

JEDEC
SOLID STATE
PRODUCT OUTLINE

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
LOW PROFILE, FINE PITCH
BALL GRID ARRAY FAMILY
(SQ.)

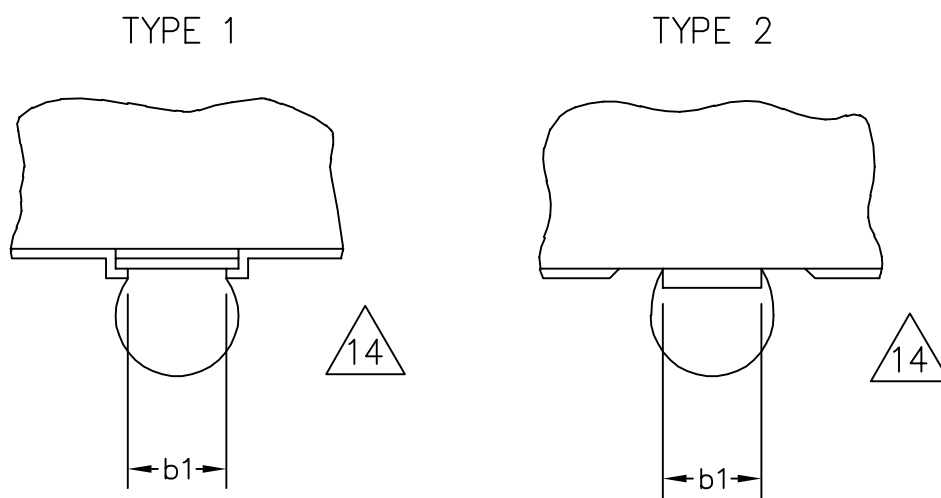
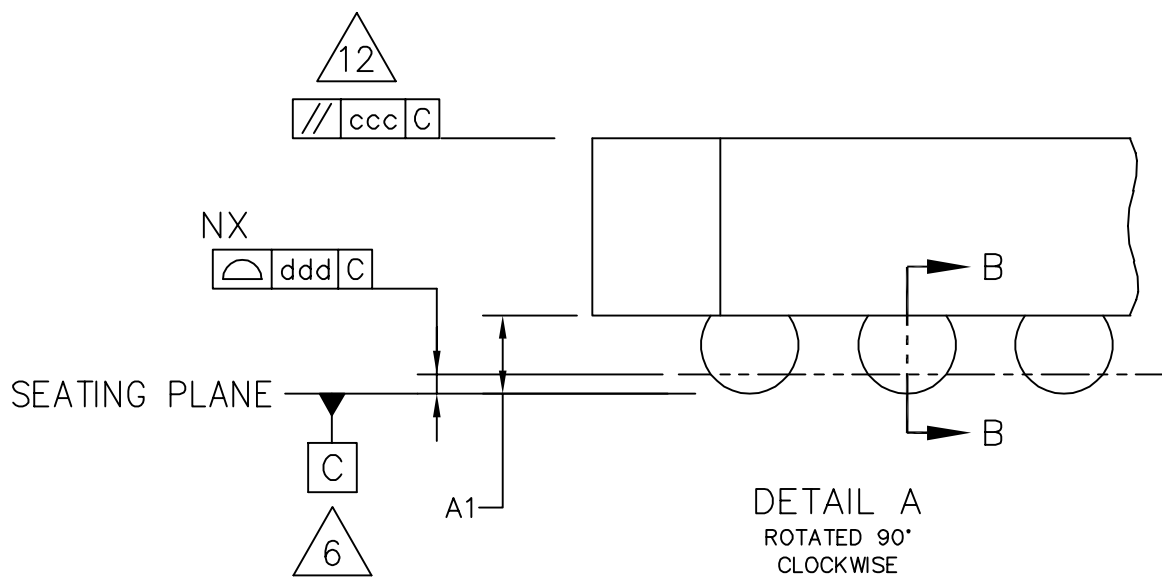
PACKAGE DESIGNATOR
LF-XBGA

ISSUE
A

DATE
May
06

MO-275

SHEET
1 OF 11



SECTION B-B

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE LOW PROFILE, FINE PITCH, BALL GRID ARRAY FAMILY (SQ.)	ISSUE A	DATE July 06	MO-275	SHEET 2 OF 11
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TABLE 1

SUMMARY TABLE							
BODY SIZE	BALL PITCH	N	NOMINAL BALL SIZE DIAMETER				
			0.50	0.45	0.40	0.35	0.30
6.00 X 6.00	0.80	49	AAAA-1	AAAB-1	AAAC-1	AAAD-1	AAAE-1
		36	AAAA-2	AAAB-2	AAAC-2	AAAD-2	AAAE-2
7.00 X 7.00	0.80	64	BBAA-1	BBAB-1	BBAC-1	BBAD-1	BBAE-1
		49	BBAA-2	BBAB-2	BBAC-2	BBAD-2	BBAE-2
8.00 X 8.00	0.80	81	CCAA-1	CCAB-1	CCAC-1	CCAD-1	CCAE-1
		64	CCAA-2	CCAB-2	CCAC-2	CCAD-2	CCAE-2
9.00 X 9.00	0.80	100	DDAA-1	DDAB-1	DDAC-1	DDAD-1	DDAE-1
		81	DDAA-2	DDAB-2	DDAC-2	DDAD-2	DDAE-2
10.00 X 10.00	0.80	144	EEAA-1	EEAB-1	EEAC-1	EEAD-1	EEAE-1
		121	EEAA-2	EEAB-2	EEAC-2	EEAD-2	EEAE-2
11.00 X 11.00	0.80	169	FFAA-1	FFAB-1	FFAC-1	FFAD-1	FFAE-1
		144	FFAA-2	FFAB-2	FFAC-2	FFAD-2	FFAE-2
12.00 X 12.00	0.80	196	GGAA-1	GGAB-1	GGAC-1	GGAD-1	GGAE-1
		169	GGAA-2	GGAB-2	GGAC-2	GGAD-2	GGAE-2
13.00 X 13.00	0.80	225	HHAA-1	HHAB-1	HHAC-1	HHAD-1	HHAE-1
		196	HHAA-2	HHAB-2	HHAC-2	HHAD-2	HHAE-2
14.00 X 14.00	0.80	289	JJAA-1	JJAB-1	JJAC-1	JJAD-1	JJAE-1
		256	JJAA-2	JJAB-2	JJAC-2	JJAD-2	JJAE-2
15.00 X 15.00	0.80	324	KKAA-1	KKAB-1	KKAC-1	KKAD-1	KKAE-1
		289	KKAA-2	KKAB-2	KKAC-2	KKAD-2	KKAE-2
16.00 X 16.00	0.80	361	LLAA-1	LLAB-1	LLAC-1	LLAD-1	LLAE-1
		324	LLAA-2	LLAB-2	LLAC-2	LLAD-2	LLAE-2
17.00 X 17.00	0.80	400	MMAA-1	MMAB-1	MMAC-1	MMAD-1	MMAE-1
		361	MMAA-2	MMAB-2	MMAC-2	MMAD-2	MMAE-2
18.00 X 18.00	0.80	484	NNAA-1	NNAB-1	NNAC-1	NNAD-1	NNAE-1
		441	NNAA-2	NNAB-2	NNAC-2	NNAD-2	NNAE-2
19.00 X 19.00	0.80	529	PPAA-1	PPAB-1	PPAC-1	PPAD-1	PPAE-1
		484	PPAA-2	PPAB-2	PPAC-2	PPAD-2	PPAE-2
20.00 X 20.00	0.80	576	RRAA-1	RRAB-1	RRAC-1	RRAD-1	RRAE-1
		529	RRAA-2	RRAB-2	RRAC-2	RRAD-2	RRAE-2
22.00 X 22.00	0.80	729	TTAA-1	TTAB-1	TTAC-1	TTAD-1	TTAE-1
		676	TTAA-2	TTAB-2	TTAC-2	TTAD-2	TTAE-2

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TITLE

LOW PROFILE, FINE PITCH,
BALL GRID ARRAY FAMILY
(SQ.)

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SHEET

3 OF 11

TABLE 1A

SUMMARY TABLE					
BODY SIZE	BALL PITCH	N	NOMINAL BALL SIZE DIAMETER		
			0.40	0.35	0.30
6.00 X 6.00	0.65	64	AABC-1	AABD-1	AABE-1
		49	AABC-2	AABD-2	AABE-2
7.00 X 7.00	0.65	100	BBBC-1	BBBD-1	BBBE-1
		81	BBBC-2	BBBD-2	BBBE-2
8.00 X 8.00	0.65	121	CCBC-1	CCBD-1	CCBE-1
		100	CCBC-2	CCBD-2	CCBE-2
9.00 X 9.00	0.65	169	DDBC-1	DDBD-1	DDBE-1
		144	DDBC-2	DDBD-2	DDBE-2
10.00 X 10.00	0.65	196	EEBC-1	EEBD-1	EEBE-1
		169	EEBC-2	EEBD-2	EEBE-2
11.00 X 11.00	0.65	256	FFBC-1	FFBD-1	FFBE-1
		225	FFBC-2	FFBD-2	FFBE-2
12.00 X 12.00	0.65	289	GGBC-1	GGBD-1	GGBE-1
		256	GGBC-2	GGBD-2	GGBE-2
13.00 X 13.00	0.65	361	HHBC-1	HHBD-1	HHBE-1
		324	HHBC-2	HHBD-2	HHBE-2
14.00 X 14.00	0.65	400	JJBC-1	JJBD-1	JJBE-1
		361	JJBC-2	JJBD-2	JJBE-2
15.00 X 15.00	0.65	484	KKBC-1	KKBD-1	KKBE-1
		441	KKBC-2	KKBD-2	KKBE-2
16.00 X 16.00	0.65	529	LLBC-1	LLBD-1	LLBE-1
		484	LLBC-2	LLBD-2	LLBE-2
17.00 X 17.00	0.65	625	MMBC-1	MMBD-1	MMBE-1
		576	MMBC-2	MMBD-2	MMBE-2
18.00 X 18.00	0.65	729	NNBC-1	NNBD-1	NNBE-1
		676	NNBC-2	NNBD-2	NNBE-2
19.00 X 19.00	0.65	784	PPBC-1	PPBD-1	PPBE-1
		729	PPBC-2	PPBD-2	PPBE-2
20.00 X 20.00	0.65	900	RRBC-1	RRBD-1	RRBE-1
		841	RRBC-2	RRBD-2	RRBE-2

TABLE 1B

SUMMARY TABLE			
BODY SIZE	BALL PITCH	N	NOMINAL BALL SIZE DIAMETER 0.30
6.00 X 6.00	0.50	121	AACE-1
		100	AACE-2
7.00 X 7.00	0.50	169	BBCE-1
		144	BBCE-2
8.00 X 8.00	0.50	225	CCCE-1
		196	CCCE-2
9.00 X 9.00	0.50	289	DDCE-1
		256	DDCE-2
10.00 X 10.00	0.50	361	EECE-1
		324	EECE-2
11.00 X 11.00	0.50	441	FFCE-1
		400	FFCE-2
12.00 X 12.00	0.50	529	GGCE-1
		484	GGCE-2
13.00 X 13.00	0.50	625	HHCE-1
		576	HHCE-2
14.00 X 14.00	0.50	729	JJCE-1
		676	JJCE-2
15.00 X 15.00	0.50	841	KKCE-1
		784	KKCE-2
16.00 X 16.00	0.50	961	LLCE-1
		900	LLCE-2
17.00 X 17.00	0.50	1089	MMCE-1
		1024	MMCE-2
18.00 X 18.00	0.50	1225	NNCE-1
		1156	NNCE-2
19.00 X 19.00	0.50	1369	PPCE-1
		1296	PPCE-2
20.00 X 20.00	0.50	1521	RRCE-1
		1444	RRCE-2

TABLE 2

VARIATION DESIGNATORS							
FIRST & SECOND CHARACTER CODES		THIRD CHARACTER CODE		FOURTH CHARACTER CODE		FIFTH CHARACTER CODE	
BODY SIZE		BALL PITCH		BALL SIZE		COLUMN / ROW	
D/E	LETTER CODE	e	LETTER CODE	b	LETTER CODE	MD/ME	NUMBER CODE
6.00	A	0.80	A	0.50	A	MD/ME	1
7.00	B	0.65	B	0.45	B	MD-1/ME-1	2
8.00	C	0.50	C	0.40	C	----	----
9.00	D	----	----	0.35	D	----	----
10.00	E	----	----	0.30	E	----	----
11.00	F	----	----	----	----	----	----
12.00	G	----	----	----	----	----	----
13.00	H	----	----	----	----	----	----
14.00	J	----	----	----	----	----	----
15.00	K	----	----	----	----	----	----
16.00	L	----	----	----	----	----	----
17.00	M	----	----	----	----	----	----
18.00	N	----	----	----	----	----	----
19.00	P	----	----	----	----	----	----
20.00	R	----	----	----	----	----	----
22.00	T	----	----	----	----	----	----

TABLE 3

COMMON DIMENSIONS															
SYMBOL	b = 0.50			b = 0.45			b = 0.40			b = 0.35			b = 0.30		
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
A	----	----	1.70	----	----	1.70	----	----	1.70	----	----	1.70	----	----	1.70
A1	0.25	----	----	0.25	----	----	0.20	----	----	0.15	----	----	0.15	----	----
A2	0.65	----	----	0.65	----	----	0.65	----	----	0.65	----	----	0.65	----	----
b	0.45	0.50	0.55	0.40	0.45	0.50	0.35	0.40	0.45	0.30	0.35	0.40	0.25	0.30	0.35
b1 TYPE 1	0.35	----	----	0.30	----	----	0.28	----	----	0.25	----	----	0.20	----	----
b1 TYPE 2	0.35	----	----	0.30	----	----	0.30	----	----	0.25	----	----	0.20	----	----
NOTES	1, 2, 7, 8, 14														
REF	11-751														
ISSUE	A														

TABLE 4

TOLERANCES OF FORM AND POSITION			
SYMBOL	VALUE	VALUE	VALUE
e	0.80	0.65	0.50
aaa	0.15	0.15	0.15
ccc	0.20	0.20	0.20
eee	0.15	0.15	0.15
fff	0.08	0.08	0.05
NOTES	1, 2		
REF	11-751		
ISSUE	A		

TABLE 4A

TOLERANCES OF FORM AND POSITION					
SYMBOL	VALUE	VALUE	VALUE	VALUE	VALUE
b	0.50	0.45	0.40	0.35	0.30
ddd	0.20	0.20	0.10	0.10	0.08
NOTES	1, 2, 6, 8				
REF	11-751				
ISSUE	A				

TABLE 5

VARIATIONS xxAx-1 $\boxed{e} = 0.80$						
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE
6.00	4.80	7	49	0	11-751	A
7.00	5.60	8	64	0.40	11-751	A
8.00	6.40	9	81	0	11-751	A
9.00	7.20	10	100	0.40	11-751	A
10.00	8.80	12	144	0.40	11-751	A
11.00	9.60	13	169	0	11-751	A
12.00	10.40	14	196	0.40	11-751	A
13.00	11.20	15	225	0	11-751	A
14.00	12.80	17	289	0	11-751	A
15.00	13.60	18	324	0.40	11-751	A
16.00	14.40	19	361	0	11-751	A
17.00	15.20	20	400	0.40	11-751	A
18.00	16.80	22	484	0.40	11-751	A
19.00	17.60	23	529	0	11-751	A
20.00	18.40	24	576	0.40	11-751	A
22.00	20.80	27	729	0	11-751	A
NOTES		4	5	10		

TABLE 5A

VARIATIONS xxAx-2 $\boxed{e} = 0.80$						
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE
6.00	4.00	6	36	0.40	11-751	A
7.00	4.80	7	49	0	11-751	A
8.00	5.60	8	64	0.40	11-751	A
9.00	6.40	9	81	0	11-751	A
10.00	8.00	11	121	0	11-751	A
11.00	8.80	12	144	0.40	11-751	A
12.00	9.60	13	169	0	11-751	A
13.00	10.40	14	196	0.40	11-751	A
14.00	12.00	16	256	0.40	11-751	A
15.00	12.80	17	289	0	11-751	A
16.00	13.60	18	324	0.40	11-751	A
17.00	14.40	19	361	0	11-751	A
18.00	16.00	21	441	0	11-751	A
19.00	16.80	22	484	0.40	11-751	A
20.00	18.40	23	529	0.00	11-751	A
22.00	20.80	26	676	0.40	11-751	A
NOTES		4	5	10		

TABLE 6

VARIATIONS xxBx-1 $\bar{e} = 0.65$						
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE
6.00	4.55	8	64	0.33	11-751	A
7.00	5.85	10	100	0.33	11-751	A
8.00	6.50	11	121	0	11-751	A
9.00	7.80	13	169	0	11-751	A
10.00	8.45	14	196	0.33	11-751	A
11.00	9.75	16	256	0.33	11-751	A
12.00	10.40	17	289	0	11-751	A
13.00	11.70	19	361	0	11-751	A
14.00	12.35	20	400	0.33	11-751	A
15.00	13.65	22	484	0.33	11-751	A
16.00	14.30	23	529	0	11-751	A
17.00	15.60	25	625	0	11-751	A
18.00	16.90	27	729	0	11-751	A
19.00	17.55	28	784	0.33	11-751	A
20.00	18.85	30	900	0.33	11-751	A
NOTES		4	5	10		

TABLE 6A

VARIATIONS xxBx-2 $\bar{e} = 0.65$						
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE
6.00	3.90	7	49	0	11-751	A
7.00	5.20	9	81	0	11-751	A
8.00	5.85	10	100	0.33	11-751	A
9.00	7.15	12	144	0.33	11-751	A
10.00	7.80	13	169	0	11-751	A
11.00	9.10	15	225	0	11-751	A
12.00	9.75	16	256	0.33	11-751	A
13.00	11.05	18	324	0.33	11-751	A
14.00	11.70	19	361	0	11-751	A
15.00	13.00	21	441	0	11-751	A
16.00	13.65	22	484	0.33	11-751	A
17.00	14.95	24	576	0.33	11-751	A
18.00	16.25	26	676	0.33	11-751	A
19.00	16.90	27	729	0	11-751	A
20.00	18.20	29	841	0	11-751	A
NOTES		4	5	10		

TABLE 7

VARIATIONS xxCx-1 $\bar{e} = 0.50$							
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE	
6.00	5.00	11	121	0	11-751	A	
7.00	6.00	13	169	0	11-751	A	
8.00	7.00	15	225	0	11-751	A	
9.00	8.00	17	289	0	11-751	A	
10.00	9.00	19	361	0	11-751	A	
11.00	10.00	21	441	0	11-751	A	
12.00	11.00	23	529	0	11-751	A	
13.00	12.00	25	625	0	11-751	A	
14.00	13.00	27	729	0	11-751	A	
15.00	14.00	29	841	0	11-751	A	
16.00	15.00	31	961	0	11-751	A	
17.00	16.00	33	1089	0	11-751	A	
18.00	17.00	35	1225	0	11-751	A	
19.00	18.00	37	1369	0	11-751	A	
20.00	19.00	39	1521	0	11-751	A	
NOTES		4	5	10			

TABLE 7A

VARIATIONS xxCx-2 $\bar{e} = 0.50$							
D/E BSC	D1/E1 BSC	MD/ME	N	SD/SE BSC	REF	ISSUE	
6.00	4.50	10	100	0.25	11-751	A	
7.00	5.50	12	144	0.25	11-751	A	
8.00	6.50	14	196	0.25	11-751	A	
9.00	7.50	16	256	0.25	11-751	A	
10.00	8.50	18	324	0.25	11-751	A	
11.00	9.50	20	400	0.25	11-751	A	
12.00	10.50	22	484	0.25	11-751	A	
13.00	11.50	24	576	0.25	11-751	A	
14.00	12.50	26	676	0.25	11-751	A	
15.00	13.50	28	784	0.25	11-751	A	
16.00	14.50	30	900	0.25	11-751	A	
17.00	15.50	32	1024	0.25	11-751	A	
18.00	16.50	34	1156	0.25	11-751	A	
19.00	17.50	36	1296	0.25	11-751	A	
20.00	18.50	38	1444	0.25	11-751	A	
NOTES		4	5	10			

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. DIMENSIONS ARE IN MILLIMETERS.
3. CONTACT BALL DESIGNATION PER JEDEC PUBLICATION 95, SECTION 3, SPP-010.
4. 'MD' AND 'ME' ARE THE MAXIMUM BALL MATRIX SIZE FOR THE 'D' AND 'E' DIMENSIONS RESPECTIVELY.
5. 'N' IS THE MAXIMUM NUMBER OF BALLS FOR A SPECIFIED MATRIX SIZE.
6. PRIMARY DATUM C (SEATING PLANE) IS DEFINED BY THE SPHERICAL CROWNS OF THE CONTACT BALLS.
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 PRIMARY 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. SOME ORIENTATION FEATURE ON THE BALL ATTACH SIDE IS RECOMMENDED.
10. DIMENSION 'SD/SE' IS MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINES THE POSITION OF THE CENTER CONTACT BALL IN THE OUTER ROW. WHEN THERE IS AN ODD NUMBER OF CONTACT BALLS IN THE OUTER ROW OF A FULL MATRIX $SD/SE=0$; WHEN THERE IS AN EVEN NUMBER OF CONTACT BALLS IN THE OUTER ROW THE VALUE $SD/SE=e/2$.
11. SOLDER BALL ARRAY MAY BE DEPOPULATED IN ANY PATTERN. DEPOPULATION IS THE OMISSION OF BALLS FROM A FULL MATRIX.
12. FOR GLOB TOP AND FLIP CHIP CONFIGURATIONS, PARALLELISM (ccc) 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. 12 X 12 BODY SIZE WITH A 14 X 14 MATRIX PATTERN (VARIATION GGAA-1) IS SHOWN FOR ILLUSTRATION ONLY.

APPLICATION NOTES:

14. THE 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, EXPOSED COPPER TRACES ARE PERMITTED OUTSIDE THE b1 PAD AREA.

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE LOW PROFILE, FINE PITCH, BALL GRID ARRAY FAMILY (SQ.)	ISSUE A	DATE July 06	MO-275	SHEET 10 OF 11
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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: July 06	Item: 11-751
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Revision History:

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

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

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

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE LOW PROFILE, FINE PITCH, BALL GRID ARRAY FAMILY (SQ.)	ISSUE A	DATE July 06	MO-275	SHEET 11 OF 11
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