

## STANDARD PROCEDURES AND PRACTICES

NUMBER: **SPP-025, Issue C**

SUBJECT: **Package Variation Designators**

EFFECTIVE DATE: **AUGUST 2018**

ITEM NUMBER: **11.2-951S**

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### **BACKGROUND:**

Currently, package variation designators use one or more letter codes to designate various package variations and summarized in a look-up table. These codes have no relationship whatsoever to the body size or other package features. Moreover, addition of new body sizes that falls in between pre-assigned body size codes result to those new variations to be listed out of alphabetical sequence in a variation table. JC-11 recognizes the need to provide a new designator scheme that addresses these shortcomings.

### **PRACTICE:**

All new and revisions to existing package outlines for BGA and LGA will be assigned a package variation designator according to the variation scheme outlined in this SPP specification.

BGA and LGA packages will take the following package variation designator format:

P-DD.DDxEE.EE-eb-nF

P = package profile height code (dimension A).

Profile heights ascend in 0.10 mm increments

140 =  $1.30 < A \leq 1.40$

130 =  $1.20 < A \leq 1.30$

120 =  $1.10 < A \leq 1.20$

110 =  $1.00 < A \leq 1.10$

100 =  $0.90 < A \leq 1.00$

090 =  $0.80 < A \leq 0.90$

080 =  $0.70 < A \leq 0.80$

070 =  $0.60 < A \leq 0.70$

060 =  $0.50 < A \leq 0.60$

050 =  $0.40 < A \leq 0.50$

040 =  $0.30 < A \leq 0.40$

030 =  $0.25 < A \leq 0.30$

025 =  $0.20 < A \leq 0.25$

020 =  $0.15 < A \leq 0.20$

015 =  $0.10 < A \leq 0.15$

010 =  $0.05 < A \leq 0.10$

005 =  $0.00 < A \leq 0.05$

DD.DD = package body size in the D dimension to 2 decimal places.

EE.EE = package body size in the E dimension to 2 decimal places.

Example: D = 55.00 mm to be listed as 55.00

D = 5.50 mm to be listed as 5.50

D = 5.55 mm to be listed as 5.55

e = ball pitch per the following codes will follow JESD30:

150 = 1.50 mm

127 = 1.27 mm

100 = 1.00 mm

92 = 0.92 mm

80 = 0.80 mm

75 = 0.75 mm

70 = 0.70 mm

65 = 0.65 mm

60 = 0.60 mm

50 = 0.50 mm

40 = 0.40 mm

If the ball pitch is different in the D and E dimensions, then the pitch variation will be added to the variation scheme as D pitch x E pitch

Example: D pitch = 75: 0.75 mm

E pitch = 50: 0.50 mm

Variation scheme = PDD.DDxEE.EE-**75x50**b-nF

b = nominal ball diameter will follow JESD30: (not used in LGA packages)

75 = 0.75 mm

70 = 0.70 mm

65 = 0.65 mm

60 = 0.60 mm

55 = 0.55 mm

50 = 0.50 mm

45 = 0.45 mm

40 = 0.40 mm

35 = 0.35 mm

30 = 0.30 mm

25 = 0.25 mm

20 = 0.20 mm

17 = 0.17 mm

n = actual ball count

F = footprint letter

**EXAMPLE:**

BGA: 140-16.50x14.00-10045-136C

D = 16.50

E = 14.00

Solder Ball Pitch = 1.00 mm

Solder Ball Diameter = 0.45 mm

Solder Ball Count = 136

Footprint on MO = C

LGA: 140-16.50x14.00-100-136C

D = 16.50

E = 14.00

Solder Ball Pitch = 1.00 mm

Solder Ball Diameter = N/A

Solder Ball Count = 136

Footprint on MO = C

## Annex A Excerpt from JESD30F

### 3.2 Field descriptions (cont'd)

**Table 3 — Codes for package-specific features**

<b>FUNCTION</b> (in order of priority)	<b>CODE</b>	<b>SUBCODE</b>	<b>Package-specific feature (relevant dimensions)</b>
Added feature	H A C		Integral heat spreader wholly or partially exposed Stacked package assembly Windowed package for optical devices
Maximum Seated height (profile)	B  L T V W U X	B2 B1          X1 X2 X3 X4	Extra thick (>3.50 mm) Very thick (>2.45 mm and ≤3.50 mm) Thick (>2.45 mm) Standard (>1.70 mm and ≤2.45 mm) Low (>1.20 mm and ≤1.70 mm) Thin (>1.00 mm and ≤1.20 mm) Very thin (>0.80 mm and ≤1.00 mm) Very, very thin (>0.65 mm and ≤0.80 mm) Ultra thin (>0.50 mm and ≤0.65 mm) Extremely thin (≤0.50 mm) Extra-thin (>0.40 mm and ≤0.50 mm) Super-thin (>0.30 mm and ≤0.40 mm) Paper-thin (>0.25 mm and ≤0.30 mm) 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,
	S		Shrink (≤0.65 mm for DSO, SOJ) Shrink [≤0.070 in (1.78 mm) for DIP, SIP, PGA]
	F	F1 F2 F3 F4 F5 F6	Fine (≤0.50 mm for QFP, QFN, DSO, DFN) Fine (<1.00 mm for BGA, LGA, DSB, WLB) Fine (= 0.80 mm for BGA, LGA, DSB, WLB) Fine (= 0.75 mm for BGA, LGA, DSB, WLB) Fine (= 0.65 mm for BGA, LGA, DSB, WLB) Fine (= 0.50 mm for BGA, LGA, DSB, WLB) Fine (= 0.40 mm for BGA, LGA, DSB, WLB) Fine (= 0.30 mm for BGA, LGA, DSB, WLB)

## Annex B Change Record History

If the change involves any words added or deleted (excluding deletion of accidentally repeated words), the change is included. Punctuation changes may or may not be included.

Initial Issue:	Date: December 2013	Item Number: 11.2-880
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### Change Record History

Issue: B	Date: July 2016	Item Number: 11.2-922
Location	Changed From:	Changed to:
Page 1	BGA packages will...	BGA and LGA packages will...
Page 1	P = package profile height code per JESD30	P = package profile height code per JESD30 (dimension A) 140 = $1.30 < A \leq 1.40$ 130 = $1.20 < A \leq 1.30$ ETC
Page 2	b = nominal ball diameter	b = nominal ball diameter (not used in LGA packages)
Page 3	BGA: P16.5x14.0-EJ-136C	BGA: 140-16.5x14.0-EJ-136C Added: LGA: 140-16.5x14.0-E-136C D = 16.50 E = 14.00 Solder Ball Pitch = 1.00mm Solder Ball Diameter = N/A Solder Ball Count = 136 Footprint on MO = C
Page 4		Added Annex A: Excerpt from JESD30F
Page 5	Annex A	Annex B

Issue: C	Date: August 2018	Item Number: 11.2-951S
Location	Changed From:	Changed to:
Page 2	DD.D/EE.E Package body size...	DD.DD/EE.EE Package body size...
Page 2		Added pitches: 0.92 mm 0.70 mm 0.60 mm

Issue: C	Date: August 2018	Item Number: 11.2-951S
Location	Changed From:	Changed to:
Page 2	e = Ball Pitch letter codes: C = 1.50 mm D = 1.27 mm E = 1.00 mm F = 0.80 mm	e = Ball Pitch number codes: 150 = 1.50 mm 127 = 1.27 mm 100 = 1.00 mm 80 = 0.80 mm
Page 2	b = Ball Diameter codes: C = 0.75 mm D = 0.70 mm E = 0.65 mm F = 0.60 mm	b = Ball diameter codes: 75 = 0.75 mm 70 = 0.70 mm 65 = 0.65 mm 60 = 0.60 mm