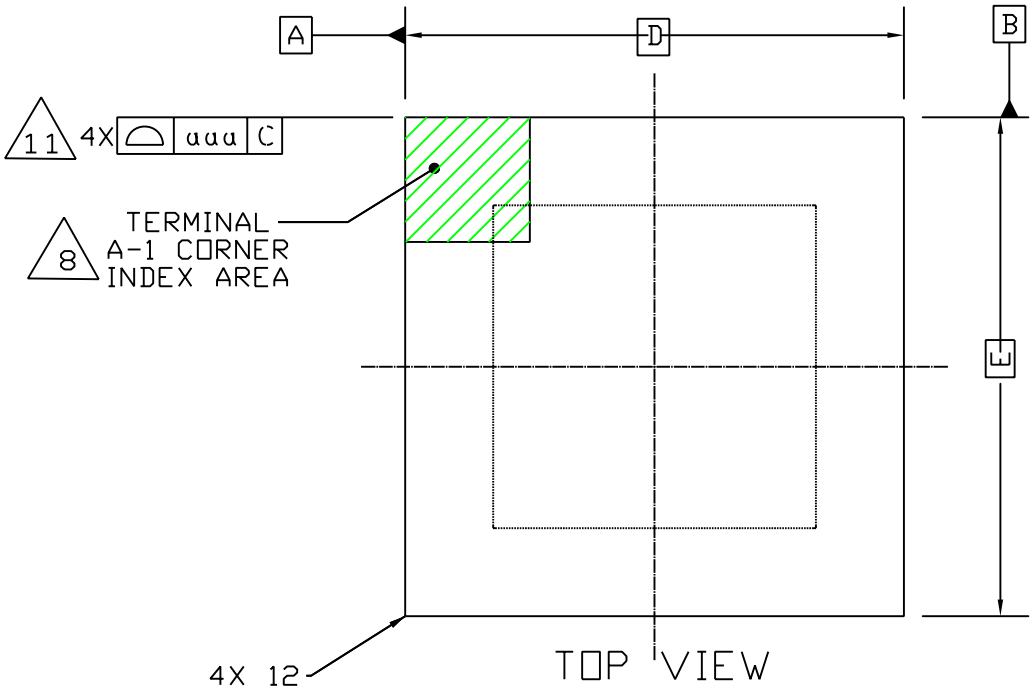
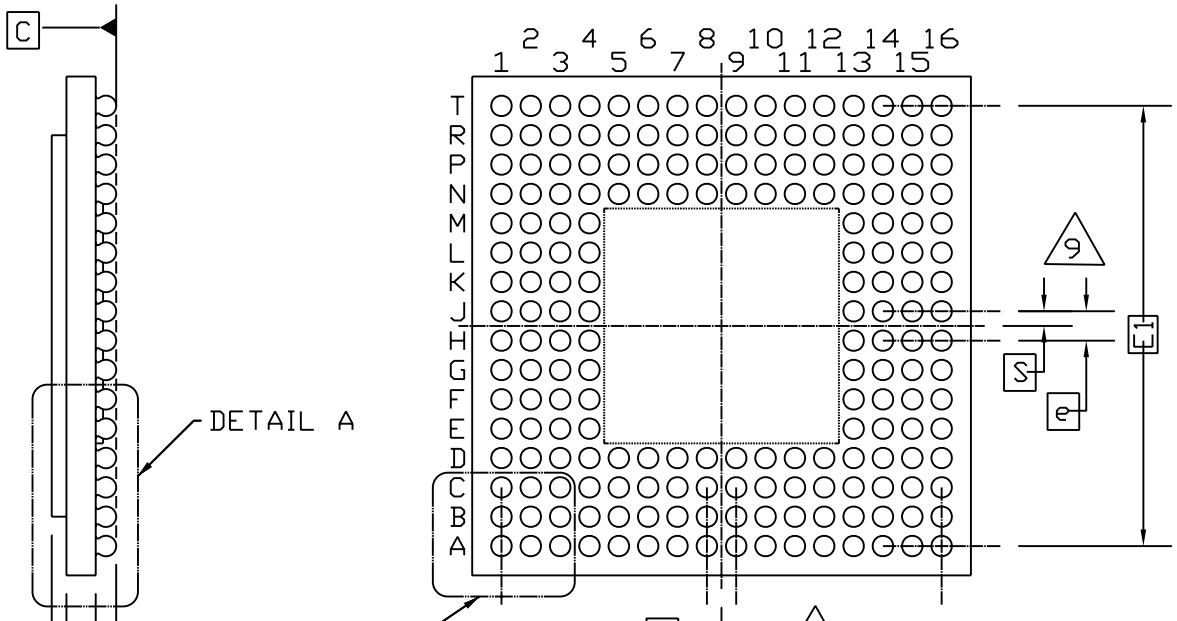


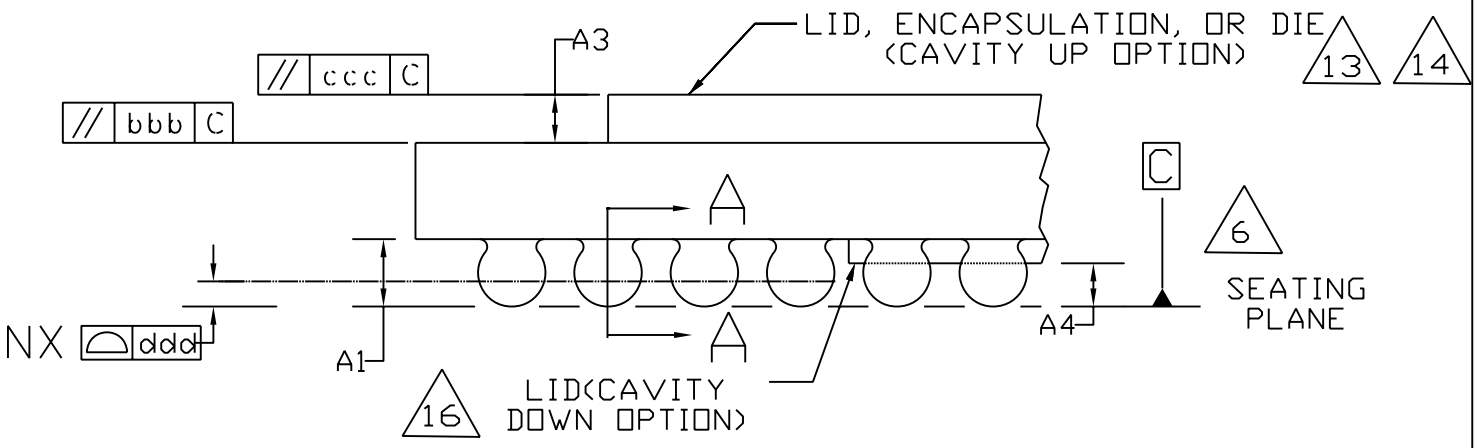
TOP VIEW



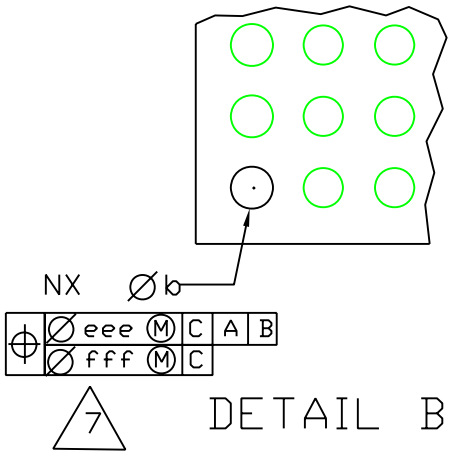
SIDE VIEW

BOTTOM VIEW

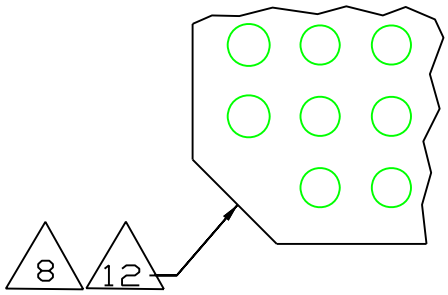
JEDEC SOLID STATE PRODUCT OUTLINES	THIS *REGISTERED OUTLINE* HAS BEEN PREPARED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USAGE IN THE ELECTRONICS INDUSTRY; CHANGES ARE LIKELY TO OCCUR.				
TITLE SQUARE CERAMIC BALL GRID ARRAY FAMILY 1.00, 1.27, AND 1.50 mm PITCH	JESD-30 DESIGNATOR CBGA	ISSUE C	DATE April 2005	MO-156	SHEET 1 OF 7



DETAIL A
(ROTATED 90°)



DETAIL B



DETAIL B
OPTIONAL CONFIGURATION
A-1 CORNER

SECTION A-A

JEDEC SOLID STATE PRODUCT OUTLINES	TITLE SQUARE CERAMIC BALL GRID ARRAY FAMILY 1.00, 1.27, AND 1.50 mm PITCH	ISSUE C	DATE April 2005	MO-156	SHEET 2 OF 7

SUMMARY TABLE							
D	E	e =1.50 mm		e =1.27 mm		e =1.00 mm	
		MD/ME	N	MD/ME	N	MD/ME	N
11.00	11.00	7	49	8	64	10	100
13.00	13.00	8	64	10	100	12	144
15.00	15.00	10	100	11	121	14	196
17.00	17.00	11	121	13	169	16	256
18.50	18.50	12	144	14	196	17	289
19.00	19.00	12	144	15	225	18	324
21.00	21.00	14	196	16	256	20	400
23.00	23.00	15	225	18	324	22	484
25.00	25.00	16	256	19	361	24	576
27.00	27.00	18	324	21	441	26	676
29.00	29.00	19	361	22	484	28	784
31.00	31.00	20	400	24	576	30	900
32.50	32.50	21	441	25	625	31	937
33.00	33.00	22	484	26	676	32	1024
NOTES		15	15	15	15	15	15
		1,2					
ISSUE		10-432					
REF.		C					

COMMON DIMENSION TABLE										
SYMBOL	e =1.50 mm			e =1.27 mm			e =1.00 mm			NOTE
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	
A	--	--	6.00	--	--	6.00	--	--	5.80	5
A2	0.30	--	5.00	0.30	--	5.00	0.30	--	5.00	
TOLERANCES OF FORM AND POSITION										
aaa	0.20			0.20			0.20			11
bbb	0.25			0.25			0.25			
ccc	0.35			0.35			0.35			
ddd	0.15			0.15			0.15			
eee	0.30			0.30			0.25			
fff	0.15			0.15			0.10			
NOTES	1,2									
ISSUE	B									
REF.	10-395									

SOLDER BALL DIMENSION TABLE										
VARIATION AXX (for bga balls that do not collapse)										
SYMBOL	e =1.50 mm			e =1.27 mm			e =1.00 mm			NOTE
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	
A1	0.80	0.90	1.00	0.80	0.90	1.00	0.70	0.80	0.90	
b	0.82	0.89	0.93	0.82	0.89	0.93	0.70	0.80	0.85	7
b1	0.81	0.86	0.91	0.81	0.86	0.91	0.75	0.80	0.85	
NOTES	1,2									
REF.	10-432									
ISSUE	C									

VARIATION BXX (for BGA balls that do collapse)										
SYMBOL	e =1.50 mm			e =1.27 mm			e =1.00 mm			NOTE
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	
A1	0.50	0.60	0.70	0.50	0.60	0.70	0.40	0.50	0.60	
b	0.60	0.75	0.90	0.60	0.75	0.90	0.50	0.60	0.70	7
b1							0.65	0.70	0.75	
NOTES	1,2									
REF.	10-432									
ISSUE	C									

VARIATIONS TABLE							
D / E	e =1.50 mm						
	MD/ME	N	D1/E1	VARIATION		REF.	ISSUE
11.00	7	49	9.00	AAA	BAA	10-345	A
13.00	8	64	10.50	AAB	BAB	10-345	A
15.00	10	100	13.50	AAC	BAC	10-337	A
17.00	11	121	15.00	AAD	BAD	10-337	A
18.50	12	144	16.50	AAE	BAE	10-337	A
19.00	12	144	16.50	AAF	BAF	10-337	A
21.00	14	196	19.50	AAG	BAG	10-337	A
23.00	15	225	21.00	AAH	BAH	10-345	A
25.00	16	256	22.50	AAJ	BAJ	10-337	A
27.00	18	324	25.50	AAK	BAK	10-337	A
29.00	19	361	27.00	AAL	BAL	10-337	A
31.00	20	400	28.50	AAM	BAM	10-345	A
32.50	21	441	30.00	AAN	BAN	10-337	A
33.00	22	484	31.50	AAP	BAP	10-345	A
NOTES	15	10, 15		REFER TO SOLDER BALL DIMENSION TABLE			
	1, 2						

VARIATIONS TABLE							
D / E	e =1.27 mm						
	MD/ME	N	D1/E1	VARIATION		REF.	ISSUE
11.00	8	64	8.89	ABA	BBA	10-345	A
13.00	10	100	11.43	ABB	BBB	10-345	A
15.00	11	121	12.70	ABC	BBC	10-337	A
17.00	13	169	15.24	ABD	BBD	10-337	A
18.50	14	196	16.51	ABE	BBE	10-337	A
19.00	15	225	17.78	ABF	BBF	10-337	A
21.00	16	256	19.05	ABG	BBG	10-337	A
23.00	18	324	21.59	ABH	BBH	10-345	A
25.00	19	361	22.86	ABJ	BBJ	10-337	A
27.00	21	441	25.40	ABK	BBK	10-337	A
29.00	22	484	26.67	ABL	BBL	10-337	A
31.00	24	576	29.21	ABM	BBM	10-345	A
32.50	25	625	30.48	ABN	BBN	10-337	A
33.00	26	676	31.75	ABP	BBP	10-345	A
NOTES	15	10, 15		REFER TO SOLDER BALL DIMENSION TABLE			
	1, 2						

VARIATIONS TABLE							
D / E	e =1.00 mm						
	MD/ME	N	D1/E1	VARIATION		REF.	ISSUE
11.00	10	100	9.00	ACA	BCA	10-345	A
13.00	12	144	11.00	ACB	BCB	10-345	A
15.00	14	196	13.00	ACC	BCC	10-337	A
17.00	16	256	15.00	ACD	BCD	10-337	A
18.50	17	289	16.00	ACE	BCE	10-337	A
19.00	18	324	17.00	ACF	BCF	10-337	A
21.00	20	400	19.00	ACG	BCG	10-337	A
23.00	22	484	21.00	ACH	BCH	10-345	A
25.00	24	576	23.00	ACJ	BCJ	10-337	A
27.00	26	676	25.00	ACK	BCK	10-337	A
29.00	28	784	27.00	ACL	BCL	10-337	A
31.00	30	900	29.00	ACM	BCM	10-345	A
32.00	31	937	30.00	ACP	BCP	10-432	B
33.00	32	1024	31.00	ACN	BCN	10-345	A
NOTES	15	10, 15		REFER TO SOLDER BALL DIMENSION TABLE			
	1, 2						

NOTES

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

2. ALL DIMENSIONS ARE IN MILLIMETERS.

3. TERMINAL POSITION (BALL) DESIGNATION PER JEP95 Sec 4.3, SPP-010.

4. 16 X 16 PERIPHERAL MATRIX IS SHOWN FOR ILLUSTRATION ONLY.

5. TOTAL PROFILE HEIGHT INCLUDES STANDOFF HEIGHT A1, PACKAGE BODY THICKNESS AND LID OR ENCAPSULATION HEIGHT, BUT DOES NOT INCLUDE ATTACHED FEATURES, E.G., EXTERNAL HEATSINK OR CHIP CAPACITORS. AN INTERNAL HEATSLUG IS NOT CONSIDERED AN ATTACHED FEATURE.

6. PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE CROWNS OF THE SOLDER BALLS.

7. DIMENSION b IS MEASURED AT THE MAXIMUM DIAMETER OF THE TERMINAL (BALL), IN A PLANE PARALLEL TO PRIMARY DATUM C.

8. THE TERMINAL A1 CORNER MUST BE IDENTIFIED ON THE TOP SURFACE OF THE PACKAGE BY USING A CORNER CHAMFER, INK OR METALLIZED MARKINGS, INDENTATION, OR OTHER FEATURE OF PACKAGE BODY, OR INTEGRAL HEATSLUG. A DISTINGUISHING FEATURE IS ALLOWABLE ON THE BOTTOM SURFACE OF THE PACKAGE TO IDENTIFY THE TERMINAL A1 CORNER.

9. $\boxed{S}$ IS MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINES THE POSITION OF THE CENTER TERMINAL (BALL) IN THE OUTER ROW OR COLUMN WHEN THERE IS AN ODD NUMBER OF TERMINALS IN THE OUTER ROW, $\boxed{S}$ = 0.00 mm. WHEN THERE IS AN EVEN NUMBER OF TERMINALS IN THE OUTER ROW, $\boxed{S} = \boxed{e/2}$.

10. THE TERMINAL (BALL) ARRAY MAY BE DEPOPULATED BY ANY METHOD, PROVIDED THERE IS NO PATTERN SHIFTING FROM ITS ORIGINAL CENTER. DEPOPULATION IS THE OMISSION OF TERMINALS (BALLS) FROM A FULL MATRIX.

11. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

12. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

13. FOR GLOB-TOP CONFIGURATIONS, THE PARALLELISM SPECIFICATION WILL NOT APPLY TO THE FILLET OR SLOPED REGION OF THE ENCAPSULANT.

14. LID MAY EXTEND TO PERIPHERY OF PACKAGE AND MAY CONSIST OF MOLDING COMPOUND, CERAMIC, METAL OR OTHER MATERIAL. LID MAY EXTEND ABOVE/BELOW PACKAGE BODY, E.G., COMPLETE OVERBODY MOLD.

NOTES (CONTINUED)

15. "MD" REPRESENTS THE MAXIMUM NUMBER OF SOLDER BALL COLUMNS PERPENDICULAR TO THE D DIMENSION. "ME" REPRESENTS THE MAXIMUM NUMBER OF SOLDER BALL ROWS PERPENDICULAR TO THE E DIMENSION. "N" REPRESENTS THE MAXIMUM BALL POPULATION FOR A VARIATION.

APPLICATION NOTES

16. FOR CAVITY DOWN CONFIGURATIONS, A MINIMUM DISTANCE (AFTER COMPONENT MOUNTING) OF 0.1 mm FROM THE LID SURFACE TO CIRCUIT BOARD SURFACE IS RECOMMENDED FOR CIRCUIT BOARD CLEANING.

17. THE COMPONENT MANUFACTURER SHOULD INSURE BALL GEOMETRIES AND METALLURGY ARE COORDINATED FOR PROPER INTERCONNECT COMPLIANCY.