

JEDEC SOLID STATE  
PRODUCT OUTLINE  
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THIS **REGISTERED OUTLINE** HAS BEEN PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USAGE IN THE ELECTRONICS INDUSTRY; CHANGES ARE LIKELY TO OCCUR.

TITLE PLASTIC BOTTOM GRID  
ARRAY BALL, 0.65MM PITCH  
SQUARE FAMILY PACKAGE

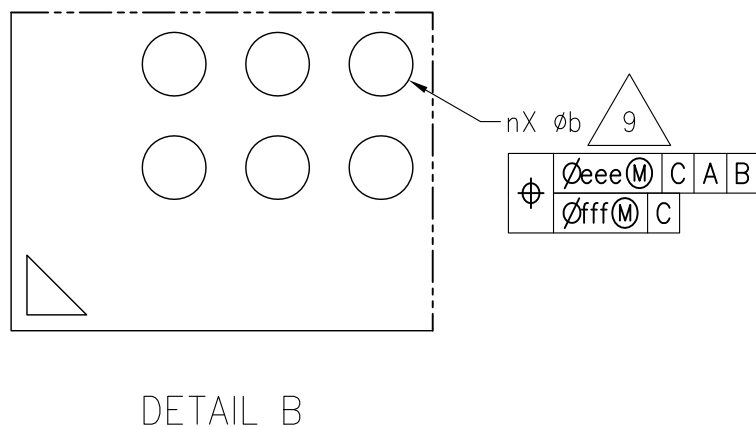
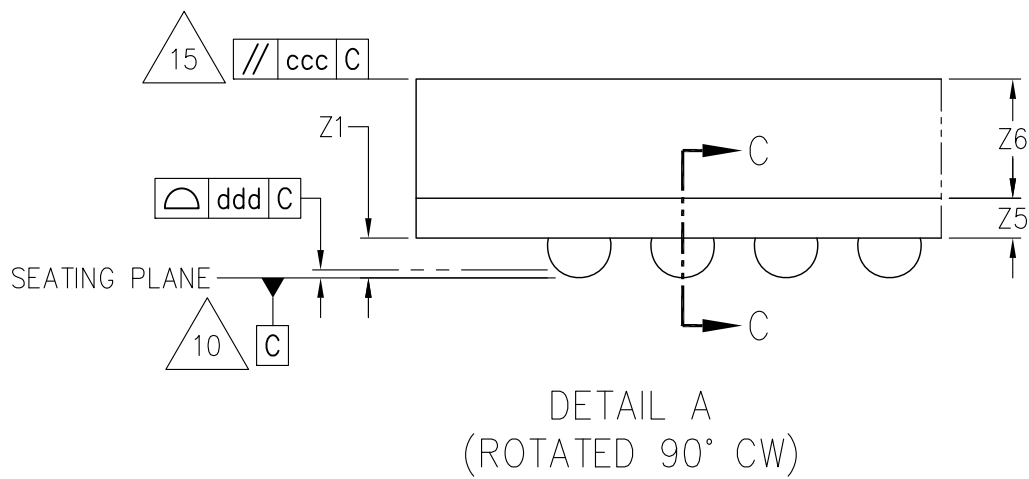
PACKAGE DESIGNATOR  
PBGA-B#[#]  
\_I0p65...

NUMBER  
MO-342

ISSUE  
A

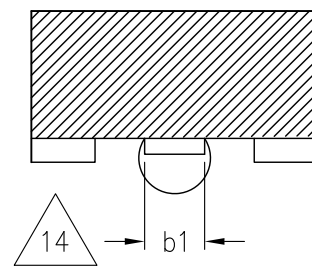
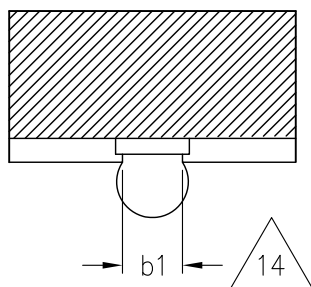
DATE  
JAN 2020

SHEET  
1 OF 11



TYPE 1 – SMD  
(SOLDER MASK DEFINED)

TYPE 2 – NSMD  
(NON SOLDER MASK DEFINED)



SECTION C-C

TABLE 1

COMMON DIMENSIONS		
SYMBOL		
Z		PACKAGE SPECIFIC
Z2	$b(NOM) = 0.300$	$Z2(MAX) = Z(MAX) - Z1(0.13)$
	$b(NOM) = 0.325$	$Z2(MAX) = Z(MAX) - Z1(0.15)$
	$b(NOM) = 0.350$	$Z2(MAX) = Z(MAX) - Z1(0.16)$
	$b(NOM) = 0.375$	$Z2(MAX) = Z(MAX) - Z1(0.18)$
	$b(NOM) = 0.400$	$Z2(MAX) = Z(MAX) - Z1(0.19)$
	$b(NOM) = 0.425$	$Z2(MAX) = Z(MAX) - Z1(0.21)$
	$b(NOM) = 0.450$	$Z2(MAX) = Z(MAX) - Z1(0.22)$
Z5		OPTIONAL – PACKAGE SPECIFIC
Z6		OPTIONAL – PACKAGE SPECIFIC
e		0.65 BASIC
NOTES		1, 2, 8
REF		11–978
ISSUE		A

TABLE 2

COMMON DIMENSIONS									
SYMBOL	SOLDER BALL DIAMETER								
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
Z1	0.13	----	----	0.15	----	----	0.16	----	----
b	0.225	0.300	0.375	0.250	0.325	0.400	0.275	0.350	0.425
b1	TYPE 1	0.20	----	----	0.21	----	----	0.23	----
	TYPE 2	0.20	----	----	0.21	----	----	0.23	----
NOTES	1, 2			1, 2			1, 2		
REF	11-978			11-978			11-978		
ISSUE	A			A			A		

TABLE 2 CONTINUED

COMMON DIMENSIONS									
SYMBOL	SOLDER BALL DIAMETER								
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
Z1	0.18	----	----	0.19	----	----	0.21	----	----
b	0.300	0.375	0.450	0.325	0.400	0.475	0.350	0.425	0.500
b1	TYPE 1	0.25	----	----	0.26	----	----	0.28	----
	TYPE 2	0.25	----	----	0.26	----	----	0.28	----
NOTES	1, 2			1, 2			1, 2		
REF	11-978			11-978			11-978		
ISSUE	A			A			A		

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

$$Z1(\text{MIN}) = b(\text{MIN}) * 0.60$$

TABLE 2 CONTINUED


COMMON DIMENSIONS										
SYMBOL		SOLDER BALL DIAMETER								
		MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
Z1		0.22	---	---	---	---	---	---	---	---
b		0.375	0.450	0.525	---	---	---	---	---	---
b1	TYPE 1	0.30	---	---	---	---	---	---	---	---
	TYPE 2	0.30	---	---	---	---	---	---	---	---
NOTES		1, 2								
REF		11-978								
ISSUE		A								

$$b1 = b(NOM) * 0.667$$

$$Z1(MIN) = b(MIN) * 0.60$$

TABLE 3

TOLERANCE OF FORM AND POSITION				
SYMBOL	PACKAGE TYPE	VALUE		
		$\phi b$ NOM = 0.300	$\phi b$ NOM = 0.325 – 0.400	$\phi b$ NOM = 0.425 – 0.450
aaa	---	0.15	0.15	0.15
ccc	ENCAPSULATED	0.20	0.20	0.20
ddd	---	0.08	0.10	0.20
eee	ENCAPSULATED	0.15	0.15	0.15
fff	---	0.08	0.08	0.08
NOTES		1, 2	1, 2	1, 2
REF		11–978	11–978	11–978
ISSUE		A	A	A

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						øb = 0.400 NOMINAL														
						NEW VARIATION 	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	MD	ME	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
						PBGA-B441[441]_I0p65-R14p0x14p0Z#-C0p475Z0p19	—	14.00	14.00	13.00	13.00	21	21	0.00	0.00	441	441	A	11-978	A
						NOTES		2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13		

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						øb = 0.425 NOMINAL														
						NEW VARIATION <div><div></div><div>16</div></div>	OLD VARIATION	X BASIC	Y BASIC	X1 BASIC	Y1 BASIC	MD	ME	SX BASIC	SY BASIC	n	N	TERMINAL PATTERN	REF	ISSUE
						PBGA-B441[441]_I0p65-R14p0x14p0Z#-C0p5Z0p21	—	14.00	14.00	13.00	13.00	21	21	0.00	0.00	441	441	A	11-978	A
	NOTES		2	2	2	2	5	5	2, 12	2, 12	6, 13	6	13							





# 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 DESIGNATOR PER JEP95, SECTION 3, SPP–020.

4. e REPRESENT 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 MATRIX SIZES MD, ME.



7 A FULLY POPULATED 24 X 24 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, INDENTATIONS, 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 SOLDER  
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.

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

STP FILE NAME	ISSUE	DATE	ITEM NUMBER
PBGA-B441[441]_I0p65-R14p0x14p0Z#-C0p475Z0p19	A	JAN 2020	11-978
PBGA-B441[441]_I0p65-R14p0x14p0Z#-C0p5Z0p21	A	JAN 2020	11-978

TASK GROUP CONTRIBUTORS

MICRON TECHNOLOGY INC.  
RENESAS ELECTRONICS CORPORATION

# 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: JANUARY 2020	ITEM NUMBER: 11-978
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CHANGE RECORD HISTORY:
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ISSUE: -	DATE: -	ITEM NUMBER: -
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LOCATION	CHANGED FROM:	CHANGED TO: