHV	SUBV
ABSVR	ADDVR	ATANHVR	COSVR	LNVR	SINHVR	SUBVR
ACOSHI	ASINHI	ATANI	DIVI	LOGI	SINI	TANI
ACOSHV	ASINHV	ATANV	DIVV	LOGV	SINV	TANV
ACOSHVR	ASINHVR	ATANVR	DIVVR	LOGVR	SINVR	TANVR
ACOSI	ASINI	COSHI	EXPI	MULTI	SQRTI	UNARYI
ACOSV	ASINV	COSHV	EXPV	MULTV	SQRTV	UNARYV
ACOSVR	ASINVR	COSHVR	EXPVR	MULTVR	SQRTVR	UNARYVR

## Relay Coils/Contacts

(9 Devices)

120VCOIL	12VCOIL	24VCOIL	24VSPDT	5VCOIL	5VSPDT	NORMAL
120VSPDT	12VSPDT					

## Misc. Analog Devices

(17 Devices)

2N2646	556	MC1496	PLL5K	SINVCO	TL431	UA555
2N6027	CAP	PLL100K	RESISTOR	SQRVCO	TRIVCO	UA556
555	FCVS	PLL10K				

## 7400-series TTL

(9 Devices)

7406	7425	7439	7445	74147	74148	74199
7407	7428					

## FAST

(92 Devices)

74F00	74F37	74F125x4	74F157	74F174	74F242	74F273
74F02	74F40	74F126	74F157A	74F175	74F243	74F280A
74F04	74F74	74F126x4	74F158	74F181	74F244	74F280B
74F06	74F83	74F132	74F158A	74F182	74F245	74F283
74F07	74F85	74F133	74F160	74F190	74F251	74F298
74F08	74F86	74F138	74F161	74F191	74F251A	74F352
74F10	74F109	74F139	74F162	74F192	74F253	74F353
74F11	74F109x2	74F139x2	74F163	74F193	74F256	74F373
74F13	74F112	74F148	74F164	74F194	74F257	74F374
74F14	74F112x2	74F151	74F166	74F195	74F257A	74F377
74F20	74F113	74F151A	74F168	74F199	74F258	74F378
74F27	74F113x2	74F153	74F169	74F240	74F258A	74F568
74F30	74F125	74F154	74F173	74F241	74F259	74F569
74F32						

## Low-power Schottky TTL

(125 Devices)

74LS00	74LS27	74LS76x2	74LS136	74LS165	74LS242	74LS352
74LS01	74LS30	74LS83A	74LS138	74LS166	74LS243	74LS353
74LS02	74LS32	74LS85	74LS139	74LS168A	74LS244	74LS373
74LS04	74LS33	74LS86	74LS139x2	74LS169A	74LS245	74LS374
74LS05	74LS37	74LS90	74LS147	74LS173	74LS247	74LS375
74LS08	74LS38	74LS92	74LS148	74LS174	74LS248	74LS377
74LS09	74LS40	74LS93	74LS151	74LS175	74LS249	74LS378
74LS10	74LS42	74LS95	74LS153	74LS181	74LS251	74LS568
74LS11	74LS47	74LS96	74LS154	74LS190	74LS253	74LS569
74LS12	74LS48	74LS109	74LS155	74LS191	74LS256	buffer3s
74LS13	74LS73	74LS109x2	74LS156	74LS192	74LS257	bufffa3s
74LS14	74LS73A	74LS112	74LS157	74LS193	74LS258	lssrfff
74LS15	74LS73x2	74LS112x2	74LS158	74LS194	74LS259	lsqdff
74LS20	74LS74	74LS113	74LS160A	74LS195	74LS266	lsdff
74LS21	74LS74x2	74LS113x2	74LS161A	74LS197	74LS273	lsram1k
74LS22	74LS75	74LS125	74LS162A	74LS199	74LS280	lsprom32
74LS25	74LS76	74LS126x4	74LS163A	74LS240	74LS283	quad3sta
74LS26	74LS76A	74LS132	74LS164	74LS241	74LS298	



## Schottky TTL

(3 Devices)

74S133      74S182      74S280

## 4000-series CMOS

(71 Devices)

4000	4015	4025	4042	4072	4086	4514	4531
4001	4017	4027	4043	4073	4093	4515	4532
4002	4018	4028	4044	4075	4094	4516	4539
4006	4019	4029	4049	4076	4502	4517	4543
4008	4020	4030	4050	4077	4505	4518	4555
4011	4021	4031	4068	4078	4508	4519	4556
4012	4022	4035	4069	4081	4510	4520x2	4585
4013	4023	4040	4070	4082	4511	4522	4731
4014	4024	4041	4071	4085	4512	4526	

## Voltage Regulators

(5 Devices)

78L05      78L08      78L12      78L15      LM317

## Voltage Controlled Switches

(7 Devices)

STTL      SW05      SWM10      SWP10      TRIAC      TTL      XTTL

## Fuses

(11 Devices)

100mA	10mA	1mA	250mA	500mA	50mA	5A
10A	1A	2.5A	25mA			

## XSpice Code Models

(16 Devices)

CLIMIT	DDT	HYSTERESIS	INT	ONESHOT	SLEWRATE	SXFER
CMETER	DIVIDE	ILIMIT	MULT	PWL	SUM	XFMR
CORE	GAIN					

## XSpice LCouple Models

(8 Devices)

100TURN	15TURN	1TURN	20TURN	310TURN	50TURN	5TURN
10TURN						

# Vendor Supplied SPICE Models

The SPICE models listed on the following pages are for use in CircuitMaker's Analog simulation mode. The models in this section were originally supplied by various hardware vendors. In some cases, the models have been modified slightly to conform to the standard Berkeley SPICE format.

## Analog Devices

(543 Devices)

AD1580	AD630S	AD713T	AD8012AN	AD840J	ADG411B
AD22050N	AD633	AD734	AD8023AN	AD840K	ADG411T
AD22050T	AD633J	AD734A	AD8031A	AD840S	ADG412
AD22057N	AD645	AD734B	AD8036an	AD844	ADG412B
AD22057T	AD645A	AD734S	AD8041A	AD844/AD	ADG412T
AD581	AD645B	AD743	AD8047	AD844A	ADG413
AD581J	AD645J	AD743A	AD8051_5	AD844A/AD	ADG413B
AD581K	AD645K	AD743B	AD8055AN	AD844B	ADG413T
AD581L	AD645S	AD743J	AD8072AN	AD844B/AD	ADG441
AD581S	AD680	AD743K	AD810	AD844S	ADG441B
AD581T	AD680A	AD743S	AD810/AD	AD844S/AD	ADG441BS
AD581U	AD680J	AD744	AD810A	AD845	ADG441S
AD584	AD680JT	AD744A	AD810A/AD	AD845A	ADG441T
AD584J	AD704	AD744B	AD811	AD845B	ADG441TS
AD584K	AD704A	AD744C	AD812	AD845J	ADG442
AD584L	AD704B	AD744J	AD812A	AD845K	ADG442B
AD584S	AD704K	AD744K	AD813	AD845S	ADG442BS
AD584T	AD704T	AD744S	AD813/AD	AD846	ADG442S
AD587	AD705	AD744T	AD813A	AD846/AD	ADG444
AD587J	AD705/AD	AD745	AD813A/AD	AD846A	ADG444B
AD587K	AD705A	AD745A	AD815AN	AD846A/AD	ADG444BS
AD587L	AD705A/AD	AD745B	AD816an	AD846B	ADG444S
AD587S	AD705J	AD745J	AD817	AD846B/AD	ADG511
AD587T	AD705J/AD	AD745K	AD817A	AD846S	ADG511_3
AD587U	AD705T	AD745S	AD818	AD846S/AD	ADG511_5
AD588	AD705T/AD	AD746	AD818A	AD847	AMP01
AD588A	AD706	AD746A	AD820	AD847A	AMP02
AD588B	AD706A	AD746B	AD820A	AD847J	AMP04
AD588J	AD706B	AD746J	AD820B	AD848	AMP04E
AD588K	AD706J	AD746S	AD822	AD848A	AMP04F
AD588S	AD706K	AD780	AD822A	AD848J	BUF04
AD588T	AD706T	AD780A	AD822S	AD848S	MAT02
AD600	AD711	AD780B	AD823A	AD8531	MAT03
AD600J	AD711A	AD780S	AD823AN	AD8532_5	MAT04
AD602	AD711B	AD795	AD824	AD8534	MLT04
AD602J	AD711C	AD795J	AD824A	AD8561	MLT04G
AD603	AD711J	AD795K	AD824B	AD9617	OP113
AD603A	AD711K	AD797	AD824	AD9618	OP162
AD620	AD711S	AD797/AD	AD826	AD9631AN	OP176
AD620A	AD711T	AD797A	AD826A	AD9632AN	OP176G
AD620B	AD712	AD797A/AD	AD828	ADG406	OP177
AD620S	AD712A	AD797B	AD829	ADG406B	OP177A
AD624	AD712B	AD797B/AD	AD829/AD	ADG407	OP177B
AD624A	AD712C	AD797S	AD829A	ADG407B	OP177E
AD624B	AD712J	AD797S/AD	AD829A/AD	ADG408	OP177F
AD624C	AD712K	AD8001A	AD829J	ADG408B	OP177G
AD624S	AD712S	AD8001AN	AD829J/AD	ADG408T	OP181
AD626	AD712T	AD8001AR	AD829S	ADG508F	OP183G
AD626B	AD713	AD8002A	AD829S/AD	ADG508FB	OP184
AD630	AD713A	AD8002AN	AD830	ADG508FT	OP186
AD630A	AD713B	AD8002AR	AD830A	ADG528F	OP191
AD630B	AD713J	AD8004AN	AD830J	ADG528FB	OP191G
AD630J	AD713K	AD8009AN	AD830S	ADG528FT	OP193
AD630K	AD713S	AD8011AN	AD840	ADG411	OP193E

OP193F	OP221E	OP284F	OP37C/AD	OP42E	OP495A	OP97A/AD	REF192G
OP196	OP221G	OP285	OP37E/AD	OP42F	OP495G	OP97E/AD	REF193
OP196G	OP249	OP285G	OP37F/AD	OP42G	OP496	OP97F/AD	REF193G
OP200	OP249A	OP290	OP37G/AD	OP450	OP496G	PM1012	REF194
OP200A	OP249E	OP290A	OP400	OP462	OP497	REF01	REF194E
OP200E	OP249F	OP290E	OP400A	OP467	OP497A	REF01A	REF194F
OP200F	OP249G	OP290F	OP400E	OP467G	OP497B	REF01C	REF194G
OP200G	OP250	OP290G	OP400F	OP470	OP497C	REF01E	REF195
OP213	OP260	OP291	OP400G	OP481	OP497F	REF01H	REF195E
OP213E	OP262	OP291G	OP400H	OP482	OP497G	REF02	REF195F
OP213F	OP27/AD	OP292	OP413	OP482G	OP77	REF02A	REF195G
OP215/AD	OP275	OP292G	OP413E	OP484	OP77A	REF02C	REF196
OP215A/AD	OP275G	OP293	OP413F	OP484E	OP77B	REF02E	REF196G
OP215B/AD	OP279	OP293E	OP42	OP484F	OP77E	REF02H	REF198
OP215C/AD	OP279G	OP293F	OP420	OP490	OP77F	REF05	REF198E
OP215E/AD	OP27A/AD	OP295	OP420B	OP490A	OP77G	REF05A	REF198F
OP215F/AD	OP27B/AD	OP295A	OP420C	OP490E	OP80	REF05B	REF198G
OP215G/AD	OP27C/AD	OP295G	OP420F	OP490F	OP80B	REF10	REF43
OP220	OP27E/AD	OP296	OP420G	OP490G	OP80E	REF10A	REF43B
OP220A	OP27F/AD	OP296G	OP420H	OP491	OP80F	REF10B	REF43F
OP220C	OP27G/AD	OP297	OP421	OP491G	OP80G	REF191	REF43G
OP220E	OP281	OP297A	OP421B	OP492	OP90	REF191E	SSM2131
OP220F	OP282	OP297E	OP421C	OP492G	OP90A	REF191F	SSM2135
OP220G	OP282G	OP297F	OP421F	OP493	OP90E	REF191G	SSM2135P
OP221	OP283	OP297G	OP421G	OP493E	OP90F	REF192	SSM2210
OP221A	OP283G	OP37/AD	OP421H	OP493F	OP90G	REF192E	SSM2220
OP221B	OP284	OP37A/AD	OP42A	OP495	OP97/AD	REF192F	SSM2275
OP221C	OP284E	OP37B/AD					

## Comlinear

(26 Devices)

CLC109	CLC404	CLC409	CLC414	CLC425	CLC430	CLC449	CLC505
CLC111	CLC405	CLC410	CLC415	CLC426	CLC432	CLC501	CLC522
CLC400	CLC406	CLC412	CLC420	CLC428	CLC440	CLC502	CLC532
CLC402	CLC407						

## Élantec

(47 Devices)

EL2020/EL	EL2041/EL	EL2075/EL	EL2176/EL	EL2224/EL	EL2360/EL	EL2460/EL
EL2028/EL	EL2044/EL	EL2099/EL	EL2180/EL	EL2232/EL	EL2386/EL	EL2539/EL
EL2029/EL	EL2045/EL	EL2120/EL	EL2186/EL	EL2242/EL	EL2423/EL	EL2540/EL
EL2030/EL	EL2070/EL	EL2160/EL	EL2190/EL	EL2243/EL	EL2424/EL	EL400/EL
EL2038/EL	EL2071/EL	EL2166/EL	EL2210/EL	EL2244/EL	EL2444/EL	EL4393/EL
EL2039/EL	EL2073/EL	EL2170/EL	EL2211/EL	EL2245/EL	EL2445/EL	EL5190/EL
EL2040/EL	EL2074/EL	EL2175/EL	EL2223/EL	EL2260/EL		

## Harris Semiconductor

(39 Devices)

HA2500	HA2539	HA2600	HA2841	HA5102	HA5137	HFA3046
HA2502	HA2540	HA2602	HA2842	HA5104	HA5147	HFA3096
HA2510	HA2541	HA2620	HA2850	HA5112	HA5190	HFA3127
HA2512	HA2542	HA2622	HA5004	HA5114	HA5221	HFA3128
HA2520	HA2544	HA2839	HA5020	HA5127	HA5222	IRF9530
HA2522	HA2548	HA2840	HA5101			

## Linear Technology

(168 Devices)

LF155	LF355	LF412	LM10C	LM108A	LM308A	LT318A
LF155A	LF355A	LF412A	LM101A	LM118	LM318	LT1001
LF156	LF356	LH2108	LM107	LM301A	LM318S8	LT1002
LF156A	LF356A	LH2108A	LM108	LM308	LT118A	LT1001S8

LT1001A	LT1014D	LT1057A	LT1192	LT1253	LTC1049	OP07E	OP37A
LT1002A	LT1022	LT1057S	LT1195	LT1254	LTC1050	OP15A	OP37C
LT1006	LT1022A	LT1058	LT1200	LT1259	LTC1050A	OP15B	OP37E
LT1006A	LT1024	LT1058A	LT1201	LT1260	LTC1051	OP15C	OP37G
LT1006S8	LT1024A	LT1077	LT1202	LT1354	LTC1052	OP15E	OP97
LT1007	LT1028	LT1078	LT1208	LT1355	LTC1052CS	OP15F	OP215A
LT1007CS	LT1028A	LT1078A	LT1209	LT1356	LTC1053	OP15G	OP215C
LT1007A	LT1028CS	LT1079	LT1217	LT1357	LTC1150	OP16A	OP215E
LT1008	LT1037	LT1079A	LT1220	LT1358	LTC7652	OP16B	OP215G
LT1012	LT1037A	LT1097	LT1221	LT1359	OP05	OP16C	OP227A
LT1012A	LT1037CS	LT1115	LT1223	LT1360	OP05A	OP16E	OP227C
LT1012D	LT1055	LT1122	LT1224	LT1361	OP05C	OP16F	OP227E
LT1012S8	LT1055A	LT1178	LT1225	LT1362	OP05E	OP16G	OP227G
LT1013	LT1055S8	LT1178A	LT1226	LT1363	OP07	OP27A	OP237A
LT1013A	LT1056	LT1179	LT1227	LT1364	OP07A	OP27C	OP237C
LT1013D	LT1056A	LT1179A	LT1229	LT1365	OP07C	OP27E	OP237E
LT1014	LT1056S8	LT1190	LT1230	LTC1047	OP07CS8	OP27G	OP237G
LT1014A	LT1057	LT1191	LT1252				

## Maxim

(92 Devices)

MAX406Ac	MAX412	MAX4122	MAX4259	MAX4212	MAX437	MAX47915	MAX908
MAX406Bc	MAX412B	MAX4126	MAX4162	MAX4216	MAX4330	MAX4795	MAX922
MAX406Ad	MAX414	MAX4129	MAX4163	MAX4220	MAX4332	MAX4793	MAX924
MAX406Bd	MAX414B	MAX4124	MAX4164	MAX4223	MAX4334	MAX492	MAX934
MAX407	MAX4100	MAX4128	MAX4165	MAX4224	MAX473	MAX494	MAX941
MAX409A	MAX4101	MAX4130	MAX4167	MAX4225	MAX474	MAX495	MAX942
MAX409B	MAX4106	MAX4132	MAX4169	MAX4226	MAX475	MAX496	MAX944
MAX417	MAX4107	MAX4134	MAX4178	MAX4227	MAX477	MAX497	MAX975LP
MAX418	MAX4108	MAX4144	MAX4182	MAX4228	MAX47815	MAX498	MAX975HS
MAX419	MAX4109	MAX4158	MAX4184	MAX4278	MAX4785	MAX499	MAX977LP
MAX410	MAX4112	MAX4159	MAX4186	MAX427	MAX4783	MAX907	MAX977HS
MAX410B	MAX4113	MAX4258	MAX4187				

## Motorola

(49 Devices)

BFS17	MC1536	MC33072	MC33171	MC33182	MC33284	MMBR901	MRF9011
LF441	MC1747	MC33074	MC33172	MC33184	MC34001	MMBR931	MRF9331
LF442	MC3458	MC33076	MC33174	MC33204	MC34084	MMBR941	MRF9411
LF444	MC4558	MC33077	MC33178	MC33272	MC34184	MMBR951	MRF947
LM11	MC4741	MC33078	MC33179	MC33274	MMBR521	MRP5711	MRF9511
LM833	MC33071	MC33079	MC33181	MC33282	MMBR571	MRP5812	TCA0372
LM2904							

## National Semiconductor

(182 Devices)

2N3904/NS	LF257/NS	LM124/NS	LM6162/NS	LM7131B/NS	LMC6044B/NS
2N3906/NS	LF351/NS	LM158/NS	LM6164/NS	LM7171A/NS	LMC6061A/NS
2N5086/NS	LF353/NS	LM218/NS	LM6165/NS	LM7171B/NS	LMC6061B/NS
2N5088/NS	LF355/NS	LM224/NS	LM6171A/NS	LM7301/NS	LMC6062A/NS
2N5401/NS	LF356/NS	LM258/NS	LM6171B/NS	LM741/NS	LMC6062B/NS
2N5551/NS	LF357/NS	LM2902/NS	LM6172/NS	LMC6001A/NS	LMC6064A/NS
BSR14/NS	LF411/NS	LM2904/NS	LM6181/NS	LMC6001B/NS	LMC6064B/NS
BSR15/NS	LF412/NS	LM318/NS	LM6218/NS	LMC6022/NS	LMC6081A/NS
BSR17A/NS	LF441A/NS	LM324/NS	LM6262/NS	LMC6024/NS	LMC6081B/NS
BSR18A/NS	LF441B/NS	LM358/NS	LM6264/NS	LMC6032/NS	LMC6082A/NS
BSS63/NS	LF442A/NS	LM6118/NS	LM6265/NS	LMC6034/NS	LMC6082B/NS
BSS64/NS	LF442B/NS	LM6132A/NS	LM6317/NS	LMC6035/NS	LMC6084A/NS
BSV52/NS	LF444A/NS	LM6132B/NS	LM6361/NS	LMC6036/NS	LMC6084B/NS
LF155/NS	LF444B/NS	LM6142A/NS	LM6362/NS	LMC6041A/NS	LMC6462A/NS
LF156/NS	LF451/NS	LM6142B/NS	LM6364/NS	LMC6041B/NS	LMC6462B/NS
LF157/NS	LF453/NS	LM6152A/NS	LM6365/NS	LMC6042A/NS	LMC6464A/NS
LF255/NS	LM111/NS	LM6152B/NS	LM7121/NS	LMC6042B/NS	LMC6464B/NS
LF256/NS	LM118/NS	LM6161/NS	LM7131A/NS	LMC6044A/NS	LMC6482A/NS

LMC6484A/NS	LMC660A/NS	LMC7211B/NS	MMBT3904/NS	MMBTH10/NS	PN2222A/NS
LMC6492A/NS	LMC660B/NS	LMC7221A/NS	MMBT3906/NS	MMPQ2222/NS	PN2369A/NS
LMC6492B/NS	LMC662/NS	LMC7221B/NS	MMBT4258/NS	MMPQ2369A/NS	PN2907A/NS
LMC6494A/NS	LMC662A/NS	LPC660A/NS	MMBT5086/NS	MMPQ2907/NS	PN4258/NS
LMC6494B/NS	LMC6762A/NS	LPC660B/NS	MMBT5088/NS	MMPQ3904/NS	PZT2222A/NS
LMC6572A/NS	LMC6762B/NS	LPC661A/NS	MMBT5179/NS	MMPQ3906/NS	PZT2907A/NS
LMC6572B/NS	LMC6772A/NS	LPC661B/NS	MMBT5401/NS	MPS5179/NS	PZT3904/NS
LMC6574A/NS	LMC6772B/NS	LPC662A/NS	MMBT5551/NS	MPSA06/NS	PZT3906/NS
LMC6574B/NS	LMC7101A/NS	LPC662B/NS	MMBTA06/NS	MPSA42/NS	PZTA06/NS
LMC6582A/NS	LMC7101B/NS	MMBT2222A/NS	MMBTA42/NS	MPSA56/NS	PZTA42/NS
LMC6582B/NS	LMC7111A/NS	MMBT2369A/NS	MMBTA56/NS	MPSA92/NS	PZTA56/NS
LMC6584A/NS	LMC7111B/NS	MMBT2907A/NS	MMBTA92/NS	MPSH10/NS	PZTA92/NS
LMC6584B/NS	LMC7211A/NS				

## Polyfet

(27 Devices)

F1007	F1022	F1120	F1260	F2012	F2202S	L88016	L88083
F1008	F1027	F1174	F2001	F2021	L88008	L88081	P121
F1020	F1072	F1214	F2002	F2201S	L88012	L88082	P123
F1021	F1074	F1240					

## Siliconix

(26 Devices)

Si3441DV	Si4431DY	Si4953DY	Si6447DQ	Si6955DQ	Si9936DY	SUP65P06-20
Si3454DV	Si4435DY	Si6426DQ	Si6943DQ	Si6956DQ	Si9947DY	SUP70N06-14
Si4410DY	Si4936DY	Si6433DQ	Si6946DQ	Si9434DY	SUP60N06-18	SUP75N06-08
Si4412DY	Si4947DY	Si6435DQ	Si6953DQ	Si9933DY		

## Texas Instruments

(16 Devices)

LP239	LP311	TLC339	TLC354	TLC3704	TLC374	TLV2352I3	TLV2354I3
LP2901	LP339	TLC352	TLC3702	TLC372	TLC393	TLV2352I5	TLV2354I5

## Zetex

(169 Devices)

2N6715	BC307AP	BC857A	FCX749	FZT758	ZTX239	ZTX696B
2N6727	BC308AP	BC858A	FMMD6050	FZT788A	ZTX239B	ZTX704
2SA1213	BC337AP	BC859A	FMMD914	FZT788B	ZTX320	ZTX705
2SC2873	BC338AP	BC860A	FMMT38B	FZT789A	ZTX321	ZTX749
BAL74	BC413BP	BCV72	FMMT597	FZT790A	ZTX337A	ZTX750
BAL99	BC414BP	BCW29	FMMT918	FZT792A	ZTX338A	ZTX751
BAR74	BC415AP	BCW32	FMMTA20	HD3A	ZTX450	ZTX757
BAR99	BC416AP	BCW60C	FMMTA70	MPSA20	ZTX454	ZTX758
BAS16	BC546BP	BCW61A	FZT604	ZTX107	ZTX455	ZTX788A
BAS19	BC547BP	BCW65A	FZT605	ZTX107B	ZTX458	ZTX788B
BAS20	BC548BP	BCW66F	FZT649	ZTX108	ZTX550	ZTX789A
BAS21	BC549BP	BCW67A	FZT651	ZTX108B	ZTX558	ZTX790A
BC107BP	BC550BP	BCW68F	FZT657	ZTX109	ZTX604	ZTX792A
BC108BP	BC556AP	BCW69	FZT658	ZTX109B	ZTX605	ZTX795A
BC109BP	BC557AP	BCW72	FZT688B	ZTX212	ZTX649	ZTX796A
BC177AP	BC558AP	BCW89	FZT689B	ZTX212A	ZTX650	ZTX948
BC178AP	BC559AP	BCX38B	FZT690B	ZTX213	ZTX651	ZTX949
BC182BP	BC560AP	BCX70J	FZT692B	ZTX214	ZTX657	ZTX951
BC183BP	BC846B	BCX71G	FZT694B	ZTX214A	ZTX658	ZTX953
BC184BP	BC847B	BFQ31	FZT696B	ZTX231A	ZTX688B	ZTX955
BC212AP	BC848B	BFS60	FZT705	ZTX237	ZTX689B	ZTX956
BC213AP	BC849B	FCX458	FZT749	ZTX237B	ZTX690B	ZTX957
BC237BP	BC950B	FCX558	FZT751	ZTX238	ZTX692B	ZTX958
BC238BP	BC856A	FCX649	FZT757	ZTX238B	ZTX694B	ZTX968
BC239BP						