

JEDEC
SOLID STATE
PRODUCT OUTLINE

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

TITLE: RECTANGULAR DIE- SIZE,
STACKED BALL GRID ARRAY FAMILY,
DUAL PITCH

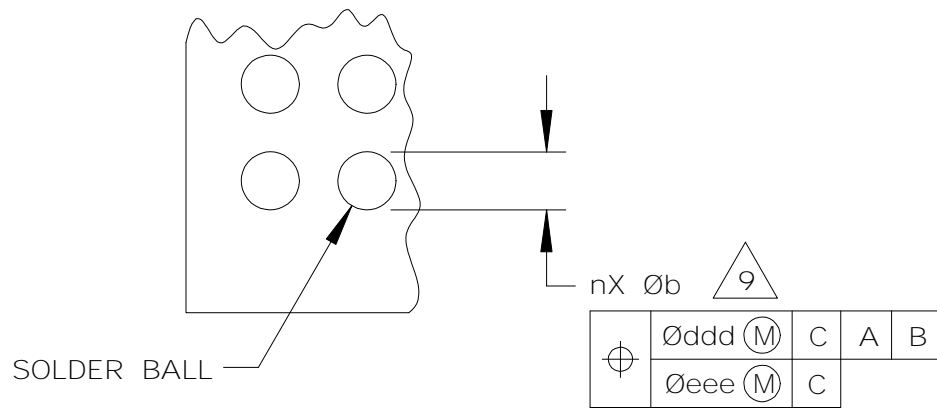
PACKAGE DESIGNATOR:
AFR- PDSB

ISSUE:
A

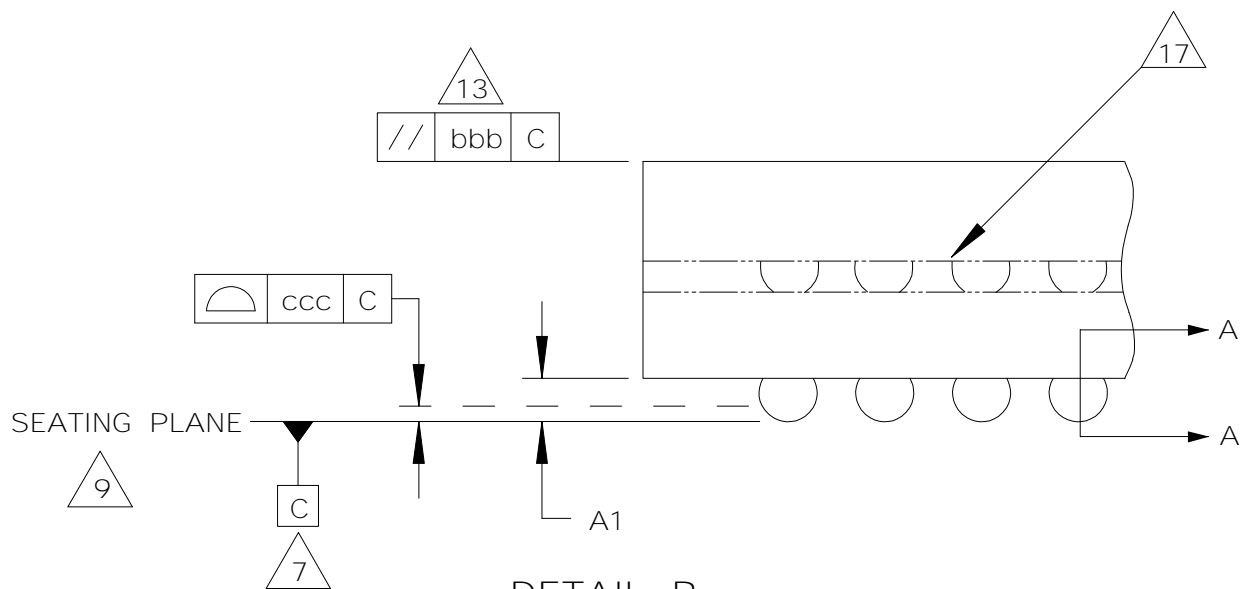
DATE:
11/05

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DETAIL A

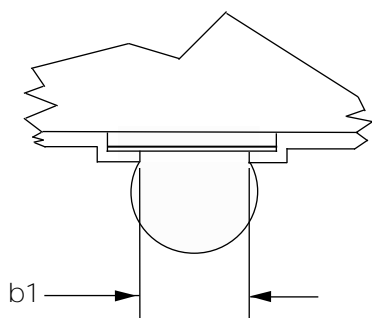


DETAIL B

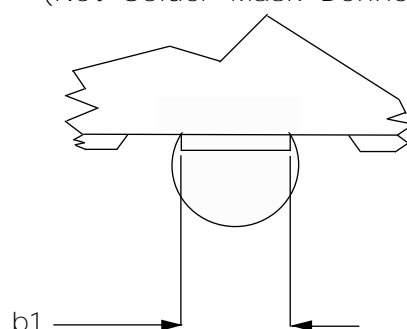
(ROTATED 90° CW)

SECTION A- A

Type 1 SMD
(Solder Mask Defined)



Type 2 NSMD
(Not Solder Mask Defined)



18

SOLDER BALL PATTERN EXAMPLES (BOTTOM VIEWS)

3

12

AA

M	+	○	○	+	+	+	○	○	+
L	+	○	○	+	+	+	○	○	+
K	+	○	○	+	+	+	○	○	+
J	+	○	○	+	+	+	○	○	+
H	+	○	○	+	+	+	○	○	+
G	○	○	○	+	+	+	○	○	○
F	○	○	○	+	+	+	○	○	○
E	○	○	○	+	+	+	○	○	○
D	○	○	○	+	+	+	○	○	○
C	○	○	○	+	+	+	○	○	○
B	○	○	○	+	+	+	○	○	○
A	○	○	○	+	+	+	○	○	○
	1	2	3		7	8	9		

AB

M	+	○	○	+	+	+	○	○	+
L	+	○	○	+	+	+	○	○	+
K	+	○	○	+	+	+	○	○	+
J	○	○	○	+	+	+	○	○	○
H	○	○	○	+	+	+	○	○	○
G	○	○	○	+	+	+	○	○	○
F	○	○	○	+	+	+	○	○	○
E	○	○	○	+	+	+	○	○	○
D	○	○	○	+	+	+	○	○	○
C	○	○	○	+	+	+	○	○	○
B	○	○	○	+	+	+	○	○	○
A	○	○	○	+	+	+	○	○	○
	1	2	3		7	8	9		

AC

T	○	○	+	+	+	+	+	○	○
R	+	+	+	+	+	+	+	+	+
P	+	○	○	+	+	+	○	○	+
N	+	○	○	+	+	+	○	○	+
M	+	○	○	+	+	+	○	○	+
L	○	○	○	+	+	+	○	○	○
K	○	○	○	+	+	+	○	○	○
J	○	○	○	+	+	+	○	○	○
H	○	○	○	+	+	+	○	○	○
G	○	○	○	+	+	+	○	○	○
F	○	○	○	+	+	+	○	○	○
E	○	○	○	+	+	+	○	○	○
D	○	○	○	+	+	+	○	○	○
C	○	○	○	+	+	+	○	○	○
B	+	+	+	+	+	+	+	+	+
A	○	○	+	+	+	+	+	○	○
	1	2	3		7	8	9		

+ = DEPOPULATED BALL POSITION

SYMBOL	COMMON DIMENSIONS				SYMBOL	TOLERANCES OF FORM and POSITION	
	MIN	NOM	MAX	NOTES			NOTES
A1	0.25	- -	- -		aaa	0.15	
b	0.40	0.45	0.50	9	bbb	0.20	13
					ccc	0.12	
					ddd	0.15	
NOTES	1, 2				eee	0.08	
REF	04- 731				NOTES	1, 2	
ISSUE	A				REF	04- 731	
					ISSUE	A	

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VARIATIONS																
VARIATION	A	A2		D	E	D1	E1	MD	ME	SD	SE	eD	eE	n	REF	ISSUE
	MAX	MIN	MAX	MAX	MAX											
AA	3.05	1.40	2.80	18.50	11.00	11.00	6.40	12	9	0.50	0	1.00	0.80	62	04- 731	A
AB	6.10	2.60	5.85	18.50	11.00	11.00	6.40	12	9	0.50	0	1.00	0.80	66	04- 731	A
AC	6.10	2.60	5.85	18.50	11.00	15.00	6.40	16	9	0.50	0	1.00	0.80	74	04- 731	A
NOTES	8			14,16	14			4	4	11	11			5		
NOTES																

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NOTES: 1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M-1994.

2. DIMENSIONS ARE IN MILLIMETERS.

3. BALL DESIGNATION IS PER JEP 95, SECTION 3.0, SPP-010 AND SPP-020.

4. "MD" AND "ME" REPRESENT THE BALL MATRIX SIZE IN THE "D" AND "E" DIRECTIONS RESPECTIVELY.

5. "n" REPRESENTS THE NUMBER OF POPULATED BALL POSITIONS FOR EACH VARIATION.

6. 8 X 6 MATRIX PATTERN IS SHOWN FOR ILLUSTRATION ONLY.

7. PRIMARY DATUM C (SEATING PLANE) IS DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS

8. DIMENSION "A" INCLUDES STANDOFF HEIGHT "A1" AND PACKAGE BODY THICKNESS "A2". BUT DOES NOT INCLUDE ATTACHED FEATURES, E.G., EXTERNAL HEAT SINK OR CHIP CAPACITOR. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AN ATTACHED FEATURE.

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

10. THE TERMINAL "A1" CORNER MUST BE IDENTIFIED ON THE TOP SURFACE OF THE PACKAGE BY USING INK OR METALIZED MARKINGS, IDENTATIONS, OR OTHER FEATURES. THE EXACT SHAPE OF EACH CORNER IS OPTIONAL. SOME ORIENTATOIN FEATURE ON THE BALL ATTACH SIDE IS RECOMMENDED.

11. DIMENSIONS SD AND SE ARE MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINE THE POSITION OF THE CENTER BALL IN THE OUTER ROW FOR A FULLY POPULATED MD X ME MATRIX. WHERE THERE IS AN ODD NUMBER OF BALLS IN THE OUTER ROW SD OR SE = 0; WHEN THERE IS AN EVEN NUMBER OF CONTACT BALLS IN THE OUTER ROW. THE VALUE OF SD OR SE = $\frac{e}{2}$.

12. SOLDER BALL ARRAY MAY BE DEPOPULATED IN ANY PATTERN. DEPOPULATION IS THE OMISSION OF BALLS FROM A FULL MATRIX DEFINED BY MD AND ME.

13. FOR GLOB TOP AND FLIP CHIP CONFIGURATIONS, PARALLELISM (bbb) MUST BE ENSURED ONLY ON THE SURFACE DIRECTLY ABOVE THE DIE AREA. THE PARALLELISM SPECIFICATION WILL NOT APPLY TO ANY FILLET OR SLOPED REGION OF THE ENCAPSULANT.

14. MAXIMUM BODY SIZE ("D" AND "E") ARE DERIVED FROM ACTUAL BODY SIZES ROUNDED TO THE NEXT HEIGHT 0.50 MM INCREMENT (X.00 OR X.50). ACTUAL VALUES FOR "D" AND "E" MUST BE OBTAINED FROM THE PACKAGE PRODUCER.

15. THIS IS THE CONTROLLING DIMENSION.

16. VARIATION "AC" INCLUDES SUPPORT BALLS AND IS OPTIONAL FOR PACKAGE SIZE D LARGER THAN 17MM.

17. AREA CONTAINS VERTICAL INTERCONNECT BETWEEN UPPER AND LOWER DEVICES. EXACT DESIGN OF THIS FEATURE IS OUTSIDE THE SCOPE OF THIS DOCUMENT. INTERNAL DETAILS SHOWN FOR ILLUSTRATION PURPOSES ONLY AND ARE NOT INTENDED TO IMPLY PART ORIENTATION, PART QUANTITY, CONFIGURATION OR ASSEMBLY.

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

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