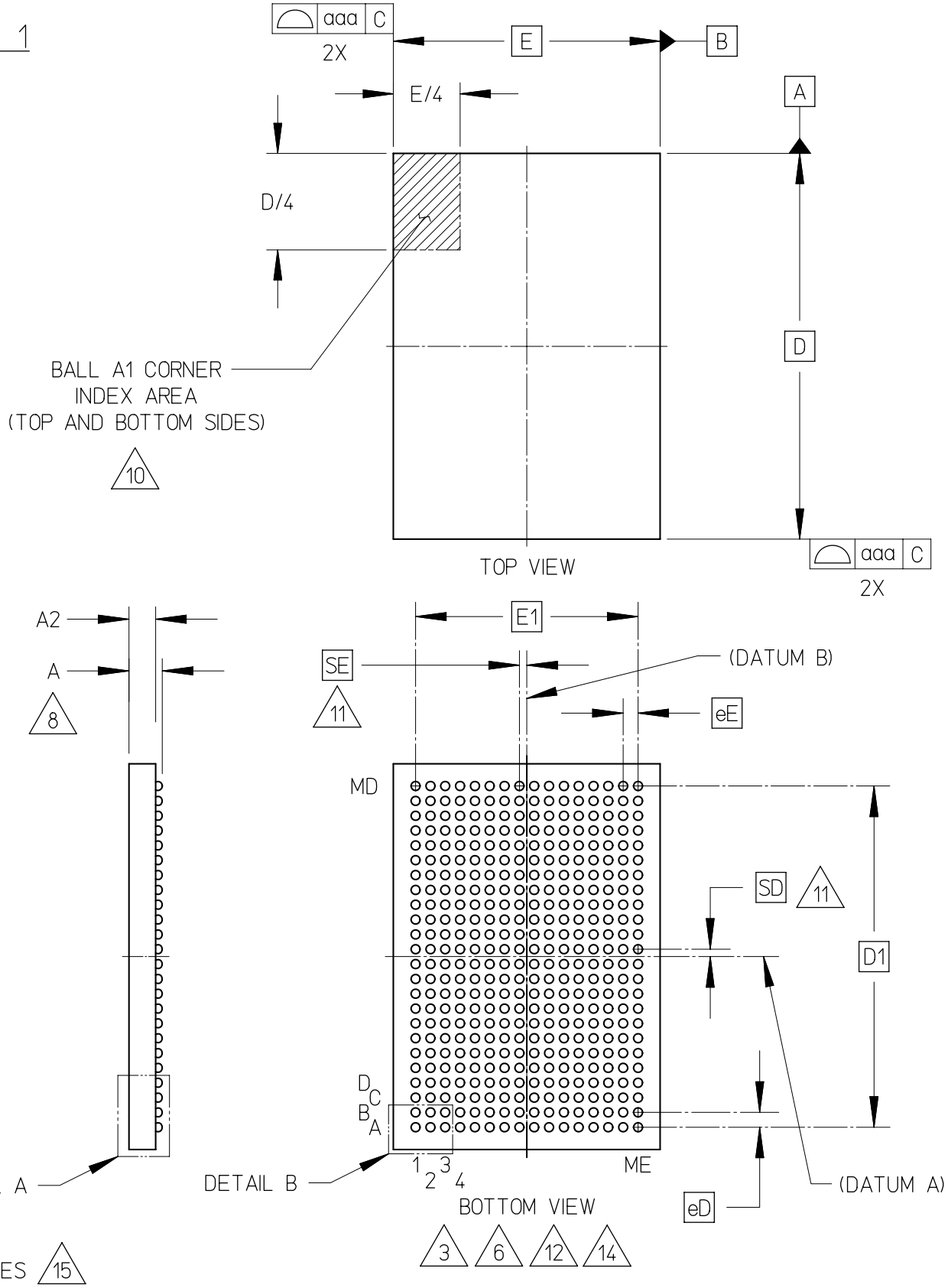
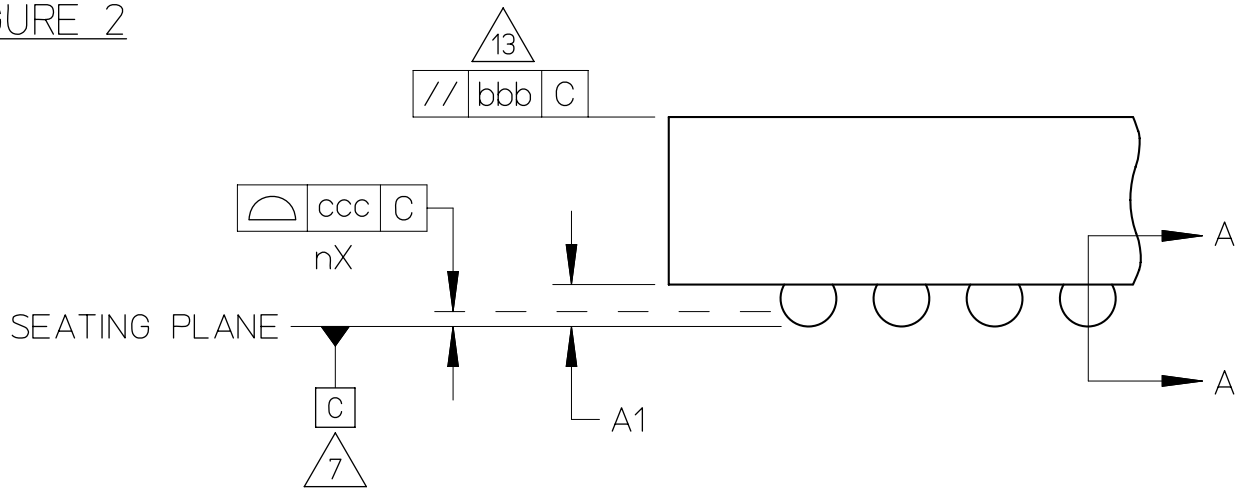
FIGURE 1



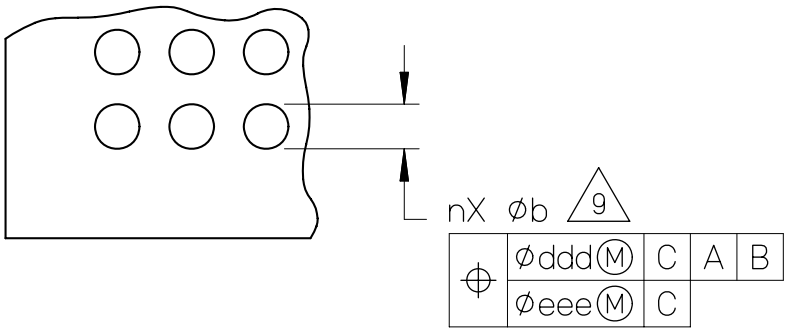
JEDEC SOLID STATE PRODUCT OUTLINE	THIS REGISTERED OUTLINE HAS BEEN PREPARED AND PUBLISHED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USE IN THE ELECTRONICS INDUSTRY. CHANGES ARE LIKELY TO OCCUR.

TITLE:	PACKAGE DESIGNATOR:	ISSUE:	DATE:		PAGE:
THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	TFR-XBGA	J	08/07	MO-210	1 OF 12

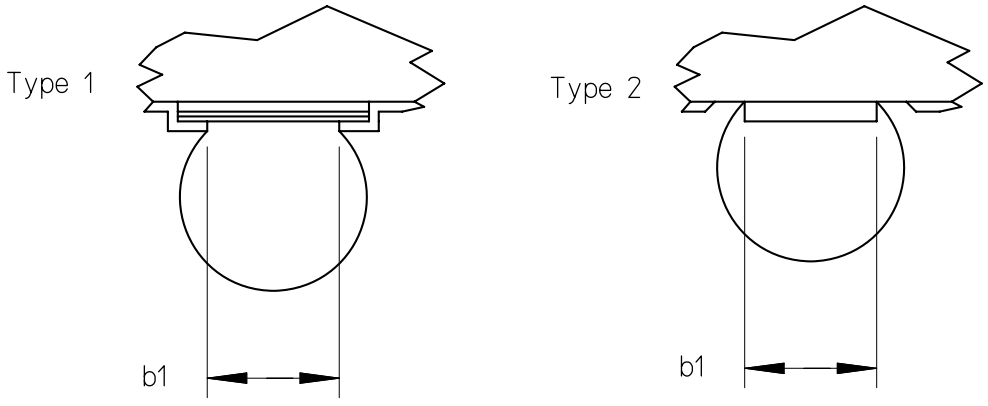
FIGURE 2



DETAIL A
(ROTATED 90° CW)



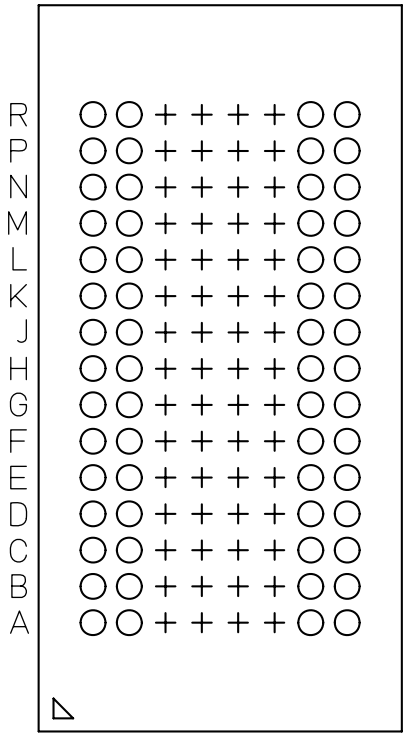
10 DETAIL B



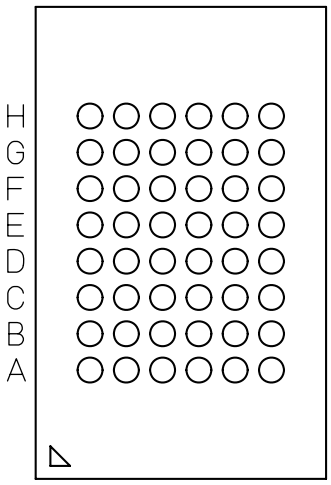
16 SECTION A-A

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 2 OF 12

FIGURE 3: SOLDER BALL PATTERNS 3 12
(BOTTOM VIEWS)



FOOTPRINT A



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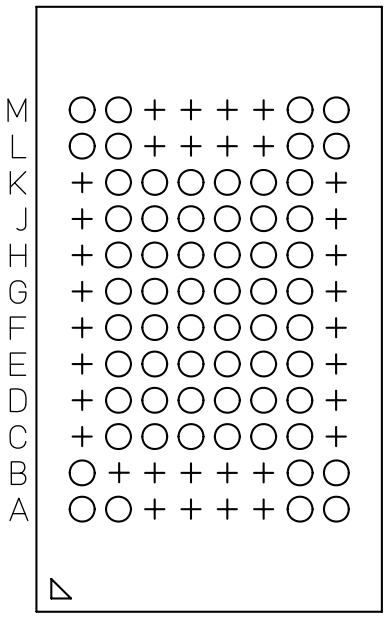
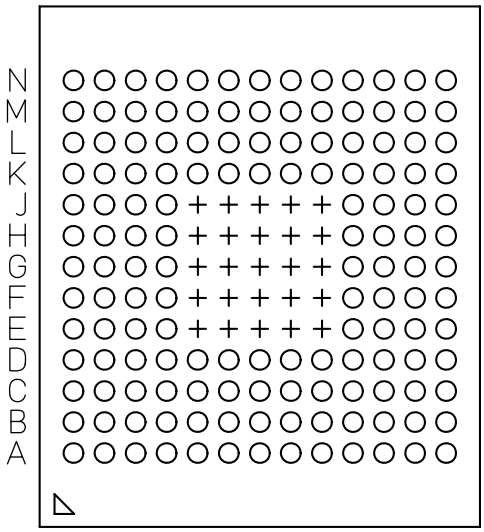
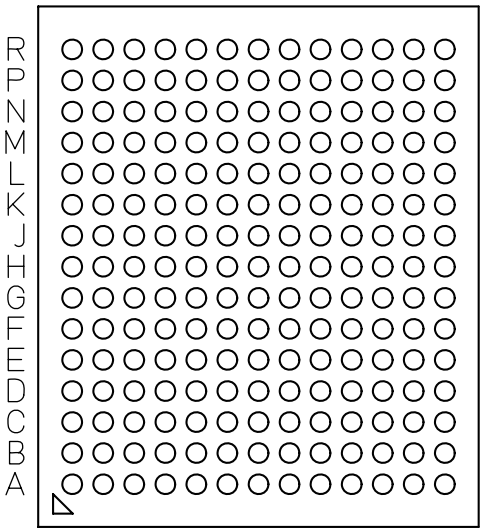


FOOTPRINT C



FOOTPRINT D

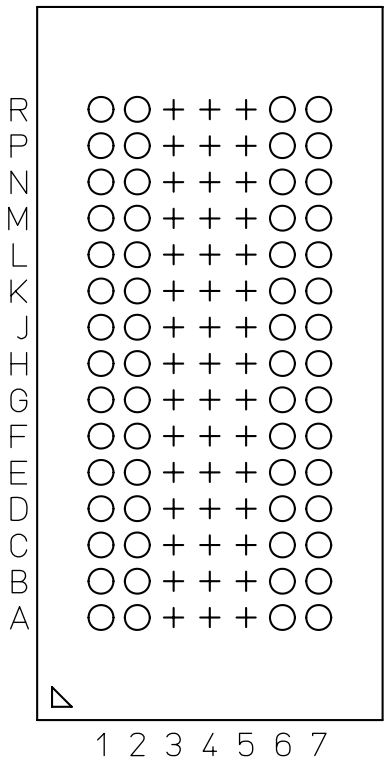


FOOTPRINT E

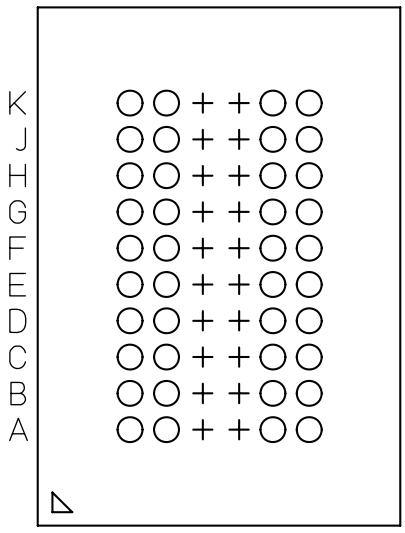
+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 3 OF 12

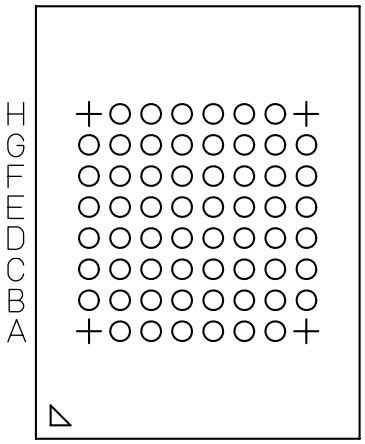
FIGURE 3: SOLDER BALL PATTERNS (cont.) 3 12
(BOTTOM VIEWS)



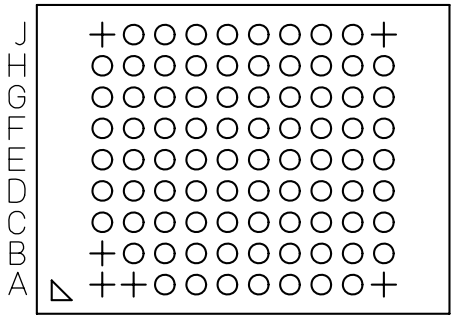
FOOTPRINT F



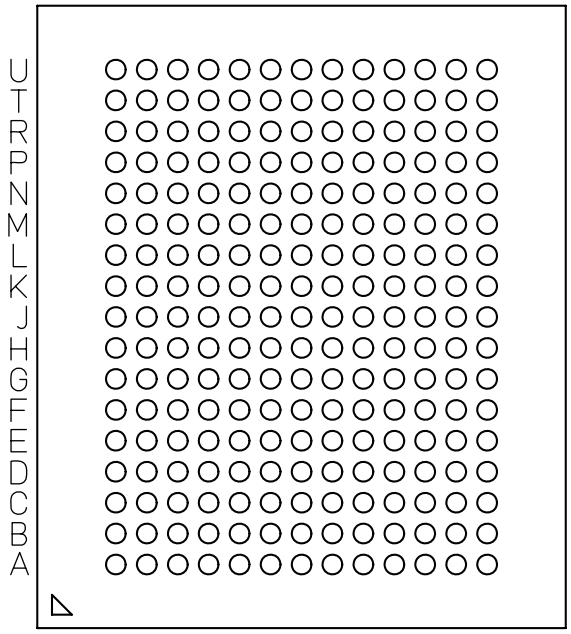
FOOTPRINT G



FOOTPRINT H



FOOTPRINT J

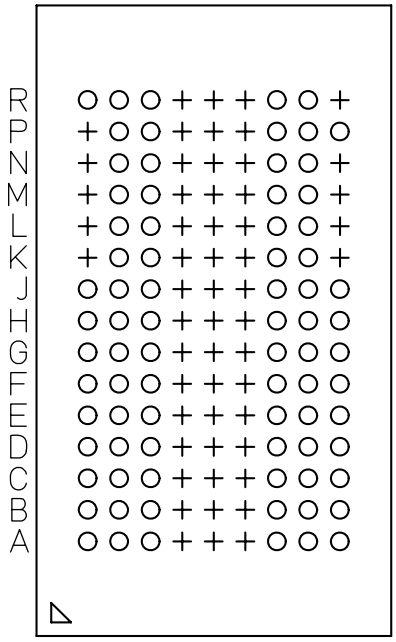


FOOTPRINT K

+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 4 OF 12

FIGURE 3: SOLDER BALL PATTERNS (cont.) 3 12
(BOTTOM VIEWS)



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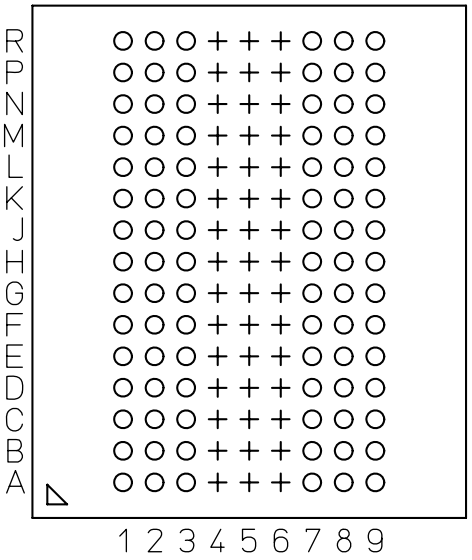
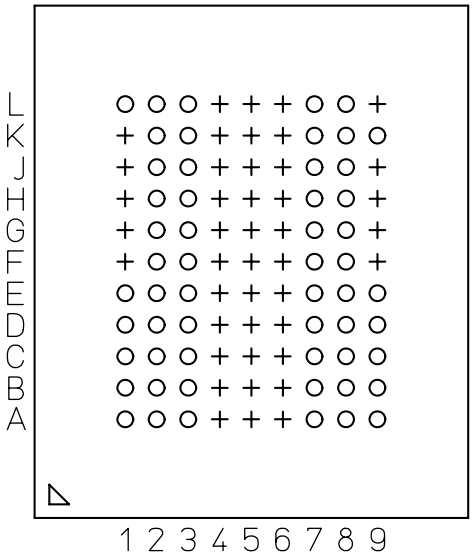
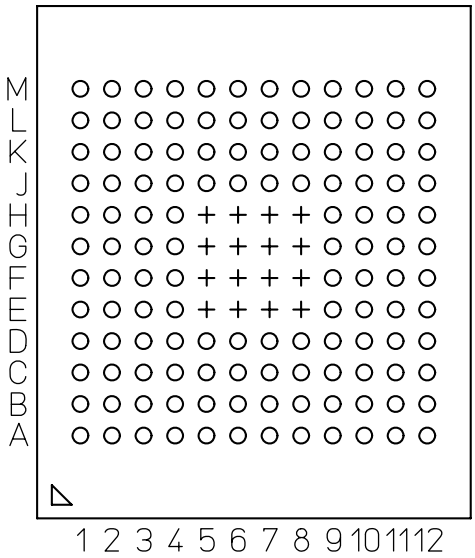


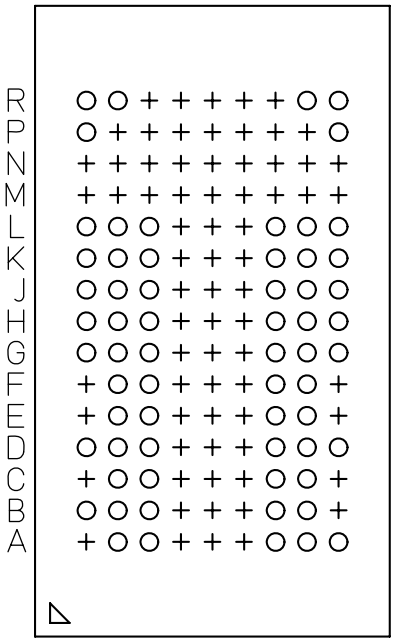
FOOTPRINT M



FOOTPRINT N



FOOTPRINT P

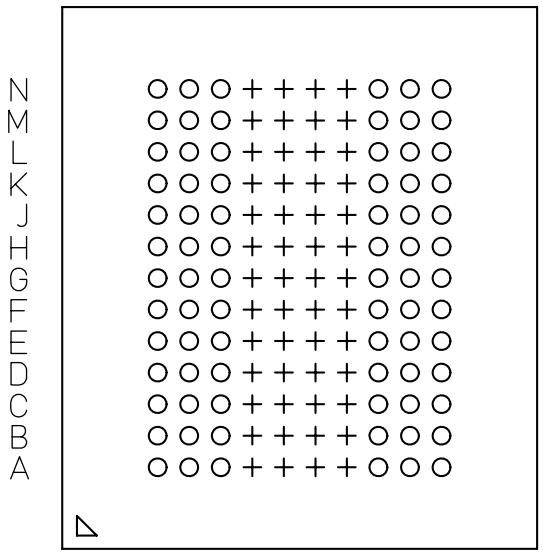


FOOTPRINT R

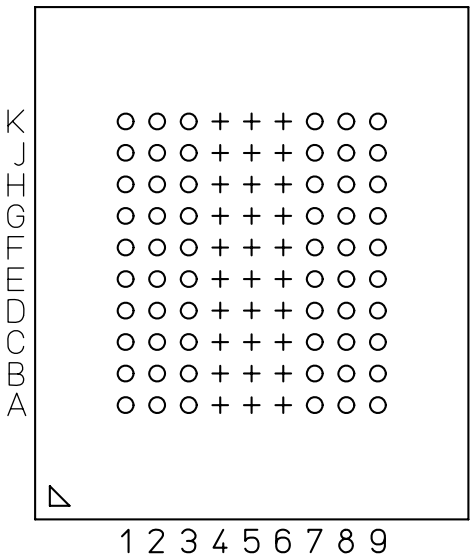
+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 5 OF 12

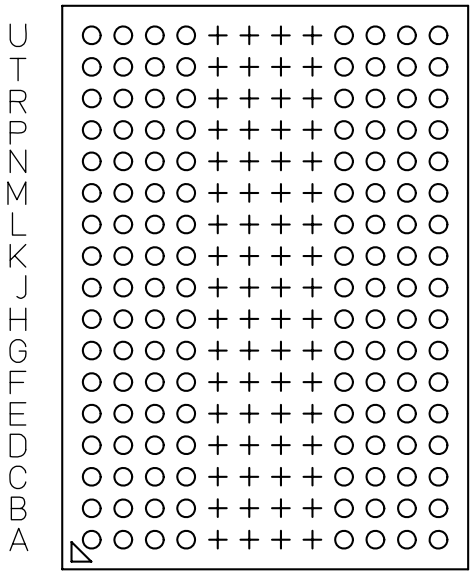
FIGURE 3: SOLDER BALL PATTERNS (cont.) 3 12
(BOTTOM VIEWS)



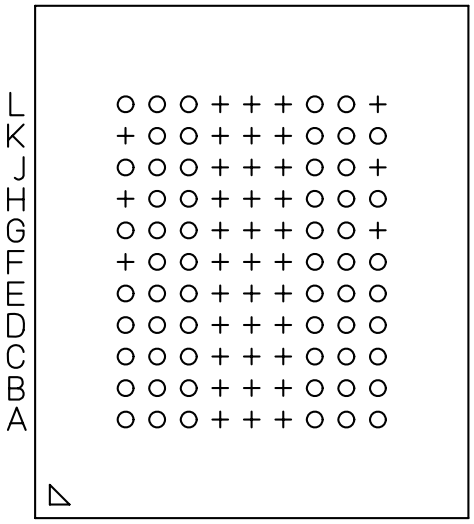
FOOTPRINT T



FOOTPRINT U



FOOTPRINT V

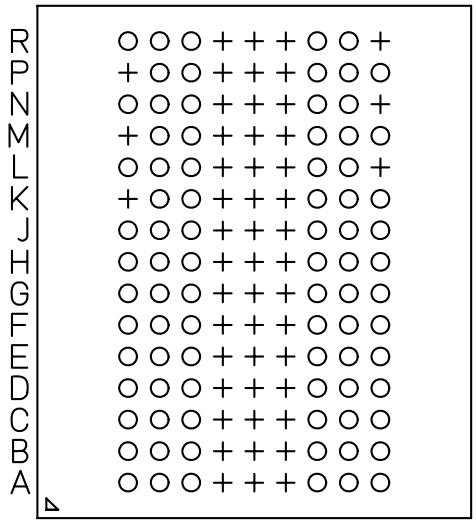


FOOTPRINT W

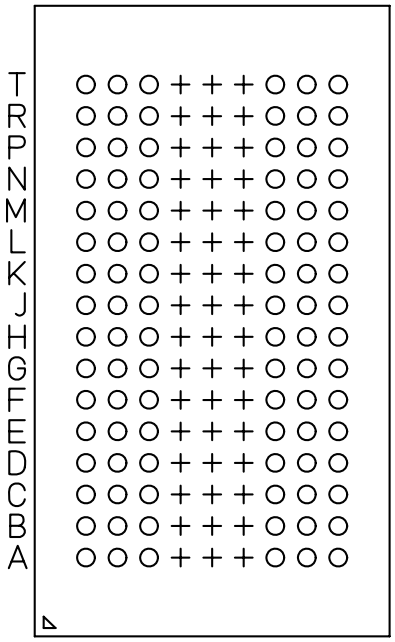
+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 6 OF 12

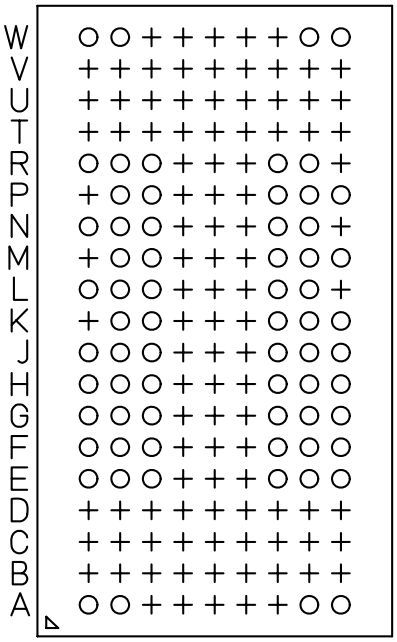
FIGURE 3: SOLDER BALL PATTERNS (cont.) 3 12
(BOTTOM VIEWS)



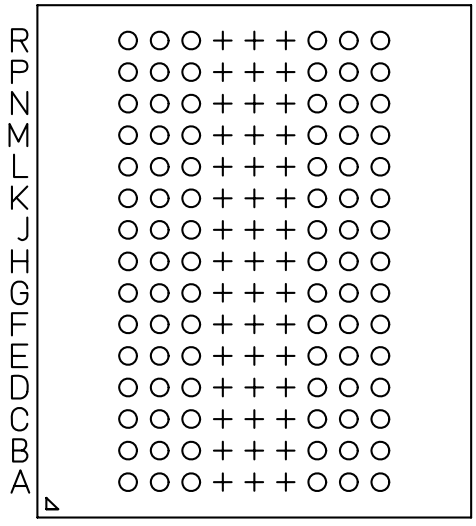
FOOTPRINT Y



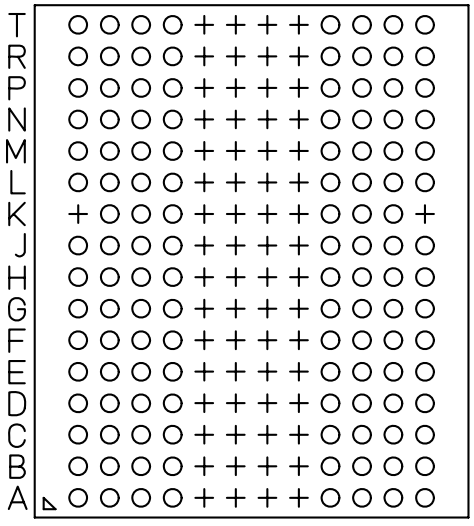
FOOTPRINT AA



FOOTPRINT AB



FOOTPRINT AC



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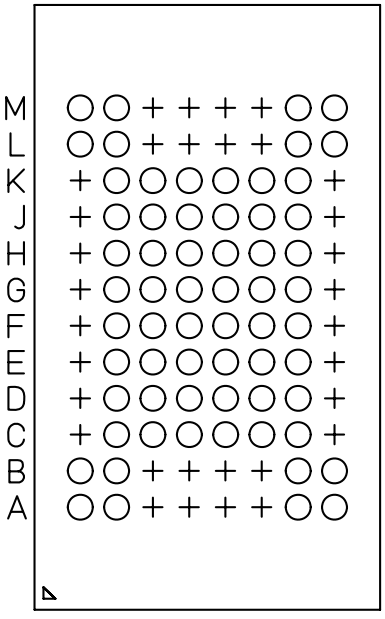

FOOTPRINT AE

+ = UNPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: THIN, FINE-PITCH, RECTANGULAR BALL GRID ARRAY FAMILY 0.80mm PITCH	ISSUE: J	DATE: 08/07	MO-210	PAGE: 7 OF 12

SYMBOL		TABLE 1: COMMON DIMENSIONS								
		XX-1			XX-2			XX-3		
		MIN	NOM	MAX	MIN	NOM	MAX	MIN	NOM	MAX
A		---	---	1.20	---	---	1.20	---	---	1.20
A1		0.25	---	---	0.15	---	---	0.25	---	---
A2		---	---	0.95	---	---	1.05	---	---	0.95
b		0.40	0.45	0.50	0.25	0.30	0.35	0.45	0.50	0.55
b1	Type1	0.30	---	---	0.20	---	---	0.35	---	---
	Type2	0.30	---	---	0.20	---	---	0.35	---	---
NOTES		1, 2, 8, 9			1, 2, 8, 9			1, 2, 8, 9		
REF		11-510/530/564			11-564/578			11-670		
ISSUE		D			E			H		

SYMBOL	TABLE 2: TOLERANCES OF FORM & POSITION		
	XX-1	XX-2	XX-3
aaa	0.15	0.15	0.15
bbb	0.20	0.20	0.20
ccc	0.12	0.08	0.12
ddd	0.15	0.15	0.15
eee	0.08	0.08	0.08
NOTES	1, 2	1, 2	1, 2
REF	11-510/530	11-564	11-670
ISSUE	C	D	H

NOTE: VARIATION BA-1 HAS BEEN MOVED TO MO-228 AS VARIATION AA.

TABLE 3: [b = 0.45 mm (nominal)]

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	16.00	8.00	11.20	5.60	15	8	0	0.40	60	A	11-510	A
AB-1	8.00	6.00	5.60	4.00	8	6	0.40	0.40	48	B	11-522	B
AC-1	9.00	6.00	5.60	4.00	8	6	0.40	0.40	48	B	11-522	B
AD-1	9.00	8.00	5.60	4.00	8	6	0.40	0.40	48	B	11-522	B
AE-1	12.00	7.00	5.60	4.00	8	6	0.40	0.40	48	B	11-522	B
AF-1	14.00	8.00	8.80	5.60	12	8	0.40	0.40	64	AE	11-522/754	B
AG-1	13.00	11.00	11.20	5.60	15	8	0	0.40	60	A	11-530	C
AH-1	15.00	13.00	9.60	9.60	13	13	0	0	144	D	11-564	D
AJ-1	15.00	13.00	11.20	9.60	15	13	0	0	195	E	11-564	D
AK-1	15.00	13.00	12.80	9.60	17	13	0	0	221	K	11-564	D
AL-1	16.00	9.00	11.20	4.80	15	7	0	0	60	F	11-578	E
AM-1	16.00	9.00	11.20	6.40	15	9	0	0	80	L	11-578	E
AN-1	13.00	11.00	11.20	6.40	15	9	0	0	90	M	11-578	E
AP-1	14.00	11.50	8.00	6.40	11	9	0	0	56	N	11-578	E
AR-1	13.00	11.00	8.80	8.80	12	12	0.40	0.40	128	P	11-600	F
AT-1	16.00	9.00	11.20	6.40	15	9	0	0	64	R	11-622	G
AU-1	14.00	10.00	12.80	8.80	17	12	0	0.40	136	V	11-682	I
AV-1	10.00	8.00	8.00	6.40	11	9	0	0	60	W	11-754	J
AW-1	11.50	8.00	8.00	6.40	11	9	0	0	60	W	11-754	J
AY-1	12.00	8.00	8.00	6.40	11	9	0	0	60	W	11-754	J
AAA-1	14.00	8.00	8.00	6.40	11	9	0	0	60	W	11-754	J
AAB-1	10.00	10.00	8.00	6.40	11	9	0	0	60	W	11-754	J
AAC-1	14.00	11.50	8.00	6.40	11	9	0	0	60	W	11-754	J
AAD-1	14.00	11.50	11.20	6.40	15	9	0	0	84	Y	11-754	J
AAE-1	12.50	8.00	11.20	6.40	15	9	0	0	84	Y	11-754	J
AAF-1	16.50	10.00	11.20	6.40	15	9	0	0	84	Y	11-754	J
AAG-1	14.00	8.00	11.20	6.40	15	9	0	0	84	Y	11-754	J
AAH-1	12.50	10.00	11.20	6.40	15	9	0	0	84	Y	11-754	J
AAJ-1	14.00	9.00	12.00	6.40	16	9	0.40	0	96	AA	11-754	J
AAK-1	16.5	10.00	14.40	6.40	19	9	0	0	68	AB	11-754	J
AAL-1	13.00	8.00	11.20	6.40	15	9	0	0	90	AC	11-754	J
AAM-1	13.50	10.50	12.00	8.80	16	12	0.40	0.40	126	AD	11-754	J
NOTES					4	4	11	11	5, 14	14		

TABLE 4: [b = 0.30 mm (nominal)]

eD & eE = 0.80

VARIATION	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	SD BSC	SE BSC	n	FOOT-PRINT	REF	ISSUE
CA-2	9.00	6.00	5.60	4.00	8	6	0.40	0.40	48	B	11-564	D
CB-2	9.00	8.00	5.60	4.00	8	6	0.40	0.40	48	B	11-564	D
CC-2	12.00	6.00	5.60	4.00	8	6	0.40	0.40	48	B	11-564	D
CD-2	12.00	11.00	8.80	5.60	12	8	0.40	0.40	63	C	11-564	D
CE-2	14.00	8.00	8.80	5.60	12	8	0.40	0.40	63	C	11-564	D
CF-2	15.00	8.00	7.20	4.00	10	6	0.40	0.40	40	G	11-564	D
CG-2	16.00	10.00	5.60	5.60	8	8	0.40	0.40	60	H	11-564	D
CH-2	12.00	9.00	7.20	6.40	10	9	0.40	0.00	84	J	11-564	D
CJ-2	9.00	8.00	5.60	5.60	8	8	0.40	0.40	60	H	11-578	E
NOTES					4	4	11	11	5, 14	14		

TABLE 5 : [b = 0.50 mm (nominal)]

eD & eE = 0.80

VARIATION	D BSC	E BSC	D1 BSC	E1 BSC	MD	ME	SD BSC	SE BSC	n	FOOT-PRINT	REF	ISSUE
DA-3	11.00	9.00	9.60	7.20	13	10	0	0.4	78	T	11-670	H
DB-3	10.00	11.50	7.20	6.40	10	9	0.4	0	60	U	11-682	I

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 DIRECTIONS RESPECTIVELY.

5 n REPRESENTS THE NUMBER OF BALLS POPULATED FOR EACH VARIATION.

6 16 X 24 MATRIX PATTERN IS SHOWN FOR ILLUSTRATION ONLY.

7 DATUM C (SEATING PLANE) IS DEFINED BY THE CROWNS OF THE BALLS.

8 DIMENSION A INCLUDES STANDOFF HEIGHT (A1) AND BODY THICKNESS (A2).

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

10 THE BALL A1 CORNER MUST BE IDENTIFIED ON THE TOP AND BOTTOM SURFACES OF THE PACKAGE BY USING INK OR METALIZED MARKINGS, INDENTATIONS, OR OTHER FEATURES. THE EXACT SHAPE OF EACH CORNER IS OPTIONAL.

11 DIMENSIONS SD AND SE ARE MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINE THE POSITION OF THE CENTERMOST BALLS IN THE OUTER ROWS FOR A FULLY POPULATED MD X ME MATRIX. WHEN THERE IS AN ODD NUMBER OF BALLS IN THE OUTER ROW, SD OR SE = 0; WHEN THERE IS AN EVEN NUMBER OF BALLS IN THE OUTER ROW, SD OR SE = e/2.

12 THE SOLDER BALL ARRAY MAY BE DEPOPULATED IN ANY PATTERN. DEPOPULATION IS THE OMISSION OF BALLS FROM A FULL MD X ME MATRIX.

13 FOR GLOB TOP AND FLIP CHIP CONFIGURATIONS, PARALLELISM (bbb) APPLIES ONLY TO THE SURFACE DIRECTLY ABOVE THE DIE AREA. THE PARALLELISM SPECIFICATION WILL NOT APPLY TO ANY FILLET OR SLOPED REGION OF THE ENCAPSULANT.

14 SEE FIGURE 3 FOR BALL PATTERNS.

15 MICRON TECHNOLOGY AND TESSERA HAVE STATED THAT CERTAIN U. S. PATENTS MAY APPLY TO CONFIGURATIONS OF THIS PACKAGE. THESE PATENTS INCLUDE 6,048,753 FROM MICRON TECHNOLOGY ALONG WITH 5,950,304 AND 6,133,627 FROM TESSERA. MICRON AND TESSERA INTEND TO COMPLY WITH THE JEDEC PATENT POLICY.

16 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: I	Date: 02/04	JC11 Item Number: 11-682

Change Record History:

Issue: J	Date: 08/07	Item Number: 11-754

Location	Changed from:	Changed to:
ALL SHEETS	Numbered 1-10	INSERTED NEW SHEET 7 RENUMBERED 1-11
SHEET 6		ADDED FOOTPRINT W
SHEET 7		ADDED FOOTPRINTS Y, AA, AB, AC, & AD
SHEET 8	NO TABLE NUMBERS	TABLES 1 & 2
SHEETS 9 & 10	TABLES 1 - 3	RENUMBERED 3 - 5
SHEET 9 TABLE 3		ADDED VARIATIONS AV-1 TO AAM-1
SHEET 11 NOTE 3	JESD 95-1, SPP-010	JEP95 SECTION 3 SPP-020
SHEET 11 NOTE 7	AND THE SEATING PLANE ARE	(SEATING PLANE) IS
SHEET 7	MISSING FOOTPRINT (ISSUE C- D)	ADDED FOOTPRINT AE
SHEET 9,VARIATION AF-1	FOOTPRINT C	FOOTPRINT AE

Issue:	Date:	Item Number:

Location	Changed from:	Changed to:

Issue:	Date:	Item Number:

Location	Changed from:	Changed to: