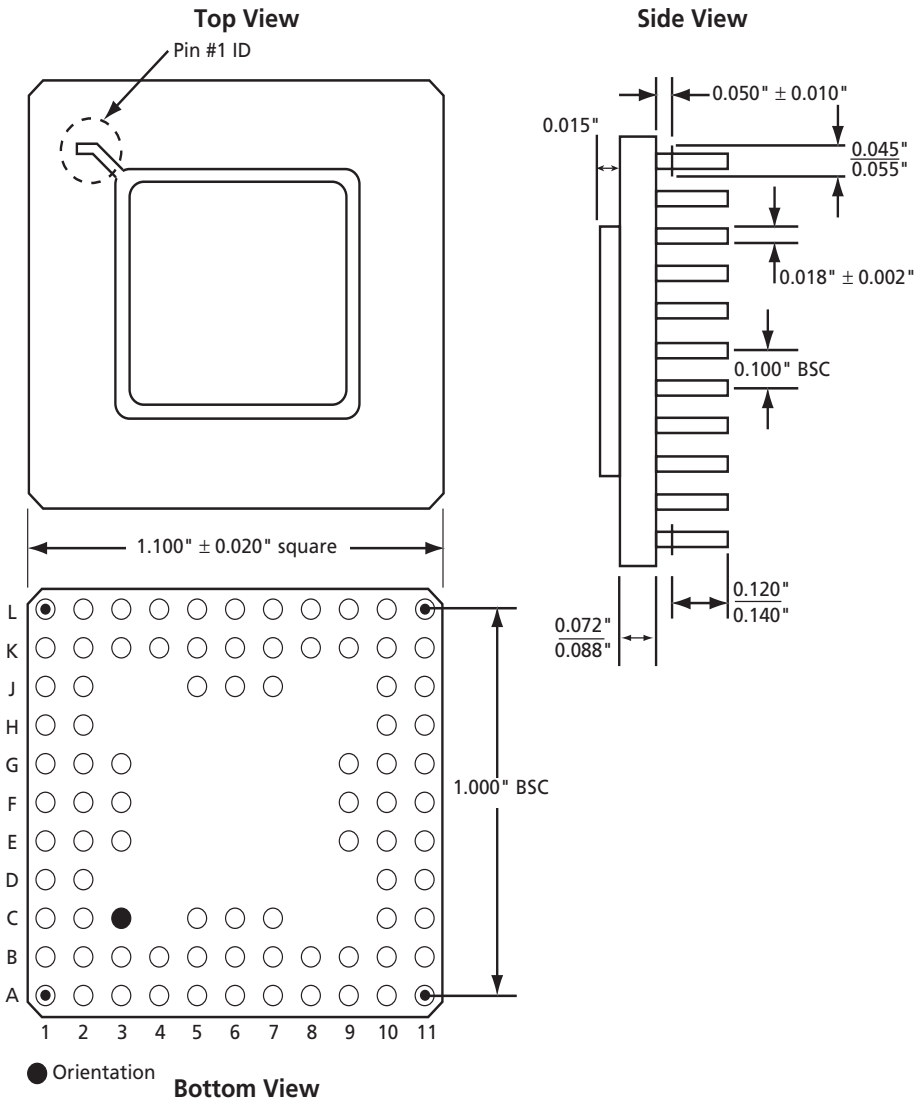
Package Mechanical Drawings

Ceramic Pin Grid Array

84-Pin CPGA



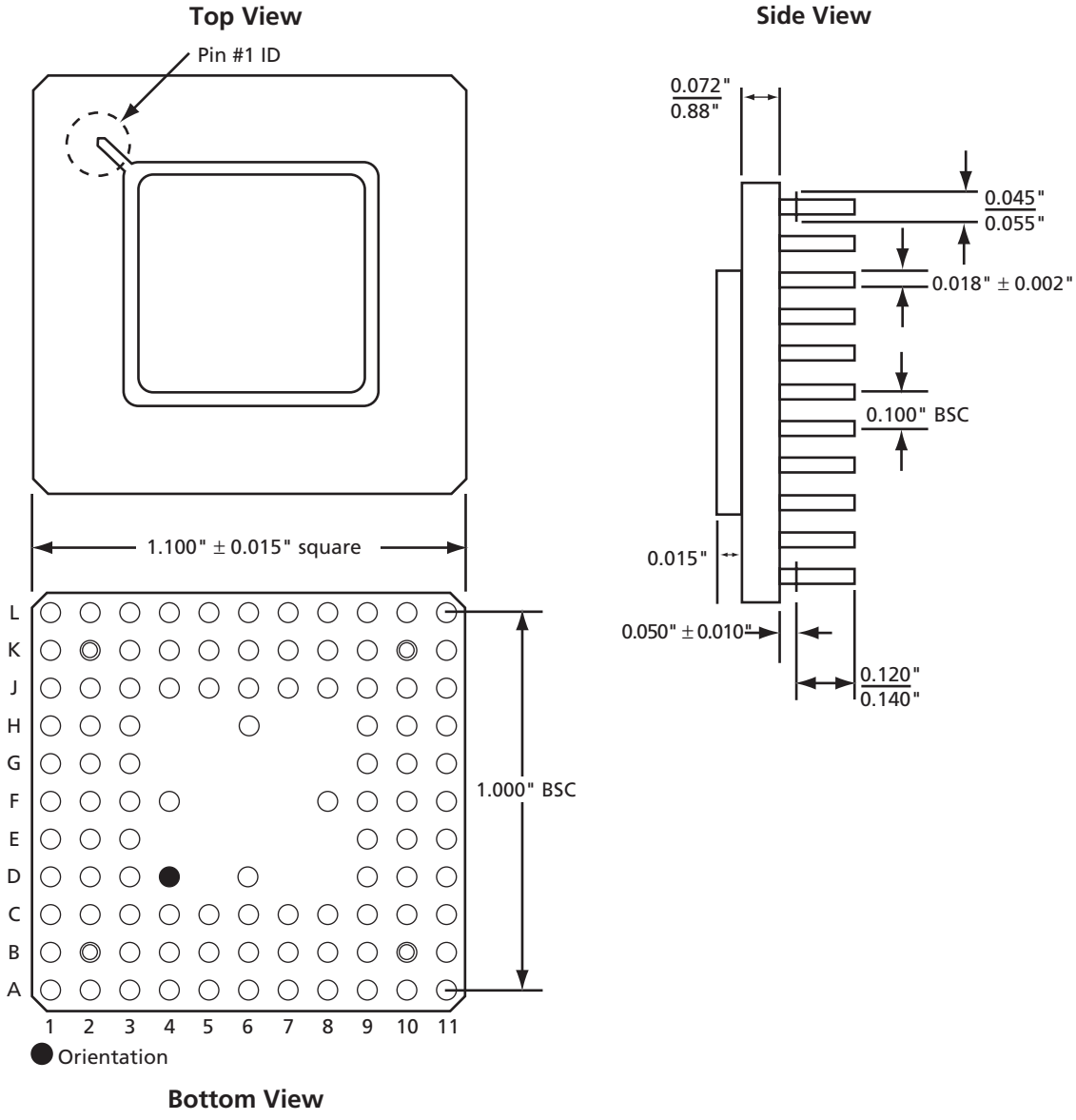
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Devices	
A1010B	A1020B

Ceramic Pin Grid Array

100-Pin CPGA



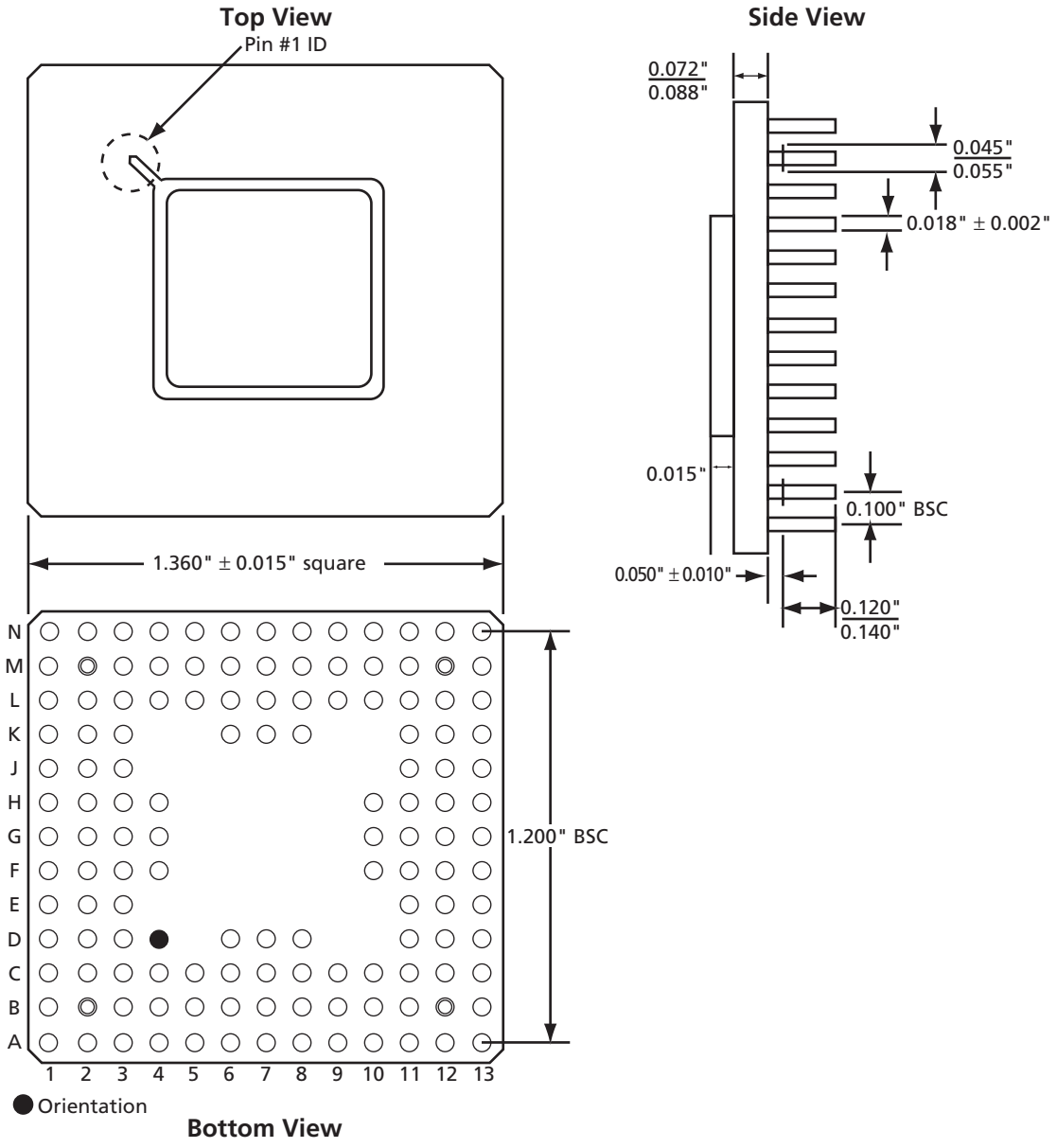
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Devices	
A1225XL	A1415A

Ceramic Pin Grid Array

132-Pin CPGA



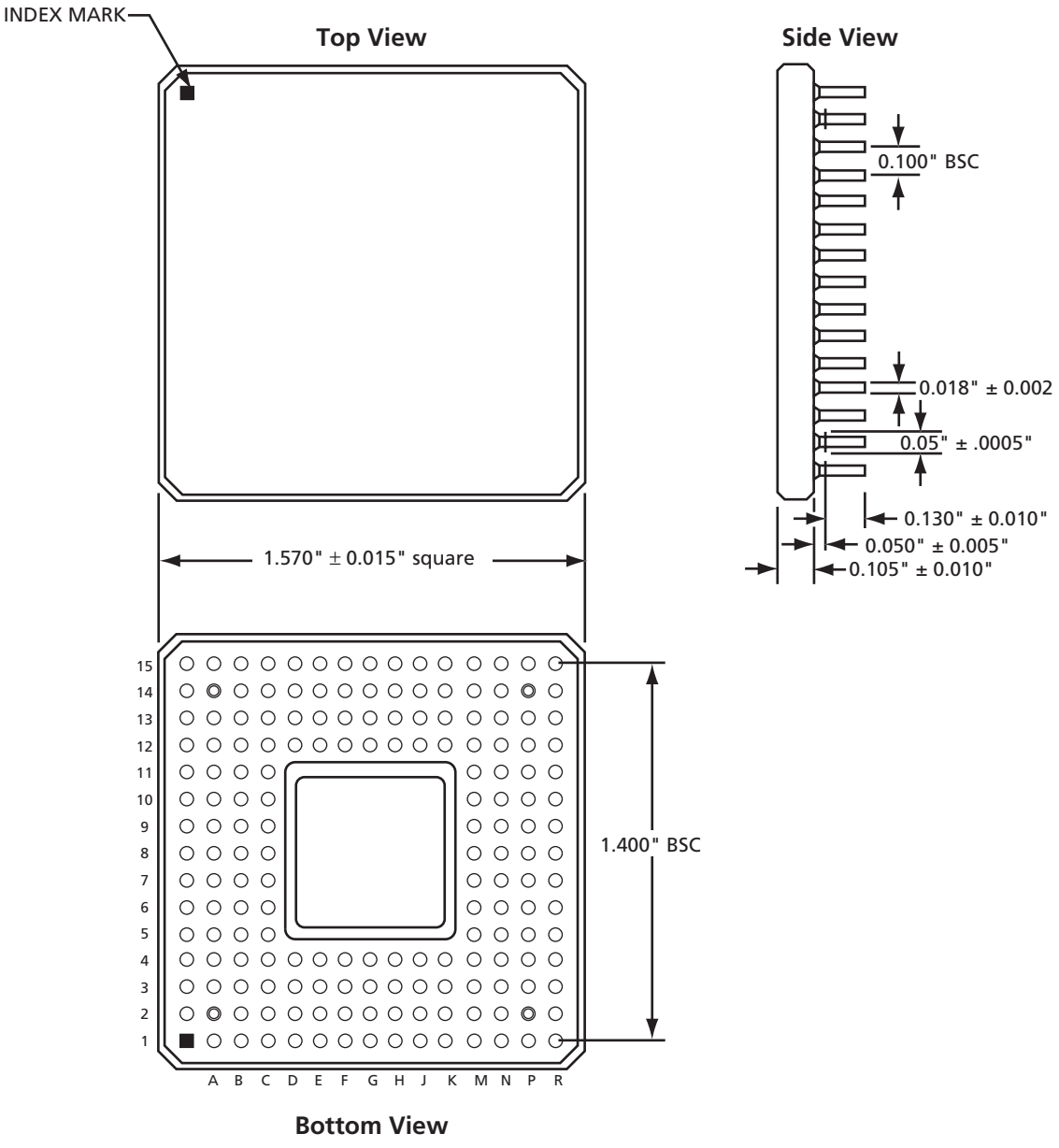
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Devices	
A1240A	A1240XL

Ceramic Pin Grid Array

175-Pin CPGA



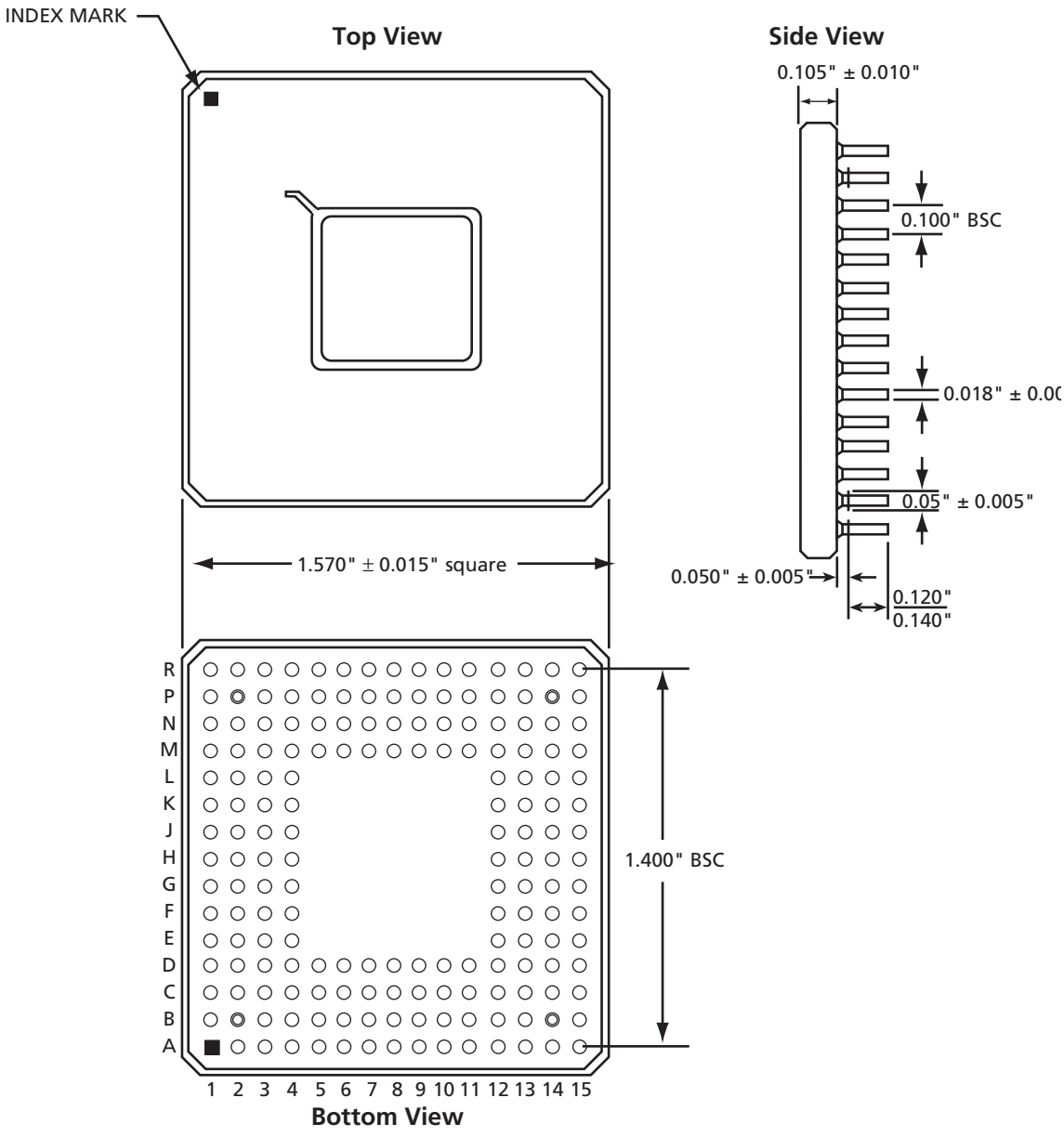
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Device
A1440A

Ceramic Pin Grid Array

176-Pin CPGA



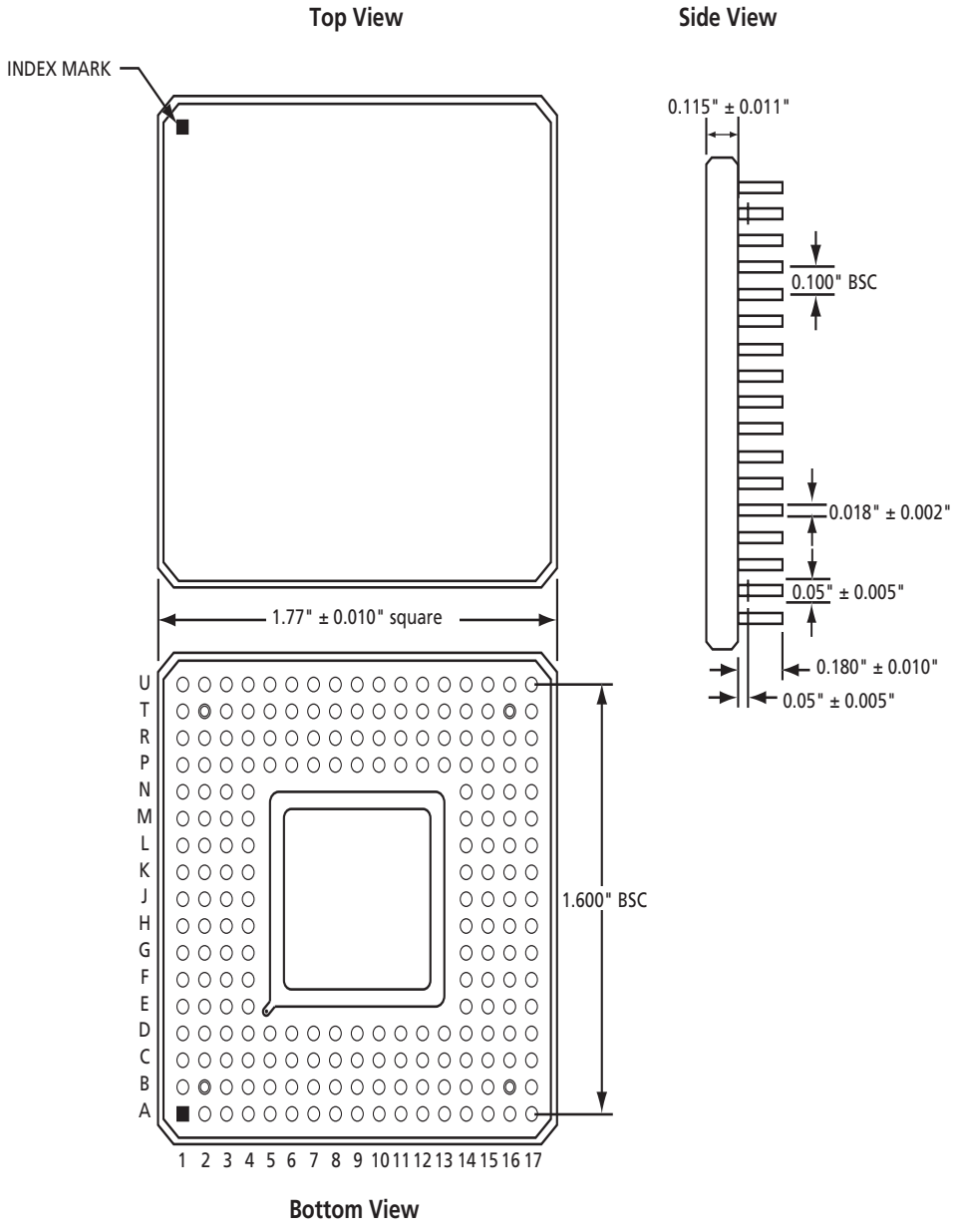
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Devices	
A1280A	A1280XL

Ceramic Pin Grid Array

207-Pin CPGA



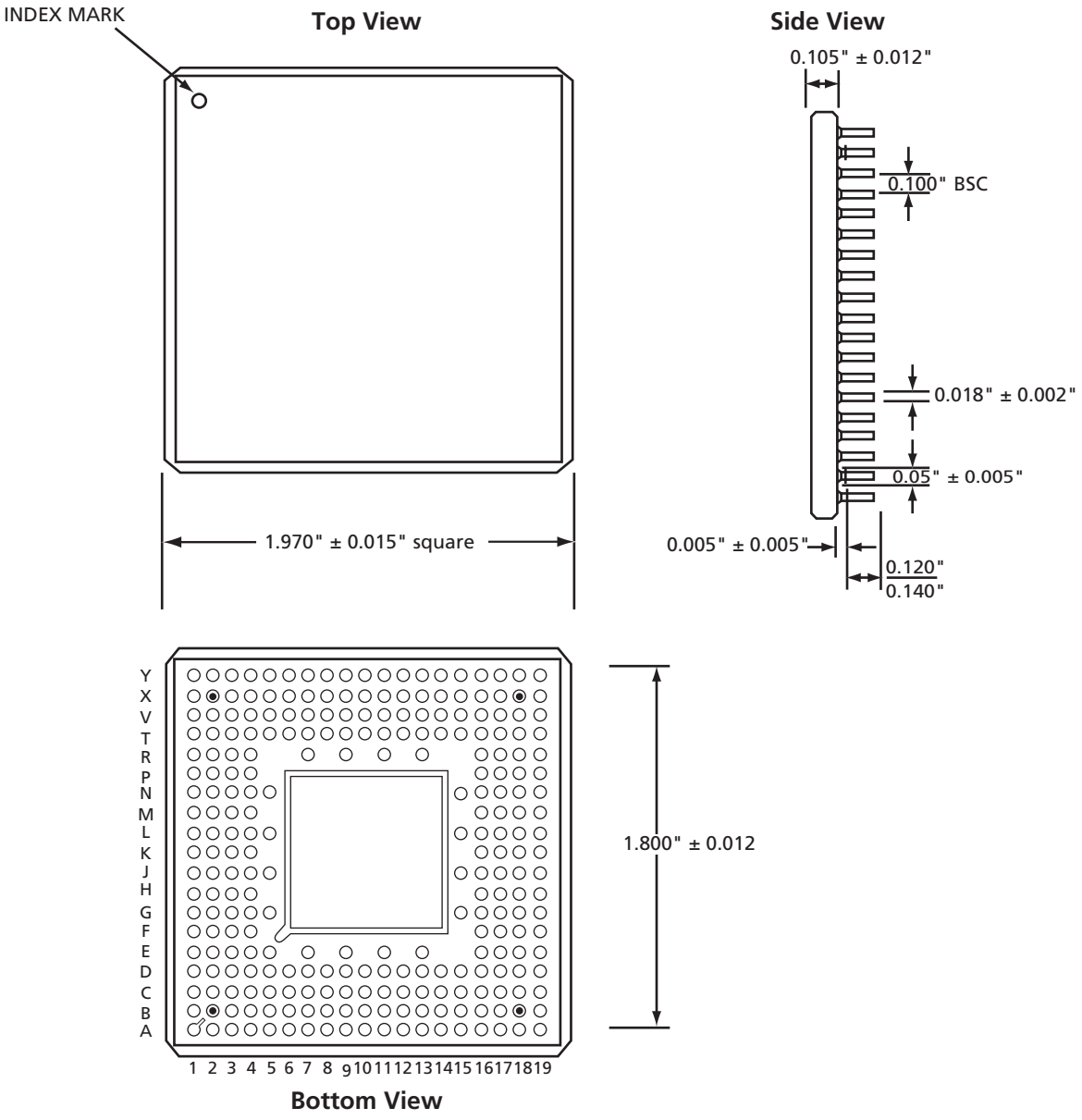
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Device
A1460A

Ceramic Pin Grid Array

257-Pin CPGA



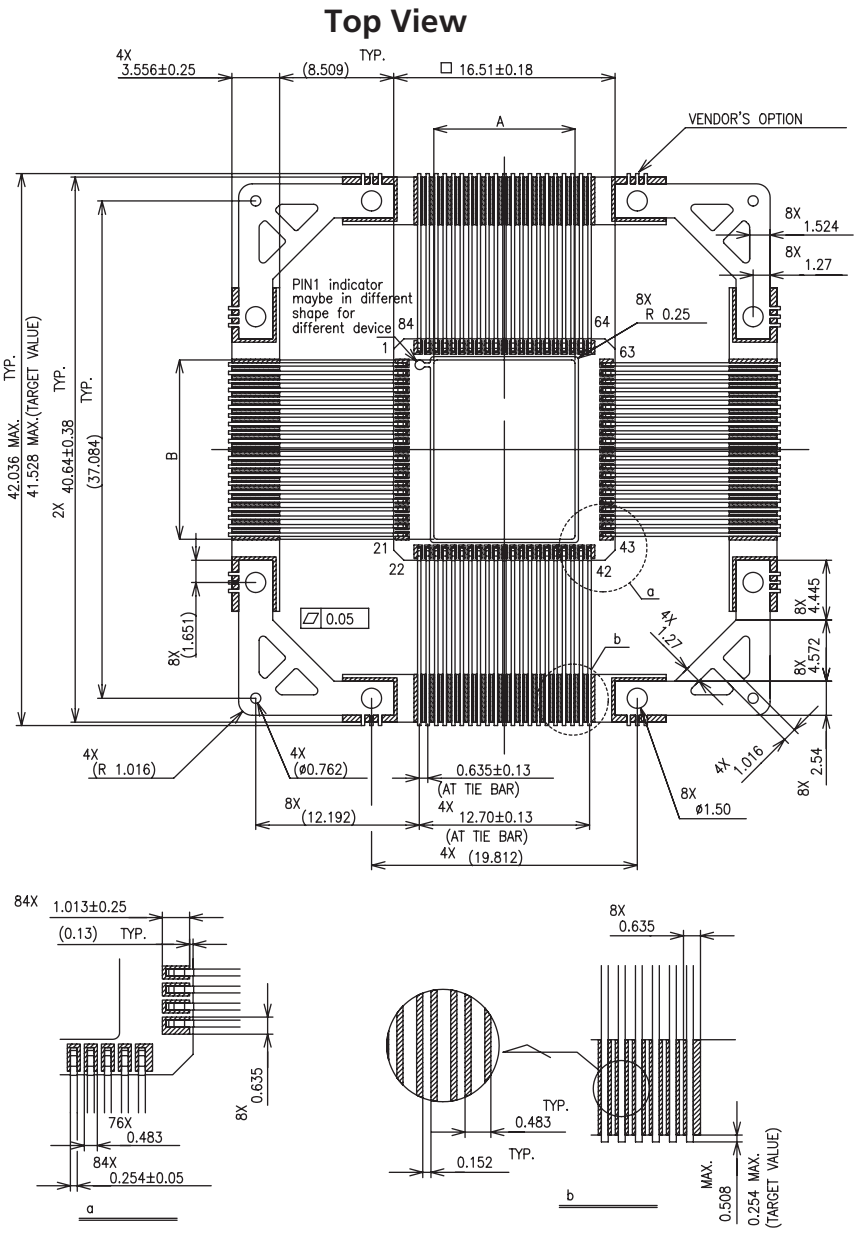
Notes:

1. All dimensions are in inches unless otherwise stated.
2. BSC—Basic Spacing between Centers.

Supported Device
A14100A

Ceramic Quad Flat Pack

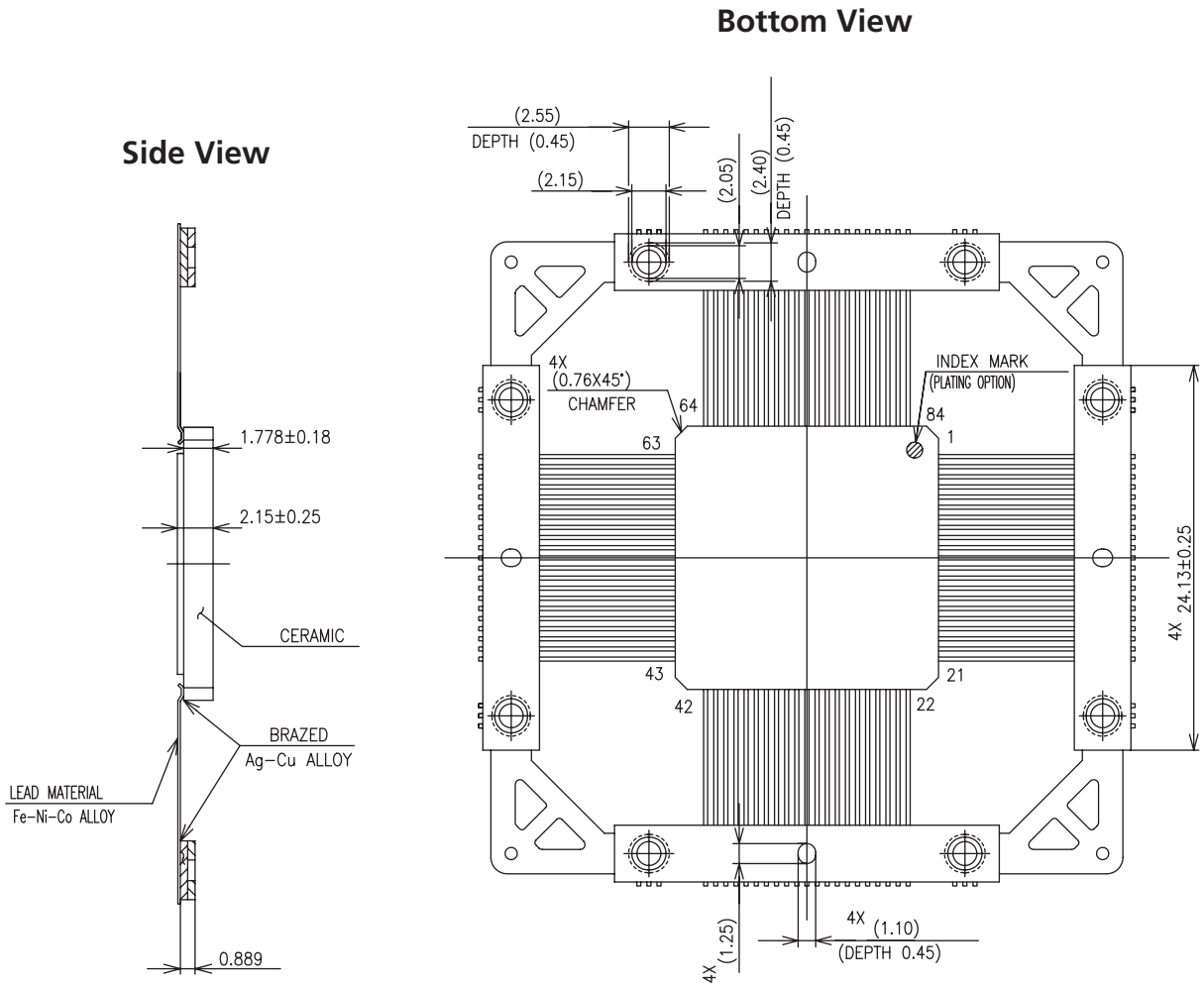
84-Pin CQFP Top View



Notes:

1. Units: mm
2. LID to be connected to GND
3. Die attach area to be connected to GND

84-Pin CQFP Side View and Bottom View



Note:

1. Units: mm
2. LID to be connected to GND
3. Die attach area to be connected to GND

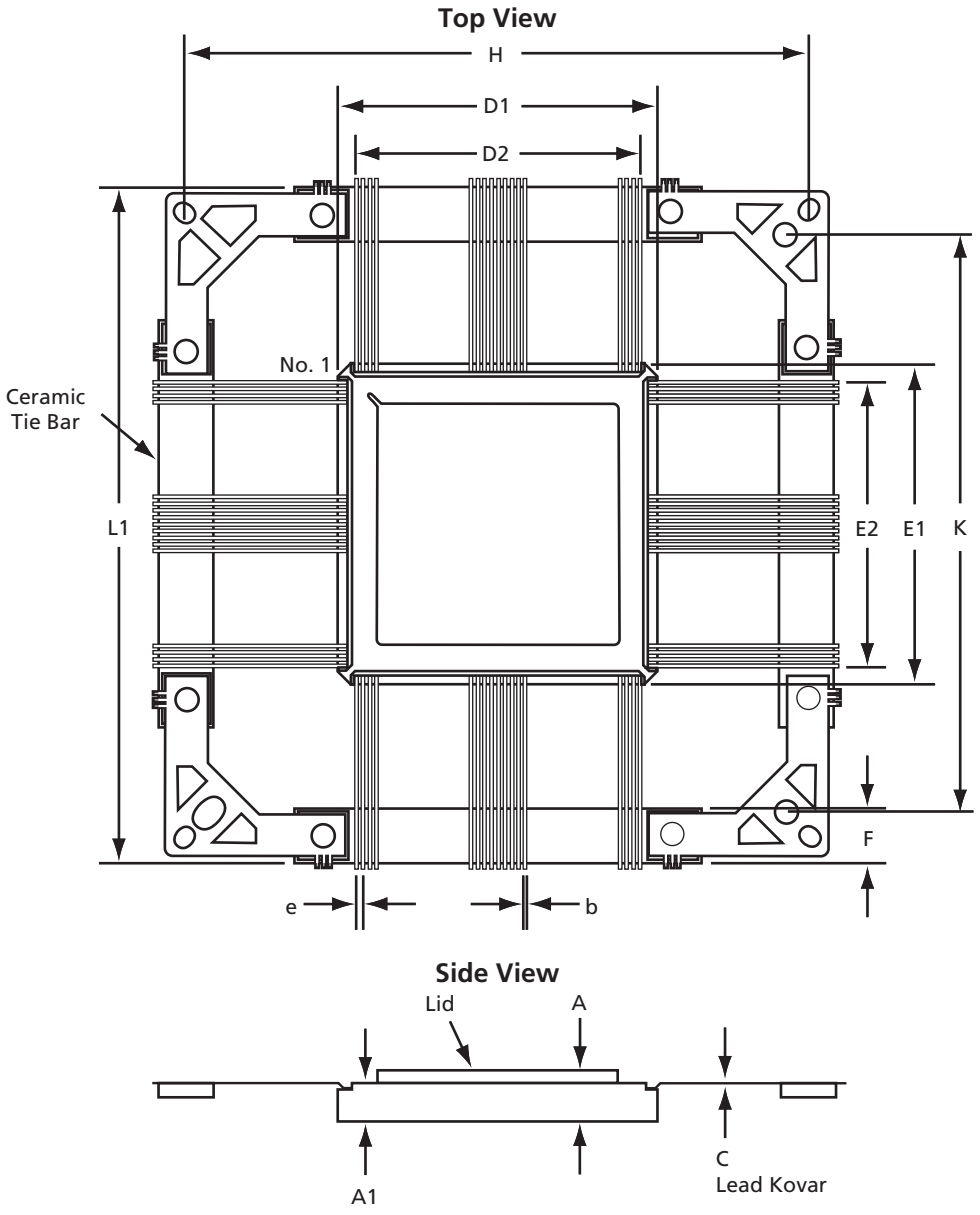
Supported Devices	
A1020B	RT1020
A32100DX	RH1020
A54SX32A	RTSX32SU

Plate Thickness	
Ni Plating	2.03~8.89 micron
Au Plating	2.54 micron min.

Lid size (Sort by device)	A	B
RTSX32SU	10.54	13.61
A1020B	13.21	13.21
A32100DX	13.97	13.97
RH1020	13.21	13.21
RT1020	13.21	13.21
A54SX32A	13.21	13.21

Ceramic Quad Flat Pack

132-, 172-, 196-, 208-, 256- and 352-Pin CQFP—Cavity Up without Heat Sink



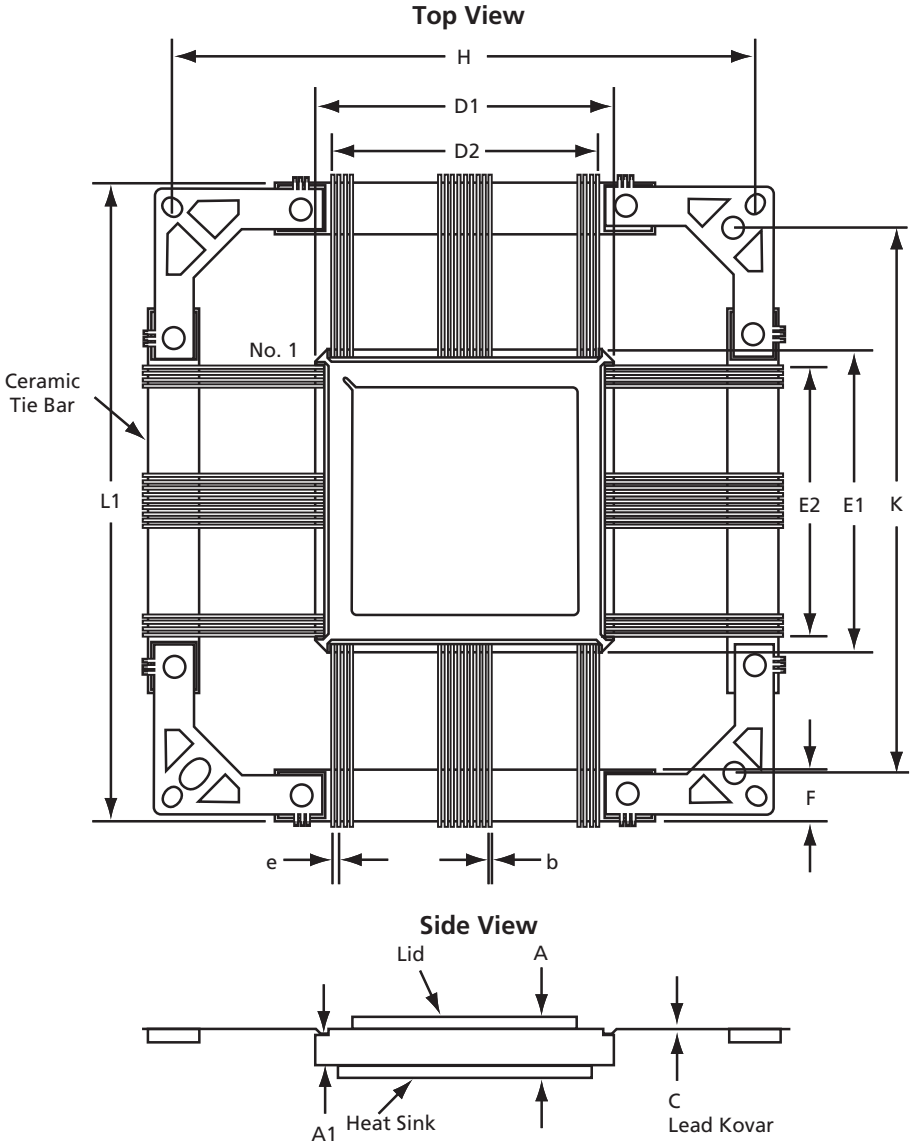
Notes:

1. All dimensions are in inches except CQ208, CQ256 and CQ352 which are in millimeters. Please see the "Ceramic Quad Flat Pack without Heat Sink Dimensions" on page 17 for the dimensions.
2. Outside lead frame holes (from dimension H) are circular for the CQ208, CQ256 and CQ352.
3. Seal ring and lid are connected to Ground.
4. Packages are shipped unformed with the ceramic tie bar in a test carrier.

Supported Devices					
CQ132	**CQ172**	**CQ196**	**CQ208**	**CQ256**	**CQ352**
A1425A	A1280A	A1460A	A42MX36	A14100A	AX2000
RT1425A	RH1280	RT1460A	A54SX16	A54SX16	APA300
	RT1280A		A54SX32	A54SX32A	APA600
			A54SX32A	A54SX72A	APA1000
			A54SX72A	RT54SX32S	RTAX1000S
			APA300	RT14100A	RTAX2000S
			APA600	RTSX32SU	
			APA1000		
			RT54SX32S		
			RTSX32SU		

Ceramic Quad Flat Pack

208- and 256-Pin CQFP—Cavity Up with Heat Sink



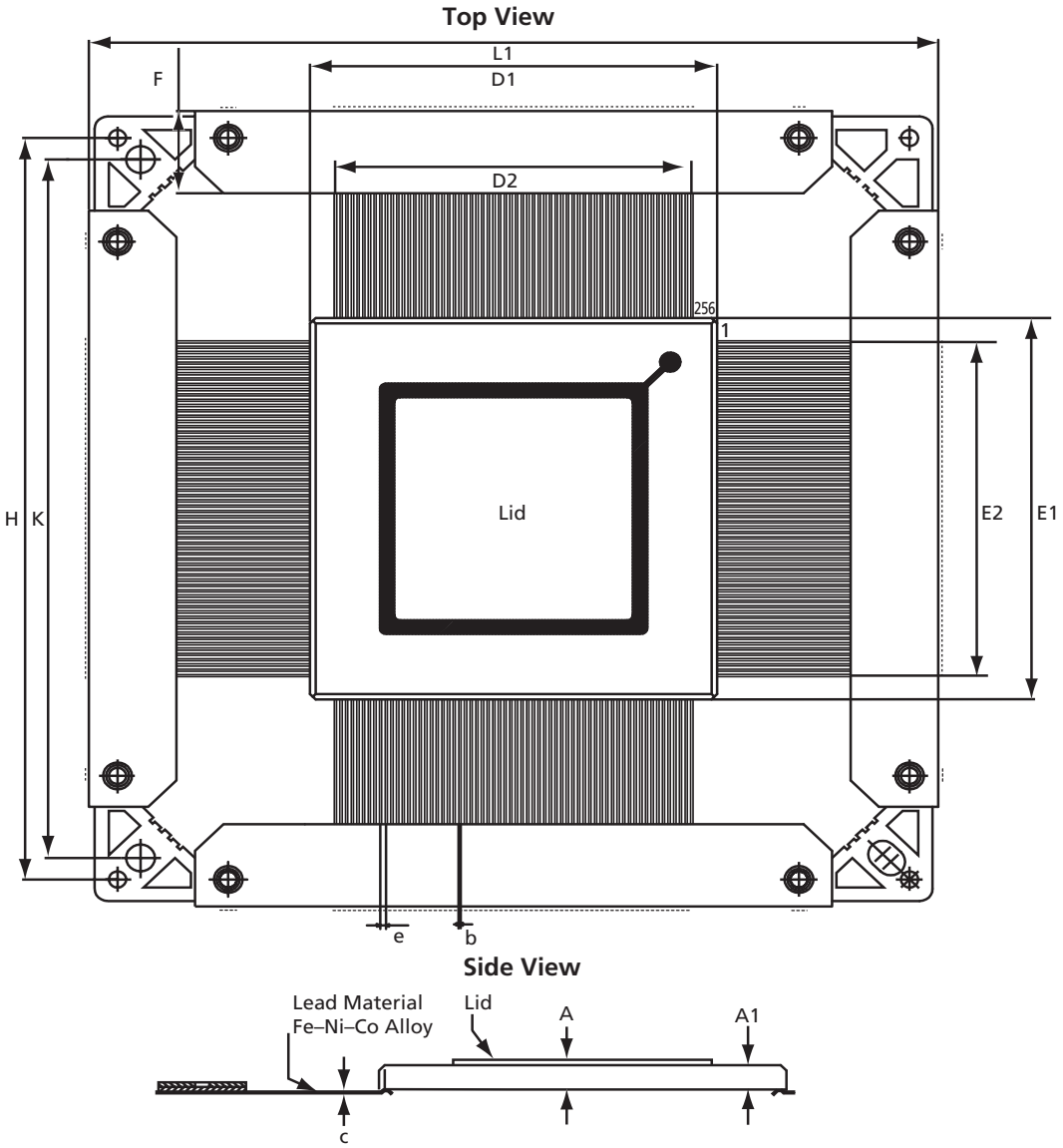
Notes:

1. All dimensions are in inches except CQ208, CQ256 and CQ352 which are in millimeters. Please see the "Ceramic Quad Flat Pack without Heat Sink Dimensions" on page 17 for the dimensions.
2. Outside lead frame holes (from dimension H) are circular for the CQ208, CQ256 and CQ352.
3. Seal ring and lid are connected to Ground.
4. Lead material is Kovar with minimum 60 microinches gold over nickel.
5. Packages are shipped unformed with the ceramic tie bar.

Supported Devices	
CQ208	**CQ256**
A32200DX	A54SX16
RT54SX72S	A54SX32
RTSX72SU	RT54SX72S
	RTSX72SU

Ceramic Quad Flat Pack

256-Pin CQFP—Cavity Down without Heat Sink



Notes:

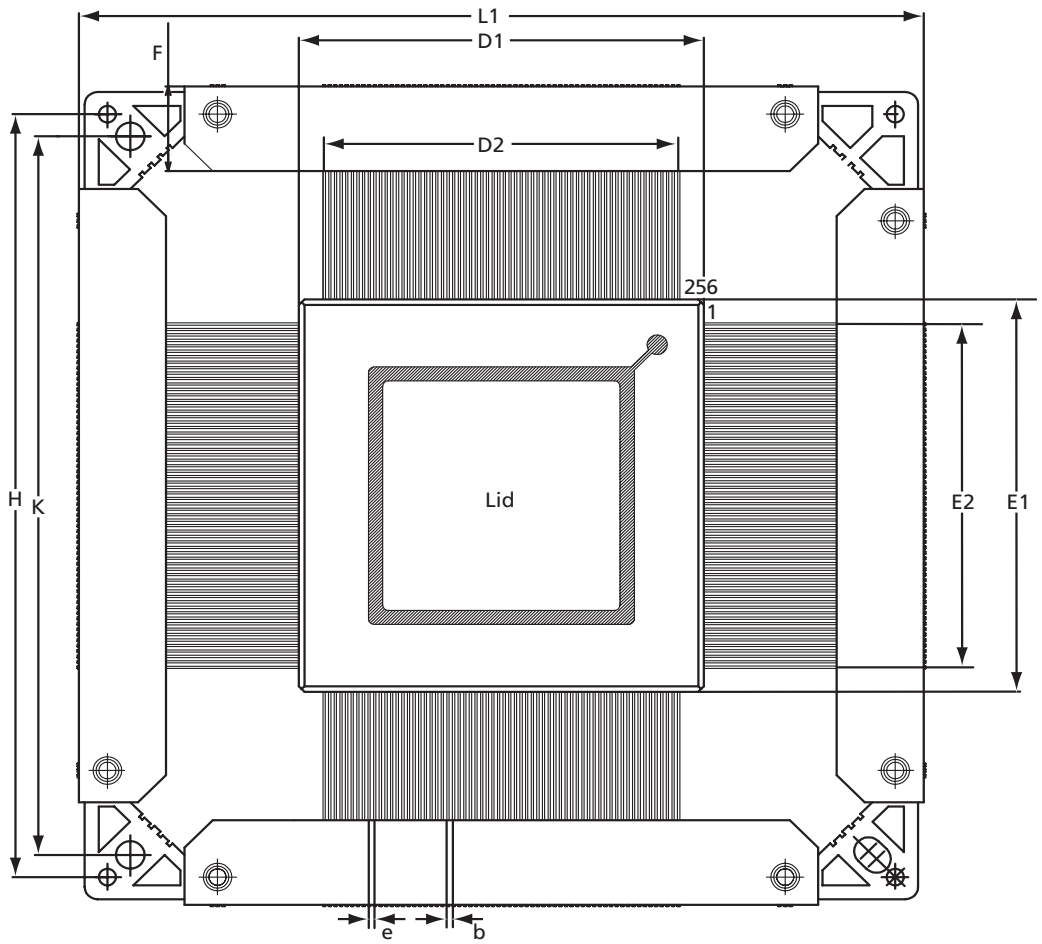
1. Dimensions are in millimeters. Please see the "Ceramic Quad Flat Pack with Heat Sink Dimensions" on page 18 for the dimensions.
2. Seal Ring and Lid are connected to Ground.
3. Lead material is Kovar with gold plate over nickel.
4. Packages are shipped unformed with the ceramic tie bar.
5. Package is cavity down, with the lid facing the bottom of the package. However the leads can be formed on either side if the application requires the lid to be facing the top.

Supported Device
A42MX36

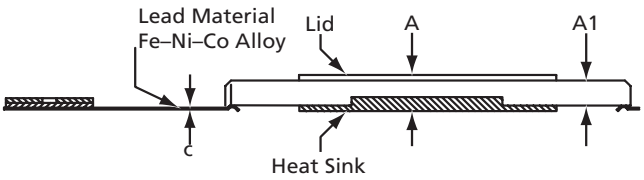
Ceramic Quad Flat Pack

256-Pin CQFP—Cavity Down with Heat Sink

Top View



Side View



Notes:

1. Packages are shipped unformed with the ceramic tie bar in a test carrier.
2. Dimensions are in millimeters. Please see the "Ceramic Quad Flat Pack with Heat Sink Dimensions" on page 18 for the dimensions.

Supported Device
A32200DX

Ceramic Quad Flat Pack without Heat Sink Dimensions

JEDEC Equiv	CQ132 MO-113 VAR AC			CQ172 MO-113 VAR AE			CQ196 MO-113 VAR AB			CQ208		
Symbol	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	0.094	0.105	0.116	0.094	0.105	0.116	0.094	0.105	0.116	2.30	2.80	3.30
A1	0.080	0.090	0.100	0.080	0.090	0.100	0.080	0.090	0.100	2.00	2.30	2.80
b	0.007	0.008	0.010	0.007	0.008	0.010	0.007	0.008	0.010	0.17	0.20	0.22
c	0.004	0.006	0.008	0.004	0.006	0.008	0.004	0.006	0.008	0.11	0.15	0.18
D1/E1	0.940	0.950	0.960	1.168	1.180	1.192	1.336	1.350	1.364	28.96	29.21	29.46
D2/E2	0.800 BSC			1.050 BSC			1.200 BSC			25.5 BSC		
e	0.025 BSC			0.025 BSC			0.025 BSC			0.50 BSC		
F	0.325	0.350	0.375	0.175	0.200	0.225	0.175	0.200	0.225	7.05	7.75	8.45
H	2.320 BSC			2.320 BSC			2.320 BSC			70.00 BSC		
K	2.140 BSC			2.140 BSC			2.140 BSC			65.90 BSC		
L1	2.485	2.500	2.505	2.485	2.495	2.505	2.485	2.495	2.505	74.60	75.00	75.40

JEDEC Equiv	CQ256 MO-134 VAR AB			CQ352 MO-134 VAR AE		
Symbol	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	2.30	2.80	3.30	2.43	2.66	2.89
A1	2.00	2.30	2.80	2.05	2.28	2.51
b	0.18	0.20	0.22	0.18	0.20	0.22
c	0.11	0.15	0.18	0.11	0.15	0.18
D1/E1	35.64	36.00	36.64	47.75	48.00	48.25
D2/E2	31.5 BSC			43.51 BSC		
e	0.50 BSC			0.50 BSC		
F	7.05	7.75	8.45		5.00	
H	70.00 BSC			70.00 BSC		
K	65.90 BSC			65.90 BSC		
L1	74.60	75.00	75.40	74.60	75.00	75.40

Notes:

1. All dimensions are in inches except CQ208, CQ256 and CQ352 which are in millimeters.
2. BSC equals Basic Spacing between Centers. This is a theoretical true position dimension and so has no tolerance.

Ceramic Quad Flat Pack with Heat Sink Dimensions

JEDEC Equiv	CQ208			CQ256 MO-134 VAR AB		
Symbol	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	2.79	3.30	3.90	2.79	3.30	3.90
A1	2.00	2.30	2.80	2.00	2.30	2.80
b	0.18	0.20	0.22	0.18	0.20	0.22
c	0.11	0.15	0.17	0.11	0.15	0.18
D1/E1	28.96	29.21	29.46	35.64	36.00	36.66
D2/E2	25.5 BSC			31.5 BSC		
e	0.50 BSC			0.50 BSC		
F	7.05	7.75	8.45	7.05	7.75	8.45
H	70.00 BSC			70.00 BSC		
K	65.90 BSC			65.90 BSC		
L1	74.60	75.00	75.40	74.60	75.00	75.40

Notes:

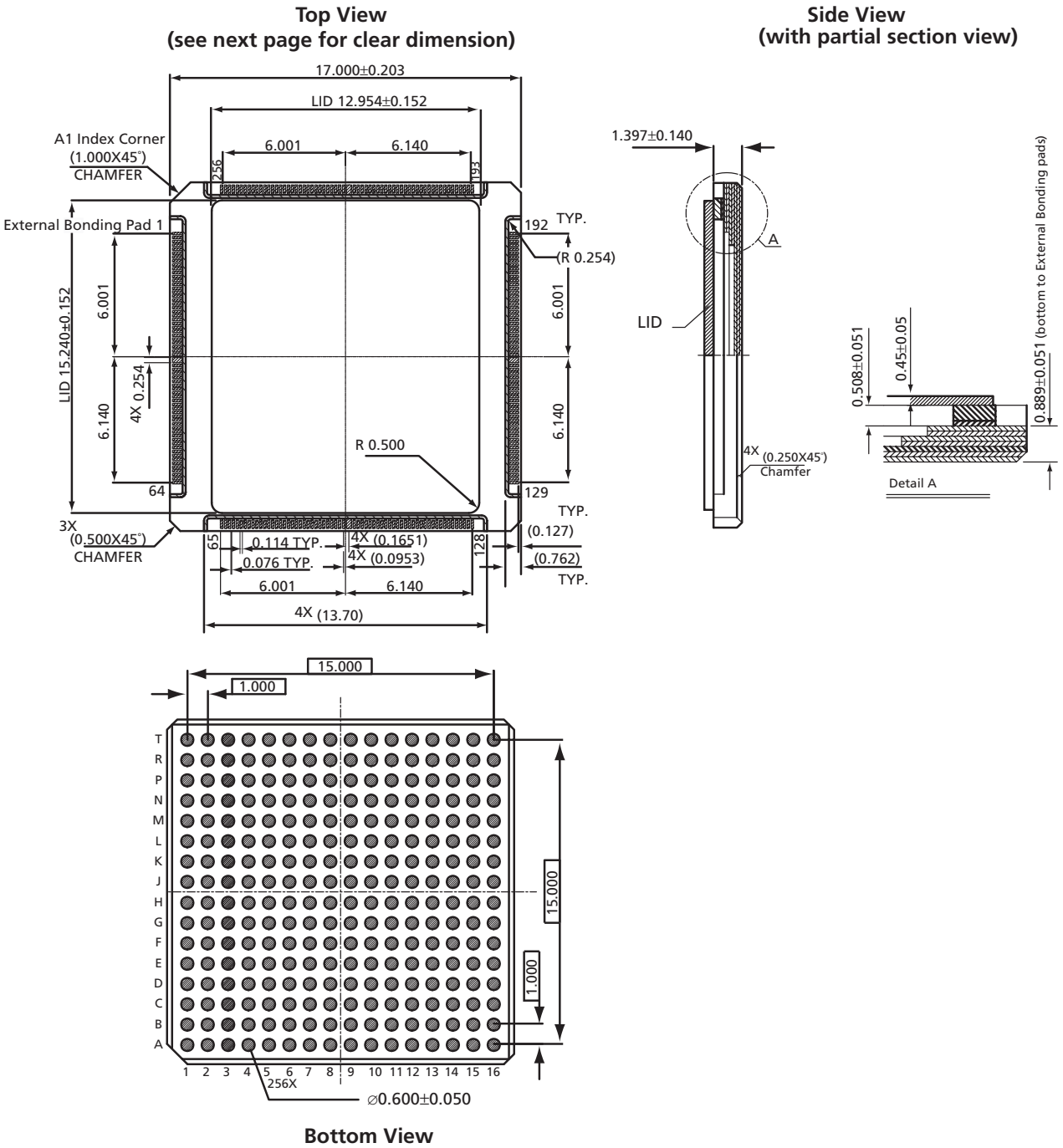
1. All dimensions are in inches except CQ208, CQ256 and CQ352 which is in millimeters.
2. BSC equals Basic Spacing between Centers. This is a theoretical true position dimension and so has no tolerance.

The dimensions above are for reference only. For more accurate dimensions, use the dimensions in the SMD drawings for a specified device.

For heat sink information, refer to Actel's *Hermetic Package Mechanical (Cavity, weight, Lid size and Heat Sink size) Configuration* document located at: *http://www.actel.com/documents/HermeticPckg.pdf*

Ceramic Chip Carrier Land Grid Substrate

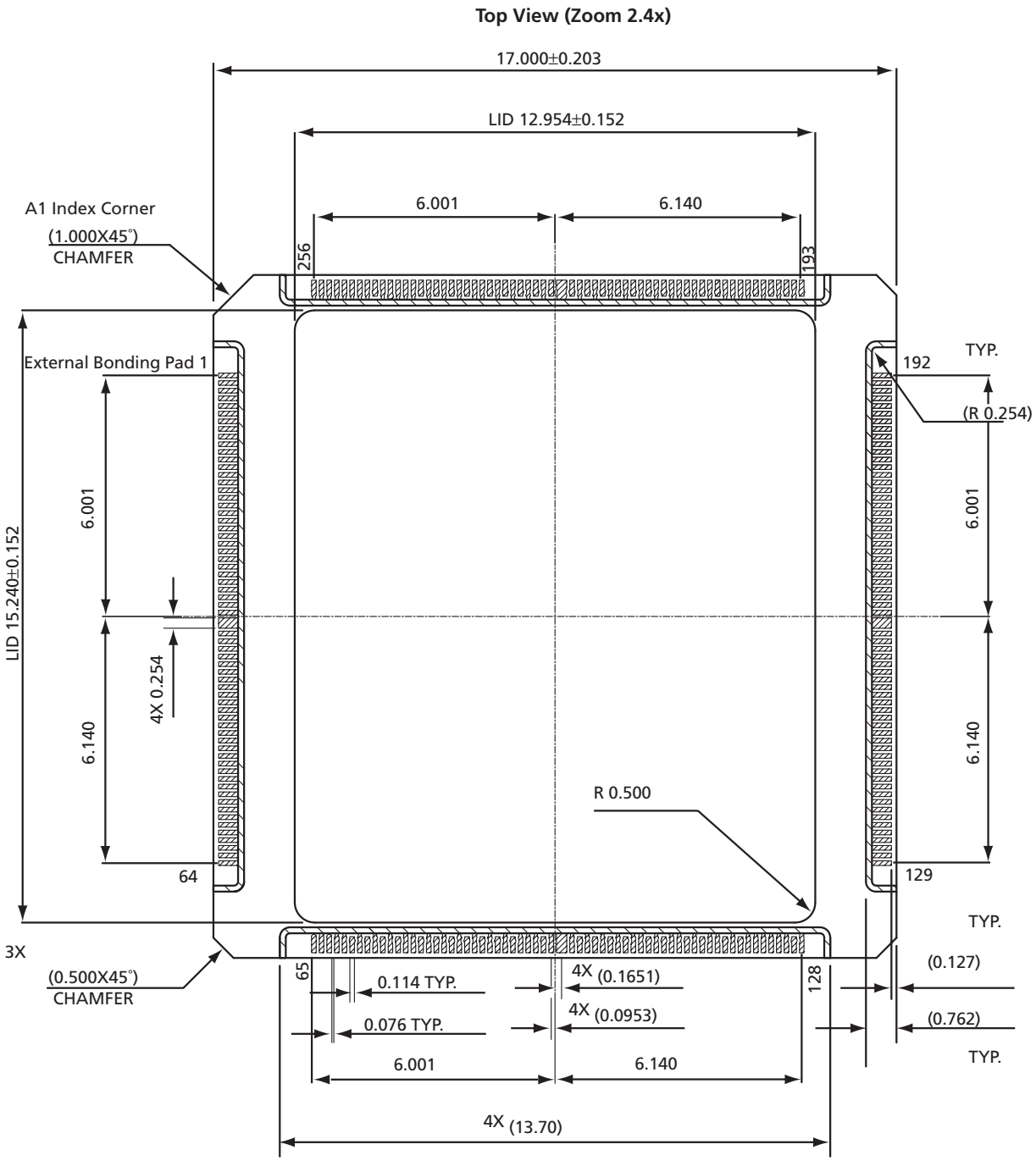
256-Pin CCLG



Note: *Units are in millimeters.*

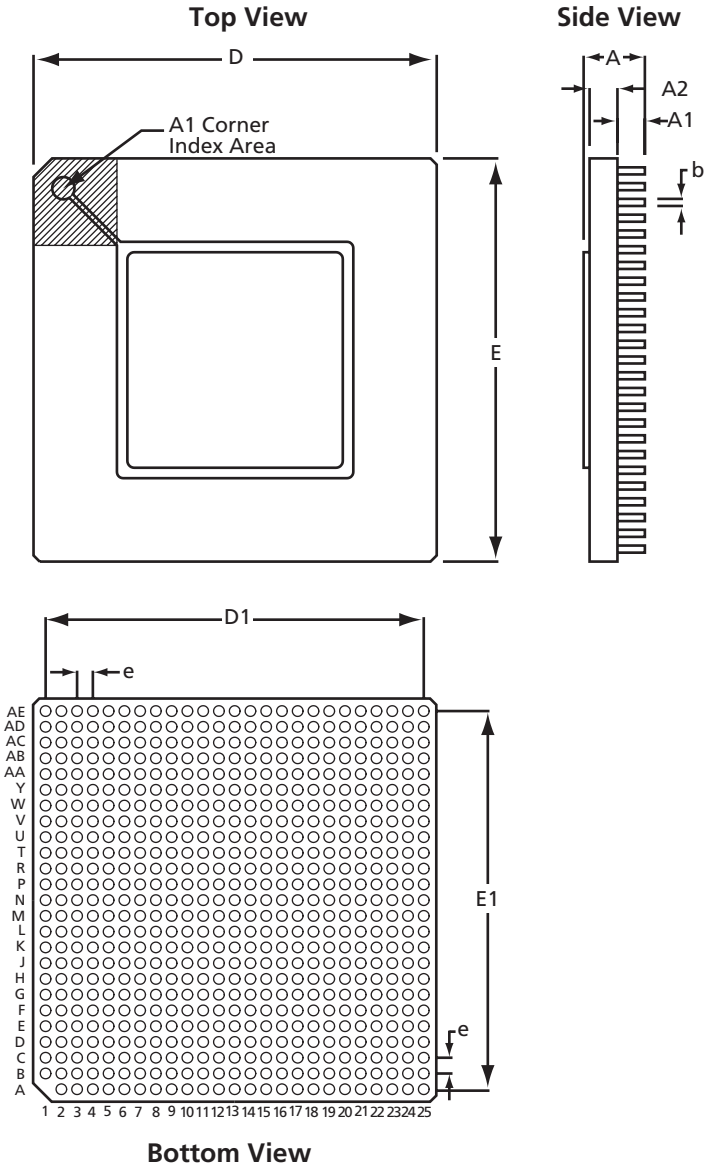
Supported Device	
RT54SX32S	RTSX32SU

Ceramic Chip Carrier Land Grid Substrate Dimensions



Ceramic Column Grid Array

624-Pin CCGA



Supported Devices		
AX2000	RTAX1000S	APA600
	RTAX2000S	APA1000
	RT54SX72S	
	RTSX72SU	

Ceramic Column Grid Array Dimensions

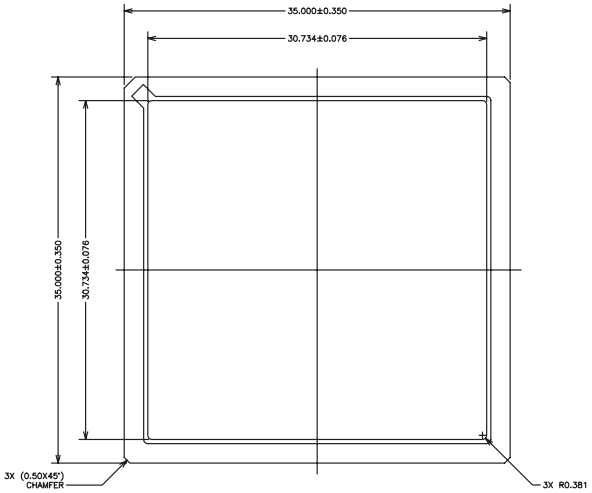
JEDEC Equiv	CG624 MO-158 VAR BE-01		
Dimension	**Min.**	**Nom.**	**Max.**
A	4.51	4.94	5.37
A1	2.01	2.21	2.41
A2	2.02	2.25	2.78
b	0.43	0.51	0.58
D/E	32.30	32.50	32.70
D1/E1	30.48 BSC		
e	1.27 BSC		

Note: *All dimensions are in millimeters.*

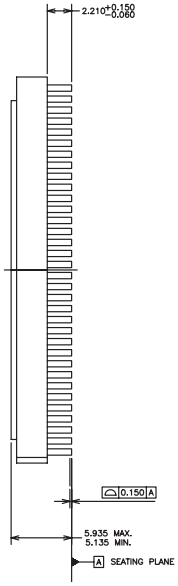
Ceramic Column Grid Array

1152-Pin CCGA

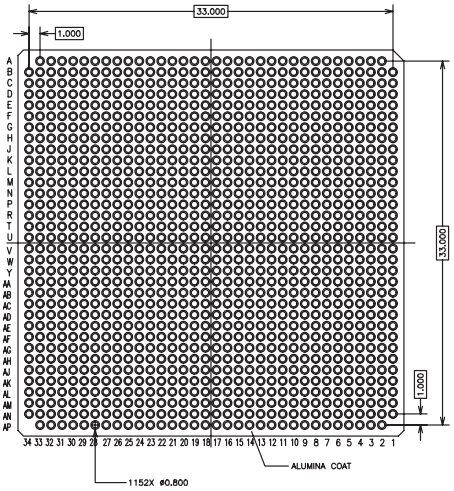
CG1152 Top View



CG1152 Side View



CG1152 Bottom View



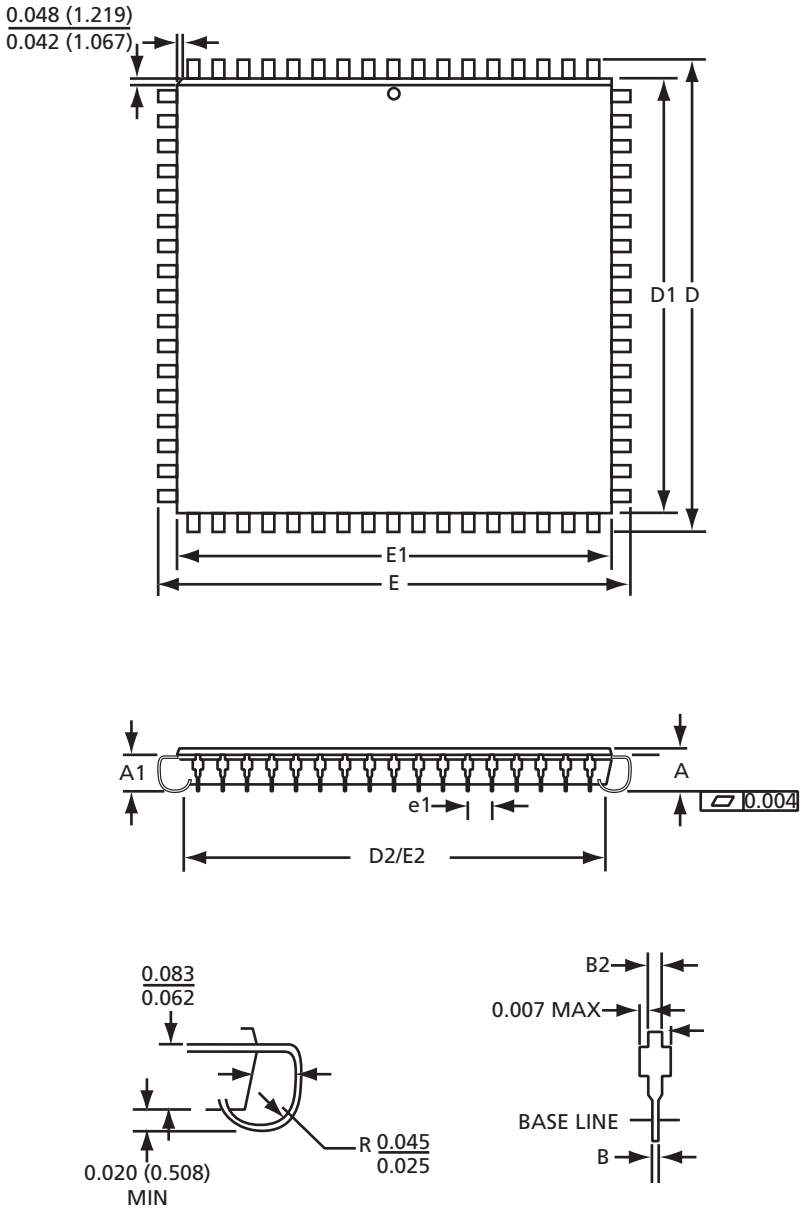
Notes:

1. The units are in mm.
2. The seal ring area must be connected to GND.
3. Die attach area must be connected to GND.

Plating Thickness	
Top: Ni Plating	3.20 ~ 8.89 Micron
Top: Au Plating	2.50 Micron Min.
Bottom: Ni Plating	3.20 ~ 8.89 Micron
Bottom: Au Plating	0.03 ~ 0.10 Micron.

Supported Devices
RTAX2000S

Plastic Leaded Chip Carrier (PLCC)



Note: *Dimensions are in millimeters. Please see the "Plastic Leaded Chip Carrier Dimensions" on page 25 for the dimensions.*

Supported Devices				
PLCC 44	**PLCC 68**	**PLCC 84**		
A1010B	A1010B	A10V20B	A1020B	A3265A
A1020B	A1020B	A1225XLV	A1225A	A54SX08
A40MX02	A10V10B	A1280XLV	A1240A	A32100DX
A40MX04	A10V20B	A2140XLV	A1280A	A32140DX
	A40MX02	A14V15A	A1225XL	A40MX04
	A40MX04	A14V25A	A1240XL	A42MX09
		A14V40A	A1280XL	A42MX16
		A3265DXV	A1415A	A42MX24
		A32100DXV	A1425A	
		A32140DXV	A1440A	

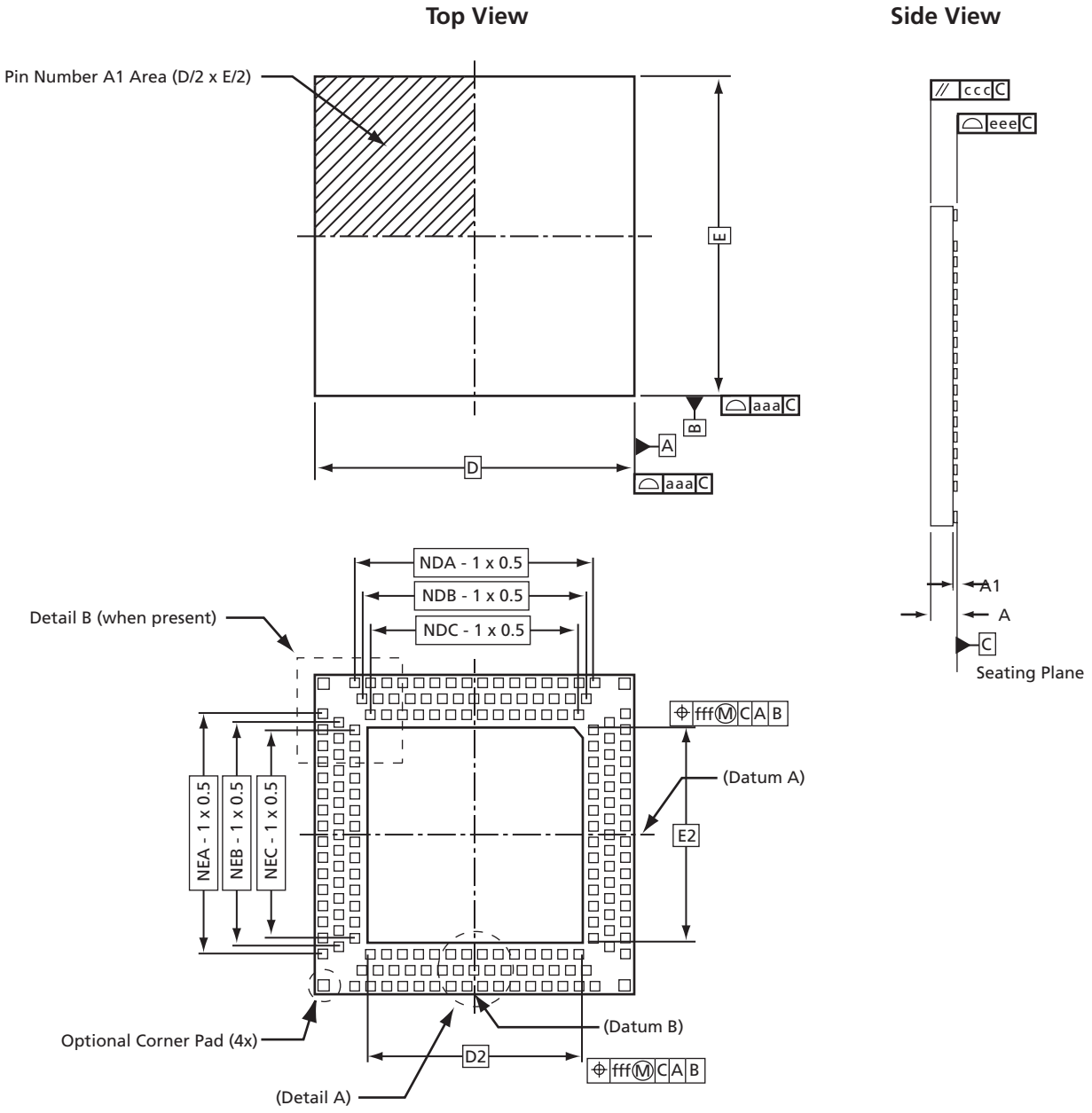
Plastic Leaded Chip Carrier Dimensions

JEDEC Equiv	**PLCC 44 MS-018 VAR AC**			**PLCC 68 MS-018 VAR AE**			**PLCC 84 MS-018 VAR AF**		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	0.165	0.172	0.180	0.165	0.172	0.180	0.165	0.172	0.180
A1	0.090	0.105	0.120	0.090	0.105	0.120	0.090	0.105	0.120
B	0.013	–	0.021	0.013	–	0.021	0.013	–	0.021
B2	0.026	–	0.032	0.026	–	0.032	0.026	–	0.032
D/E	0.685	0.690	0.695	0.985	0.990	0.995	1.185	1.190	1.195
D1/E1	0.650	0.653	0.656	0.950	0.954	0.958	1.150	1.154	1.158
D2/E2	0.590	0.610	0.630	0.890	0.910	0.930	1.090	1.110	1.130
e1	0.050 BSC			0.050 BSC			0.050 BSC		

Notes:

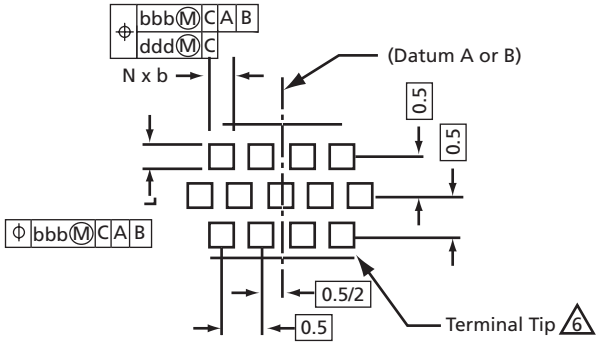
1. All dimensions are in inches.
2. BSC—Basic Spacing between Centers.

Quad Flat No Lead (QFN)

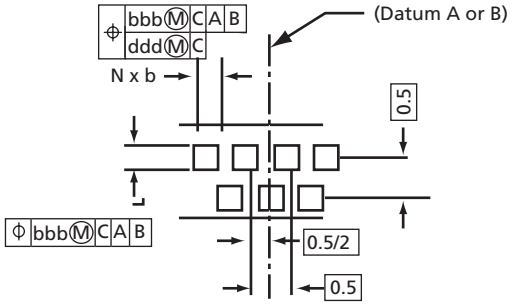


Quad Flat No Lead Details

Detail A

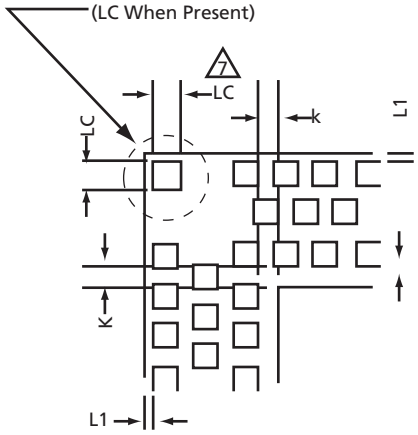


QN180/QN132



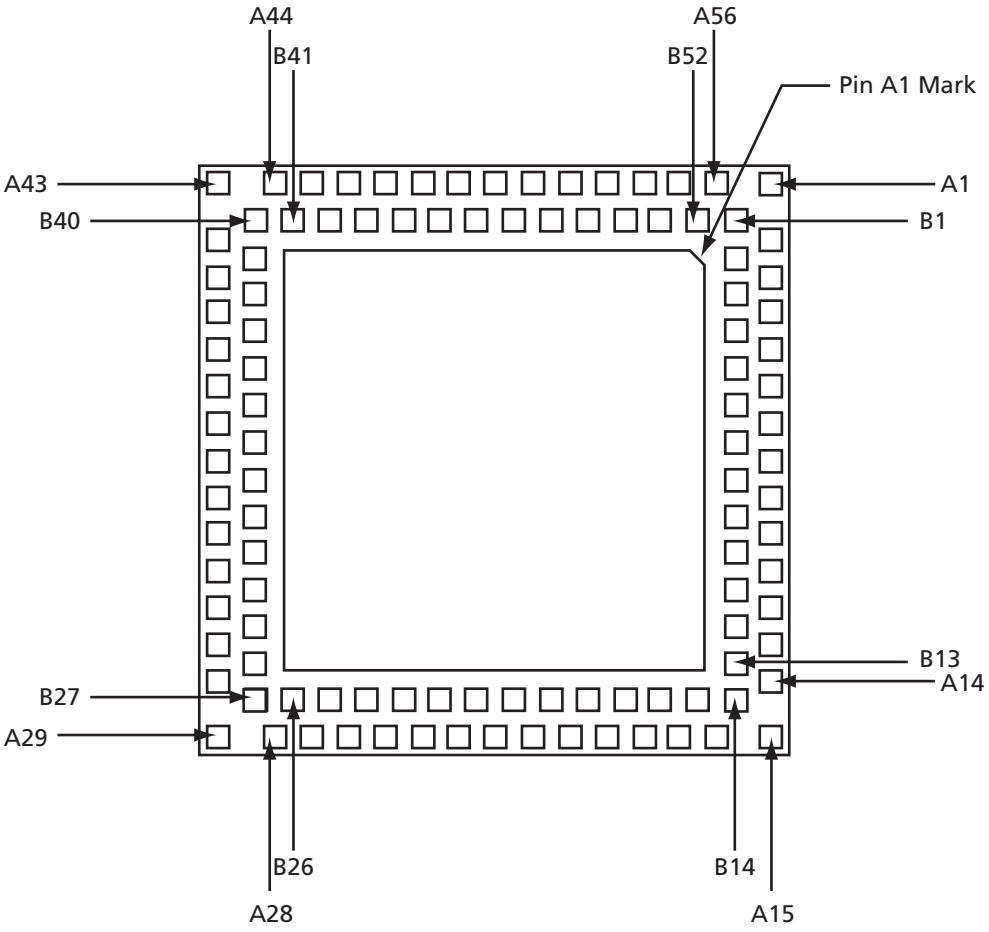
QN108

Detail B



Quad Flat No Lead

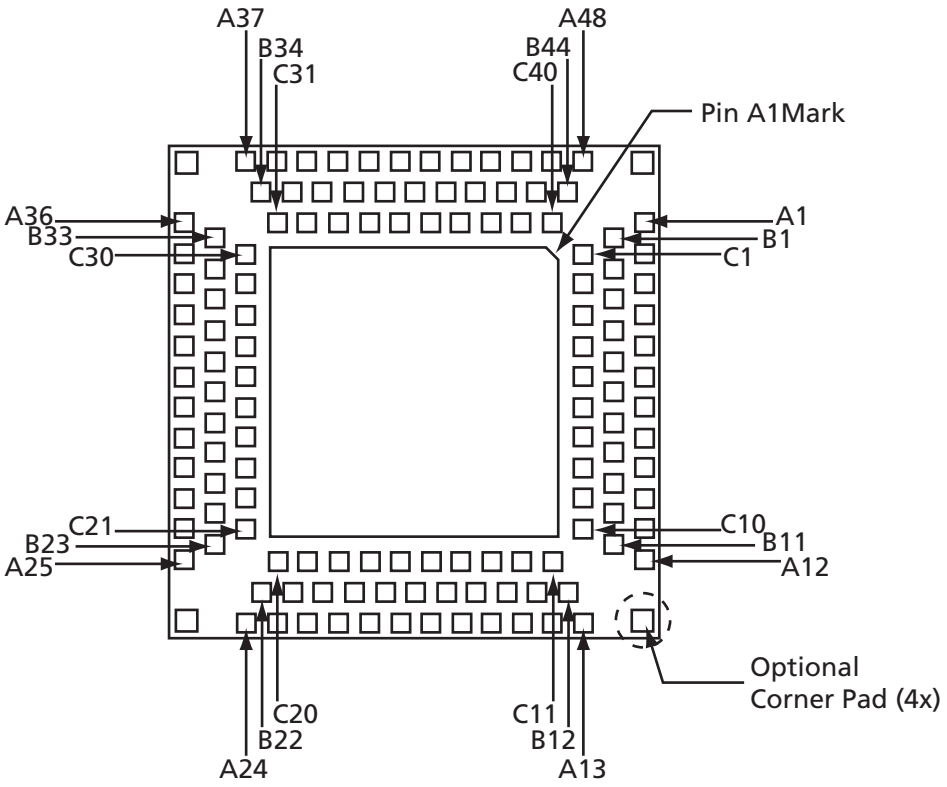
108-Pin Bottom View (QFN108)



Supported Device
AFS090

Quad Flat No Lead

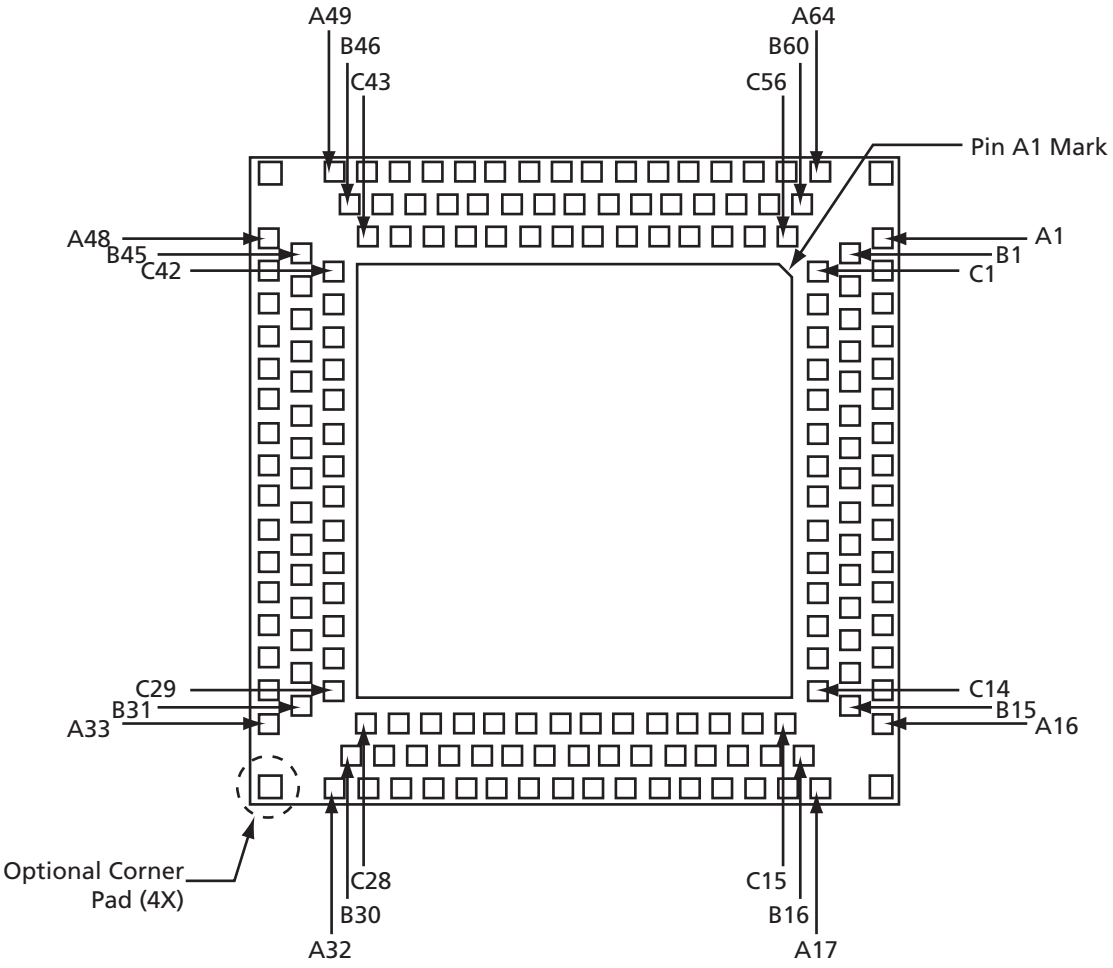
132-Pin Bottom View (QFN132)



Supported Device
A3P030
A3P060
A3P125
A3P250

Quad Flat No Lead

180-Pin Bottom View (QFN180)



Supported Devices
AFS090
AFS250

Quad Flat No Leads Dimensions

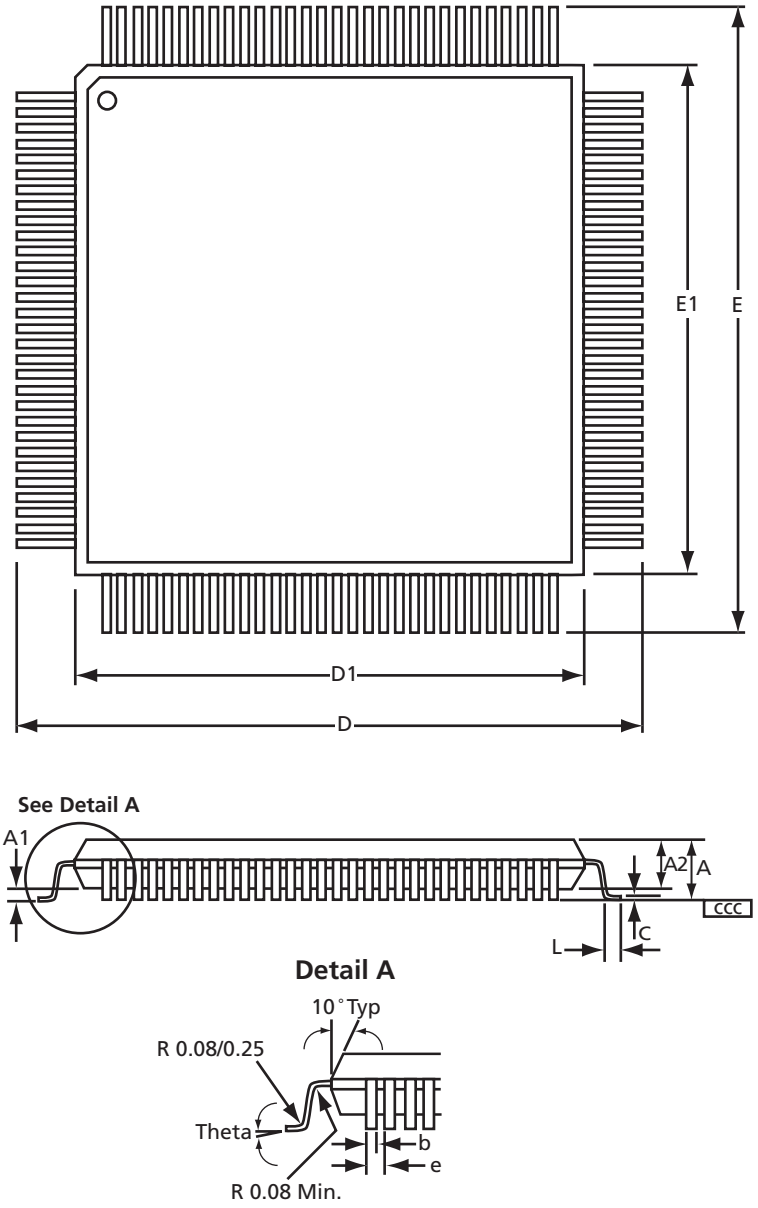
Symbol	Min.	Nom.	Max.
A	0.70	0.75	0.80
A1	0.00	–	0.05
b	0.25	–	0.35
d	0.25	–	0.35
k	0.20	–	–
L	0.25	–	0.35
L1	0.05	–	0.05
Tolerance of Form and Position			
aaa	0.15		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		
fff	0.10		

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

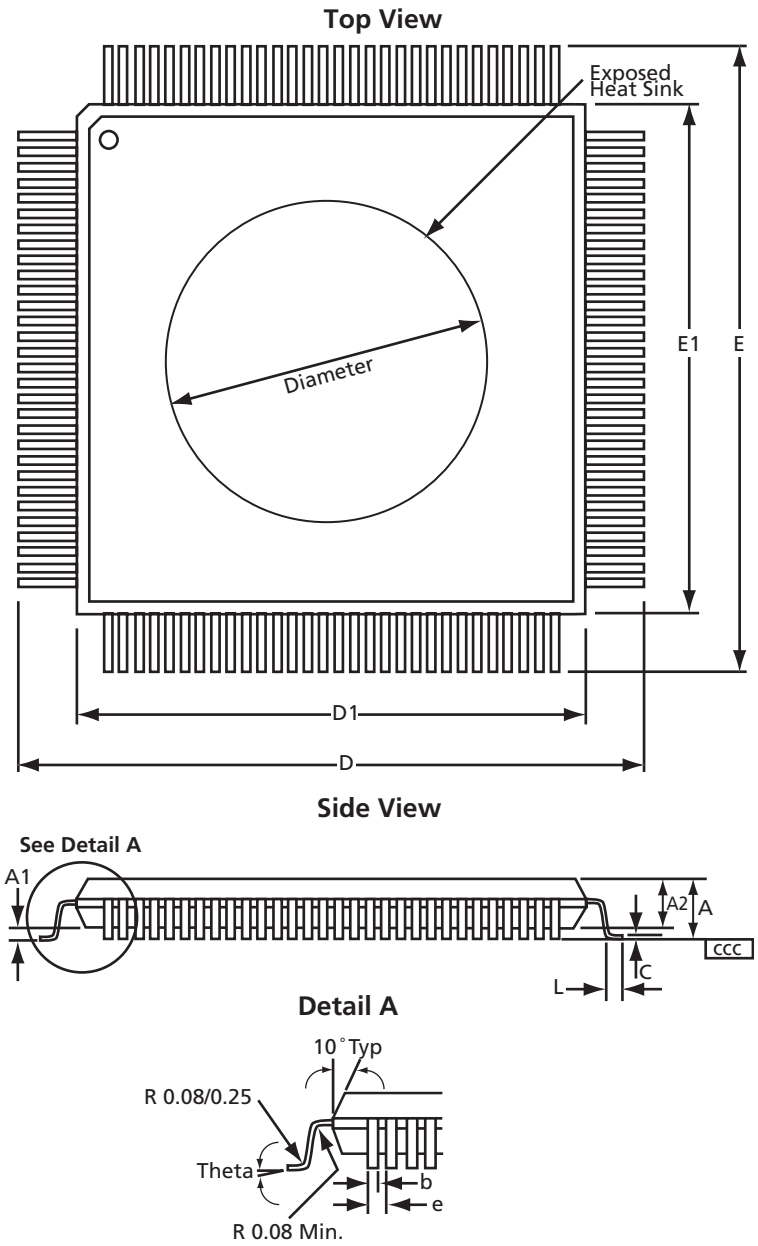
Variation / Symbol		QFN108	QFN132	QFN180
D BSC.		8.00	8.00	10.00
E BSC.		8.00	8.00	10.00
D2	Min.	5.65	4.65	6.65
	Nom.	5.70	4.70	6.70
	Max.	5.75	4.75	6.75
E2	Min.	5.65	4.65	6.65
	Nom.	5.70	4.70	6.70
	Max.	5.75	4.75	6.75
LC	Min.	–	0.30	0.30
	Nom.	–	–	–
	Max.	–	0.40	0.40
N		108	132	180
NDA		12	12	16
NDB		11	11	15
NDC		–	10	14
NEA		12	12	16
NEB		11	11	15
NEC		–	10	14

Plastic Quad Flat Pack (PQFP, TQFP, VQFP)



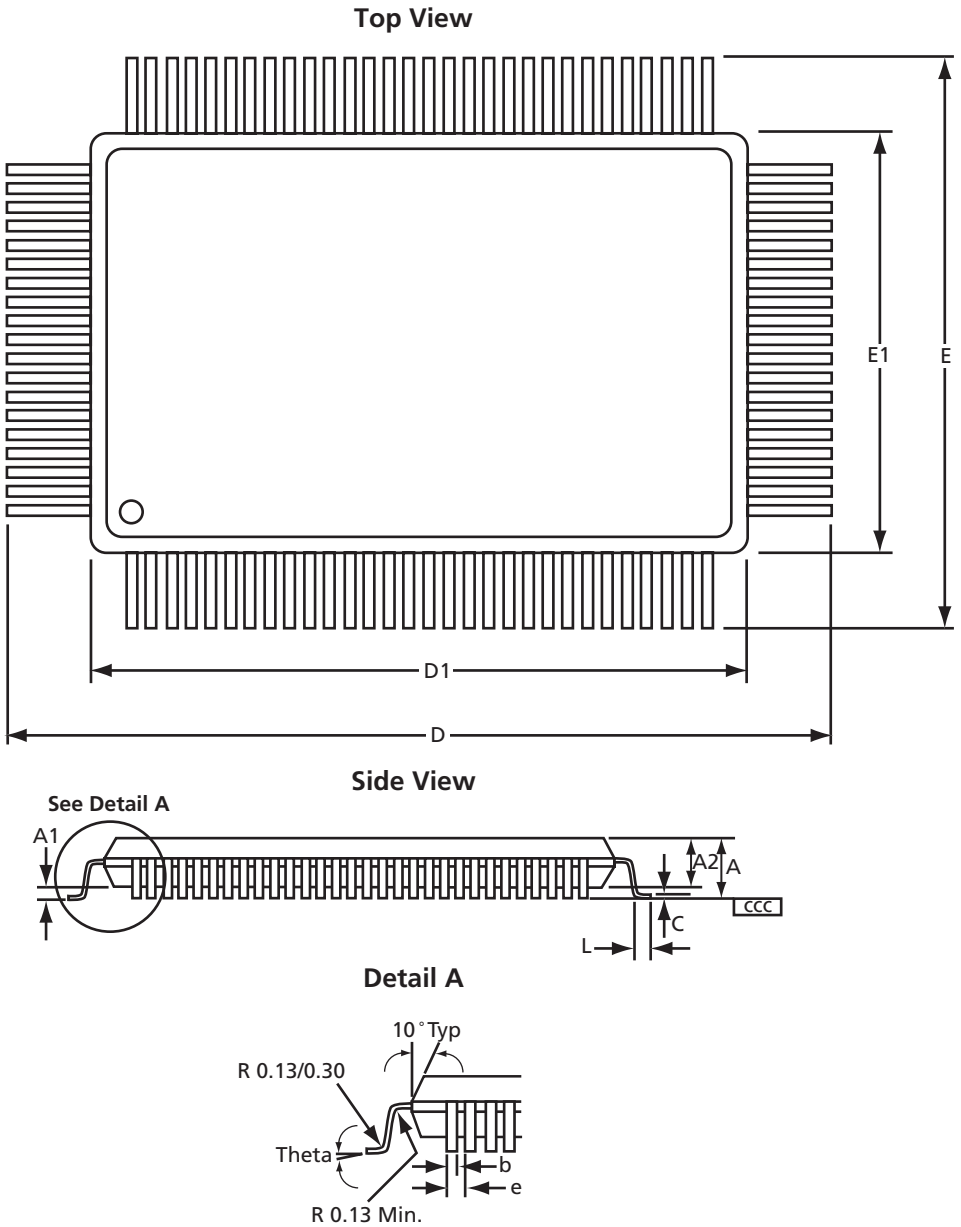
Note: *Dimensions are in millimeters. Please see the "Plastic Quad Flat Pack (PQFP) Dimensions" on page 36, "Plastic Quad Flat Pack (TQFP) Dimensions" on page 38, and "Plastic Quad Flat Pack (VQFP) Dimensions" on page 38 for the dimensions.*

Plastic Quad Flat Pack (RQFP)



Note: *Dimensions are in millimeters. Please see the "Plastic Quad Flat Pack (RQFP/PQFP) Dimensions" on page 36 for the dimensions.*

Plastic Quad Flat Pack Rectangular Package (PQ100)



Note: *Dimensions are in millimeters. Please see the "Plastic Quad Flat Pack (PQFP) Dimensions" on page 36 for the dimensions.*

Supported Devices								
RQFP 208	**PQFP 100**	**PQFP 144**	**PQFP 160**	**PQFP 208**			**RQFP 240**	**PQFP 240**
A14V100A	A1010B	A1240A	A14V25A	A1280XL	A54SX32A	APA1000	A32200DX	A42MX36
A14100A	A1020B	A1240XL	A1425A	A32100DX	A54SX72A	A1460A	A32300DX	
A32200DX	A1225A		A14V40A	A32140DX	AX250	A14V60A	A32200DXV	
A32300DX	A1225XL		A1440A	A32200DX	AX500	A3P125	A32300DXV	
A32300DXV	A1240XL		A14V60A	A32200DXV	A500K050	A3P250/ M7A3P250		
	A1415A		A1460A	A42MX16	A500K130	A3P400/ M7A3P400		
	A1425A		A1280A	A42MX24	A500K180	A3P600/ M7A3P600		
	A3265DX		A1280XL	A42MX36	A500K270	A3P1000/ M7A3P1000		
	A40MX02		A3265DX	A54SX08	APA075	A3PE600/ M7A3PE600		
	A40MX04		A32100DX	A54SX16	APA150	A3PE1500/ M7A3PE1500		
	A42MX09		A32140DX	A54SX16P	APA300	A3PE3000/ M7A3PE3000		
	A42MX16		A42MX09	A54SX32	APA450	AFS250		
			A42MX16	A54SX08A	APA600	AFS600/ M7AFS600		
			A42MX24	A54SX16A	APA750			

Plastic Quad Flat Pack (PQFP) Dimensions

JEDEC Equiv	PQFP 100 MS-022 VAR GC-1			PQFP 144 MS-022 VAR DC-1			PQFP 160 MS-022 VAR DD-1		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	–	–	3.40		–	4.10	–	–	4.10
A1	0.25	–	0.5	0.25	–	0.50	0.25	0.33	0.50
A2	2.50	2.70	2.9	3.20	3.40	3.60	3.20	3.40	3.60
b	0.22	–	0.40	0.22	–	0.40	0.22	–	0.40
c	0.11	–	0.23	0.11	–	0.23	0.11	–	0.23
D	23.20 BSC			31.20 BSC			31.20 BSC		
D1	20.00 BSC			28.00 BSC			28.00 BSC		
E	17.20 BSC			31.20 BSC			31.20 BSC		
E1	14.00 BSC			28.00 BSC			28.00 BSC		
e	0.65 BSC			0.65 BSC			0.65 BSC		
L	0.73	0.88	1.03	0.73	0.88	1.03	0.73	0.88	1.03
ccc	0.10			0.10			0.10		
Theta	0	–	7 deg	0	–	7 deg	0	–	7 deg

Plastic Quad Flat Pack (RQFP/PQFP) Dimensions

JEDEC Equiv	RQFP 208/PQFP 208 MS-029 VAR FA-1			RQFP 240/PQFP 240 MS-029 VAR GA		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	–	–	4.10		–	4.10
A1	0.25		0.50	0.25	–	0.50
A2	3.20	3.40	3.60	3.20	3.40	3.60
b	0.17	–	0.27	0.17	–	0.27
c	0.09	–	0.20	0.09	–	0.20
D/E	30.60 BSC			34.60 BSC		
D1/E1	28.00 BSC			32.10 BSC		
e	0.50 BSC			0.50 BSC		
L	0.45	0.60	0.75	0.50	0.60	0.75
ccc	0.10			0.10		
Theta	0	3.50	8 deg	0	3.50	8 deg
Diameter	19.82	20.32	20.82	23.63	24.13	24.63

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

Supported Devices							
TQFP 64	**TQFP 100**	**TQFP 144**	**TQFP 176**		**VQFP 80**	**VQFP 100**	
eX64	APA075	A54SX08	A1240A	A42MX09	A1010B	A1225XL	A54SX16
eX128	APA150	A54SX16P	A1440A	A42MX16	A10V10B	A1415A	A54SX16P
	A54SX08A	A54SX32	A1460A	A42MX24	A1020B	A1425A	A54SX08
	A54SX16A	A54SX08A	A14V40A	A54SX08	A10V20B	A1440A	A3P030
	A54SX32A	A54SX16A	A14V60A	A54SX16	A40MX02	A14V15A	A3P060
	eX64	A54SX32A	A1240XL	A54SX16P	A40MX04	A14V25A	A3P125
	eX128	APA075	A1280XL	A54SX32		A14V40A	A3P250/M7A3P250
	eX256	A3P060	A1280XLV	A54SX32A		A42MX09	
		A3P125	A1240XLV			A42MX16	
			A3265DX				
			A32140DX				
			A3265DXV				
			A32140DXV				

Plastic Quad Flat Pack (TQFP) Dimensions

JEDEC Equivalent	TQFP 64 MS-026 VAR BCD			TQFP 100 MS-026 VAR BED			TQFP 144 MS-026 VAR BFB			TQFP 176 MS-026 VAR BCA		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	–	–	1.60	–	–	1.60	–	–	1.60	–	–	1.60
A1	0.05	–	0.15	0.05	–	0.15	0.05	–	0.15	0.05	–	0.15
A2	1.35	1.40	1.45	1.35	1.40	1.45	1.35	1.40	1.45	1.35	1.40	1.45
b	0.17	0.22	0.27	0.17	0.22	0.27	0.17	0.22	0.27	0.17	0.22	0.27
c	0.09	–	0.20	0.09	–	0.20	0.09	–	0.20	0.09	–	0.20
D/E	12.00 BSC			16.00 BSC			22.00 BSC			26.00 BSC		
D1/E1	10.00 BSC			14.00 BSC			20.00 BSC			24.00 BSC		
e	0.50 BSC			0.50 BSC			0.50 BSC			0.50 BSC		
L	0.45	0.60	0.75	0.45	0.60	0.75	0.45	0.60	0.75	0.45	0.60	0.75
ccc	0.08			0.08			0.08			0.08		
Theta	0	3.50 deg	7 deg	0	3.50 deg	7 deg	0	3.50 deg	7 deg	0	3.50 deg	7 deg

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

Plastic Quad Flat Pack (VQFP) Dimensions

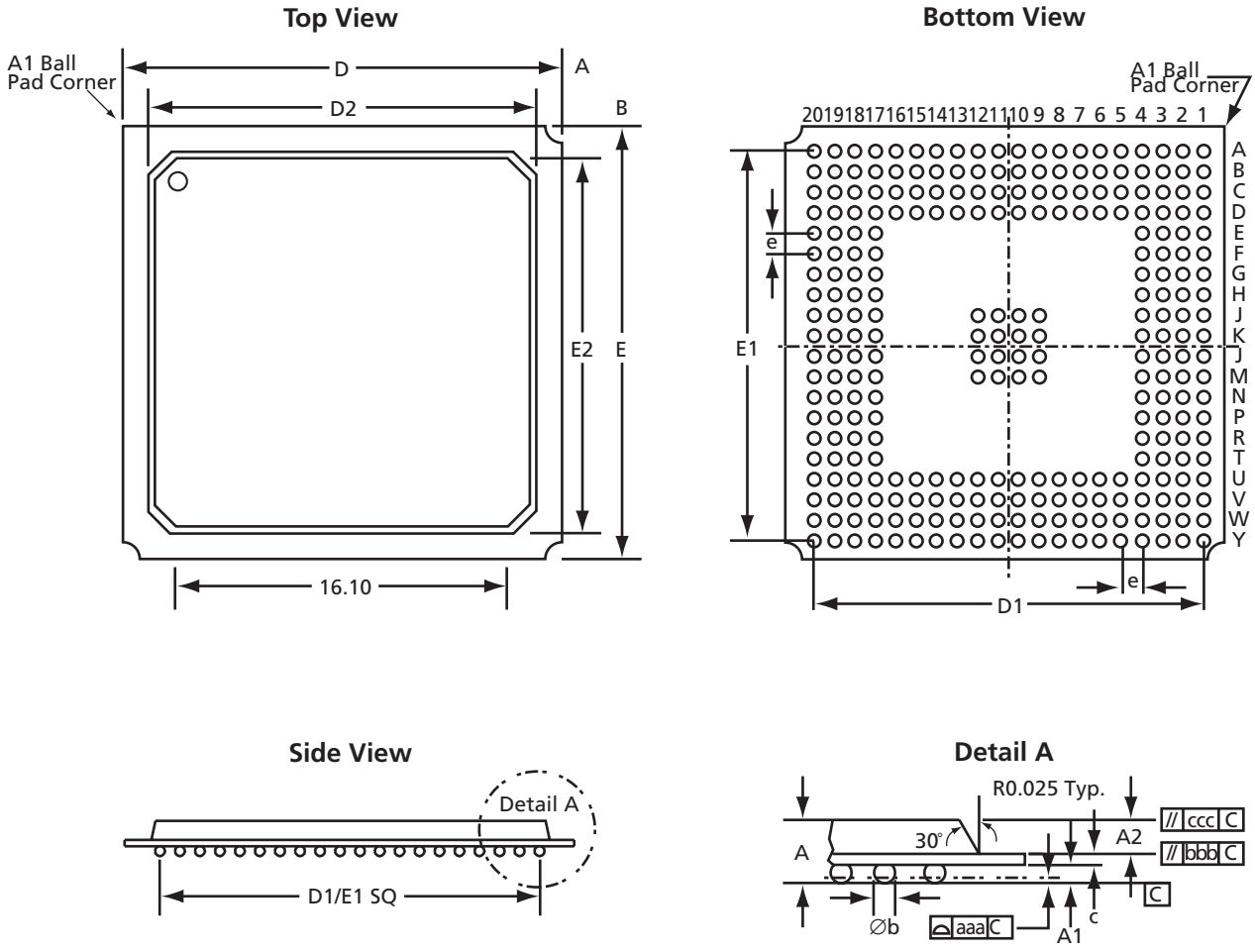
JEDEC Equivalent	VQFP 80 MS-026 VAR AEC			VQFP 100 MS-036 VAR AED		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	–	–	1.20		–	1.20
A1	0.05	–	0.15	0.05	–	0.15
A2	0.95	1.00	1.05	0.95	1.00	1.05
b	0.22	0.32	0.38	0.17	0.22	0.27
c	0.09	–	0.20	0.09	–	0.20
D/E	16.00 BSC			16.00 BSC		
D1/E1	14.00 BSC			14.00 BSC		
e	0.65 BSC			0.50 BSC		
L	0.45	0.60	0.75	0.45	0.60	0.75
ccc	0.10			0.08		
Theta	0	3.50 deg	7 deg	0	3.50 deg	7 deg

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

Plastic Ball Grid Array

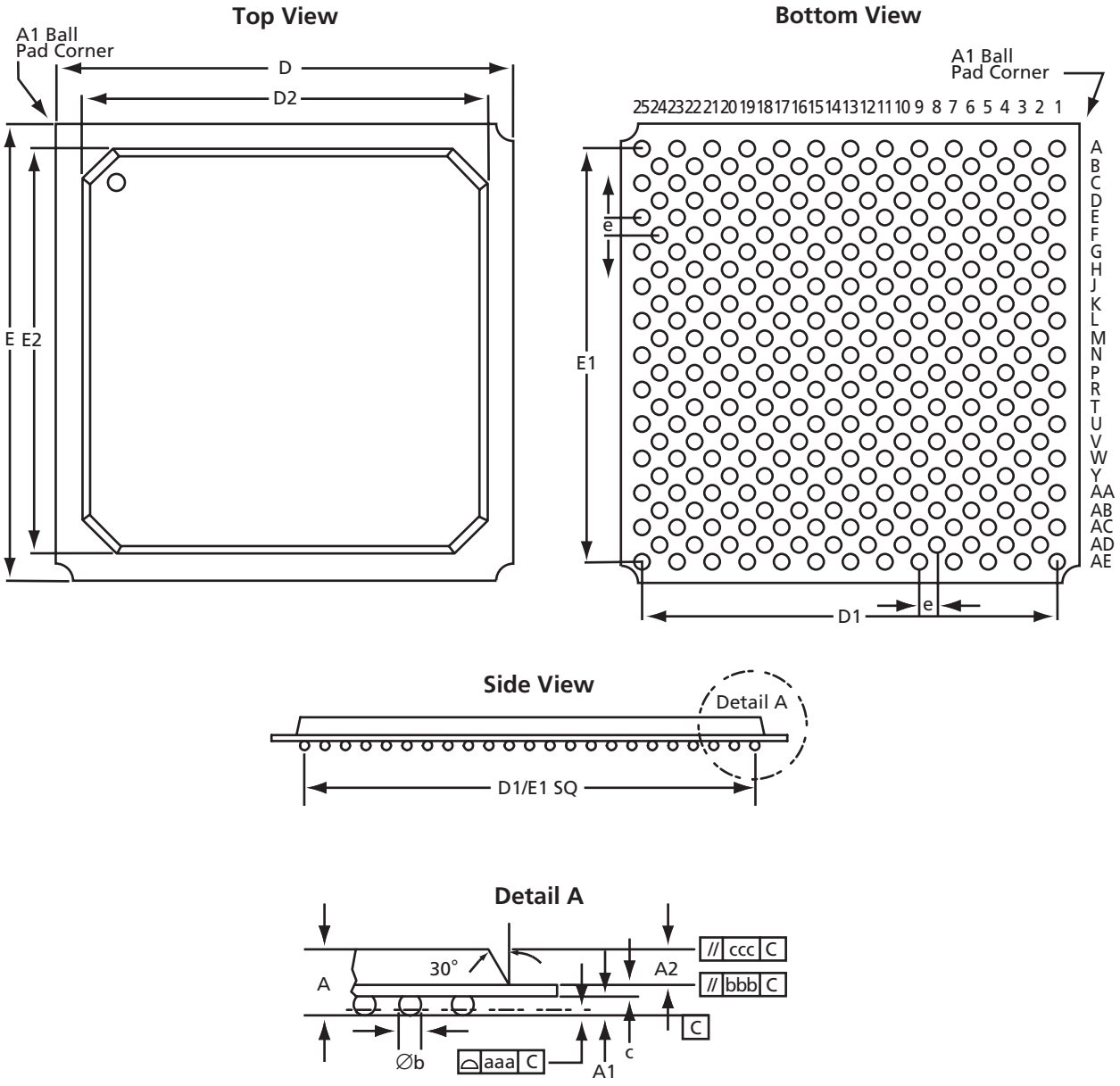
272-Pin PBGA



Supported Devices	
A42MX36	A500K050 A500K130

Plastic Ball Grid Array

313-Pin PBGA

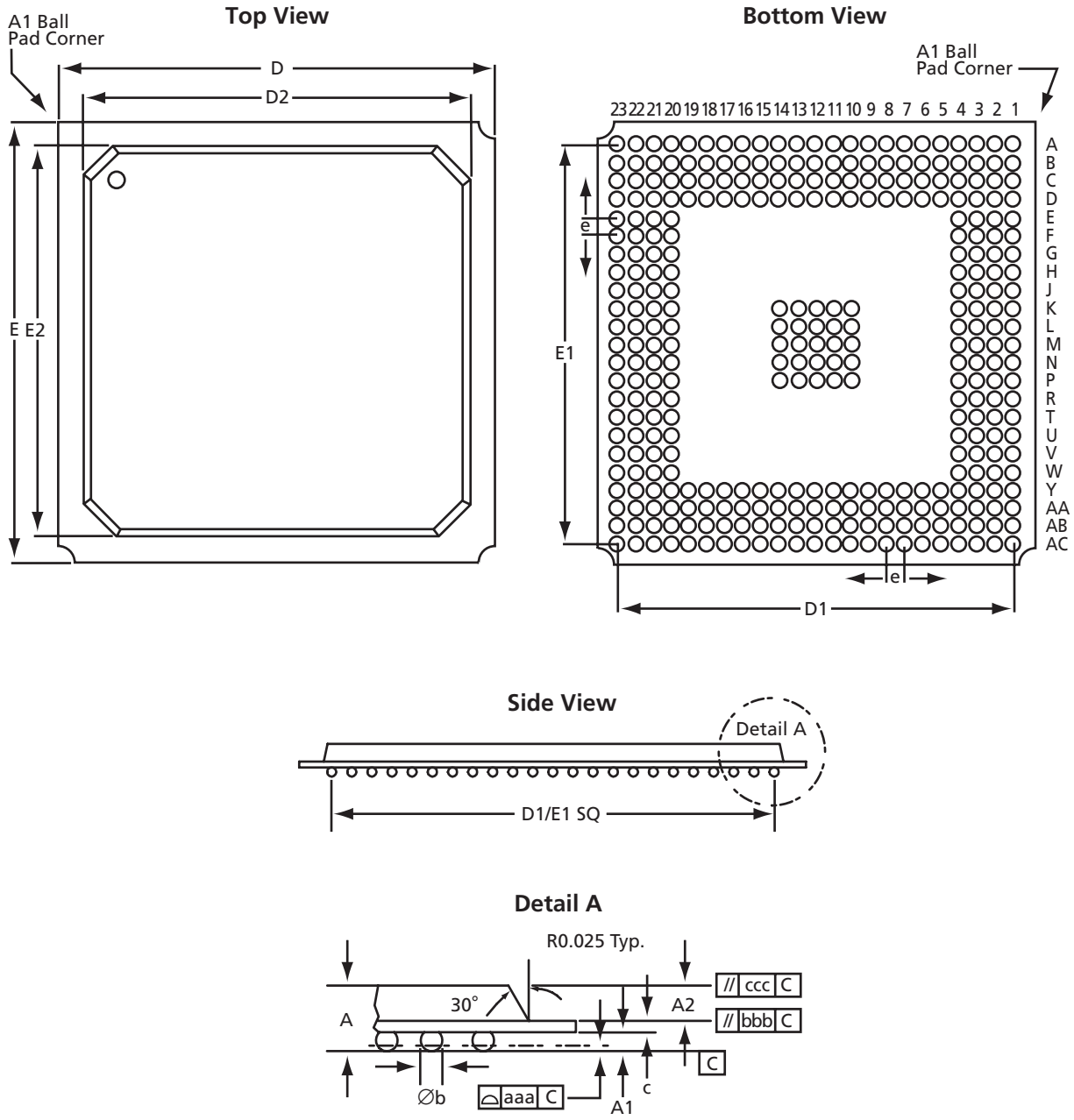


Note: *Dimensions are in millimeters. Please see the* *"Plastic Ball Grid Array Dimensions" on page 44* *for the dimensions.*

Supported Devices		
A54SX32	A14100A	A14V100A

Plastic Ball Grid Array

329-Pin PBGA

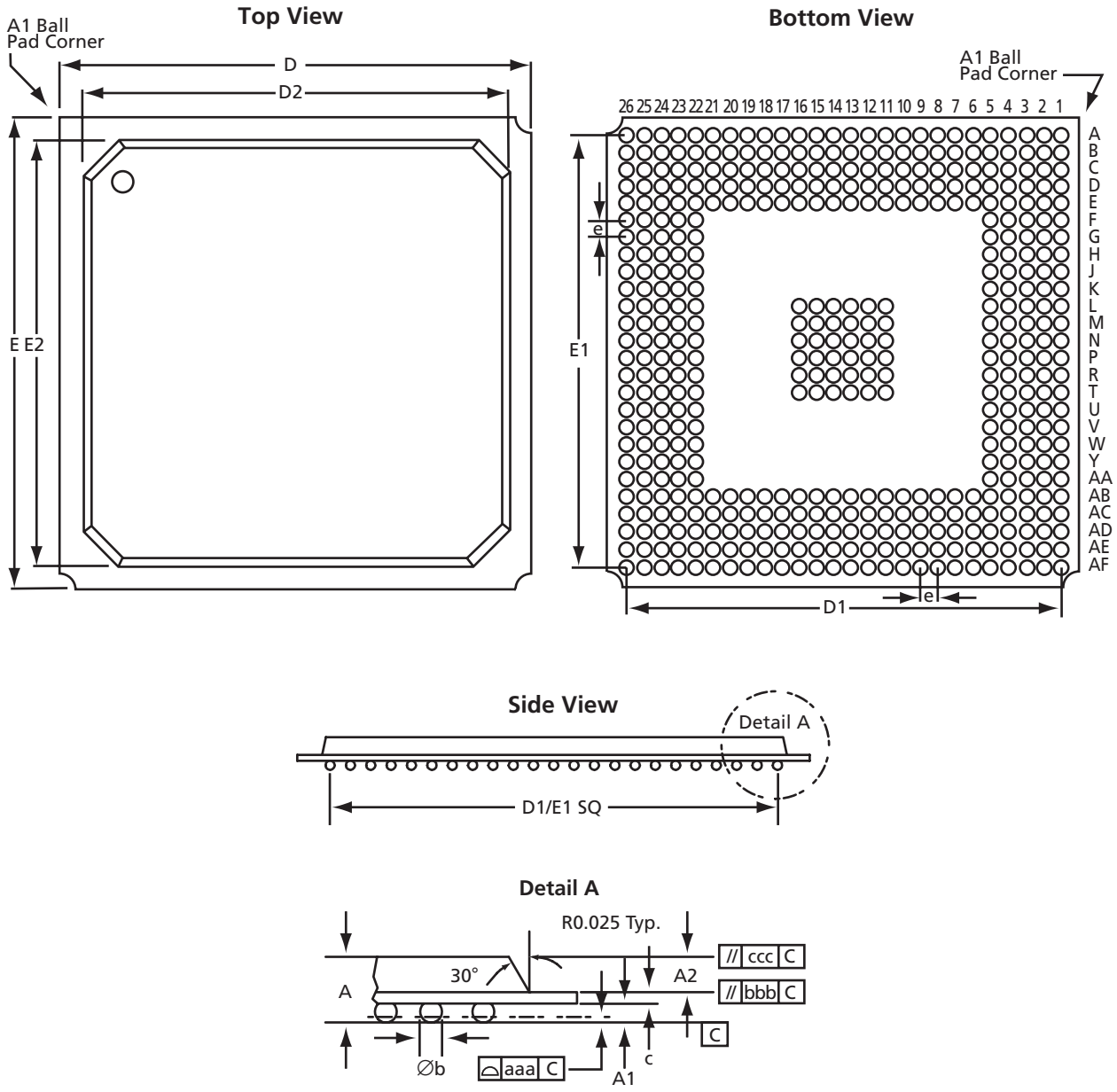


Note: *Dimensions are in millimeters. Please see the "Plastic Ball Grid Array Dimensions" on page 44 for the dimensions.*

Supported Devices	
A54SX32	A53SX32A

Plastic Ball Grid Array

456-Pin PBGA

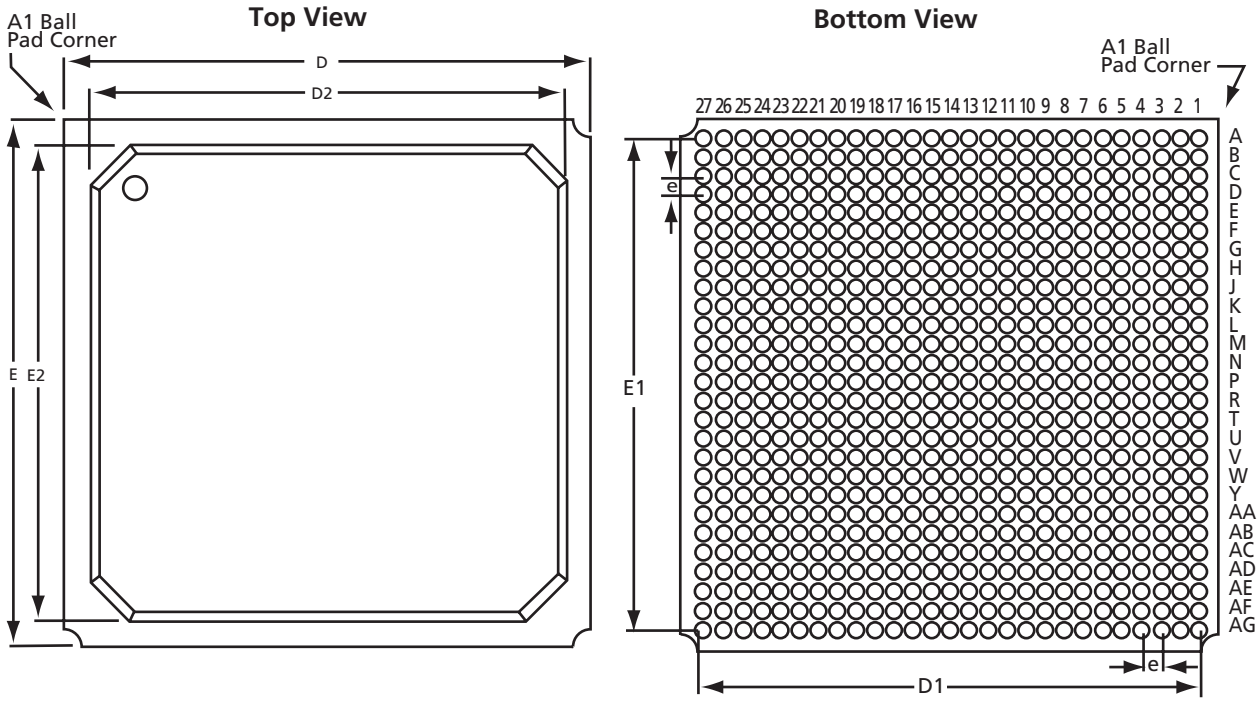


Note: *Dimensions are in millimeters. Please see the "Plastic Ball Grid Array Dimensions" on page 44 for the dimensions.*

Supported Devices		
A500K130	APA150	APA600
A500K180	APA300	APA750
A500K270	APA450	APA1000

Plastic Ball Grid Array

729-Pin PBGA



Note: *Dimensions are in millimeters. Please see the "Plastic Ball Grid Array Dimensions" on page 44 for the dimensions.*

Supported Device
AX1000

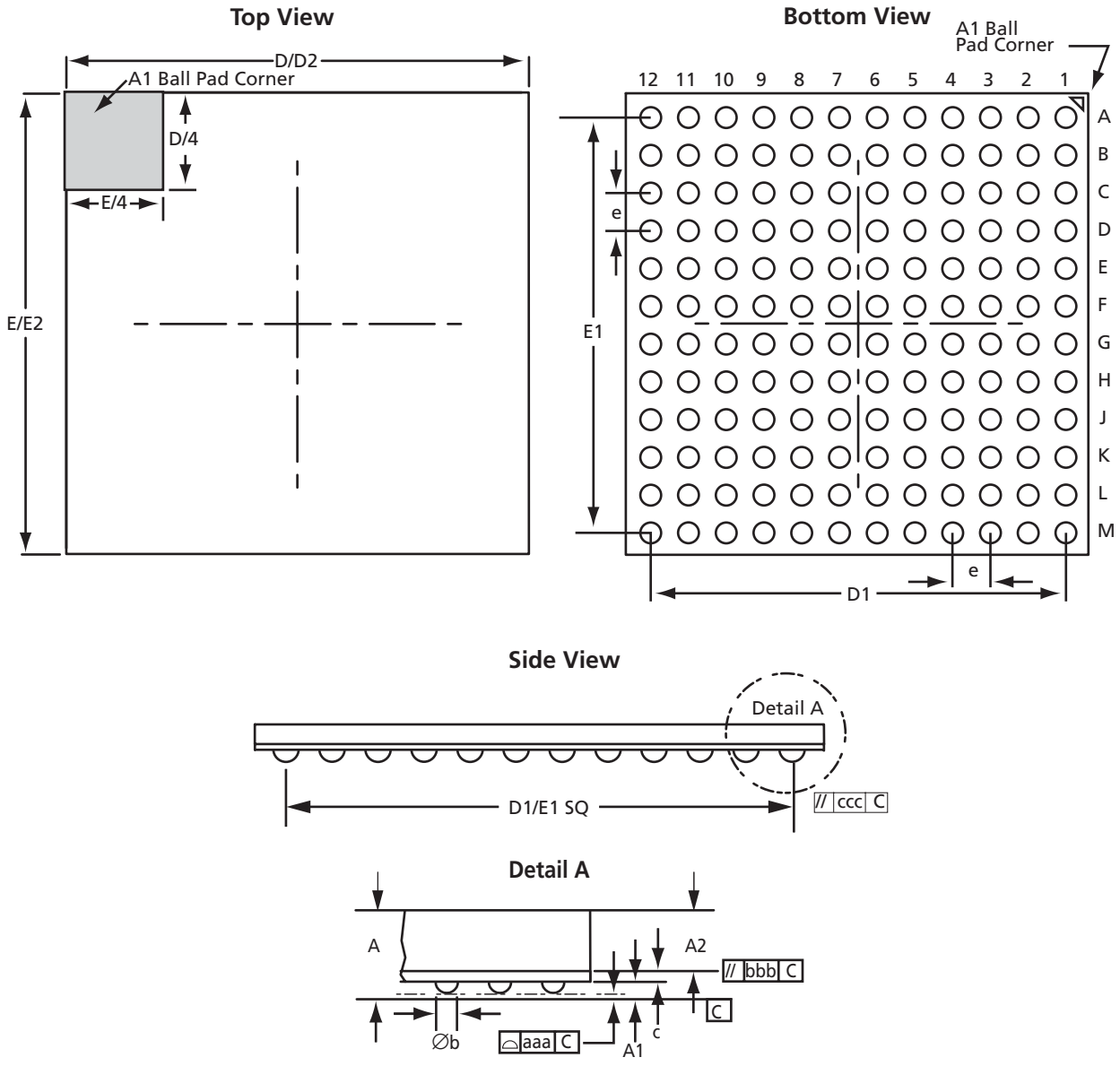
Plastic Ball Grid Array Dimensions

JEDEC Equivalent	PBGA272 MS-034 VAR BAL-2			PBGA313 MS-034			PBGA329 MS-034 VAR BAN-2			PBGA456 MS-034 VAR BAR-2		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	2.18	2.33	2.50	2.12	2.33	2.52	2.17	2.33	2.70	2.12	2.33	2.54
A1	0.50	0.60	0.70	0.50	0.60	0.70	0.50	0.60	0.70	0.50	0.60	0.70
A2	1.15	1.17	1.19	1.12	1.17	1.22	1.10	1.20	1.30	1.12	1.17	1.19
aaa	0.20			0.20			0.20			0.20		
b	0.60	0.75	0.90	0.60	0.76	0.90	0.60	0.76	0.90	0.60	0.76	0.90
bbb	0.25			0.25			0.25			0.25		
c	0.53	0.56	0.61	0.53	0.56	0.61	0.53	0.60	0.70	0.51	0.56	0.61
ccc	0.35			0.35			0.35			0.35		
D	26.80	27.00	27.20	34.80	35.00	35.20	30.80	31.00	31.20	34.80	35.00	35.20
D1	24.13 BSC			30.48 BSC			27.94 BSC			31.75 BSC		
D2	23.90	24.00	24.10	29.50	30.00	30.70	27.90	28.00	28.10	29.80	30.00	30.20
E	26.80	27.00	27.20	34.80	35.00	35.20	30.80	31.00	31.20	34.80	35.00	35.20
E1	24.13 BSC			30.48 BSC			27.94 BSC			31.75 BSC		
E2	23.90	24.00	24.10	29.50	30.00	30.70	27.90	28.00	28.10	29.80	30.00	30.20
e	1.27 typ.			1.27 typ.			1.27 typ.			1.27 typ.		

JEDEC Equivalent	PBGA729 MS-034 VAR BAR-1		
Dimensions	**Min.**	**Nom.**	**Max.**
A	2.12	2.33	2.54
A1	0.50	0.60	0.70
A2	1.12	1.17	1.19
aaa	0.20		
b	0.60	0.76	0.90
bbb	0.25		
c	0.50	0.56	0.62
ccc	0.35		
D	34.80	35.00	35.20
D1	33.02 BSC		
D2	29.95	30.00	30.70
E	34.80	35.00	35.20
E1	33.02 BSC		
E2	29.95	30.00	30.70
e	1.27 typ.		

Fine Pitch Plastic Ball Grid Array

144-Pin FG

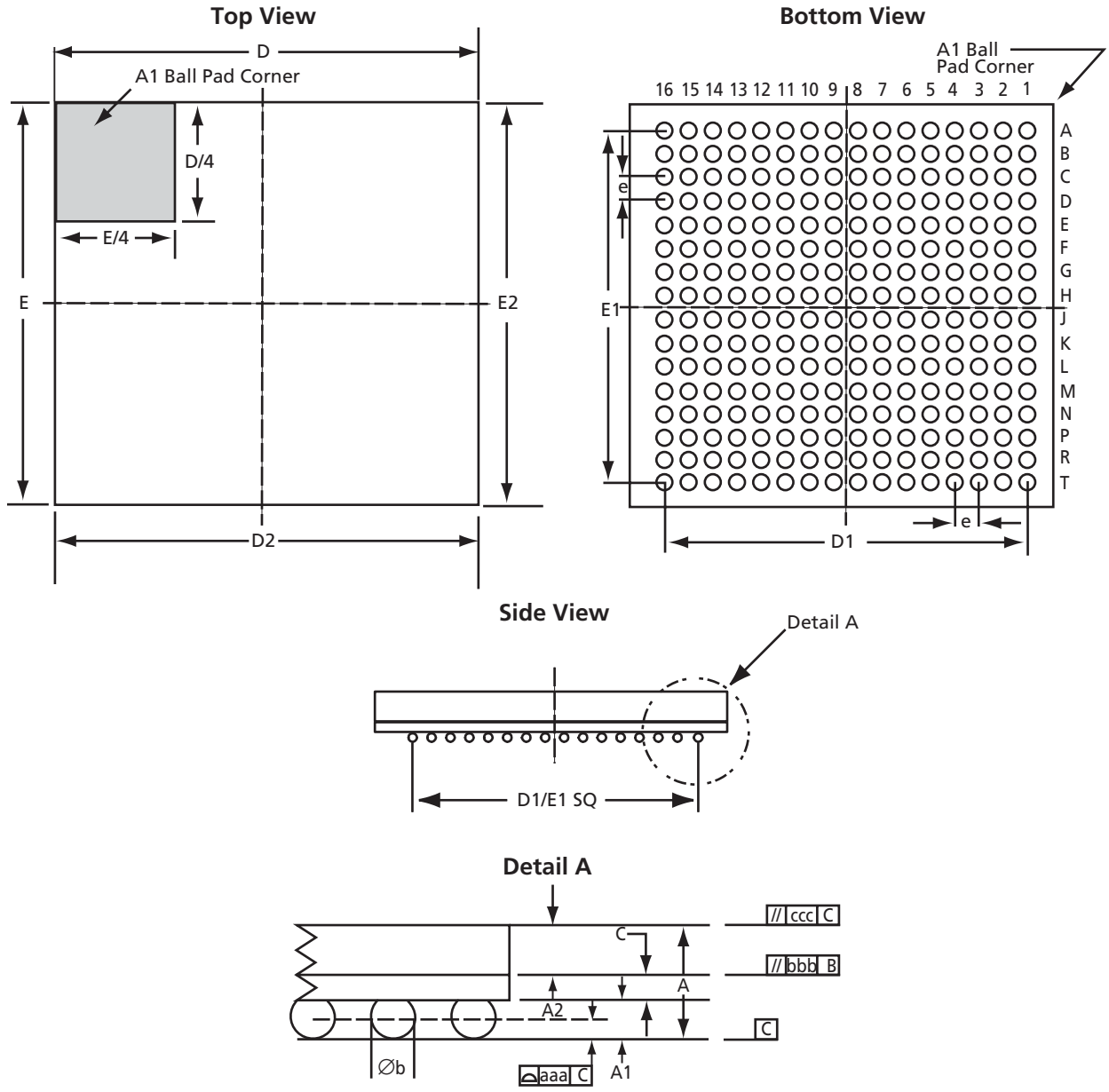


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 54 for the dimensions.*

Supported Devices					
A54SX08	A500K050	APA075	A54SX08A	A3P060	A3P400/M7A3P400
	A500K130	APA150	A54SX16A	A3P125	A3P600/M7A3P600
		APA300	A54SX32A	A3P250/M7A3P250	A3P1000/M7A3P1000
		APA450			

Fine Pitch Plastic Ball Grid Array

256-Pin FG

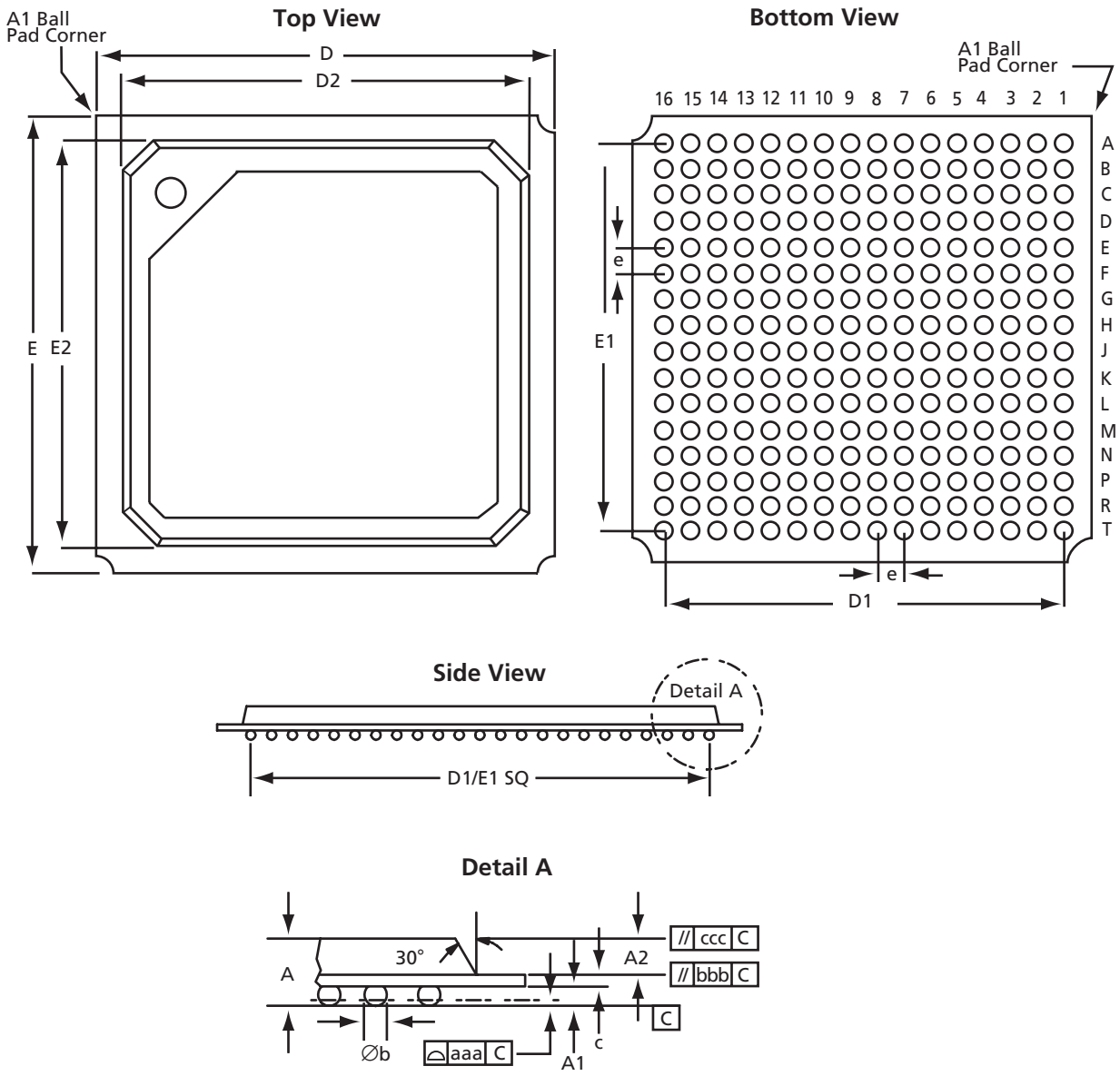


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 54 for the dimensions.*

Supported Devices					
A500K130	APA150	A54SX16A	AX125	A3P250	AFS090
A500K180	APA300		AX250	A3P400/M7A3P400	AFS250
A500K270	APA450			A3P600/M7A3P600	AFS600/M7AFS600
	APA600			A3P1000/M7A3P1000	AFS1500/M7AFS1500
				M7A3PE600/M7A3PE600	

Fine Pitch Plastic Ball Grid Array

256-Pin FG

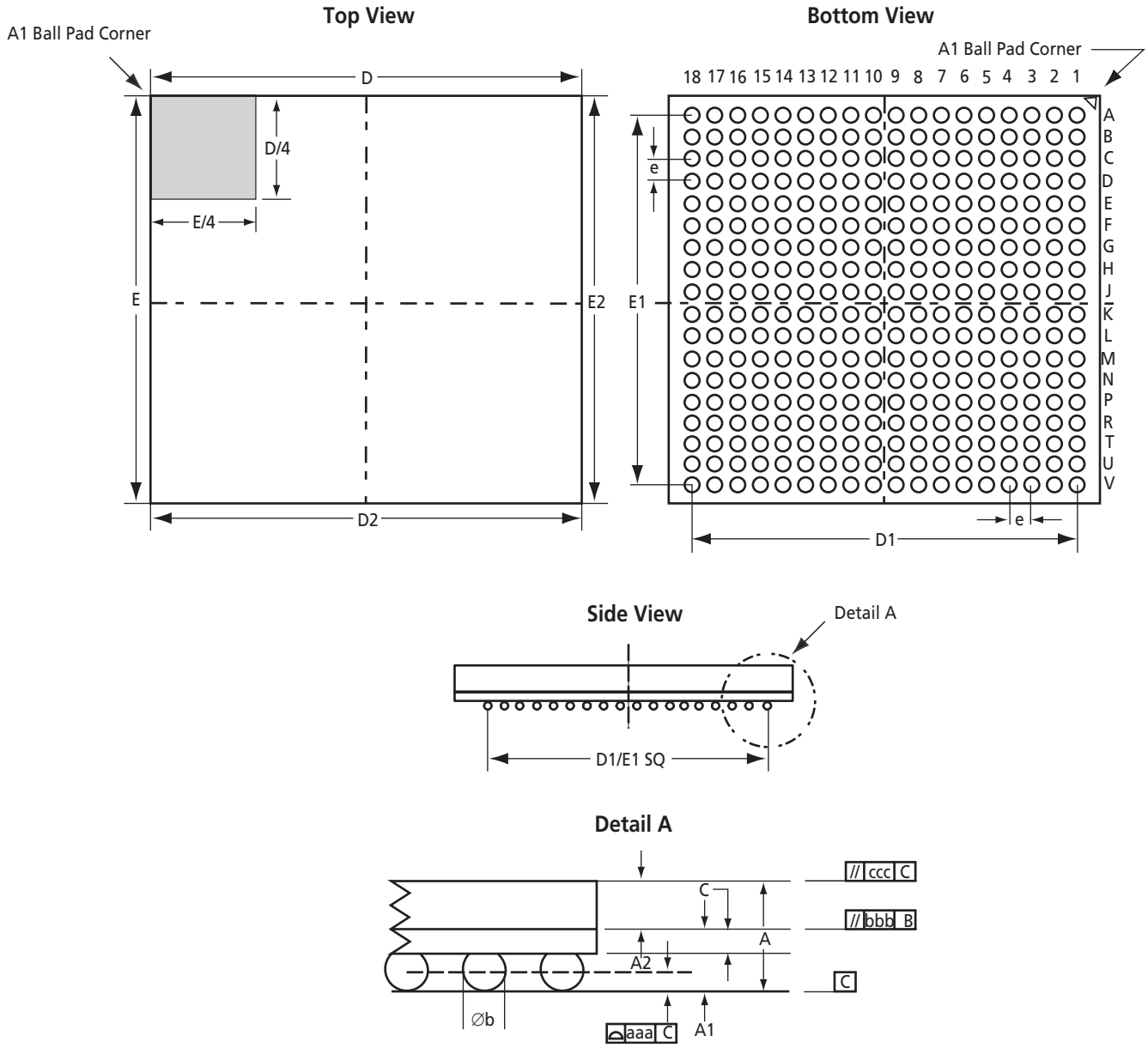


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 54 for the dimensions.*

Supported Devices	
A54SX32A	A54SX72A

Fine Pitch Plastic Ball Grid Array

324-Pin FG

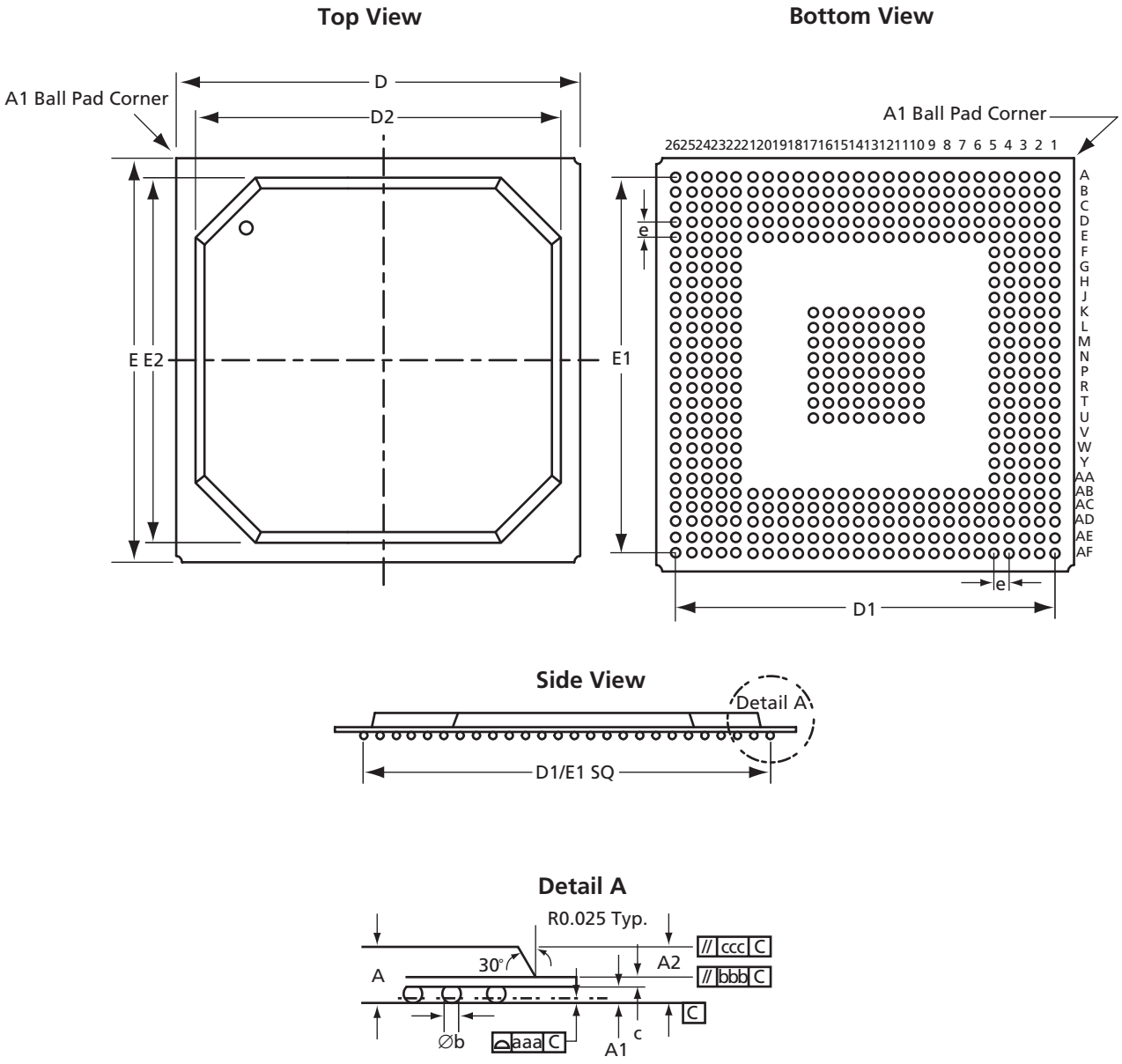


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 54 for the dimensions.*

Supported Device
AX125

Fine Pitch Plastic Ball Grid Array

484-Pin FG

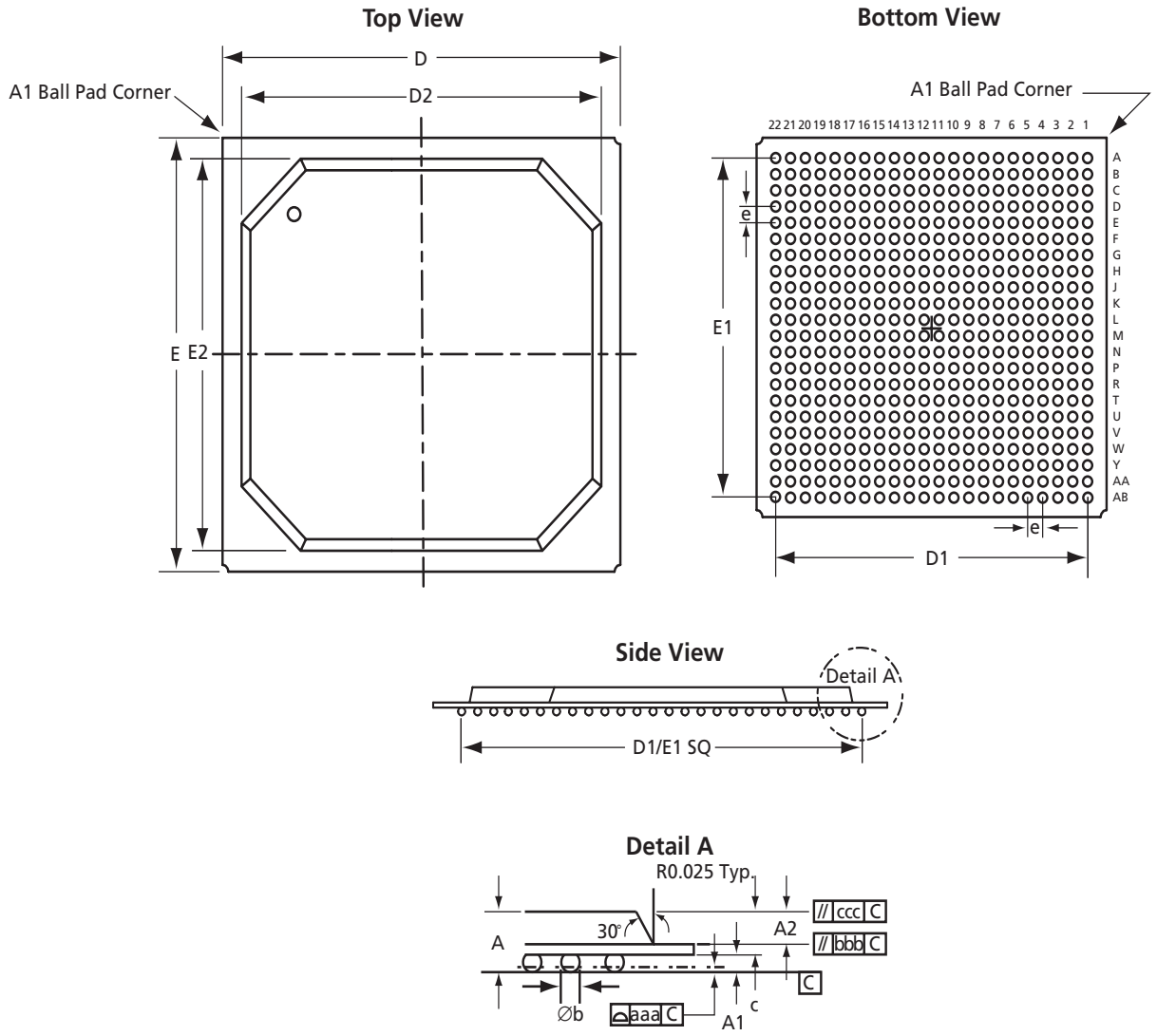


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 54 for the dimensions.*

Supported Devices
A54SX32A
A54SX72A

Fine Pitch Plastic Ball Grid Array

484-Pin FG—Fully Populated

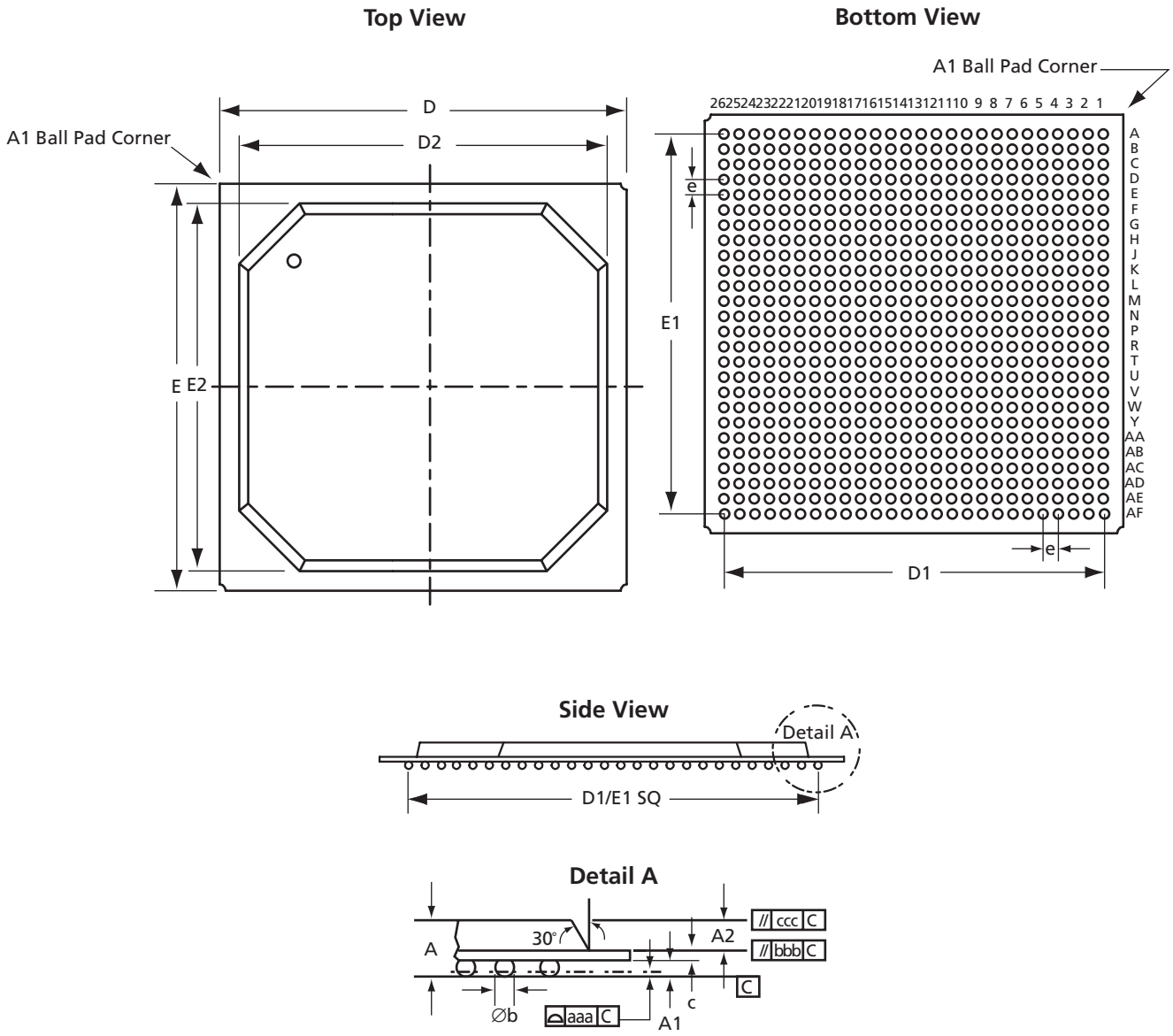


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions"on page 55 for the dimensions.*

Supported Devices			
APA450	AX250	A3P400/M7A3P400	AFS600/M7AFS600
APA600	AX500	A3P600/M7A3P600	AFS1500/M7AFS1500
	AX1000	A3P1000/M7A3P1000	
		A3PE600/M7A3PE600	
		A3PE1500/M7A3PE1500	
		A3PE3000/M7A3PE3000	

Fine Pitch Plastic Ball Grid Array

676-Pin FG

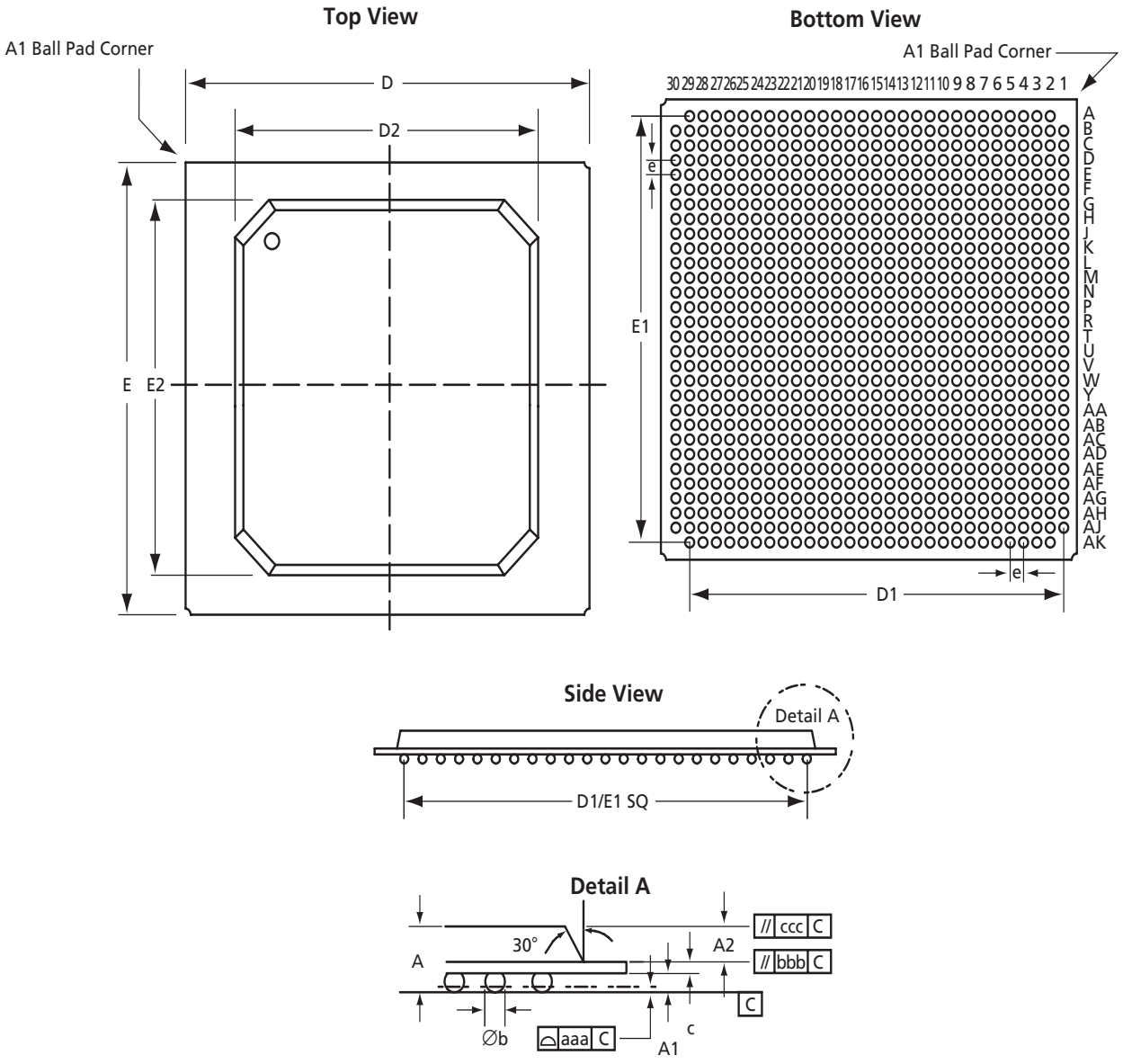


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions"on page 55 for the dimensions.*

Supported Devices				
A500K270	APA600 APA750	AX500 AX1000	A3PE1500/ M7A3PE1500	AFS1500/M7AFS1500

Fine Pitch Plastic Ball Grid Array

896-Pin FG

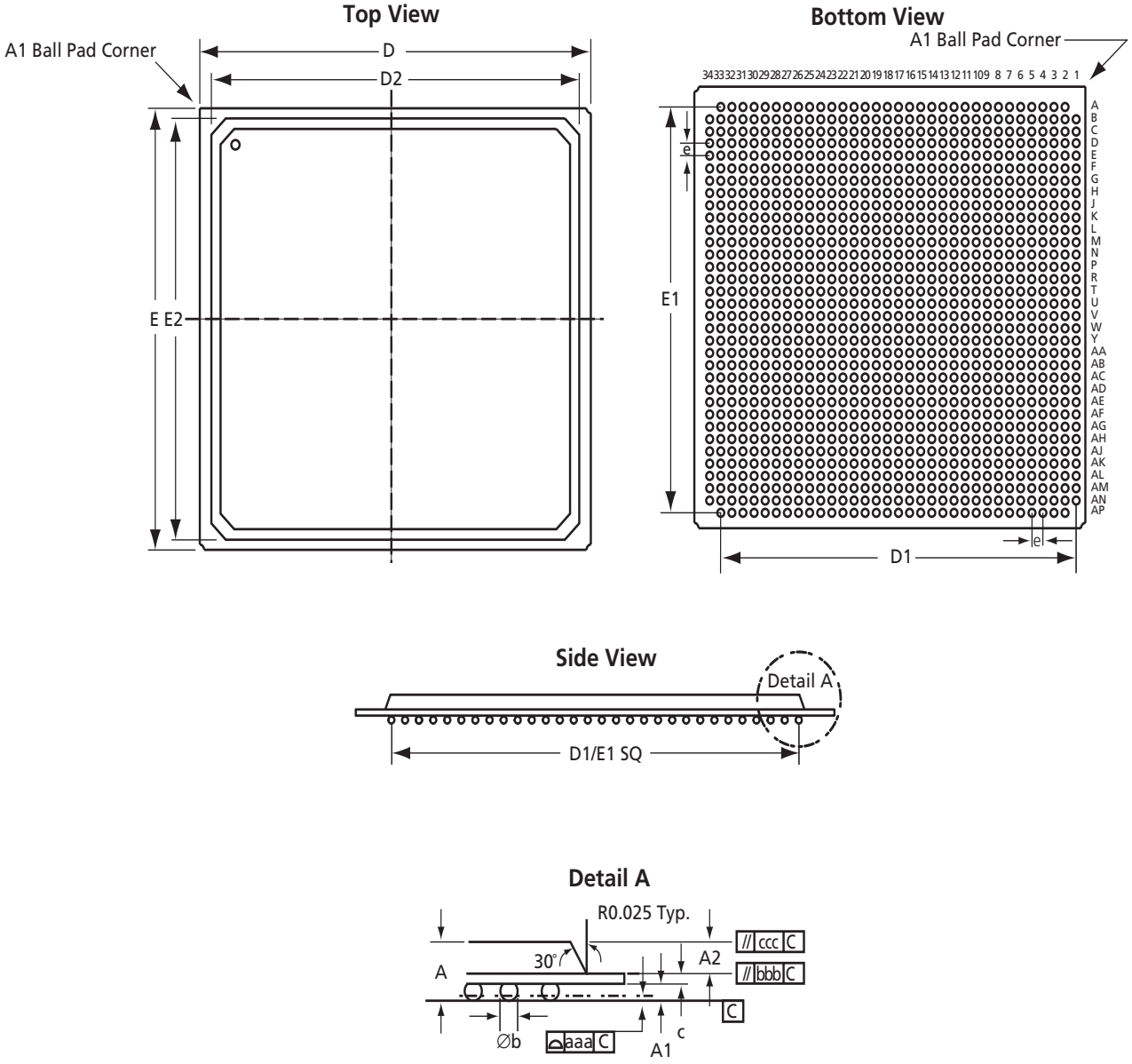


Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions"on page 55 for the dimensions.*

Supported Devices		
APA750	AX1000	A3PE3000/M7A3PE3000
APA1000	AX2000	

Fine Pitch Plastic Ball Grid Array

1152-Pin FG



Note: *Dimensions are in millimeters. Please see the "Fine Pitch Plastic Ball Grid Array Dimensions" on page 55 for the dimensions.*

Supported Devices	
APA1000	AX2000

Fine Pitch Plastic Ball Grid Array Dimensions

	FBGA 144 MO-192 VAR DAD-1			FBGA 256 (page 46) MO-192 VAR DAF1			FBGA 256 (page 47) MS-034 VAR AAF-1			FBGA 324 MS-034 VAR AAG-1			FBGA 484 (page 49) MS-034 VAR AAL-1		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	1.35	1.45	1.55	1.35	1.60	1.70	1.55	1.76	1.97	1.48	1.63	1.78	2.02	2.23	2.44
A1	0.35	0.40	0.45	0.25	0.40	–	0.30	0.40	0.50	0.33	0.38	0.43	0.40	0.50	0.60
A2	0.65	0.70	0.75	0.65	0.70	0.75	0.75	0.80	0.85	0.65	0.70	0.75	1.12	1.17	1.22
aaa	0.12			0.12			0.20			0.20			0.20		
b	0.45	0.50	0.55	0.45	0.50	0.55	0.40	0.50	0.60	0.49	0.54	0.59	0.50	0.63	0.70
bbb	0.25			0.25			0.25			0.25			0.25		
c	–	0.35	–	0.25	0.50	1.10	0.50	0.56	0.62	0.50	0.55	0.60	0.50	0.56	0.62
ccc	0.35			0.35			0.35			0.35			0.35		
D	12.80	13.00	13.20	16.80	17.00	17.20	16.80	17.00	17.20	18.80	19.00	19.20	26.80	27.00	27.20
D1	11.00 BSC			15.00 BSC			15.00 BSC			17.00 BSC			25.00 BSC		
D2	12.80	13.00	13.20	16.80	17.00	17.20	14.80	15.00	15.20	18.80	19.00	19.20	23.80	24.00	24.20
E	12.80	13.00	13.20	16.80	17.00	17.20	16.80	17.00	17.20	18.80	19.00	19.20	26.80	27.00	27.20
E1	11.00 BSC			15.00 BSC			15.00 BSC			17.00 BSC			25.00 BSC		
E2	12.80	13.00	13.20	16.80	17.00	17.20	14.80	15.00	15.20	18.80	19.00	19.20	23.80	24.00	24.20
e	1.00 typ.			1.00 typ.			1.00 typ.			1.00 typ.			1.00 typ.		

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

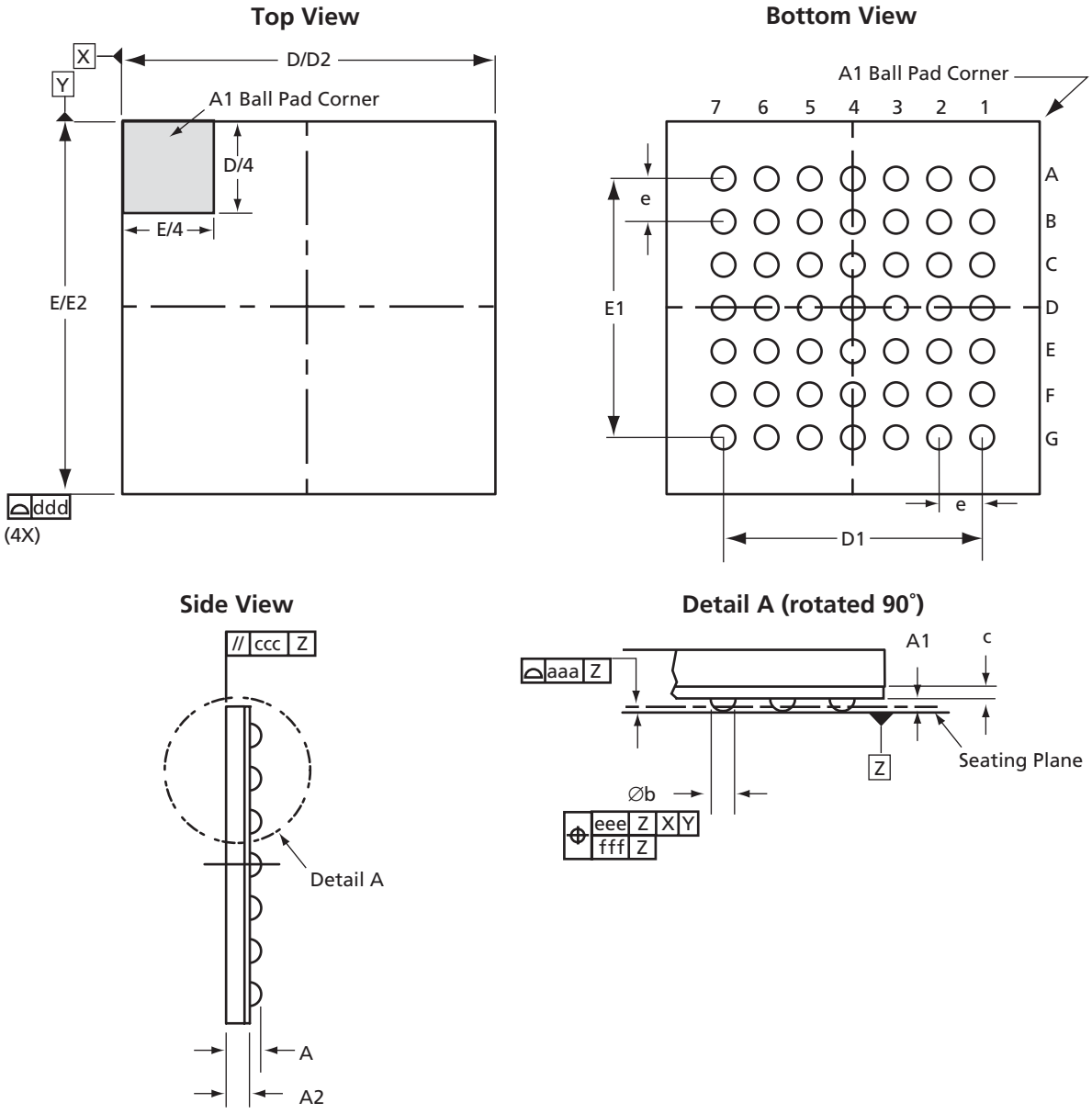
	FBGA 484 (page 50) (23x23 Fully Populated) MS-034 VAR AAJ-1			FBGA 676 MS-034 VAR AAL-1			FBGA 896 MS-034 VAR AAN-1			FBGA 1152 MS-034 VAR AAR-1		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	2.02	2.23	2.44	2.02	2.23	2.44	2.02	2.23	2.44	2.02	2.23	2.44
A1	0.40	0.50	0.60	0.40	0.50	0.60	0.40	0.50	0.60	0.40	0.50	0.60
A2	1.12	1.17	1.22	1.12	1.17	1.22	1.12	1.17	1.22	1.12	1.17	1.22
aaa		0.20			0.20			0.20			0.20	
b	0.50	0.63	0.70	0.50	0.63	0.70	0.50	0.63	0.70	0.50	0.63	0.70
bbb		0.25			0.25			0.25			0.25	
c	0.50	0.56	0.62	0.50	0.56	0.62	0.50	0.56	0.62	0.50	0.56	0.62
ccc		0.35			0.35			0.35			0.35	
D	22.80	23.00	23.20	26.80	27.00	27.20	30.80	31.00	31.20	34.80	35.00	35.20
D1		21.00 BSC			25.00 BSC			29.00 BSC			33.00 BSC	
D2	19.45	19.50	20.20	23.95	24.00	24.70	25.95	26.00	26.70	33.65	33.70	34.20
E	22.80	23.00	23.20	26.80	27.00	27.20	30.80	31.00	31.20	34.80	35.00	35.20
E1		21.00 BSC			25.00 BSC			29.00 BSC			33.00 BSC	
E2	19.45	19.50	20.20	23.95	24.00	24.70	25.95	26.00	26.70	33.65	33.70	34.20
e		1.00 typ.			1.00 typ.			1.00 typ.			1.00 typ.	

Notes:

1. All dimensions are in millimeters.
2. BSC—Basic Spacing between Centers.

Chip Scale Package

49-Pin CSP

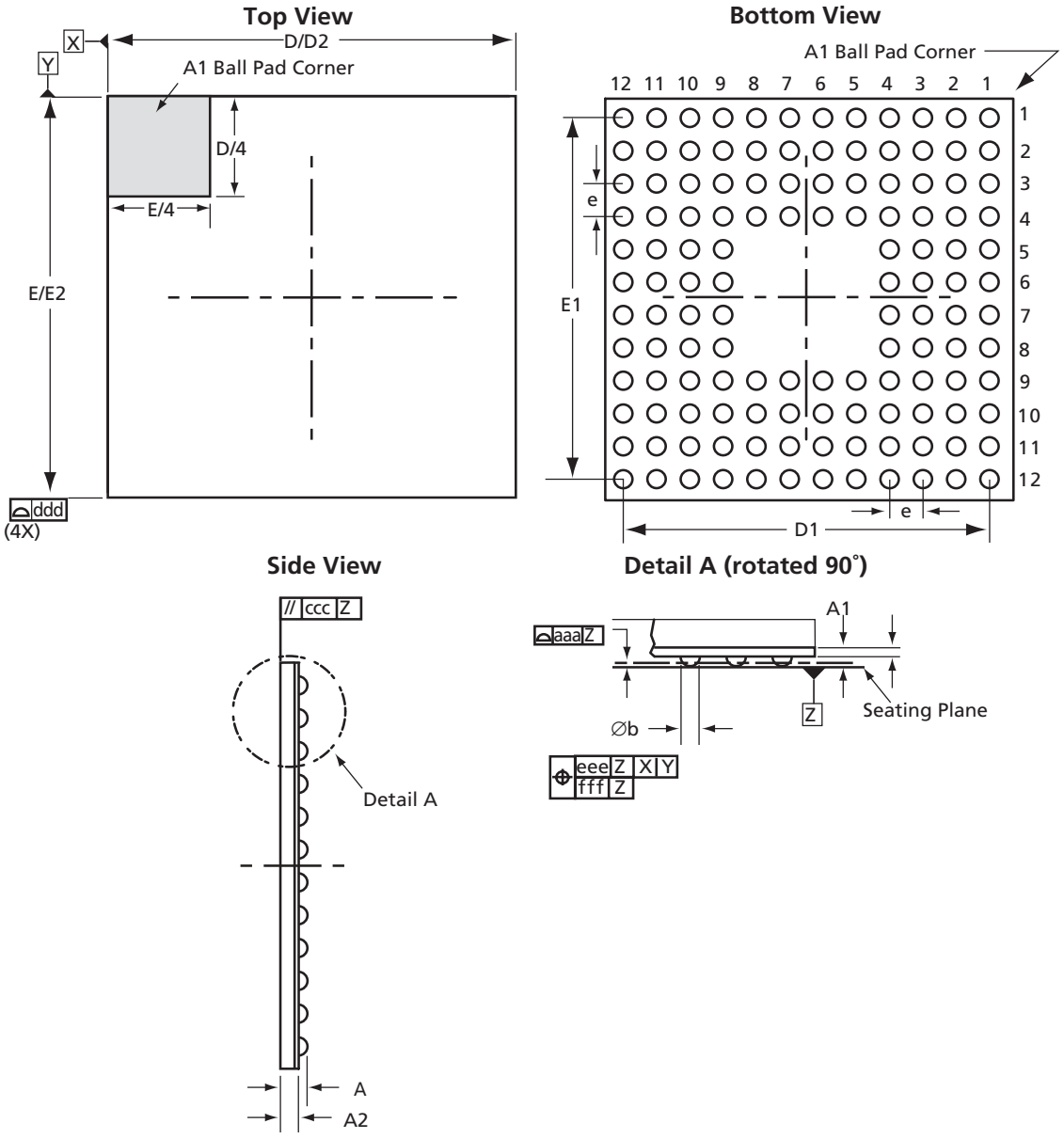


Note: *Dimensions are in millimeters. Please see the "Chip Scale Package Dimensions" on page 59 for the dimensions.*

Supported Devices	
eX64	eX128

Chip Scale Package

128-Pin CSP

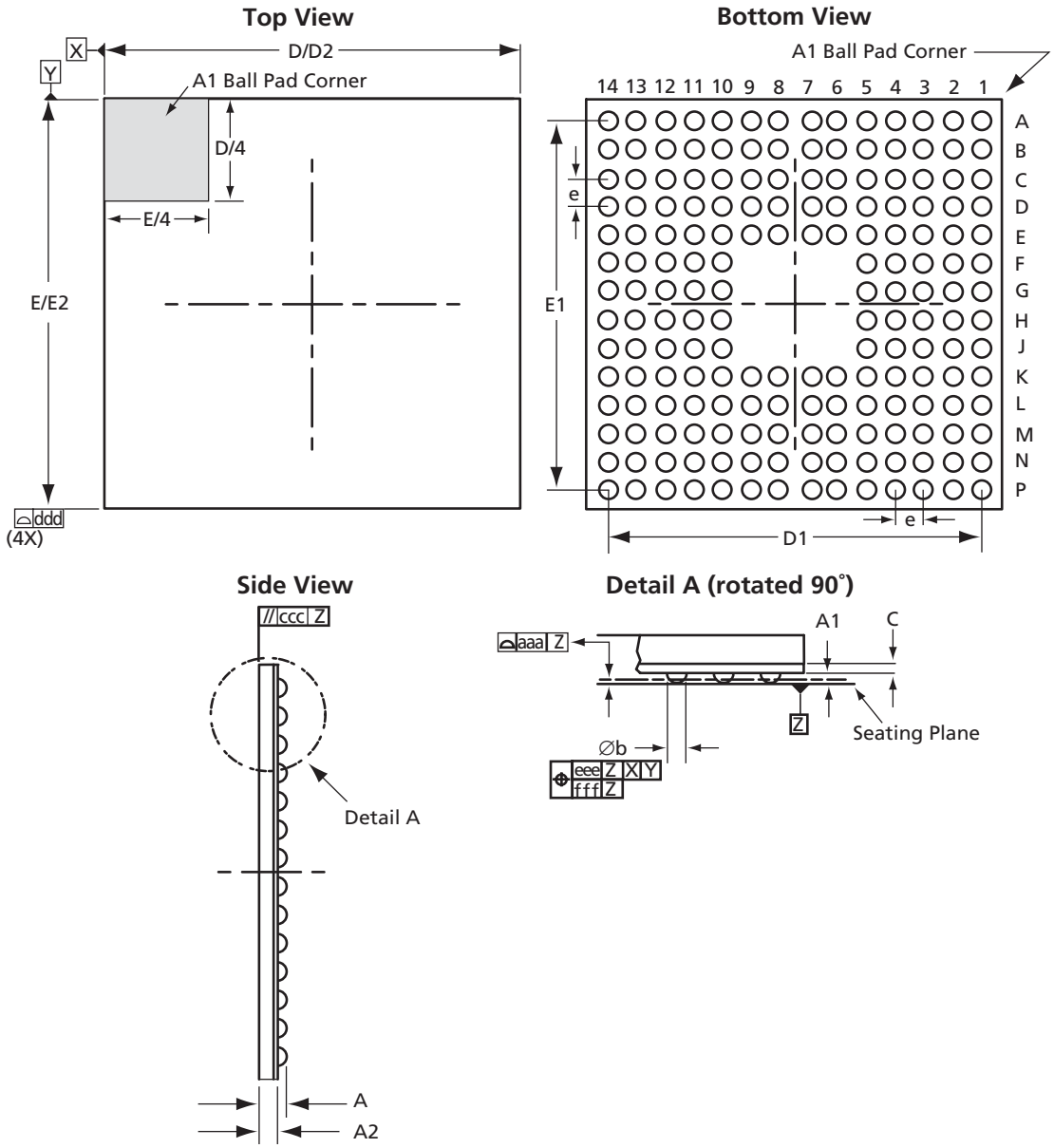


Note: *Dimensions are in millimeters. Please see the "Chip Scale Package Dimensions" on page 59 for the dimensions.*

Supported Devices
eX64
eX128
eX256

Chip Scale Package

180-Pin CSP



Note: *Dimensions are in millimeters. Please see the* *"Chip Scale Package Dimensions" on page 59* *for these dimensions.*

Supported Devices	
eX256	AX125

Chip Scale Package Dimensions

JEDEC Equivalent	CS49 MO-205			CS128 MO-205, Variation BD			CS180 MO-205, Variation BF		
Dimension	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**	**Min.**	**Nom.**	**Max.**
A	–	–	1.50	–	–	1.50	–	–	1.50
A1	0.25	–	–	0.25	–	–	0.25	–	–
A2	0.85	–	–	0.85	–	–	0.85	–	–
aaa		0.12			0.12			0.12	
b	0.45	0.50	0.55	0.45	0.50	0.55	0.45	0.50	0.55
c	–	0.36	–	–	0.36	–	–	0.36	–
ccc		0.10			0.10			0.10	
ddd		0.10			0.10			0.10	
D/E	–	7.00	–	–	11.00	–	–	13.00	–
D1/E1	–	4.80	–	–	8.80	–	–	10.40	–
e		0.8 typ.			0.8 typ.			0.8 typ.	
eee		0.15			0.15			0.15	
fff		0.08			0.08			0.08	

Note: *All dimensions are in millimeters.*

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