JEDEC STANDARD

Descriptive Designation System for Semiconductor-device Packages

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JESD30E

(Revision of JESD30D, July 2006)

SEPTEMBER 2008

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

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DESCRIPTIVE DESIGNATION SYSTEM FOR SEMICONDUCTOR-DEVICE PACKAGES

Contents

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Foreword

This standard establishes requirements for the generation of semiconductor-device package designators for the Electronic Industries Alliance (EIA) and JEDEC Solid State Technology Association. The requirements herein are intended to ensure that such designators are presented in as uniform a manner as practicable regardless of the devices in the packages.

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 JESD30C. 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.

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DESCRIPTIVE DESIGNATION SYSTEM FOR SEMICONDUCTOR-DEVICE PACKAGES

(From JEDEC Board Ballot JCB-06-24 and JCB-08-32, 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 semiconductor-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 purposes of this standard, the following definitions shall apply:

can package: Generally, a cylindrical package whose terminals exit from one end parallel to the axis of the package.

chip-scale package: A package whose area is generally no greater than 120% of the area of the semiconductor device it contains.

NOTE The package size does not necessarily change with decreases in the die size.

clamped package: 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 busbars acting as heat sinks.

die-size package: A chip-scale package whose area is generally equal to the area of the semiconductor device it contains.

NOTE 1 Usually, but not necessarily, some portion of the silicon IC is exposed. The device is then also an uncased device.

NOTE 2 The package size will change with changes in the size of the die.

disk-button package: 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.

flange-mount package: 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.

footprint (of a package): The pattern of package leads 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.

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2 Terms and definitions (cont'd)

grid-array package: A package whose terminals are located on one surface in a matrix of at least three rows and three columns.

NOTE Terminals may be missing from some row-column intersections.

in-line module: A microelectronic assembly whose terminals consist of metal pad surfaces located on one or both sides of a circuit board designed for insertion into an edge connector.

in-line package: A package having a single row or parallel rows of leads designed primarily for insertion (through-hole) mounting perpendicular to the seating plane.

NOTE The leads may emerge from a single side or from two parallel sides with the leads formed to produce parallel rows.

long-form package: A cylindrical or elliptical tubular package having terminal endcaps or axial leads.

microelectronic assembly: An assembly of unpackaged (uncased) microcircuits and/or packaged microcircuits so constructed on a packaging interconnect structure that it is considered to be an indivisible component for the purpose of specification, testing, commerce, and maintenance.

NOTE The 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, and the external terminals typically exit from one side of the assembly. Various package sizes, shapes, and external terminal forms may be used.

post-mount package: 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 forms are possible.

press-fit package: A round or elliptical package whose mechanical mounting area is pressed into the packaging interconnect structure or cold plate for purposes of thermal and electrical connection.

press-pack: Synonym for "press-fit package".

quad flatpack: A surface-mount package whose terminals are on four sides and consist of metal pad surfaces (on leadless versions) or leads emerging from the package.

NOTE 1 The package leads may be formed to facilitate surface mounting.

NOTE 2 The small-outline package is similar except for having terminals on only two opposite sides of the package.

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2 Terms and definitions (cont'd)

small-outline package: A package whose chip cavity or mounting area occupies a major fraction of the package area and whose terminals are on one or two (normally opposite) sides and consist of metal pad surfaces (on leadless versions) or leads formed around the sides and under the package or out from the package (on leaded versions).

NOTE 1 On leaded versions the lead form is typically gull wing, but other lead forms may be used.

NOTE 2 The quad flatpack is similar except for having terminals on four sides of the package.

special-shape package: A package whose outline style is not otherwise specified in JESD30.

stud-mount package: Synonym for "post-mount package".

terminal: An externally available point of electrical connection. (Ref. JESD99.)

uncased device: A device with some portion of the die exposed.

NOTE 1 Typically, the die has bonding pads, bumps, etc. that may be bonded to pads or lands on a leadframe, tape, substrate, or printed wiring board

vertical surface-mount package: A surface-mount package that is intended to be mounted perpendicular to the seating plane.

NOTE The package may include supporting posts (for insertion through the seating surface) or pedestals (for attachment to the seating surface).

wafer-level package: A chip-scale package whose area is generally equal to the area of the semiconductor device it contains and that is formed by processing on a complete wafer rather than on an individual device.

NOTE 1 Because of the wafer-level processing, a wafer-level package may be defined by finer dimensions and tighter tolerances than a similar non-wafer-level package.

NOTE 2 The package size will change with changes in the size of the die.

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3 Descriptive designation system for semiconductor-device packages

3.1 General

The standard descriptive designation system is a method for identifying the physical features of an electronic-device package. The system is predicated upon a mandatory field (shown below) consisting of a three-letter basic package designator that indicates the package outline style and terminal position or form, preceded by a field to indicate the package-body material. This mandatory package designator may be extended, through the use user-selected fields, to provide additional package information such specific package features, package differentiators, terminal count, and supplemental information separated from the descriptive designator by a slash (/).

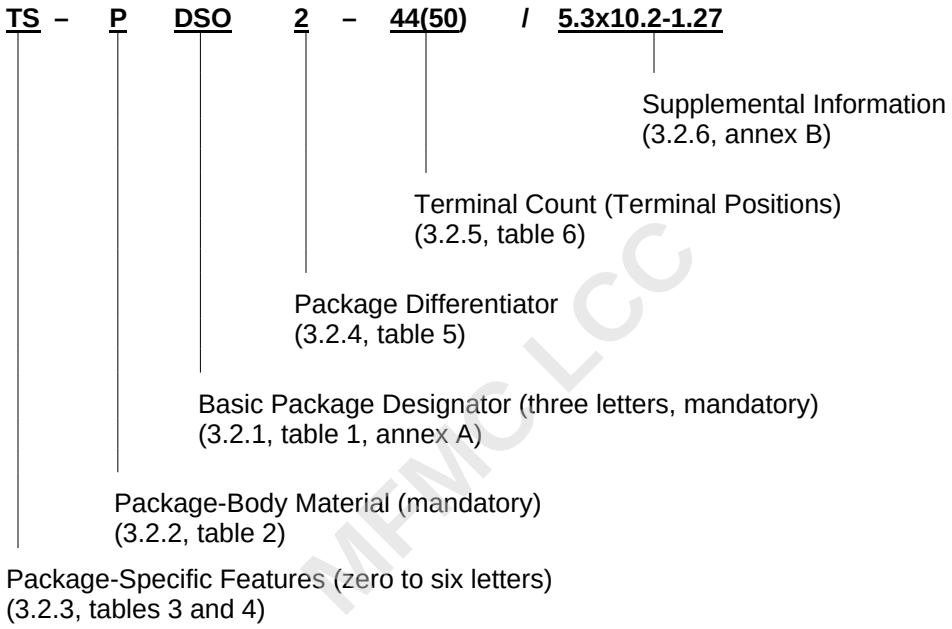

Figure 1 — Descriptive designation system for semiconductor-device packages

NOTE JEITA ED7303 (“Name and code for integrated circuit package”) and IEC 60191-4 (“Coding system and classification into forms of package outlines for semiconductor device packages”) are standards similar to JESD30. The major difference between JESD30 and those standards is that the package-body material identifier field precedes the package-specific feature field in the JEITA and IEC standards.

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3.2 Field descriptions

3.2.1 Basic package designator

The basic package designator is a three-letter code comprising a two-letter package outline style code (see table A.1) and either a preceding terminal-position code (see table A.2) or a succeeding lead-form (or terminal-shape) code (see table A.3). Complete three-letter basic package designators are described in table 1.

Table 1 — Three-letter basic package designators

Basic pkg. designator	Common pkg. name	Description
BGA	Ball grid array	A grid-array package with balls or bumps on the bottom surface
CGA	Column grid array	A grid-array package with columns on the bottom surface
DIM	Dual in-line module	An in-line module with terminal pad surfaces on both surfaces of a printed circuit board substrate
DIP	Dual in-line package	An in-line package with leads in parallel rows on opposite sides of the package body and intended for through-hole insertion into a circuit board
DSO	Small-outline package	A small-outline package with gull-wing-shaped leads on two opposite sides
DSB	Die-size BGA	A BGA that is the size of the die it contains and whose size will change with changes in die size
LGA	Land grid array	A grid-array package with terminal pads on the bottom surface
PGA	Pin grid array	A grid-array package with pins protruding from the bottom surface
QFF	---	A flat-type package with flat, unformed leads extending from four sides
QFJ	---	A flat-type package with J-shaped leads on four sides
QFN	---	A flat-type package with terminal pads (no leads) along the four edges of the bottom surface
QFP	Quad flatpack	A flat-type package with gull-wing-shaped leads on four sides
SIM	Single in-line module	An in-line module with terminal pad surfaces on only one surface of a printed circuit board substrate
SIP	Single in-line package	An in-line package with leads on only one side
SKT	Socket	An array of terminals embedded in a nonconductive shell. This is typically used as an electromechanical interface between a component and a PC board.
SOF	---	A small-outline package with unformed (flat) leads on two opposite sides
SOJ	---	A small-outline package with J-shaped leads on two opposite sides
SON	---	A small-outline package with terminal pads along two opposite edges of the bottom surface
SVP	---	A vertical surface-mount package with supporting posts
UCI	Tape carrier package	An uncased chip with leads extending outward in four directions on an insulating film
WLB	Wafer-level BGA	A BGA that is processed on an entire wafer before singulation rather than on an individual die, and whose size will change with changes in die size
ZIP	Zigzag in-line package	An in-line package with zigzag leads on only one side for through-hole insertion into a printed circuit board

NOTE 1 Descriptions for basic package designators not listed are to be defined and added as necessary.
NOTE 2 Basic package designator examples are illustrated in figure A.1.

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3.2 Field descriptions (cont'd)

3.2.2 Package-body material

A single-letter prefix is used to identify the predominant 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 1, an upper case letter "X" should be used to signify a special or new material, which will later be replaced by a JEDEC-approved code.

Table 1 shows the package-body-material prefix codes.

Table 2 — Prefixes for predominant package-body material

Code	Material
C	Ceramic, metal-sealed, cofired
G	Ceramic, glass-sealed
M	Metal
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

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3.2.3 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 the three-letter basic package designator (see tables 1 and 2), and are separated from them by a dash (-).

Table 3 shows the defined package-specific-feature codes. Table 4 illustrates some of the combinations of the codes for seated height and terminal pitch.

Package-specific feature codes shall be used in the order of priority of the categories as presented in table 3. For example the package-specific features prefix for a package having a 1.3-mm nominal seated height, a 0.6-mm nominal terminal pitch, and an integral heat slug is "HLS" (following the order "Added feature", "Seated height", and "Terminal pitch").

When subcodes are shown in table 3, they may be used if a more a more restrictive definition of the feature characteristic is desired, e.g., "F3" may be used if a more specific range of terminal pitch is desired than would be recognized by the use of the major code "F"

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3.2 Field descriptions (cont'd)

Table 3 — Codes for package-specific features

Function (in order of priority)	**Code**	**Subcode**	**Package-specific feature (relevant dimensions)**
Added feature	H		Integral heat spreader wholly or partially exposed
	A		Stacked package assembly
	C		Windowed package for optical devices
Maximum Seated height (profile)		B2	Extra thick (>3.50 mm)
		B1	Very thick (>2.45 mm and ≤3.50 mm)
	B		Thick (>2.45 mm)
	(blank)		Standard (>1.70 mm and ≤2.45 mm)
	L		Low (>1.20 mm and ≤1.70 mm)
	T		Thin (>1.00 mm and ≤1.20 mm)
	V		Very thin (>0.80 mm and ≤1.00 mm)
	W		Very, very thin (>0.65 mm and ≤0.80 mm)
	U		Ultra thin (>0.50 mm and ≤0.65 mm)
	X		Extremely thin (≤0.50 mm)
		X1	Extra-thin (>0.40 mm and ≤0.50 mm)
		X2	Super-thin (>0.30 mm and ≤0.40 mm)
		X3	Paper-thin (>0.25 mm and ≤0.30 mm)
		X4	Die-thin (≤0.25 mm)
Terminal pitch	E		Enlarged (>1.27 mm for DSO, SOJ) Enlarged (>1.00 mm for QFP) Enlarged (>0.100 in for DIP, SIP, PGA) Enlarged (≥1.50 mm for BGA, LGA, CGA)
	(blank)		Standard (>0.070 in and ≤ 0.100 in) for DIP, SIP, PGA) Standard (>0.65 mm and ≤1.27 mm for DSO, SOJ) Standard (>0.50 mm and ≤1.00 mm for QFP) Standard (≥0.40 mm and ≤1.00 mm for LQFP, TQFP) Standard (≥1.00 mm and <1.50 mm for BGA, LGA, CGA)
	S		Shrink (≤0.65 mm for DSO, SOJ) Shrink [≤0.070 in (1.78 mm) for DIP, SIP, PGA]
	F		Fine (≤0.50 mm for QFP, QFN, DSO, SON) Fine (<1.00 mm for BGA, LGA, DSB, WLB)
		F1	Fine (= 0.80 mm for BGA, LGA, DSB, WLB)
		F2	Fine (= 0.75 mm for BGA, LGA, DSB, WLB)
		F3	Fine (= 0.65 mm for BGA, LGA, DSB, WLB)
		F4	Fine (= 0.50 mm for BGA, LGA, DSB, WLB)
		F5	Fine (= 0.40 mm for BGA, LGA, DSB, WLB)
		F6	Fine (= 0.30 mm for BGA, LGA, DSB, WLB)
Other	I		Interstitial pitch (staggered leads)
	R		Rectangular body
NOTE Certain packages (DIP, SIP, PGA) traditionally designed using inch dimensioning may continue to use			

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3.2 Field descriptions (cont'd)

Table 4 — Codes for seated height and terminal pitch combination examples

Nominal terminal pitch	Package seated height						
	Standard	Low	Thin	Very thin	Very very thin	Ultra thin	Extremely thin
Enlarged	E	LE	TE	VE	WE	UE	XE
Standard	(blank)	L	T	V	W	U	X
Shrink	S	LS	TS	VS	WS	US	XS
Fine	F	LF	TF	VF	WF	UF	XF
Fine (0.80 mm)	F1	LF1	TF1	VF1	WF1	UF1	XF1

3.2.4 Package differentiator

If package differentiation other than that defined by the package-specific-features prefix (see 3.2.3) is required, an Arabic numeral may be added to the basic package designator, e.g., SOJ2.

Table 5 shows defined package differentiation number codes.

Table 5 — Package differentiator suffix codes

Code	Usage	Description
1	SOJ1	A small-outline package with J-shaped leads on the two short sides
	SON1	A leadless small-outline package with terminals on the two short sides
	DSO1	A small-outline package with gull-wing-shaped leads on the two short sides
2	SOJ2	A small-outline package with J-shaped leads on the two long sides
	SON2	A leadless small-outline package with terminals on the two long sides
	DSO2	A small-outline package with gull-wing-shaped leads on the two long sides

3.2.5 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 only those terminals that were used to determine the lead-form suffix in accordance with annex A. If the terminal count is lower than the number of available terminal positions, the latter may be added in parentheses, e.g., 20(26) or 168(289). The terminal-count suffix field is separated from the preceding portion of the descriptive designator by a dash (-).

For BGA packages, if several ball diameters are permitted, an additional three-character code may be added to the terminal count field. The code consists of the lowercase letter "b" and 2 numbers corresponding to the code in table 6. For example, FR-PBGA-127b04 would mean a fine-pitch, rectangular, plastic BGA with 127 balls with a nominal diameter of 0.45 mm.

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3.2.5 Terminal-count suffixes (cont'd)

Table 6 — BGA ball diameter codes

Code	Description
b01	nominal ball diameter = 0.75 mm
b02	nominal ball diameter = 0.60 mm
b03	nominal ball diameter = 0.50 mm
b04	nominal ball diameter = 0.45 mm
b05	nominal ball diameter = 0.40 mm
b06	nominal ball diameter = 0.35 mm
b07	nominal ball diameter = 0.30 mm
b08	nominal ball diameter = 0.25 mm
b09	nominal ball diameter = 0.20 mm
b10	nominal ball diameter = 0.17 mm

3.2.6 Supplemental-information field

A supplemental-information field, beginning with a slash (/), may be appended to the descriptive designator. When applied, the field normally refers to nominal package dimensions (see annex B). An optional use for this field may be allowed for reference to an outline drawing, a company package code, or a specific variation of a registered outline.

The slash signifies the beginning of the supplemental-information field. There shall be no space between the slash and the preceding field.

An example of the usage of the supplemental field would be this description for MO-086B, variation AC: PQFP-68/bumpered, English pitch.

3.3 New descriptive codes

If a new package is proposed that does not conform to one of the designated field character codes, the JEDEC JC-11 Committee on Mechanical Standardization may include a new code for that package characteristic in the next issue of this document.

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Annex A (Normative) **Derivation of Basic Package Designators and Common Names**

A.1 Package-outline-style codes

The basic package designator is a three-character code comprising a two-character package outline style code and either a preceding terminal-position code or a succeeding lead-form (or terminal-shape) code (see A.2 and A.3). Table A.1 shows the two-character package outline style codes.

The use of a preceding or succeeding code to complete the basic package designator is determined by existing code usage or by the need to define the most important package characteristics. The current combination three-letter package designators are described in Table 1.

Table A.1 — Package-outline-style codes

Package style code	Package type
CP	Clamped Package (Press-Pack)
CY	Cylinder or Can
DB	Disk Button
DS	Die-size Array
FM	Flange Mount
GA	Grid Array
IM	In-Line Module
IP	In-Line Package
LF	Long Form
MA	Microelectronic Assembly
PF	Press Fit
PM	Post or Stud Mount
QF	Quad Flatpack (terminals exit parallel to the seating plane on four sides of the package)
SO	Small Outline (terminals exit parallel to the seating plane on only two opposite sides of the package)
SS	Special Shape
UC	Uncased Chip
VP	Vertical Surface-Mount Package
WL	Wafer-level Array

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A.2 Terminal-position prefix

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

Table A.2 shows one-letter terminal-position prefix codes.

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A.2 Terminal-position prefix (cont'd)

Table A.2 — Prefixes for terminal position

Code	Name	Position
A	Axial	Terminals extend from both ends in the direction of the major axis of a cylindrical or elliptical package
B	Bottom	Terminals extend to or through the seating plane
C	Column	Terminals are perpendicular to the seating plane and consist of solid or metallized extensions (e.g., solder)
D	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 having circular or elliptical cross section
P	Perpendicular	Terminals are perpendicular to seating plane on a square or rectangular package. (Restricted to GA package-outline style)
Q	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	Radial	Terminals extend radially from the periphery of a cylindrical or spherical package
S	Single	Terminals are on one side or surface of a square or rectangular package in a single row
Z	Zigzag	Terminals are on one surface of a square or rectangular package arranged in a staggered configuration

NOTE References to package shape do not take account of flanges, notches, or other irregularities.

A.3 Lead-form (or terminal-shape) suffix

The two-letter package-outline-style code may be supplemented with a single-letter suffix that identifies the standard form or shape of the lead. Table A.3 shows one-letter lead-form (or terminal-shape) suffix codes. Figure A.1 illustrates the lead forms and terminal shapes.

If more than one type of terminal is present, the terminals carrying the principal current determine the lead-form code. If one of these terminals is a mounting stud or flange, its shape shall not govern the choice of lead-form (or terminal-shape) suffix because that is described by the package-outline-style code. Examples are illustrated in figure C.1.

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A.3 Lead-form (or terminal-shape) suffix (cont'd)

Table A.3 — Suffixes for lead form (or terminal shape)

Code	Form/shape	Description
B	Ball	A solder ball for attachment perpendicular to the land structure
C	C bend	A C-shaped noncompliant lead bent down and under the package body
D	Solder lug	A lug terminal on the package
F	Flat	A compliant, or noncompliant, unformed 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
H	High-current cable	A lug terminal at the end of a flexible lead
I	Insulated	A flat lead formed by depositing a thin conductor onto a 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 bottom surface of the package
P	Pin	A tempered lead extending from the body of the package and intended for insertion into a plated through-hole in a printed circuit board or into a socket
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 intended for attachment to a through-hole in the land structure
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 untempered wire lead extending from the body of the package
Y	Screw	A threaded hole

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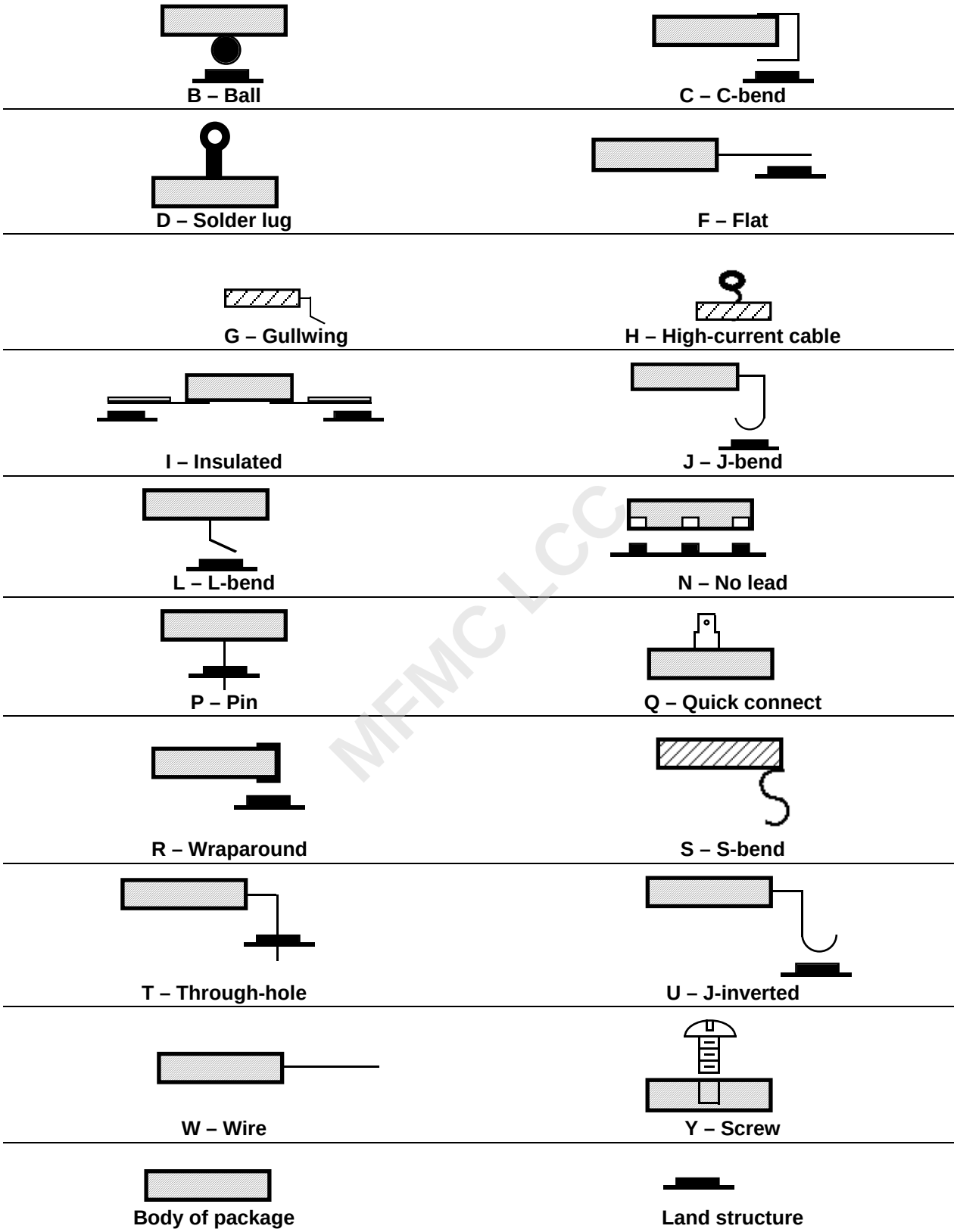

Figure A.1 — Illustrations of lead form (or terminal shape)

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Annex B (Informative) **Dimensions Used in the Supplemental Information Field**

Two fields separated by a dash (-) may be included in the supplemental information field (see 3.2.6) to indicate dimensional aspects of the package.

The first field specifies the two major nominal package dimensions (as determined by the basic package designator, see table B.1), e.g., body width and body length, seated height and body length, or body length and terminal row spacing.

The second field specifies the terminal pitch, e.g., 2.54 or 0.100. When a value less than one is written, a zero must precede the decimal sign.

Table B.1 — Nominal package dimensions

Basic package designator	Nominal dimension	Unit of measurement	Examples
BGA	Body length & width	mm	14x14 or S14
DIM	Seated height & body length	mm	25.4x67.6
DSB	Body length & width	mm	5x4
DSO	Body length & width	mm	11x4.4
DIP	Body length & terminal row spacing	inch	1.25x0.1
LGA	Body size (square)	mm	27x27U or S27U
PGA	Body size (square)	inch	S1.15U
QFF	Body length & width	inch	1.154x1.154 or S1.154
QFJ	Body length & width	inch	1.154x1.154 or S1.154
QFN	Body length & width	mm	3.5x3.5 or S3.5
QFP	Body length & width	mm	10x10 or S10
SIM	Body length & width	mm	25.4x67.6
SIP	Seated height & body length	mm	1x4.5
SOJ	Body length & width	mm	0.3x0.675
SON	Body length & width	mm	0.6x1
UCI	Tape body size	mm	28x28 or S28
WLB	Body length & width	mm	4x3
ZIP	Seated height & body length	inch	9.25x26.65

NOTE Leading “R” and “S” indicate rectangular or square, respectively. Rectangular is also indicated by the code “R” in the package-specific-features field when it is necessary to differentiate between square and rectangular body types. Trailing “D” and “U” here indicate cavity-down or cavity-up, respectively.

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Annex C (Informative) **Application of the Descriptive Designation System**

C.1 Objectives of the package designation system

The objectives of the descriptive designation system as described in the early versions of this standard were

1) to define and legitimize the then-existing abbreviations and acronyms without requiring changes in their usage, and

2) to provide a coherent system for generating new codes for packages as they were developed.

To accomplish the first objective, within a coherent system, the meanings of some of the existing abbreviations were changed. For example:

ball-grid array (BGA) became *bottom* grid array, and
pin-grid array (PGA) became *perpendicular* grid array.

It must be emphasized that, as originally standardized, this designation system did not require changes to the existing common names or abbreviations.

Common names are often developed by nontechnical advertising or marketing persons (and often trademarked) to distinguish sometimes minor differences between that manufacturer's product and the competition's product. **It is not the purpose of this standard to define or in any way control the development of these common names.** This is true even though the descriptive designation system shown here could lead to a systematized naming convention.

To avoid misunderstandings (especially when translating between different languages), it is strongly recommended that the descriptive designator be determined first for any package type, and then the common name be derived **from** that designator. For example TF-PQFP should be read as "**T**hin **F**ine-pitch **P**lastic **Q**uad **F**lat **P**ack". To describe this package as "plastic thin fine-pitch … " would therefore be deprecated.

C.2 Common names

Table C.1 lists examples of applications of the descriptive designation system. It does not demonstrate all possible combinations of package-outline-style codes (see A.1), terminal-position prefixes (see A.2), and lead-form (or terminal shape) suffixes (see A.3).

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Table C.1 — Descriptive designation system illustrative examples

Common package designation	Common package name	Example JEDEC outline number *	Example JESD30 descriptive designator
BGA	ball-grid array	MO-149AA-1X	TBGA-196
		MS-034CAG-2	PBGA-121
		MS-028AB	R-PBGA-153
CC	chip carrier	see CCC, CLCC, LCC, and PLCC	
CCC	ceramic chip carrier	MO-087AD	CQFJ-68
cerquad	ceramic quad flatpack	MO-060AB	GQFF-132
		MO-087AD	GQFJ-68
cerDIP	ceramic DIP	MS-030AB	GDIP-14
CDIP	ceramic dual in-line package	MS-015AE	CDIP-20
CGA	column-grid array	MO-158AF	E-CCGA-484
		MO-159AA-1	ER-CCGA-336
		MO-159CB-1	FR-CCGA-1302
CLCC	ceramic **leaded** chip carrier	MS-008BD	CQFJ-68
	ceramic **leadless** chip carrier	MS-014AJ	CQFN-96
CPGA	ceramic pin-grid array	MS-017BK	CPGA-361
CSP	chip-scale package	see DSBGA and WLBGA	
DIMM	dual in-line memory module	MO-160AA	R-PDIM-72
DIP	dual in-line package	MS-001AG	PDIP-28
DSBGA	die-size BGA	MO-207AA-2	TFR-PDSB-40
DSO	small-outline gull wing	MS-012AC	PDSO-16
FP	flatpack	MS-022AB	PQFP-44
		MO-060AA	CQFF-132
		MO-070AD	CSOF-24
FBGA	fine-pitch BGA	MO-205AF	LF-PBGA-225
FRBGA	fine-pitch, rectangular BGA	MO-210AF-1	TFR-PBGA-64 (96)
FQFP	fine-pitch quad flatpack	MS-029CC	F-PQFP-120
LCC	**leadless** chip carrier	MO-041AB	R-CQFN-32
		MS-009AD	CQFN-32
LCCC	leadless ceramic chip carrier	MO144AA	CSON-20 (26)
LGA	land grid array	MO-222DA	VFR-XLGA-35
PGA	pin-grid array	MO-067BH	CPGA-256

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Table C.1 — Descriptive designation system illustrative examples (cont'd)

Common package designation	Common package name	Example JEDEC outline number *	Example JESD30 descriptive designator
PLCC	plastic leaded chip carrier	MS-016AD	R-PQFJ-28
		MS-018AB	PQFJ-28
PQFP	plastic quad flatpack	MS-026ADA	T-PQFP-44
		MS-026BDA	L-PQFP-44
QFN	no-lead quad flatpack	MO-239DDC	HVF-PQFN-112
		MO-243WHHD	HWF-PQFN-B32
QFP	quad flatpack	MO-060AA	CQFF-132
		MO-060AB	GQFF-132
		MS-022GB-1	PQFP-80
SIMM	single in-line memory module	MO-116AB	R-PSIM-72
SIP	single in-line package	MO-055AB	CSIP-16
		TO-260AA	CSIP-3
SO	small outline	see DSO, SOD, SOIC, SOJ, SOL, SON, SOP, SOT, SSOP, TSOP, TSOP I, TSOP II, and TSSOP	
SOD	small-outline diode	DO-215AA	PDSO-2
SOH	small-outline heat slug	MO-184AE	H-PDSO-20
SOIC	small-outline integrated circuit	MS-012AC	PDSO-16
SOJ	small-outline J-lead	MS-023AB	PSOJ-20(26)
SON	no-lead small-outline package	MO-236BA	U-PSON-4
		MO-229VGJB	UR-PSON-14
SOP	small-outline package	MO-180BA	PDSO-56
SOT	small-outline transistor	TO-243AA	PSOF-3/SOT89
SSOP	shrink small-outline package	MO-152BB	S-PDSO-24
TAB	tape automated bonding	see TCP	
TCP	tape carrier package	US-001EG-24	S-PUCI-416
TSOP	thin small-outline package	see TSOP I and TSOP II	
TSOP I	thin small-outline package, type 1	MO-142DC	T-PDSO1-48
TSOP II	thin small-outline package, type 2	MS-024BB	T-PDSO2-44(50)
TSSOP	thin shrink small-outline package	MO-153BC	TS-PDSO-28
WLBGA	wafer-level BGA	MO-211BB	FR-PWLB-6

NOTE The JEDEC outline registration or standard, or some other specification, defines the exact package type and dimensions. A reference to this registration, standard, or other specification may be appended to the descriptive designator in the supplemental field in accordance with 3.2.6, e.g., for the first entry in this table the JEDEC outline number might be added: TBGA-196/MO-149AA-1X.

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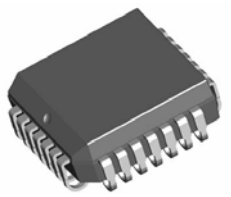
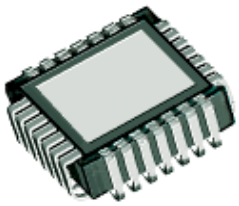
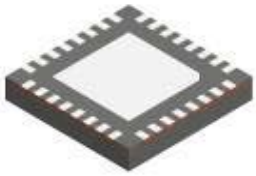


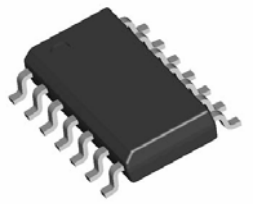
PLCC / QFJ



CLCC / **QFJ**

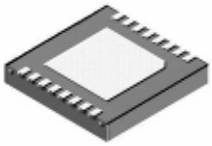


QFN

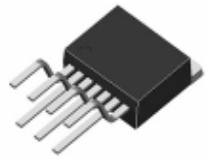


DSO / SOIC / SOP

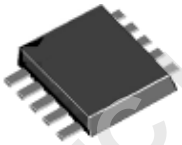
SOJ



SON / DFN

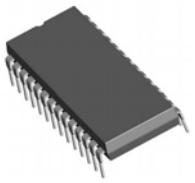


ZIP

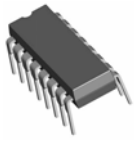


SOF

SOF



DIP



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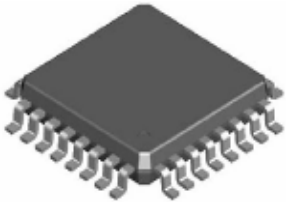
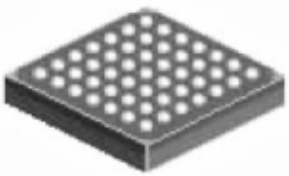


QFP

xCY / CYx /

xDB / DBx / MICRO-x



BGA / FBGA

Figure C.1 — Illustrations of some basic packages and their designators

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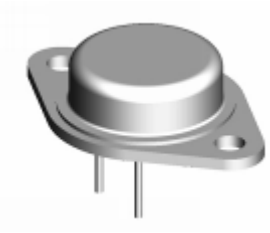
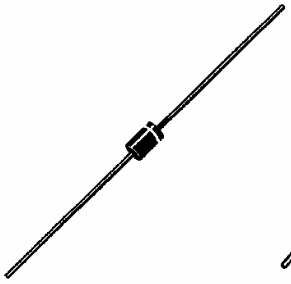
xCY / CYx / TO5

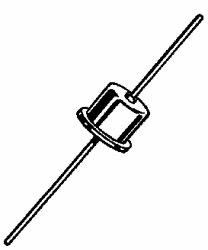
xCY / CYx / TO99



TO3 / xFM / FMx

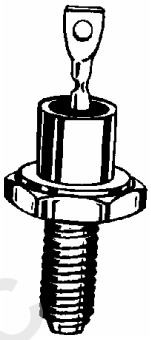


LFx / xLF

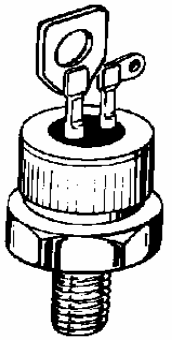


LFx / xLF

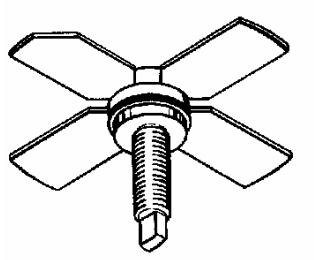
PFx / xPF



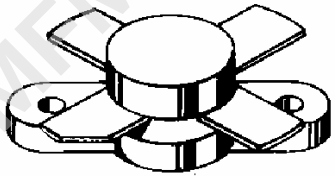
PMx / xPM



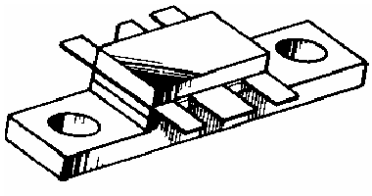
PMx / xPM



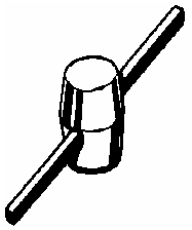
PMx / xPM



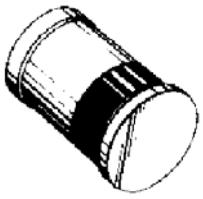
FMx / xFM



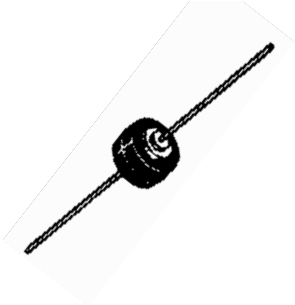
FMx / xFM



DBx / xDB



LFx / xLF



DBx / xDB

Figure C.1 — Illustrations of some basic packages and their designators (cont'd)

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Annex D (informative) **Package classification**

Semiconductor-device packages may be classified by form, basic type, or derivative type.

D.1 Major classification

Major classification (basic style) is determined by the primary method of attachment to the interconnect land structure. The following definitions apply:

point-to-point-wiring device: A device using flexible wire or cable, clamps, screws, or other means for electrical connection.

NOTE For the purposes of this standard “point-to-point-wiring device” incorporates lead-form codes D, H, Q and Y (see table A.3). The mounting surface may or may not be an electrical connection.

surface-mount device (SMD): A device intended for mounting on a single surface of the interconnect land structure.

NOTE For the purposes of this standard “surface-mount device” incorporates lead-form codes B, C, F, G, I, J, L, N, R, S and U (see table A.3).

through-hole (or insert-mount) device: A device intended for mounting on a land structure by inserting one or more of its terminals through holes in the structure.

NOTE For the purposes of this standard, “through-hole device” incorporates lead-form codes P, T, and W (see table A.3).

D.2 Intermediate classification

For purposes of classification, intermediate classification (or package-outline style) is represented by a two-letter package-outline-style code (see A.1) and the terminal-position prefix or lead-form suffix code. For example, “BGA” (bottom or ball-grid array) is a surface-mount device while “PGA” (perpendicular or pin-grid array) is a through-hole mount device.

D.3 Minor classification

Minor classification (or derivative package style) is defined as the further differentiation of the intermediate classification (basic package designator) by the addition of other designators to indicate terminal position (table A.2), package-body material (table 2), package specific feature code(s) (table 3), or lead-form code (table A.3).

The minor classification may also be used to define the first field of the optional detailing information field (see 3.3.6).

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Table D.1 – Semiconductor-device package classification examples

Major classification (basic style)	Intermediate classification (package outline style)	Minor classification (derivative package style)
Surface-mount devices (SMD)	GA	PBGA PTBGA
	QF	CQFB PQFJ CQFP
(lead-form codes B, C, F, I, J, L, N, P, R, S, or U)	DB	
	FM	
	FP	PQFF CQFP
	LF	
	SO	CSOF PSOJ PSON PDSO PDSO2
	VP	RSVP
Through-hole-mount devices	CY	
	FM	
	IP	CDIP, PSIP, PZIP
(lead-form codes T or W)	PGA	CPGA
Other devices	CP	
	FO	
	LF	
(lead-form codes D, H, N, Q, or Y)	IM	RDIM, RSIM
	MW	
	PF	
	PM	
	SS	
	X-	

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Annex E (informative) **Differences between JESD30E and JESD30D**

This table briefly describes most of the changes made to entries that appear in this standard, JESD30E, compared to its predecessor, JESD30D (June 2006). Punctuation changes may or may not be included.

Initial Issue: A	Date: N/A	JC11 Item Number: N/A

CHANGE RECORD HISTORY

Issue: D	Date: June 2006	Item Number: 11.02-689S
Description of changes		
Major document revision		
Revised definition texts for clarity in section 2		
Deleted deprecated or obsolete definitions in section 2		
Added definitions for chip-scale, die-size, and wafer-level packages in section 2		
Added note referencing JEITA and IEC documents at figure 1; removed “mandatory” and “optional” headings; noted the mandatory codes; adjusted paragraph references		
Combined sections 3.2 and 3.3 into new section 3.2 with title “Field descriptions”; reordered and renumbered subsections and tables		
Deleted deprecated basic package designators in table 1; added codes DSB and WLB; revised descriptive text		
Deleted unused package-body material prefix codes in table 2		
Reordered package-specific feature codes in table 3; added feature code C; added feature sub-codes for B, and X (new profile codes); added sub-codes for F (new terminal pitches); added explanation of recommended ordering in designator and of use of sub-codes to text in 3.2.3		
Added table 6 with new suffix code for ball diameter and added explanatory text to 3.2.5		
Added table A.1 replacing old text listing; deleted deprecated codes		
Updated tables B.1, C.1, and D.1; added SON and QFN examples to table C.1; deleted some obsolete shapes from figure C.1		
Deleted chip-sized package paragraphs from Annex D and references in table D.1		
Revised and corrected text throughout document		
Revised Table of Contents		

Issue: E	Date: April 2008	Item Number: 11.02-764S
Description of changes		
Page 6 - Change table from “Seated Height Profile” to “Maximum Seated Height Profile” to match up with SPP-017.		
Page 8, Table 6 – Changed the alphanumeric code for “b” to 3 digits and added the nominal ball diameter 0.20mm to align with Design Guide 4.5		
Figure C.1 - Rearrange and clean up the package pictures		
Table 1 - Add SKT designator to this table for sockets		
Para. 3.2.5 – Changed from “..an additional two-character…” to “…an additional three-character…”		

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STANDARD IMPROVEMENT FORM **JEDEC** **JESD30E**

The purpose of this form is to provide the Technical Committees of JEDEC with input from the industry regarding usage of the subject standard. Individuals or companies are invited to submit comments to JEDEC. All comments will be collected and dispersed to the appropriate committee(s).

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☐ Test method number _____ Clause number _____

The referenced clause number has proven to be:

☐ Unclear ☐ Too Rigid ☐ In Error

☐ Other _____

2. Recommendations for correction:

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_____

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3. Other suggestions for document improvement:

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