

JEDEC STANDARD

Descriptive Designation System for Electronic-device Packages and Footprints

JESD30L

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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Foreword

This standard establishes requirements for the generation of electronic-device package designators for the JEDEC Solid State Technology Association. The requirements herein are intended to ensure that such designators are presented in as uniform a manner as practicable

Example of how this standard can be used, is in defining the part in sufficient detail to enable process efficiencies during the part and product life cycles, i.e., design, purchasing, manufacturing, quality control, test, etc... This release includes additional definition and clarification of the device to provide this support to the industry. The standard is designed to be scalable insofar that it should cover as many components as possible that are available in the market. It should also be scalable to encompass the emergence of new packages in the future. It is not intended to provide standardization for a limited number of parts, or the perceived common parts in the market, since this is impracticable to measure.

Although this standard is considered to have international standardization implications, a complete comparison between the JEDEC standard and the international documents has not been made.

This revision of the standard incorporates many new table entries and text emendations compared to JESD30I. The material contained in this standard was formulated by the JEDEC JC-11 Committee on Mechanical (Package Outlines) Standardization and approved by the JEDEC Board of Directors.

This standard supports the JEP30-P100 Part Model Package Guidelines for Electronic-Device Packages – XML Requirements, and its companion JEP30-P101, Part Model Package Schema. These JEP30 standards represent a standard XML structure to enable Component Manufacturers to provide part data to their customers, utilizing these definitions herein in a digital model.

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DESCRIPTIVE DESIGNATION SYSTEM FOR ELECTRONIC-DEVICE PACKAGES

(From JEDEC Board Ballot JCB-23-26 formulated under the cognizance of the JC-11 Committee on Mechanical (Package outline) Standardization.)

1 Scope

This standard describes a systematic method for generating descriptive designators for electronic-device packages. The descriptive designator is intended to provide a useful communication tool but has no implied control for assuring package interchangeability.

2 Terms and Definitions

For the purpose of this standard, the following definitions shall apply:

2.1 Package Terms and Definitions

body direction: this attribute defines whether the part body is either vertical or horizontal, by comparing the cross-sectional area of the part in both the horizontal direction and the vertical direction. If the horizontal cross-sectional area is greater than the vertical cross-sectional area, then the body direction is horizontal.

die-size package: See chip scale package

footprint (of a package): The pattern of package terminals that is used to define the land patterns on a mating printed circuit board.

NOTE The footprint may include features necessary for mechanical mounting of the package.

package: The encapsulation of an electronic component.

See Table 1 for a list of package outline styles.

package terminal: Package terminal code is a one-character code that indicates the terminal codes of all the terminals on the package (see 3.2.4 for how this is calculated). An additional optional code can be added to explain the extended terminal type.

package terminal position: Package terminal position is a one-character code that indicates the position of all the terminals on the package (see 3.2.2 for how this is calculated). An additional optional code can be added to explain the extended terminal type.

part access direction: Various parts require additional clearance around the part, typically in one direction post assembly on the PCB. This may be a once off access to the part as the PCB is mounted into its enclosure, or it may require continuous access over the life of the product. Part access can come in any of the following directions – Topside, Underside, Front, Back, Right side, Left side

terminal: An externally available point of electrical connection. (Ref. JESD99.) The solid or stranded wire or formed conductor that extends from a package body to serve as a mechanical or electrical connector, or both. The terminal can also be a metallic post or stud mount package body that is used for making electrical connections.

2.1 Package Terms and Definitions (cont'd)

terminal group: A part can have multiple terminals of different shapes, position, and size. The term group is used to define a grouping of terminals that have a uniform layout, and which have a common set of terminal types and terminal dimensions. As an example, a layout of multiple terminals would be a set of 16 terminals organized into 2 columns of 8 where the spacing in the vertical direction is the same for all terminals and the spacing in the horizontal direction is the same for all terminals.

terminal group terminal code: A single-letter suffix that identifies the standard terminal belonging to a specific group of terminals on a package. When there is a single terminal group on a package, then the package terminal code is the same as the terminal group terminal code.

terminal group terminal position: A single-letter prefix that identifies the physical terminal positions specific to a group of terminals on a package. When there is a single terminal group on a package, then the package terminal position is the same as the terminal group terminal position.

terminal mount: The method or technology employed in mounting the terminal to the printed board land pattern. There are 5 types available – SMT, Through-hole, Non-board, Hole, or Press-fit

2.2 Footprint Terms and Definitions

all layers: All routing layers.

any mount: The object is displayed when footprint is placed either Top or Bottom

assembly: Mount side assembly layer

assembly top: Top side of the board assembly layer

assembly bottom: Bottom side of the board assembly layer

assembly opposite: Opposite side of the board assembly layer

bottom layer: Bottom side of the board; the object with this layer will be shown when the footprint is placed on the bottom of the board.

bottom mount only: The object is displayed when footprint is placed on the Bottom only

drill drawing layer: The layer in which you specify the drill hole size.

drill hole size: The shape and dimensions of the hole size before plating.

finish hole size: The shape and dimensions of the hole size after plating.

mount layer: The top routing layer for top mounted part.

mount side: The side of the printed circuit board on to which the component is assembled.

opposite layer: The bottom routing layer for a top mounted part.

opposite side: The other side of the printed circuit board on to which the component is assembled.

2.2 Footprint Terms and Definitions (cont'd)

relative layer N: Route layer relative to the Mount Layer, with 0 = Mount Layer. i.e., component manufacturers may want to specify a ground plane to be placed N layers below the package body, to ensure proper functionality of the part.

silkscreen bottom layer: Bottom side of the board silkscreen layer

silkscreen mount layer: Mount side silkscreen layer

silkscreen opposite layer: Opposite side silkscreen layer.

silkscreen top layer: Top side of the board silkscreen layer.

soldermask bottom layer: Bottom side of the board soldermask layer

soldermask mount layer: Mount side soldermask layer

soldermask opposite layer: Opposite side soldermask layer.

soldermask top layer: Top side of the board soldermask layer.

solderpaste bottom layer: Bottom side of the board solderpaste layer

solderpaste mount layer: Mount side solderpaste layer

solderpaste opposite layer: Opposite side solderpaste layer.

solderpaste top layer: Top side of the board solderpaste layer.

top Layer: Top side of the board; the object with this layer will be shown when the footprint is placed on the top of the board.

top mount only: The object is displayed when footprint is placed on the Top only

Infinite soldering: This is a process in which there is an unconstrained amount of solder available to make the solder connection between the terminal and the Thru-hole or the Surface pad connection. It consists of

- 1) Wave soldering,
- 2) Selective wave soldering,
- 3) Solder Pot
- 4) Manual soldering

Finite soldering: This process limits the amount of solder that is available to the specific Thru-hole connection or the Surface pad connection. Finite Soldering process consists of

- 1) SMT (for Surface Mount Devices), and Paste-in-Hole (for Through Hole Mount devices).
- 2) Captive Solder Charge, e.g., Laser Soldering

3 Descriptive Designation System for Electronic-device Packages

3.1 General

The standard descriptive designation system is a method for identifying the physical features of an electronic-device package. The most scalable method to achieve this is to split the definition of the package into three basic elements, namely package outline, terminal position, and terminal description. To conform as close as possible to previous JEDEC Standards, the terminal position precedes the package outline, while the terminal code follows the package outline. This designator is extended through the use of additional fields to provide additional package information such as package-body material, terminal count, and package body dimensions.

This mandatory package designator may be extended, through the use of user-selected fields, to provide additional package information such as specific package features, package differentiators, and supplemental information.

As outlined in the Foreword, this standard supports the JEP30-P100 Part Model Package Guidelines for Electronic-Device Packages – XML Requirements, and its companion JEP30-P101, Part Model Package Schema. When populating dimensional data associated with the component part, it is required to provide tolerance data so that software tools consuming this data can take cognizance of the tolerance spread to perform their function. An example of this is in Footprint creation where the tolerance spread on the terminal contact area, terminal span and spacing all contribute to the final dimension of the land pattern.

In contrast, when the component manufacturer provides a recommended design pattern, they are only required to populate the target design value to which the design tools should conform to. If compliance to these dimensions is critical to the integrity of the component part performance, then component manufacturers are encouraged to also provide the tolerance on the footprint design to which the fabrication process must adhere too in order to guarantee the performance and reliability specified by the component manufacturer. An example of this would be the hole size and spread to guarantee a gas tight connection between pressfit terminals and the final PCB product.

The second advantage to providing tolerances on the land pattern that can be gained from the provision of a tolerance on a design dimension, is that if end-user customers have already established footprint, which matches the requirement land pattern for a given part, then it avoids the need for the customer to generate a new footprint, for a small and irrelevant change.

These JEP30 standards represent a standard XML structure to enable Component Manufacturers to provide part data to their customers, utilizing these definitions herein in a digital model.

NOTE JEITA ED7303 (“Name and code for integrated circuit package”) and IEC 60191-4 (“Coding system and classification into forms of package outlines for electronic device packages”) are standards similar to JESD30.

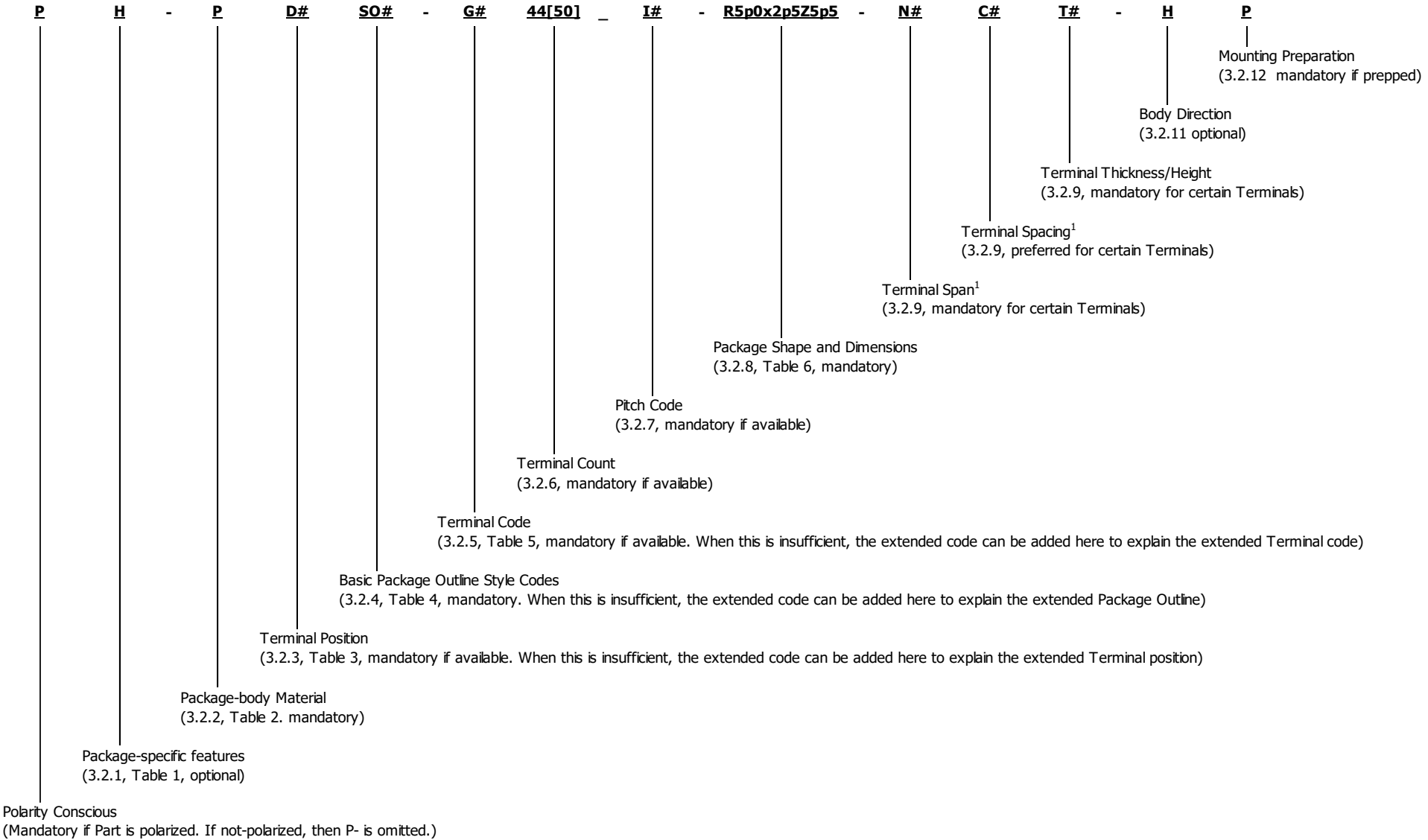


Figure 1 - Descriptive Designation System for Electronic-device Packages

3.2 Field Descriptions

3.2.1 Package-specific Features

Package-specific features are described through the use of a prefix comprising codes for applicable functions. All package-specific features precede the package material code and are separated from them by a dash (-).

Table 1 shows the defined package-specific-feature codes.

Table 1 - Codes for Package-specific Features

Function	Code	Package-specific feature
Added feature	H	Integral heat spreader wholly or partially exposed
	A	Stacked package assembly
	C	Windowed package for optical devices

3.2.2 Package-body Material

A single-letter prefix is used to identify the predominant external package-body material. The package-body-material prefix is the first field of the mandatory descriptive designator and must be included.

When multiple material possibilities may coexist interchangeably, or when the package-body material is other than one of those defined in Table 2, an upper-case letter “X” should be used to signify a special or new material.

Table 2 - Prefixes for Predominant Package-body Material

Code	Material
A	Plastic Metal mix
C	Ceramic, metal-sealed, cofired
E	Ceramic Plastic mix
G	Ceramic, glass-sealed
L	Glass
M	Metal - A hybrid circuit package made solely of metal, without glass or ceramic.
P	Plastic (molding compound, glob-top, and printed circuit board-like substrates)
S	Silicon
T	Tape (usually polyimide), where tape is an integral part of the package
X	Other

3.2.3 Terminal-position Prefix

The two-letter package-outline-style code should be supplemented with a single-letter prefix that identifies the physical terminal positions or, if applicable, the device footprint, e.g., DIP, PGA, SIP, and ZIP.

If more than one type of terminal is present, then the position character is defined by the position of the electrical terminals that determine the terminal code as defined in Table 3 – Prefixes for terminal position below. If one of these terminals is a mounting stud, its position shall not govern the choice of the position character prefix in the package name. The following rules apply:

The extended definitions of positions are recommended to be incorporated in the name of the package.

If there is only one Terminal group within the Package, then the Terminal position in the Package name = the value of the Terminal position of that Terminal Group.

If there are several Terminal Groups within a Package, where each terminal group has a terminal position that cannot be represented by the same single character, such as one terminal group having a position of any of S, D, T, Q, R and the other terminal group having any of A, B, E, G, U, Z, the character that denotes the Terminal position in the package name should reflect this complexity by using the code “M” for “Mixed Position”,

The value of the Terminal position attribute is defined according to the signal/power terminals only. When there are no such terminals, the Terminal position attribute is defined according to the remaining terminals. If there are no terminals of any kind as in a housing only, then the Terminal position code is omitted.

If there are 2 or more Terminal groups, where one Terminal Group Terminal Position = Dual “Left-to-Right/Outside”, and the next Terminal Group Terminal Position = Dual “Back-to-Front/Outside”, then at the Package level, the Package Terminal Position is set to “Quad / Outside”.

- 1) Assuming in that same example that one Terminal Group Terminal Position was “Outside”, and the other Terminal Group Terminal Position was not “Outside”, then the Package Terminal Position is set to “Quad” at the Package level.
- 2) This means that the primary Package Terminal Position character can be set even if the extended definitions of the Terminal Group Terminal Positions do not align up.

Table 3 shows one-letter terminal-position prefix codes.

The value of these codes is available in the “Terminal position with additional information” table in Annex A. Position Images along with an explanation of the “Relationship concepts between the Terminal Contact Area and the Body Outline” are also available following this table in Annex A.

3.2.3 Terminal-position Prefix (cont'd)

Table 3 - Prefixes for Terminal Position

Code	Name	Position
A	Axial	Terminal wires extend from both ends in the direction of the major longitudinal axis of a cylindrical, elliptical package, or elongated box-shaped package. i.e., the Terminals emerge from two opposite ends of an elongated component, through the main axis of the package body.
B ²	Bottom	Terminals extend to or through the seating plane.
D ²	Dual	Terminals are on opposite sides of a square or rectangular package or located in two parallel rows on one surface.
E	End	Terminals are package endcaps.
G	Diagonal	Two Terminals located diagonally on the body. May be located on the underside or on the side of the package body.
I	Internal	Terminals which are defined internal to a connector. When a connector does not have terminals that make electrical connections to a pcb substrate, then this position classification, as in a cable-to-cable connector.
M	Mixed position	Terminal belonging to several Terminal Groups whose terminal positions that cannot be consolidated into one of the other position codes.
Q ²	Quad	Terminals are on the four sides of a square or rectangular package or arranged in a square or rectangle pattern on one surface.
R ²	Radial	Terminals extend from the package equidistance from the central z-axis.
S ²	Single	Terminals are on one side or surface of a square or rectangular package
T ²	Triple	Terminals are on three sides of a square or rectangular package.
U ²	Upper	Terminals are on the upper surface of a package opposite to the seating plane.
Z	Zigzag	Terminals are on one surface of a square or rectangular package arranged in a staggered configuration.
NOTE Example of terminal positions images are shown in Annex A. NOTE 1 References to package shape do not take account of notches, or other irregularities. NOTE 2 These position definitions can have some variations that often require further definition or clarification as defined in Annex A.		

3.2.4 Package Outline Style Codes

The basic package designator is a two-character package outline style code. It is preceded with a terminal-position code and a succeeding terminal code (see 3.2.3 Terminal-position Prefix above and 3.2.5 Terminal Suffix below). Table 4 shows the two-character package outline style codes.

Table 4 - Package Outline Style Codes

Package style code	Package type	Description
AT	Array Type	A rectangular or square shaped body with or without chamfered corners with perpendicular sides. The sides do not taper outwards or inwards as in a Small Outline or a Flatpack Package Outline.
CP	Clamped Package (Press-Pack)	A package for high-current devices, in the form of a cylinder with a flat, circular high-current terminal on each end that is intended to be clamped between two bus bars acting as heat sinks.
CS	Chip Scale Package	A Package that is no more than 1.2X the area of the internal die size.
CY	Cylinder or Can	A cylindrical (tubular) package whose terminals exit from one end parallel to the axis of the package.
DB	Disk Button	A package shaped like a disk or button whose terminals exit radially from the periphery of the package (like the spokes of a wheel) or axially from the center of the disk.
FM	Flange Mount	A package having a flange mounted heat sink that is an integral part of the package and that extends beyond the package body to provide mechanical mounting to a packaging interconnect structure or cold plate. NOTE The terminals may exit from, or be attached to, any surface of the package.
FP	Flatpack	A surface-mount package whose terminals project parallel to, and are designed primarily to be attached parallel to, the seating plane. The terminals exist on three or four sides of the package and can contain a surface terminal on the underside of the package. The terminals can also be metal pad surfaces or be terminals that emerge from the side of the package.
GA	Grid-Array	A package that has terminals arranged in a matrix on the bottom or upper side of the package and contained within the package outline.

Table 4 - Package Outline Style Codes (cont'd)

Package style code	Package type	Description
IP	In-Line Package	A package having a single row or parallel rows of terminals designed primarily for insertion (through-hole) mounting perpendicular to the seating plane. NOTE: The terminals may emerge from a single side or from two parallel sides with the terminals formed to produce parallel rows.
LF	Long Form	A cylindrical or tubular package having terminal endcaps or axial terminal wires.
MA ¹	Microelectronic Assembly	Unpackaged (uncased) microcircuits and/or packaged microcircuits so constructed on a packaging interconnect structure. NOTE The microelectronic assembly may also include discrete devices. These and the microelectronic devices may be mounted on either one or two sides of the packaging interconnect structure. The external terminals typically exit from one side of the assembly. Various package sizes, shapes, and external terminal shapes may be used.
PF	Press Fit	A round or elliptical package whose mechanical mounting area is inserted under pressure into the packaging interconnect structure or cold plate for purposes of thermal and/or electrical connection. NOTE 1 The package body (not the terminals) must be press fit into the interconnecting structure to be defined as a pressfit package. If the terminals are press fit into the interconnecting structure, but the package body is not, then the terminals are defined as pressfit, and the package is classified as one of the other package style codes. NOTE 2 If the package body is also an electrical connection, then the pressfit portion of the package body is also defined as the pressfit pin.
PM ¹	Post or Stud Mount	A package, intended for mounting to an interconnect structure or cold plate, that incorporates a threaded stud, threaded hole, or post for that purpose. NOTE A variety of package sizes, shapes, and external terminal shapes are possible.

Table 4 - Package Outline Style Codes (cont'd)

Package style code	Package type	Description
SO	Small Outline	A surface-mount package whose terminals project parallel to, and are designed primarily to be attached parallel to, the seating plane. The terminals exist on one or two sides of the package and can contain a surface terminal on the underside of the package. The terminals can also be metal pad surfaces or be terminals that emerge from the side of the package.
UC	Uncased Chip	Unpackaged die that has bumps, terminal frames or other terminals added for electrical attachment.
XC	Connector	A package that physically and electrically joins or separates two component/PCB/interconnect structures, transferring electrical signals or current.
XD	Discrete	An electronic device, either passive (resistor, capacitor, inductor) or simple active (transistor or diode).
XH	Hardware	An item used solely for performing auxiliary activities such as heat or light conduction, support, elevation, anchoring, grounding, etc.
XS	Switch	A device that opens and closes the flow of current in an electrical circuit. Relays with mechanical contacts are also regarded as switches.
NOTE Example of package outline styles images are shown in Annex A.		
NOTE 1 These package outline styles definitions can have some variations that often require further definition or clarification as defined in Annex A.		

3.2.5 Terminal Suffix

The two-letter package-outline-style code is supplemented with a single-letter suffix following a dash (-) that identifies the terminal code. Table 5 shows one-letter terminal suffix codes.

If more than one type of terminal is present, then the electrical terminals determine the terminal suffix code. If one of these terminals is a mounting stud, its classification shall not govern the choice of terminal suffix code because that is described by the package-outline-style code. The following rules apply:

- 1) The extended definitions of Terminals are recommended to be incorporated in the name of the package.
- 2) If there is only one Terminal group within the Package, then the Terminal code in the Package name = the value of the Terminal code of that Terminal Group.

If there are several Terminal Groups within a Package, the character that denotes the Terminal code in the Package name should reflect the combination of the Terminals across each of the Terminal Groups, by using the Mixed SMT, Mixed TH, or Mixed Technology if each Terminal Group has different Terminal types. When there are 2 or more Terminal Groups on the part, and the value of the Terminal code is different for each terminal group, then

- 1) If all the terminals are surface mount terminals, then the terminal code character in the package name is set to "E" for "Mixed SMT"; or
- 2) If all the terminals are through hole terminals, then the terminal code character in the package name is set to "K" for "Mixed TH"; or
- 3) If all the terminals are a mixture of both surface mount, through hole, or pressfit, then the terminal code character in the package name is set to "V" for "Mixed Technology"

The value of the Terminal code attribute is defined according to the signal/power terminals only. When there are no such terminals, the Terminal code attribute is defined according to the remaining terminals. If there are no terminals of any kind as in a housing only, then the Terminal code is omitted.

Similar to the rollup of the Terminal Group Terminal Position into the Package Terminal Position, if the extended codes of the Terminal Group Terminal Code are not the same for each Terminal Group, then the extended definition is ignored at the Package Terminal Code level.

3.2.5 Terminal Suffix (cont'd)

Table 5 - Suffixes for Terminal

Code	Form/shape	Description
B ¹	Ball	A spherical terminal in the shape of a ball.
C	C-bend	A compliant terminal extending from the sides of the body, bending down, and forming a flat contact area with the board under the package body. It is similar to a J-bend except that the bottom of the terminal is flat, and not rounded up under the package body.
D ¹	Lug	A type of wire terminal secured by a screw, crimp, or solder to provide electrical and/or mechanical function.
F ¹	Flat	A compliant, or noncompliant, unformed planar terminal that extends away from the package body.
G ¹	Gull-wing	An SMD terminal that extends horizontally from the package body, bent downward adjacent to the body, and then bent outward near the bottom of the body.
H	Compressed Mount Technology	The connector is sandwiched between two objects to provide connection, such as two PCB boards. Enough retention force is needed to compress the terminal at both ends to ensure the reliability of connection.
I	Post (Stud) Terminal	A metallic post or a modified through-hole terminal intended for SMD mounting.
J	J-bend	An SMD terminal form that extends horizontally from the package body near its Z axis centerline, is formed down and then rolled under the package. Terminals so formed are shaped like the letter "J".
L ¹	L-bend	An L-shaped compliant SMD terminal that extends from the bottom of the package body and bends sideways, forming an "L" shape. Additional classification is not necessary if the terminal ends are visible in the plan view of the part when mounted on the seating plane.
M ¹	Column	Terminals are perpendicular to the seating plane and consist of solid or metallized extensions
N ¹	Surface-terminal	Metallized contact area located on any surface of the device body.
O ¹	Pressfit	A terminal that forms an interference fit with the hole in which it is vertically inserted, using pressure, creating enough friction that causes the metal coating of the terminal and the hole to reflow
P ¹	Pin	A reinforced terminal that extends from the bottom of the package body and is intended for attachment as is, to a plated through-hole in the printed board or into a socket. This terminal is not meant to be formed or cut during the part assembly to the printed board.

Table 5 - Suffixes for Terminal (cont'd)

Code	Form/shape	Description
Q ¹	Quick-connect	A tab-like terminal typically extending from the upper or under side of the package body, or a terminal within a socket that plugs into another connector. If the part is mounted to the printed board, then it should be classified under the definition of the electrical terminals that connect to the printed boards, and not by these tab-like terminals. These terminals provide a plug-on, plug-off connection.
R ¹	Wraparound	A metallized contact area that wraps around the top, 1 or more sides and bottom of the package body.
S ¹	S-bend	A SMD terminal that extends away from the package body and is then rolled twice underneath the package to form a shape like the letter "S".
T ¹	Through-Hole	A tempered terminal with square/rectangular/circular or V-shaped cross section intended for attachment to a through-hole in the land structure. This terminal can be prepped to provide a different mounting method for the Part.
U	J-inverted	A SMD terminal that extends horizontally from the package body near its Z axis centerline, is formed down and then rolled away the package.
W ¹	Terminal Wire	A solid metal terminal that extends from the package body.
Y	Screw	A hole or a threaded terminal
NOTE Examples of terminal images are shown in Annex A.		
NOTE 1 These terminal form definitions can have some variations that often require further definition or clarification as defined in Annex A.		

3.2.6 Terminal-count Suffixes

The terminal-count suffix is a numeric field used to identify the number of terminals on the device package. If there is more than one type of terminal, the terminal-count shall include all those terminals whose function is either electrical signal or power terminals. If the terminal count is lower than the number of available terminal positions due to terminals missing or deleted, the latter may be added in parentheses, e.g., 20[26] or 168[289]. The terminal count suffix field follows the terminal code character, which is separated from the preceding portion of the descriptive designator by a dash (-).

Terminals are considered missing when the terminal numbering of the available terminals present assumes that there are no missing terminals. Hence when the 3rd terminal is missing in a row of 4 terminals, the fourth terminal number is 4.

Terminals are considered deleted when the terminal numbering of the available terminals present assumes that there was never a terminal intended for that location. Hence when the 3rd terminal is deleted in a row of 4 terminals, the last terminal in the row is terminal number 3.

3.2.6 Terminal-count Suffixes (cont'd)

Some terminals may be excluded from terminal numbering. Example of some of these terminals are non-electrical terminals, such as those terminals that provide only a mechanical function.

When there are no such signal/power terminals, the Terminal count attribute is defined according to the remaining terminals. If there are no terminals of any kind as in a housing only, then the Terminal count is omitted.

3.2.7 Package Pitch

The Package Pitch follows the Terminal Count via a separation of an underscore (_). There are characters that are used to represent the direction of the pitch on the package. The value is determined by the shortest distance between the center of any 2 terminals, irrespective if they belong to the same terminal group or not. When the smallest pitch is

- In either the x or y direction, then the character I for “Inline” is used. If the pitch is in the x direction, then the distance between the center on the terminals in the y direction (dy) = 0. If the pitch is in the y direction, then the distance between the center on the terminals in the x direction (dx) = 0. For grid pattern of terminals in which the pitch value in the row and column directions are different, then a secondary pitch value can be applied to the Inline pitch code, e.g., Ix1p20y0p75 conveys that the pitch is 1.2mm in the x axis and 0.75mm in the y axis. See NOTE 8 in Table A.3 - Suffixes for terminal with additional definition below.
- If both the dx and the dy are > 0 , then the character D for “Diagonal Pitch” is used. Interstitial pitch (staggered terminals).
- If the Terminals are in a circular array, then the character R for “Pitch Radius” is used. The Pitch Radius is then followed by the Angle between the terminal’s centers, e.g., R4p5A30 means that the Pitch Radius is 4.5mm and that angle between the Terminals is 30 degrees.
- If there is no pitch, on the part, due to for example a single terminal, then the character “X” is used. If there are no terminals of any kind as in a housing only, then the pitch is omitted.
- Pitch values shall be specified at their nominal values

Pitch codes as per previous revisions of this Standard are no longer used because of the emergence of too many new pitches in the industry.

3.2.8 Supplemental-information Field

An additional supplemental-information field follows Package Pitch and is separated by a dash (-). When applied, the field normally refers to nominal package dimensions. An example of such is R5p08x2p54Z1p27, meaning Package-body shape is Rectangle and its dimension = 5.08 mm x 2.54 mm and Package-body dimension in the z direction = 1.27 mm.

Table 6 - Package Shape and Size below provides a list of standard Package Shapes with their respective shape codes to help identify the shape of the package body.

Table 6 - Package Shape and Size

Package Shape	Dimension 1	Dimension 2	Dimension 3	Diameter	Radius	No. of Sides	Inner/Outer	Code	Example	Construction
Rectangle	Y	Y						R	R5p0x2p5Z5p5	R<Dim1>x<Dim2>
Rounded Rectangle	Y	Y			Y			RR	RR1p0x0p5R0p05Z5p5	RR<Dim1>x<Dim2>R<Radius>
Modified Rectangle	Y	Y						MR	MR1p0x0p5Z5p5	MR<Dim1>x<Dim2>
Circle				Y				C	C0p5Z5p5	C<Diameter>
Double-D	Y	Y						DD	DD5p0x1p25Z5p5	DD<Dim1>x<Dim2>
Regular Polygon				Y		Y	Y	RP	RP8ID8p6Z5p5, or RP8OD8p6Z5p5	RP<Number of Sides><Inner/Outer Diameter><Diameter>
Segment	Y			Y				S	S5p5D2p4Z5p5	S<Diameter>D<Dim 1>
Para-truncated Circle	Y			Y				PtC	PtC10p0x5p2Z5p5	PtC<Diameter>D<Dim 1>
Rounded Diamond	Y			Y	Y			RD	RD10p0x12p2x1p5Z5p5	RD<Diameter>D<Dim 1><Radius>
Rounded Chamfered Diamond	Y	Y		Y				RCD	RD10p0x12p2x1p0Z5p5	RD<Diameter>D<Dim 1><Dim2>
Isosceles Trapezoid	Y	Y	Y					IT	IT10p0x0p5x0p70Z5p5	IT<Dim 1>x<Dim 2>x<Dim 3>
Contour								Ctur	Ctur<checksum>Z5p5	Ctur<checksum>

Shapes with Tab have “wT” abbreviation added to the end of the shape code, as in RwT5p0x2p5.

The shape definitions are specified in the JEDEC Publication JEP30-P100, in A.1

3.2.9 Terminal Span, Spacing, Shape and Size

The Package name as shown in Figure 1 - Descriptive Designation System for Electronic-device Packages shows the example of Terminal Span, Spacing and Terminal Thickness as defined by the –N#C#T# following the Package dimensions is configurable based on Terminal type, as outlined in the following sub-clauses. Notice that some Terminal types do not require this information to be captured in the package name, since these terminal types do not add value to the Package name designation, however, they are required to be properly defined in the PartModel file as defined in the JEP30 Guideline publications.

The addition of this clause to the naming convention only applies to the signal/power terminals only. When there are no such terminals, the Terminal code attribute is defined according to the remaining terminals. When there are multiple terminal types that drive multiple values for this clause, then this clause can be excluded from the naming convention.

3.2.9.1 Terminal Span and Terminal Spacing

Terminal Span and Spacing values are critical in the calculation of the most efficient land patterns for many Terminal types. Failure to provide the complete set of this information results in the user applying worse case calculations that have a wider tolerance than what is otherwise the case.

IPC proposes a series of formulas to arrive at a new min and max terminal spacing, derived from terminal span values minus 2 times the terminal contact length minus the square root of the sum of the squares of the part and terminal tolerances. The calculation is made based off the assumption that the worst-case scenario is that the maximum terminal length will not occur at the same time on the part as the minimum terminal span. This may be statically true for a large percentage of the parts, but it does not guarantee that all parts will fall in between those new limits. These new dimensions are then used in the footprint rules calculations, resulting in land patterns that are either too big or too small, but almost certainly not properly optimized for the part.

Since it is most likely that the maximum terminal length will not occur at the minimum terminal span to calculate the minimum terminal spacing, the component manufacturer should provide the following set of dimensions in relation to the terminal contact area and position.

- 1) Terminal span including tolerances - The max value is critical
- 2) Terminal spacing including tolerances - The min value is critical
- 3) Terminal length including tolerances.

These dimensions are critical for the following terminal types and added to the Package name as shown in Figure 1 - Descriptive Designation System for Electronic-device Packages.

3.2.9.2 Terminal Shape and Size

Terminal Shape and Size is more applicable than Span or Spacing values for some Terminal types, because this shape and size is used in the calculation of the land patterns for these Terminal types. Table 7 - Terminal types requiring Terminal Span and Terminal Spacing versus Terminal Shapes and Size dimensions below outlines which terminal types should have their shape and size defined and which terminal types should have their span and spacing defined. For those terminals which require their shape and size to be defined, Table 8 – Terminal shape and size below provides the code structure to represent this data.

Table 7 - Terminal types requiring Terminal Span and Terminal Spacing versus Terminal Shapes and Size dimensions

Code	Name	Level 1	Span, Spacing, Shape Size
B	Ball	Bump	Terminal Shape & Size
		Collapsing	Terminal Shape & Size
		Non-Collapsing	Terminal Shape & Size
C	C-bend		Span and Spacing
D	Lug	Perforated (Pierced) Solder Terminal	Terminal Shape & Size
		Cup Solder Terminal	Terminal Shape & Size
		Hook Solder Terminal	Terminal Shape & Size
		Crimp Lug	Terminal Shape & Size
		Ring Tongue Terminal	Terminal Shape & Size
		Lug with Threaded Hole	Terminal Shape & Size
F	Flat		Span and Spacing
		Elevated	Span and Spacing
		Flat-L-Bend	Span and Spacing
		Hole	Not Required
		With-opening	Not Required
G	Gull-wing		Span and (Opt) Spacing
		Modified	Span and (Opt) Spacing
H	Compressed Mount Technology		Pad Shape and Size
I	Post (Stud)	Butt	Terminal Shape & Size
		Flatten Post Connection	Terminal Shape & Size
J	J-bend		Span Pitch
L	L-bend		Span Pitch
		Inward	Span and Spacing
		Outward	Span and Spacing
		Side Inward	Span and Spacing
		Side Outward	Span and Spacing
		LC-bend	Span and Spacing
M	Column		Terminal Shape & Size
		Ribbon Wrap	Terminal Shape & Size
		Microspring	Terminal Shape & Size
		Copper Coated Solder Column	Terminal Shape & Size
N	Surface-terminal		Terminal Shape & Size
		Castellated	Terminal Shape & Size
		Hole	Terminal Shape & Size
		With-opening	Terminal Shape & Size
		Open-Ring	Terminal Shape & Size

Table 7 - Terminal types requiring Terminal Span and Terminal Spacing versus Terminal Shapes and Size dimensions (cont'd)

Code	Name	Level 1	Span, Spacing, Shape Size
O	Pressfit		Pad Hole and Shape Size
		Compliant	Pad Hole and Shape Size
		Non-Compliant	Pad Hole and Shape Size
P	Pin		Terminal Shape & Size
		Kinked	Terminal Shape & Size
		Shoulder	Terminal Shape & Size
		Press-In Solderable	Not Required
		Swage Fastening Pin	Terminal Shape & Size
		Press-In Non-Solderable	Not Required
Q	Quick-connect		Terminal Shape & Size
R	Wraparound	Castellated	Not Required
		Ring	Not Required
		Open-Ring	Not Required
		Nibble	Not Required
		Convex-E	Not Required
		Convex-S	Not Required
S	S-bend	Inward Flat	Span and Spacing
		Inward Curved	Span and Spacing
		Outward Flat	Span and Spacing
		Outward Curved	Span and Spacing
T	Through-Hole		Terminal Shape & Size
		Kinked	Terminal Shape & Size
		Shoulder	Terminal Shape & Size
U	J-inverted		
W	Terminal Wire		Terminal Shape & Size
		Kinked (Bent)	Terminal Shape & Size
		SM-Wire	Terminal Shape & Size
		SM-Coined Wire	Terminal Shape & Size
		Wraparound – SMT Mount	Terminal Shape & Size
		Coined Wraparound – SMT Mount	Terminal Shape & Size
Y	Screw	Clearance Hole	Not Required
		Threaded Hole	Not Required
		Screw	Not Required

Table 8 - Terminal Shape and Size

Terminal Shape	Dimension 1	Dimension 2	Dimension 3	Diameter	Radius	No. of Sides	Inner/Outer	Code	Example	Construction
Rectangle	Y	Y						R	R1p0x0p5	R<Dim1>x<Dim2>
Rounded Rectangle	Y	Y			Y			RR	RR1p0x0p50R0p05	RR<Dim1>x<Dim2>R<Radius>
Modified Rectangle	Y	Y						MR	MR1p0x0p5	MR<Dim1>x<Dim2>
Circle				Y				C	C0p5	C<Diameter>
D-Shape	Y	Y						DS	DS1p0X0p2	DS<Dim1>x<Dim2>
Double-D	Y	Y						DD	DD1p0x0p2	DD<Dim1>x<Dim2>
Regular Polygon				Y		Y	Y	RP	RP8ID0p6, or RP8OD0p6	RP<Number of Sides><Inner/Outer Diameter><Diameter>
Segment	Y			Y				S	S0p5D0p4	S<Diameter>D<Dim 1>
Para-truncated Circle	Y			Y				PtC	PtC1p0x0p2	PtC<Diameter>D<Dim 1>
Isosceles Trapezoid	Y	Y	Y					IT	IT1p0x0p5x0p7	IT<Dim 1>x<Dim 2>x<Dim 3>
Contour								Ctur	Ctur<checksum>	Ctur<checksum>

The shape definitions are specified in the JEDEC Publication JEP30-P100, in A.1

3.2.10 Terminal Vertical Dimensions

Terminal vertical dimensions is sometimes used to calculate the solder fillet requirements for certain terminal shapes.

This dimension should be captured for the following terminal shapes and added to the Package name as shown in Figure 1 - Descriptive Designation System for Electronic-device Packages. The definition of the Terminal Vertical Dimensions is specified in Table 9.

Table 9 - Terminal Types Requiring Terminal Vertical Dimensions

Code	Name	Level 1	Terminal Vertical Dimensions
B	Ball	Bump	Terminal Height
		Collapsing	Terminal Height
		Non-Collapsing	Terminal Height
C	C-bend		Terminal Thickness
D	Lug	Perforated (Pierced) Solder Terminal	Not Required
		Cup Solder Terminal	Not Required
		Hook Solder Terminal	Not Required
		Crimp Lug	Not Required
		Ring Tongue Terminal	Not Required
		Lug with Threaded Hole	Not Required
F ¹	Flat		Terminal Thickness
		Elevated	Terminal Thickness
		Flat-L-Bend	Terminal Thickness
		Hole	Not Required
		With-opening	Not Required
G ¹	Gull-wing		Terminal Thickness
		Modified	Terminal Thickness
H	Compressed Mount Technology		Not Required
I	Post (Stud)	Butt	Not Required
		Flatten Post Connection	Not Required
J	J-bend		Terminal Thickness
L ¹	L-bend		Terminal Thickness
		Inward	Terminal Thickness
		Outward	Terminal Thickness
		Side Inward	Terminal Thickness
		Side Outward	Terminal Thickness
		LC-bend	Terminal Thickness
M ¹	Column		Terminal Height
		Ribbon Wrap	Terminal Height
		Microspring	Terminal Height
		Copper Coated Solder Column	Terminal Height

Table 9 - Terminal Types Requiring Terminal Vertical Dimensions (cont'd)

Code	Name	Level 1	Terminal Vertical Dimensions
N	Surface-terminal		Exposed Terminal Thickness
		Castellated	Exposed Terminal Thickness
		Hole	Exposed Terminal Thickness
		With-opening	Exposed Terminal Thickness
		Open-Ring	Exposed Terminal Thickness
O	Pressfit	Compliant	Terminal Insertion Height
			Terminal Insertion Height
			Terminal Insertion Height
			Terminal Insertion Height
		Non-Compliant	Terminal Insertion Height
P ¹	Pin		Terminal Insertion Height
		Kinked	Terminal Insertion Height
		Shoulder	Terminal Insertion Height
		Press-In Solderable	Not Required
		Swage Fastening Pin	Terminal Insertion Height
		Press-In Non-Solderable	Not Required
Q	Quick-connect		Not Required
R ¹	Wraparound	Castellated	Not Required
		Ring	Not Required
		Open-Ring	Not Required
		Nibble	Not Required
		Convex-E	Not Required
		Convex-S	Not Required
S	S-bend	Inward Flat	Terminal Thickness
		Inward Curved	Terminal Thickness
		Outward Flat	Terminal Thickness
		Outward Curved	Terminal Thickness
T ¹	Through-Hole		Terminal Insertion Height
		Kinked	Terminal Insertion Height
		Shoulder	Terminal Insertion Height
U	J-inverted		Terminal Thickness
W ¹	Terminal Wire		Terminal Insertion Height
		Kinked (Bent)	Terminal Insertion Height
		SM-Wire	Terminal Thickness
		SM-Coined Wire	Terminal Thickness
		Wraparound – SMT Mount	Terminal Thickness
		Coined Wraparound – SMT Mount	Terminal Thickness

Table 9 - Terminal Types Requiring Terminal Vertical Dimensions (cont'd)

Code	Name	Level 1	Terminal Vertical Dimensions
Y	Screw	Clearance Hole	Not Required
		Threaded Hole	Not Required
		Screw	Not Required

The Terminal Vertical definitions is specified in the JEDEC Publication JEP30-P100, in A.2, the following codes are used for each type of Terminal vertical dimension.

- Terminal Height “H”
- Terminal Thickness “T”
- Exposed Terminal Thickness “ET”
- Terminal Insertion Height “IH”

3.2.11 Body Direction

This attribute is different to the “mounting preparation attribute” since it defines whether the part body is either vertical or horizontal, by comparing the cross-sectional area of the part in both the horizontal direction and the vertical direction. If the horizontal cross-sectional area is greater than the vertical cross-sectional area, then the body direction is horizontal. The enumerated value of this attribute is therefore:

- 1) Horizontal (H), and
- 2) Vertical (V)
- 3) The Code H and V are optional for inclusion into the Package Name

An example of horizontal body direction is shown in

Figure 2 - Horizontal Body Direction, and an example of vertical body direction is shown in

Figure 3 - Vertical Body Direction.

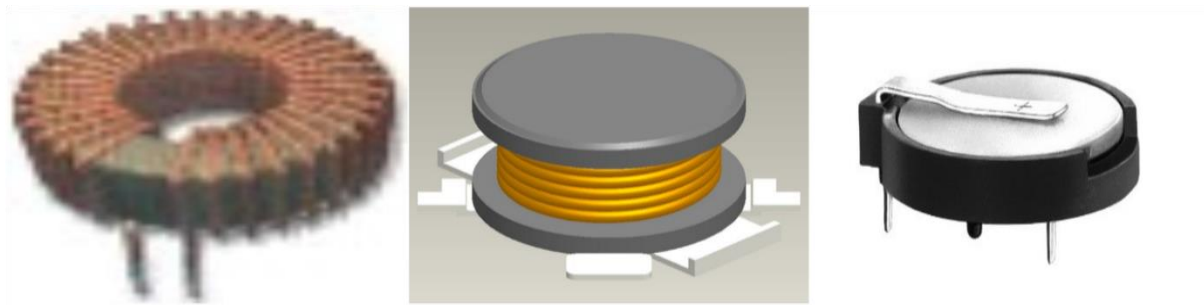


Figure 2 - Horizontal Body Direction

3.2.11 Body Direction (cont'd)

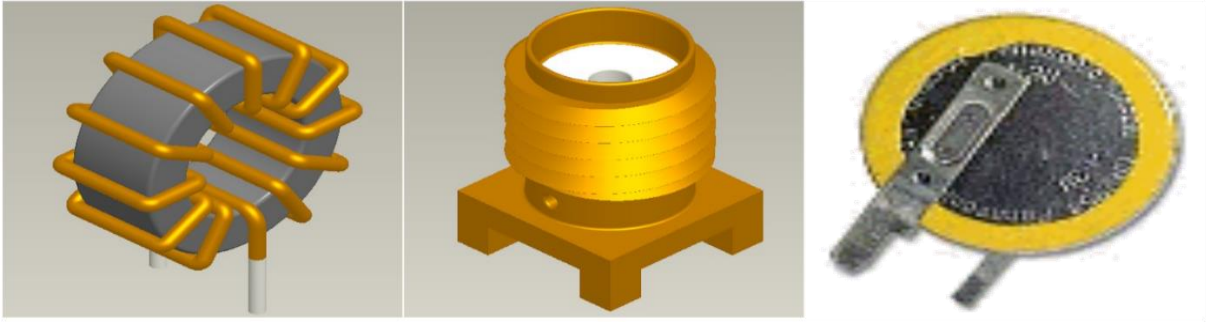


Figure 3 - Vertical Body Direction

3.2.12 Mounting Preparation

Most parts are mounted onto the printed board, without the need to preform (prep) the part. This is defined as “Straight” mounting, since the part is placed on the printed board in the way intended by the component manufacturer. When the part is pre-formed before assembly, and the body direction, or standoff is changed to enable an alternative assembly mounting, then this is called “Prepped before Mounting”. The enumerated value of this attribute is therefore:

- 1) Straight Mounted (S), and
 - a. The Code S is optional for inclusion into the Package Name
- 2) Prepped before Mounting (P)
 - a. The Code P is mandatory for inclusion into the Package Name if the Part is prepped by the component manufacturer.

A sample of horizontal and vertical body directions is shown in Figure 4 - Packages that are Straight Mounted as received from Supplier, and Figure 5 - Prepped Packages prior to Assembly below

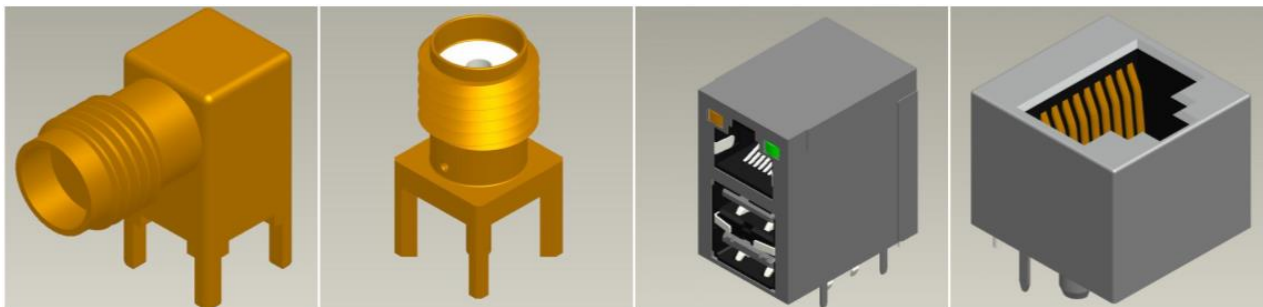


Figure 4 - Packages that are Straight Mounted as received from Supplier