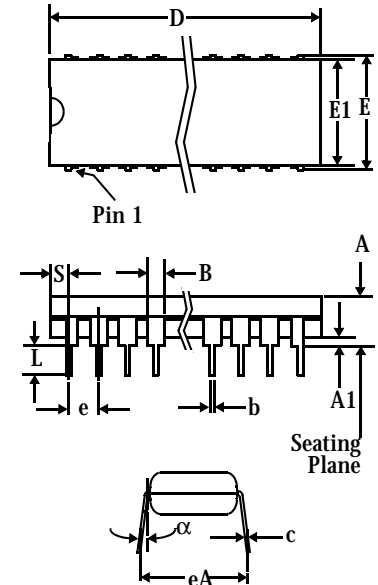




Plastic dual in-line package (PDIP)

	20-pin 300 mil		28-pin 300 mil		32-pin 300 mil		32-pin 400 mil		32-pin 600 mil	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	-	0.175	-	0.180	-	0.180	-	0.200	-	0.220
A1	0.010	-	0.010	-	0.015	-	0.015	-	0.015	-
B	0.046	0.054	0.040	0.065	0.045	0.055	0.045	0.065	0.030	0.070
b	0.018	0.024	0.014	0.022	0.014	0.022	0.014	0.022	0.014	0.022
c	0.008	0.014	0.008	0.014	0.008	0.012	0.009	0.015	0.008	0.014
D	-	0.980	-	1.400	-	1.620	-	1.620	-	1.660
E	0.290	0.310	0.295	0.320	0.300	0.325	0.390	0.425	0.600	0.615
E1	0.263	0.293	0.278	0.298	0.280	0.298	0.340	0.390	0.541	0.557
e	0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC	
eA	0.310	0.350	0.330	0.380	0.330	0.380	0.430	0.470	0.625	0.665
L	0.110	0.130	0.120	0.140	0.110	0.142	0.118	0.162	0.12	0.14
α	0°	15°	0°	15°	0°	15°	0°	15°	0°	15°
S	-	0.040	-	0.055	-	0.060	-	0.065	-	0.085

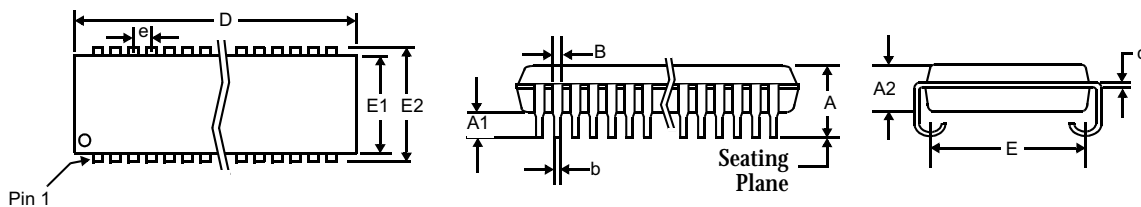
Dimensions in inches



Plastic small outline J-bend (SOJ)

	20/26-pin 300 mil		24/26-pin 300 mil		28-pin 300 mil		32-pin 300 mil		28-pin 400 mil		32-pin 400 mil		36-pin 400 mil		40-pin 400 mil		42-pin 400 mil		44-pin 400 mil	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	-	0.140	-	0.148	-	0.140	-	0.145	0.132	0.146	-	0.145	-	0.148	-	0.145	0.128	0.148	0.128	0.148
A1	0.020	-	0.026	-	0.025	-	0.025	-	0.062	-	0.025	-	0.027	-	0.025	-	0.025	-	0.025	-
A2	0.095	0.105	0.106	NOM	0.095	0.105	0.086	0.105	0.105	0.115	0.086	0.115	0.102	NOM	0.086	0.115	0.105	0.115	0.105	0.115
B	0.025	0.032	0.015	0.020	0.028	TYP	0.026	0.032	0.024	0.032	0.026	0.032	0.026	0.032	0.026	0.032	0.026	0.032	0.026	0.032
b	0.016	0.022	0.028	NOM	0.018	TYP	0.014	0.020	0.013	0.021	0.015	0.020	0.013	0.021	0.015	0.022	0.015	0.020	0.015	0.020
c	0.008	0.014	0.006	0.008	0.010	TYP	0.006	0.013	0.005	0.012	0.007	0.013	0.006	0.012	0.007	0.014	0.007	0.013	0.007	0.013
D	-	0.686	0.670	0.680	-	0.730	0.820	0.830	0.720	0.729	0.820	0.830	0.920	0.930	1.020	1.035	1.070	1.080	1.120	1.130
E	0.245	0.285	0.255	0.275	0.245	0.285	0.250	0.275	0.354	0.378	0.360	0.380	0.350	0.390	0.348	0.390	0.370	NOM	0.370	NOM
E1	0.295	0.305	0.295	0.305	0.295	0.305	0.292	0.305	0.395	0.405	0.395	0.405	0.400	NOM	0.390	0.410	0.395	0.405	0.395	0.405
E2	0.327	0.347	0.328	0.339	0.327	0.347	0.330	0.340	0.430	0.440	0.435	0.445	0.435	0.445	0.435	0.445	0.435	0.445	0.435	0.445
e	0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.050 BSC		0.045	0.055	0.050 BSC		0.050 NOM		0.050 NOM	

Dimensions in inches

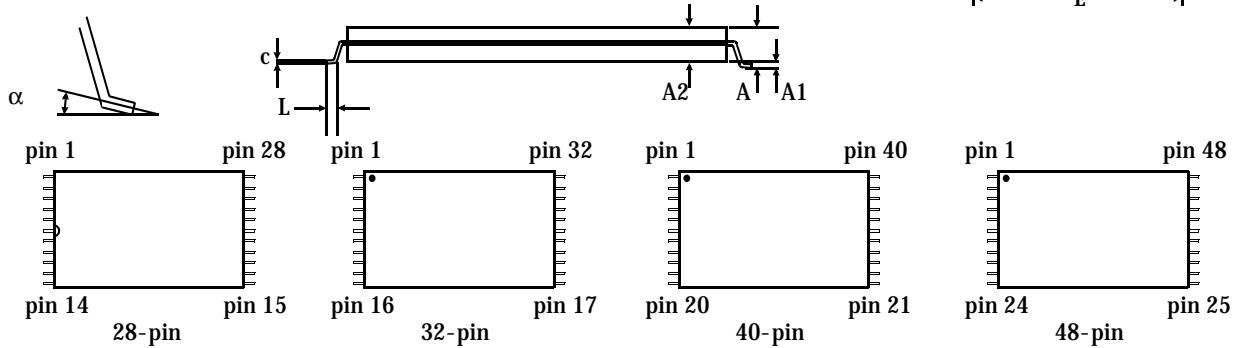
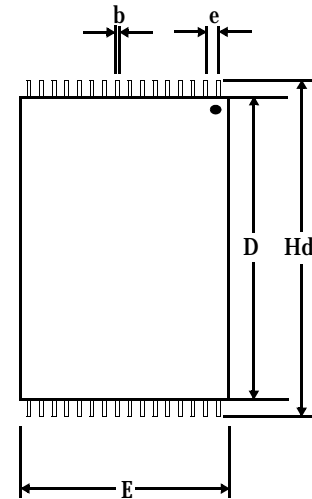




Thin small outline package (TSOP-I)

	28-pin 8×13.4		32-pin 8×20		40-pin 10×20		48-pin 12×20	
	Min	Max	Min	Max	Min	Max	Min	Max
A	-	1.20	-	1.20	-	1.20	-	1.27
A1	0.10	0.20	0.05	0.15	0.05	0.15	0.05	0.15
A2	0.95	1.05	0.95	1.05	0.95	1.05	0.95	1.05
b	0.15	0.25	0.17	0.27	0.17	0.27	0.17	0.27
c	0.10	0.20	0.10	0.21	0.10	0.21	0.15 nominal	
D	11.60	11.80	18.20	18.60	18.20	18.60	18.20	18.60
e	0.55 nominal		0.50 nominal		0.50 nominal		0.50 nominal	
E	8.0 nominal		7.80	8.20	9.90	10.10	11.90	12.10
Hd	13.30	13.50	19.80	20.20	19.80	20.20	19.80	20.20
L	0.50	0.70	0.50	0.70	0.50	0.70	0.50	0.70
α	0°	5°	0°	5°	0°	5°	0°	5°

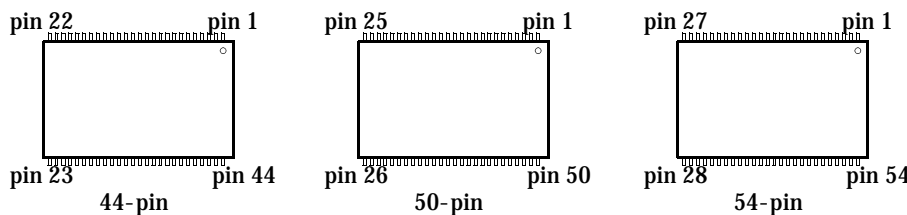
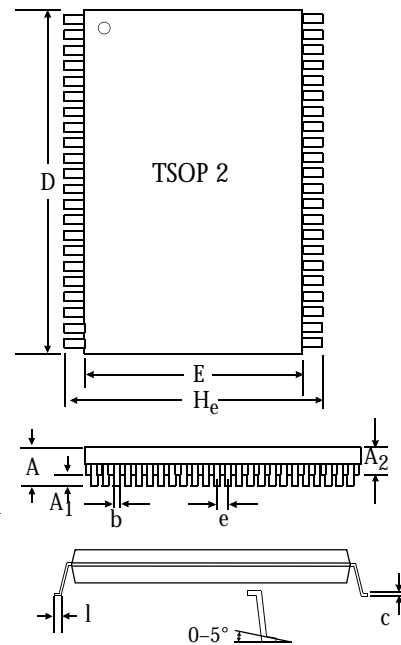
Dimensions in millimeters



Thin small outline package (TSOP 2)

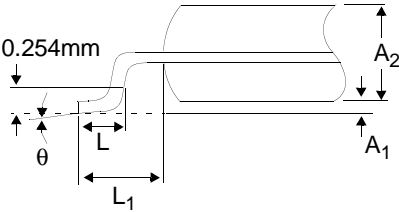
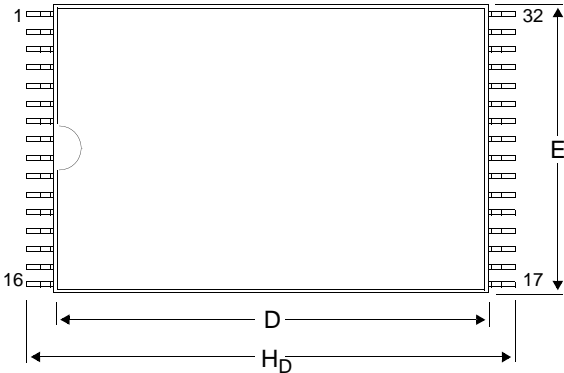
	44-pin TSOP 2		50-pin TSOP 2		54-pin TSOP 2	
	Min (mm)	Max (mm)	Min (mm)	Max (mm)	Min (mm)	Max (mm)
A	-	1.2	-	1.2	-	1.2
A1	0.05	-	0.05	-	0.05	-
A2	0.95	1.05	0.95	1.05	0.95	1.05
b	0.30	0.45	0.30	0.45	0.30	0.45
c	0.127 (typical)		0.12	0.21	0.12	0.21
D	18.28	18.54	20.85	21.05	22.12	22.32
E	10.03	10.29	10.03	10.29	10.03	10.29
e	0.80 (typical)		0.80 (typical)		0.80 (typical)	
He	11.56	11.96	11.56	11.96	11.56	11.96
l	0.40	0.60	0.40	0.60	0.40	0.60

*ranges encompass both 44/50 and 50/50 pin configurations.

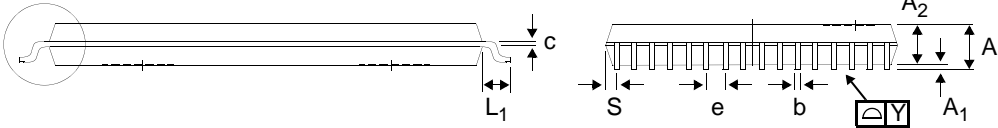




Shrink thin small outline package (32 sTSOPI)



Symbol	Dimensions in mm		
	Min	Norm	Max
A	-	-	1.20
A ₁	0.05	-	0.20
A ₂	0.95	1.00	1.05
b	-	0.20	-
c	-	0.127	-
D	11.70	11.80	11.90
E	7.90	8.00	8.10
e	0.40	0.50	0.60
H _D	13.10	13.40	13.70
L	0.40	0.50	0.60
L ₁	0.60	0.80	1.00
S	-	-	0.50
Y	-	-	0.08
θ	-	-	5°

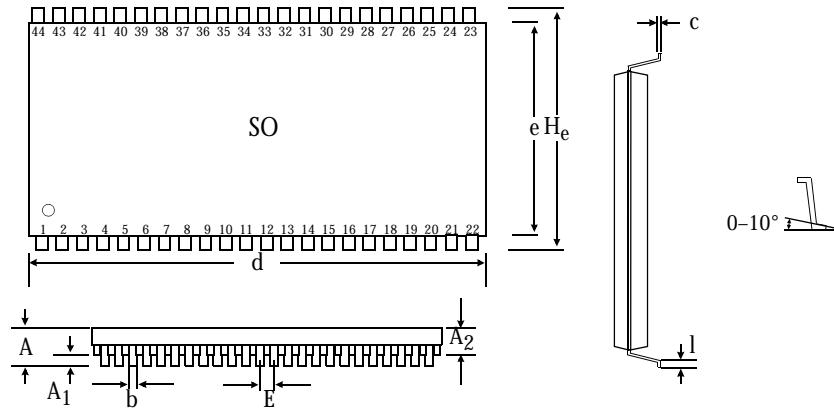




Plastic small outline package (SO)

JEDEC MO - 175 AA
44-pin SO

	Min (mm)	Max (mm)
A	-	3.1
A1	0.05	-
A2	2.5	2.9
b	0.25	0.45
c	0.09	0.25
d	28.0	28.4
e	12.4	12.8
E	1.27 (typical)	
He	16.05 (typical)	
l	0.73	1.3

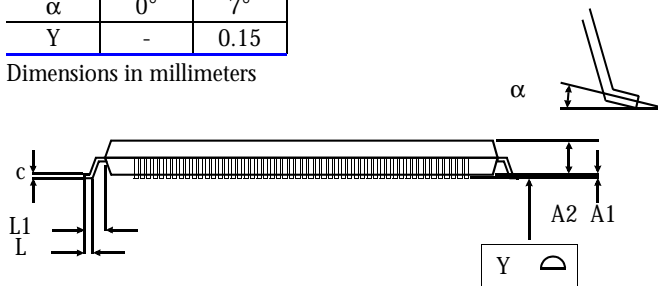
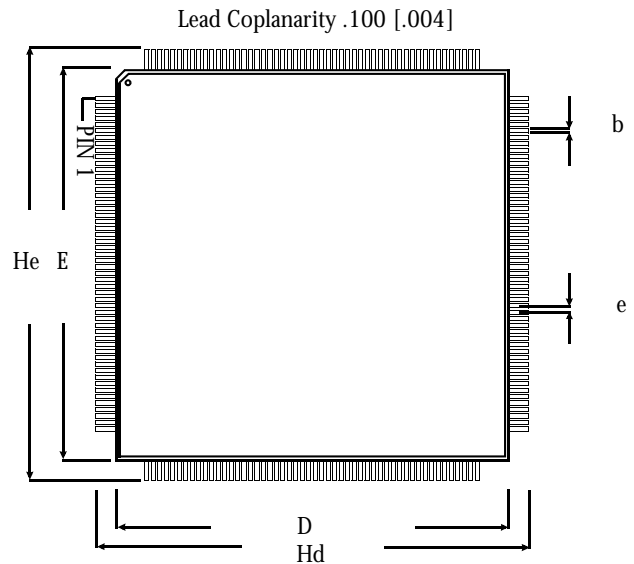


208-pin plastic quad flat pack (PQFP)

2.6 mm

	Min	Max
A1	0.05	0.50
A2	3.17	3.47
b	0.10	0.30
c	0.10	0.20
D	27.87	28.10
E	27.87	28.10
e	0.50	
Hd	30.35	30.85
He	30.35	30.85
L	0.40	0.75
L1	1.30	
α	0°	7°
Y	-	0.15

Dimensions in millimeters

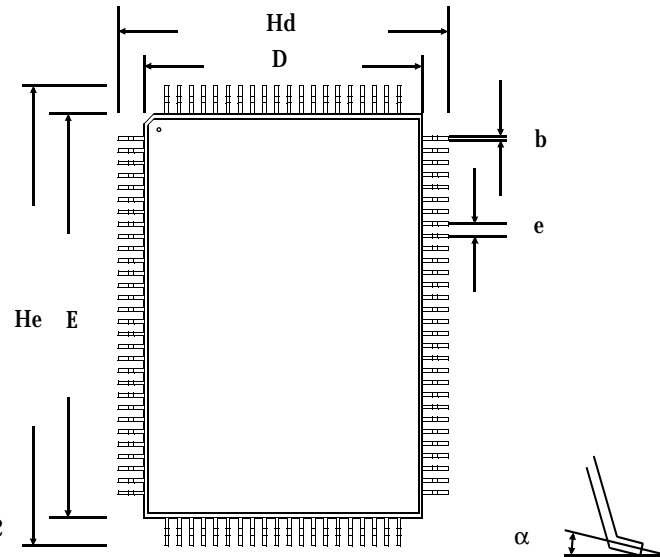
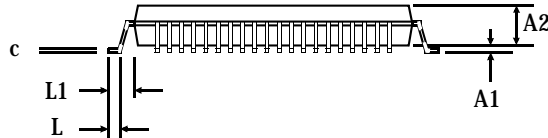




100-pin quad flat pack (PQFP and TQFP)

	(P)QFP		TQFP	
	Min	Max	Min	Max
A1	0.25	0.35	0.05	0.15
A2	2.55	3.05	1.35	1.45
b	0.22	0.38	0.22	0.38
c	0.13	0.23	0.09	0.20
D	13.90	14.10	13.80	14.20
E	19.90	20.10	19.80	20.20
e	0.65 nominal		0.65 nominal	
Hd	16.95	17.45	15.80	16.20
He	22.95	23.45	21.80	22.20
L	0.73	1.03	0.45	0.75
L1	1.60 nominal		1.00 nominal	
α	0°	10°	0°	7°

Dimensions in millimeters

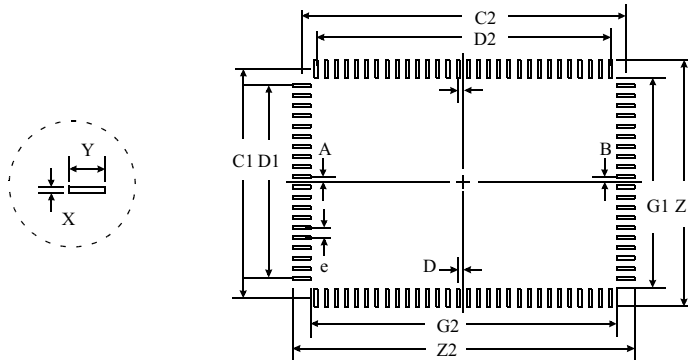


100-pin PQFP and TQFP PCB land pattern

Symbol	Description	TQFP/PQFP	
		Min	Max
C1	Reference	15.98 ref.	
C2	Reference	21.98 ref.	
D1	Reference	12.35 ref.	
D2	Reference	18.85 ref.	
e	Pad pitch	0.65	
G1	Pad inner dimension	13.69	13.79
G2	Pad inner dimension	19.69	19.79
N	Pad count	100	
X	Pad width	0.35	0.38
Y	Pad length	2.24 ref.	
Z1	Pad outer dimension	18.16	18.26
Z2	Pad outer dimension	24.16	24.26

Controlling dimension: mm.

This land pattern accommodates both PQFP and TQFP packages.

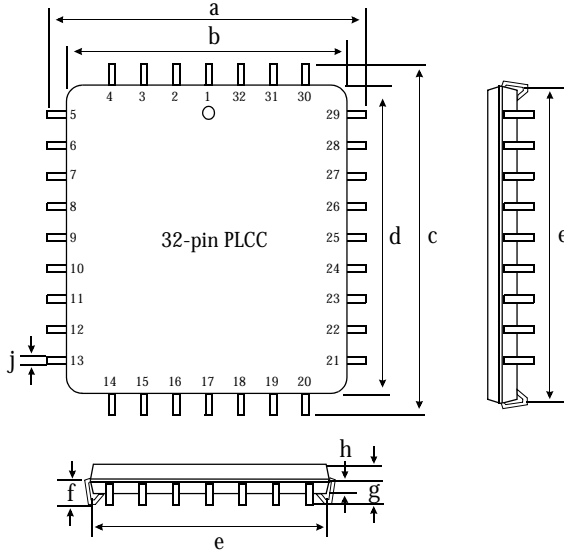


Notes on land pattern

- 1 Pad requirement to accommodate two package types is larger than for one package type.
- 2 All dimensioning and tolerancing conform to ANSI Y14.5M-1982. Dimensions in mm.
- 3 Datums A--B and --D-- to be determined from the center two leads.
- 4 Based on the surface mount Design and Land Pattern Standard in IPC-SM-782 rev. A, subsection 11.3, 8/93 for PQFP.



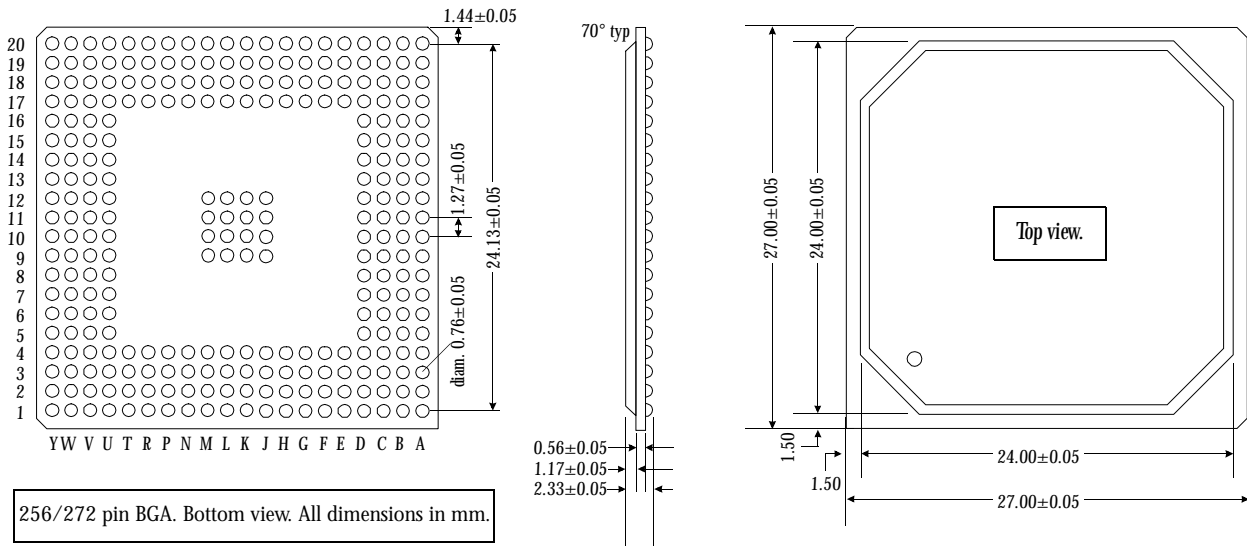
Plastic leaded chip carrier (PLCC)



32-pin PLCC	
typical (inch)	
a	0.49
b	0.45
c	0.59
d	0.55
e	0.52
f	0.09
g	0.136
h	0.075
i	0.52
j	0.028

JEDEC outline MS-016 AE
 Body size 0.450 in. × 0.550 in.
 Package thickness 0.110 in.
 Board standoff 0.020 in. (min)
 Lead pitch 0.050 in.
 Coplanarity 0.004 in. (max)

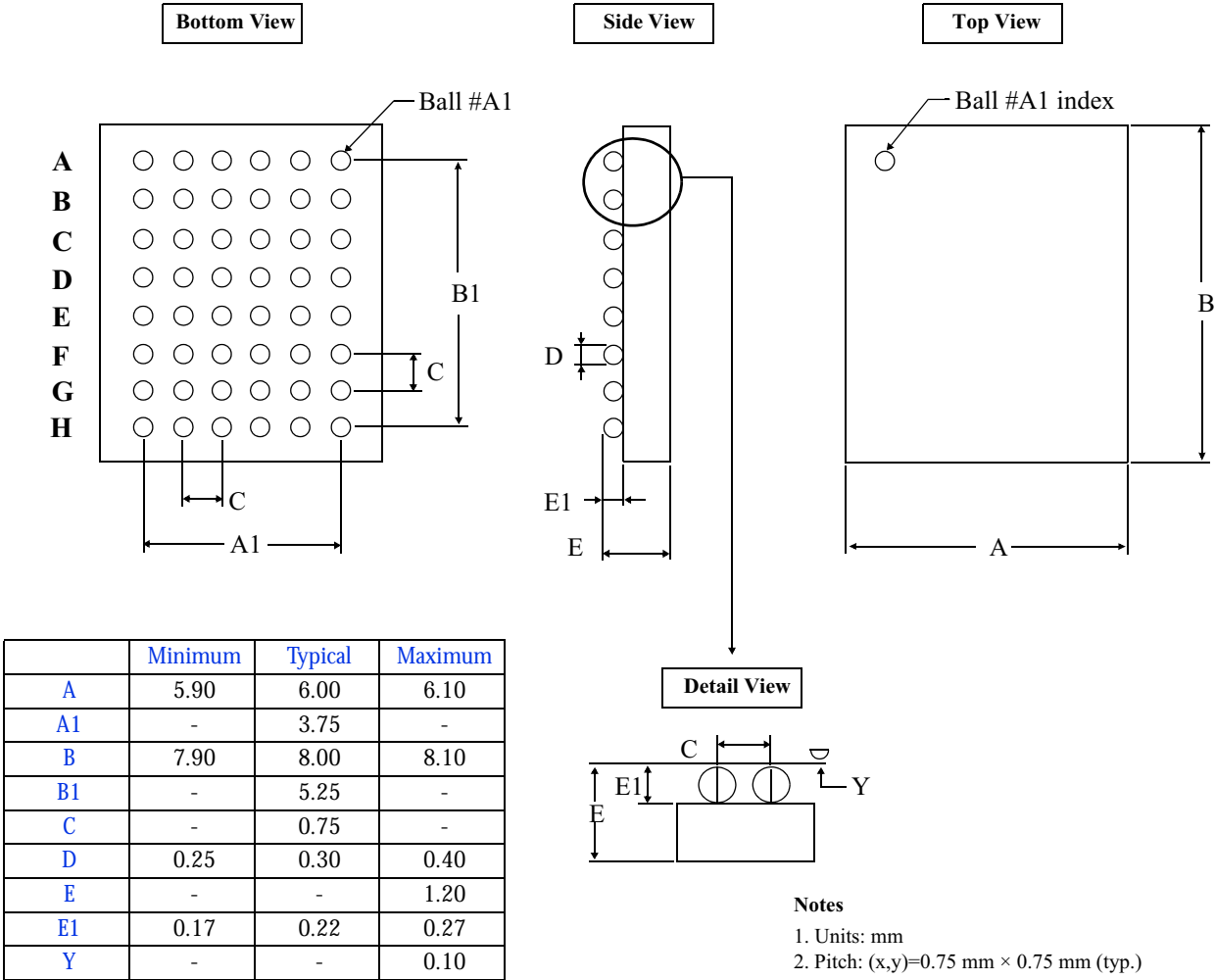
Plastic ball grid array (PBGA) package dimensions for 256/272 pin



256/272 pin BGA. Bottom view. All dimensions in mm.

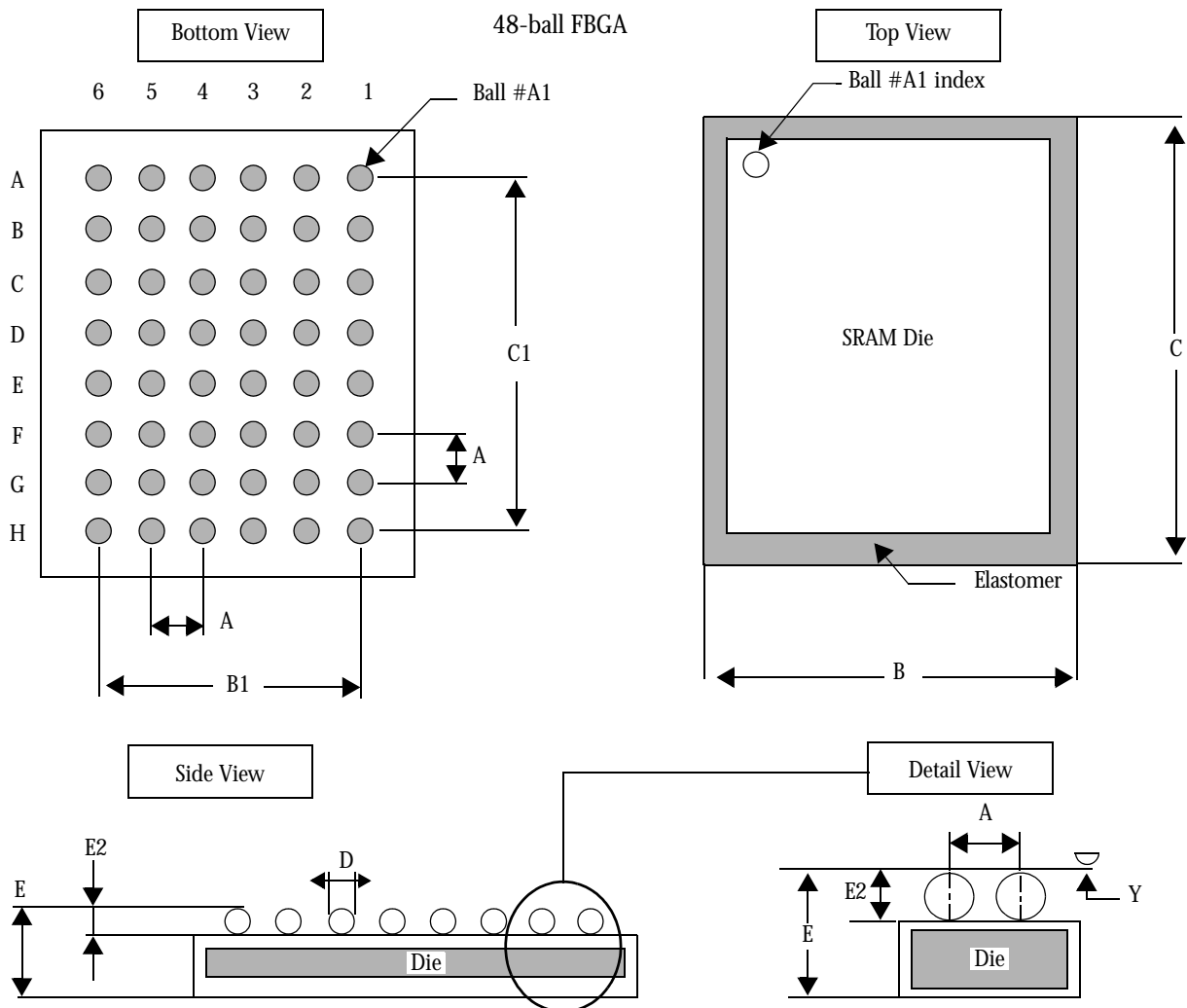


48-CSP Ball-Grid-Array Package 6 x 8 mm





48-CSP Ball-Grid-Array Package 7 x 11 mm



	Minimum	Typical	Maximum
A	-	0.75	-
B	6.90	7.00	7.10
B1	-	3.75	-
C	10.90	11.00	11.10
C1	-	5.25	-
D	0.30	0.35	0.40
E	-	-	1.20
E2	0.20	0.23	0.26
Y	-	-	0.08

Notes

1. Bump counts: 48 (8 row × 6 column).
2. Pitch: (x,y) = 0.75 mm × 0.75 mm (typ).
3. Units: millimeters.
4. All tolerance are ±0.050 unless otherwise specified.
5. Typ: typical.
6. Y is coplanarity: 0.08 (max).



Package Dimensions: 165 Pin BGA 13 x 15 mm

All measurements are in mm.

	Min	Typ	Max
A		1.00	
B	14.90	15.00	15.10
C		14.00	
D	12.90	13.00	13.10
E		10.00	
F		0.26	
G	0.30	0.35	0.40
H			1.20
I	0.40	0.45	0.50

