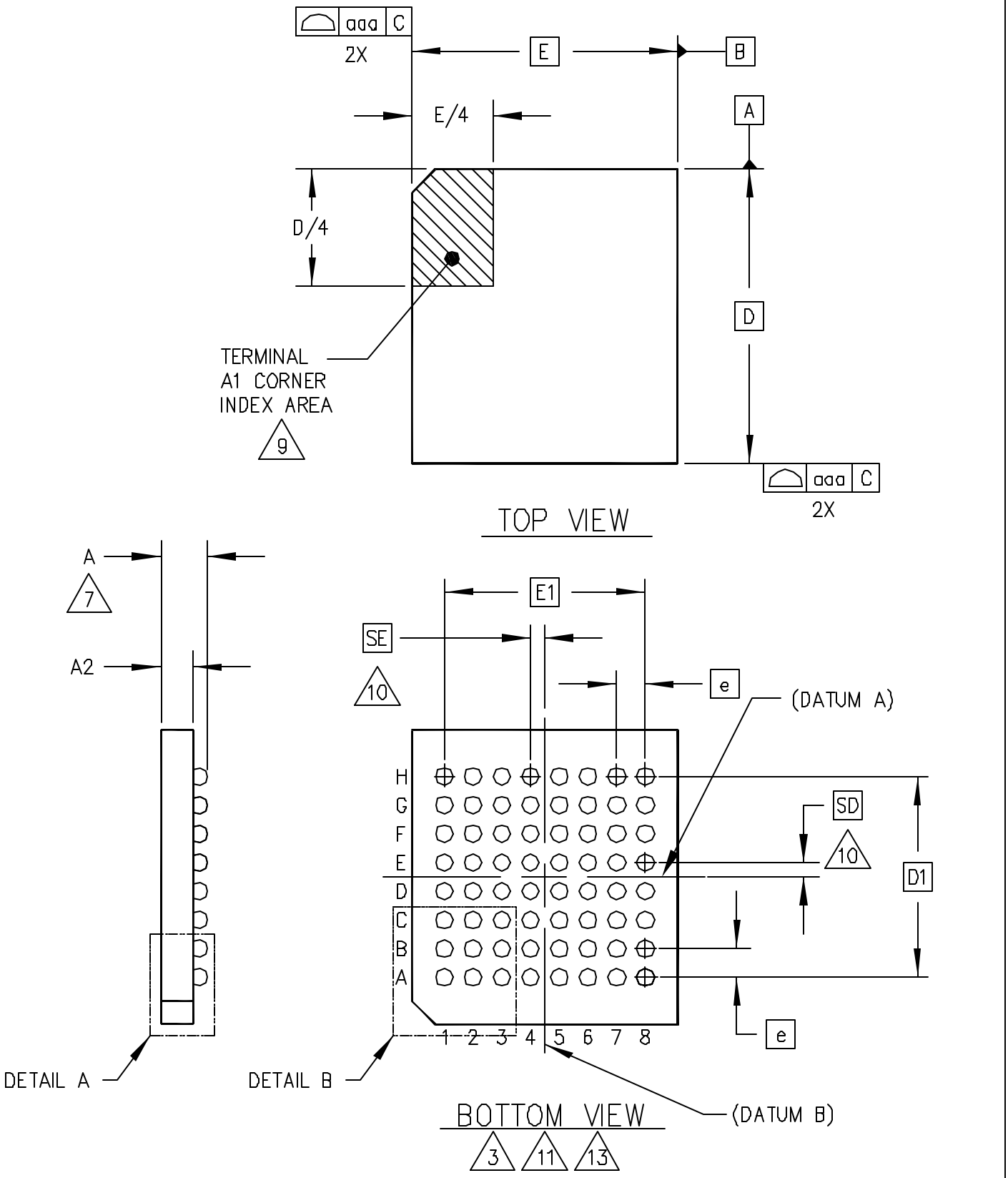
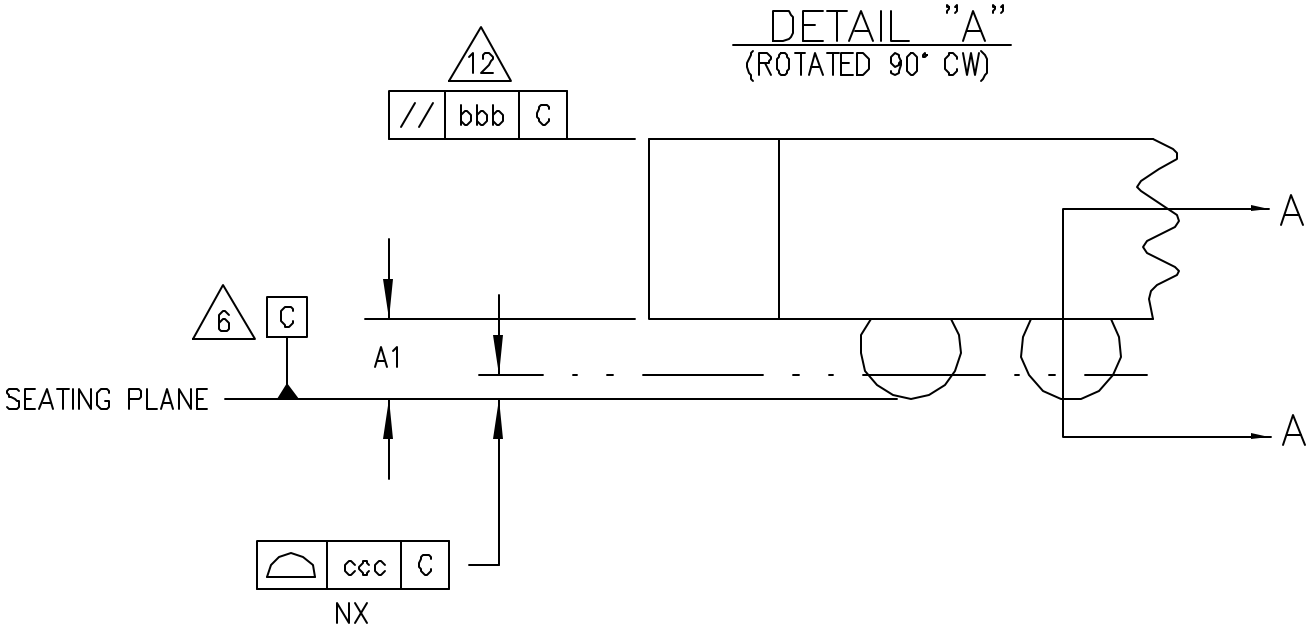


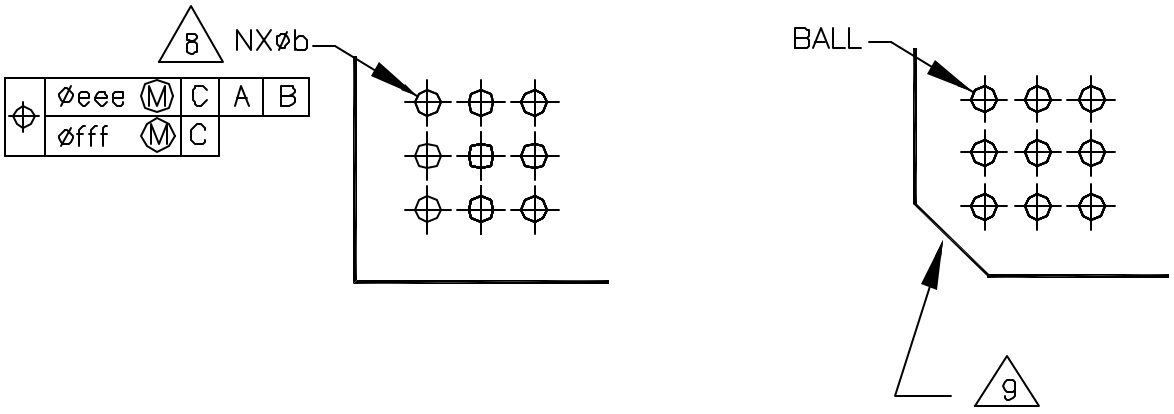
JEDEC SOLID STATE PRODUCT OUTLINE	THIS REGISTERED OUTLINE HAS BEEN PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USE IN THE ELECTRONICS INDUSTRY. CHANGES ARE LIKELY TO OCCUR.

TITLE: THIN PROFILE, SQUARE AND RECTANGULAR, BALL GRID ARRAY FAMILY, 1.00 & 0.80 mm PITCHES	PACKAGE DESIGNATOR: T-XBGA, TF-XBGA TR-XBGA	ISSUE: E	DATE: AUG 2003	MO-216	PAGE: 1 OF 9

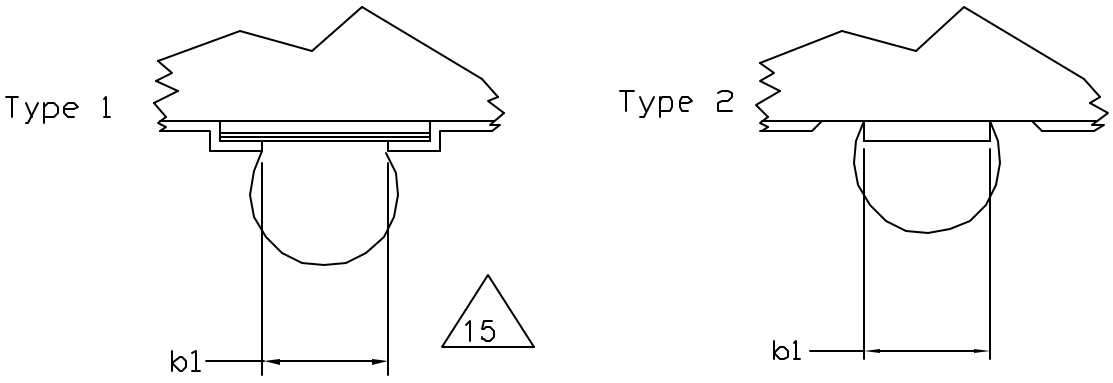
DETAIL "A"
(ROTATED 90° CW)



DETAIL "B"
CORNER A1 OPTIONAL CONFIGURATION



SECTION A–A



JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN PROFILE, SQUARE AND RECTANGULAR, BALL GRID ARRAY FAMILY, 1.00 & 0.80 mm PITCHES	ISSUE: E	DATE: AUG 2003	MO-216	PAGE: 2 OF 9

TABLE 1: COMMON DIMENSIONS & TOLERANCES OF FORM AND POSITION

SYMBOL	COMMON DIMENSIONS MINIMUM	COMMON DIMENSIONS NOMINAL	COMMON DIMENSIONS MAXIMUM	NOTES	SYMBOL	TOLERANCES OF FORM AND POSITION	NOTES
A	–	–	1.20	7	aaa	0.10	12
A1	0.20	–	–	7	bbb	0.20	
A2	0.65	–	–		ccc	0.12	
b	0.40	0.45	0.50	8	ddd	--	
b1 Type 1	0.35	–	–	15	eee	0.15	
b1 Type 2	0.30	–	–	15	fff	0.08	
NOTES	1,2						
REF	11-541						
ISSUE	B						

TABLE 2: SQUARE VARIATIONS – 1.00 PITCH

[D] / [E]	[e] = 1.00							
	MD/ME	N	SD/SE	VARIATION	MD-1/ME-1	N	SD/SE	VARIATION
6.00	5	25	0.00	AAA-1	4	16	0.50	AAA-2
7.00	6	36	0.50	AAB-1	5	25	0.00	AAB-2
8.00	7	49	0.00	AAC-1	6	36	0.50	AAC-2
9.00	8	64	0.50	AAD-1	7	49	0.00	AAD-2
10.00	9	81	0.00	AAE-1	8	64	0.50	AAE-2
11.00	10	100	0.50	AAF-1	9	81	0.00	AAF-2
12.00	11	121	0.00	AAG-1	10	100	0.50	AAG-2
13.00	12	144	0.50	AAH-1	11	121	0.00	AAH-2
14.00	13	169	0.00	AAJ-1	12	144	0.50	AAJ-2
15.00	14	196	0.50	AAK-1	13	169	0.00	AAK-2
16.00	15	225	0.00	AAL-1	14	196	0.50	AAL-2
17.00	16	256	0.50	AAM-1	15	225	0.00	AAM-2
18.00	17	289	0.00	AAN-1	16	256	0.50	AAN-2
19.00	18	324	0.50	AAP-1	17	289	0.00	AAP-2
20.00	19	361	0.00	AAR-1	18	324	0.50	AAR-2
21.00	20	400	0.50	AAS-1	19	361	0.00	AAS-2
22.00	21	441	0.00	AAT-1	20	400	0.50	AAT-2
23.00	22	484	0.50	AAU-1	21	441	0.00	AAU-2
24.00	23	529	0.00	AAV-1	22	484	0.50	AAV-2
25.00	24	576	0.50	AAW-1	23	529	0.00	AAW-2
26.00	25	625	0.00	AAX-1	24	576	0.50	AAX-2
27.00	26	676	0.50	AAY-1	25	625	0.00	AAY-2
NOTES	4	5	10		4	5	10	
	1,2,13				1,2,13			

APPLICATION NOTES: THE VARIATION AAA-1 CORRESPONDS TO A PITCH OF 1.00 (A), FIRST VARIATION (AA), AND MAXIMUM BALL COUNT (-1).
THE VARIATION AAA-2 CORRESPONDS TO A PITCH OF 1.00 (A), FIRST VARIATION (AA), AND MAXIMUM BALL COUNT MINUS ONE COLUMN AND ROW (-2).

TABLE 3: SQUARE VARIATIONS – 0.80 PITCH

D / E	e = 0.80							
	MD/ME	N	SD/SE	VARIATION	MD-1/ME-1	N	SD/SE	VARIATION
6.00	7	49	0.00	BAA-1	6	36	0.40	BAA-2
7.00	8	64	0.40	BAB-1	7	49	0.00	BAB-2
8.00	9	81	0.00	BAC-1	8	64	0.40	BAC-2
9.00	10	100	0.40	BAD-1	9	81	0.00	BAD-2
10.00	12	144	0.40	BAE-1	11	121	0.00	BAE-2
11.00	13	169	0.00	BAF-1	12	144	0.40	BAF-2
12.00	14	196	0.40	BAG-1	13	169	0.00	BAG-2
13.00	15	225	0.00	BAH-1	14	196	0.40	BAH-2
14.00	17	289	0.00	BAJ-1	16	256	0.40	BAJ-2
15.00	18	324	0.40	BAK-1	17	289	0.00	BAK-2
16.00	19	361	0.00	BAL-1	18	324	0.40	BAL-2
17.00	20	400	0.40	BAM-1	19	361	0.00	BAM-2
18.00	22	484	0.40	BAN-1	21	441	0.00	BAN-2
19.00	23	529	0.00	BAP-1	22	484	0.40	BAP-2
20.00	24	576	0.40	BAR-1	23	529	0.00	BAR-2
21.00	25	625	0.00	BAS-1	24	576	0.00	BAS-2
22.00	27	729	0.00	BAT-1	26	676	0.40	BAT-2
23.00	28	784	0.40	BAU-1	27	729	0.00	BAU-2
24.00	29	841	0.00	BAV-1	28	784	0.40	BAV-2
25.00	31	961	0.00	BAW-1	30	900	0.40	BAW-2
26.00	32	1024	0.40	BAX-1	31	961	0.00	BAX-2
27.00	33	1089	0.00	BAY-1	32	1024	0.40	BAY-2
NOTES	4	5	10		4	5	10	
	1,2,13				1,2,13			

APPLICATION NOTES: THE VARIATION BAA-1 CORRESPONDS TO A PITCH OF 0.80 (B), FIRST VARIATION (AA), AND MAXIMUM BALL COUNT (-1).
THE VARIATION BAA-2 CORRESPONDS TO A PITCH OF 0.80 (B), FIRST VARIATION (AA), AND MAXIMUM BALL COUNT MINUS ONE COLUMN AND ROW (-2).

TABLE 4: RECTANGULAR VARIATIONS – 1.00 PITCH

D	E	e = 1.00							
		MD	ME	N	SD	SE	VARIATION	REF	ISSUE
13.00	10.00	8	8	64	0.50	0.50	CAA–1	11–541	B
13.00	10.00	10	8	80	0.50	0.50	CAE–1	11–658	E
15.00	13.00	15	11	165	0.00	0.00	CAB–1	11–573	C
15.00	13.00	15	13	195	0.00	0.00	CAC–1	11–573	C
17.00	15.00	14	10	165	0.00	0.00	CAD–1	11–630	D
NOTES		4	4	5	10	10			
		1,2,13							

APPLICATION NOTES: THE VARIATION CAA–1 CORRESPONDS TO A PITCH OF 1.00 (C), FIRST VARIATION (AA), AND MAXIMUM BALL COUNT (–1).

TABLE 5: VARIATIONS SUMMARY

VAR	REF	ISSUE	VAR	REF	ISSUE	VAR	REF	ISSUE	VAR	REF	ISSUE
AAA-1	11-535	A	AAA-2	11-535	A	BAA-1	11-535	A	BAA-2	11-535	A
AAB-1	11-535	A	AAB-2	11-535	A	BAB-1	11-535	A	BAB-2	11-535	A
AAC-1	11-535	A	AAC-2	11-535	A	BAC-1	11-535	A	BAC-2	11-535	A
AAD-1	11-535	A	AAD-2	11-535	A	BAD-1	11-535	A	BAD-2	11-535	A
AAE-1	11-535	A	AAE-2	11-535	A	BAE-1	11-535	A	BAE-2	11-535	A
AAF-1	11-535	A	AAF-2	11-535	A	BAF-1	11-535	A	BAF-2	11-535	A
AAG-1	11-535	A	AAG-2	11-535	A	BAG-1	11-535	A	BAG-2	11-535	A
AAH-1	11-535	A	AAH-2	11-535	A	BAH-1	11-535	A	BAH-2	11-535	A
AAJ-1	11-535	A	AAJ-2	11-535	A	BAJ-1	11-535	A	BAJ-2	11-535	A
AAK-1	11-535	A	AAK-2	11-535	A	BAK-1	11-535	A	BAK-2	11-535	A
AAL-1	11-535	A	AAL-2	11-535	A	BAL-1	11-535	A	BAL-2	11-535	A
AAM-1	11-535	A	AAM-2	11-535	A	BAM-1	11-535	A	BAM-2	11-535	A
AAN-1	11-535	A	AAN-2	11-535	A	BAN-1	11-535	A	BAN-2	11-535	A
AAP-1	11-535	A	AAP-2	11-535	A	BAP-1	11-535	A	BAP-2	11-535	A
AAR-1	11-535	A	AAR-2	11-535	A	BAR-1	11-535	A	BAR-2	11-535	A
AAS-1	11-535	A	AAS-2	11-535	A	BAS-1	11-535	A	BAS-2	11-535	A
AAT-1	11-535	A	AAT-2	11-535	A	BAT-1	11-535	A	BAT-2	11-535	A
AAU-1	11-535	A	AAU-2	11-535	A	BAU-1	11-535	A	BAU-2	11-535	A
AAV-1	11-535	A	AAV-2	11-535	A	BAV-1	11-535	A	BAV-2	11-535	A
AAW-1	11-535	A	AAW-2	11-535	A	BAW-1	11-535	A	BAW-2	11-535	A
AAX-1	11-535	A	AAX-2	11-535	A	BAX-1	11-535	A	BAX-2	11-535	A
AAY-1	11-535	A	AAY-2	11-535	A	BAY-1	11-535	A	BAY-2	11-535	A
CAA-1	11-541	B									
CAB-1	11-573	C									
CAC-1	11-573	C									
CAD-1	11-630	D									
CAE-1	11-658	E									

NOTES:

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

2 ALL DIMENSIONS ARE IN MILLIMETERS.

3 SOLDER BALL DESIGNATION IS PER JEP 95, SECTION 4.3, SPP–010.

4 FOR SQUARE VARIATIONS, 'MD' AND 'ME' ARE THE MAXIMUM BALL MATRIX SIZE FOR THE 'D' AND 'E' DIMENSIONS RESPECTIVELY. FOR RECTANGULAR VARIATIONS, 'MD' AND 'ME' ARE THE ACTUAL BALL MATRIX SIZE FOR THE 'D' AND 'E' DIMENSIONS, RESPECTIVELY.

5 'N' IS THE MAXIMUM NUMBER OF BALLS FOR A SPECIFIED MATRIX SIZE.

6 THE CROWNS OF THE SOLDER BALLS DEFINE DATUM C AND THE SEATING PLANE.

7 DIMENSION 'A' INCLUDES STANDOFF HEIGHT 'A1', PACKAGE BODY THICKNESS AND LID HEIGHT, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g. EXTERNAL HEAT SINK OR CHIP CAPACITORS. AN INTEGRAL HEAT SLUG IS NOT CONSIDERED AN ATTACHED FEATURE.

8 DIMENSION 'b' IS MEASURED AT THE MAXIMUM BALL DIAMETER IN A PLANE PARALLEL TO DATUM C.

9 THE A1 CORNER MUST BE IDENTIFIED ON THE TOP SURFACE OF THE PACKAGE BY USING A CORNER CHAMFER, INK OR METALIZED MARKINGS, INDENTATION, OR OTHER FEATURE OF PACKAGE BODY, LID, OR INTEGRAL HEAT SLUG. IF THE OPTIONAL CHAMFERED CORNER IS USED, THE MAXIMUM NUMBER OF SOLDER BALLS 'N' MAY BE REDUCED. EXACT SHAPE OF EACH CORNER IS OPTIONAL, BUT PIN 1 CORNER MUST BE UNIQUE. A DISTINGUISHING FEATURE IS ALLOWABLE ON THE BOTTOM SURFACE OF THE PACKAGE TO IDENTIFY THE TERMINAL A1 CORNER.

10 DIMENSION 'SD' OR 'SE' IS MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINES THE POSITION OF THE CENTER BALL(S) IN THE OUTER ROW OR COLUMN. WHEN THERE IS AN ODD NUMBER OF BALLS IN THE OUTER ROW OF A FULL MATRIX, 'SD' OR 'SE'=0.00; WHEN THERE IS AN EVEN NUMBER OF BALLS IN THE OUTER ROW, 'SD' OR 'SE'=e/2.

11 THE ARRAY OF BALLS MAY BE DEPOPULATED IN ANY MANNER. DEPOPULATION IS THE OMISSION OF BALLS FROM A FULL MATRIX.

12 FOR GLOB TOP AND FLIP CHIP CONFIGURATIONS, PARALLELISM (bbb) MUST BE ENSURED ON THE TOP SURFACE IN A CENTERED MINIMUM AREA OF 2.50 X 2.50 mm. THE PARALLELISM SPECIFICATION WILL NOT APPLY TO THE FILLET OR SLOPED REGION OF THE ENCAPSULANT.

13 8 X 8 MATRIX PATTERN IS SHOWN FOR ILLUSTRATION ONLY.

APPLICATION NOTES:

14 THE USER SHOULD ENSURE THE BALL GEOMETRY AND THE METALURGY ARE APPROPRIATE FOR THE INTENDED USE.

15 THE SOLDERABLE SURFACE MAY BE DEFINED BY AN OPENING IN THE SOLDER RESIST LAYER (Type 1) OR BY THE SIZE OF THE 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.