PCB Symbol Naming Convention

Summary

This standard describes systematic conventions for the naming of PCB footprints. It covers semiconductors, passives and connectors used in board-level designs.

Library Standard
LS0002 (v1.3) March 19, 2004

Three conventions are employed for the purpose of assigning a unique code to any PCB footprint associated with a semiconductor package, passive device or connector.

The naming convention for connectors and through-hole capacitors, diodes and resistors is described towards the end of this document. Most package types follow the semiconductor convention.

Semiconductor Convention

The convention is in sympathy with component names used in the IPC-SM-782A standard and closely follows the JEDEC standard, "Descriptive Designation System for Semiconductor-Device Packages" JESD30-B (April 1995).

The naming system is based upon a minimum, compulsory code that describes the 'Package Outline Style'. Further characters are used to provide additional information such as the number of terminals and their position. Seven fields are available for the assignment of a unique name to each PCB footprint.

Overview of fields

1. Features-	Package Specific Features - (Optional)
2. Position	Terminal Position (Optional)
3. Package	Package Outline Style (Compulsory)
4. Dimensions	Major dimensions of package (Optional)
5. -Form	- Lead Form (Optional)
6. Count	Terminal Count (Optional)
7. /Supplementary	/Supplementary Information (Optional)

Examples:

TSSO6x14-G16	Thin Shrink Small Outline with 16 Gull wing leads and package dimensions of 6 & 14mm for the respective parameters of D & H.
DIP-24/D31	24 pin, Dual In-Line Package with a silk screen length of 31mm for the dimension, D.

1. Package Specific Features-

Designator	Description
B	Bumpered (corner bumpers present) employed with QFP family
C	Ceramic
E	Enlarged pitch (greater than1.27 mm)
F	Fine pitch (less than or equal to 0.50 mm) restrict to QFP family
H	Integral heat slug
I	Interstitial pitch (staggered leads)
L	Low profile (1.4 mm body thickness)
LED	LED Display

R	Rectangular
S	Shrink pitch (less than or equal to 0.65 mm) all families except QFP
T	Thin profile (1.0 mm body thickness)
TP	Test-pad leads (less than or equal to 0.30 mm pitch)
TS	Thin shrink (1.0 mm body thickness, less than or equal to 0.65 mm pitch)
U	Ultra-thin profile (less than 1.0 mm body thickness)

2. Terminal/Pin Position

Seating plane is the bottom of the package

Designator	Description
A	Axial - Terminals extend from both ends in the direction of the major axis of a cylindrical or elliptical package.
B	Bottom - Terminals extend from the bottom of the package.
D	Dual - Terminals are on opposite sides of a square or rectangular package or located in two parallel rows.
E	End - Terminals are package endcaps having circular or elliptical cross-section.
L	Lateral - Terminals are on the four sides of a square or rectangular package. The preferred name is “Quad”, code Q.
P	Perpendicular - Terminals are perpendicular to seating plane on a square or rectangular package. Restrict to PGA family.
Q	Quad - Terminals are on the four sides of a square or rectangular package or located in four parallel rows.
R	Radial - Terminals extend radially from the periphery of a cylindrical or spherical package.
S	Single - Terminals are on one surface of a square or rectangular package in a single row.
T	Triple - Terminals are on three sides of a square or rectangular package.
U	Upper - Terminals are perpendicular to and opposite the seating plane, and are on one surface of a package.
X	Other - Terminal positions are other than those described.
Z	Zig-zag - Terminals are on one surface of a square or rectangular package arranged in a staggered configuration.

3. Package Outline Style

Designator	Description
CAN	Can
CC	Chip Carrier, Chip Capacitor
CD	Chip Diode
CI	Chip Inductor
CP	Clamped Package (Press-Pack)
CR	Chip Resistor
CY	Cylinder or Can
DB	Disk-Button
DO	Diode Outline
FM	Flange Mount
FP	Flatpack
GA	Grid Array
IL	In-Line Package (preferred code is IP)

IP	In-Line Package (Restrict to DIP/SIP/ZIP)
LF	Long Form Horizontal Package
MELF-D	Metal Electrode Face (MELF), Diode
MELF-R	Metal Electrode Face (MELF), Resistor
PF	Press Fit
PM	Post/Stud Mount
SO	Small Outline
TC	Tantalum Capacitor
TO	Transistor Outline
TP	Tape Pack
VP	Vertical Surface-Mount Package

4. Major Package Dimensions

Designator	Description
##x##	BGA and PGA - Silk screen dimensions, DxE (mm)
##x##	QFP, except Bumpered – Dimensions of the package body, E1xD1 (mm)
##x##	Thin Shrink Small Outline - Short package length by largest overall length including terminals, DxH (mm)
####-####	Chip Capacitor, Diode, Inductor and Resistor, Tantalum Capacitor and MELFs - length by width for both metric and imperial units, the general form is: <(Lx10mm)(Wx10mm)>-<(L/10mil)(W/10mil)> Example: A chip resistor of package dimensions 1.6mm x 0.8mm (LxW) would correspond to a PCB footprint name of: CR1608-0603

5. -Lead Form or Terminal Shape

Designator	Description
B	Butt or Ball - A short lead or solder ball intended for attachment perpendicular to the land structure.
C	“C” bend - A “C” shaped noncompliant lead bent down and under the body of the package.
D	Solder lug - A lug terminal on the package.
F	Flat - A compliant or noncompliant, non-formed flat lead that extends away from the body of the package.
G	Gull wing - A compliant lead bent down from the body of the package with a foot at the end pointing away from the package.
I	Insulated - A flat lead formed by depositing a thin conductor onto a supporting insulating film.
J	“J” bend - A “J” shaped compliant or noncompliant lead bent down and back under the body of the package.
L	“L” bend - An “L” shaped compliant lead intended for surface mounting.
N	No lead - Metallized terminal pads located on the body of the package.
P	Pin or Peg - A tempered lead extending from the bottom of the package and intended for attachment to a plated through-hole in the land structure.
Q	Quick-connect - A tab-like terminal extending from the body of the package.
R	Wraparound - A metallized noncompliant terminal wrapped around the package body.
S	“S” bend - An “S” shaped compliant lead bent under the body of the package.
T	Through-hole - A terminal with flat or V-shaped cross-section, extending from the side of the body and intended for attachment to a through-hole.

U	“J” inverted - A “J” shaped compliant or noncompliant lead bent down from the body of the package with the curved end pointing away from the package.
W	Wire - An un-tempered wire lead extending from the body of the package.
X	Other - A lead form or terminal shape other than those defined, including “Yoke” leads.
Y	Screw - A threaded hole.
Z	“Z” bend.

6. Terminal/Pin Count

Designator	Description
#	Number of terminals. Include those of the type described by the 'lead from' designator.
(#)	Number of terminal positions: Include only if this figure differs from the number of terminals given above. Do not apply to grid arrays. Example: DIP-14(22) corresponds to a 22-pin package missing eight pins.

7. /Supplementary Information

The code following the 'slash' is used to differentiate between similar footprints which would otherwise share the same name. The key to these characters is shown below and typically refers to a distinctive attribute of the package. A combination of these characters may be used.

Designator	Description
V	Mounted vertically
W	Spacing lead form 
S	Stagger lead form 
N	Terminals numbered from a corner of the PCB footprint
T	Terminals numbered from a center of one side of the PCB footprint
M	Modified
F	Flange, Tab or mounting on PCB board
#	This pin, at least, is absent
###	Pin Sequence
H	Horizontal
R	Suitable for reflow soldering

In addition, the code following the 'slash' may refer to the dimensions of the PCB footprint. Where this is the case, the code consists of a letter followed by a number. The letter designates the parameter and the number gives the length in millimeters. The key to these characters is shown below and typically refers to a distinctive attribute of the PCB footprint. A character from this table may be used in conjunction with a character from the above table.

Designator	Description
A	Silkscreen length, corresponding to the package thickness
B	Diameter of drill hole
C	Average distance between two rows of pads, (from the center of the pads)
D	Silkscreen length or diameter, corresponding to the package dimensions.
E	Silkscreen length, corresponding to the package width
G	Minimum distance between two rows of pads, (from inside edges of pads)
H	Height
J	Tab width of a metal can
K	Tab length of a metal can

P	Lead pitch
Q	Distance between mounting-hole centers of a diamond-base metal package
R	Radius of the major outline of a cylindrical or diamond-base package
X	Pad width.
Y	Pad length
Z	Maximum distance between two rows of pads, (from outside edges of pads)

Example 1:	The footprints of two different small outline packages, both with 54 gull wing leads may be distinguished in the following manner:
SO-G54/X.5	SOP54 with a pad width of 0.5mm
SO-G54/P.8	SOP54 with a lead pitch of 0.8mm
Example 2:	
CAN-12/D9.4	Twelve pin can with silk screen value of 9.4mm for the dimension, D.

Through-Hole Capacitors, Diodes and Resistors Convention

Dimensions are given in millimeters.

Capacitor - Radial Polarized

Radial, Polar Cylinder	CAPPR<Pin Spacing>-< Body Diameter>x<Height>
Electrolytic Mount Ring	CAPPRM<Pin Spacing>-< Body Diameter>x<Height>
Electrolytic Snap-In	CAPPRS<Pin Spacing>-< Body Diameter>x<Height>
Tantalum Bead	CAPTB<Pin Spacing>-< Body Diameter>x<Height>
Tantalum Rectangle	CAPTR<Pin Spacing>-<Body Width>x<Body Thickness>

Capacitor - Radial Non-Polarized

Radial, Non-Polar	CAPR<Pin Spacing>-<Body Width>x<Body Thickness>
Tantalum Rectangle	CAPNTR<Pin Spacing>-<Body Width>x<Body Thickness>
Tantalum Oval	CAPNTO<Pin Spacing>-<Body Width>x<Body Thickness>
Disc	CAPRD<Pin Spacing>-<Body Length>x<Body Width>
Tubular	CAPRT<Pin Spacing>-<Body Length>x<Body Diameter>

Capacitor - Axial

Axial Polar	CAPPA<Pin Spacing>-<Body Length>x<Body Diameter>
Axial, Non-Polar	CAPA<Pin Spacing>-<Body Length>x<Body Diameter>

Diode

Axial	DIO<Pin Spacing>-<Body Length>x<Body Diameter>

Resistor

Axial	RES<Pin Spacing>-<Body Length>x<Body Diameter>

Where the number of pins differs from two or there is the possibility of an ambiguity a dash followed by the number of pins shall be appended to the code.

Example: CAPPRM8.25-16x30-4 corresponds to a ‘Capacitor, Electrolytic, Radial, Solder Ring; Body 16 x 30 mm (Dia.xH typ); Pin Spacing 8.25 mm (typ); 4-pins’.

Connector Convention

Connector General Form

<type>[</technology>]<pitch>-[<fixture count>]<mount angle><pad count> [<rev letter>]

Example: 050DSUB1.27-2H120B

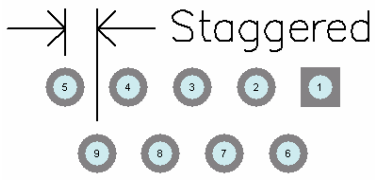
Description

<type> The abbreviation indicates the connector type.

Prefix	Connector Type
050DSUB	050 D Subminiature
CARD	Card Edge
CHAMP	Champ
DIMM	DIMM
DOCK	Docking Station
DSUB	D Subminiature
FFC	Flat Flexible Cable, Flexible Film Products, FPC (Flexible Printed Circuit)
HSPD	High-Speed
JACK	PCB Mounted Jack, Modular Jack
PCI	CompactPCI
SIMM	SIMM
SMT	Smart Card

[</technology>] [Optional] required for surface mount components, otherwise leave blank. Include /SM after <type>

<pitch> Distance (mm) between adjacent terminal centers of a pin row. Where signal terminals are arranged in a staggered configuration, use half the pitch (See diagram).



[<fixture count>] [Optional] Number of mounting fixtures, both plated and un-plated, that have pads on the PCB board. Leave blank where mounting fixtures absent.

Example: '2' indicates two mounting holes.

<mount angle> Orientation of component:

H Horizontal

V Vertical

<pad count> The number of pads, excluding mounting pads.

[<rev letter>] [Optional] Required to distinguish between different footprints, that would otherwise, have the same name. Leave blank if not required. Use a capital letter, commencing with the letter 'A' for successive footprint names.

Revision History

Date	Version No.	Revision
12-Nov-2001	1.1	Added package style for chip capacitor and chip resistor.
17-Jul-2002	1.2	Appended convention for thru-hole capacitors, diodes and resistors.
19-Mar-2004	1.3	Reformatted document and amalgamated the convention for connectors.