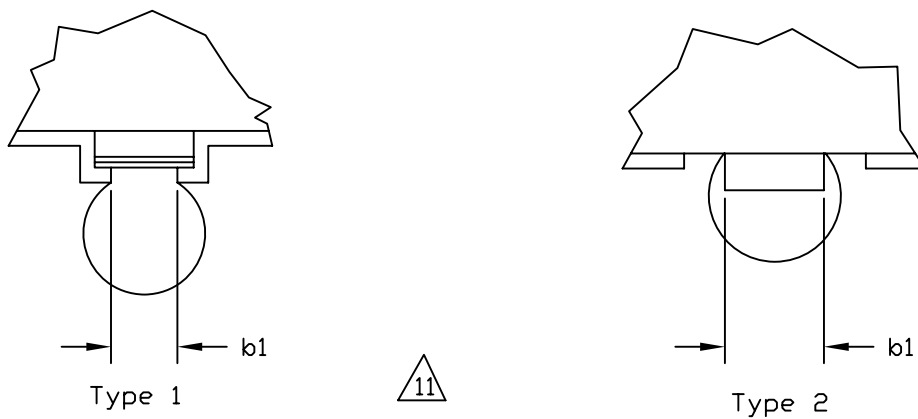
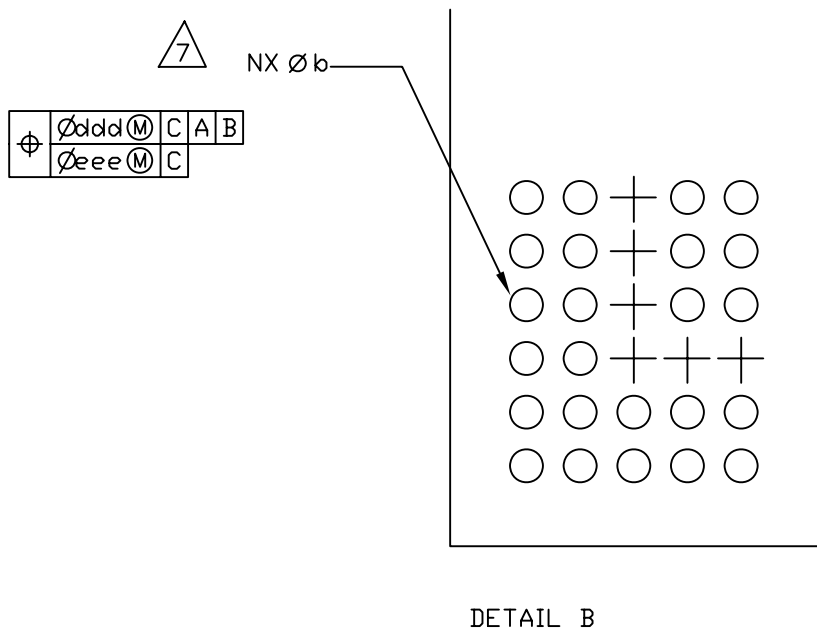
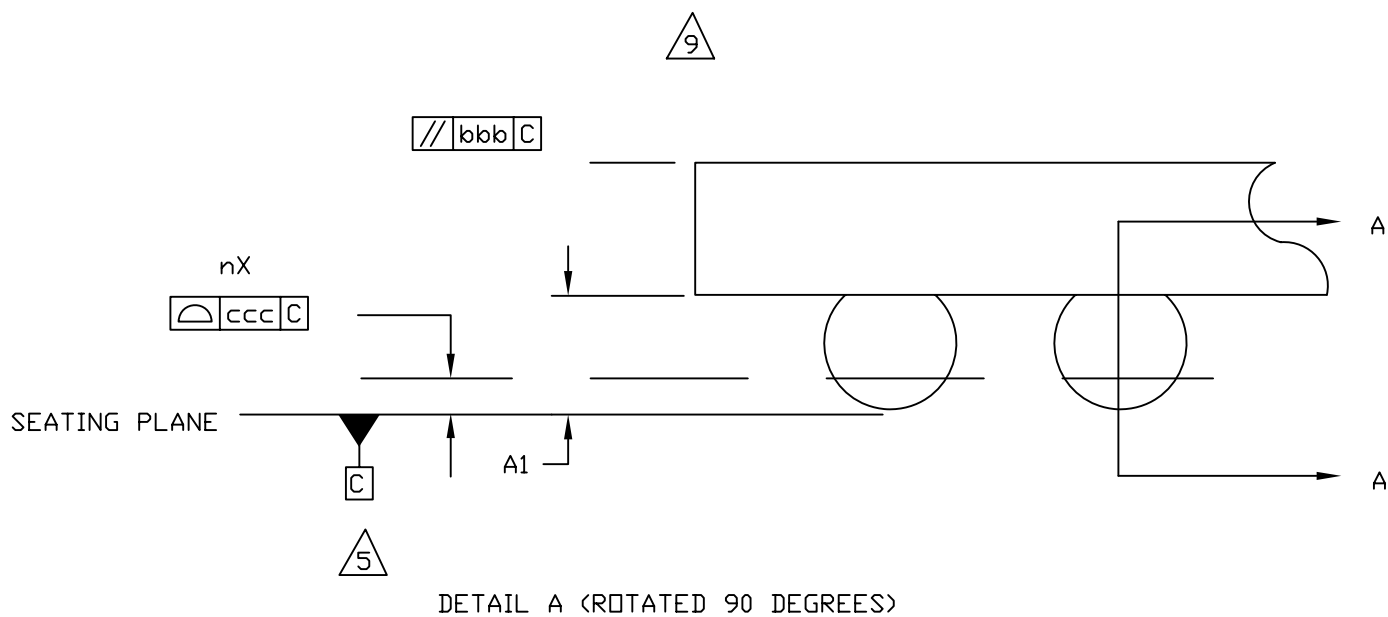
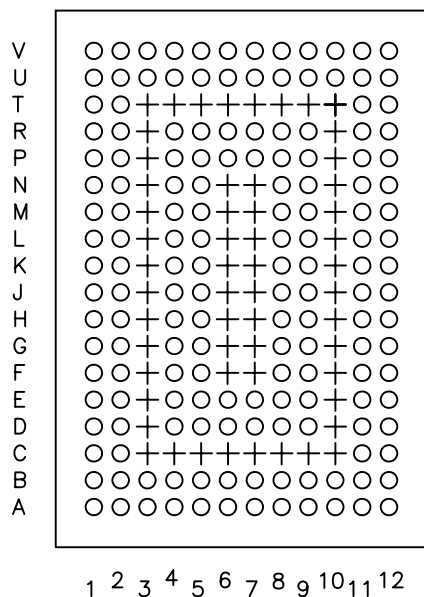


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OUTLINES

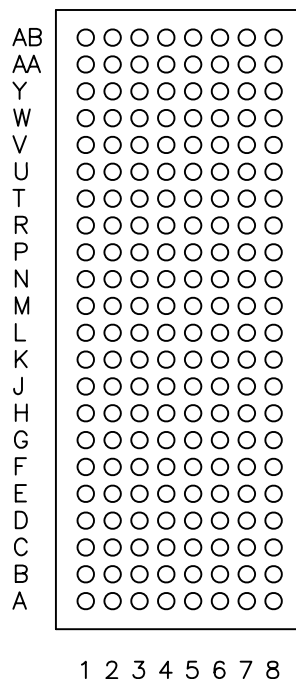
THIS REGISTERED OUTLINE HAS BEEN PREPARED BY THE JEDEC JC-11
COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USAGE IN THE
ELECTRONICS INDUSTRY; CHANGES ARE LIKELY TO OCCUR

TITLE	RECTANGULAR, FINE PITCH, THIN BALL GRID ARRAY (0.65 MM PITCH)	PACKAGE DESIGNATOR TFR-XBGA	ISSUE D	DATE July 08	MO-246	SHEET 1 OF 6
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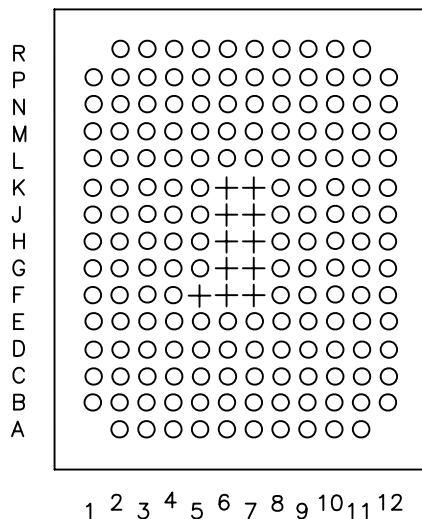




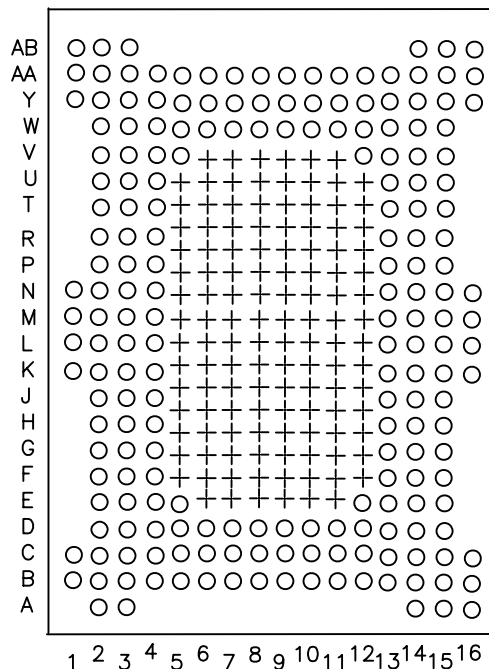
Variation A



Variation B



Variation C/D



Variation E

+ = DEPOPULATED BALL POSITION

S Y M B O L	COMMON DIMENSIONS				S Y M B O L	TOLERANCES OF FORM and POSITION	
	MIN	NOM	MAX	NOTES		VALUE	NOTES
A	–	–	1.20	6	aaa	0.15	
A1	0.25	–	–		bbb	0.20	9
A2	0.75	0.80	0.85		ccc	0.10	
b	0.35	0.40	0.45	7	ddd	0.15	
b1	0.28	0.40	0.45	11	eee	0.08	
e	0.65 BSC						
REF.	11-796				REF.	11-796	
ISSUE	D				ISSUE	D	
NOTES	1, 2				NOTES	1, 2	

VARIATIONS											
VAR	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	n	SD BSC	SE BSC	REF.	ISSUE
A	13.00	9.00	11.05	7.15	18	12	160	0.325	0.325	11-669	A
B	15.00	6.00	13.65	4.55	22	8	176	0.325	0.325	11-695	B
C	12.00	10.00	9.10	7.15	15	12	165	0.000	0.325	11-709	C
D	13.00	11.00	9.10	7.15	15	12	165	0.000	0.325	11-709	C
E	16.00	12.00	13.65	9.75	22	16	199	0.325	0.325	11-796	D
			10	10	13	13	4, 13				
NOTES						1, 2					

NOTES:

1. ALL DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5M-1994.

2. ALL DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).

3. SOLDER BALL POSITION DESIGNATION PER JEDEC PUBLICATION 95, SECTION 3, SPP-020. Variation A depopulation is shown on the bottom view of page 1 and the + indicators on the drawing show the depopulated ball areas.

4. n IS THE NUMBER OF BALLS PRESENT.

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

6. DIMENSION A INCLUDES THE STANDOFF HEIGHT A1 AND PACKAGE BODY THICKNESS A2.

7. DIMENSION b IS MEASURED AT THE MAXIMUM BALL DIAMETER, PARALLEL TO DATUM C.

8. THE TERMINAL A1 CORNER MUST BE IDENTIFIED ON THE TOP SURFACE OF THE PACKAGE BY USING INK OR METALLIZED MARKINGS, INDENTATIONS, OR OTHER FEATURES. THE EXACT SHAPE OF EACH CORNER IS OPTIONAL.

9. 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.

10. E1 AND D1 SHALL ONLY BE A MULTIPLE OF THE PITCH e.

11. SOLDERABLE SURFACE MAY BE DEFINED BY AN OPENING IN THE SOLDER RESIST LAYER (TYPE 1) OR BY THE SIZE OF A METALLIZED PAD (TYPE 2). IT MAY BE ELLIPTICAL PROVIDED THE RATIO OF 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, COPPER TRACES ARE PERMITTED OUTSIDE THE b1 PAD AREA.

12. 12 X 18 MATRIX PATTERN (VARIATION A) IS SHOWN FOR ILLUSTRATION ONLY

13. SYMBOL "MD" IS THE BALL MATRIX SIZE IN THE "D" DIRECTION. SYMBOL "ME" IS THE BALL MATRIX SIZE IN THE "E" DIRECTION. "n" IS THE ACTUAL NUMBER OF BALLS FOR MATRIX SIZE MD x ME AND DOES NOT INCLUDE BALLS FROM ANY DEPOPULATED LOCATIONS.

JEDEC SOLID STATE PRODUCT OUTLINES	TITLE RECTANGULAR, FINE PITCH, THIN BALL GRID ARRAY (0.65 MM PITCH)	ISSUE D	DATE July 08	MD-246	SHEET 5 of 6
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Change Record

If the changes 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: A	Date: Nov. 1999	Item: M□-246
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Revision History:

Issue: D	Date: April 08	Item: 11-796
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Location	Change from:	Change to:
Sheet 3		Add Variation E

Issue:	Date:	Item:
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Location	Change from:	Change to:

Issue:	Date:	Item:
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Location	Change from:	Change to: