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Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

Applications of Embedded - FPGAs

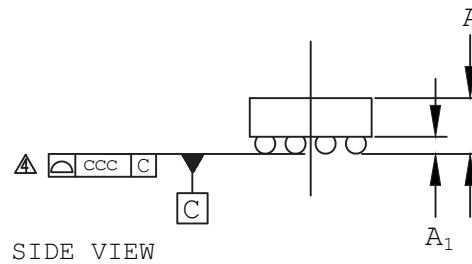
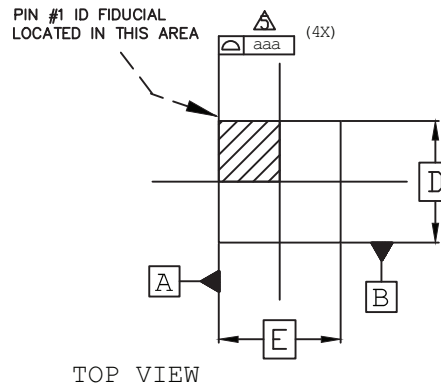
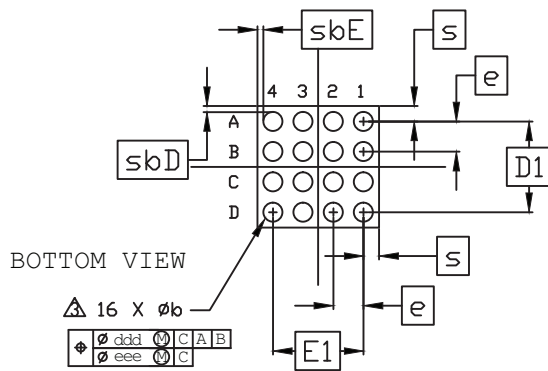
The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

Details

Product Status	Obsolete
Number of LABs/CLBs	-
Number of Logic Elements/Cells	1500
Total RAM Bits	18432
Number of I/O	67
Number of Gates	-
Voltage - Supply	1.14V ~ 1.26V
Mounting Type	Surface Mount
Operating Temperature	0°C ~ 85°C (TJ)
Package / Case	100-LQFP
Supplier Device Package	100-TQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lfec1e-5t100c

16-Ball WLCS Package Option 2: iCE40 UltraLite™

Dimensions in Millimeters



NOTES:

1. ALL DIMENSIONS AND TOLERANCE PER ASME Y 14.5M - 1994.

2. ALL DIMENSIONS ARE IN MILLIMETERS.

△ DIMENSION "b" IS MEASURES AT THE MAXIMUM BUMP DIAMETER PARALLEL TO PRIMARY DATUM C.

△ PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BUMPS.

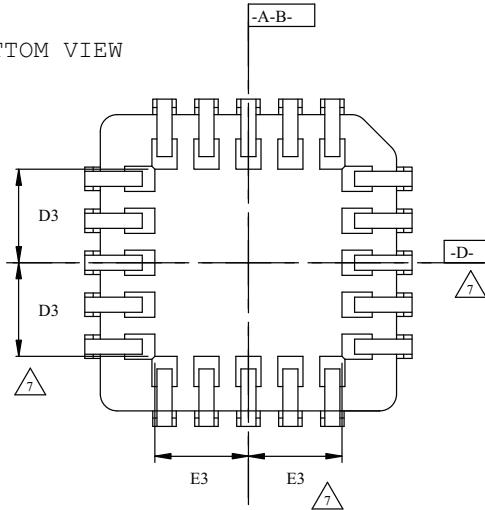
△ BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

REF.	Min.	Nom.	Max.
A	0.413	0.452	0.491
A1	0.122	0.152	0.182
b	0.188	0.218	0.248
D	1.409 BSC		
E	1.409 BSC		
D1	1.05 BSC		
E1	1.05 BSC		
e	0.35 BSC		
s	-	0.180	-
sbD	0.067	0.071	0.072
sbE	0.067	0.071	0.072
aaa	0.03		
ccc	0.03		
ddd	0.050		
eee	0.015		

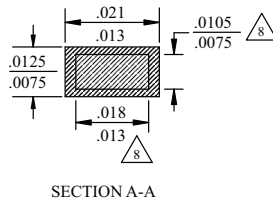
20-Pin PLCC Package

Dimensions in Inches

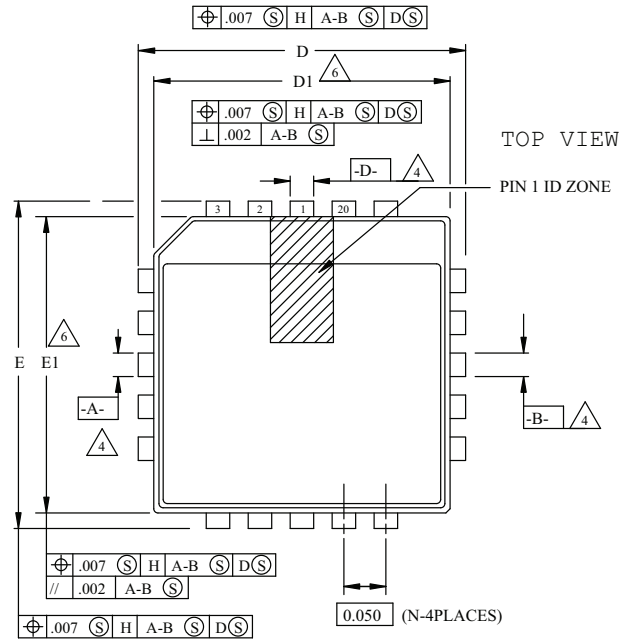
BOTTOM VIEW



	MIN.	NOM.	MAX.
A	.165	.172	.180
A1	.090	.105	.120
A2	.062	-	.083
D	.385	.390	.395
D1	.350	.353	.356
D2	.141	.155	.169
D3		.075	
E	.385	.390	.395
E1	.350	.353	.356
E2	.141	.155	.169
E3		.075	
N		20	

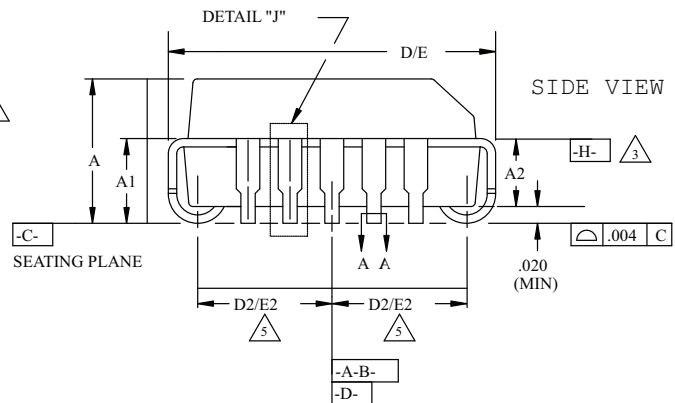


SECTION A-A



TOP VIEW

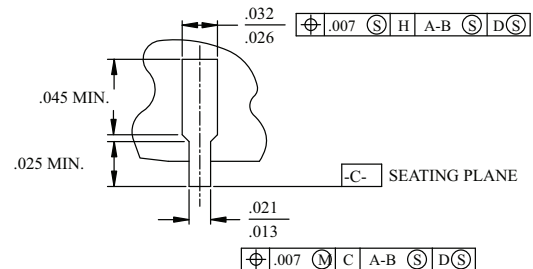
PIN 1 ID ZONE



SIDE VIEW

NOTES:

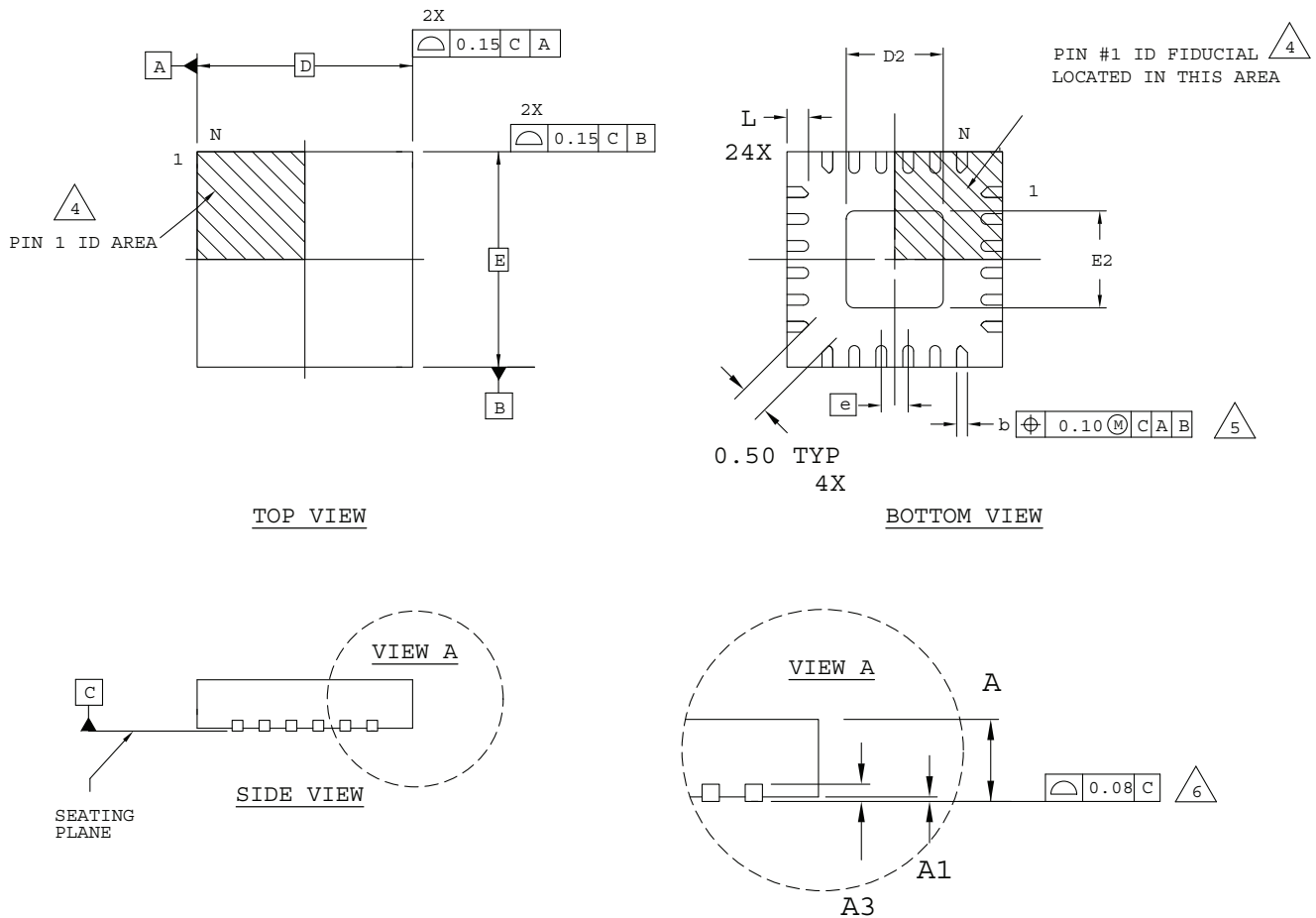
- ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1982
- ALL DIMENSIONS IN INCHES
- DATUM PLANE $\boxed{-H-}$ LOCATED AT TOP OF MOLD PARTING LINE AND COINCIDENT WITH TOP OF LEAD WHERE LEAD EXITS PLASTIC BODY
- DATUMS $\boxed{-A-B-}$ AND $\boxed{-D-}$ TO BE DETERMINED WHERE CENTER LEADS EXIT PLASTIC BODY AT DATUM PLANE $\boxed{-H-}$
- TO BE MEASURED AT SEATING PLANE $\boxed{-C-}$ CONTACT POINT
- DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .010 PER SIDE.
- TOP POINT OF MEASUREMENT IS DATUM $\boxed{-H-}$; BOTTOM POINT OF MEASUREMENT IS AT MAJOR FLAT AREA OF LOWER PLASTIC SURFACE DEFINED BY D3/E3
- DIMENSION APPLIES TO BASE METAL ONLY



DETAIL "J" (TYP ALL SIDES)

24-Pin QFNS Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DRAWING CONFORMS TO JEDEC MO-220, VARIATION VGGD-9.

△ 4 EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

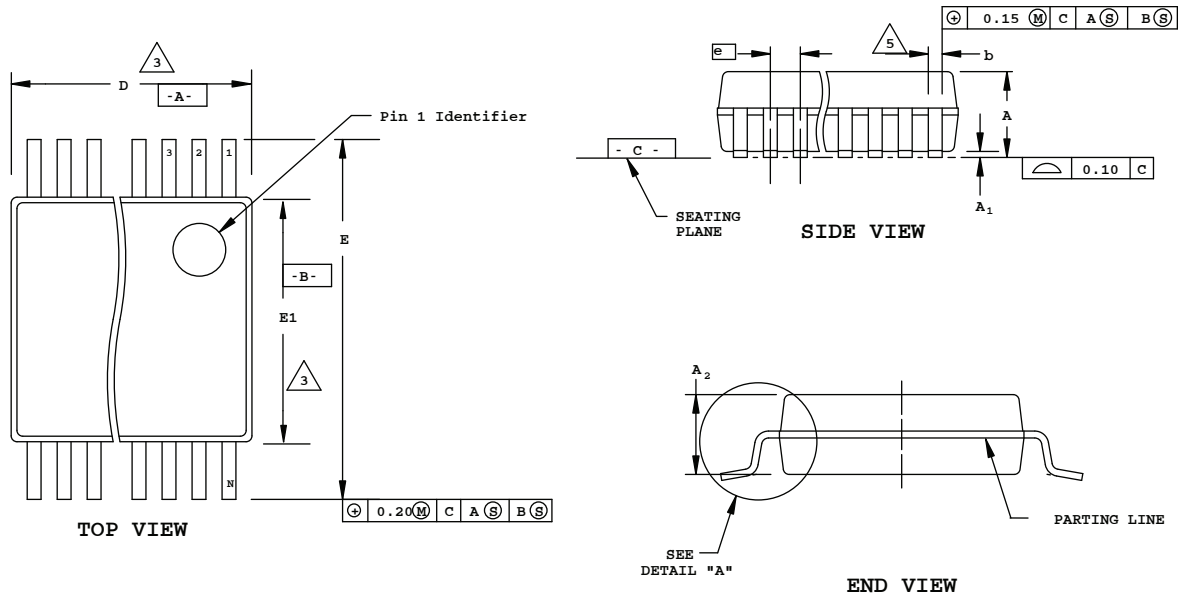
△ 5 DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.

△ 6 APPLIES TO EXPOSED PORTION OF TERMINALS.

SYMBOL	MIN.	NOM.	MAX.
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A3	0.2 REF		
D	4.0 BSC		
D2	1.05	-	2.45
E	4.0 BSC		
E2	1.05	-	2.45
b	0.18	0.25	0.30
e	0.50 BSC		
L	0.45	0.50	0.55

28-Pin SSOP Package

Dimensions in Millimeters



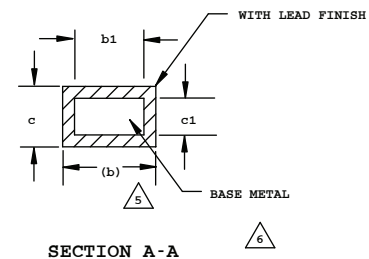
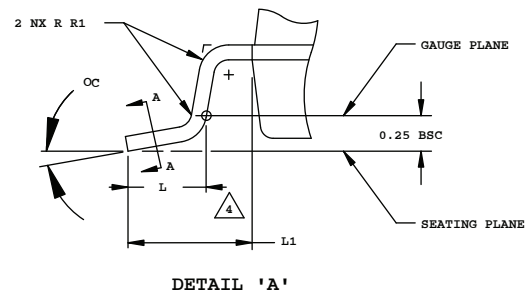
SYMBOL	COMMON DIMENSIONS		
	MIN.	NOM.	MAX.
A	--	--	2.0
A ₁	0.05	--	--
A ₂	1.65	1.75	1.85
b	0.22	--	0.38
b ₁	0.22	0.30	0.33
c	0.09	--	0.25
c ₁	0.09	0.15	0.21
D	9.90	10.20	10.50
E1	5.00	5.30	5.60
e	0.65 BSC		
E	7.40	7.80	8.20
L	0.55	0.75	0.95
L1	1.25 REF.		
N	28		
OC	0	4	8
R1	0.09	--	--

NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS.
2. DIMENSIONING & TOLERANCES PER ANSI.Y14.5M-1982.

3. "D" & "E1" DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS, BUT DO INCLUDE MOLD MISMATCH AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.20mm PER SIDE.

4. TO BE DETERMINED AT THE SEATING PLANE



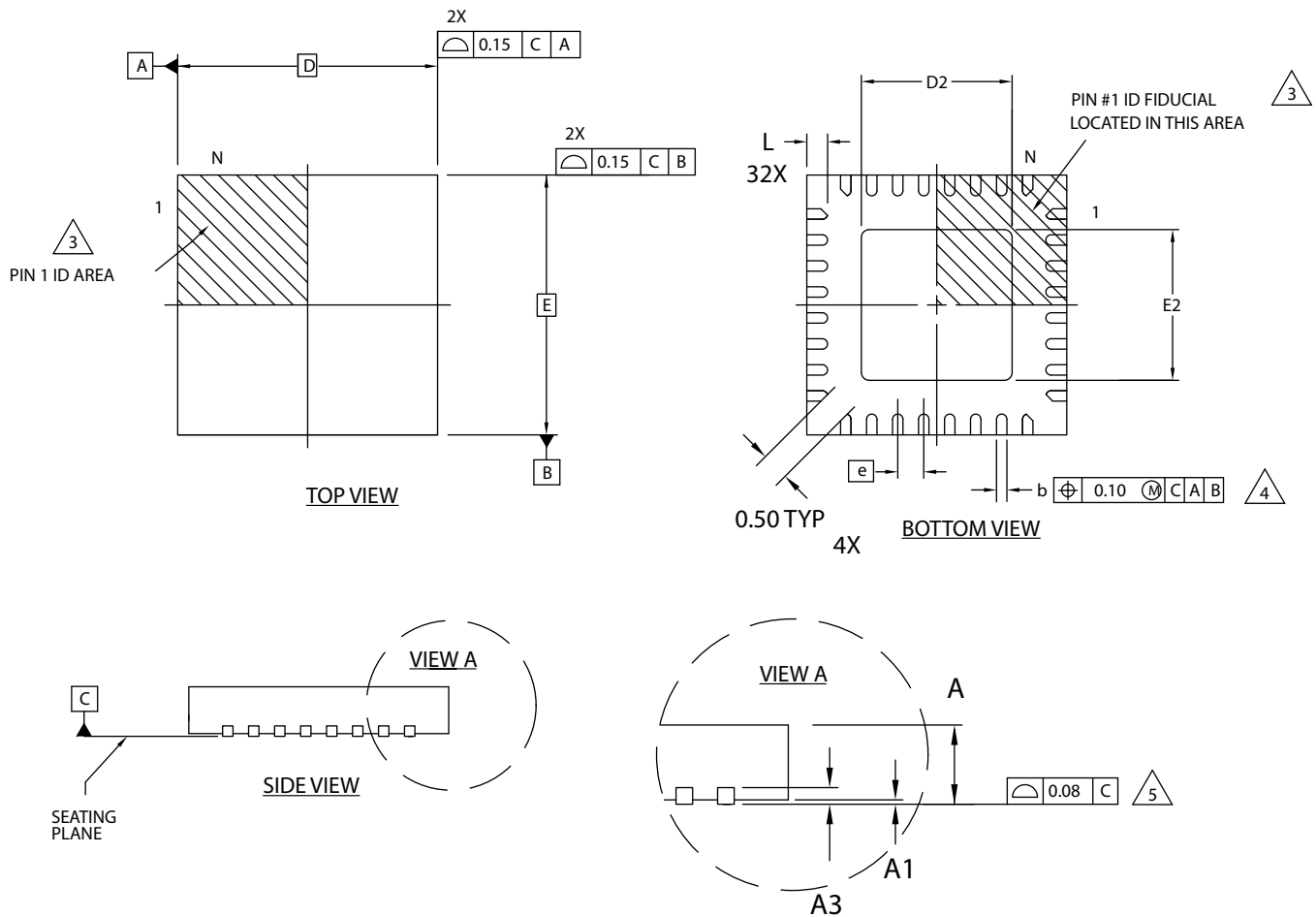
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13mm TOTAL IN EXCESS OF b DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION b BY MORE THAN 0.07mm AT LEAST MATERIAL CONDITION.

6. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 & 0.25mm FROM THE LEAD TIP

7. "N" IS THE NUMBER OF TERMINAL POSITIONS


32-Pin QFN Package Option 1: Power Manager II, iCE40™


Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES
PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

 EXACT SHAPE AND SIZE OF THIS
FEATURE IS OPTIONAL.

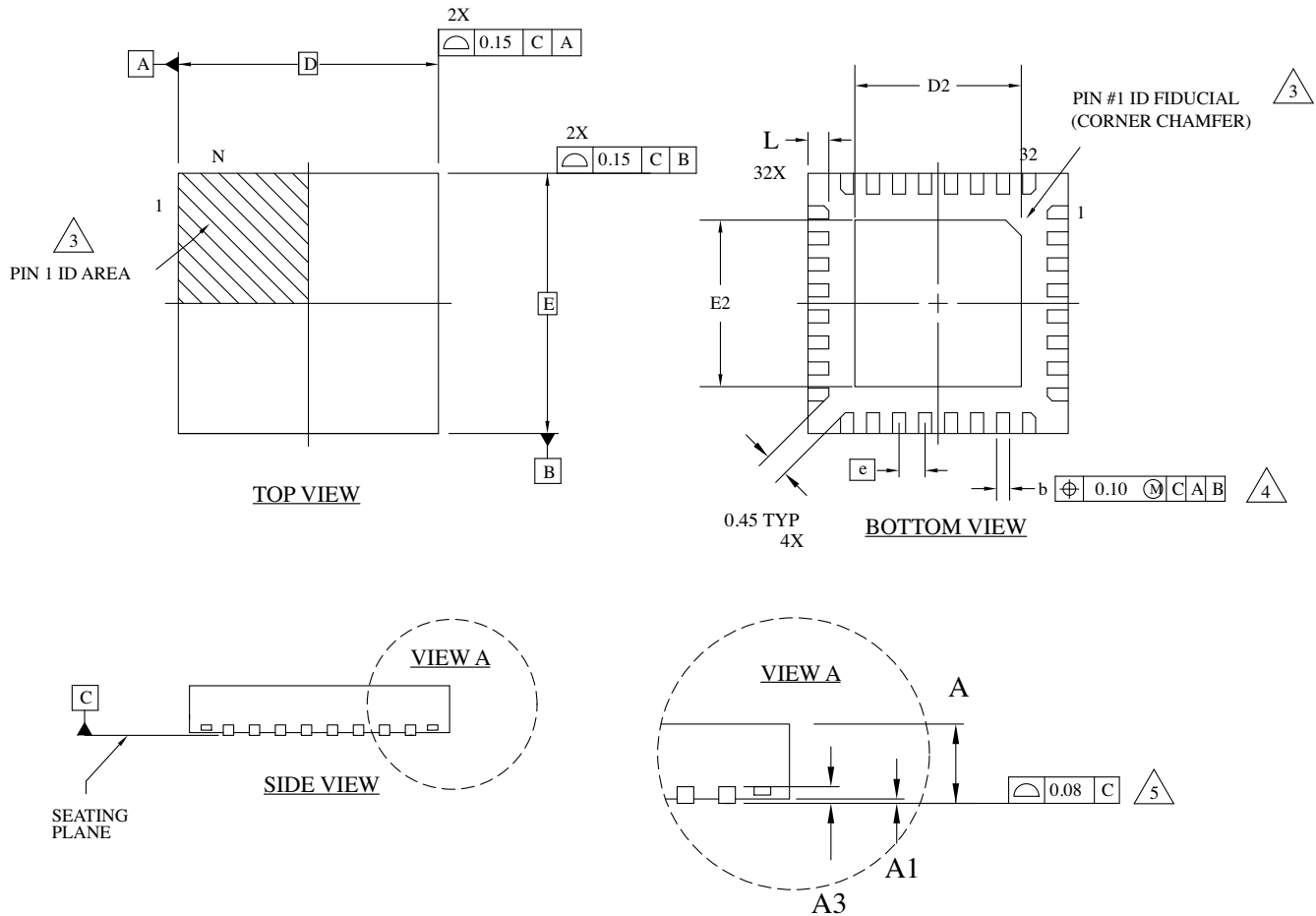
 DIMENSION b APPLIES TO PLATED
TERMINAL AND IS MEASURED BETWEEN
0.15 AND 0.30 mm FROM TERMINAL TIP.

△₅ APPLIES TO EXPOSED PORTION OF TERMINALS.

SYMBOL	MIN.	NOM.	MAX.
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A3	0.2 REF		
D	5.0 BSC		
D2	1.25	2.70	3.75
E	5.0 BSC		
E2	1.25	2.70	3.75
b	0.18	0.24	0.30
e	0.50 BSC		
L	0.30	0.40	0.50

32-Pin QFN Package Option 2: MachXO2™

Dimensions in Millimeters



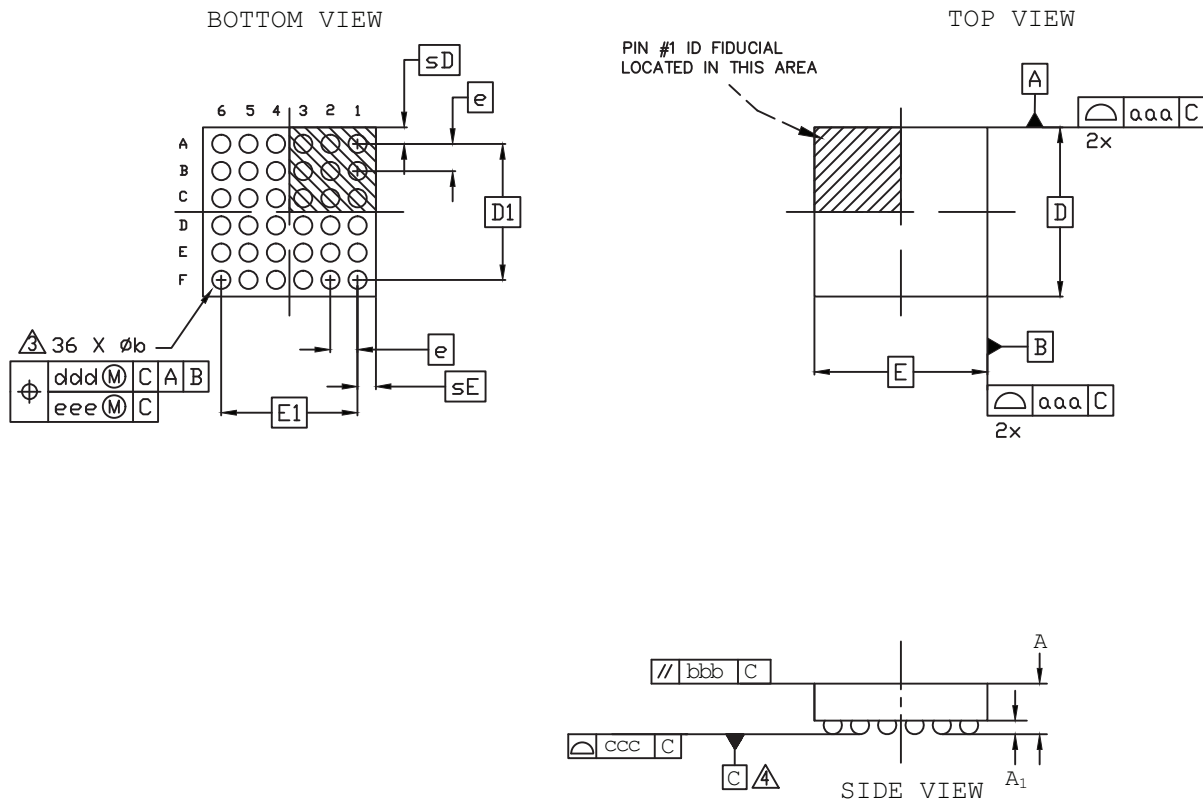
NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.
4. DIMENSION *b* APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
5. APPLIES TO EXPOSED PORTION OF TERMINALS.

SYMBOL	MIN.	NOM.	MAX.
A	0.50	0.55	0.60
A1	0.00	0.02	0.05
A3	0.2 REF		
D	5.0 BSC		
D2	3.10	3.20	3.30
E	5.0 BSC		
E2	3.10	3.20	3.30
b	0.20	0.25	0.30
e	0.50 BSC		
L	0.35	0.40	0.45

36-Ball WLCS Package Option 2: MachXO3™

Dimensions in Millimeters



NOTES:

1. ALL DIMENSIONS AND TOLERANCE PER ASME Y 14.5M - 1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

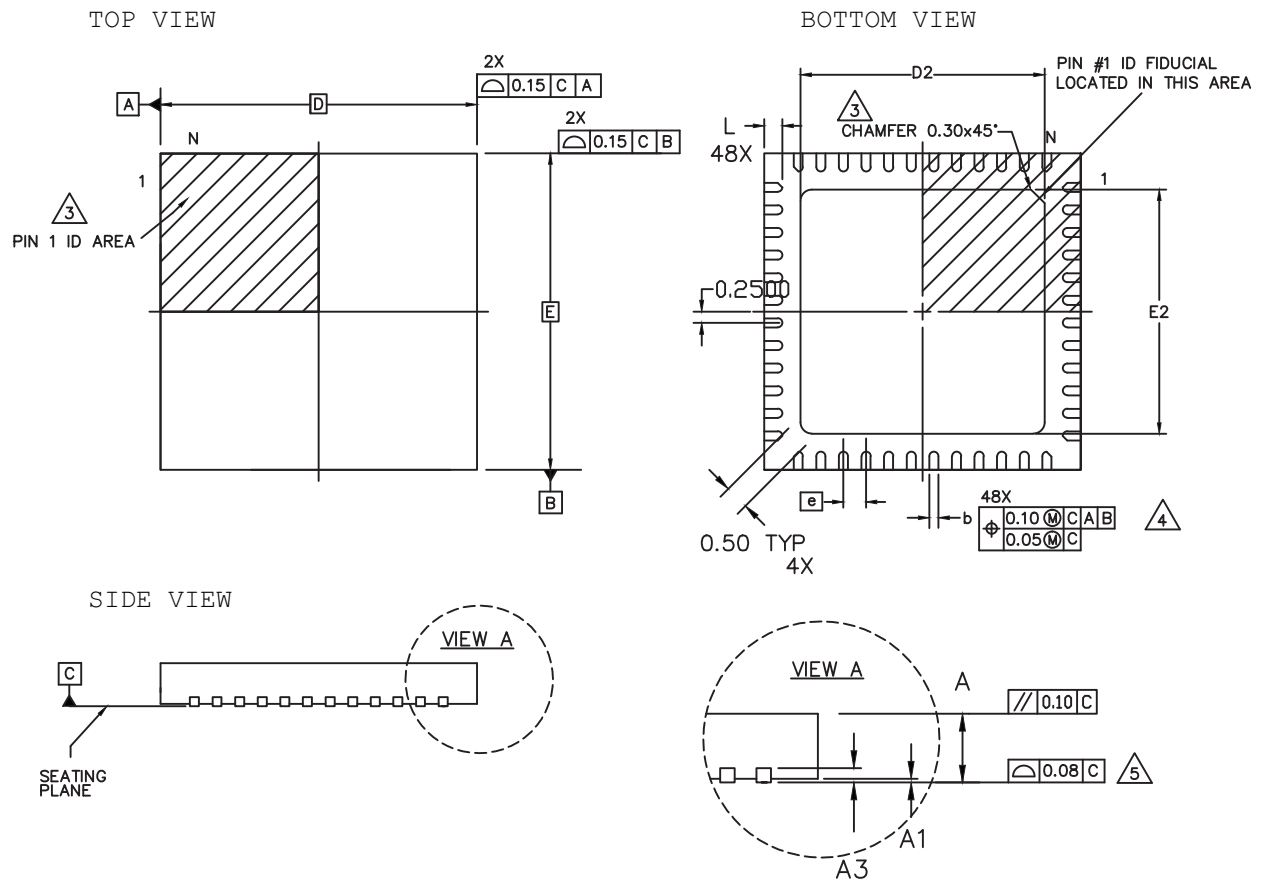
△ DIMENSION "b" IS MEASURES AT THE MAXIMUM BUMP DIAMETER PARALLEL TO PRIMARY DATUM [C].

△ PRIMARY DATUM [C] AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BUMPS.

REF.	Min.	Nom.	Max.
A	0.510	0.543	0.576
A1	0.167	0.196	0.225
b	0.239	0.266	0.319
D	2.487 BSC		
E	2.541 BSC		
D1	2.00 BSC		
E1	2.00 BSC		
e	0.40 BSC		
sD	-	0.244	-
sE	-	0.271	-
aaa	0.025		
bbb	0.060		
ccc	0.030		
ddd	0.0150		
eee	0.050		


48-Pin QFN Package Option 2: L-ASC10, iCE40 Ultra, iCE40 UltraPlus, MachXO2


Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

 EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

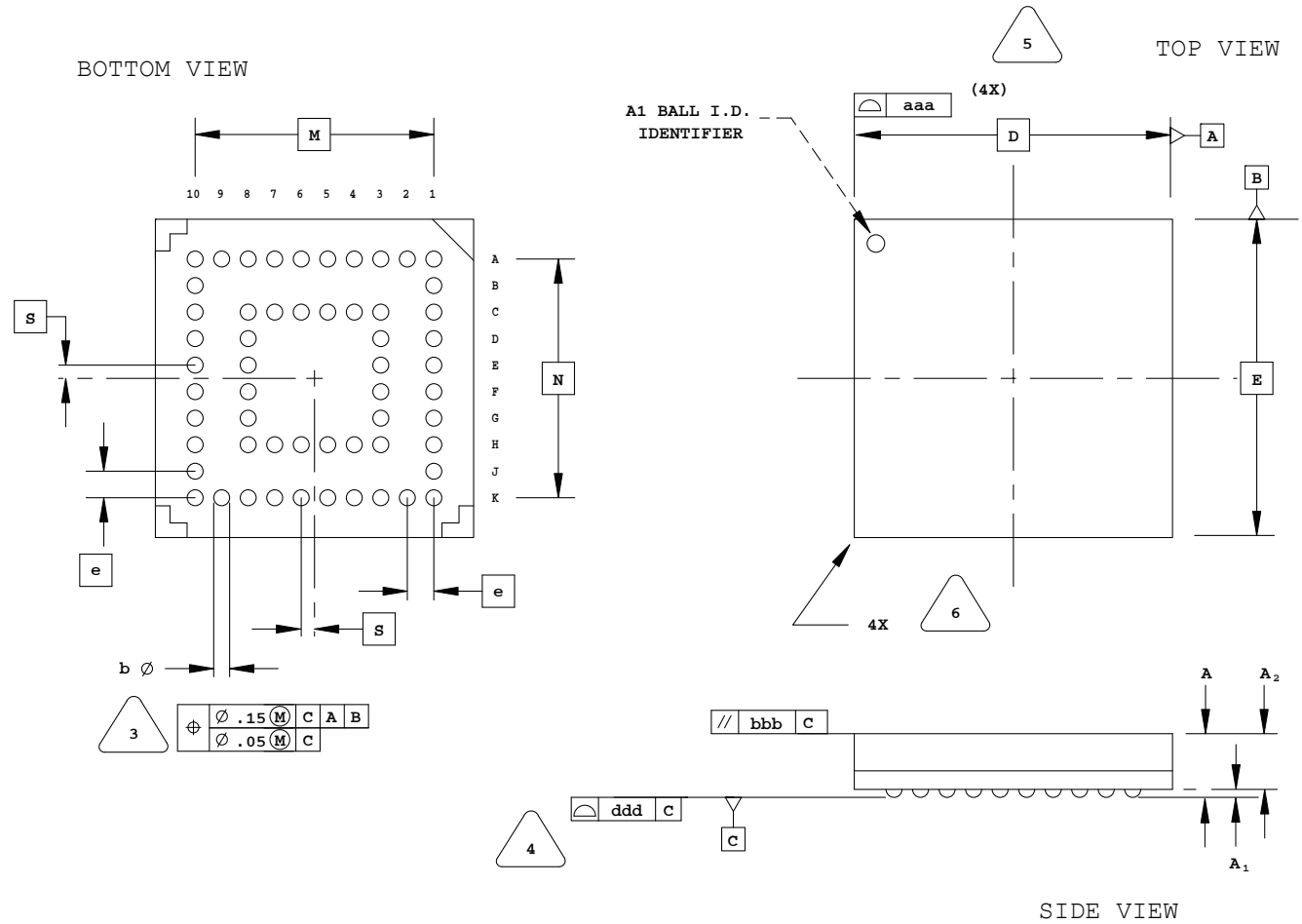
 DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.

 APPLIES TO EXPOSED PORTION OF TERMINALS.

SYMBOL	MIN.	NOM.	MAX.
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A3	0.2 REF		
D	7.0 BSC		
D2	5.30	5.40	5.50
E	7.0 BSC		
E2	5.30	5.40	5.50
b	0.15	0.20	0.25
e	0.50 BSC		
L	0.35	0.40	0.45

56-Ball csBGA Package

Dimensions in Millimeters



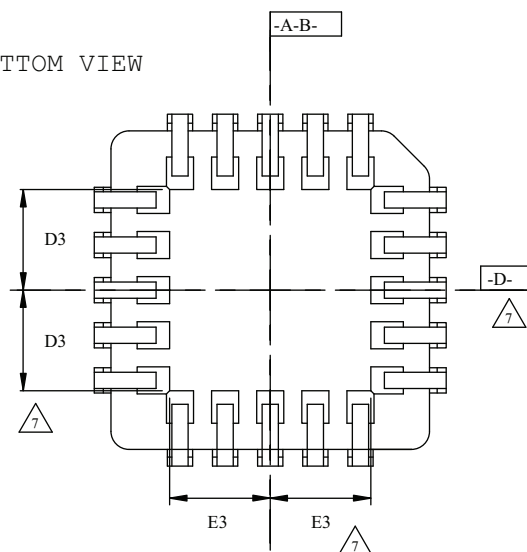
NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

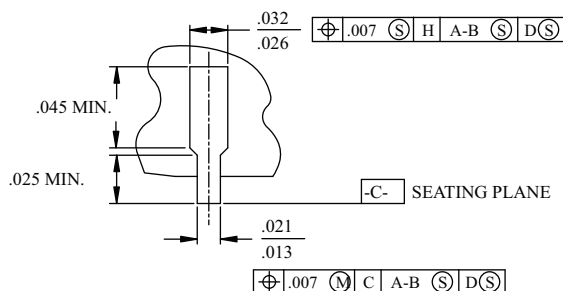
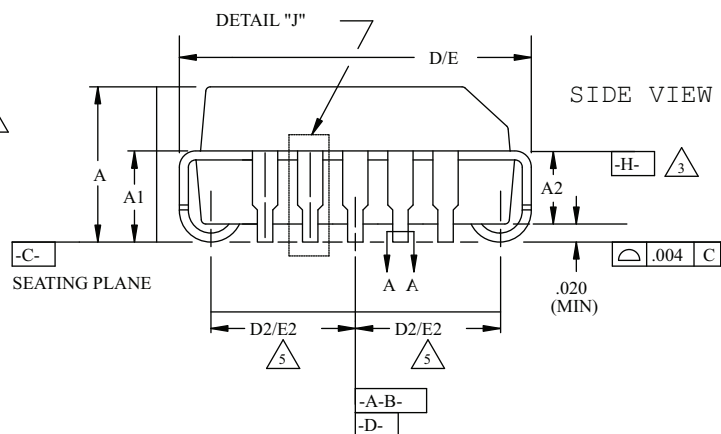
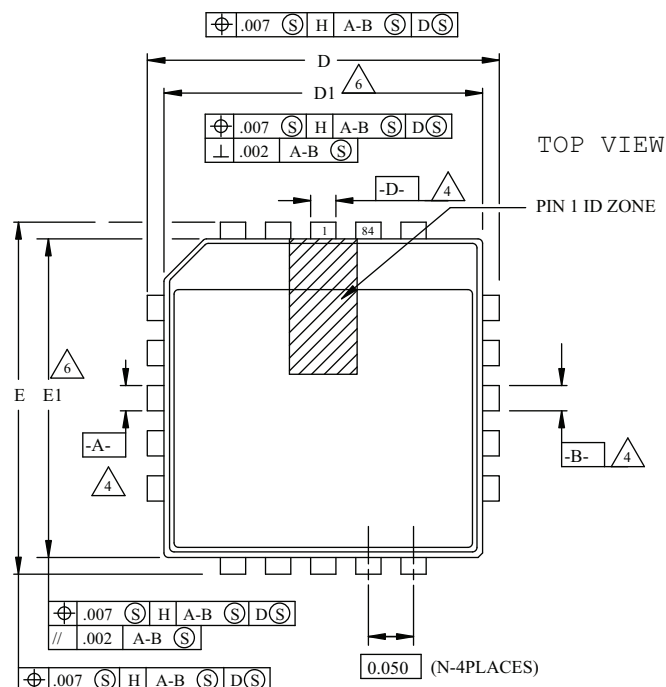
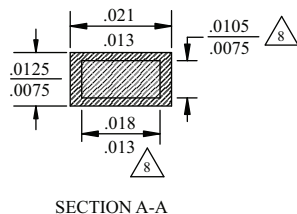
3. DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM C
4. PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.
6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	1.10	1.23	1.35
A1	0.15	-	-
A2	-	-	1.10
D/E	6.00 BSC		
M/N	4.50 BSC		
S	0.25 BSC		
b	0.25	0.30	0.35
e	0.50 BSC		
aaa	-	-	0.10
bbb	-	-	0.10
ddd	-	-	0.08

Dimensions in Inches



SYM BOL			
	MIN.	NOM.	MAX.
A	.165	.172	.180
A1	.090	.105	.120
A2	.059	-	.080
D	1.185	1.190	1.195
D1	1.150	1.154	1.158
D2	.541	.555	.569
D3		.475	
E	1.185	1.190	1.195
E1	1.150	1.154	1.158
E2	.541	.555	.569
E3		.475	
N	84		



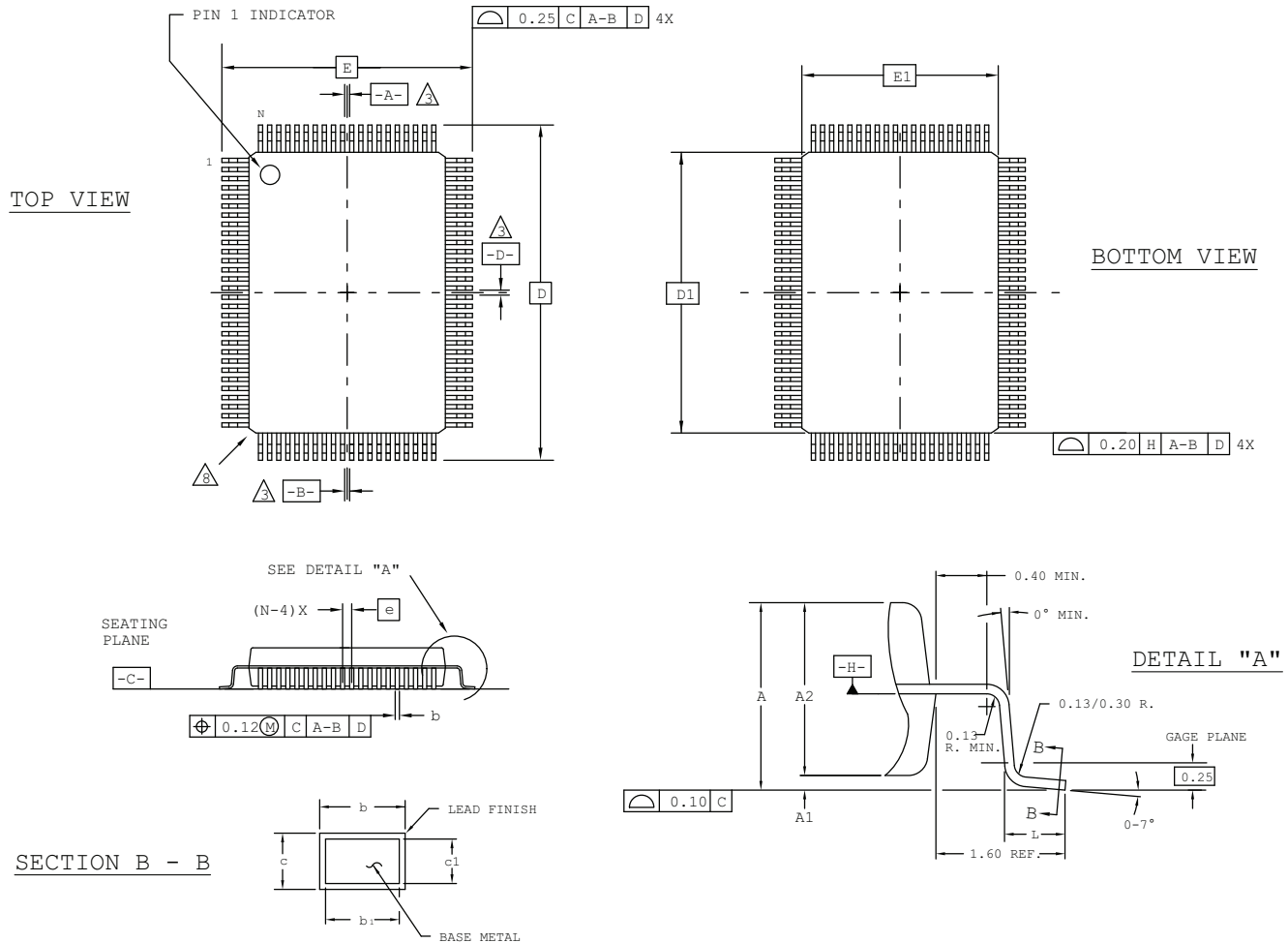
DETAIL "J" (TYP ALL SIDES)

NOTES:

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1982
2. ALL DIMENSIONS IN INCHES
3. DATUM PLANE -H- LOCATED AT TOP OF MOLD PARTING LINE AND COINCIDENT WITH TOP OF LEAD WHERE LEAD EXITS PLASTIC BODY
4. DATUMS A-B AND -D- TO BE ESTABLISHED WHERE CENTER LEADS EXIT PLASTIC BODY AT DATUM PLANE -H-
5. TO BE MEASURED AT SEATING PLANE -C- CONTACT POINT
6. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .010 PER SIDE.
7. TOP POINT OF MEASUREMENT IS DATUM -H-; BOTTOM POINT OF MEASUREMENT IS AT MAJOR FLAT AREA OF LOWER PLASTIC SURFACE DEFINED BY D3/E3
8. DIMENSION APPLIES TO BASE METAL ONLY

100-Pin PQFP Package

Dimensions in Millimeters



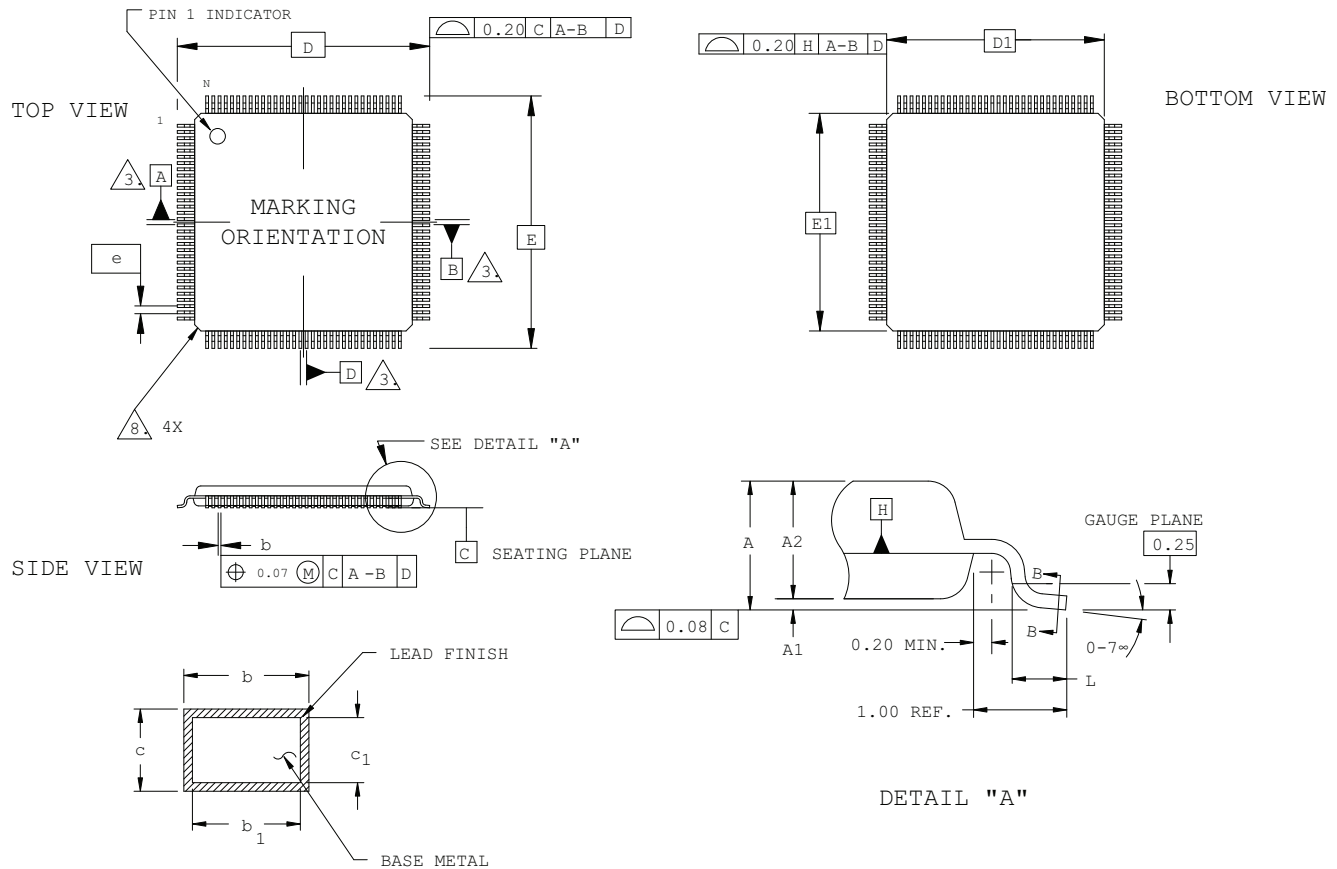
NOTES:

- 1.0 DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1982.
- 2.0 ALL DIMENSIONS ARE IN MILLIMETERS.
3. DATUMS A, B AND D TO BE DETERMINED AT DATUM PLANE H.
- 4.0 DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.254 MM ON D1 AND E1 DIMENSIONS.
- 5.0 THE TOP OF PACKAGE MAY BE SMALLER THAN THE BOTTOM OF THE PACKAGE BY 0.15 MM.
- 6.0 SECTION B-B:
THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.
- 7.0 A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
8. EXACT SHAPE OF EACH CORNER IS OPTIONAL.
9. EXACT SHAPE OF EXPOSED HEATSINK IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	3.40
A1	0.25	-	0.50
A2	2.50	2.70	2.90
D	23.20 BSC		
D1	20.00 BSC		
E	17.20 BSC		
E1	14.00 BSC		
L	0.73	0.88	1.03
N	100		
e	0.65 BSC		
b	0.22	-	0.40
b1	0.22	0.30	0.36
c	0.11	-	0.23
c1	0.11	0.15	0.19

128-Pin TQFP Package

Dimensions in Millimeters



SECTION B - B

SIDE VIEW

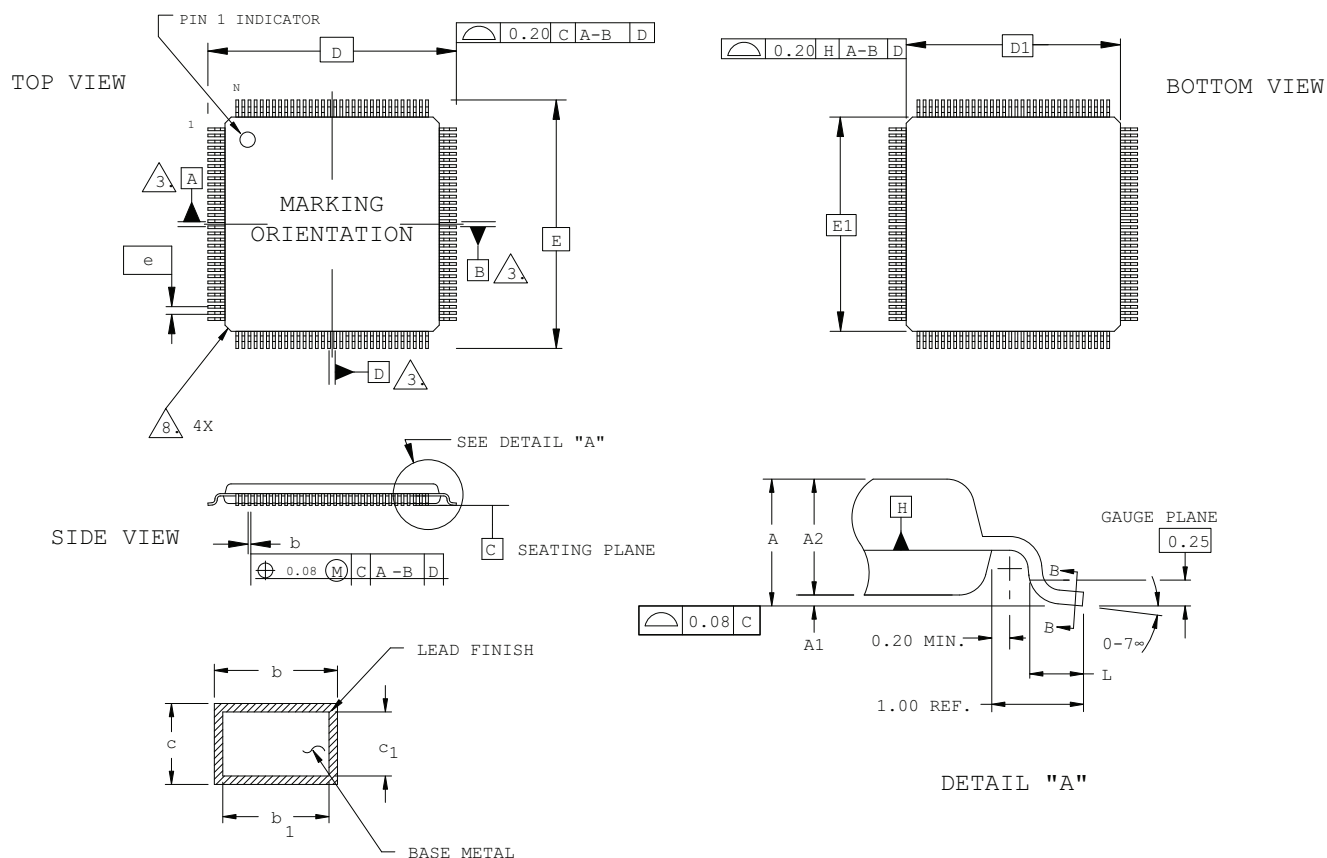
NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1982.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- DATUMS A, B AND D TO BE DETERMINED AT DATUM PLANE H.
- DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.254 MM ON D1 AND E1 DIMENSIONS.
- THE TOP OF PACKAGE MAY BE SMALLER THAN THE BOTTOM OF THE PACKAGE BY 0.15 MM.
- SECTION B-B: THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.
- A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
- EXACT SHAPE OF EACH CORNER IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.60
A1	0.05	-	0.15
A2	1.35	1.40	1.45
D	16.00 BSC		
D1	14.00 BSC		
E	16.00 BSC		
E1	14.00 BSC		
L	0.45	0.60	0.75
N	128		
e	0.40 BSC		
b	0.13	0.18	0.23
b1	0.13	0.16	0.19
c	0.09	0.15	0.20
c1	0.09	0.13	0.16

144-Pin TQFP Package

Dimensions in Millimeters



SECTION B - B

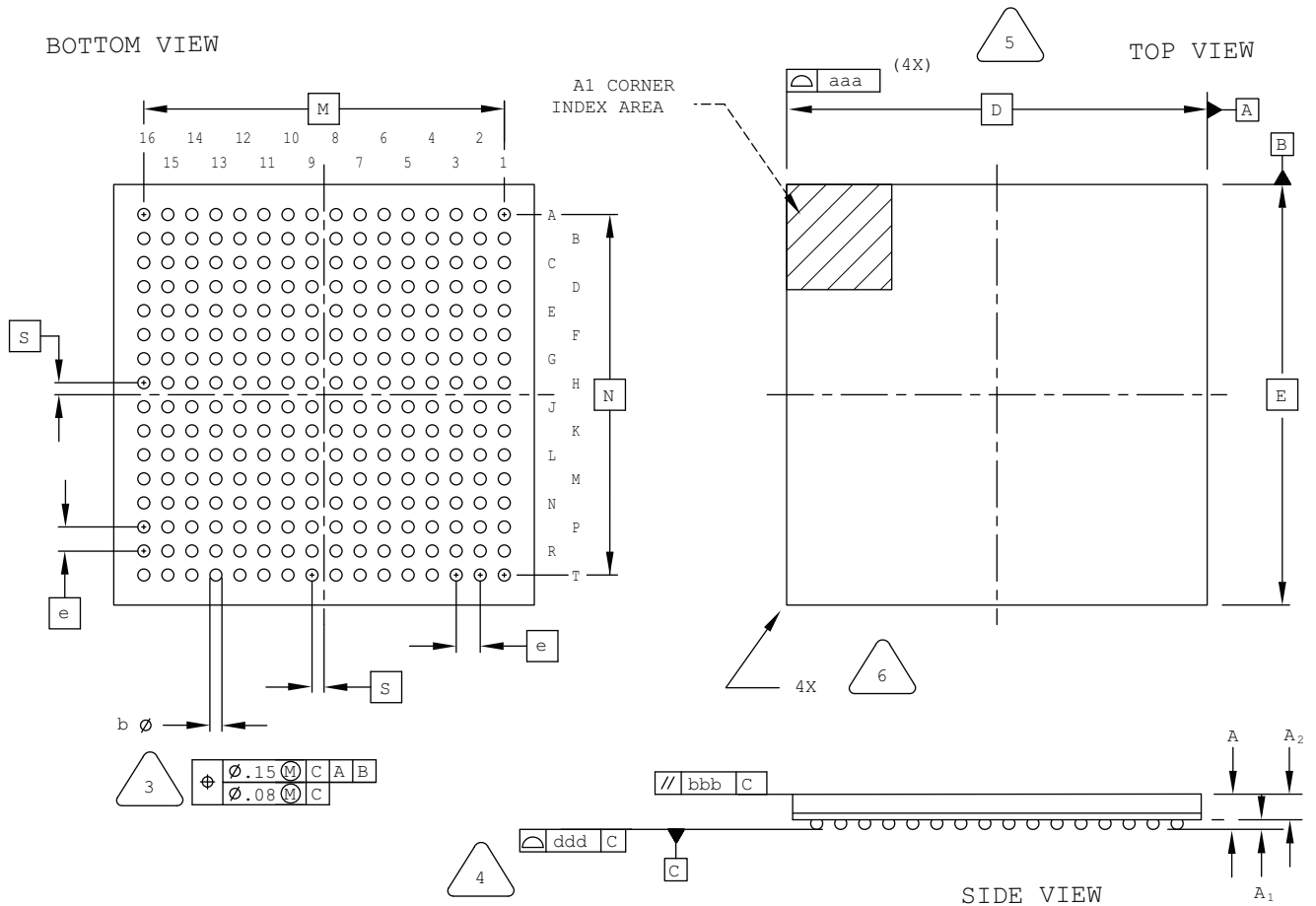
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5 - 1982.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DATUMS A, B AND D TO BE DETERMINED AT DATUM PLANE H.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.254 MM ON D1 AND E1 DIMENSIONS.
5. THE TOP OF PACKAGE MAY BE SMALLER THAN THE BOTTOM OF THE PACKAGE BY 0.15 MM.
6. SECTION B-B:
THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.
7. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
8. EXACT SHAPE OF EACH CORNER IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.60
A1	0.05	-	0.15
A2	1.35	1.40	1.45
D	22.00 BSC		
D1	20.00 BSC		
E	22.00 BSC		
E1	20.00 BSC		
L	0.45	0.60	0.75
N	144		
e	0.50 BSC		
b	0.17	0.22	0.27
b1	0.17	0.20	0.23
c	0.09	0.15	0.20
c1	0.09	0.13	0.16

256-Ball caBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
- ALL DIMENSIONS ARE IN MILLIMETERS.

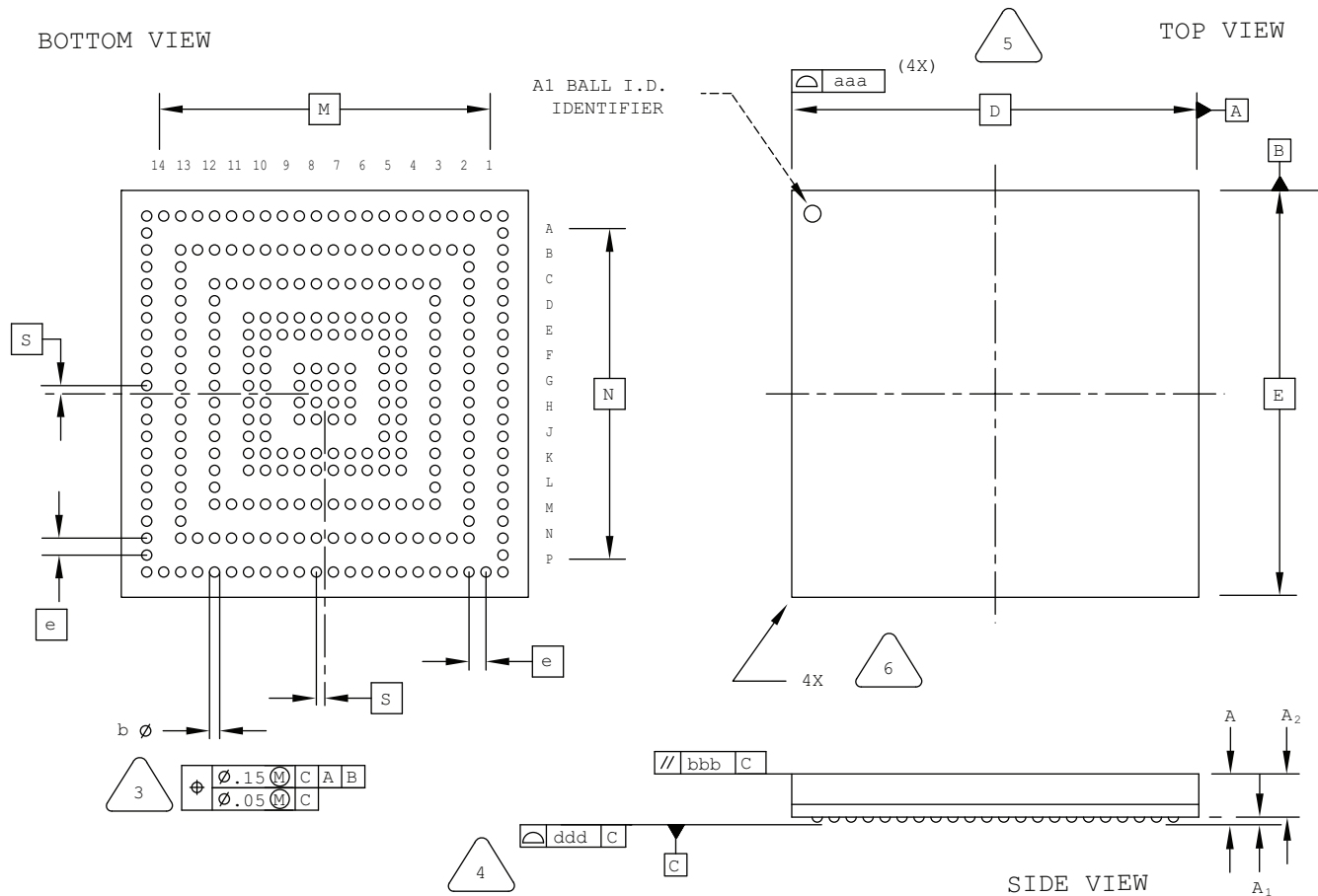
- DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM [C]
- PRIMARY DATUM [C] AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
- BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.
- EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

- REFERENCE JEDEC MO-275, VARIATION JJAB-2.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.70
A1	0.25	-	-
A2	0.65	-	-
D/E	14.0 BSC		
M/N	12.0 BSC		
S	0.40 BSC		
b	0.40	0.45	0.50
e	0.80 BSC		
aaa	-	-	0.15
bbb	-	-	0.20
ddd	-	-	0.20

284-Ball csBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.



DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM **C**



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



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

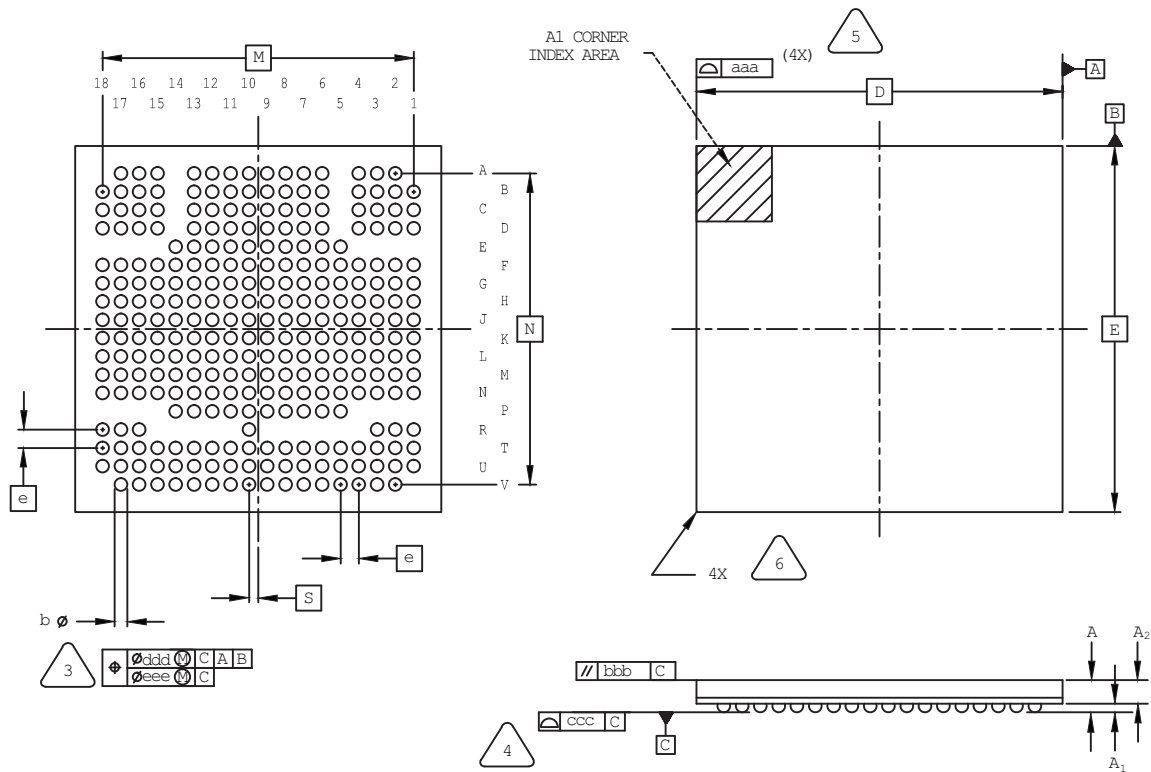


EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.00
A1	0.15	-	-
A2	-	-	0.85
D/E	12.00 BSC		
M/N	10.50 BSC		
S	0.25 BSC		
b	0.25	0.31	0.37
e	0.50 BSC		
aaa	-	-	0.10
bbb	-	-	0.10
ddd	-	-	0.08

285-Ball csfBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

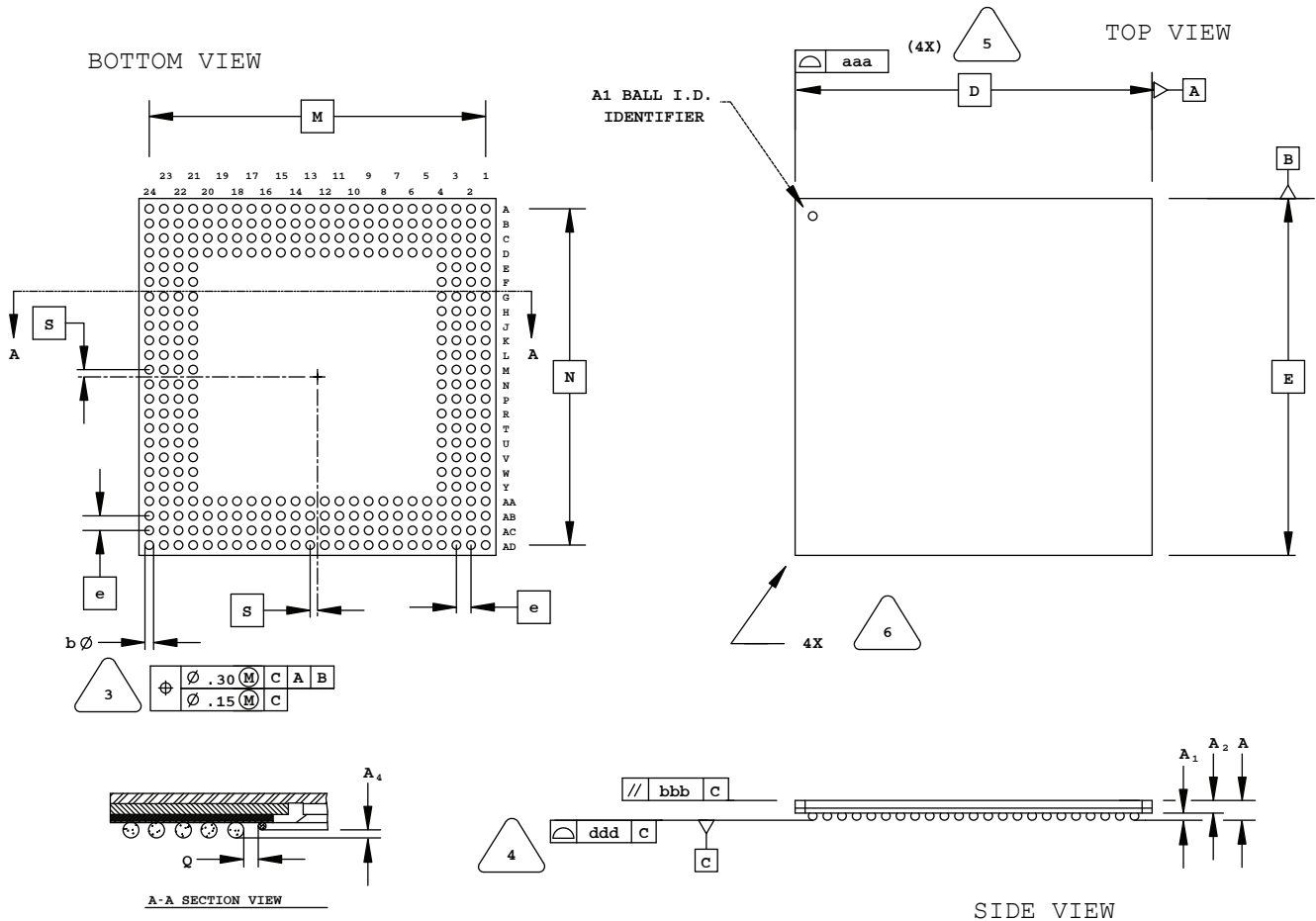
1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

3. DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM C .
4. PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.
6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.30
A1	0.15	-	-
A2	-	-	1.00
D/E	10.00 BSC		
M/N	8.50 BSC		
S	0.25 BSC		
b	0.25	0.30	0.35
e	0.50 BSC		
aaa	0.10		
bbb	0.10		
ccc	0.08		
ddd	0.15		
eee	0.05		

320-Ball SBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
- ALL DIMENSIONS ARE IN MILLIMETERS.



DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM C



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



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

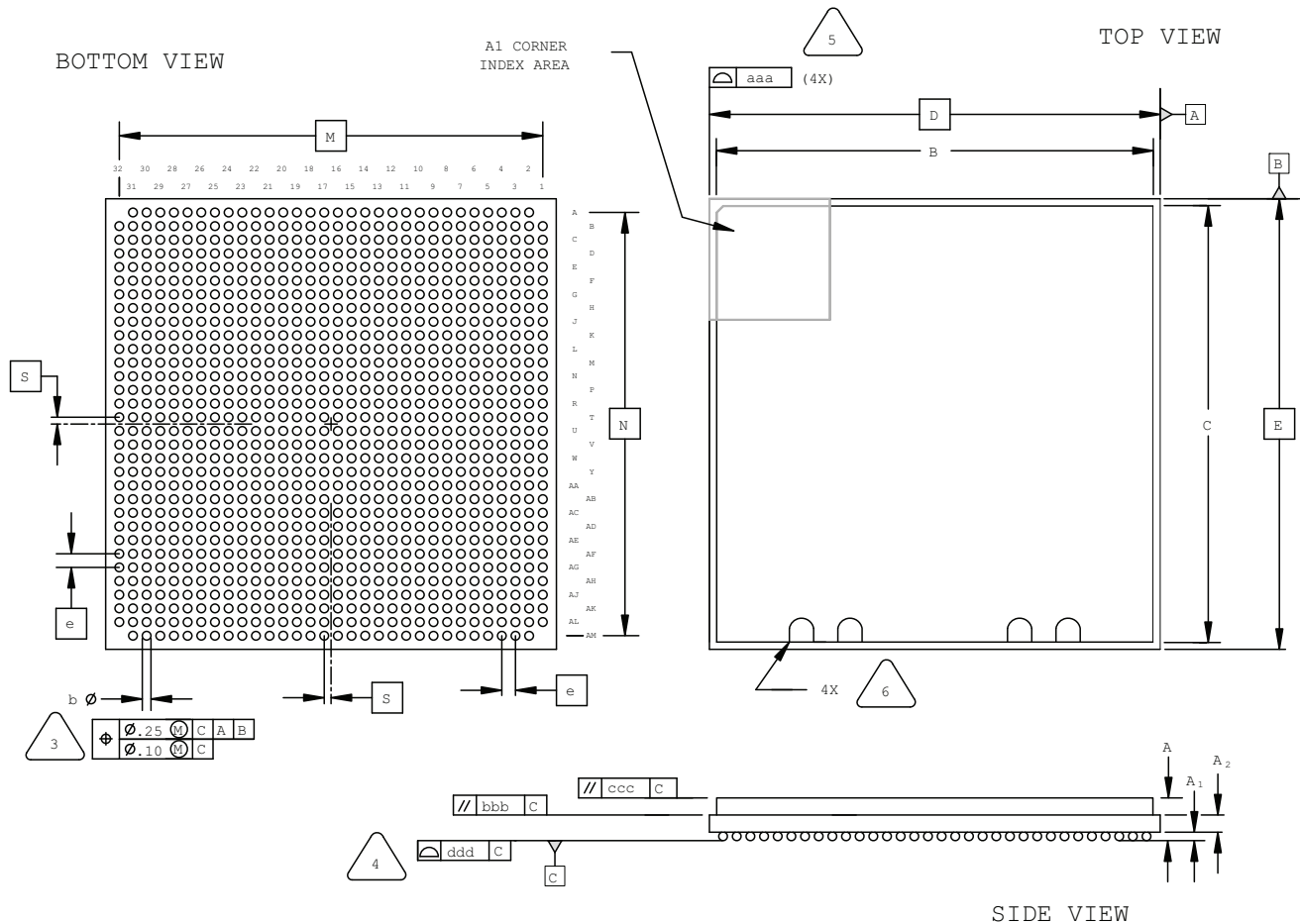


EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.70
A1	0.50	0.65	0.80
A2	0.80	0.90	1.00
D/E	31.00 BSC		
M/N	29.21 BSC		
S	0.635 BSC		
b	0.60	0.75	0.90
e	1.27 BSC		
Q	0.25	-	-
A4	0.10	-	-
aaa	-	-	0.20
bbb	-	-	0.25
ddd	-	-	0.20

1020-Ball Organic fcBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
- ALL DIMENSIONS ARE IN MILLIMETERS.



DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM **C**



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



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

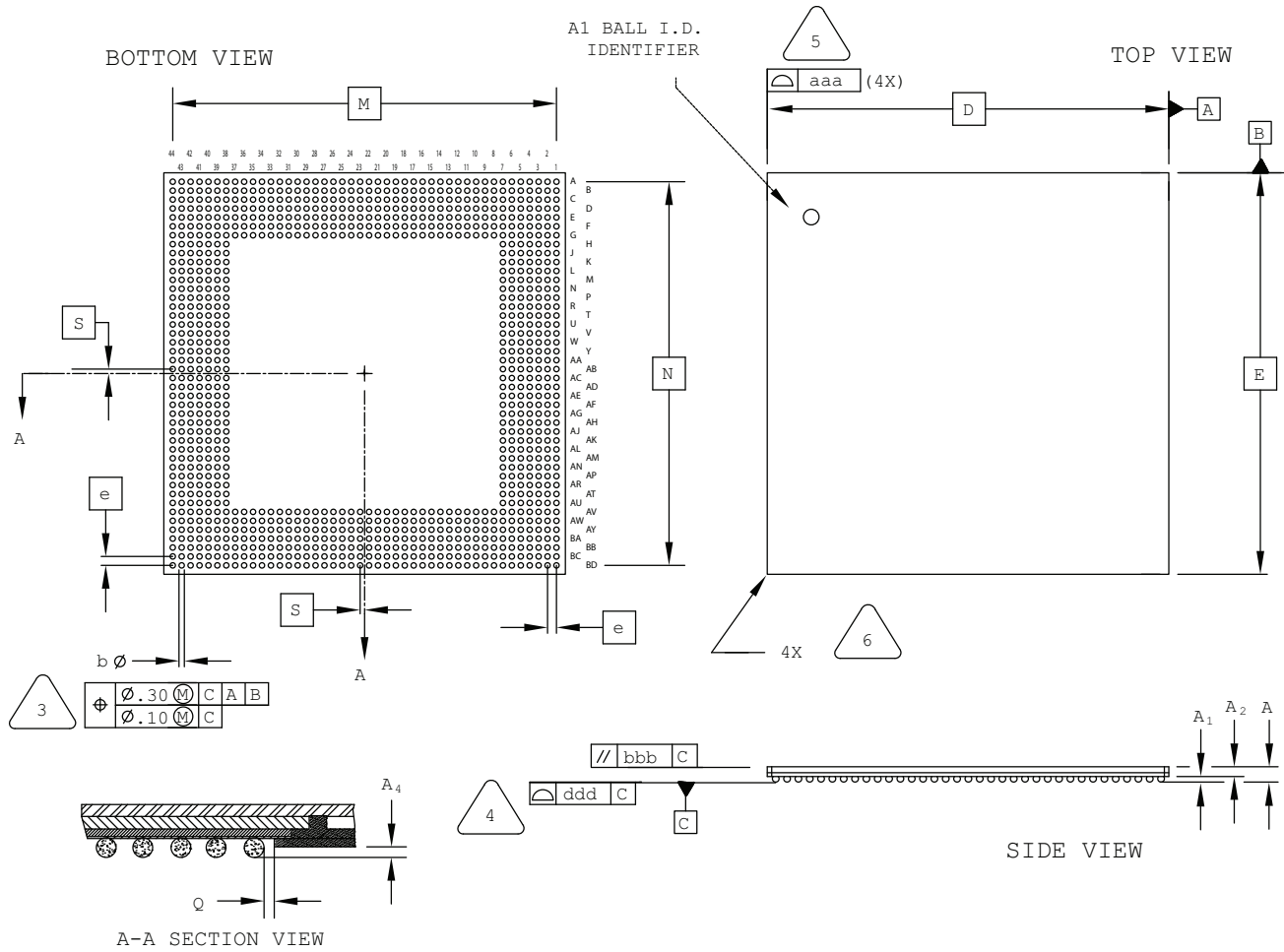


EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	2.52	3.12	3.82
A1	0.30	0.50	0.70
A2	1.24 REF		
B/C	31.10	32.00	32.90
D/E	33.00 BSC		
M/N	31.00 BSC		
S	0.50 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		
aaa	-	-	0.20
bbb	-	-	0.25
ccc	-	-	0.35
ddd	-	-	0.20

1036-Ball ftSBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

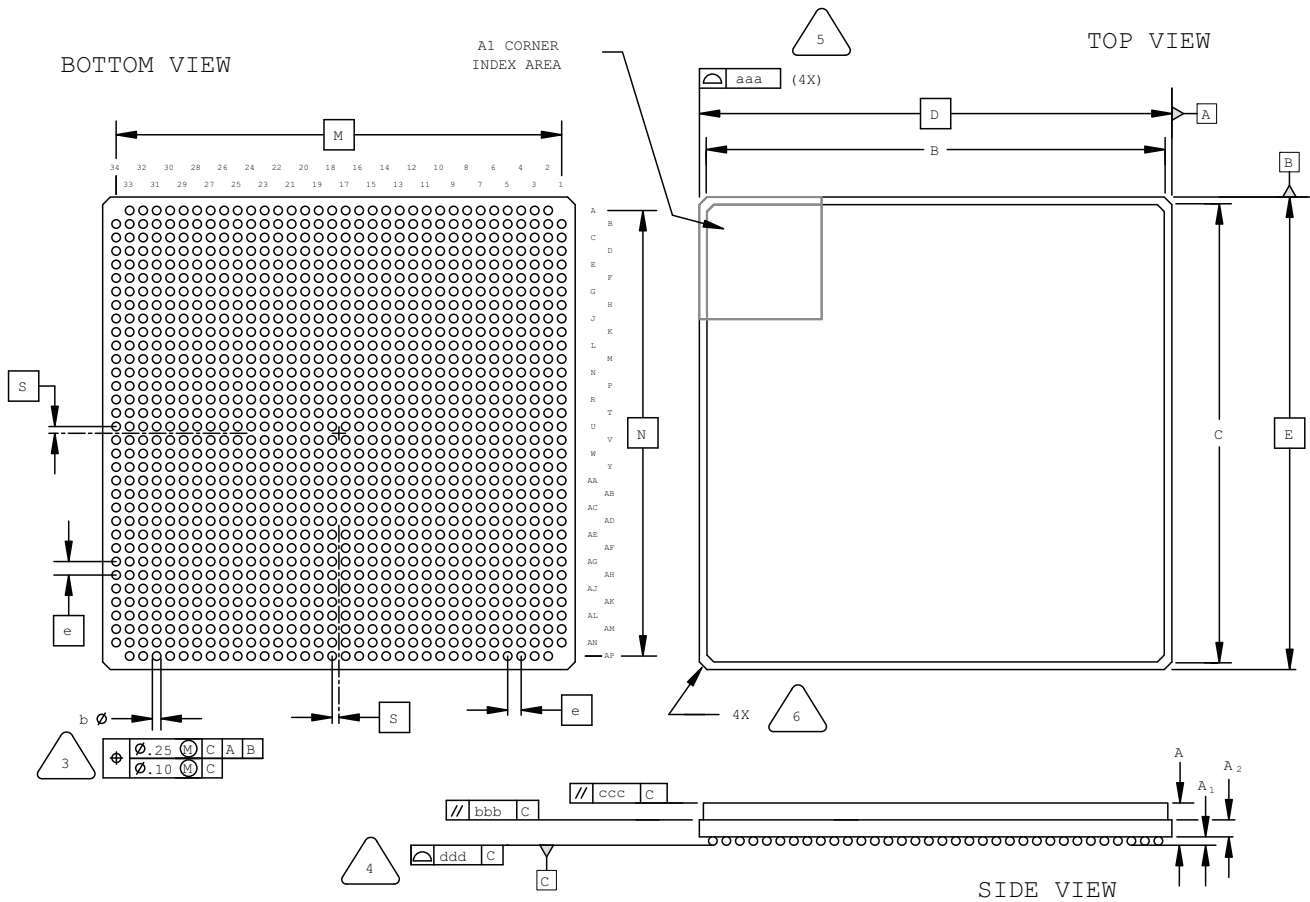
1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
2. ALL DIMENSIONS ARE IN MILLIMETERS.

3. DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM $\square C$
4. PRIMARY DATUM $\square C$ AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.
6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.80
A1	0.40	0.55	0.70
A2	0.90	0.98	1.10
D/E	45.00 BSC		
M/N	43.00 BSC		
S	0.50 BSC		
b	0.50	0.65	0.80
e	1.00 BSC		
Q	0.25	-	-
A4	0.10	-	-
aaa	-	-	0.20
bbb	-	-	0.35
ddd	-	-	0.20

1152-Ball Ceramic fcBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
- ALL DIMENSIONS ARE IN MILLIMETERS.



DIMENSION "b" IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM **C**



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



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



EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

SYMBOL	MIN.	NOM.	MAX.
A	4.00	4.60	5.20
A1	0.30	0.50	0.70
A2	1.40 REF		
B/C	33.10	34.00	34.90
D/E	35.00 BSC		
M/N	33.00 BSC		
S	0.50 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		
aaa	-	-	0.20
bbb	-	-	0.25
ccc	-	-	0.35
ddd	-	-	0.20