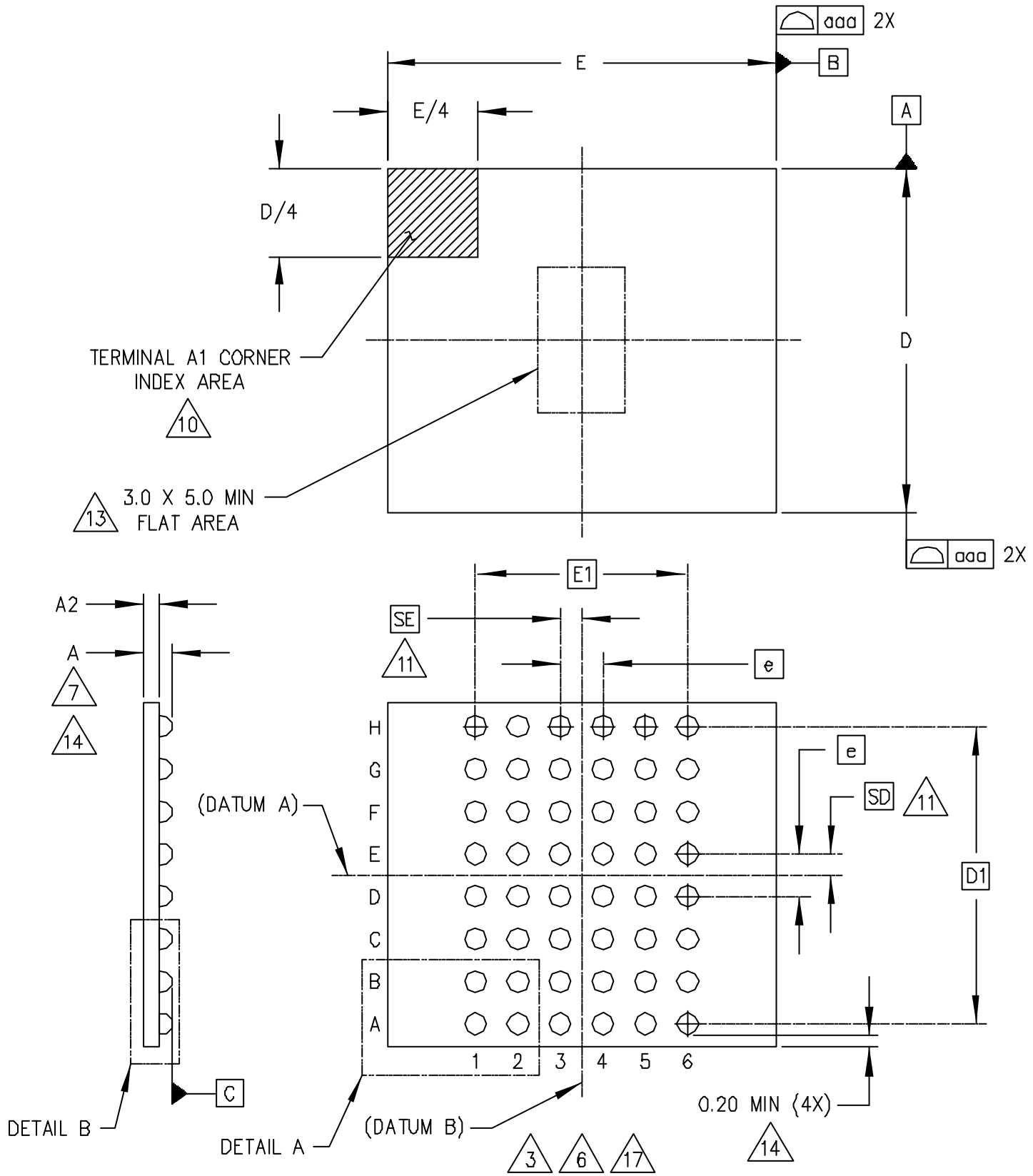
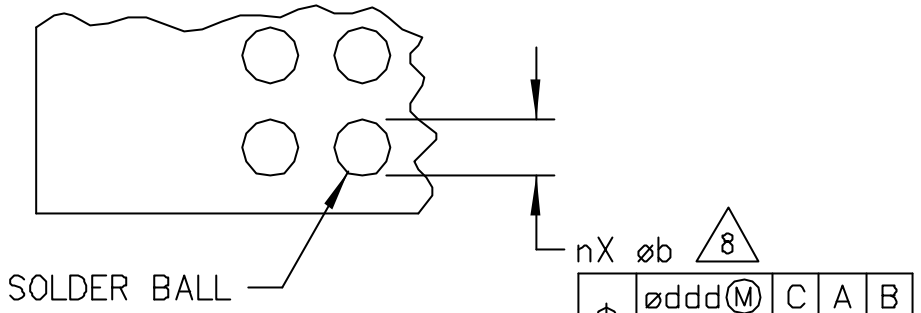
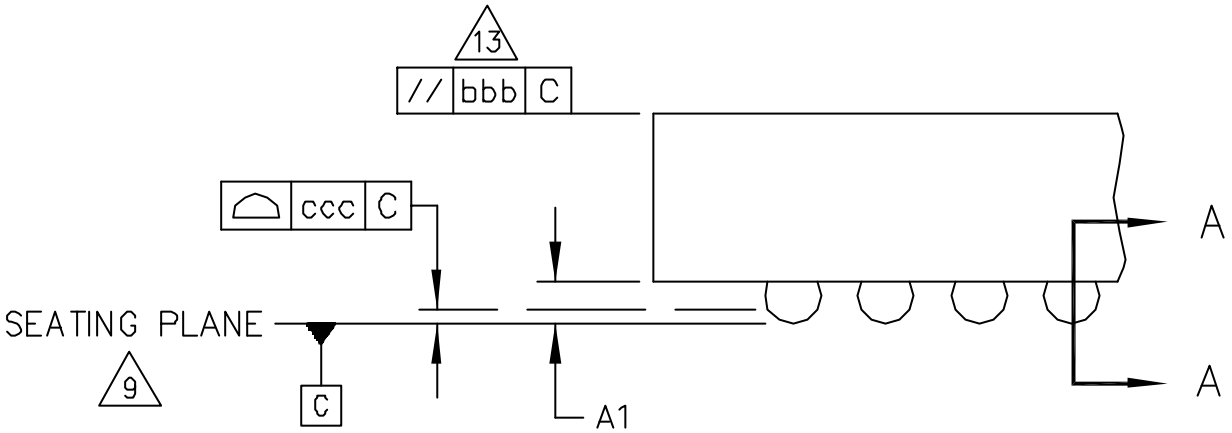


JEDEC SOLID STATE PRODUCT OUTLINE	THIS REGISTERED OUTLINE HAS BEEN PREPARED AND PUBLISHED BY THE JEDEC JC-11 COMMITTEE AND REFLECTS A PRODUCT WITH ANTICIPATED USE IN THE ELECTRONICS INDUSTRY. CHANGES ARE LIKELY TO OCCUR.

TITLE:	PACKAGE DESIGNATOR:	ISSUE:	DATE:	ITEM	PAGE:
SQUARE & RECTANGULAR DIE-SIZE, BALL GRID ARRAY FAMILY	(L,T,V,W) F (R) – xDSB	L	12/07	MO-207	1 OF 22



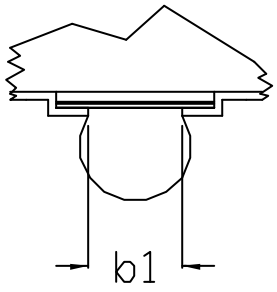
DETAIL A



DETAIL B
(ROTATED 90° CW)

SECTION A-A

Type 1 SMD
(Solder Mask Defined)



21

Type 2, NSMD
Not Solder Mask Defined

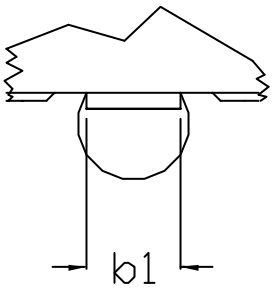


TABLE 1: TOLERANCES OF FORM AND POSITION 16

VAR / SYMBOL	Ayy–z	Byy–z	Cyy–z	Dyy–z	NOTES
e	0.75	0.65	0.50	0.80	4
aaa	0.15	0.15	0.15	0.15	
bbb	0.20	0.20	0.20	0.20	13
ddd	0.15	0.15	0.15	0.15	
eee	0.08	0.08	0.05	0.08	
NOTES	1, 2, 18				
REF	11–494				
ISSUE	A				

yy = A, B, C ..... AA, AB, AC ..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.

z = 1, 2, etc ..... FOR PROFILE HEIGHTS OPTIONS.

TABLE 2: PROFILE DIMENSIONS – LOW 16

VAR / SYMBOL	Ayy–1			Byy–1			Cyy–1			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	1.70	---	---	1.70	---	---	1.70	7,14
A1	0.25	---	---	0.20	---	---	0.15	---	---	
A2	0.60	---	---	0.60	---	---	0.60	---	---	
b	0.40	0.45	0.50	0.35	0.40	0.45	0.25	0.30	0.35	8
b1	0.30	---	---	0.30	---	---	0.20	---	---	
e	0.75			0.65			0.50			4
	TOLERANCE OF FORM AND POSITION									
ccc	0.12			0.10			0.08			
Notes	1, 2, 18									
Ref	04–628									
Issue	G									

yy = A, B, C ..... AA, AB, AC ..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.

TABLE 2: PROFILE DIMENSIONS – LOW (CONT'D) 16

VAR / SYMBOL	Dyy–1			–			–			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	1.70	---	---	–	---	---	–	7,14
A1	0.25	---	---	–	---	---	–	---	---	
A2	0.60	---	---	–	---	---	–	---	---	
b	0.40	0.45	0.50	–	–	–	–	–	–	8
b1	0.30	---	---	–	---	---	–	---	---	
e		0.80			–			–		4
	TOLERANCE OF FORM AND POSITION									
ccc		0.12			–			–		
Notes	1, 2, 18									
Ref	04–703									
Issue	J									

TABLE 3: PROFILE DIMENSIONS – THIN 16

VAR / SYMBOL	Ayy–2			Ayy–2a			Byy–2			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	----	----	1.20	----	----	1.20	----	----	1.20	7,14
A1	0.25	----	----	0.18	----	----	0.20	----	----	
A2	0.60	----	----	0.60	----	----	0.60	----	----	
b	0.40	0.45	0.50	0.30	0.35	0.40	0.35	0.40	0.45	8
e		0.75			0.75			0.65		4
	TOLERANCE OF FORM AND POSITION									
ccc		0.12			0.10			0.10		
Notes	1, 2, 18									
Ref	04–628			04–628			04–628			
Issue	G			G			G			

yy = A, B, C ..... AA, AB, AC ..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.

TABLE 3: PROFILE DIMENSIONS – THIN (CONT'D) 16

VAR / SYMBOL	Cyy–2			Dyy–2			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	1.20	---	---	1.20	7,14
A1	0.15	---	---	0.25	---	---	
A2	0.60	---	---	0.60	---	---	
b	0.25	0.30	0.35	0.40	0.45	0.50	8
e	0.50			0.80			4
	TOLERANCE OF FORM AND POSITION						
ccc	0.08			0.12			
Notes	1, 2, 18			22			
Ref	04–628			04–628			
Issue	G			G			

TABLE 4: PROFILE DIMENSIONS – VERY THIN 16

VAR / SYMBOL	Ayy–3			Ayy–3a			Ayy–3b			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	1.00	---	---	1.00	---	---	1.00	7,14
A1	0.15	---	---	0.25	---	---	0.15	---	---	
A2	---	---	0.80	---	---	0.70	---	---	0.80	
b	0.25	0.30	0.35	0.40	0.45	0.50	0.30	0.35	0.40	8
e	0.75			0.75			0.75			4
	TOLERANCE OF FORM AND POSITION									
ccc	0.08			0.12			0.10			
Notes	1, 2, 18									
Ref	04–628			04–628			04–628			
Issue	G			G			G			

yy = A, B, C ..... AA, AB, AC ..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.

TABLE 4: PROFILE DIMENSIONS – VERY THIN (CONT'D) 16

VAR / SYMBOL	Byy–3			Cyy–3			Dyy–3			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	1.00	---	---	1.00	---	---	1.00	7,14
A1	0.15	---	---	0.15	---	---	0.25	---	---	
A2	---	---	0.80	---	---	0.80	---	---	0.70	
b	0.25	0.30	0.35	0.25	0.30	0.35	0.40	0.45	0.50	8
e	0.65			0.50			0.80			4
	TOLERANCE OF FORM AND POSITION									
ccc	0.08			0.08			0.12			
Notes	1, 2, 18									
Ref	04–628			04–628			04–628			
Issue	G			G			G			

TABLE 5: PROFILE DIMENSIONS – VERY VERY THIN 16

VAR / SYMBOL	Cyy–4			–			–			Notes
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	---	---	0.80	---	---	–	---	---	–	7,14
A1	0.15	---	---	–	---	---	–	---	---	
A2	---	---	0.60	---	---	–	---	---	–	
b	0.25	0.30	0.35	–	–	–	–	–	–	8
e	0.50			–			–			4
	TOLERANCE OF FORM AND POSITION									
ccc	0.08									
Notes	1, 2, 18									
Ref	XX–YYY									
Issue	Z									

yy = A, B, C ..... AA, AB, AC ..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.

TABLE 6: VARIATIONS – 0.75 PITCH

e = 0.75												
D (MAX)	E (MAX)	D1	E1	MD	ME	n	SD	SE	VARIATION	REF	ISS	NOTE
6.00	5.50	5.25	3.00	8	5	40	0.375	0.0	AA–z	11–494	A	
7.00	6.00	5.25	3.75	8	6	48	0.375	0.375	AW–3a	04–618	F	19
7.00	8.00	3.75	5.25	6	8	46	0.375	0.375	AAD–2a	04–618	F	
7.50	6.50	5.25	2.25	8	4	32	0.375	0.375	AB–z	11–494	A	
8.00	6.00	5.25	3.00	8	5	40	0.375	0.0	AC–z	11–494	A	
8.00	6.00	5.25	3.00	8	5	40	0.375	0.0	AC–3b	04–618	F	
8.00	6.00	5.25	3.75	8	6	48	0.375	0.375	AD–z	11–494	A	
8.00	6.00	5.25	3.75	8	6	48	0.375	0.375	AD–3a	04–618	F	19
8.00	6.00	6.00	3.75	9	6	54	0.0	0.375	AAM–3b	04–775	L	
8.00	7.50	3.75	5.25	6	8	48	0.375	0.375	AN–z	11–524	B	
8.00	7.50	3.75	5.25	6	8	48	0.375	0.375	AN–3b	04–618	F	
8.50	7.00	3.75	5.25	6	8	47	0.375	0.375	AAE–2a	04–618	F	
9.00	7.00	5.25	3.75	8	6	48	0.375	0.375	AY–3a	04–618	F	19
9.00	8.50	5.25	3.75	8	6	48	0.375	0.375	AE–z	11–494	A	
10.00	6.00	5.25	3.75	8	6	48	0.375	0.375	AF–z	11–494	A	
10.00	7.00	3.75	5.25	6	8	48	0.375	0.375	AAF–2a	04–618	F	
10.00	7.00	7.50	5.25	11	8	58	0.0	0.375	AAG–2a	04–775	L	
10.00	8.00	3.00	5.25	5	8	40	0.0	0.375	AG–z	11–494	A	
10.00	8.00	3.00	5.25	5	8	40	0.0	0.375	AG–3b	04–618	F	
10.00	8.00	3.75	5.25	6	8	48	0.375	0.375	AH–z	11–494	A	
10.00	8.00	3.75	5.25	6	8	48	0.375	0.375	AH–3b	04–618	F	
10.00	8.00	5.25	3.75	8	6	48	0.375	0.375	AAA–3a	04–618	F	19
10.00	8.00	5.25	5.25	8	8	64	0.375	0.375	AJ–z	11–494	A	
10.00	8.00	6.00	3.75	9	6	54	0.0	0.375	AAN–3b	04–775	L	
11.50	7.00	9.00	3.75	13	6	52	0.0	0.375	AT–z	04–532	C	
11.50	11.00	9.00	3.75	13	6	52	0.0	0.375	AU–z	04–532	C	
NOTES				5	5	5,12	11	11				
		1, 2, 16, 18										

z = 1, 2, etc ..... FOR PROFILE HEIGHTS OPTIONS.

TABLE 6: VARIATIONS – 0.75 PITCH (CONT'D)

[e] = 0.75												
D (MAX)	E (MAX)	[D1]	[E1]	MD	ME	n	[SD]	[SE]	VARIATION	REF	ISS	NOTE
12.00	7.00	3.75	5.25	6	8	48	0.375	0.375	AAH–2a	04–618	F	
12.00	7.00	7.50	5.25	11	8	58	0.0	0.375	AAJ–2a	04–618	F	
12.00	8.00	3.75	5.25	6	8	48	0.375	0.375	AAK–2a	04–618	F	
12.00	8.00	5.25	3.75	8	6	48	0.375	0.375	AAB–3a	04–618	F	19
12.00	8.00	7.50	5.25	11	8	59	0.0	0.375	AAL–2a	04–618	F	
12.00	9.00	5.25	3.75	8	6	48	0.375	0.375	AAC–3a	04–618	F	19
12.50	6.00	5.25	3.75	8	6	48	0.375	0.375	AK–z	11–494	A	
13.00	7.50	3.75	5.25	6	8	48	0.375	0.375	AP–z	11–524	B	
13.00	7.50	3.75	5.25	6	8	48	0.375	0.375	AP–3b	04–618	F	
14.00	8.00	7.50	5.25	11	8	60	0.0	0.375	AV–z	04–570	D	
14.00	8.00	7.50	5.25	11	8	60	0.0	0.375	AV–3b	04–618	F	
14.50	8.00	7.50	3.75	11	6	44	0.0	0.375	AR–z	04–532	C	
15.50	8.50	3.75	2.25	6	4	24	0.375	0.375	AL–z	11–494	A	
17.00	10.00	5.25	5.25	8	8	64	0.375	0.375	AM–z	11–494	A	
NOTES				5	5	5,12	11	11				
		1, 2, 16, 18										

TABLE 7: VARIATIONS – 0.65 PITCH

[e] = 0.65											
D (MAX)	E (MAX)	[D1]	[E1]	MD	ME	n	[SD]	[SE]	VARIATION	REF	ISSUE
6.00	5.50	4.55	2.60	8	5	40	0.325	0.0	BA–z	11–494	A
7.50	6.50	4.55	1.95	8	4	32	0.325	0.325	BB–z	11–494	A
10.00	5.00	4.55	3.25	8	6	48	0.325	0.325	BC–z	11–494	A
10.00	6.00	4.55	3.25	8	6	48	0.325	0.325	BD–z	11–494	A
11.00	7.50	4.55	3.25	8	6	48	0.325	0.325	BE–z	11–494	A
15.50	8.50	3.25	1.95	6	4	24	0.325	0.325	BF–z	11–494	A
NOTES				5	5	5,12	11	11			
		1, 2, 16, 18									

z = 1, 2, etc ..... FOR PROFILE HEIGHTS OPTIONS.

TABLE 8: VARIATIONS – 0.50 PITCH

e = 0.50											
D (MAX)	E (MAX)	D1	E1	MD	ME	n	SD	SE	VARIATION	REF	ISSUE
5.00	4.50	2.50	3.50	6	8	48	0.250	0.250	CA–z	11–494	A
6.00	4.00	5.00	2.50	11	6	48	0.0	0.250	CB–z	04–683	I
6.00	4.00	4.00	2.50	9	6	34	0.0	0.250	CC–z	04–683	I
NOTES				5	5	5,12	11	11			
		1, 2, 16, 18									

TABLE 9: VARIATIONS – 0.80 PITCH

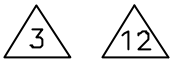
e = 0.80												
D (MAX)	E (MAX)	D1	E1	MD	ME	n	SD	SE	VARIATION	REF	ISS	NOTE
8.00	6.00	5.60	4.00	8	6	48	0.40	0.40	DN–z	04–683	I	
8.00	8.00	6.40	6.40	9	9	54	0.0	0.0	DC–z	04–624	F	
9.00	8.00	6.40	6.40	9	9	54	0.0	0.0	DD–z	04–624	F	
9.00	8.50	6.40	6.40	9	9	54	0.0	0.0	DA–z	04–605	E	
10.00	8.00	5.60	4.00	8	6	48	0.40	0.40	DP–z	04–683	I	
11.00	9.00	8.80	7.20	12	10	63	0.40	0.40	DH–z	04–628	G	
11.00	10.50	7.20	6.40	10	9	60	0.40	0.0	DQ–z	04–683	I	
12.00	8.00	6.40	6.40	9	9	54	0.0	0.0	DE–z	04–624	F	
12.00	8.00	9.60	6.40	13	9	58	0.0	0.0	DF–z	04–624	F	
14.00	8.00	6.40	6.40	9	9	54	0.0	0.0	DG–z	04–624	F	
14.00	11.00	11.20	7.20	15	10	137	0.0	0.40	DV–z	04–703	J	
14.00	12.00	12.80	10.40	17	14	170	0.0	0.40	DAA–z	04–775	L	22
14.00	14.00	12.80	8.80	17	12	136	0.0	0.40	DR–z	04–683	I	22
15.00	12.50	8.00	6.40	11	9	60	0.0	0.0	DJ–z	04–628	G	20
15.50	8.50	6.40	6.40	9	9	54	0.0	0.0	DB–z	04–605	E	
17.00	12.50	9.60	6.40	13	9	78	0.0	0.0	DT–z	04–703	J	20
18.00	12.50	11.20	6.40	15	9	84	0.0	0.0	DK–z	04–628	G	20
19.00	12.50	12.00	6.40	16	9	96	0.40	0.0	DU–z	04–703	J	20
21.00	12.50	14.40	6.40	19	9	68	0.0	0.0	DM–z	04–628	G	20
NOTES				5	5	5,12	11	11				
		1, 2, 16, 18										

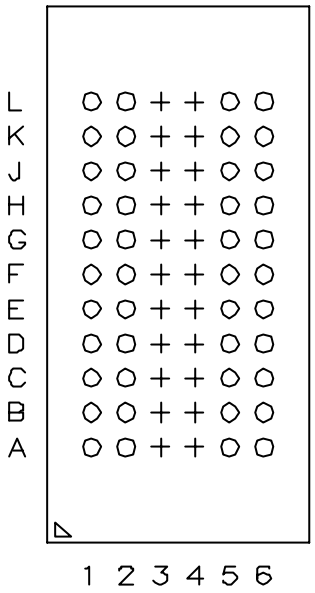
z = 1, 2, etc ..... FOR PROFILE HEIGHTS OPTIONS.

TABLE 9: VARIATIONS – 0.80 PITCH (CNT'D)

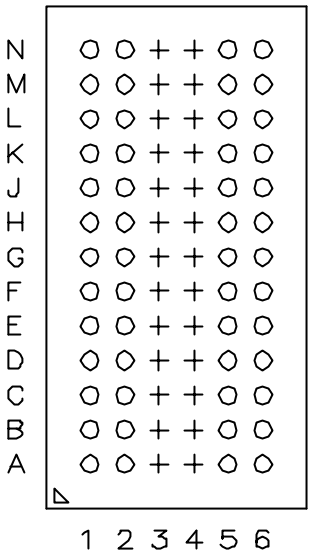
e = 0.80												
D (MAX)	E (MAX)	D1	E1	MD	ME	n	SD	SE	VARIATION	REF	ISS	NOTE
21.00	12.50	16.00	6.40	21	9	92	0.0	0.0	DL–z	04–628	G	20
22.00	12.50	8.00	17.60	23	11	106	0.0	0.0	DW–z	04–775	L	20
22.00	12.50	8.00	16.80	22	11	112	0.4	0.0	DY–z	04–775	L	20
NOTES				5	5	5,12	11	11				
		1,	2, 16,	18								

z = 1, 2, etc ..... FOR PROFILE HEIGHTS OPTIONS.

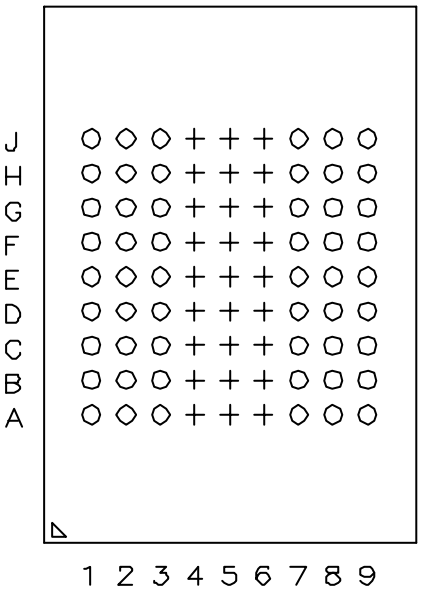
FIGURE 3 : SOLDER BALL PATTERNS 



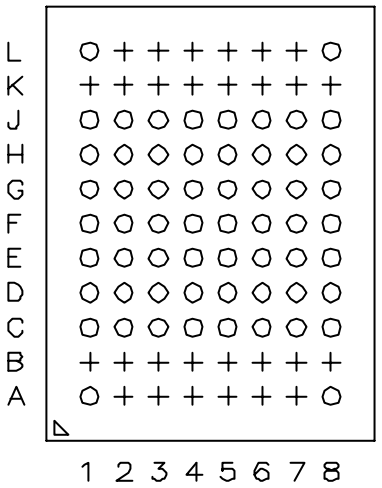
VARIATION AR–z



VARIATION AT–z, AU–z



VARIATION DA–z, DB–z
DC–z, DD–z, DE–z, DG–z

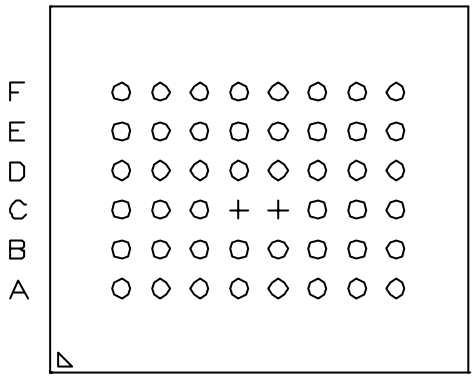


VARIATION AV–z, AV–3b

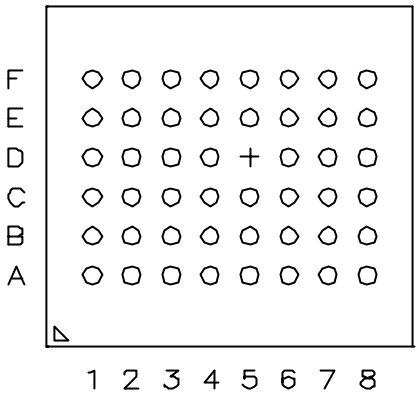
\+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE: L	DATE: 12/07	ITEM MO–207	PAGE: 11 OF 22

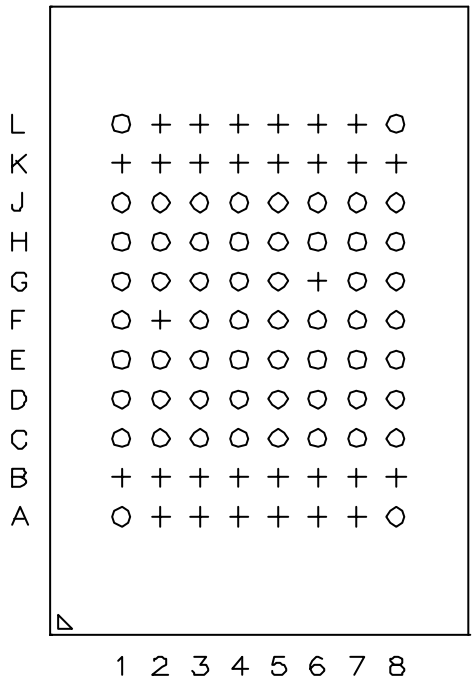
FIGURE 3 : SOLDER BALL PATTERNS (CONT'D) 3 12



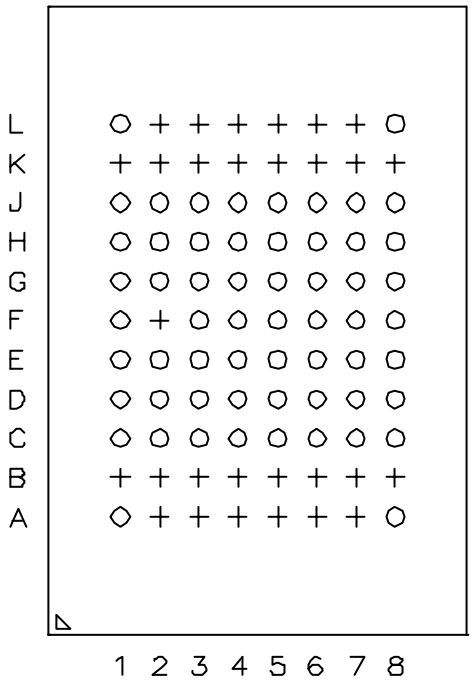
VARIATION AAD–2a



VARIATION AAE–2a



VARIATION AAG–2a, AAJ–2a

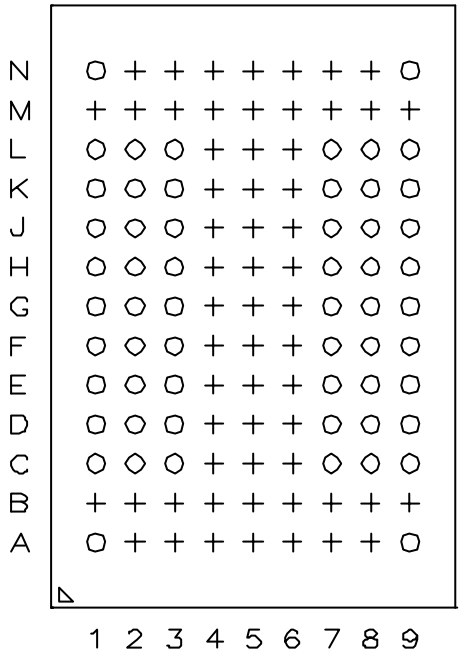


VARIATION AAL–2a

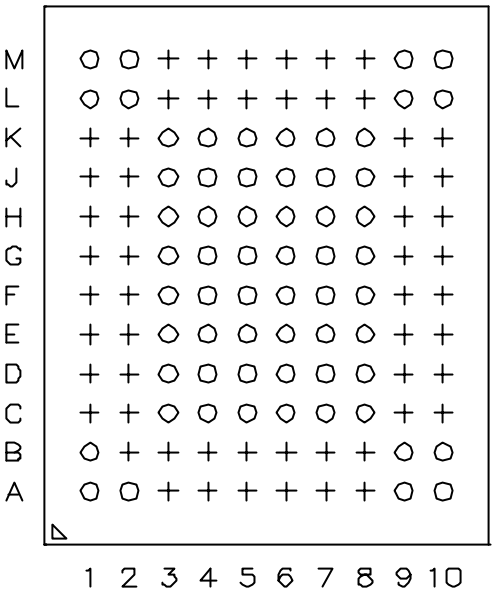
\+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE:	DATE:	ITEM	PAGE:
		L	12/07	MO–207	12 OF 22

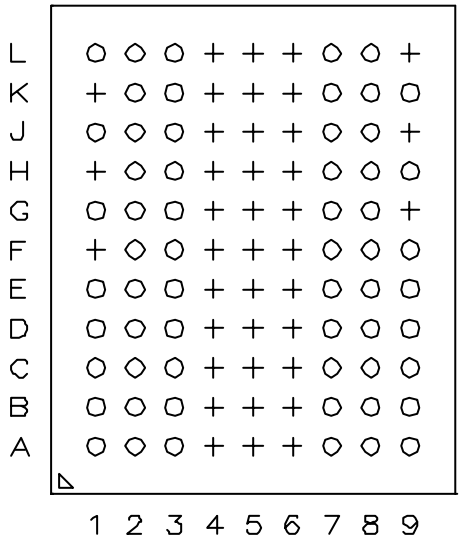
FIGURE 3 : SOLDER BALL PATTERNS (CONT'D) △3 △12



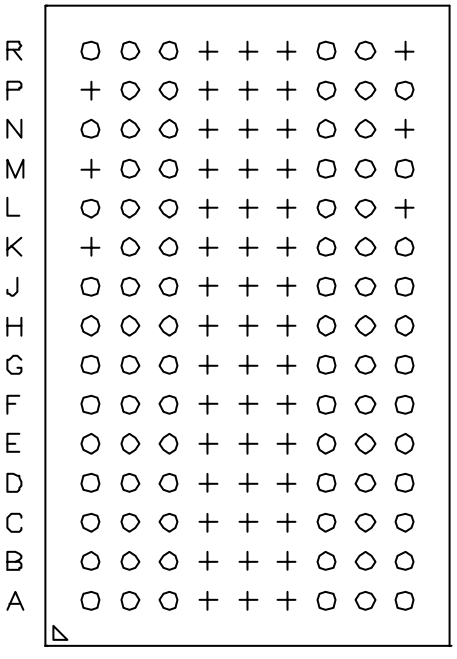
VARIATION DF–z



VARIATION DH–z



VARIATION DJ–z

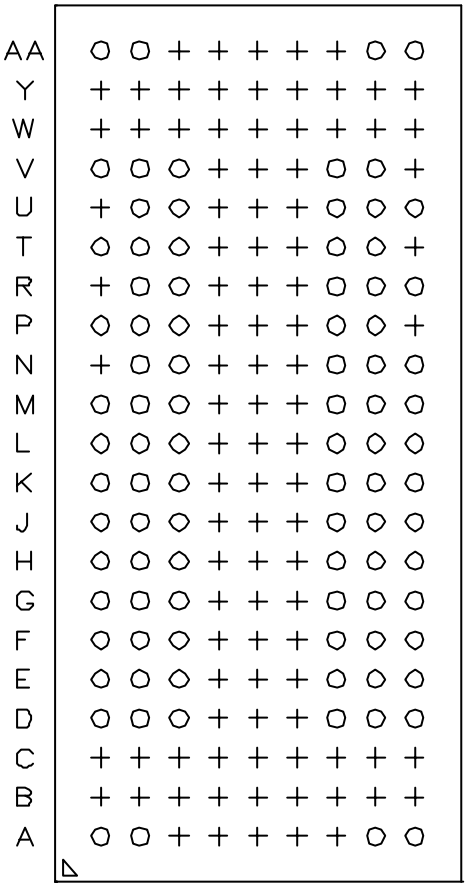


VARIATION DK–z

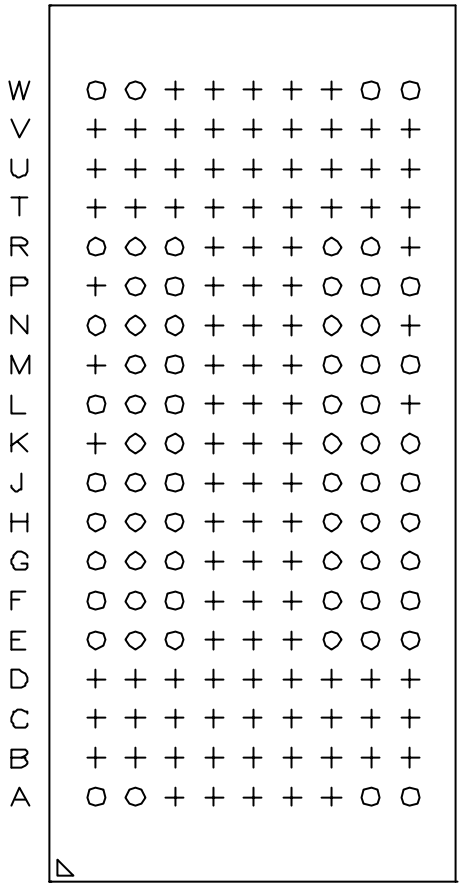
\+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE: L	DATE: 12/07	ITEM MO–207	PAGE: 13 OF 22

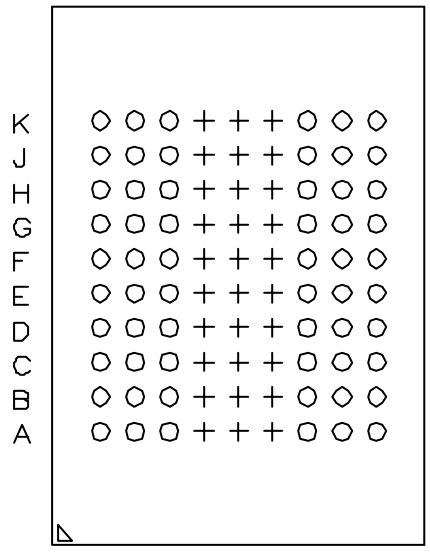
FIGURE 3 : SOLDER BALL PATTERNS (CONT'D) 3 12



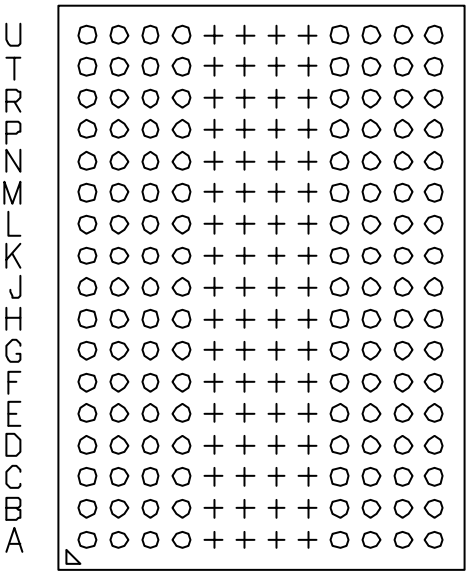
VARIATION DL–z



VARIATION DM–z



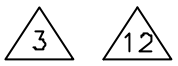
VARIATION DQ–z

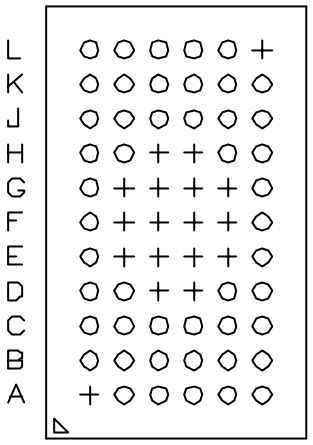


VARIATION DR–z

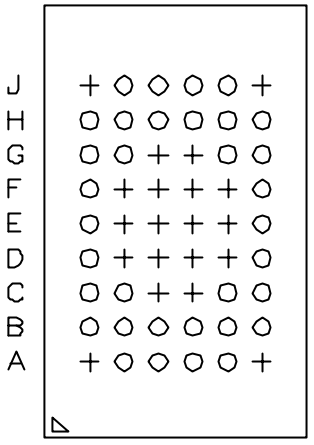
\+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE: L	DATE: 12/07	ITEM MO–207	PAGE: 14 OF 22

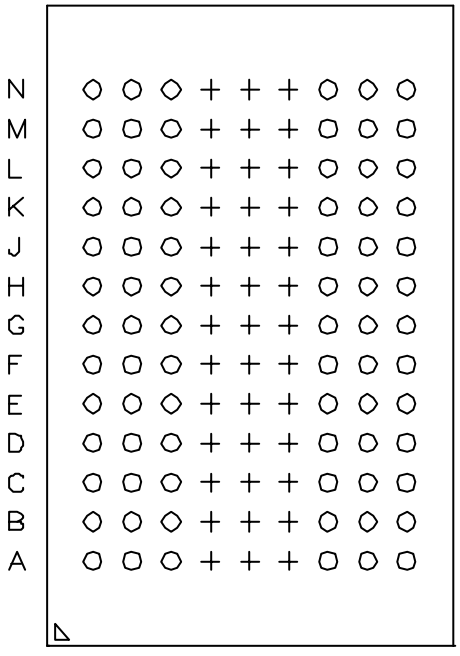
FIGURE 3 : SOLDER BALL PATTERNS 



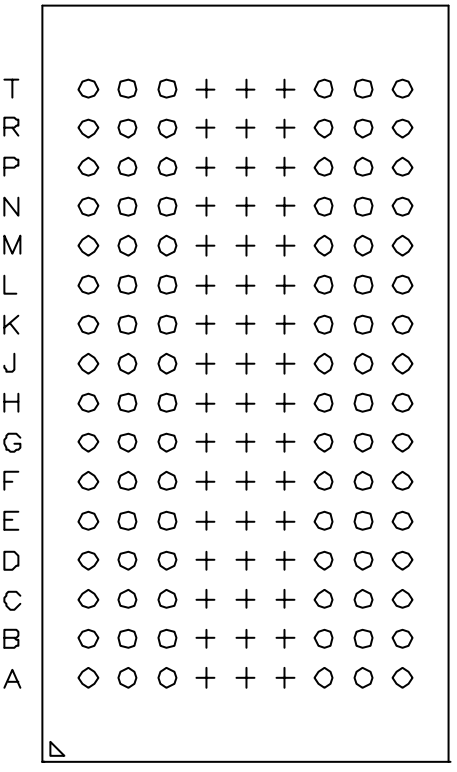
VARIATION CB–z



VARIATION CC–z



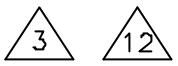
VARIATION DT–z

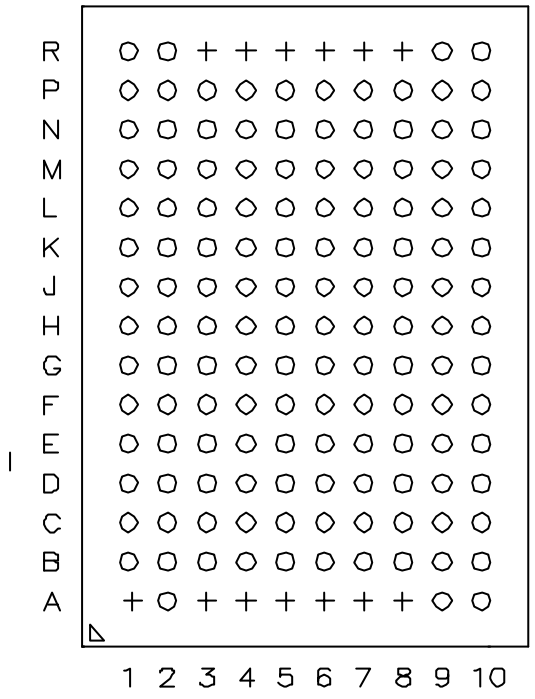


VARIATION DU–z

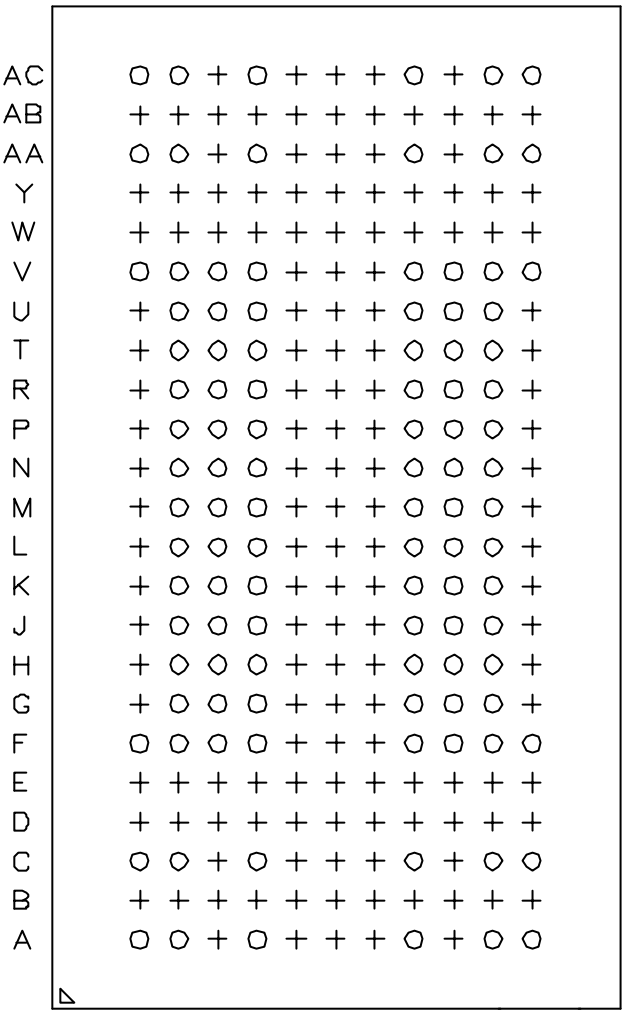
\+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE:	DATE:	ITEM	PAGE:
		L	12/07	MO–207	15 OF 22

FIGURE 3 : SOLDER BALL PATTERNS 



VARIATION DV–z

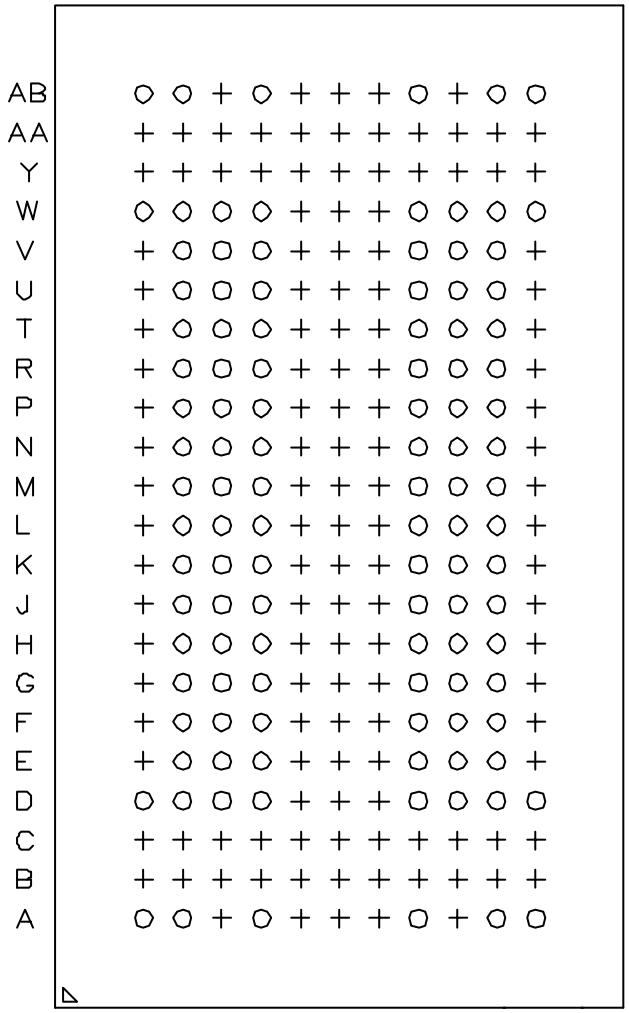


VARIATION DW–z

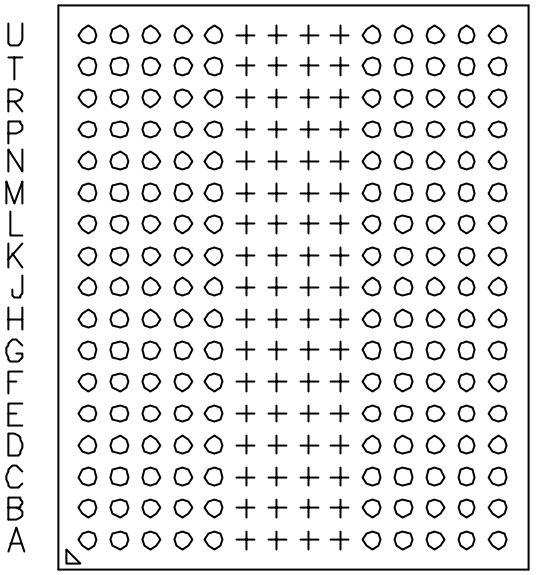
+ = DEPOPULATED BALL POSITION

JEDEC SOLID STATE PRODUCT OUTLINE	TITLE: SQUARE & RECTANGULAR DIE–SIZE, BALL GRID ARRAY FAMILY	ISSUE: L	DATE: 12/07	ITEM MO–207	PAGE: 16 OF 22

FIGURE 3 : SOLDER BALL PATTERNS (CONT'D) 3 12



VARIATION DY–z



VARIATION DAA–z

\+ = DEPOPULATED BALL POSITION

NOTES:

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

2. ALL DIMENSIONS ARE IN MILLIMETERS.

3. SOLDER BALL POSITION DESIGNATION PER JEP95, SECT. 3, SPP–010 (SQUARE PACKAGES), SPP–020 (RECTANGULAR PACKAGES).

4. THE "e" REPRESENTS THE SOLDER BALL GRID PITCH.

5. SYMBOL "MD" IS THE BALL MATRIX SIZE IN THE "D" DIRECTION. SYMBOL "ME" IS THE BALL MATRIX SIZE IN THE "E" DIRECTION. n IS THE ACTUAL NUMBER OF BALLS FOR MATRIX SIZE MD x ME AND DOES NOT INCLUDE BALLS FROM ANY DEPOPULATED LOCATIONS.

6. 6 X 8 MATRIX IS SHOWN FOR ILLUSTRATION ONLY.

7. THIS DIMENSION INCLUDES STAND–OFF HEIGHT "A1", AND PACKAGE BODY THICKNESS, BUT DOES NOT INCLUDE ATTACHED FEATURES, e.g., EXTERNAL HEATSINK OR CHIP CAPACITORS. AN INTEGRAL HEATSLUG IS NOT CONSIDERED AN ATTACHED FEATURE.

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

9. PRIMARY DATUM C (SEATING PLANE) IS DEFINED BY THE CROWNS OF THE SOLDER BALLS.

10. TERMINAL A1 CORNER MUST BE IDENTIFIED ON THE TOP SURFACE BY CHAMFER, INK MARK, METALLIZED MARKINGS, INDENTATION, OR OTHER MEANS ON THE PACKAGE BODY, LID OR INTEGRAL HEATSLUG. SOME ORIENTATION FEATURE ON THE BALL ATTACH SIDE IS RECOMMENDED.

11. SD AND SE ARE MEASURED WITH RESPECT TO DATUMS A AND B AND DEFINE THE POSITION OF THE CENTER SOLDER BALL IN THE OUTER ROW. WHEN THERE IS AN ODD NUMBER OF SOLDER BALLS IN THE OUTER ROW PARALLEL TO THE D OR E DIMENSION, RESPECTIVELY, SD OR SE = 0.0 BSC. WHEN THERE IS AN EVEN NUMBER OF SOLDER BALLS IN THE OUTER ROW, SD OR SE = e/2 BSC.

12. SOLDER BALL ARRAY MAY BE DEPOPULATED BY OMISSION OF BALLS FROM A FULL MD x ME MATRIX.

13. PARALLELISM ON THE TOP SURFACE (bbb) APPLIES ONLY TO THE 3.0mm x 5.0mm MINIMUM FLAT AREA SHOWN ON THE TOP VIEW (SHEET 1). THIS AREA MAY BE USED FOR MARKING OR VACUUM PICKUP.

14. THIS IS A CONTROLLING DIMENSION.

15. MAXIMUM BODY SIZES (D AND E) ARE DERIVED FROM ACTUAL BODY SIZES ROUNDED TO THE NEXT HIGHEST 0.50 MM INCREMENT (X.00 OR X.50). ACTUAL VALUES FOR D AND E MUST BE OBTAINED FROM PACKAGE PRODUCER.

16. VARIATION CODING FORM IS xyy–zs, WHERE:
x = A, B, C OR D FOR VARIOUS BALL PITCHES (0.75mm, 0.65mm, 0.50mm OR 0.80mm RESPECTIVELY).
yy = A, B, C ..... AA, AB, AC..... FOR THE VARIOUS BODY/MATRIX SIZE COMBINATIONS (MAY BE 1 OR 2 CHARACTERS). EACH SET OF PITCH VARIATIONS IS INDEPENDENT.
z = 1, 2, etc,..... FOR PROFILE HEIGHTS OPTIONS.
s = a, b, etc,..... FOR SPECIAL FEATURES (OPTIONAL CHARACTER).

17. FOR BOARD LAYOUT USER MUST OBTAIN CORRECT TERMINAL A1 CORNER ORIENTATION FROM DEVICE SUPPLIER.

18. THESE PACKAGES ARE USED PRINCIPALLY FOR MEMORY DEVICES.

19. THE xyy CALLOUT ON THESE VARIATIONS WERE REVISED. HERE IS A CROSS–REFERENCE OF THE OLD CALLOUT AND THE NEW CALLOUT:

OLD			NEW		
VARIATION	REF	ISS	VARIATION	REF	ISS
AA–3a	04–605	E	AW–3a	04–618	F
AB–3a	04–605	E	AD–3a	04–618	F
AC–3a	04–605	E	AY–3a	04–618	F
AD–3a	04–605	E	AAA–3a	04–618	F
AE–3a	04–605	E	AAB–3a	04–618	F
AF–3a	04–605	E	AAC–3a	04–618	F

20. FOR DDR2 AND DDR3 MODULE APPLICATIONS REFER TO DETAIL F, PAGE 4 OF MO–237.
E (MAX) DIMENSION MAY BE PRACTICALLY LIMITED.
ALSO FOR DDR3 MODULE APPLICATIONS, **E (MAX) DIMENSION MAY BE PRACTICALLY LIMITED.**

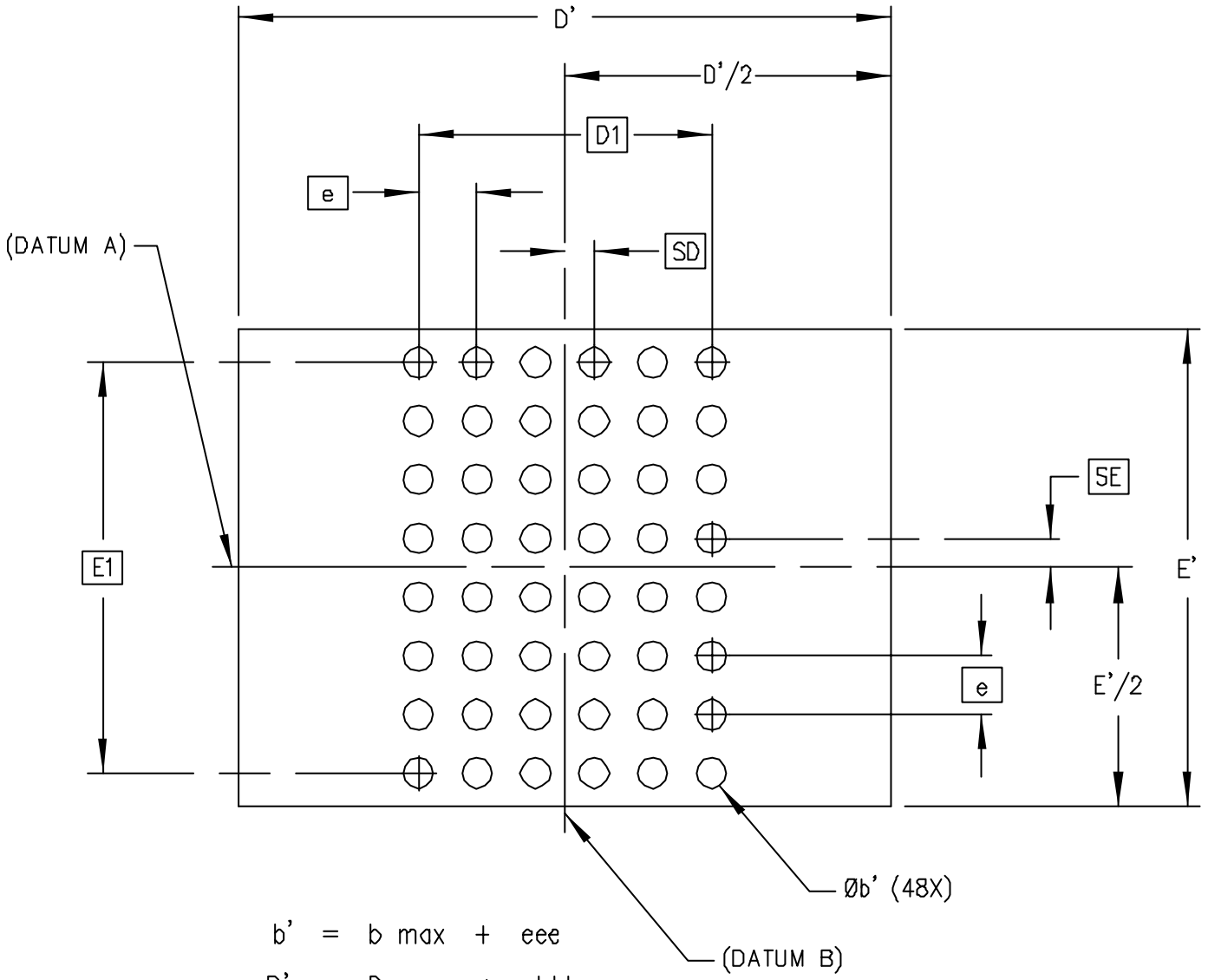
21. THE SOLDERABLE SURFACE MAY BE DEFINED BY AN OPENING IN THE SOLDER RESIST LAYER (Type 1 "SMD") OR BY THE SIZE OF A METALIZED PAD (Type 2 "NSMD"). IT MAY BE ELLIPTICAL **PROVIDED THE RATIO** OF THE MAJOR TO MINOR AXES IS NO GREATER THAN 2/1, AND THE SURFACE **AREA IS NO LESS THAN** THE MINIMUM FOR A CIRCULAR PAD. FOR TYPE 2 DESIGNS, EXPOSED COPPER **TRACES ARE PERMITTED** OUTSIDE THE b1 PAD AREA.

APPLICATION NOTES:

22. FOR GDDR4 AND GDDR5 APPLICATION, THERE ARE ADDITIONAL RESTRICTIONS ON PACKAGE HEIGHT TOLERANCE AND ON BALL STAND-OFF VALUES FOR MORE HARMONIZED GEOMETRICAL PROPERTIES ACROSS THE SUPPLIERS.
THE VALUES ARE: AMIN = 1.00; AMAX = 1.20; A1MIN = 0.30; A1MAX = 0.40.

⑥ POSITIONAL TOLERANCE OVERLAY EXAMPLE

(VARIATION CA-X EXAMPLE)



b' = b max + eee

D' = D max + ddd

E' = E max + ddd

APPLICATION: BODY EDGES MUST LIE ON OR INSIDE D' X E' BOUNDARY WHEN ALL BALLS LIE ON OR INSIDE Øb' BOUNDARIES.

NOTE: D' X E' IS THE MINIMUM BOARD KEEPOUT ZONE REQUIRED.

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:	Date:	JC11 Item Number:
MO-207J	May 2005	11.4-703

Change Record History

Issue: K	Date: May 05	Item: 11.4-732
Location	Changed from:	Changed to:
Page 9	Table 9	Table 9: addition of 2 variations DW-z and DY-z.
Page 17	Solder ball patterns	Two new drawings for ball layout

Issue: K	Date: May 05	Item: 11.4-715
Location	Changed from:	Changed to:
Application Notes	-	addition of NOTE 22

Issue: L	Date: Jul 07	Item Number: 11.4-775
Location	Changed from:	Changed to:
Page 9	Table 9	added var. DAA-z
Page 17	Solder ball pattern	added var. DAA-z
Page 20	Application note 22	added GDDR5
Page 7 & 8	Table 6	several SE, SD values corrected, per JC11 decision
Page 11 to 16	Solder ball patterns	added pin A1 mark and deleted symbol ⊕ , per JC11 decision

Issue:	Date:	Item Number:
Location	Changed from:	Changed to: