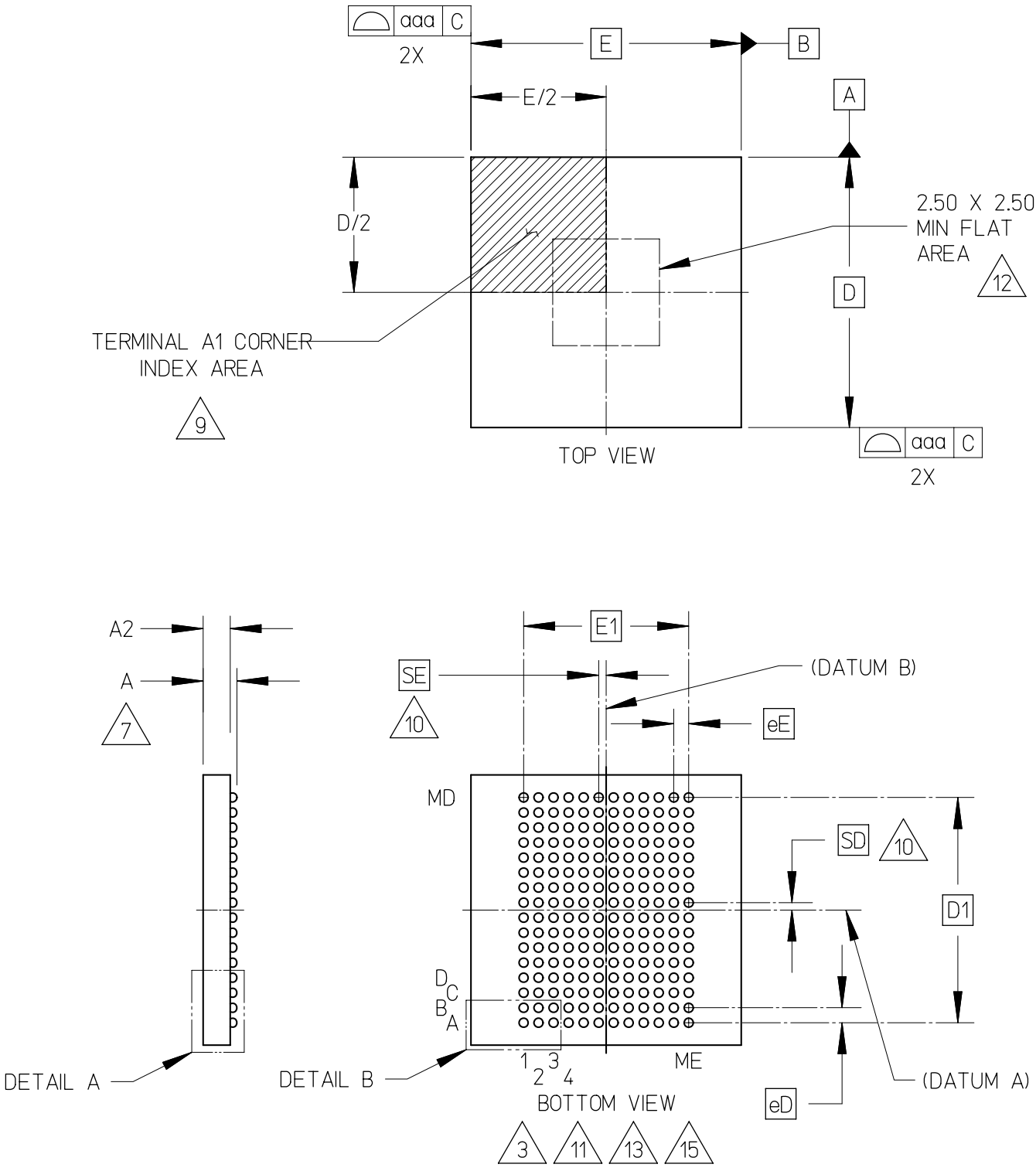
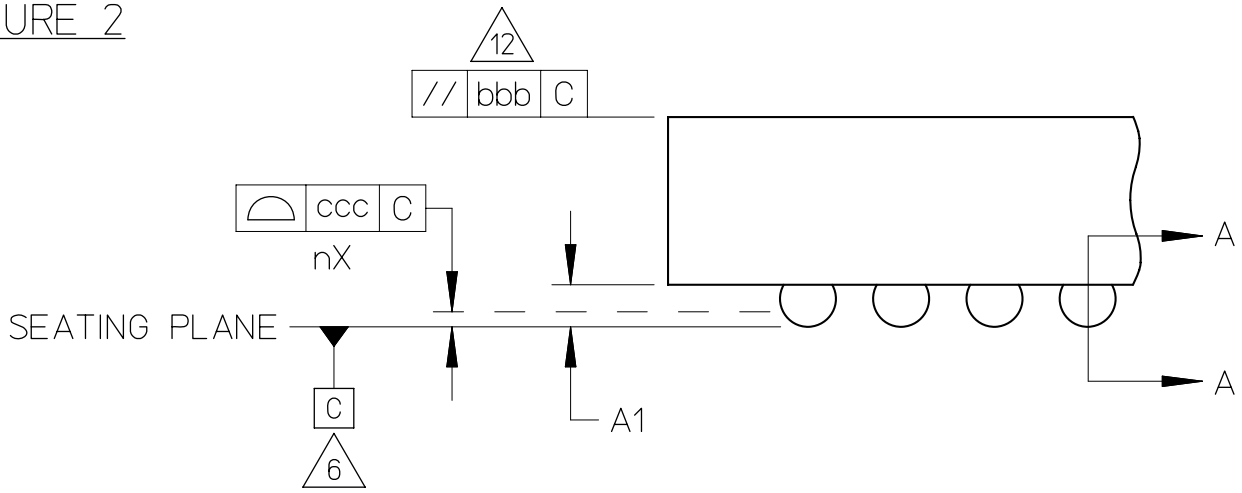
FIGURE 1



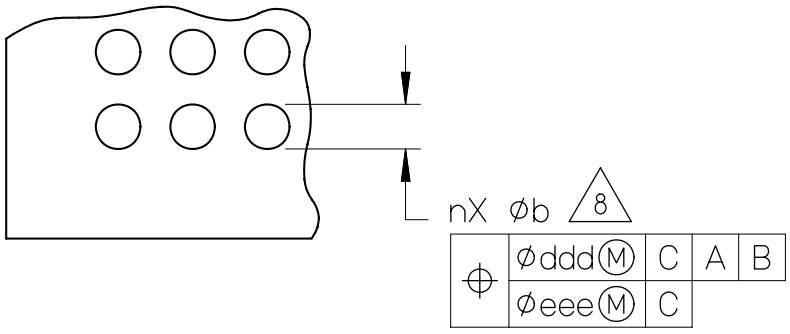
JEDEC SOLID STATE PRODUCT OUTLINE	THIS REGISTERED OUTLINE HAS BEEN PREPARED AND PUBLISHED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USE IN THE ELECTRONICS INDUSTRY. CHANGES ARE LIKELY TO OCCUR.

TITLE:	PACKAGE DESIGNATOR:	ISSUE:	DATE:		PAGE:
VERY THIN, FINE-PITCH, BALL GRID ARRAY FAMILY, RECT, 0.50/0.65/0.80 mm PITCH	VFR-XBGA	A	08/07	MO-285	1 OF 8

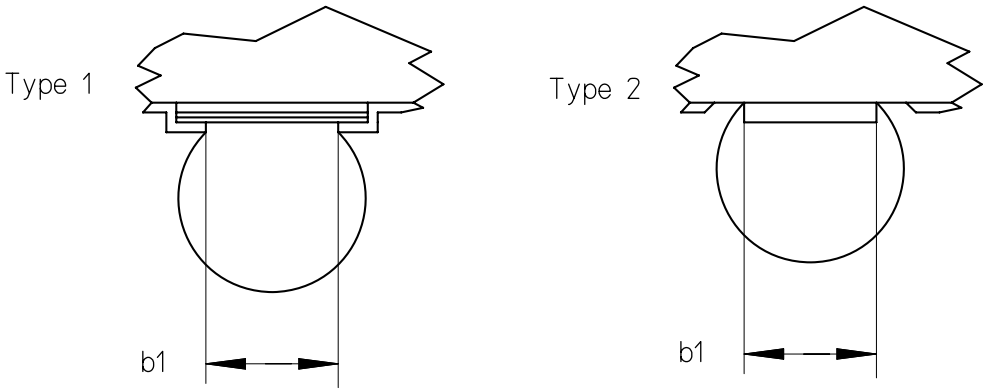
FIGURE 2



DETAIL A
(ROTATED 90° CW)



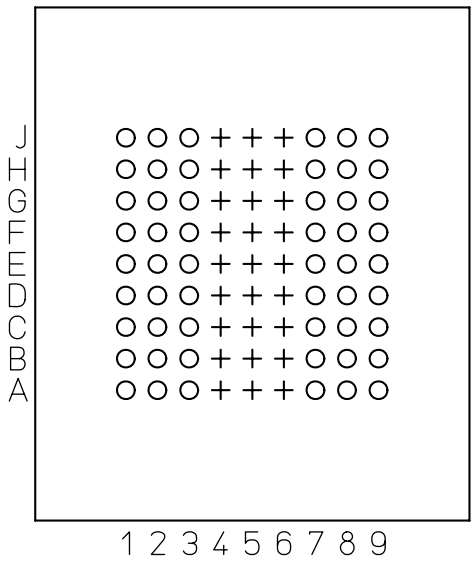
9 DETAIL B



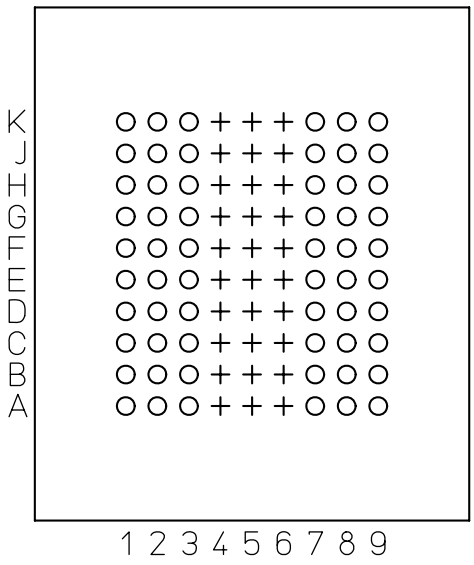
17 SECTION A-A

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: VERY THIN, FINE-PITCH, BALL GRID ARRAY FAMILY, RECT, 0.50/0.65/0.80 mm PITCH	ISSUE: A	DATE: 08/07	MO-285	PAGE: 2 OF 8

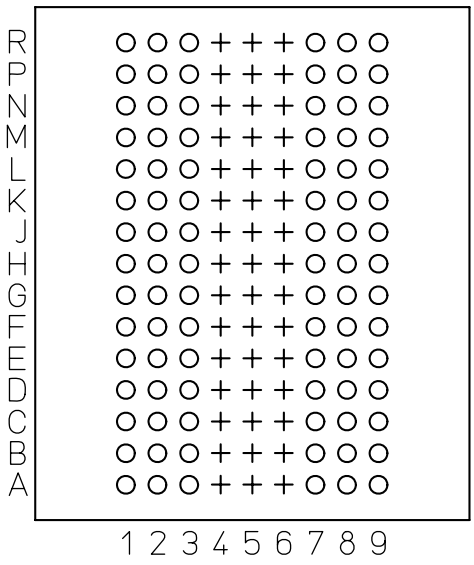
FIGURE 3: SOLDER BALL PATTERNS 3 11
(BOTTOM VIEWS)



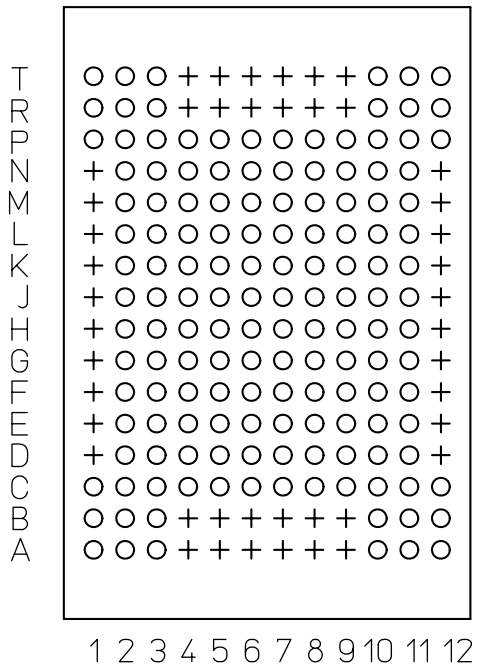
FOOTPRINT A



FOOTPRINT B



FOOTPRINT C

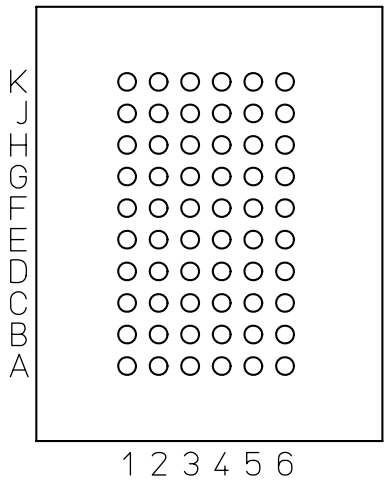


FOOTPRINT D

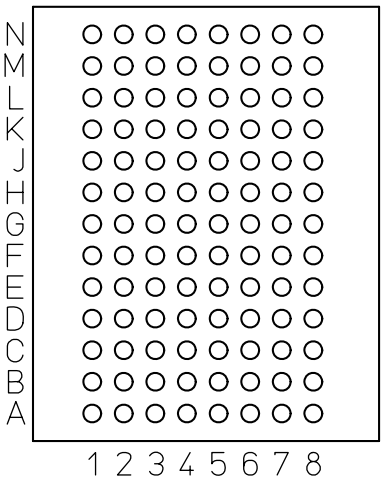
+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: VERY THIN, FINE-PITCH, BALL GRID ARRAY FAMILY, RECT, 0.50/0.65/0.80 mm PITCH	ISSUE: A	DATE: 08/07	MO-285	PAGE: 3 OF 8

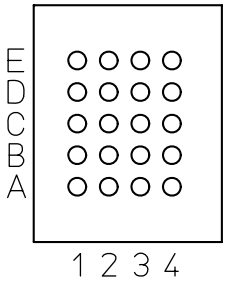
FIGURE 3: SOLDER BALL PATTERNS (cont.) △3 △11
(BOTTOM VIEWS)



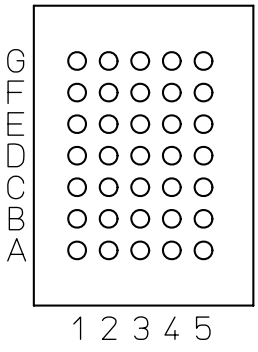
FOOTPRINT E



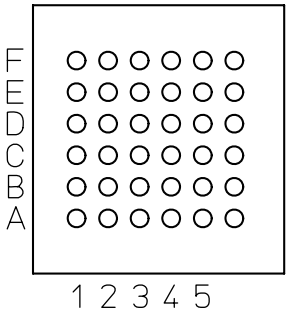
FOOTPRINT F



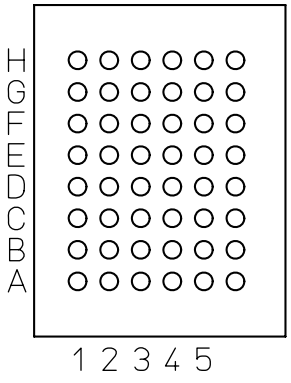
FOOTPRINT G



FOOTPRINT H



FOOTPRINT J



FOOTPRINT K

+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: VERY THIN, FINE-PITCH, BALL GRID ARRAY FAMILY, RECT, 0.50/0.65/0.80 mm PITCH	ISSUE: A	DATE: 08/07	MO-285	PAGE: 4 OF 8

SYMBOL	TABLE 1: COMMON DIMENSIONS								
	XX-1			XX-2			XX-3		
	MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.00	---	---	1.00	---	---	1.00
A1	0.25	---	---	0.15	---	---	0.15	---	---
A2	---	---	0.75	0.65	---	---	0.65	---	---
b	0.40	0.45	0.50	0.35	0.40	0.45	0.25	0.30	0.35
b1 Type1	0.30	---	---	0.25	---	---	0.20	---	---
b1 Type2	0.30	---	---	0.25	---	---	0.20	---	---
NOTES	1, 2, 7, 8			1, 2, 7, 8, 14			1, 2, 7, 8		
REF	11-760			11-760			11-760		
ISSUE	A			A			A		

SYMBOL	TABLE 2: TOLERANCES OF FORM & POSITION		
	VARIATIONS		
	XX-1	XX-2	XX-3
aaa	0.15	0.10	0.10
bbb	0.20	0.10	0.10
ccc	0.12	0.10	0.08
ddd	0.15	0.15	0.15
eee	0.08	0.08	0.05
NOTES	1, 2	1, 2	1, 2
REF	11-760	11-760	11-760
ISSUE	A	A	A

TABLE 3

eD & eE = 0.80

VARIATION	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	SD BSC	SE BSC	n	FOOT-PRINT	REF	ISSUE
AA-1	9.00	8.00	6.40	6.40	9	9	0	0	54	A	11-760	A
AB-1	11.50	10.00	6.40	6.40	9	9	0	0	54	A	11-760	A
AC-1	11.50	10.00	7.20	6.40	10	9	0.40	0	60	B	11-760	A
AD-1	13.00	10.00	11.20	6.40	15	9	0	0	90	C	11-760	A
AE-1	13.50	10.00	12.00	8.80	16	12	0.40	0.40	148	D	11-760	A
NOTES					4	4	10	10	5, 15	15		

TABLE 4

eD & eE = 0.65

VARIATION	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	SD BSC	SE BSC	n	FOOT-PRINT	REF	ISSUE
BA-2	7.00	4.50	5.85	3.25	10	6	0.325	0.325	60	E	11-760	A
BB-2	9.00	6.00	7.80	4.55	13	8	0	0.325	104	F	11-760	A
BC-2	4.00	3.00	2.60	1.95	5	4	0	0.325	20	G	11-760	A
NOTES					4	4	10	10	5, 15	15		

NOTE: SEE TRANSFER RECORD HISTORY: BA-2, BB-2, BC-2

TABLE 5

eD & eE = 0.50

VARIATION	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	SD BSC	SE BSC	n	FOOT-PRINT	REF	ISSUE
CA-3	4.00	3.00	3.00	2.00	7	5	0	0	35	H	11-760	A
CB-3	4.00	3.50	2.50	2.50	6	6	0.25	0.25	36	J	11-760	A
CC-3	5.00	4.00	3.50	2.50	8	6	0.25	0.25	48	K	11-760	A
NOTES					4	4	10	10	5, 15	15		

NOTE: SEE TRANSFER RECORD HISTORY: CA-3, CB-3, CC-3

NOTES:

1 DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

2 DIMENSIONS ARE IN MILLIMETERS.

3 BALL DESIGNATION PER JEP95 SECTION 3 SPP-020.

4 'MD' AND 'ME' REPRESENT THE MATRIX SIZE CORRESPONDING TO 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 DOMED CROWNS OF THE BALLS.

7 DIMENSION 'A' INCLUDES STANDOFF HEIGHT 'A1' AND PACKAGE BODY THICKNESS 'A2' 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 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. WHEN THERE IS AN ODD NUMBER OF BALLS IN THE OUTER ROW PARALLEL TO DIMENSION 'D' OR 'E' RESPECTIVELY, 'SD' OR 'SE' = 0. WHEN THERE IS AN EVEN NUMBER OF BALLS IN THE OUTER ROW, 'SD' OR 'SE' = e/2 BASIC.

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

12 PARALLELISM (bbb) ON THE TOP SURFACE APPLIES ONLY TO THE 2.50 X 2.50 mm MINIMUM FLAT AREA SHOWN ON THE TOP VIEW (SHEET 1). THIS AREA MAY BE USED FOR MARKING OR VACUUM PICKUP.

13 16 X 12 MATRIX PATTERN VARIATION (AE-1) IS SHOWN FOR ILLUSTRATION ONLY.

14 VARIATION XX-2, DIMENSION A1 DOES NOT MEET THE DESIGN GUIDE. THIS VARIATION WAS ESTABLISHED BEFORE THE GUIDELINE WAS COMPLTE.

15 SEE FIGURE 3 FOR BALL PATTERNS.

APPLICATION NOTES:

16 SOME TYPE OF ASYMMETRIC DEPOPULATION OF THE BALL MATRIX IS RECOMMENDED AS AN AID TO CORRECT PACKAGE ORIENTATION AT SECOND-LEVEL ASSEMBLY. DEPOPULATION OF THE A1 BALL LOCATION IS A PREFERRED IMPLEMENTATION.

17 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.

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: 05/07	JC11 Item Number: 11-760

Transfer Record History:

MO-225 B Variation (Was)	MO-285 A Variation (Now)	Date	Item #
BA	BA-2	05/07	11-760
BB	BB-2	05/07	11-760
BC	BC-2	05/07	11-760
DA	CA-3	05/07	11-760E
DB	CB-3	05/07	11-760E
DC	CC-3	05/07	11-760E

Change Record History:

Issue: A	Date: 08/07	Item Number: 11-760E

Location	Changed from:	Changed to:
SHEET 6, TABLE 5	CA-2, CB-2, CC-2	CA-3, CB-3, CC-3
SHEET 8, TRANSFER RECORD HISTORY	CA-2, CB-2, CC-2	CA-3, CB-3, CC-3

Issue:	Date:	Item Number:

Location	Changed from:	Changed to: