

JEDEC SOLID STATE
PRODUCT OUTLINE
Copyright © 2025 JEDEC. All rights reserved.
May not be reproduced without permission.

THIS **REGISTERED OUTLINE** WAS PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT FOR ANTICIPATED USE IN THE ELECTRONICS INDUSTRY. CHANGES ARE LIKELY TO OCCUR. USERS ASSUME ALL RISK AND LIABILITY RESULTING FROM THE USE OF THIS OUTLINE.

TITLE PLASTIC BOTTOM GRID,
ARRAY BALL, 0.50 MM PITCH
RECTANGULAR FAMILY PACKAGE

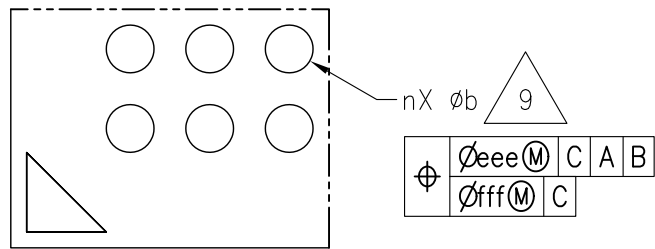
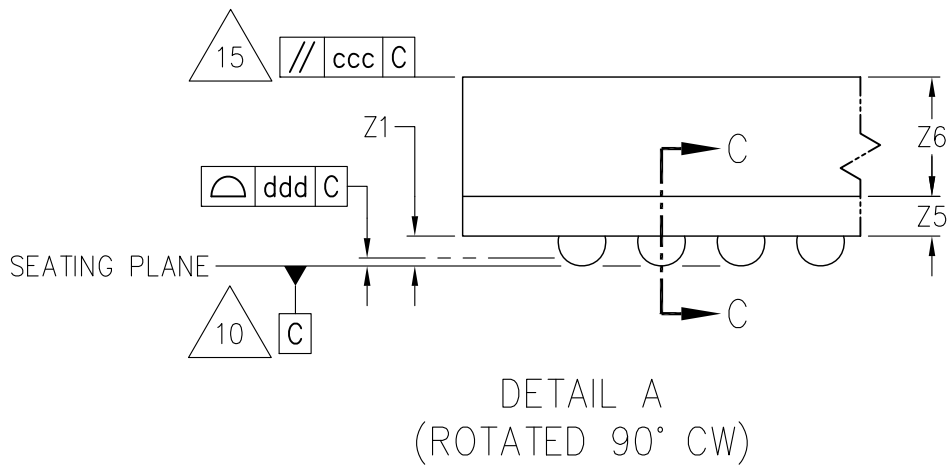
PACKAGE DESIGNATOR
PBGA-B#[#]
I0p5...

ITEM
MO-276

ISSUE
V

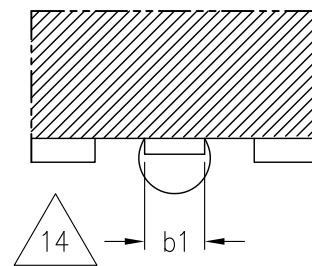
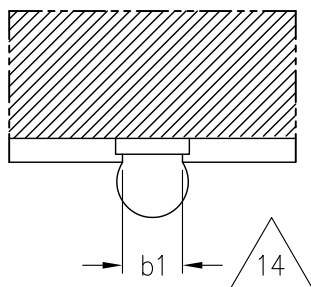
DATE
AUG 2025

SHEET
1 OF 19



TYPE 1 – SMD
(SOLDER MASK DEFINED)

TYPE 2 – NSMD
(NON SOLDER MASK DEFINED)



SECTION C-C

TABLE 1

VARIATION	Ax			Bx			Cx		
SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
Z	–	–	1.40	–	–	1.30	–	–	1.85
Z1	0.15	–	–	0.15	–	–	0.15	–	–
Z2	–	–	1.20	–	–	1.10	–	–	1.70
NOTES	1, 2, 8			1, 2, 8			1, 2, 8		
REF	11–756, 11–1008			11–756, 11–1008			11–847, 11–1008		
ISSUE	Q			Q			Q		

VARIATIONS IN THIS TABLE DO NOT MEET JEDEC PROFILE HEIGHTS DEFINED IN JESD30 AND SHOULD NOT BE USED WHEN ADDING NEW VARIATIONS.

TABLE 2

COMMON DIMENSIONS		
SYMBOL		
Z		PACKAGE SPECIFIC
Z2	b(NOM) = 0.300	$Z2(\text{MAX}) = Z(\text{MAX}) - Z1$
	b(NOM) = 0.325	$Z2(\text{MAX}) = Z(\text{MAX}) - Z1$
Z5		OPTIONAL – PACKAGE SPECIFIC
Z6		OPTIONAL – PACKAGE SPECIFIC
e		0.50 BASIC
NOTES		1, 2, 8
REF		11-977, 11-1008
ISSUE		Q

TABLE 3


COMMON DIMENSIONS							
SYMBOL		SOLDER BALL DIAMETER					
		MIN	NOM	MAX	MIN	NOM	MAX
Z1		PACKAGE SPECIFIC	---	---	PACKAGE SPECIFIC	---	---
b		0.225	0.300	0.375	0.250	0.325	0.400
b1	TYPE 1	0.20	---	---	0.21	---	---
	TYPE 2	0.20	---	---	0.21	---	---
NOTES		1, 2, 17			1, 2, 17		
REF		11-756, 11-901, 11-977, 11-1008			11-977, 11-1008		
ISSUE		Q			Q		

TABLE 4

TOLERANCE OF FORM AND POSITION			
SYMBOL	PACKAGE TYPE	VALUE	
		ϕb NOM = 0.300	ϕb NOM = 0.325
aaa	---	0.15	0.15
ccc	ENCAPSULATED	0.20	0.20
ddd	---	0.08	0.10
eee	ENCAPSULATED	0.15	0.15
fff	---	0.05	0.05
NOTES		1, 2	1, 2
REF		11-756, 11-901, 11-956	11-977
ISSUE		N	0

$$b1 = b(\text{NOM}) * 0.667$$

TABLE 5

øb = 0.300 NOMINAL														
NEW VARIATION	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	MX	MY	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
 PBGA-B29[36]_I0p50-R2p3x5p8Z#-C0p375H#	---	2.30	5.80	1.50	5.00	4	11	0.25	0.00	35	44	AA	11-1027	T
*P7.80x2.73-5030-55Y	---	2.73	7.80	2.00	7.00	5	15	0.00	0.00	55	75	Y	11-956	N
PBGA-B55[75]_I0p50-R2p73x7p8Z#-C0p375H#	---	2.73	7.80	2.00	7.00	5	15	0.00	0.00	55	75	Y	11-977	O
*P7.50x3.00-5030-53M	DA	3.00	7.50	2.00	6.50	5	14	0.00	0.25	53	70	M	11-858	F
PBGA-B53[70]_I0p50-R3p0x7p5Z#-C0p375H#	DA	3.00	7.50	2.00	6.50	5	14	0.00	0.25	53	70	M	11-977	O
*P8.00x3.00-5030-56U	---	3.00	8.00	2.00	7.00	5	15	0.00	0.00	56	75	U	11-909	J
PBGA-B56[75]_I0p50-R3p0x8p0Z#-C0p375H#	---	3.00	8.00	2.00	7.00	5	15	0.00	0.00	56	75	U	11-977	O
PBGA-B78[90]_I0p50-R3p23x7p8Z#-C0p375H#	---	3.23	7.80	2.50	7.00	6	15	0.25	0.00	78	90	AB	11-1022	R
-	AE	6.00	7.00	4.00	5.00	9	11	0.00	0.00	79	99	D	11-835	D
-	AJ	6.00	8.00	4.50	6.50	10	14	0.25	0.25	56	140	H	11-835	D
-	AH	6.00	8.00	5.00	7.00	11	15	0.00	0.00	120	165	G	11-835	D
-	AG	6.00	12.00	4.50	10.50	10	22	0.25	0.25	180	220	F	11-835	D
-	AF	7.00	9.00	5.00	7.00	11	15	0.00	0.00	121	165	E	11-835	D
*P9.50x8.00-5030-149W	---	8.00	9.50	6.50	7.50	14	16	0.25	0.25	149	224	W	11-942	L
PBGA-B149[224]_I0p50-R8p0x9p5Z#-C0p375H#	---	8.00	9.50	6.50	7.50	14	16	0.25	0.25	149	224	W	11-977	O
	NOTES	2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13		

NOTE:
FOR VARIATIONS THAT BEGIN WITH *, SEE SPP-025 ISSUE C FOR EXPLANATION OF VARIATION SCHEME.
THIS VARIATION SCHEME HAS BEEN REPLACED BY JESD30.

TABLE 5 CONTINUED

ϕb = 0.300 NOMINAL														
NEW VARIATION	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	MX	MY	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
	AD	9.00	12.00	7.50	10.50	16	22	0.25	0.25	199	352	C	11-797	C
*P11.50x11.00-5030-253P	EA	11.00	11.50	8.00	8.00	17	17	0.00	0.00	253	289	P	11-866	G
PBGA-B253[289]_I0p50-R11p0x11p5Z#-C0p375H#	EA	11.00	11.50	8.00	8.00	17	17	0.00	0.00	253	289	P	11-977	O
PBGA-B153[196]_I0p50-R11p0x13p0Z#-C0p375H#	---	11.00	13.00	6.50	6.50	14	14	0.25	0.25	153	196	B	11-986	P
-	AN	11.50	13.00	6.50	6.50	14	14	0.25	0.25	153	196	B	11-858	F
*P13.00x11.50-5030-209X	---	11.50	13.00	9.50	9.50	20	20	0.25	0.25	209	400	X	11-943	M
PBGA-B209[400]_I0p50-R11p5x13p0Z#-C0p375H#	---	11.50	13.00	9.50	9.50	20	20	0.25	0.25	209	400	X	11-977	O
-	BA	11.50	13.00	6.50	6.50	14	14	0.25	0.25	153	196	B	11-756	A
*P13.00x11.50-5030-221S	EB	11.50	13.00	6.50	10.50	14	22	0.25	0.25	221	308	S	11-878	H
PBGA-B221[308]_I0p50-R11p5x13p0Z#-C0p375H#	EB	11.50	13.00	6.50	10.50	14	22	0.25	0.25	221	308	S	11-977	O
*P13.00x11.50-5030-254V	---	11.50	13.00	8.50	11.50	18	24	0.25	0.25	254	432	V	11-913	K
PBGA-B254[432]_I0p50-R11p5x13p0Z#-C0p375H#	---	11.50	13.00	8.50	11.50	18	24	0.25	0.25	254	432	V	11-977	O
*P15.00x12.00-5030-275T	---	12.00	15.00	9.50	13.00	20	27	0.25	0.00	275	540	T	11-901	I
	NOTES	2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13		

NOTE:
 FOR VARIATIONS THAT BEGIN WITH *, SEE SPP-025 ISSUE C FOR EXPLANATION OF VARIATION SCHEME.
 THIS VARIATION SCHEME HAS BEEN REPLACED BY JESD30.

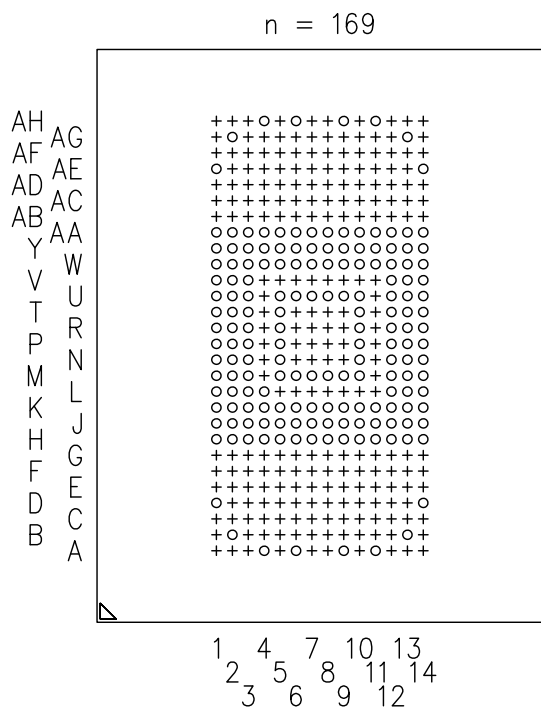
TABLE 5 CONTINUED

øb = 0.300 NOMINAL														
NEW VARIATION	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	ME MX	MD MY	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
PBGA-B275[540]_I0p50-R12p0x15p0Z#-C0p375H#	---	12.00	15.00	9.50	13.00	20	27	0.25	0.00	275	540	T	11-977	O
	AR	12.00	16.00	6.50	13.50	14	28	0.25	0.25	132	392	R	11-878	H
*P16.00x12.00-5030-132R	DB	12.00	16.00	6.50	13.50	14	28	0.25	0.25	132	392	R	11-878	H
PBGA-B132[392]_I0p50-R12p0x16p0Z#-C0p375H#	DB	12.00	16.00	6.50	13.50	14	28	0.25	0.25	132	392	R	11-977	O
	AA	12.00	16.00	6.50	13.50	14	28	0.25	0.25	169	392	A	11-756	A
	CC	12.00	16.00	6.50	13.50	14	28	0.25	0.25	169	392	A	11-858	F
	AP	12.00	16.00	10.00	14.00	21	29	0.00	0.00	346	609	N	11-866	G
	AB	12.00	18.00	6.50	13.50	14	28	0.25	0.25	169	392	A	11-756	A
-	AC	14.00	18.00	6.50	13.50	14	28	0.25	0.25	169	392	A	11-786	B
-	CD	14.00	18.00	6.50	13.50	14	28	0.25	0.25	169	352	A	11-858	F
-	AM	16.00	20.00	12.50	16.50	26	34	0.25	0.25	156	884	L	11-847	E
-	CA	16.00	20.00	12.50	16.50	26	34	0.25	0.25	156	884	L	11-847	E
*P20.00x16.00-5030-156L	DC	16.00	20.00	12.50	16.50	26	34	0.25	0.25	156	884	L	11-878	H
PBGA-B156[884]_I0p50-R16p0x20p0Z#-C0p375H#	DC	16.00	20.00	12.50	16.50	26	34	0.25	0.25	156	884	L	11-977	O
-	AK	16.00	20.00	12.50	16.50	26	34	0.25	0.25	193	884	J	11-835	D
-	CB	16.00	20.00	12.50	16.50	26	34	0.25	0.25	193	884	J	11-847	E
-	AL	17.00	22.00	12.50	18.50	26	38	0.25	0.25	237	988	K	11-835	D
	NOTES	2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13		

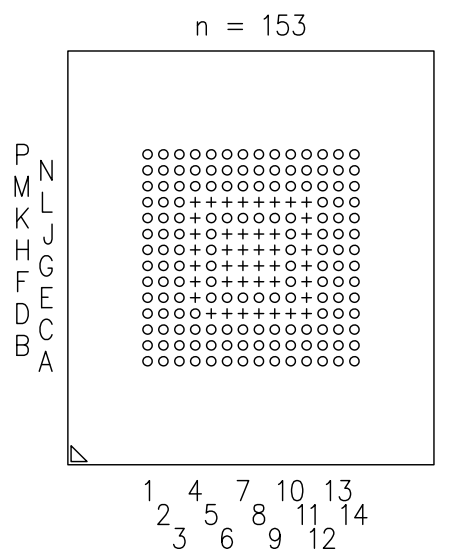
NOTE:
FOR VARIATIONS THAT BEGIN WITH *, SEE SPP-025 ISSUE C FOR EXPLANATION OF VARIATION SCHEME.
THIS VARIATION SCHEME HAS BEEN REPLACED BY JESD30.

TABLE 6

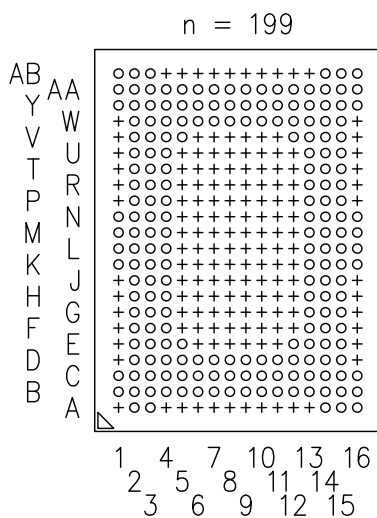
øb = 0.325 NOMINAL														
NEW VARIATION	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	MX	MY	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
PBGA-B153[196]_I0p50-R7p5x13p0Z#-C0p4H#	---	7.50	13.00	6.50	6.50	14	14	0.25	0.25	153	196	B	11-1081	V
PBGA-B153[196]_I0p50-R9p0x13p0Z#-C0p4H#	---	9.00	13.00	6.50	6.50	14	14	0.25	0.25	153	196	B	11-1036	U
PBGA-B297[456]_I0p50-R11p5x13p0Z#-C0p4H#	---	11.50	13.00	9.00	11.50	19	24	0.00	0.25	297	456	Z	11-977	O
PBGA-B305[456]_I0p50-R11p5x13p0Z#-C0p4H#	---	11.50	13.00	9.00	11.50	19	24	0.00	0.25	305	456	AD	11-1025	S
PBGA-B460[598]_I0p50-R12p0x14p0Z#-C0p4H#	---	12.00	14.00	11.00	12.50	23	26	0.00	0.25	460	598	AC	11-1025	S
PBGA-B297[456]_I0p50-R12p5x14p0Z#-C0p4H#	---	12.50	14.00	9.00	11.50	19	24	0.00	0.25	297	456	Z	11-977	O
PBGA-B297[456]_I0p50-R13p0x14p0Z#-C0p4H#	---	13.00	14.00	9.00	11.50	19	24	0.00	0.25	297	456	Z	11-977	O
NOTES		2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13		



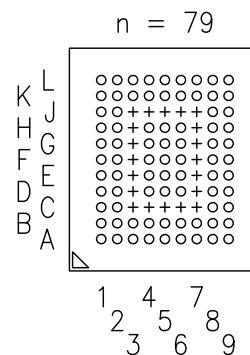
TERMINAL PATTERN A



TERMINAL PATTERN B

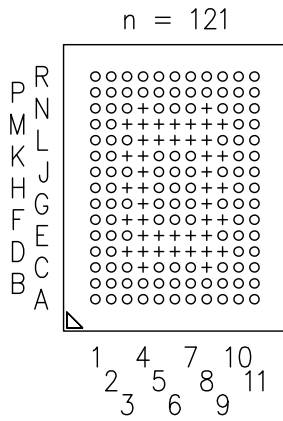


TERMINAL PATTERN C

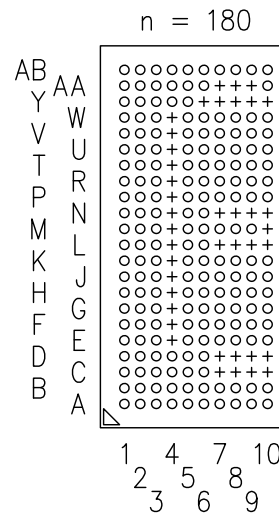


TERMINAL PATTERN D

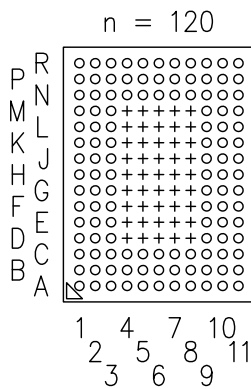




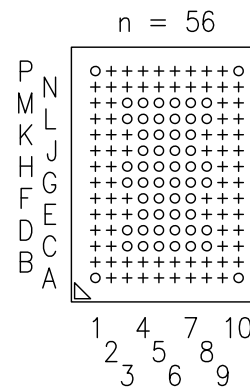
TERMINAL PATTERN E



TERMINAL PATTERN F



TERMINAL PATTERN G



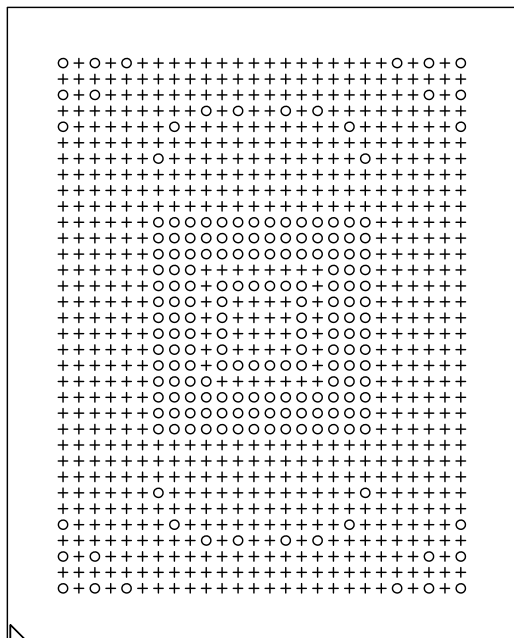
TERMINAL PATTERN H



+ = DEPOPULATED TERMINAL POSITIONS

n = 193

AP
AM
AK
AH
AF
AD
AB
Y
V
T
P
M
K
H
F
D
B

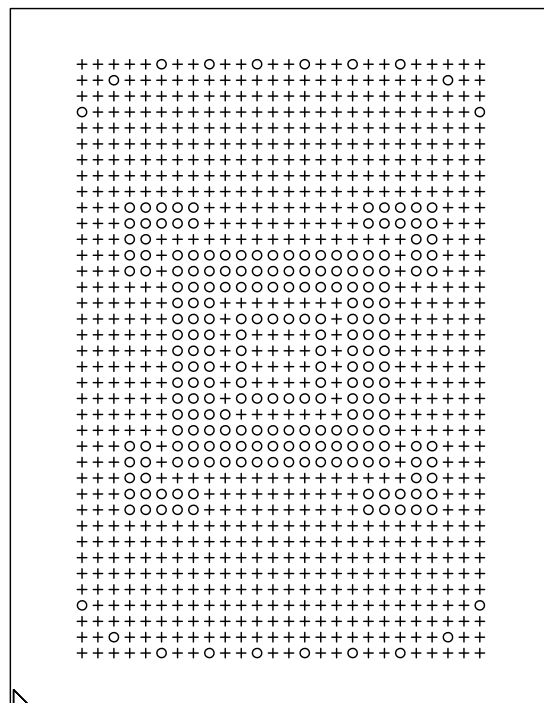


1 4 7 10 13 16 19 22 25
2 5 8 11 14 17 20 23 26
3 6 9 12 15 18 21 24

TERMINAL PATTERN J

n = 237

AV
AT
AP
AM
AK
AH
AF
AD
AB
Y
V
T
P
M
K
H
F
D
B

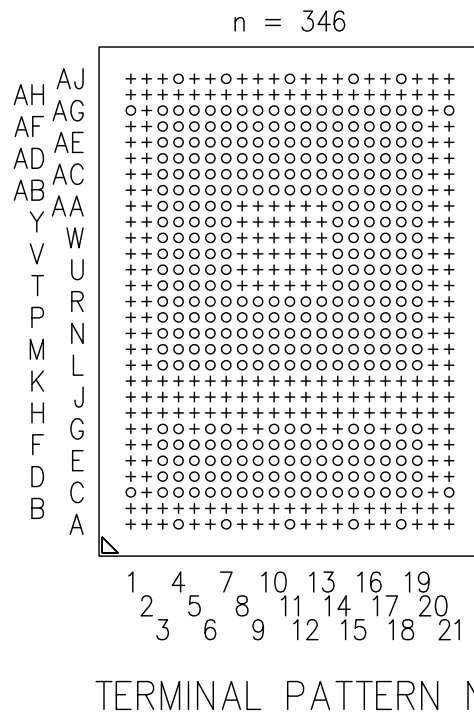
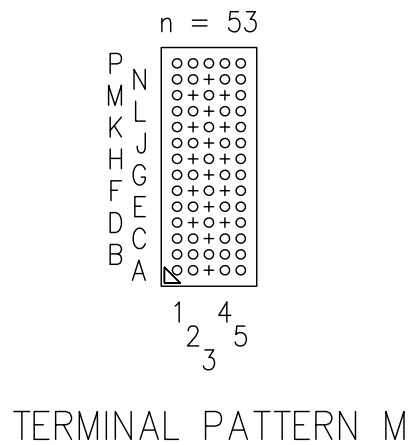
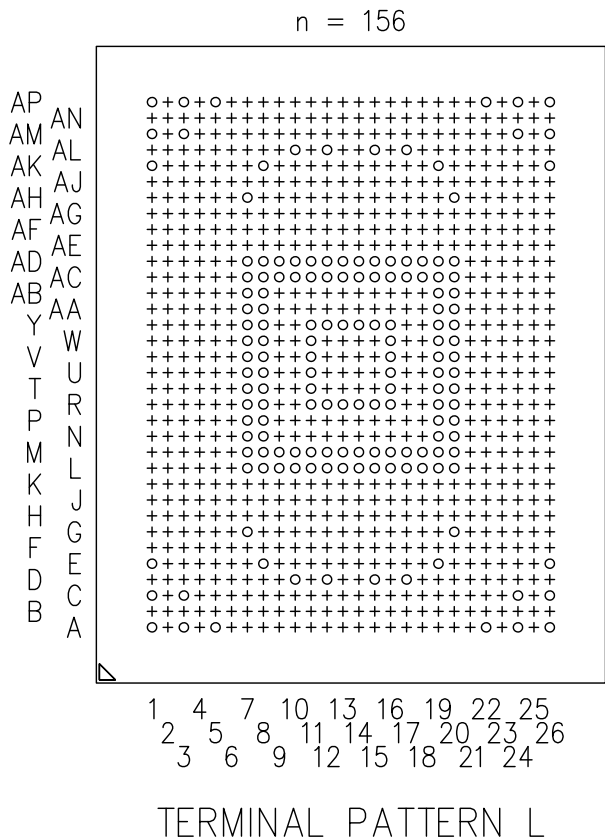


1 4 7 10 13 16 19 22 25
2 5 8 11 14 17 20 23 26
3 6 9 12 15 18 21 24

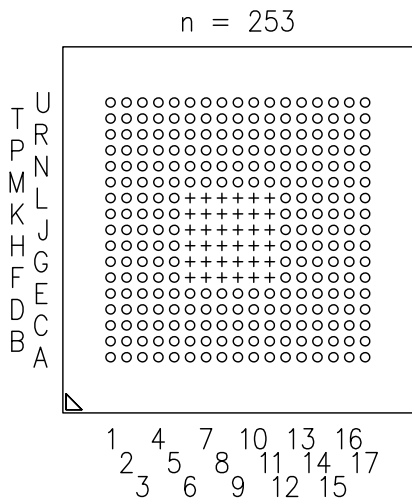
TERMINAL PATTERN K



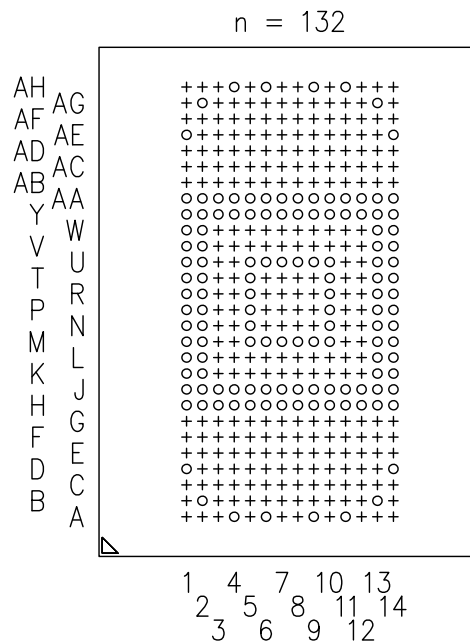
+ = DEPOPULATED TERMINAL POSITIONS



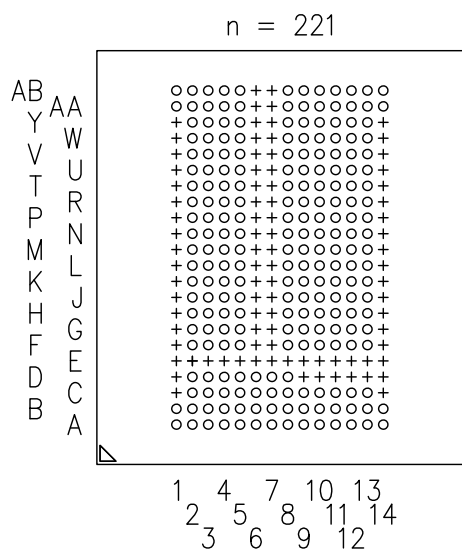
+ = DEPOPULATED TERMINAL POSITIONS



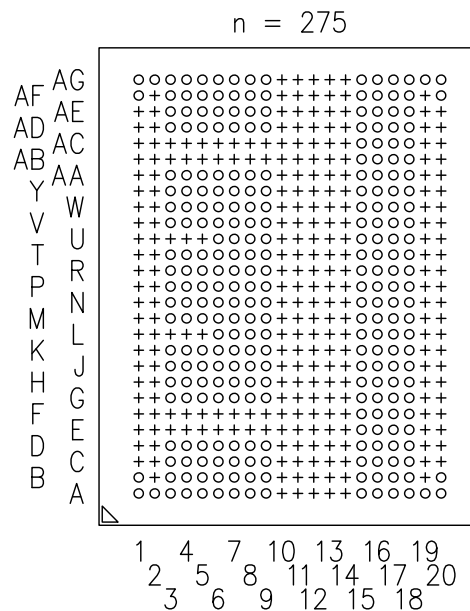
TERMINAL PATTERN P



TERMINAL PATTERN R



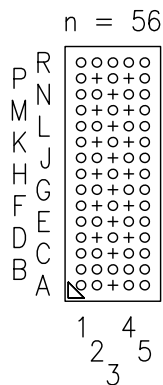
TERMINAL PATTERN S



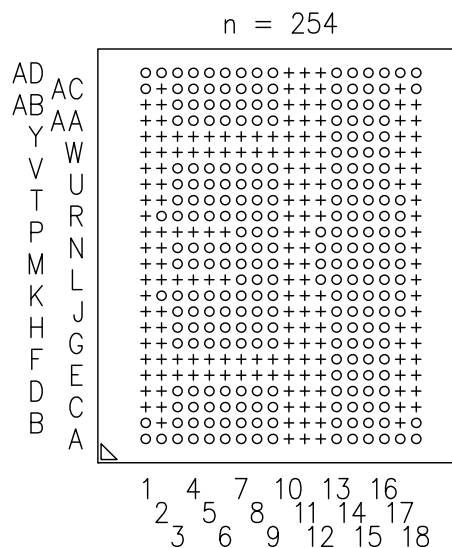
TERMINAL PATTERN T



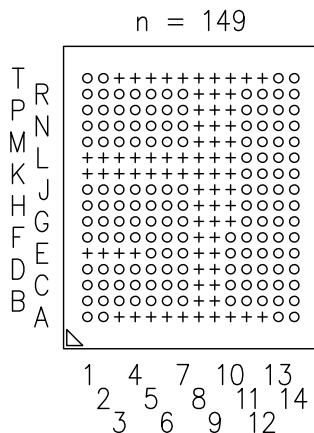
+ = DEPOPULATED TERMINAL POSITIONS



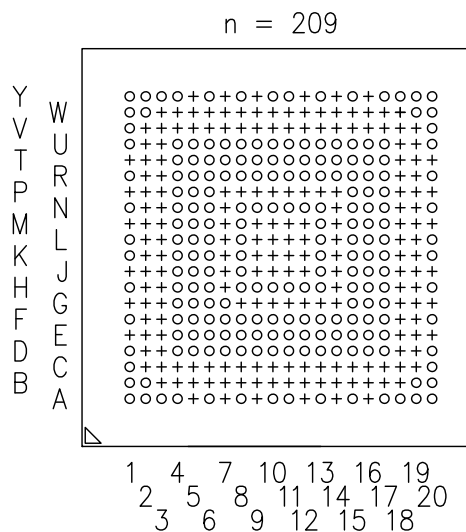
TERMINAL PATTERN U



TERMINAL PATTERN V



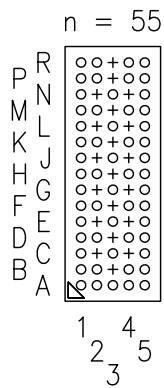
TERMINAL PATTERN W



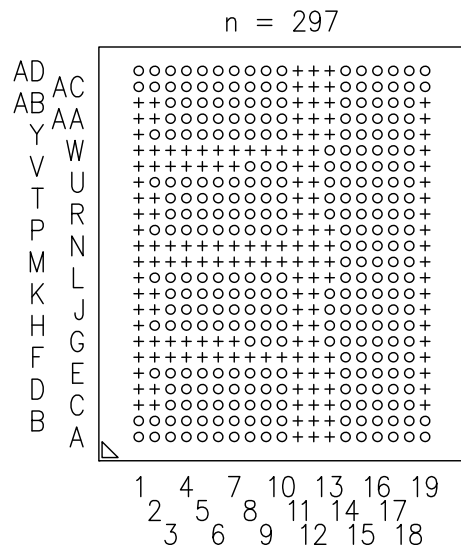
TERMINAL PATTERN X



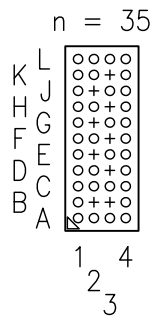
+ = DEPOPULATED TERMINAL POSITIONS



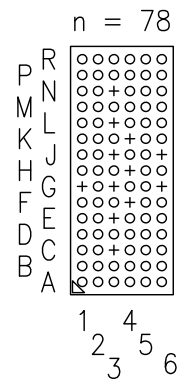
TERMINAL PATTERN Y



TERMINAL PATTERN Z



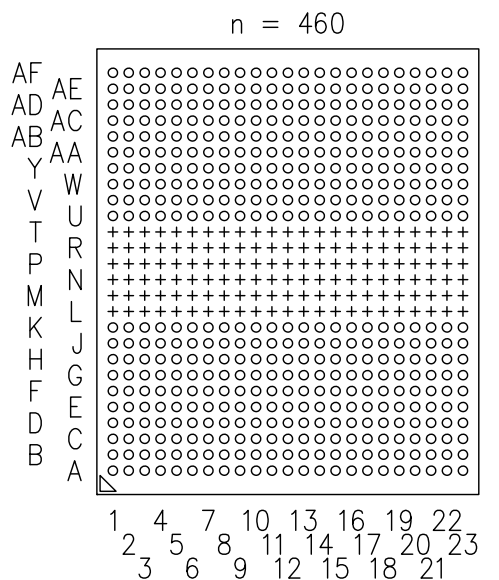
TERMINAL PATTERN AA



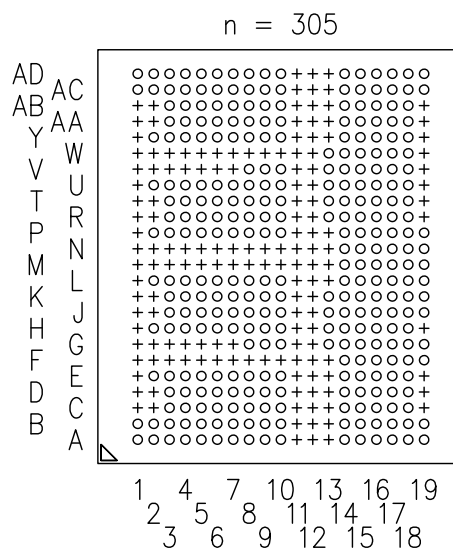
TERMINAL PATTERN AB



+ = DEPOPULATED TERMINAL POSITIONS



TERMINAL PATTERN AC



TERMINAL PATTERN AD



+ = DEPOPULATED TERMINAL POSITIONS

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5–2009.
THIS OUTLINE CONFORMS TO JEP95, SECTION 4.5.

2. ALL DIMENSIONS ARE IN MILLIMETERS.



3. SOLDER BALL POSITION DESIGNATION PER JEP95 SECTION 3, SPP–010.

4. e REPRESENTS THE SOLDER BALL GRID PITCH.

5. MX AND MY REPRESENT THE MAXIMUM MATRIX SIZE CORRESPONDING TO THE
X AND Y DIRECTIONS RESPECTIVELY.

6. n REPRESENTS THE ACTUAL NUMBER OF SOLDER BALLS AFTER DEPOPLUATION.
N REPRESENTS THE MAXIMUM NUMBER OF SOLDER BALLS FOR A FULL MATRIX, MD X ME.



7. A FULLY POPULATED 26 X 32 MATRIX SIZE IS SHOWN FOR ILLUSTRATION ONLY.



8. DIMENSION Z INCLUDES STAND–OFF HEIGHT Z1, PACKAGE BODY THICKNESS
AND LID HEIGHT, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g., EXTERNAL
HEATSINK. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AN ATTACHED FEATURE.



9. DIMENSION b IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER PARALLEL TO
PRIMARY DATUM C.



10. PRIMARY DATUM C (SEATING PLANE) IS DEFINED BY THE PLANE ESTABLISHED BY THE
CONTACT POINTS OF THREE OR MORE SOLDER BALLS THAT SUPPORT THE DEVICE WHEN
IT IS PLACED ON TOP OF A PLANAR SURFACE.



11. THE A1 TERMINAL CORNER MUST BE IDENTIFIED ON BOTH THE BOTTOM AND TOP SIDES
OF THE PACKAGE, THE IDENTIFICATION FEATURE CAN BE MADE USING INK, METALIZED
MARKINGS, IDENTATIONS, OR OTHER FEATURES.



12. DIMENSIONS SX AND SY ARE MEASURED WITH RESPECT TO DATUMS A AND B
AND DEFINE THE POSITION OF THE CENTER SOLDER BALLS.
WHEN THERE IS AN ODD NUMBER OF SOLDER BALLS, SX OR SY = 0.00.
WHEN THERE IS IS AN EVEN NUMBER OF SOLDER BALLS, SX OR SD = e/2.



13. SOLDER BALL DEPOPULATION IS ALLOWED. DEPOPULATION IS THE OMISSION
OF BALLS FROM A FULL MATRIX (MX X MY).



14. THE SOLDERABLE SURFACE MAY BE DEFINED BY AN OPENING IN THE SOLDER RESIST LAYER
(TYPE 1) OR BY THE SIZE OF A METALIZED PAD (TYPE 2). IT MAY BE ELLIPITACL PROVIDED
THE RATIO OF THE MAJOR TO MINOR AXES IS NO GREATER THAN 2/1, AND THE SURFACE
AREA IS NO LESS THEN THE MINIMUM FOR A CIRCULAR PAD. FOR TYPE 2 DESIGNS, EXPOSED
COPPER TRACES ARE PERMITTED OUTSIDE THE b1 PAD AREA.

NOTES CONTINUED:

15 FOR GLOB TOP AND FLIP CHIP CONFIGURATIONS, PARALLELISM (ccc) APPLIES ONLY TO THE SURFACE DIRECTLY ABOVE THE DIE AREA. THE PARALLELISM SPECIFICALLY WILL NOT APPLY TO ANY FILLET OR SLOPED REGION OF THE ENCAPSULANT.

16 SEE JESD30 FOR EXPLANATION OF VARIATION SCHEME.
PACKAGE HEIGHT IS THE MAXIMUM PACKAGE THICKNESS.

17. THE Z1 HEIGHT NEEDS TO BE ACCEPTABLE TO MANUFACTURING STANDARDS.

STP (3D) FILE RECORD
3D FILE NAMES MAY EXCEED LENGTH REQUIREMENTS FOR SOME SOFTWARE TOOLS.

STP FILE NAME	DATE	ITEM NUMBER
MO-276T_PBGA-B35[44]_I0p50-R2p3x5p8Z#-C0p375H#	JAN 2023	11-1027 11-1081
MO-276R_PBGA-B78[90]_I0p50-R3p23x7p8Z#-C0p375H#	AUG 2022	11-1022 11-1081
MO-276U_PBGA-B153[196]_I0p50-R9p0x13p0Z#-C0p4H#	AUG 2023	11-1036 11-1081
MO-276P_PBGA-B153[196]_I0p50-R11p0x13p0Z#-C0p375H#	JAN 2021	11-986 11-1081
MO-276O_PBGA-B297[456]_I0p50-R11p5x13p0Z#-C0p4H#	JUL 2020	11-977 11-1081
MO-276O_PBGA-B297[456]_I0p50-R12p5x14p0Z#-C0p4H#	JUL 2020	11-977 11-1081
MO-276O_PBGA-B297[456]_I0p50-R13p0x14p0Z#-C0p4H#	JUL 2020	11-977 11-1081
MO-276S_PBGA-B305[456]_I0p50-R11p5x13p0Z#-C0p4H#	NOV 2022	11-1025 11-1081
MO-276S_PBGA-B460[598]_I0p50-R12p0x14p0Z#-C0p4H#	NOV 2022	11-1025 11-1081
MO-276V_PBGA-B153[196]_I0p50-R7p5x13p0Z#-C0p4H#	AUG 2025	11-1081

TASK GROUP CONTRIBUTORS

INTEL CORPORATION
MICRON TECHNOLOGY INC.
SAMSUNG

<div>JEDEC SOLID STATE PRODUCT OUTLINE</div> <div>Copyright © 2025 JEDEC. All rights reserved. May not be reproduced without permission.</div>	<div>TITLE</div> <div>PLASTIC BOTTOM GRID, ARRAY BALL, 0.50 MM PITCH RECTANGULAR FAMILY PACKAGE</div>	<div>ITEM</div> <div>MO-276</div>	<div>ISSUE</div> <div>V</div>	<div>DATE</div> <div>AUG 2025</div>	<div>SHEET</div> <div>ii</div>
--	---	-----------------------------------	-------------------------------	-------------------------------------	--------------------------------

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

INITIAL ISSUE: A	DATE: SEPTEMBER 2006	ITEM NUMBER: 11-756
------------------	----------------------	---------------------

CHANGE RECORD HISTORY:

ISSUE: B	DATE: JANUARY 2008	ITEM NUMBER: 11-786
----------	--------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 3, TABLE 3	NON-EXISTENT	ADDED VARIATION AC 18 X 14 MM 160-BALL FOOTPRINT 1
ALL PAGES	DRAWING GENERATED IN CATIA, TEXT NOT EDITABLE IN AUTOCAD	TEXT WAS CONVERTED TO AND NOW EDITABLE IN AUTOCAD

ISSUE: C	DATE: JULY 2008	ITEM NUMBER: 11-797
----------	-----------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
PAGES 3 & 4	NON-EXISTENT	ADDED FOOTPRINT 3, VAR AD

ISSUE: D	DATE: DECEMBER 2010	ITEM NUMBER: 11-835
----------	---------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
PAGES 4, 5, 7, & 8	NON-EXISTENT	ADDED FOOTPRINTS 4 TO 10 VARIATIONS AE TO AL

ISSUE: E	DATE: APRIL 2011	ITEM NUMBER: 11-847
----------	------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
PAGES 5, 6, & 9	NON-EXISTENT	ADDED FOOTPRINT 11 VARIATIONS AM, CA, & CB



CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

ISSUE: F	DATE: MARCH 2012	ITEM NUMBER: 11-858
----------	------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
PAGE 1	LFR-XBGA	(L,T)FR-XBGA
ALL PAGES	STANDARD PROFILE AND LOW PROFILE	STANDARD, LOW AND THIN PROFILE
PAGE 6 & 7	NON-EXISTENT	ADDED VARIATIONS AN, CC, CD, & DA
PAGE 8, 9, & 10	PREVIOUS DRAWING	CLEAN FOOTPRINT 1-11, ALIGN BALL CENTERLINES TO GRID, CENTER ARRAY IN PACKAGE BORDER
PAGE 10	NON-EXISTENT	ADDED FOOTPRINT 12

ISSUE: G	DATE: OCTOBER 2012	ITEM NUMBER: 11-866
----------	--------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
ALL SHEETS	STANDARD, LOW AND THIN PROFILE	STANDARD, LOW, THIN AND VERY THIN PROFILE
SHEET 1	(L,T,)FR-XBGA DETAIL A DETAIL B  aaaC 2X	(L,T,V)FR-XBGA SEE DETAIL B SEE DETAIL A  aaaC⊖
SHEET 2	DETAIL A DETAIL B SECTION A-A	DETAIL B DETAIL A (ROTATED 90° CW) SECTION C-C
SHEETS 6 & 8	NON-EXISTENT	ADDED VARIATION AP & EA
SHEET 12	NON-EXISTENT	ADDED FOOTPRINT 13 & 14

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

ISSUE: H	DATE: JUNE 2013	ITEM NUMBER: 11-878
----------	-----------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 1		REMOVED CORNER CHAMFERS
SHEET 1 & 2	DELTA 15	CORRECTED DETAIL A & B TO MATCH SHEETS 1 & 2 DELTA 14
SHEETS 3 - 9	TABLES 3 - 9 PROFILE & VARIATION VALUES COMBINED VARIATIONS Ax, Bx, Cx, Dx, Ex COMBINED TOGETHER	TABLES 3 - 8 PROFILE & VARIATION VALUES SEPARATED VARIATIONS Ax, Bx, Cx, Dx, Ex SEPARATED INTO OWN TABLE
SHEETS 5, 8 & 9		ADDED VARIATIONS AR, DB, DC, & EB
SHEETS 10-14		CORNER OF ALL FOOTPRINTS ADDED INDEX MARK AT A1
SHEET 14		ADDED FOOTPRINT 15 & 16
SHEET 15	NOTE 5 NOTE 15	ADDED 'N REPRESENTS THE MAXIMUM NUMBER OF ...' DELETED NOTE 14 NOTE 14

ISSUE: I	DATE: DECEMBER 2014	ITEM NUMBER: 11-901
----------	---------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 1	14 X 14 PERIPHERAL BALL MATRIX	14 X 24 FULL BALL MATRIX TO MATCH SHEETS 1 & 2
SHEET 3	TABLE 3	TABLE 1
SHEET 4	TABLE 3 CON'T	TABLE 2
	DELETED A1	ADDED e
SHEET 5		TABLE 2, ADDED L AND STANDARD PROFILE HEIGHTS
	TABLE 1	TABLE 3
		ADDED b SOLDER BALL DIA TO TABLE 3
	DELETED e FROM TABLE 3	ADDED A1 TO TABLE 3
	TABLE 2	TABLE 4
		ADDED b NOM = 0.30 TO TABLE 4

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEETS 6 & 7	TABLES 4 – 8	TABLE 5
		ADDED NEW VARIATION SCHEME FOR ACCEPTABLE VARIATIONS
		ADDED P15.0x12.0–LM–275T
SHEETS 8 – 12	FOOTPRINTS 1 – 16	FOOTPRINTS A – S
SHEET 13		ADDED FOOTPRINT T
SHEET 14		REMOVED DELTA FROM NOTE 2
	A 14 X 14 PERIPHERAL MATRIX IS SHOWN,,,	A FULLY POPULATED 14 X 22 MATRIX SIZE IS SHOWN...
SHEET 15		ADDED NOTE 15

ISSUE: J	DATE: JULY 2015	ITEM NUMBER: 11–909
----------	-----------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 6	"TABKE" AND "OKD" (TYPOS)	"TABLE" AND "OLD"
		NEW ROW FOR VARIATION P8.0x3.0–KM–56U IN TABLE 5
SHEET 13		ADDED FOOTPRINT U

ISSUE: K	DATE: NOVEMBER 2015	ITEM NUMBER: 11–913
----------	---------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 6		ADDED P13.0x11.5–KM–254V IN TABLE 5
SHEET 13		ADDED FOOTPRINT V

ISSUE: L	DATE: SEPTEMBER 2017	ITEM NUMBER: 11–942
----------	----------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
ALL SHEETS: TITLE	FINE PITCH BALL GRID ...	BALL GRID ARRAY ...
SHEET 1: PKG DESIGNATOR	(L,T,V)FR–XBGA	PBGA
SHEET 2: DETAIL A		ADDED DIM A5 AND A6
SHEETS 4 – 8	LETTER PROFILE HEIGHT	NUMERIC PROFILE HEIGHT
		ADDED A5 AND A6

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 10		ADDED P9.5x8.0–KM–149W
SHEET 17		ADDED FOOTPRINT W
SHEETS 19, NOTE 15	P = ... CODE PER JESD 30	P = ... CODE (DIMENSION A)
		ADDED NEW PROFILE HEIGHT VARIATION SCHEME EXAMPLES

ISSUE: M	DATE: NOVEMBER 2017	ITEM NUMBER: 11–943
----------	---------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 10		ADDED P13.0x11.5–KM–209X
SHEET 17		ADDED FOOTPRINT X

ISSUE: N	DATE: JUNE 2018	ITEM NUMBER: 11–956
----------	-----------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEETS 4 – 8, TABLE 2		ADDED REFERENCE TO NOTE 16
SHEETS 2 & 9, PARALLELISM	bbb	ccc
SHEETS 10 – 11, TABLE 5		ADDED P7.80x2.73–5030–55Y CHANGED VARIATION NAMES TO MATCH UPDATED SCHEME
SHEET 18		ADDED FOOTPRINT Y
SHEETS 19 – 21		UPDATED NOTES TO CURRENT STANDARD FOR ALL BGA PACKAGES

ISSUE: O	DATE: JULY 2020	ITEM NUMBER: 11–977
----------	-----------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
ALL SHEETS	BALL GRID ARRAY FAMILY RECTANGULAR, 0.50 MM PITCH	PLASTIC BOTTOM GRID ARRAY BALL, 0.50 MM PITCH RECTANGULAR FAMILY PACKAGE
SHEET 1, PKG DESIGNATOR	PBGA	PBGA–B#[#]_l0p50...
ALL SHEETS	SYMBOLS A, D, AND E	SYMBOLS Z, Y, AND X RESPECTIVELY
SHEET 1	Z	Z MAX

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 4, TABLE 2	DELETED P = PACKAGE PROFILE HEIGHT 070 THRU 260	
	A = > 0.60 THRU 2.60 A2 0.50 MAX THRU 2.40 MAX	Z = PACKAGE SPECIFIC Z2(MAX) = Z(MAX) - Z1(0.XX)
SHEET 5, TABLE 3	A1 = 0.15 b MIN = 0.25 b MAX = 0.35	Z1 = 0.13 b MIN = 0.225 b MAX = 0.375
		ADDED 0.325 BALL DIAMETER
SHEET 5, TABLE 4		ADDED 0.325 BALL DIAMETER
SHEETS 6 – 8		ADDED JESD30 VARIATION ADDED NOTE
SHEET 9		ADDED 0.325 BALL TABLE
SHEETS 10 – 16	FOOTPRINT	TERMINAL PATTERN
SHEET 16		ADDED TERMINAL PATTERN Z
SHEET 17, NOTE 1	... SECTION 4.14.	... SECTION 4.5.
SHEETS 18, NOTE 16	EXPLANATION OF VARIATION SCHEME	SEE JESD30 FOR EXPLANATION OF VARIATION SCHEME
	PACKAGE PROFILE HEIGHT IS... IT IS THE RANGE... ...DESIGNATED PROFILE HEIGHT CODE.	PACKAGE HEIGHT IS THE MAXIMUM PACKAGE THICKNESS.
		REMOVED SPP-025 VARIATION SCHEME

ISSUE: P	DATE: JANUARY 2021	ITEM NUMBER: 11-986
----------	--------------------	---------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 7		ADDED VARIATION PBGA-B153[196]_I0p50- R11p0x13p0Z#-C0p375Z0p13

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

ISSUE: Q	DATE: JULY 2022	ITEM NUMBER: 11-1008
----------	-----------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 2		ADDED TYPE 2 – NSMD VIEW
SHEET 3	A, A1, A2	Z, Z1, Z2
SHEET 4	$Z2(\text{MAX}) = Z(\text{MAX}) - Z1(0.13)$ $Z2(\text{MAX}) = Z(\text{MAX}) - Z1(0.15)$	$Z2(\text{MAX}) = Z(\text{MAX}) - Z1$ $Z2(\text{MAX}) = Z(\text{MAX}) - Z1$
SHEET 5, TABLE 3	$Z1 = 0.13$ FOR b NOM = 0.300 $Z1 = 0.15$ FOR b NOM = 0.325	$Z1 = \text{PACKAGE SPECIFIC}$ $Z1 = \text{PACKAGE SPECIFIC}$
	b1 b1	ADDED TYPE 1 ADDED TYPE 2 AND DIM
SHEET 6 & 16		ADDED VARIATION PBGA-B29[36]_I0p50- R2p3x4p8Z#-C0p375Z#
SHEET 18		ADDED NOTE 17

ISSUE: R	DATE: AUGUST 2022	ITEM NUMBER: 11-1022
----------	-------------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 6		ADDED VARIATION PBGA-B78[90]_I0p50- R3p23x7p8Z#-C0p375Z#
SHEET 16		ADDED TERMINAL PATTERN AB

ISSUE: S	DATE: NOVEMBER 2022	ITEM NUMBER: 11-1025
----------	---------------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 9		ADDED VARIATION PBGA-B305[456]_I0p50- R11p5x13p0Z#-C0p4Z#
		ADDED VARIATION PBGA-B460[598]_I0p50- R12p0x14p0Z#-C0p4Z#
SHEET 17		ADDED TERMINAL PATTERN AC AND AD

CHANGE RECORD

IF THE CHANGE INVOLVES ANY WORDS ADDED OR DELETED (EXCLUDING DELETION OF ACCIDENTALLY REPEATED WORDS), THE CHANGE IS TO BE INCLUDED BELOW. PUNCTUATION CHANGES MAY OR MAY NOT BE INCLUDED.

ISSUE: T	DATE: JANUARY 2023	ITEM NUMBER: 11-1027
----------	--------------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 6	PBGA-B29[36]_I0p50 -R2p3x4p8Z#-C0p375Z# Y=4.8 Y1=4.00 MY=9 n=29 N=36	PBGA-B35[44]_I0p50 -R2p3x5p8Z#-C0p375Z# Y=5.8 Y1=5.00 MY=11 n=35 N=44
SHEET 16		CORRECTED 305 AND 460 TO TERMINAL PATTERN AD AND AC RESPECTIVELY
SHEET 9	TERMINAL PATTERN AA WAS 29 TERMINALS	TERMINAL PATTERN AA TO 35 TERMINALS

ISSUE: U	DATE: AUGUST 2023	ITEM NUMBER: 11-1036
----------	-------------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEET 9		ADDED: PBGA-B153[196]_I0p50 -R9p0x13p0Z#-C0p4Z#

ISSUE: V	DATE: AUGUST 2025	ITEM NUMBER: 11-1081
----------	-------------------	----------------------

LOCATION:	CHANGED FROM:	CHANGED TO:
SHEETS 5-8 & i	...Z0p??	...H#
SHEET 8		ADDED: PBGA-B153[196]_I0p50 -R7p5x13p0Z#-C0p4H#