

Welcome to **E-XFL.COM**

Understanding <u>Embedded - FPGAs (Field Programmable Gate Array)</u>

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	80
Number of Logic Elements/Cells	640
Total RAM Bits	-
Number of I/O	159
Number of Gates	-
Voltage - Supply	1.14V ~ 1.26V
Mounting Type	Surface Mount
Operating Temperature	0°C ~ 85°C (TJ)
Package / Case	256-BGA
Supplier Device Package	256-FPBGA (17x17)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo640e-4fn256c

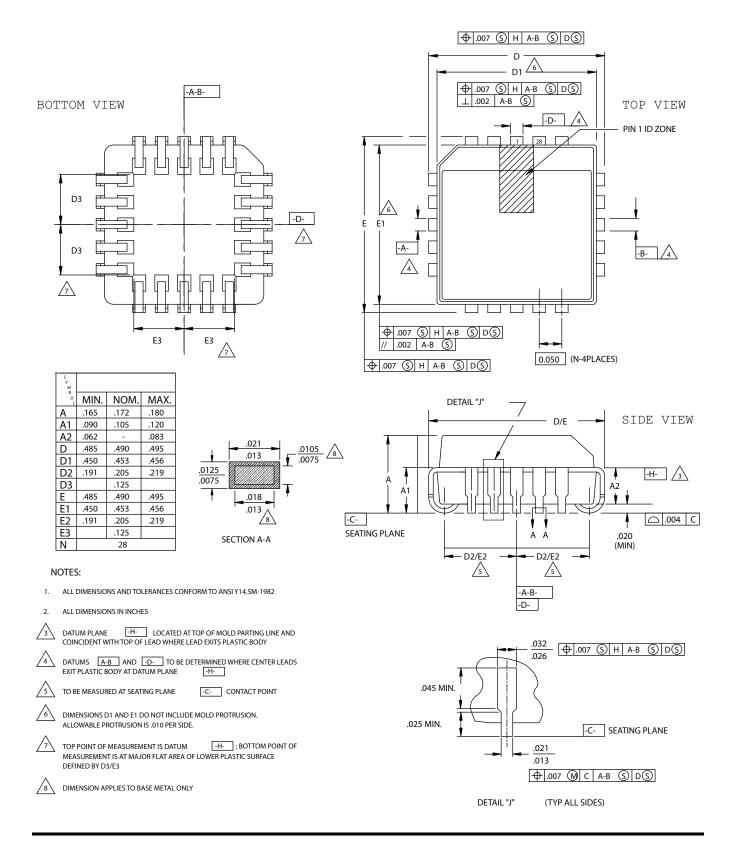
Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong



28-Pin PLCC Package

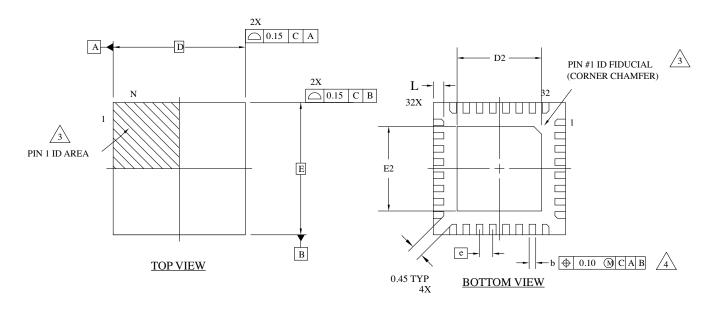
Dimensions in Inches

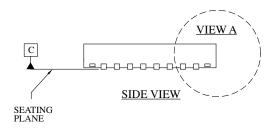


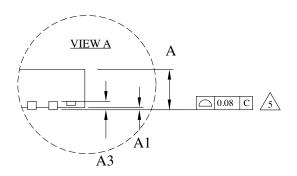


32-Pin QFN Package Option 2: MachXO2™

Dimensions in Millimeters







NOTES: UNLESS OTHERWISE SPECIFIED

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

EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.

DIMENSION 6 APPLIES TO PLATED
TERMINAL AND IS MEASURED BETWEEN
0.15 AND 0.30 mm FROM TERMINAL TIP.

APPLIES TO EXPOSED PORTION OF TERMINALS.

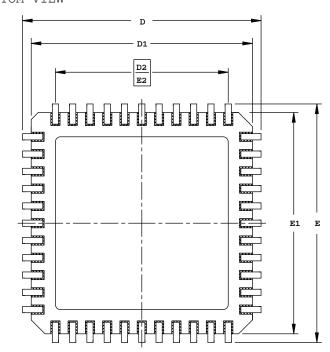
SYMBOL MIN. NOM. MAX. A 0.50 0.55 0.60 A1 0.00 0.02 0.05 A3 0.2 REF D 5.0 BSC D2 3.10 3.20 3.30 E 5.0 BSC E2 3.10 3.20 3.30 b 0.20 0.25 0.30 e 0.50 BSC L 0.35 0.40 0.45				
A1 0.00 0.02 0.05 A3 0.2 REF D 5.0 BSC D2 3.10 3.20 3.30 E 5.0 BSC E2 3.10 3.20 3.30 b 0.20 0.25 0.30 e 0.50 BSC	SYMBOL	MIN.	NOM.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

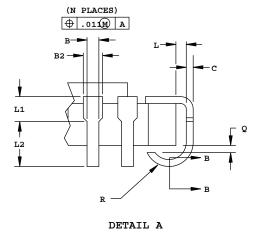


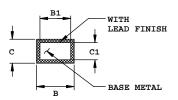
44-Pin JLCC Package

Dimensions in Inches

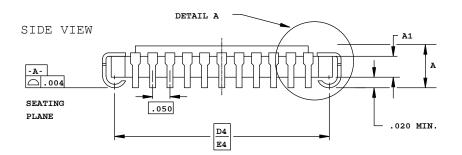
BOTTOM VIEW







SECTION B-B



NOTES:

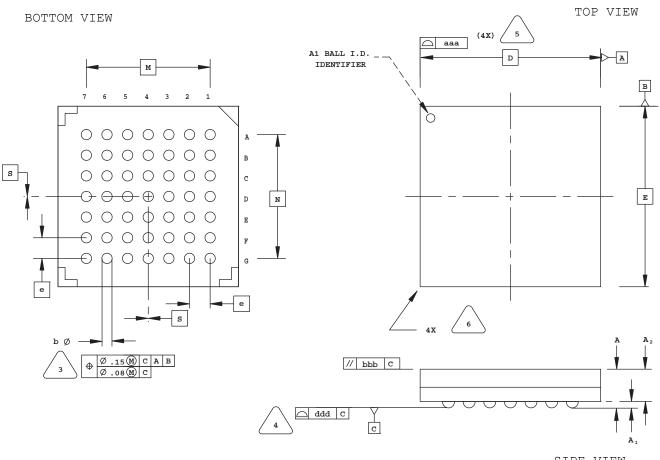
- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M.
- 2. ALL DIMENSIONS ARE IN INCHES.
- 3. CORNER CHAMFERS AND/OR NOTCHES ARE OPTIONAL.

S Y M	INCHES		
M B O L	MIN.		MAX.
A	.115	1	.190
A1	. 0	65 RE	F
В	.013	-	.023
B1	.013	ı	.020
B2	.022	-	.035
С	.007	ı	.013
C1	.007	ı	.010
D/E	.675	.690	.700
D1/E1	.620	ı	.660
D2/E2		00 BS	c
D4/E4	. 6	30 BS	C
L	.005	ı	-
L1	.020	-	-
L2	.025	ı	-
Q	.003	-	-
R	.020	-	.040
N	44		



49-Ball caBGA Package

Dimensions in Millimeters



SIDE VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

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



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.



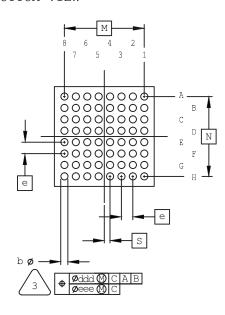
SYMBOL	MIN.	NOM.	MAX.
A	1.30	1.40	1.50
A1	0.31	0.36	0.41
A2	0.99	1.04	1.09
D/E	7	.00 BSC	
M/N	4	.80 BSC	
s		0 BSC	
b	0.40	0.46	0.52
е	0	.80 BSC	
aaa	-	-	0.10
bbb	-	-	0.10
ddd	-	-	0.12

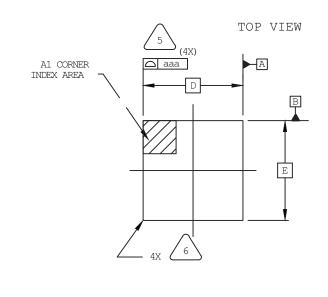


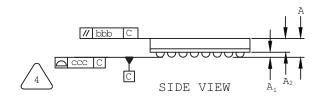
64-Ball ucfBGA Package

Dimensions in Millimeters

BOTTOM VIEW







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.

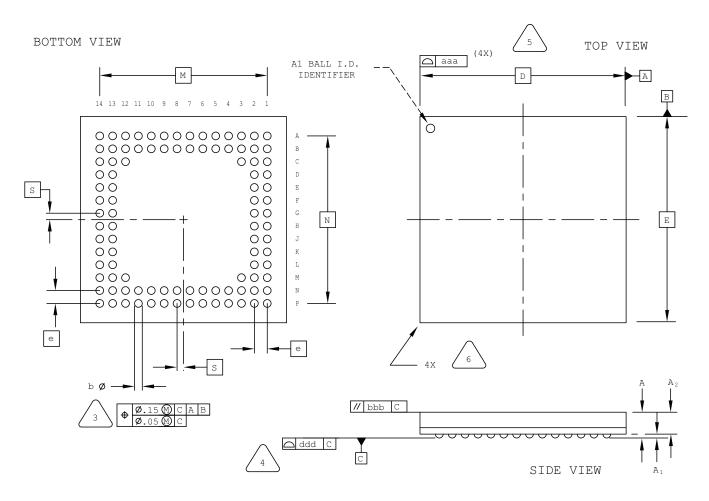


SYMBOL	MIN.	NOM.	MAX.
А	-	_	1.00
A1	0.11	-	-
A2	0.62	-	_
D/E		3.50 BSC	
M/N		2.80 BSC	
S	0.20 BSC		
b	0.20	0.25	0.30
е	0.40 BSC		
aaa	0.10		
bbb	0.10		
ccc	0.08		
ddd	0.15		
eee		0.08	



100-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.

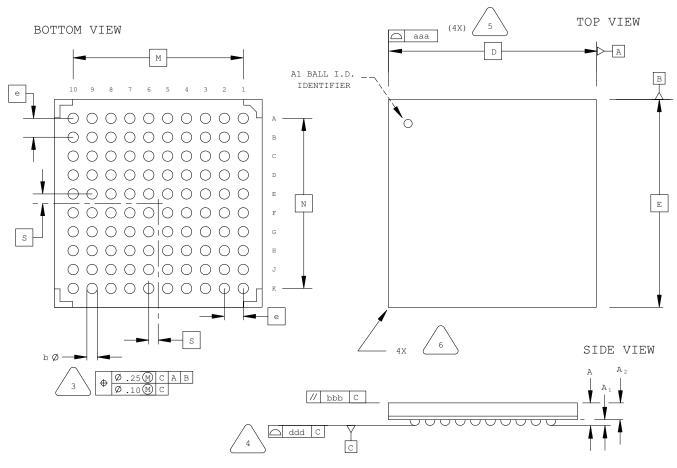


SYMBOL	MIN.	NOM.	MAX.
А	0.90	1.23	1.35
A1	0.15	_	-
A2	-	-	1.10
D/E	8	.00 BSC	
M/N	6.50 BSC		
S	0	.25 BSC	
b	0.25	0.30	0.35
е	0.50 BSC		
aaa	-	_	0.10
bbb	-	-	0.10
ddd	_	_	0.08



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.



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.

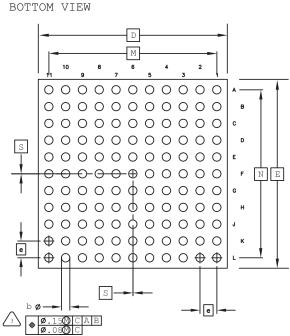


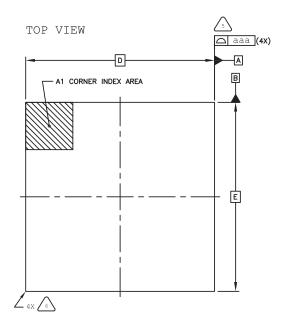
SYMBOL	MIN.	NOM.	MAX.	
А	1.30	1.50	1.70	
A1	0.30	0.50	0.70	
A2	1.	.10 REF		
D/E	11	11.00 BSC		
M/N	9.00 BSC			
S	0	0.50 BSC		
b	0.40	0.55	0.70	
е	1.00 BSC			
aaa	-	-	0.20	
bbb	_	_	0.25	
ddd	_	_	0.20	

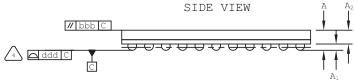


121-Ball caBGA Package (9x9 mm Body)

Dimensions in Millimeters







NOTES: UNLESS OTHERWISE SPECIFIED

1. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.

2. ALL DIMENSIONS ARE IN MILLIMETERS.



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.

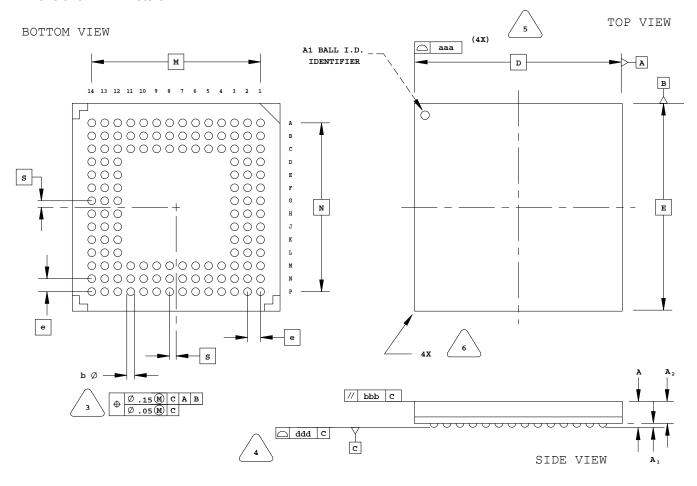


SYMBOL	MIN.	NOM.	MAX.
А	_	_	1.10
A1	0.15	_	_
A2	0.55	_	_
D/E	9	.00 BSC	
M/N	8.00 BSC		
S	0.00 BSC		
b	0.30	0.40	0.50
е	0.80 BSC		
aaa	0.15		
bbb	0.20		
ddd		0.10	



132-Ball csBGA Package Option 1: MachXO2, MachXO, LatticeXP2™

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- 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.

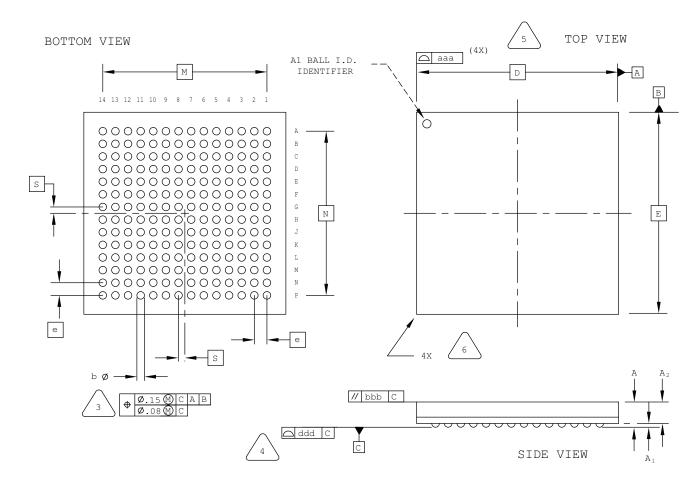


	Г		
SYMBOL	MIN.	NOM.	MAX.
A	0.90	1.23	1.35
A1	0.15	-	-
A2	-	-	1.10
D/E	8	.00 BSC	
M/N	6.50 BSC		
s	0.	.25 BSC	
b	0.25	0.30	0.35
е	0	.50 BSC	
aaa	-	-	0.10
bbb	-	-	0.10
ddd	-	-	0.08



196-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.

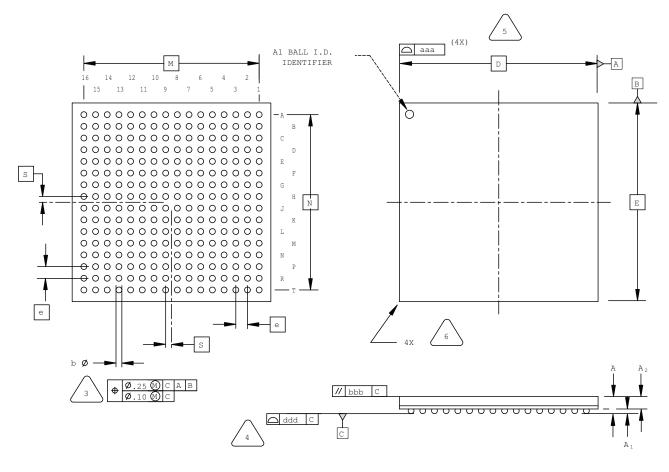


SYMBOL	MIN.	NOM.	MAX.	
А	-	-	1.00	
A1	0.15	_	_	
A2	_	_	0.85	
D/E	8	8.00 BSC		
M/N	6.50 BSC			
S	0	.25 BSC		
b	0.25	0.30	0.35	
е	0.50 BSC			
aaa	_	_	0.10	
bbb	_	_	0.10	
ddd	_	_	0.08	



256-Ball ftBGA Package Option 1: ispMACH 4000, MachXO, LatticeXP2

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.

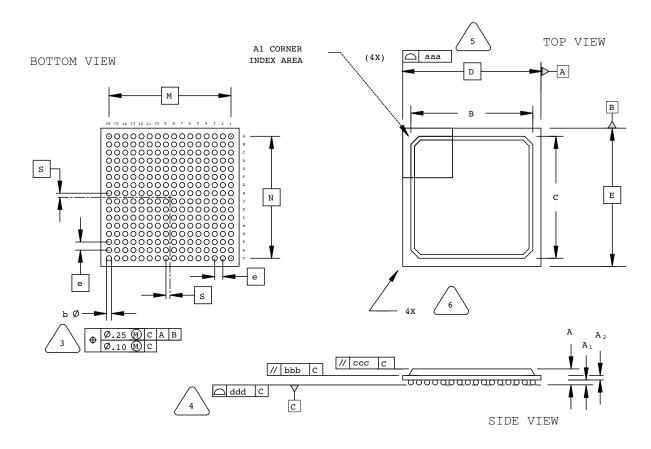


SYMBOL	MIN.	NOM.	MAX.	
A	1.25	1.40	1.55	
A1	0.30	-	-	
A2	-	-	1.25	
D/E	1	17.0 BSC		
M/N	15.0 BSC			
S	0.	.50 BSC		
b	0.40	0.50	0.60	
е	1.00 BSC			
aaa	-	-	0.20	
bbb	-	-	0.25	
ddd	-	-	0.12	



256-Ball fpBGA 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.

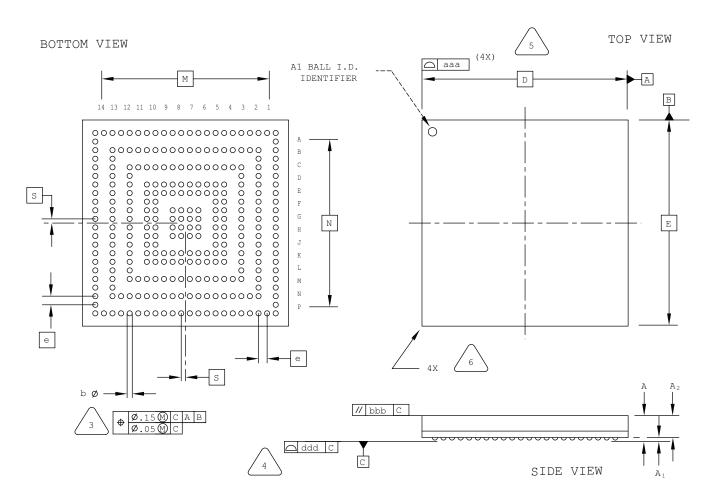


			-	
SYMBOL	MIN.	NOM.	MAX.	
A	1.30	1.70	2.10	
A1	0.30	0.50	0.70	
A2	0.30	0.50	0.70	
в/с	14.80	15.30	15.80	
D/E	17	7.00 BSC		
M/N	15	15.00 BSC		
S	-	0.50 BSC		
b	0.50	0.60	0.70	
е	1	.00 BSC		
aaa	-	-	0.20	
bbb	-	_	0.25	
ccc	-	_	0.35	
ddd	-	_	0.20	



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.

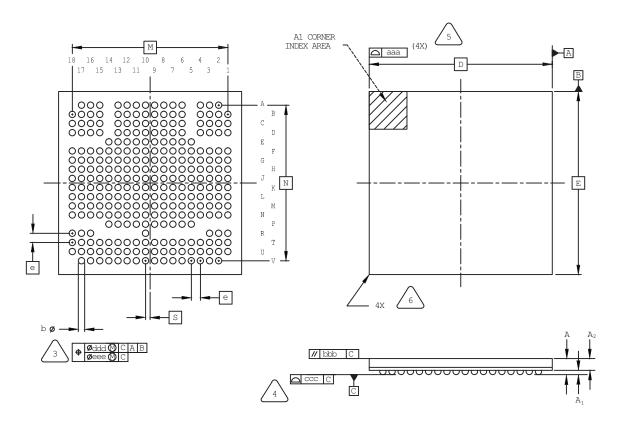


SYMBOL	MIN.	NOM.	MAX.
А	-	-	1.00
A1	0.15	_	ı
A2	_	-	0.85
D/E	12.00 BSC		
M/N	10.50 BSC		
S	0.25 BSC		
b	0.25	0.31	0.37
е	0.50 BSC		
aaa	_	_	0.10
bbb	_	_	0.10
ddd	_	_	0.08



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.



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.

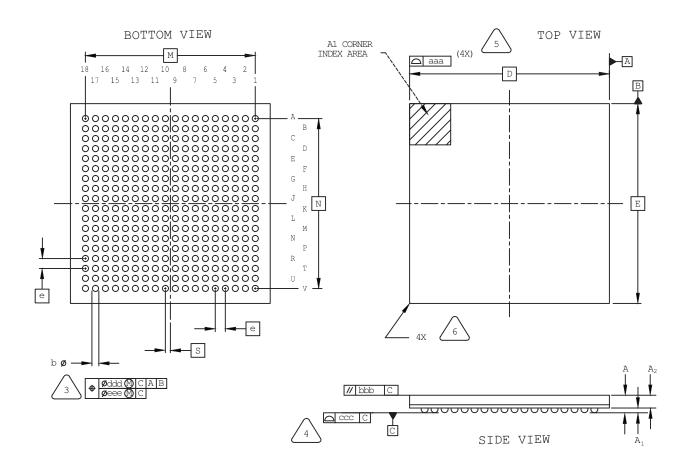


SYMBOL	MIN.	NOM.	MAX.
А	-	-	1.30
A1	0.15	_	_
A2	-	-	1.00
D/E	10.00 BSC		
M/N	8.50 BSC		
S	0.25 BSC		
b	0.25 0.30		0.35
е	0.50 BSC		
aaa	0.10		
bbb	0.10		
ccc	0.08		
ddd	0.15		
eee	0.05		



324-Ball csfBGA 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 \square .



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.

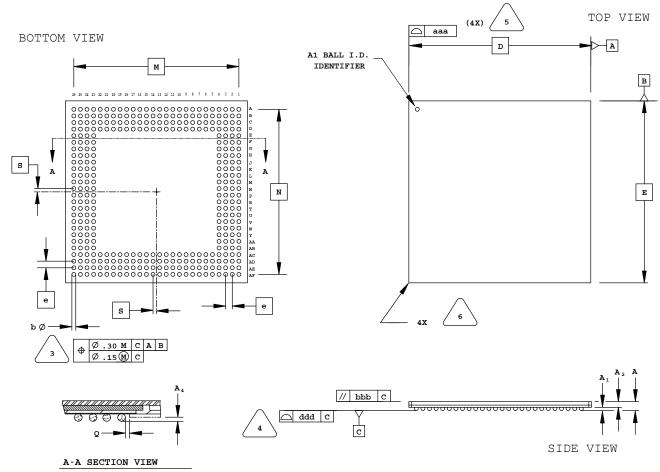


SYMBOL	MIN.	NOM.	MAX.
А	-	-	1.00
A1	0.15	0.24	ı
A2	_	0.66	-
D/E	10.00 BSC		
M/N	8.50 BSC		
S	0.25 BSC		
b	0.25	0.30	0.35
е	0.50 BSC		
aaa	0.10		
bbb	0.10		
ccc	0.08		
ddd	0.15		
eee	0.05		
•			



352-Ball SBGA 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.

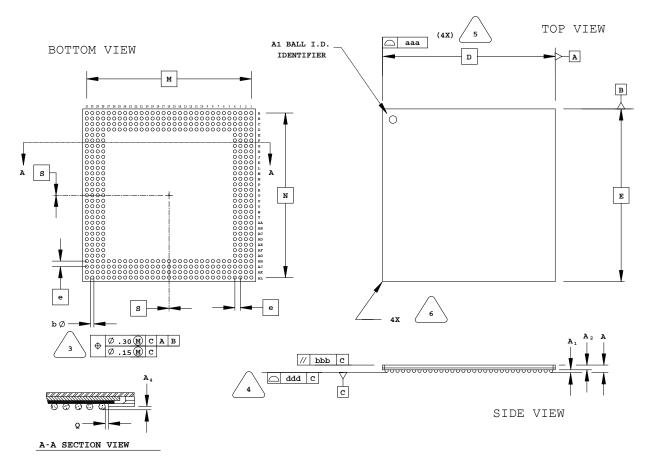


SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.70
A1	0.50	0.65	0.80
A2	0.80	0.90	1.00
D/E	35.00 BSC		
M/N	31.75 BSC		
s	0.635 BSC		
b	0.60	0.75	0.90
е	1.27 BSC		
Q	0.25	-	-
A4	0.10	-	-
aaa	-	-	0.20
bbb	-	-	0.25
ddd	-	-	0.20



432-Ball SBGA Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

- 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.

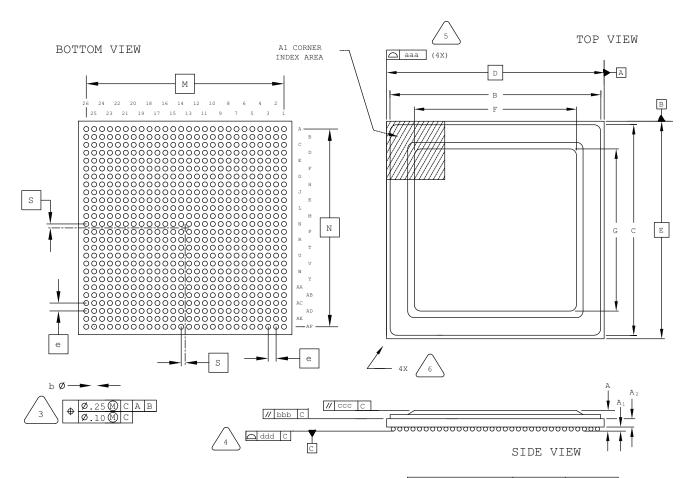


NOM 0.65 0.90 0.00 BSC 8.10 BSC	MAX. 1.70 0.80 1.00	
0.90 0.00 BSC	0.80	
0.90 0.00 BSC		
0.00 BSC	1.00	
8.10 BSC		
0.00 BSC		
0.75	0.90	
1.27 BSC		
-	-	
-	-	
-	0.20	
-	0.25	
-	0.20	
	0.00 BSC 0.75	



676-Ball fcBGA 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.

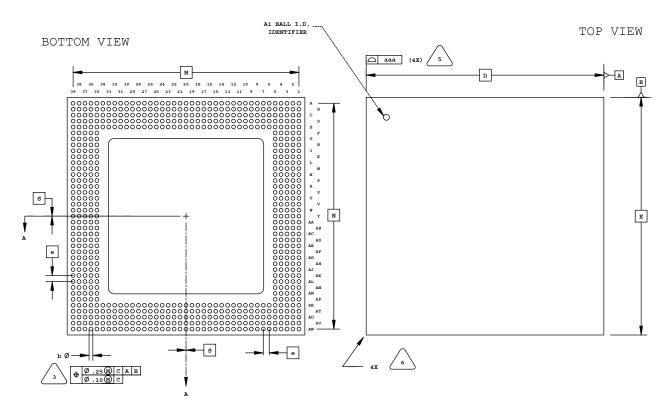


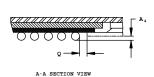
SYMBOL	MIN.	NOM.	MAX.
A	2.55	2.90	3.25
A1	0.40	0.50	0.60
A2	1	1.20 REF	
B/C	26.55	26.60	26.65
D/E	27.00 BSC		
F/G	18.55	18.60	18.65
M/N	25.00 BSC		
S	0.50 BSC		
b	0.50	0.60	0.70
е	1.00 BSC		
aaa	-	-	0.20
bbb	-	-	0.25
ccc	-	-	0.35
ddd	_	_	0.20

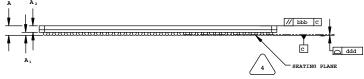


680-Ball fpSBGA Package

Dimensions in Millimeters







SIDE VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

- 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.



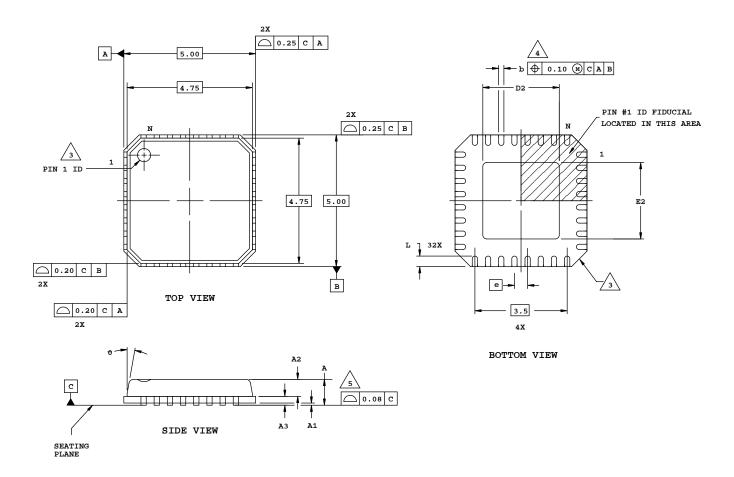
SYMBOL	MIN.	NOM.	MAX.
A	-	-	1.70
A1	0.45	0.53	0.60
A2	0.90	0.98	1.05
D/E	40.00 BSC		
M/N	38.00 BSC		
s	0.00 BSC		
b	0.50	0.65	0.80
е	1.00 BSC		
Q	0.25	-	-
A4	0.10	-	-
aaa	-	-	0.20
bbb	-	-	0.25
ddd	-	-	0.20



Appendix A. Package Archive

32-Pin QFN (Punch Singulated) Package

Dimensions in Millimeters



NOTES: UNLESS OTHERWISE SPECIFIED

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

<u>3</u> I

EXACT SHAPE AND SIZE OF THIS FEATURE IS OPTIONAL.



DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.20 AND 0.25 mm FROM TERMINAL TIP.



APPLIES TO EXPOSED PORTION OF TERMINALS.

SYMBOL	MIN.	NOM.	MAX.
A	-	0.85	1.00
A1	0.00	0.01	0.05
A2	0.00	0.65	1.00
A 3	0.20 REF		
D2	1.25	2.70	3.25
E2	1.25	2.70	3.25
е	0.50 BSC		
b	0.18	0.24	0.30
L	0.30	0.40	0.50
Ð	-	-	12