# Lattice Semiconductor Corporation - ISPLSI 5512VA-110LB272 Datasheet



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## Understanding Embedded - CPLDs (Complex Programmable Logic Devices)

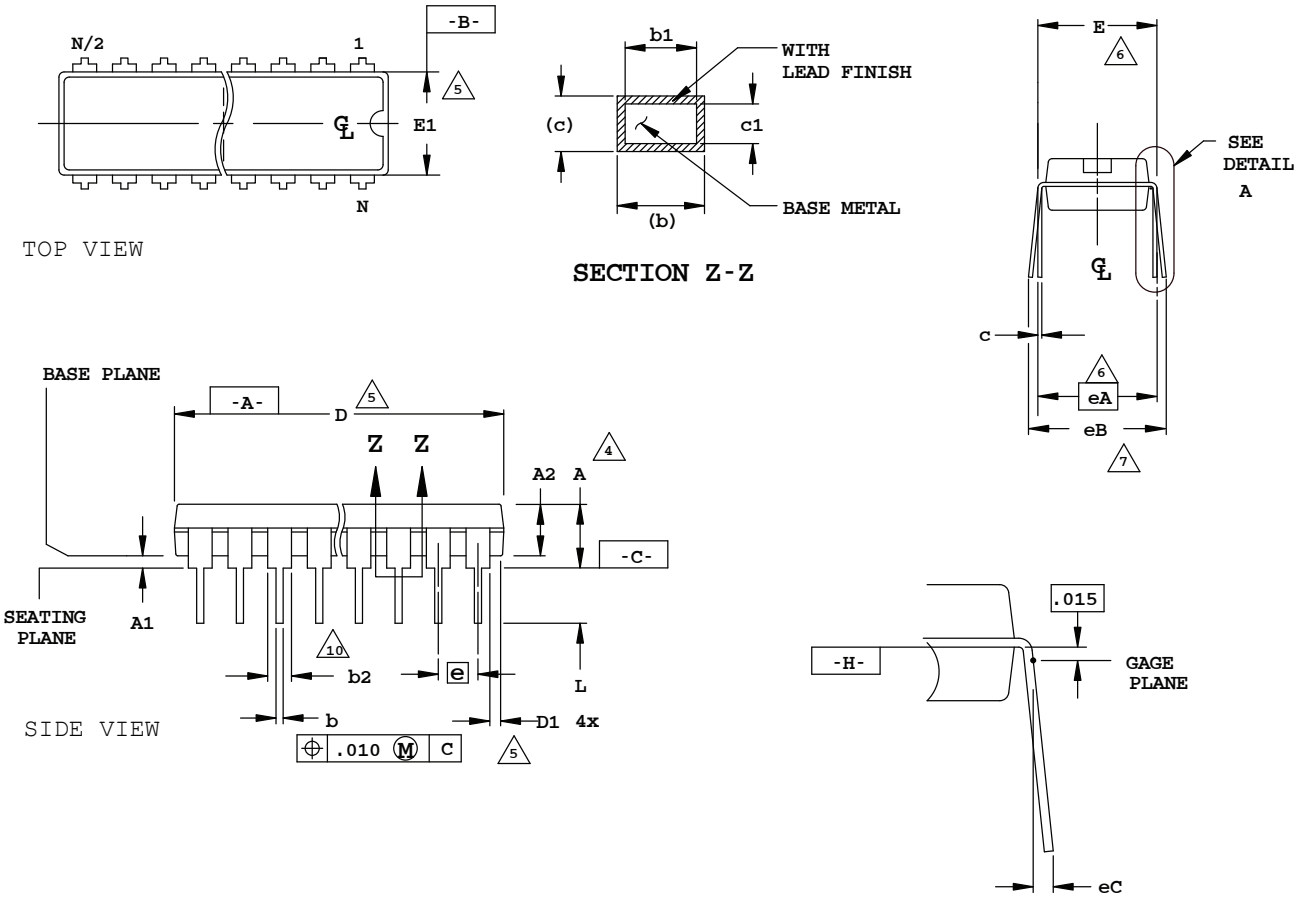
Embedded - CPLDs, or Complex Programmable Logic Devices, are highly versatile digital logic devices used in electronic systems. These programmable components are designed to perform complex logical operations and can be customized for specific applications. Unlike fixed-function ICs, CPLDs offer the flexibility to reprogram their configuration, making them an ideal choice for various embedded systems. They consist of a set of logic gates and programmable interconnects, allowing designers to implement complex logic circuits without needing custom hardware.

## Applications of Embedded - CPLDs

| Details | |
|---|---|
| Product Status | Obsolete |
| Programmable Type | In System Programmable |
| Delay Time tpd(1) Max | 8.5 ns |
| Voltage Supply - Internal | 3V ~ 3.6V |
| Number of Logic Elements/Blocks | 16 |
| Number of Macrocells | 512 |
| Number of Gates | 24000 |
| Number of I/O | 192 |
| Operating Temperature | 0°C ~ 70°C (TA) |
| Mounting Type | Surface Mount |
| Package / Case | 272-BBGA |
| Supplier Device Package | 272-BGA (27x27) |
| Purchase URL | https://www.e-xfl.com/product-detail/lattice-semiconductor/isplsi-5512va-110lb272 |

# 20-Pin Plastic DIP Package

Dimensions in Inches



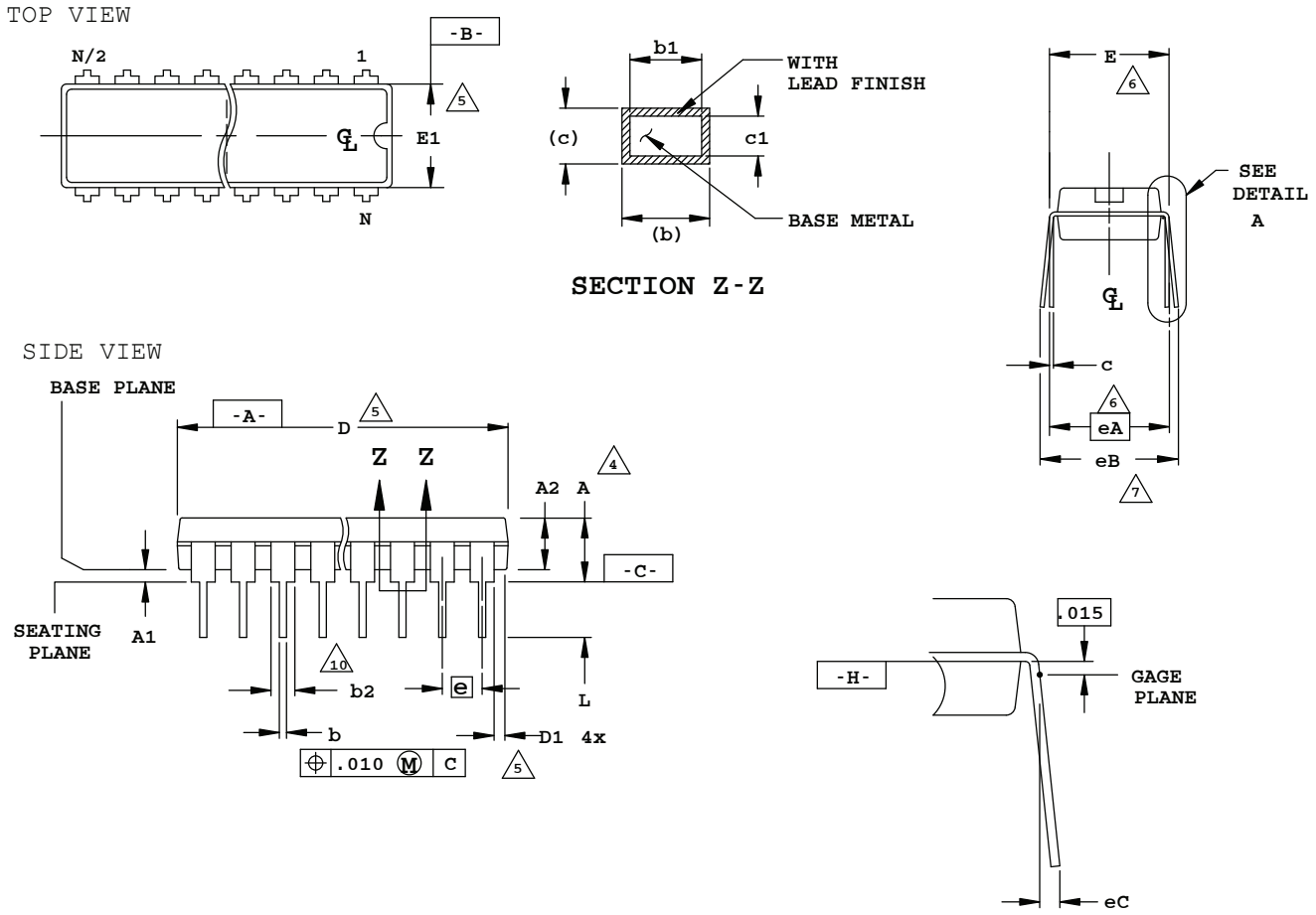

NOTES:

1. CONTROLLING DIMENSION: INCH.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M
3. DISTANCE BETWEEN LEADS INCLUDING DAMBAR PROTRUSIONS TO BE .005 MINIMUM.
4. DIMENSIONS A, A1 & L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.
5. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010
6. E AND eA MEASURED WITH THE LEADS CONSTRAINED TO BE PERPENDICULAR TO DATUM -C-
7. eB AND eC ARE MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
8. N IS THE MAXIMUM NUMBER OF LEAD POSITIONS.
9. POINTED OR ROUNDED LEAD TIPS ARE PREFERRED TO EASE INSERTION
10. b2 MAXIMUM DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSIONS. DAMBAR PROTRUSIONS SHALL NOT EXCEED .010
11. DATUM PLANE -H- COINCIDENT WITH THE BOTTOM OF LEAD , WHERE LEAD EXITS BODY

| SYMBOL | N = 20 INCHES MIN. | NOM. | MAX. | NOTE |
|---|---|---|---|---|
| A | - | - | .210 | 4 |
| A1 | .015 | - | - | 4 |
| A2 | .115 | .130 | .195 | |
| b | .014 | .018 | .022 | |
| b1 | .014 | .018 | .020 | |
| b2 | .045 | .060 | .070 | 10 |
| c | .008 | .010 | .014 | |
| c1 | .008 | .010 | .011 | |
| D | .980 | 1.030 | 1.060 | 5 |
| D1 | .005 | - | - | 5 |
| E | .300 | .310 | .325 | 6 |
| E1 | .240 | .250 | .280 | 5 |
| e | .100 BSC | | | |
| eA | .300 BSC | | | 6 |
| eB | - | - | .430 | 7 |
| eC | .000 | - | .060 | 7 |
| L | .115 | .130 | .150 | 4 |

# 24-Pin Plastic DIP

Dimensions in Inches




DETAIL A

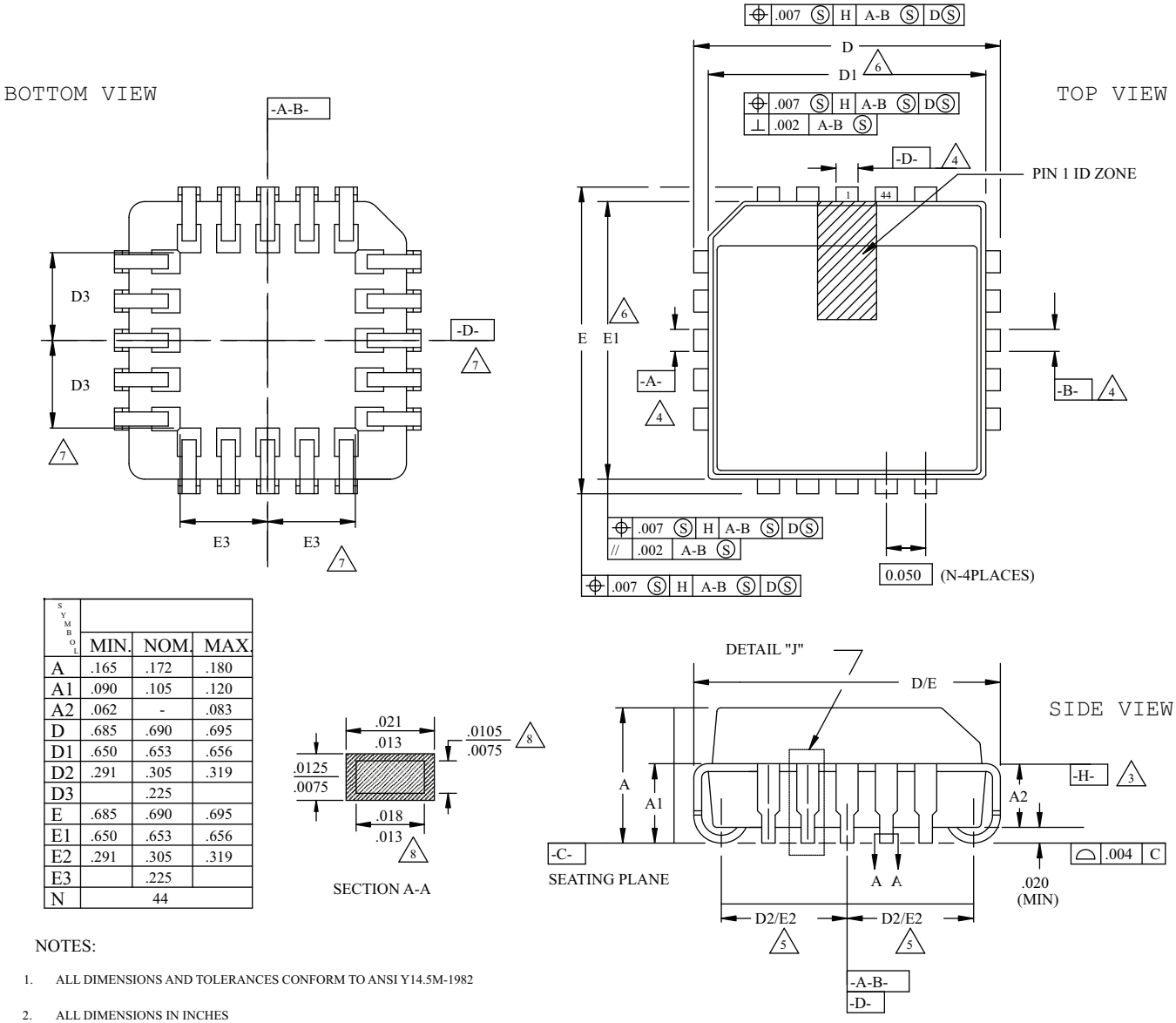
NOTES:

1. CONTROLLING DIMENSION: INCH.
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M
3. DISTANCE BETWEEN LEADS INCLUDING DAMBAR PROTRUSIONS TO BE .005 MINIMUM.
4. DIMENSIONS A, A1 & L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.
5. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010
6. E AND eA MEASURED WITH THE LEADS CONSTRAINED TO BE PERPENDICULAR TO DATUM -C-
7. eB AND eC ARE MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
8. N IS THE MAXIMUM NUMBER OF LEAD POSITIONS.
9. POINTED OR ROUNDED LEAD TIPS ARE PREFERRED TO EASE INSERTION
10. b2 MAXIMUM DIMENSIONS DOES NOT INCLUDE DAMBAR PROTRUSIONS. DAMBAR PROTRUSIONS SHALL NOT EXCEED .010
11. DATUM PLANE -H- COINCIDENT WITH THE BOTTOM OF LEAD , WHERE LEAD EXITS BODY

| | N = 24 | | | |
|---|---|---|---|---|
| SYMBOL | INCHES | | | NOTE |
| | MIN. | NOM. | MAX. | |
| A | - | - | .210 | 4 |
| A1 | .015 | - | - | 4 |
| A2 | .115 | .130 | .195 | |
| b | .014 | .018 | .022 | |
| b1 | .014 | .018 | .020 | |
| b2 | .045 | .060 | .070 | 10 |
| c | .008 | .010 | .014 | |
| c1 | .008 | .010 | .011 | |
| D | 1.230 | 1.250 | 1.280 | 5 |
| D1 | .005 | - | - | 5 |
| E | .300 | .310 | .325 | 6 |
| E1 | .240 | .250 | .280 | 5 |
| e | .100 BSC | | | |
| eA | .300 BSC | | | 6 |
| eB | - | - | .430 | 7 |
| eC | .000 | - | .060 | 7 |
| L | .115 | .130 | .150 | |

# 44-Pin PLCC Package

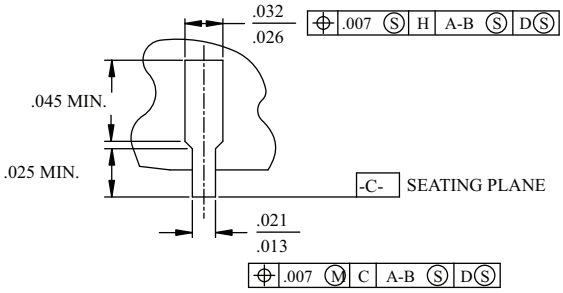
Dimensions in Inches




| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | .165 | .172 | .180 |
| A1 | .090 | .105 | .120 |
| A2 | .062 | - | .083 |
| D | .685 | .690 | .695 |
| D1 | .650 | .653 | .656 |
| D2 | .291 | .305 | .319 |
| D3 | | .225 | |
| E | .685 | .690 | .695 |
| E1 | .650 | .653 | .656 |
| E2 | .291 | .305 | .319 |
| E3 | | .225 | |
| N | 44 | | |

NOTES:

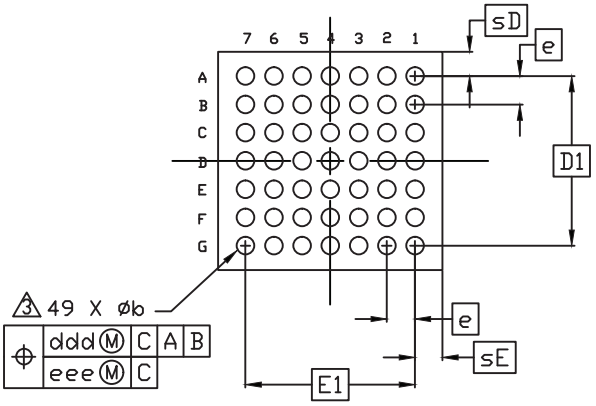
1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1982
2. ALL DIMENSIONS IN INCHES
3. DATUM PLANE -H- LOCATED AT TOP OF MOLD PARTING LINE AND COINCIDENT WITH TOP OF LEAD WHERE LEAD EXITS PLASTIC BODY
4. DATUMS A-B AND -D- TO BE DETERMINED WHERE CENTER LEADS EXIT PLASTIC BODY AT DATUM PLANE -H-
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



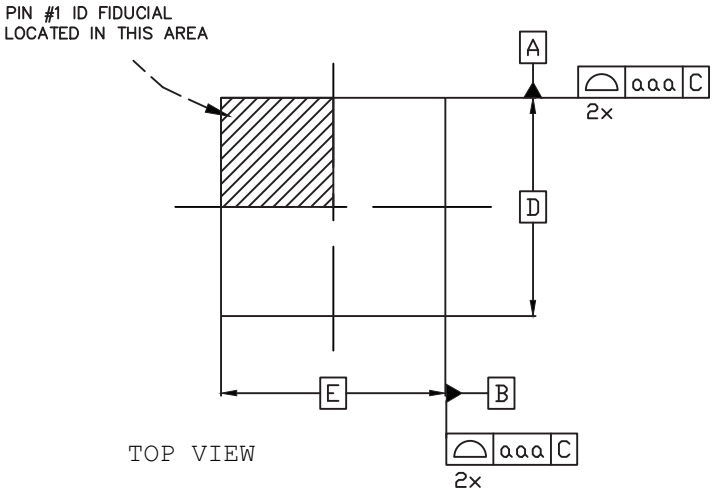

DETAIL "J" (TYP ALL SIDES)

## 49-Ball WLCS Package

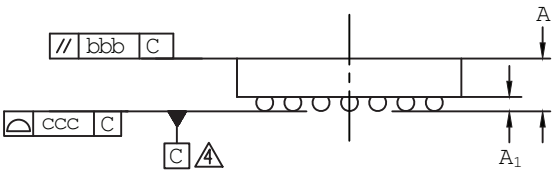
Dimensions in Millimeters




BOTTOM VIEW




TOP VIEW




SIDE VIEW

Notes:

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

2 ALL DIMENSIONS ARE IN MILLIMETERS.

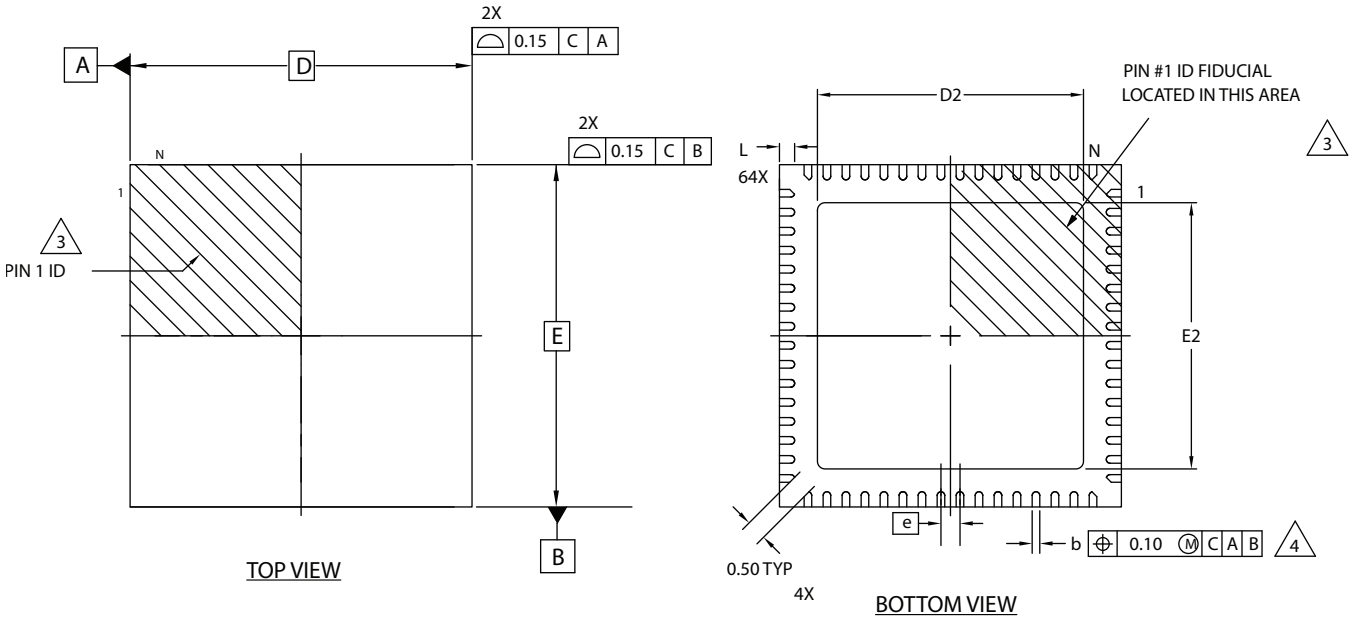
3 DIMENSION "b" IS MEASURED AT THE MAXIMUM BUMP DIAMETER PARALLEL TO PRIMARY DATUM C.

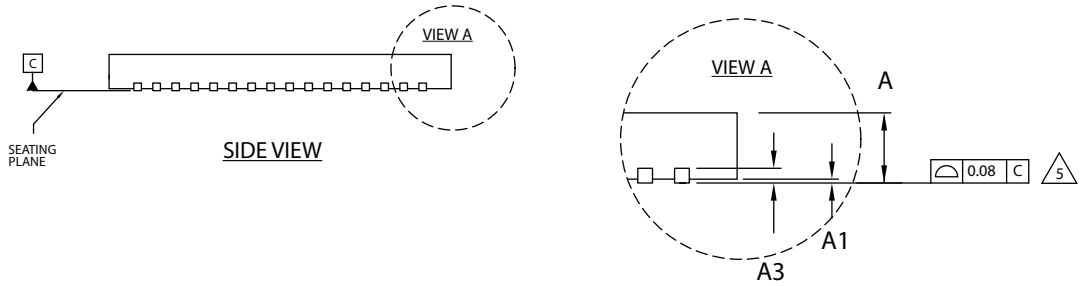
4 PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BUMPS.

| REF. | Min. | Nom. | Max. |
|---|---|---|---|
| A | - | - | 0.600 |
| A1 | 0.167 | 0.199 | 0.232 |
| b | 0.239 | 0.266 | 0.319 |
| D | 3.055 | 3.106 | 3.155 |
| E | 3.125 | 3.185 | 3.225 |
| D1 | 2.40 BSC | | |
| E1 | 2.40 BSC | | |
| e | 0.40 BSC | | |
| sD | 0.353 | - | 0.383 |
| sE | 0.388 | - | 0.418 |
| aaa | 0.030 | | |
| bbb | 0.060 | | |
| ccc | 0.050 | | |
| ddd | 0.015 | | |
| eee | 0.050 | | |

## 64-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. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

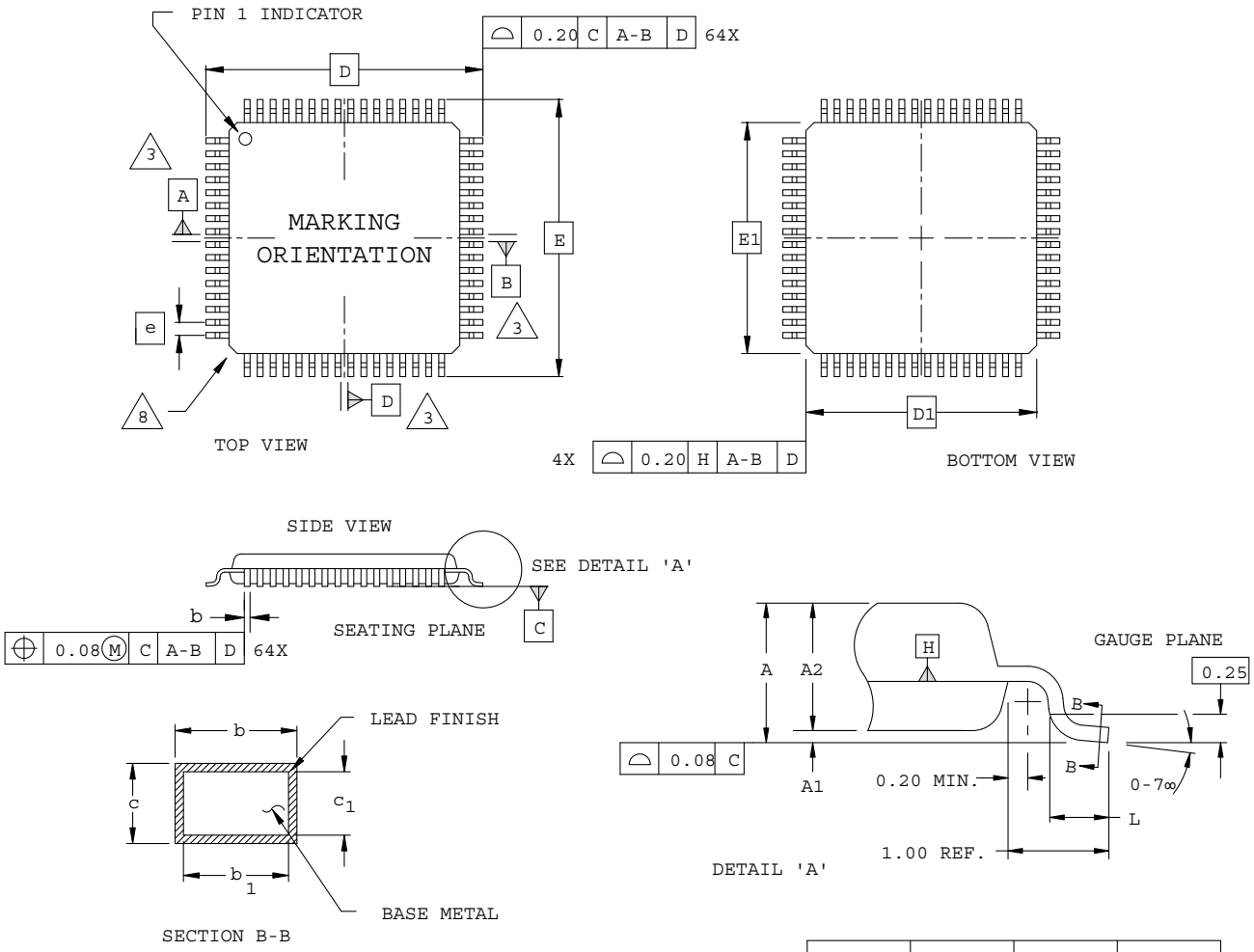
4. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.

5. APPLIES TO EXPOSED PORTION OF TERMINALS.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 0.80 | 0.90 | 1.00 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | 0.2 REF | | |
| D | 9.0 BSC | | |
| D2 | 5.00 | - | 7.50 |
| E | 9.0 BSC | | |
| E2 | 5.00 | - | 7.50 |
| b | 0.18 | 0.24 | 0.30 |
| e | 0.50 BSC | | |
| L | 0.30 | 0.40 | 0.50 |

# 64-Pin TQFP Package

Dimensions in Millimeters



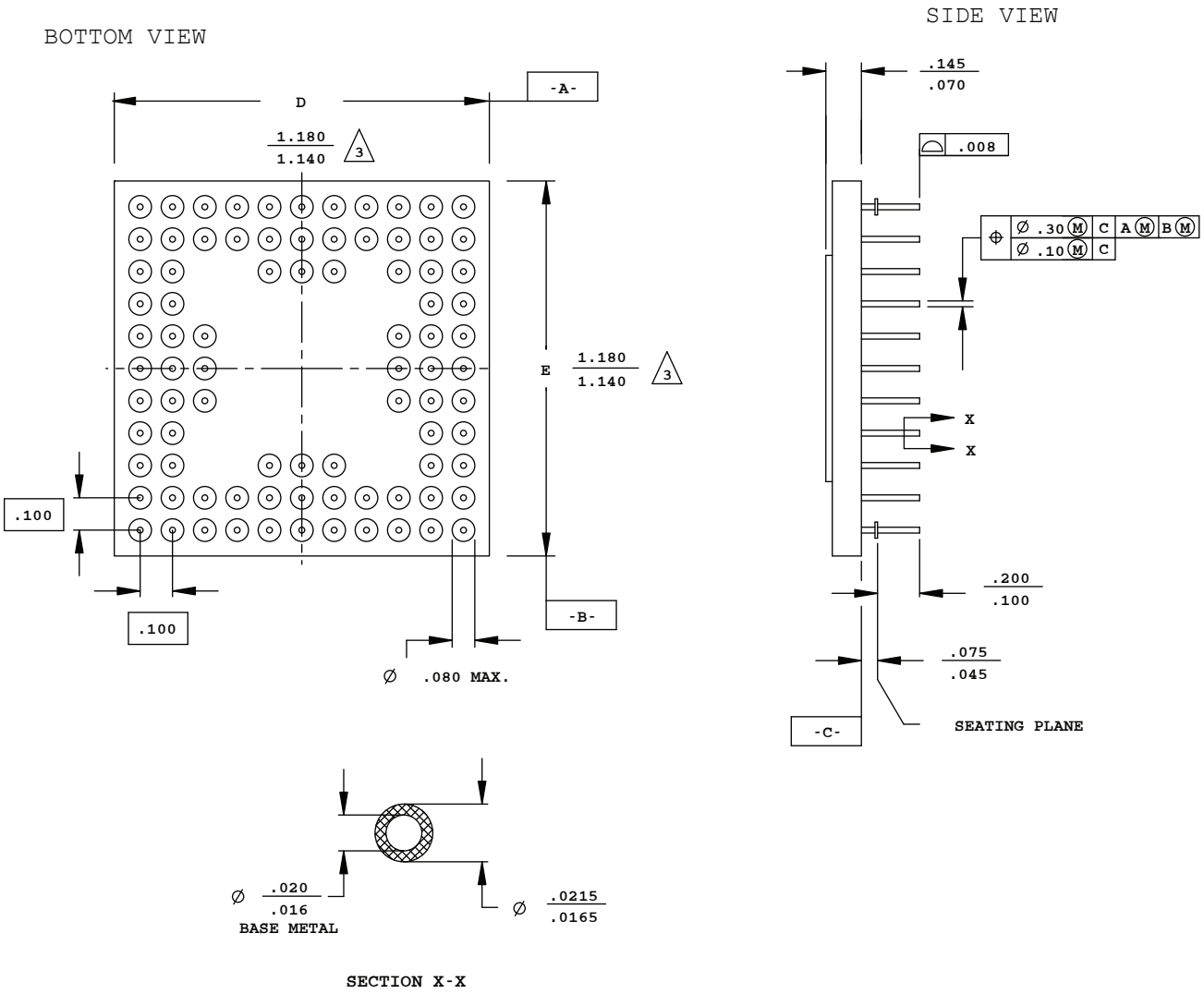

NOTES:

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 | 12.00 BSC | | |
| D1 | 10.00 BSC | | |
| E | 12.00 BSC | | |
| E1 | 10.00 BSC | | |
| L | 0.45 | 0.60 | 0.75 |
| N | 64 | | |
| e | 0.50 BSC | | |
| b | 0.17 | 0.22 | 0.27 |
| b1 | 0.17 | 0.20 | 0.23 |
| c | 0.09 | - | 0.20 |
| c1 | 0.09 | - | 0.16 |

## 84-Pin CPGA Package

Dimensions in Inches




**NOTES:**

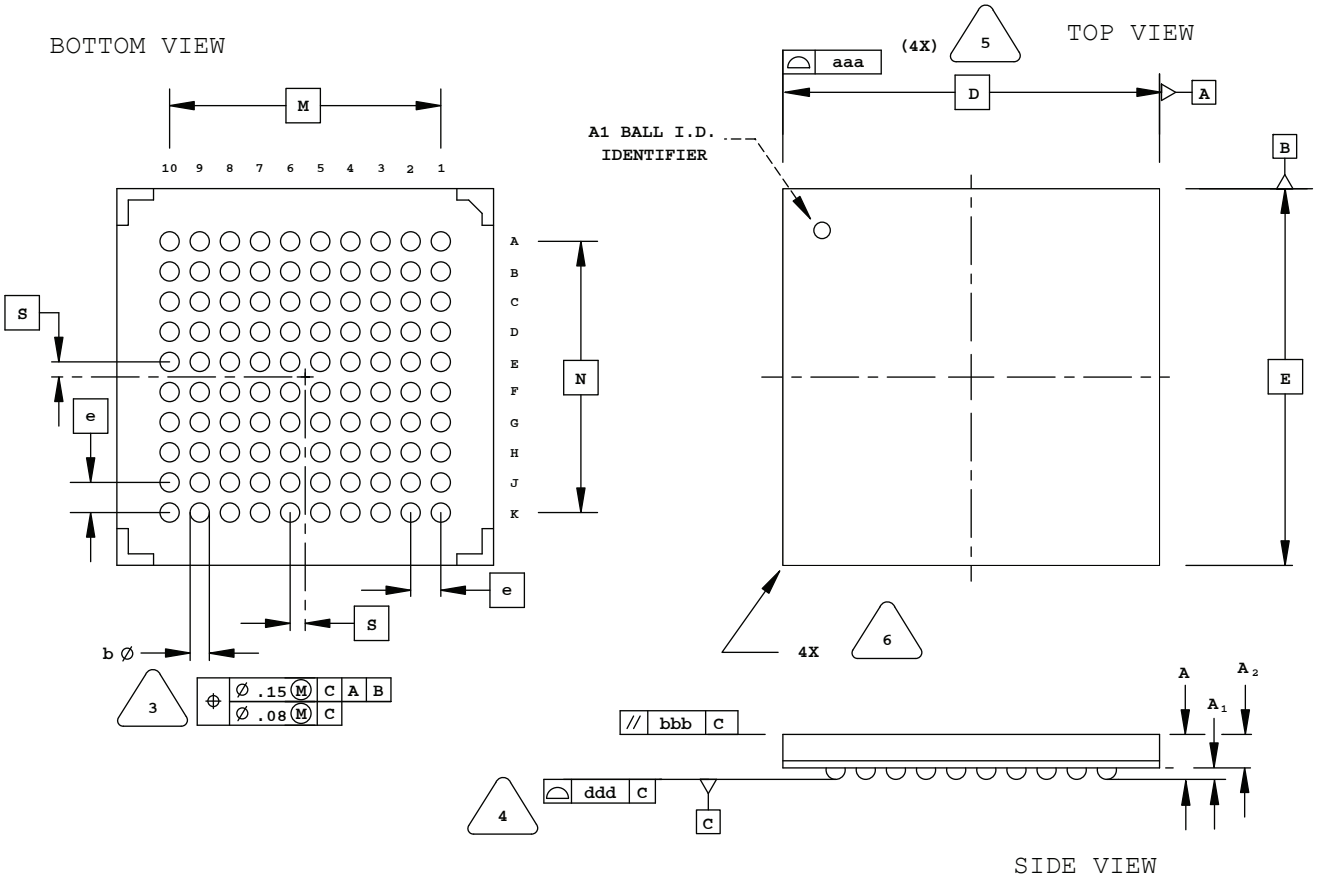
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M.

2. ALL DIMENSIONS ARE IN INCHES.

3. DIMENSIONS D AND E MAY HAVE MATERIAL PROTRUSION OF .006 INCHES MAXIMUM ABOVE THE DIMENSION SHOWN NOT TO EXCEED .003 INCHES MAXIMUM PER SIDE.

# 100-Ball caBGA 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.

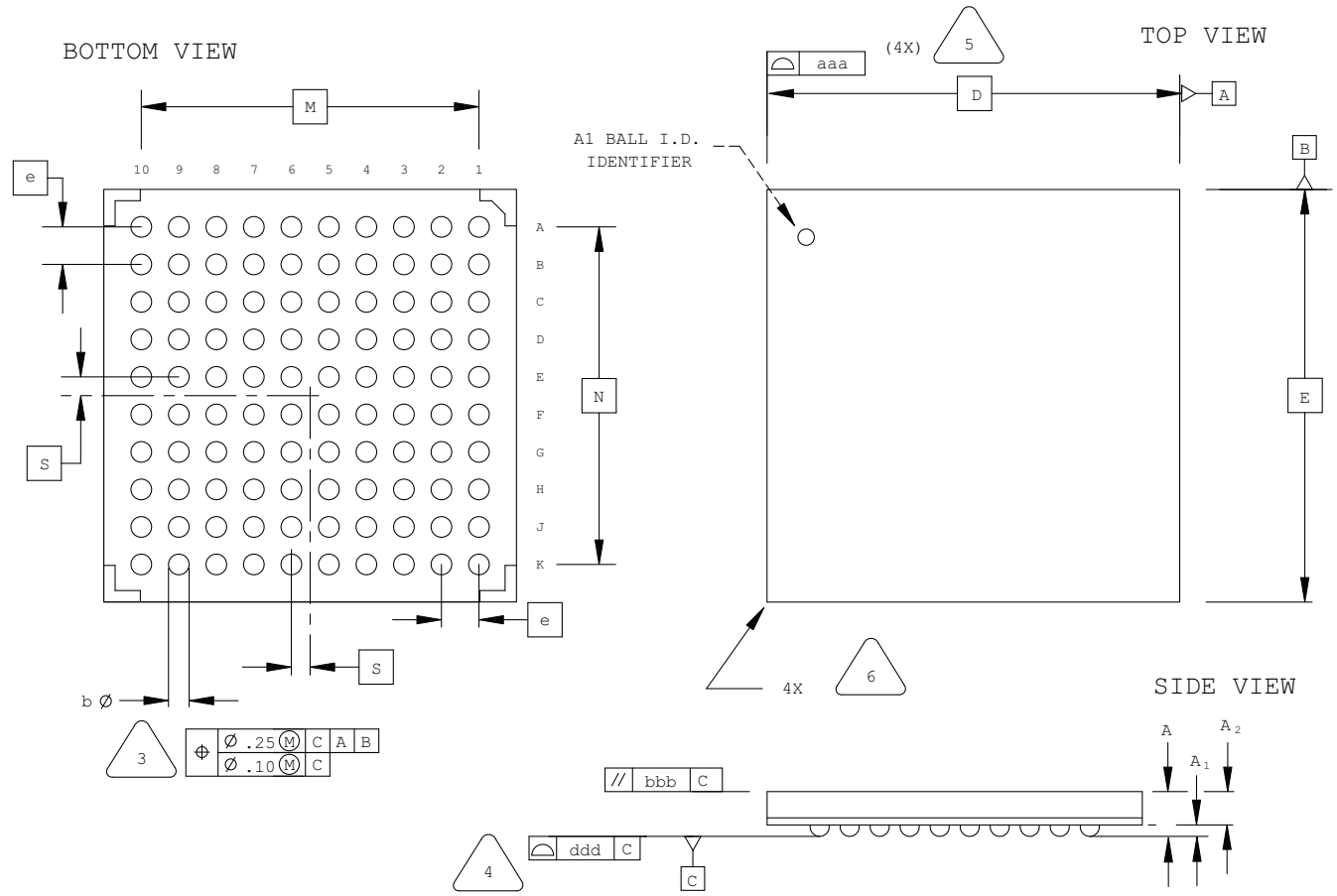
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 1.30 | 1.40 | 1.50 |
| A1 | 0.31 | 0.36 | 0.41 |
| A2 | 0.99 | 1.04 | 1.09 |
| D/E | 10.00 BSC | | |
| M/N | 7.20 BSC | | |
| S | 0.40 BSC | | |
| b | 0.40 | 0.46 | 0.52 |
| e | 0.80 BSC | | |
| aaa | - | - | 0.10 |
| bbb | - | - | 0.10 |
| ddd | - | - | 0.12 |

# 100-Ball fpBGA 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.

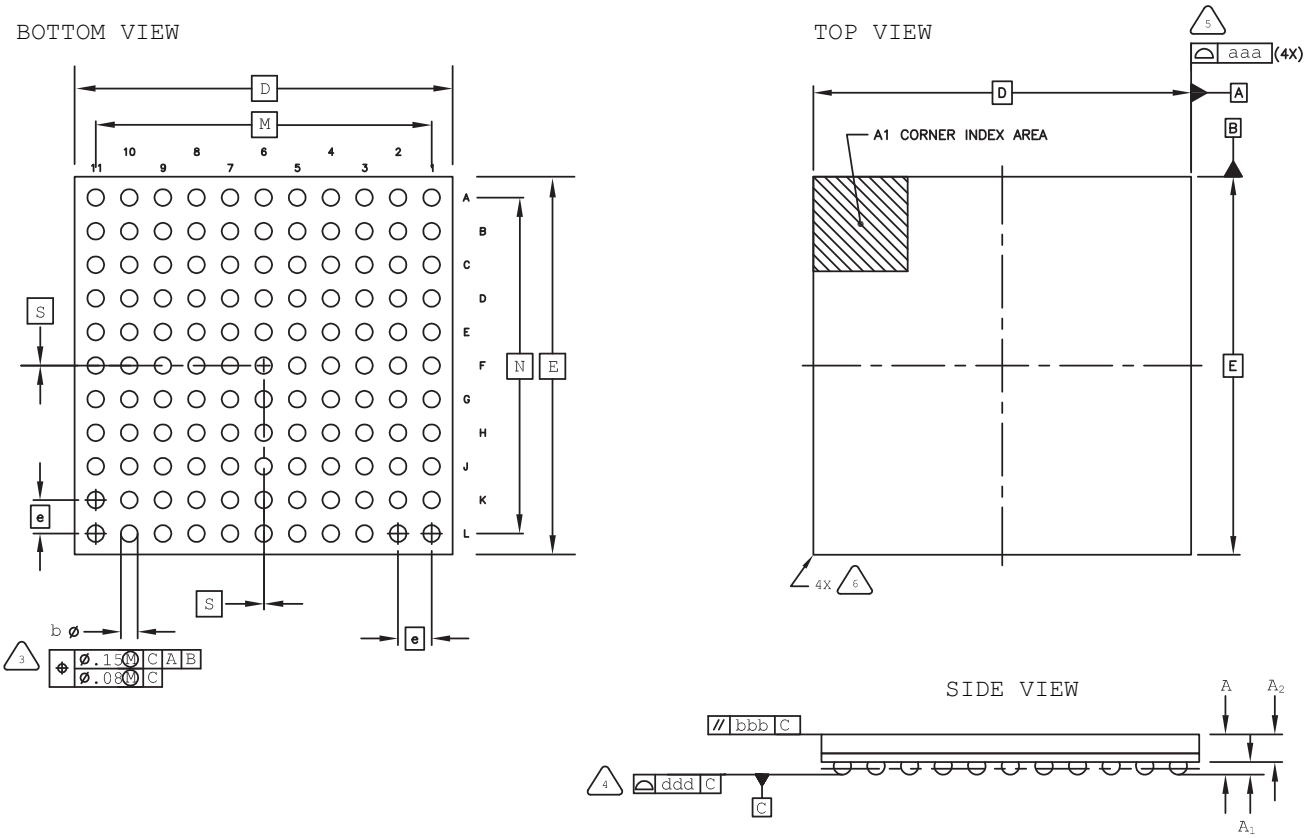
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 1.30 | 1.50 | 1.70 |
| A1 | 0.30 | 0.50 | 0.70 |
| A2 | 1.10 REF | | |
| D/E | 11.00 BSC | | |
| M/N | 9.00 BSC | | |
| S | 0.50 BSC | | |
| b | 0.40 | 0.55 | 0.70 |
| e | 1.00 BSC | | |
| aaa | - | - | 0.20 |
| bbb | - | - | 0.25 |
| ddd | - | - | 0.20 |

# 121-Ball caBGA Package (9x9 mm Body)

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.

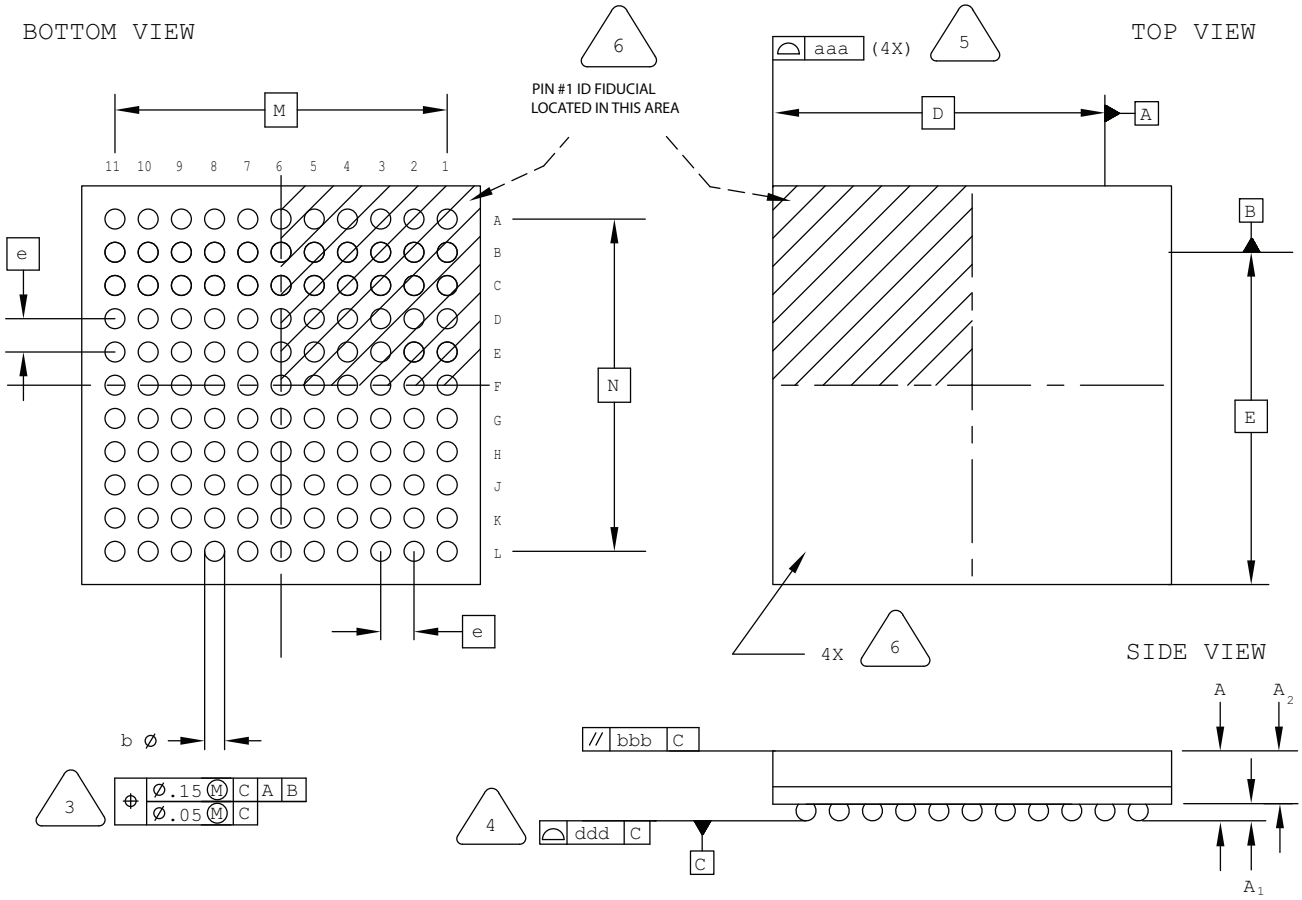
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | – | – | 1.10 |
| A1 | 0.15 | – | – |
| A2 | 0.55 | – | – |
| D/E | 9.00 BSC | | |
| M/N | 8.00 BSC | | |
| S | 0.00 BSC | | |
| b | 0.30 | 0.40 | 0.50 |
| e | 0.80 BSC | | |
| aaa | 0.15 | | |
| bbb | 0.20 | | |
| ddd | 0.10 | | |

## 121-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.

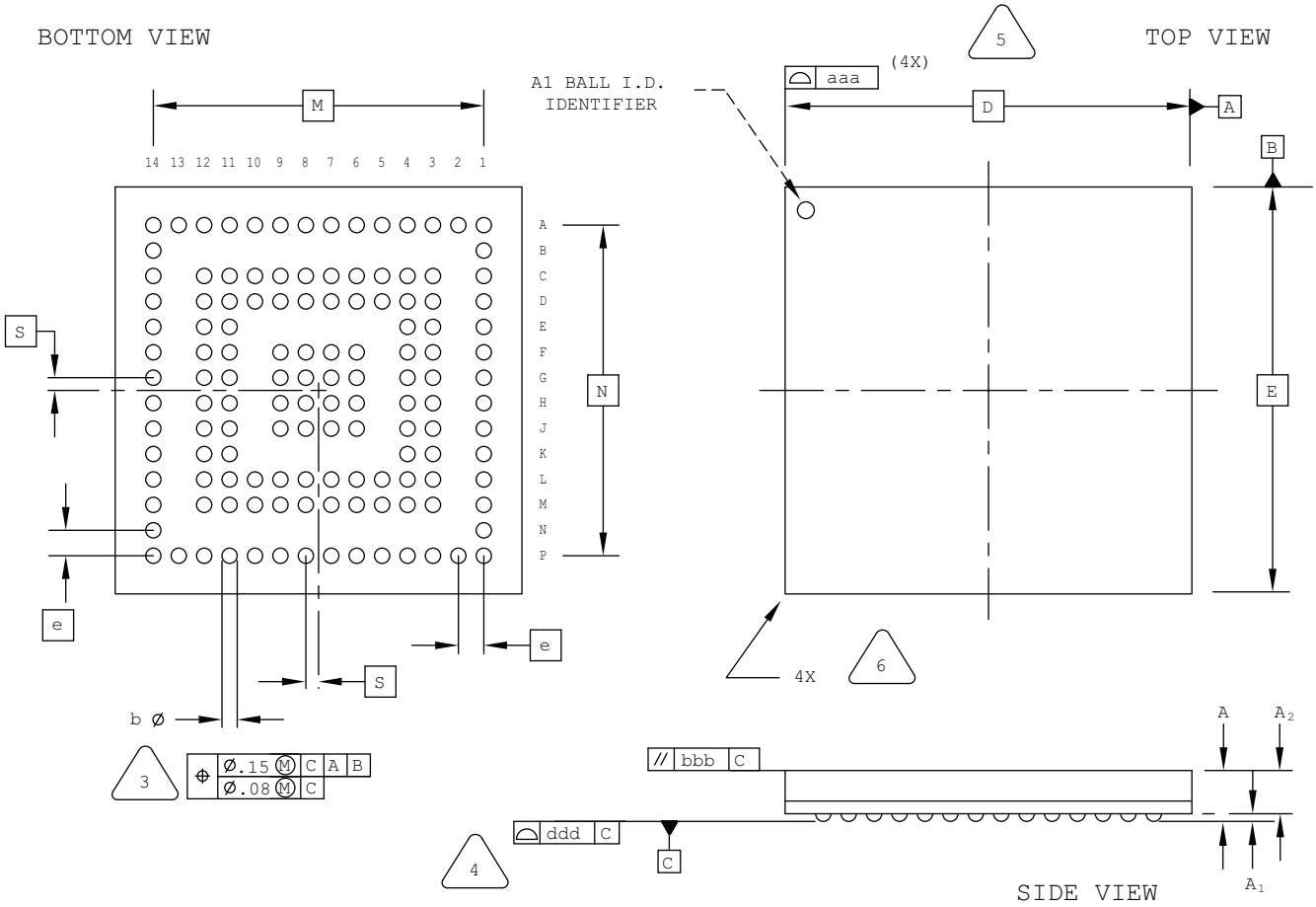
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | - | - | 1.00 |
| A1 | 0.10 | - | - |
| A2 | - | - | 0.90 |
| D/E | 6.00 BSC | | |
| M/N | 5.00 BSC | | |
| b | 0.20 | 0.25 | 0.30 |
| e | 0.50 BSC | | |
| aaa | - | - | 0.10 |
| bbb | - | - | 0.10 |
| ddd | - | - | 0.10 |

## 132-Ball csBGA Package Option 2: iCE40

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.

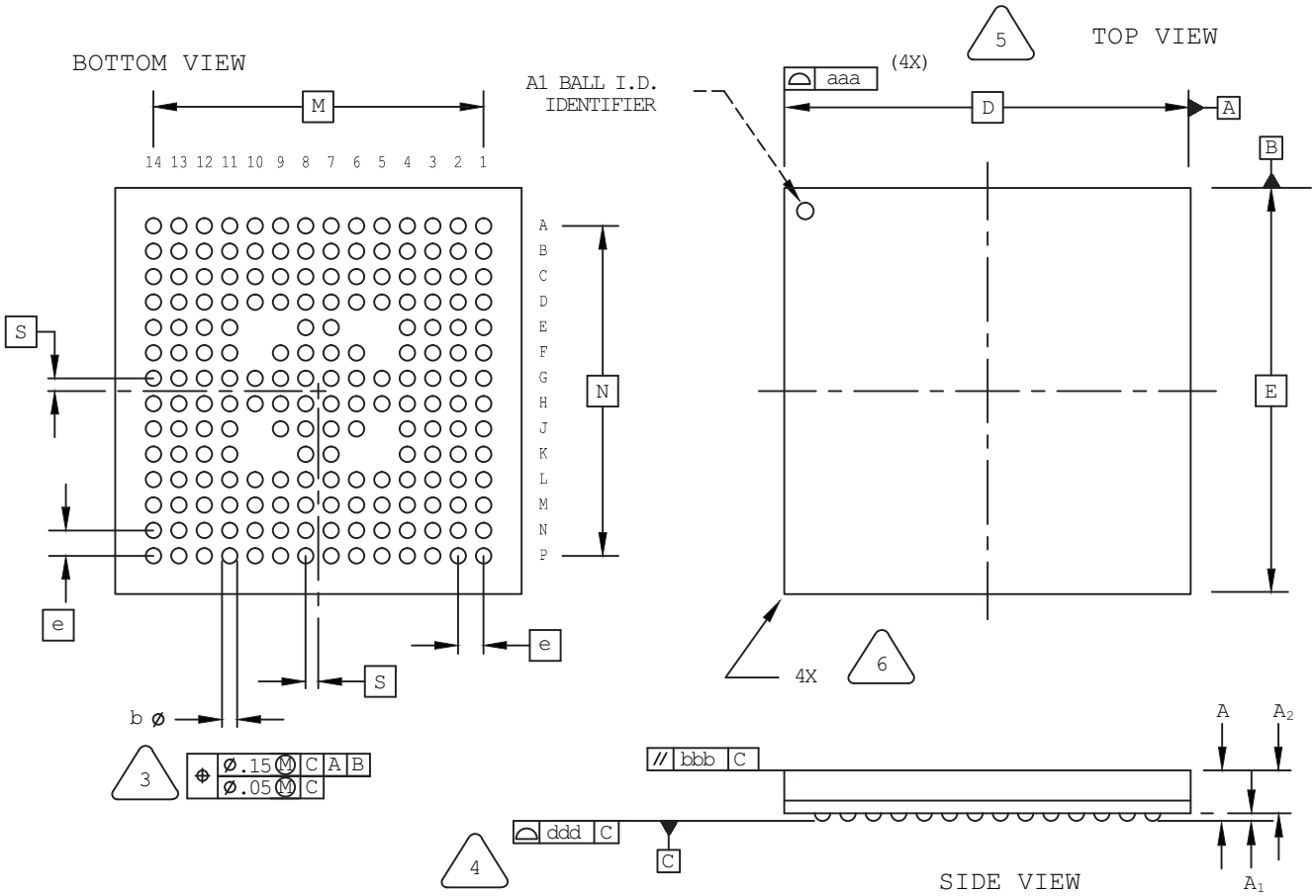
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | - | - | 1.00 |
| A1 | 0.15 | - | - |
| A2 | - | - | 0.85 |
| D/E | 8.00 BSC | | |
| M/N | 6.50 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 |

## 184-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.

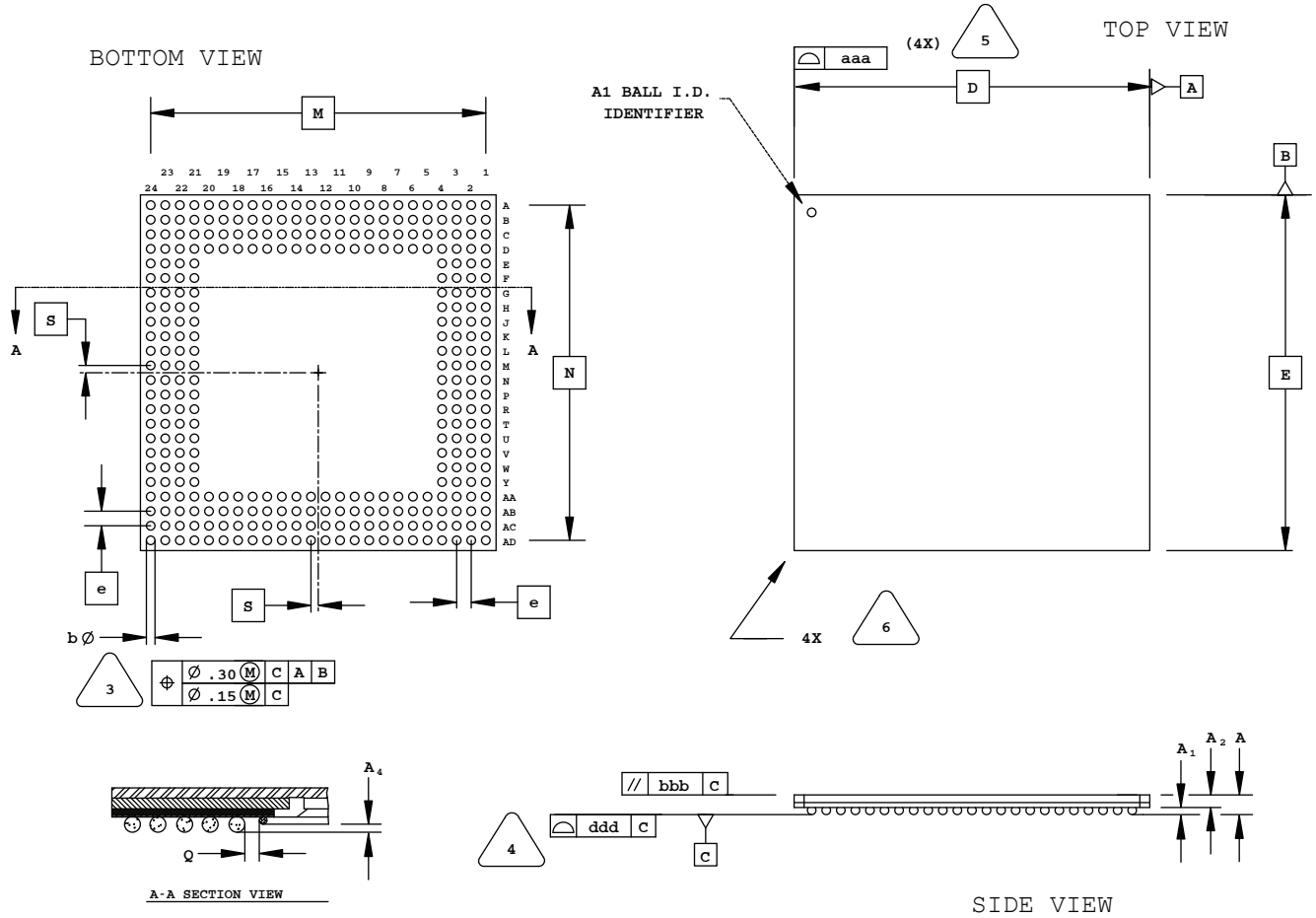
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 1.20 | 1.35 | 1.50 |
| A1 | 0.16 | – | – |
| A2 | – | – | 1.34 |
| D/E | 8.00 BSC | | |
| M/N | 6.50 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 |

# 320-Ball SBGA 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.

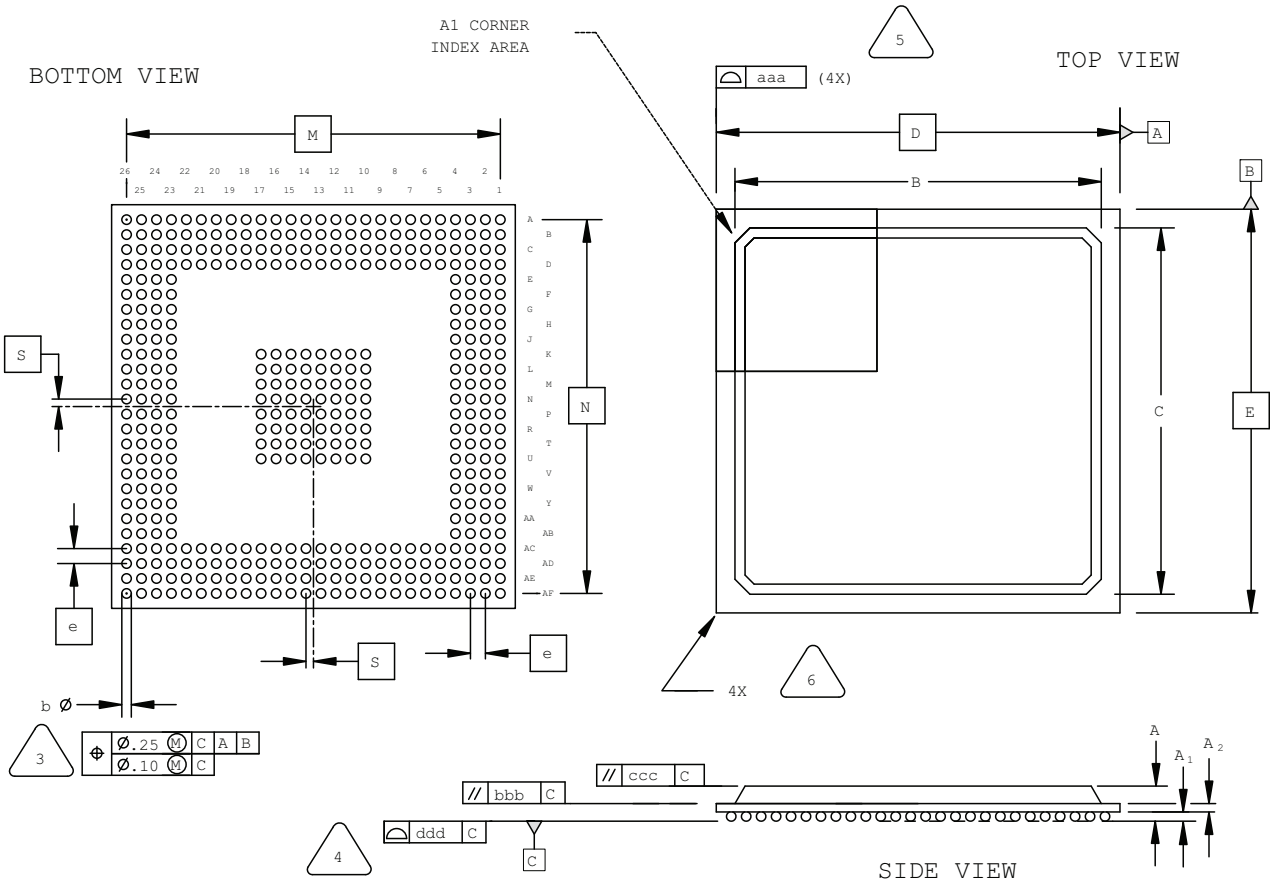
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | - | - | 1.70 |
| 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 |

# 416-Ball fpBGA 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.

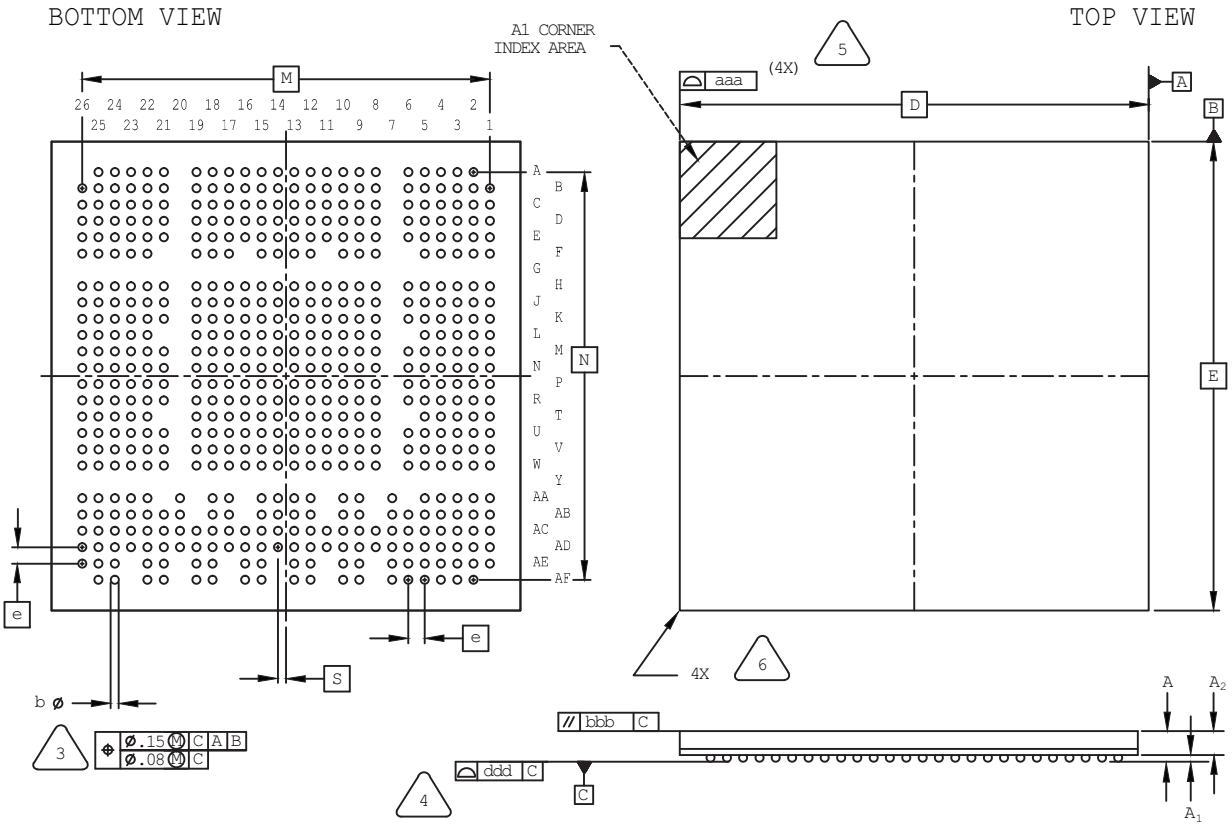
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 1.70 | 2.15 | 2.60 |
| A1 | 0.30 | 0.50 | 0.70 |
| A2 | 0.30 | 0.50 | 0.70 |
| B/C | 23.80 | 24.80 | 25.80 |
| D/E | 27.00 BSC | | |
| M/N | 25.00 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 |

## 554-Ball caBGA 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.

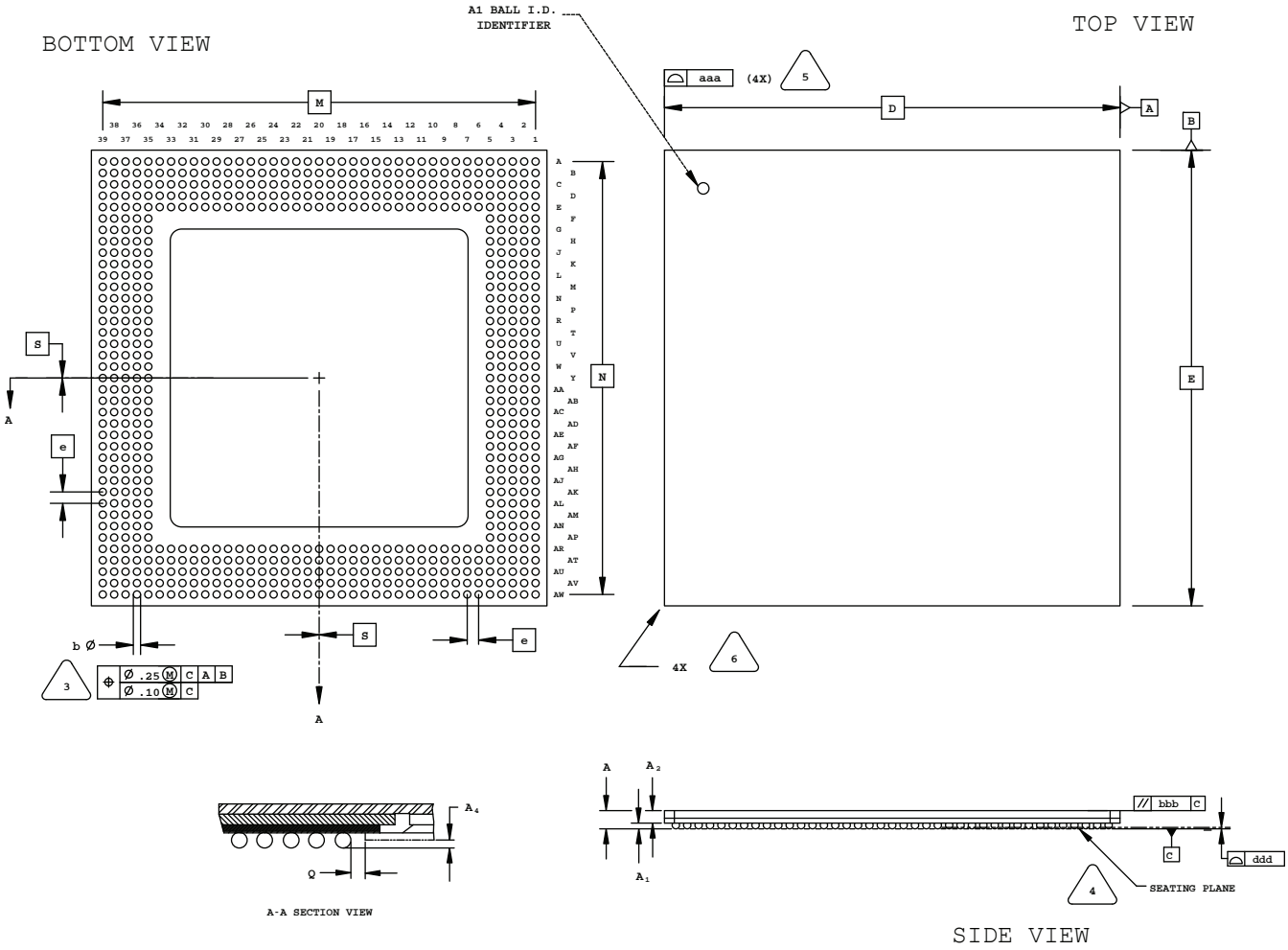
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | – | – | 1.76 |
| A1 | 0.25 | 0.30 | 0.35 |
| A2 | 0.80 | – | – |
| D/E | 23.0 BSC | | |
| M/N | 20.0 BSC | | |
| S | 0.40 BSC | | |
| b | 0.35 | 0.40 | 0.45 |
| e | 0.80 BSC | | |
| aaa | – | – | 0.15 |
| bbb | – | – | 0.20 |
| ddd | – | – | 0.12 |

# 680-Ball fpSBGA 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.

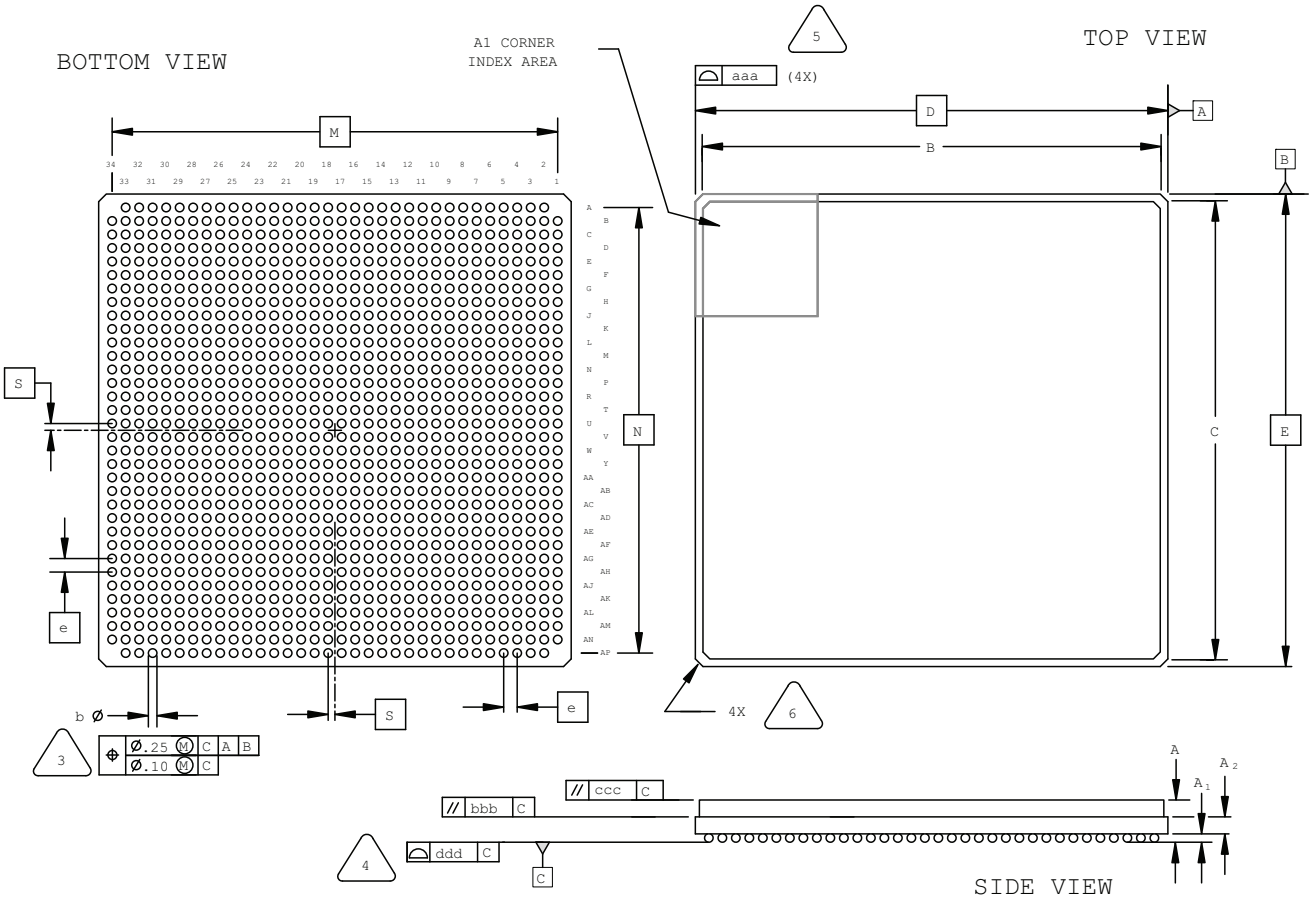
5. BILATERAL TOLERANCE ZONE IS APPLIED TO EACH SIDE OF THE PACKAGE BODY.

6. EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | - | - | 1.70 |
| A1 | 0.45 | 0.53 | 0.60 |
| A2 | 0.90 | 0.98 | 1.05 |
| D/E | 40.00 BSC | | |
| M/N | 38.00 BSC | | |
| S | 0.00 BSC | | |
| b | 0.50 | 0.65 | 0.80 |
| e | 1.00 BSC | | |
| Q | 0.25 | - | - |
| A4 | 0.10 | - | - |
| aaa | - | - | 0.20 |
| bbb | - | - | 0.25 |
| ddd | - | - | 0.20 |

# 1152-Ball Ceramic fcBGA 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 | 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 |