

Fujitsu, a world leader in packaging and interconnect technology now offers Ball Grid Array (BGA) packaging options in both our CG/CE46 (0.65 micron) and CG/CE51 (0.5 micron) high performance CMOS ASIC product families.

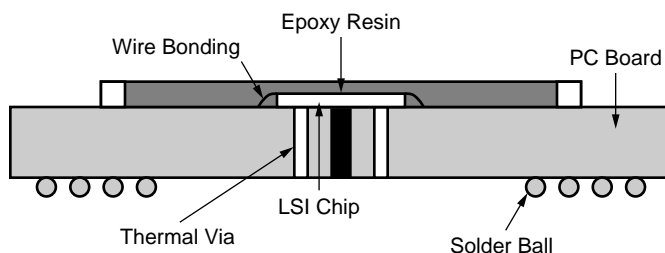
BGA's have proven to offer several advantages over more conventional packages including:

1. Reduced footprint: High pin count BGA packages require up to 26% less real estate than QFPs.
2. Better electrical characteristics: Up to 38% lower inductance than a comparable QFP.
3. Improved thermal resistance: Thermal vias allow up to a 33% reduction in thermal resistance compared to a QFP.
4. Higher I/O's: BGA's can easily support upwards of 1000 power and signal pins.

High pin count, fine pitch QFP's have traditionally posed an assembly problem for high volume manufacturing due to the difficulty of maintaining lead coplanarity. The alternative has often been to use a high cost Pin Grid Array (PGA) which are frequently incompatible with a surface mounted packaging assembly process. The inherent coplanarity of BGA's offers significantly improved manufacturing assembly yields which result in lower overall product cost.

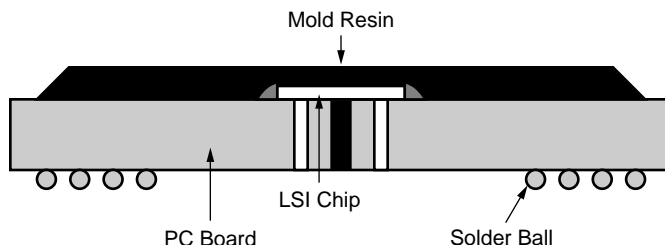
Fujitsu offers four type of BGA packages to suit a wide variety of performance needs.

Type A PBGA Package



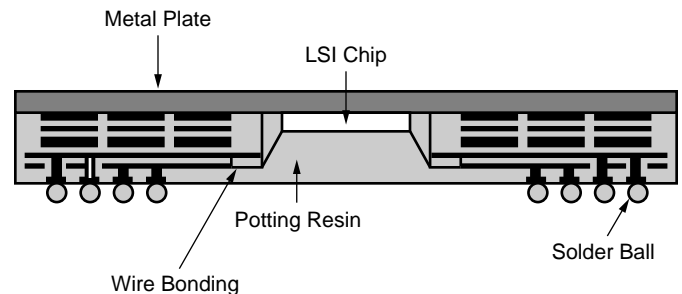
The Type "A" PBGA is used primarily as a prototyping vehicle. It incorporates a resin filled dam on a four layer printed circuit board substrate. It is cost effective package for very low volume, moderate performance designs

Type B PBGA Package



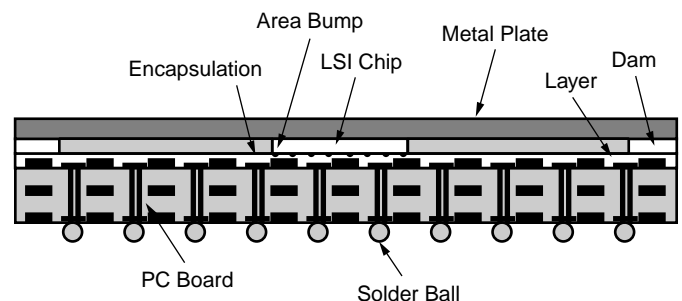
The Type "B" BGA is an OMPAC (Over Molded Pad Array Carrier) style package designed for high volume applications. It utilizes a four layer printed circuit board substrate and provides a high level of electrical performance. It provides good thermal performance for moderate power designs. Thermal performance can be further enhanced through the use of additional thermal vias and balls placed directly under the die mounting area. Epoxy-filled through holes in the substrate insure a high level of reliability. For very cost sensitive designs, a lower performance, two layer printed circuit board version of the type "B" is also available

Type C PBGA Package



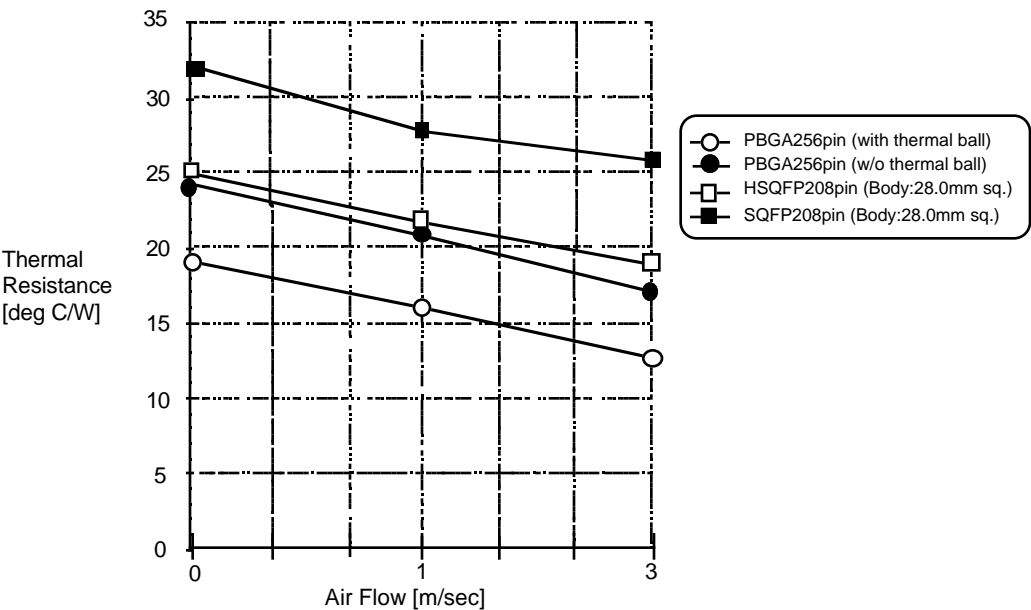
The Type "C" PBGA is a high performance, cavity down, high power package. It utilizes either a six or eight layer printed circuit board substrate and provides a very high level of electrical performance. The backside of the die is attached to a metal heat spreader for high power dissipation. Conventional wire bond technology is used for die to package connection. The cavity is filled with potting resin to insure high levels of reliability.

Type D PBGA Package



The Type "D" PBGA is a very high performance, high power package. It utilizes a multi-layer BT resin substrate. Die attach is by area bump ("Flip Chip"). A copper heat slug provides high power dissipation. The Type "D" provides the best electrical performance and highest available I/O's of all BGA packages. The Type "D" is designed for very high performance sub micron and deep sub-micron system level ASIC designs.

BGA256 Type B Thermal Characteristics Vs. 208 PQFP



BGA256 Type B Electrical /Thermal Characteristics

	Air flow	w/thermal ball	w/o thermal ball
θ_{ja}	0 m/s	19 deg C/W	24 deg C/W
	1 m/s	16 deg C/W	21 deg C/W
	3 m/s	13 deg C/W	17 deg C/W
θ_{jc}	—	2.5 deg C/W	2,5 deg C/W

BGA416 Type C Electrical/Thermal Characteristics

	Air flow	w/o Heat Sink	w/Heat Sink
θ_{ja}	0 m/s	13.1 deg C/W	10 deg C/W
	1 m/s	9.4 deg C/W	6 deg C/W
	3 m/s	7.4 deg C/W	5 deg C/W

BGA Package Summary

	Outline Dimension (mm)	Pin Pitch (mm)	Pin Matrix	Type
PBGA 256	27.00 sq.	1.27	20P12M	Type-B
PBGA 352	35.00 sq.	1.27	26P18M	Type-B
PBGA 352	35.00 sq.	1.27	26P18M	Type-C
PBGA 416	40.00 sq.	1.27	30P22M	Type-C
PBGA 576	40.00 sq.	1.27	30P18M	Type-C
PBGA 899	42.50 sq.	1.27	32x32 Full	Type-D

BGA Mechanical Summary

	BGA 256 (Type - B)	BGA 352 (Type - B)	BGA 352 (Type - C)	BGA 416 (Type - C)	BGA 576 (Type - C)
Body size					
X (mm)	27	35	35	40	40
Y (mm)	27	35	35	40	40
Z (mm)	2.36	3.10	3.10	3.10	3.10
Ball pitch (mm)	1.27	1.27	1.27	1.27	1.27
Ball height (mm)	0.6	0.6	0.6	0.6	0.6
Ball size (Ø)	0.75	0.75	0.75	0.75	0.75
PKG Weight	~2.8g	TBD	~8.0g	11.2g	~11.5g

Package Selector Guide for CG/CE51 0.5 micron ASIC Products

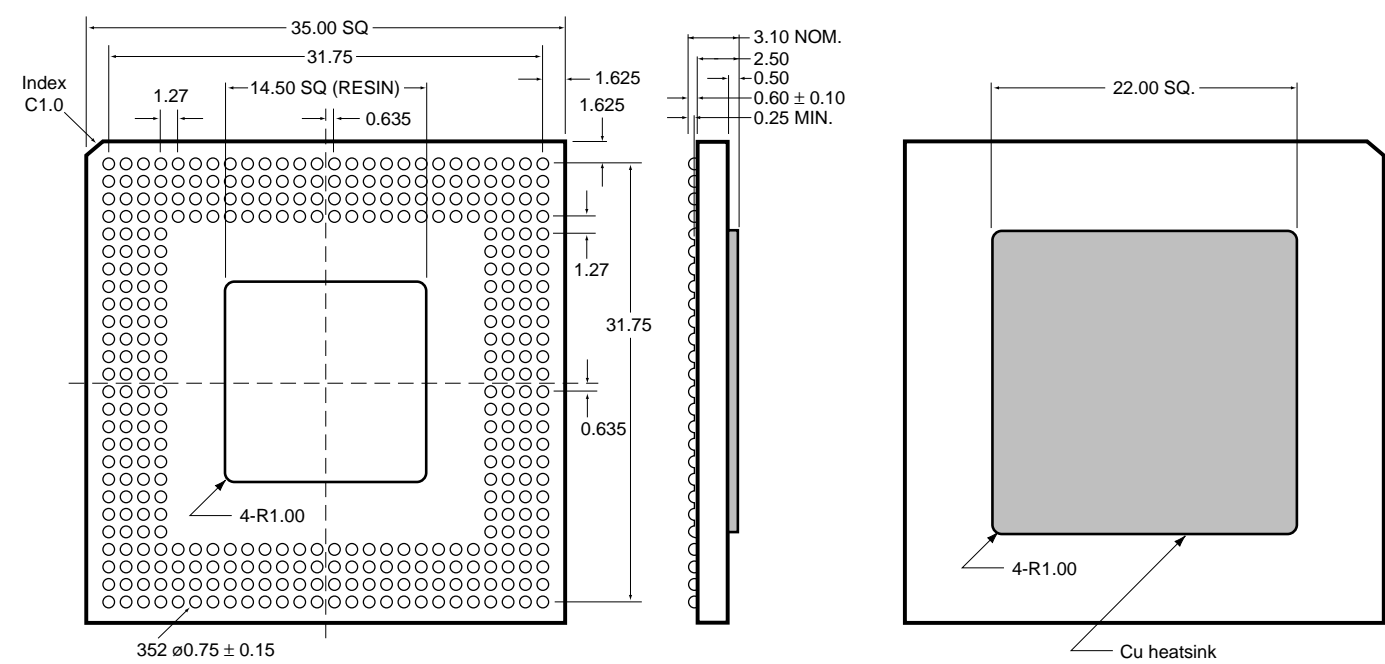
CG51 Device CE51 Device No. of Pads	CG51343 CE51343 120	CG51114 CE51114 208	CG51164 CE51164 240	CG51214 CE51214 272	CG51284 CE51284 304	CG51364 CE51364 352	CG51484 CE51484 400	CG51654 CE51654 456	CG51754 CE51754 496
BGA-256 (Type-B)			✓	✓	✓				
BGA-352 (Type-B)					✓	✓	✓		
BGA-352 (Type-C)					✓	✓	✓		
BGA-416 (Type-C)							✓	✓	
BGA-576 (Type-C)									✓

Package Selector Guide for CG/CE46 0.65 micron ASIC Products

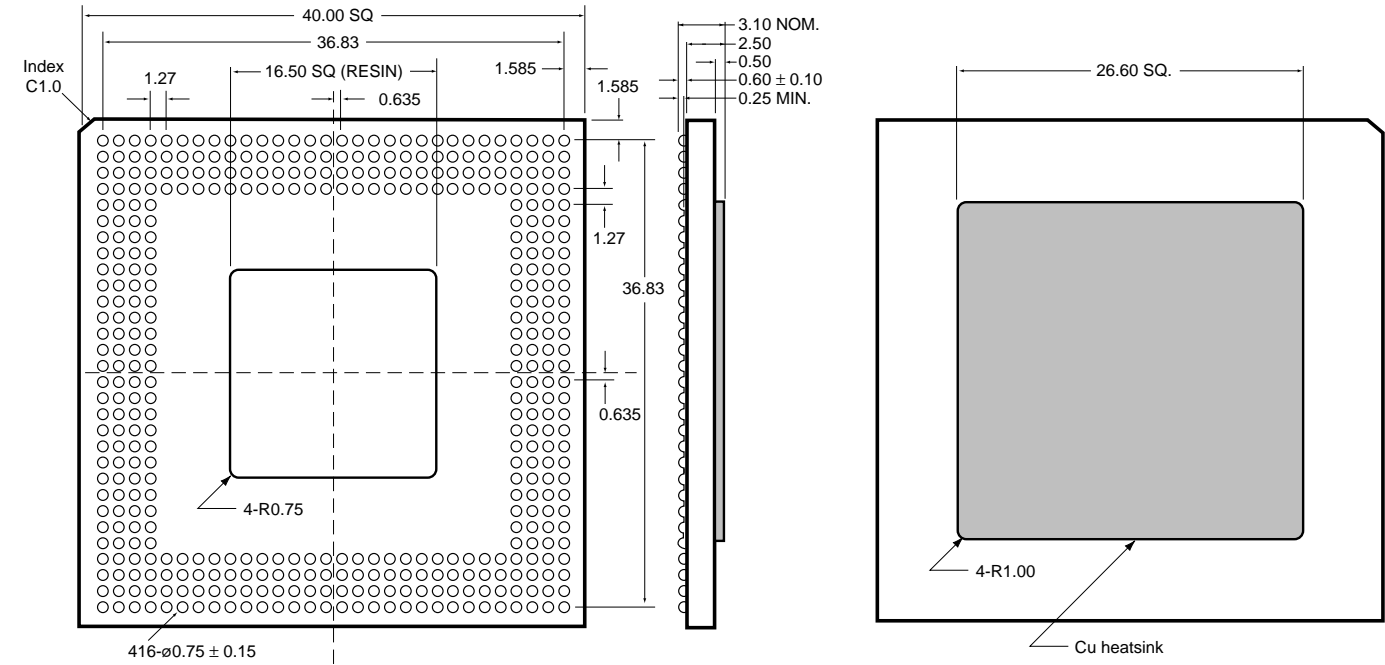
CE46 Device No. of Pads	CE46533 208	CE46713 240	CE46833 256	CE46903 272	CE46104 288	CE46114 304	CE46134 336	CG46154 352	CE46194 400
BGA-256 (Type-B)			✓	✓	✓	✓	✓	✓	
BGA-352 (Type-B)						✓	✓	✓	✓

PACKAGE DIMENSIONS

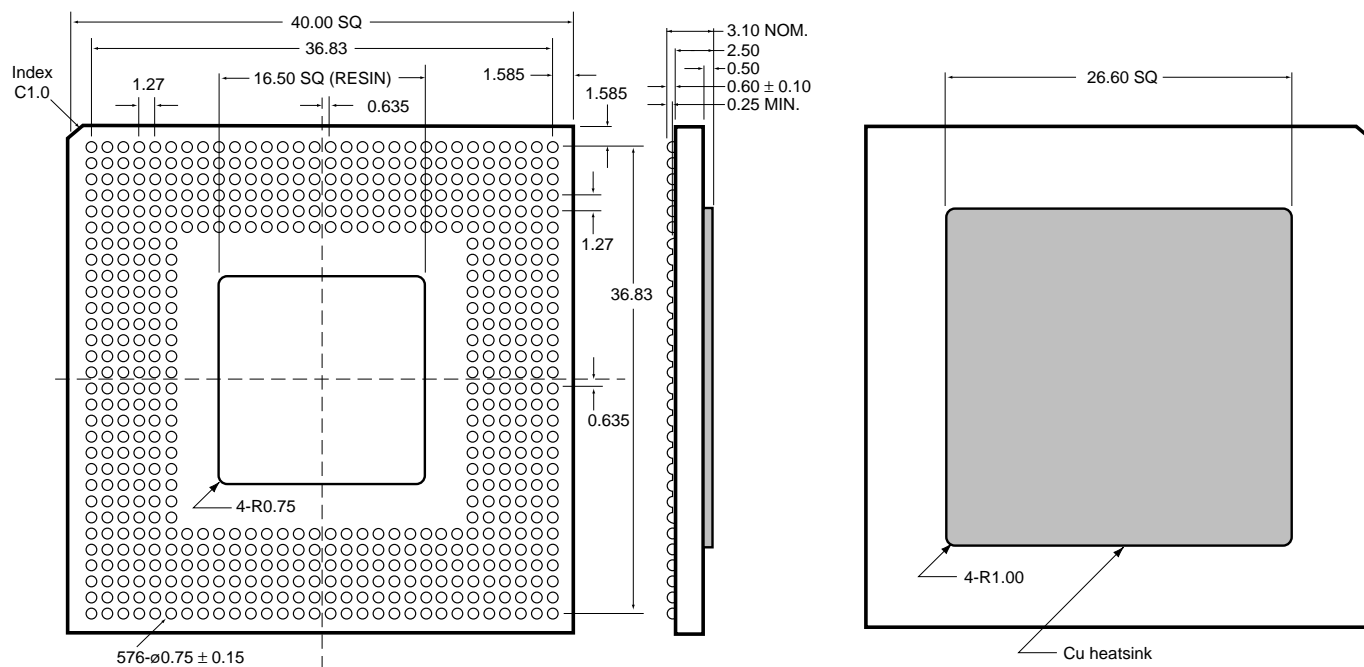
BGA352 (Type-C)



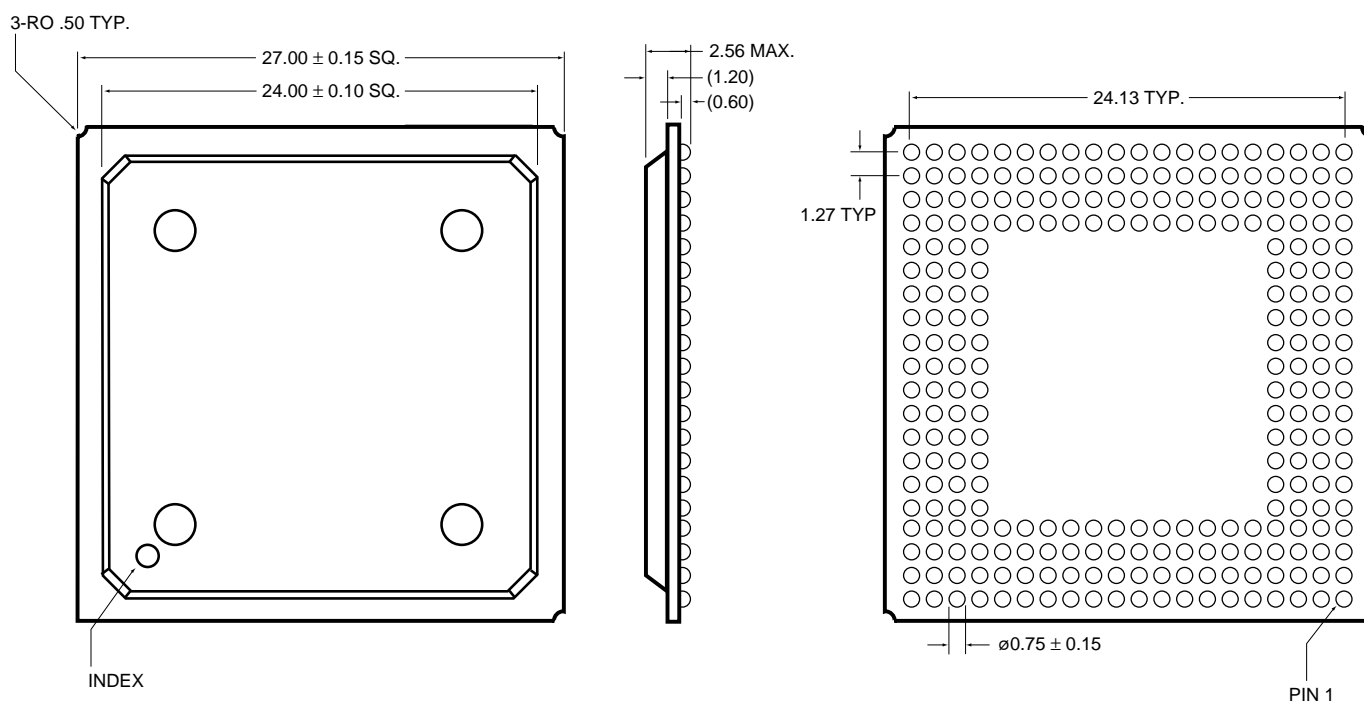
BGA416 (Type-C)



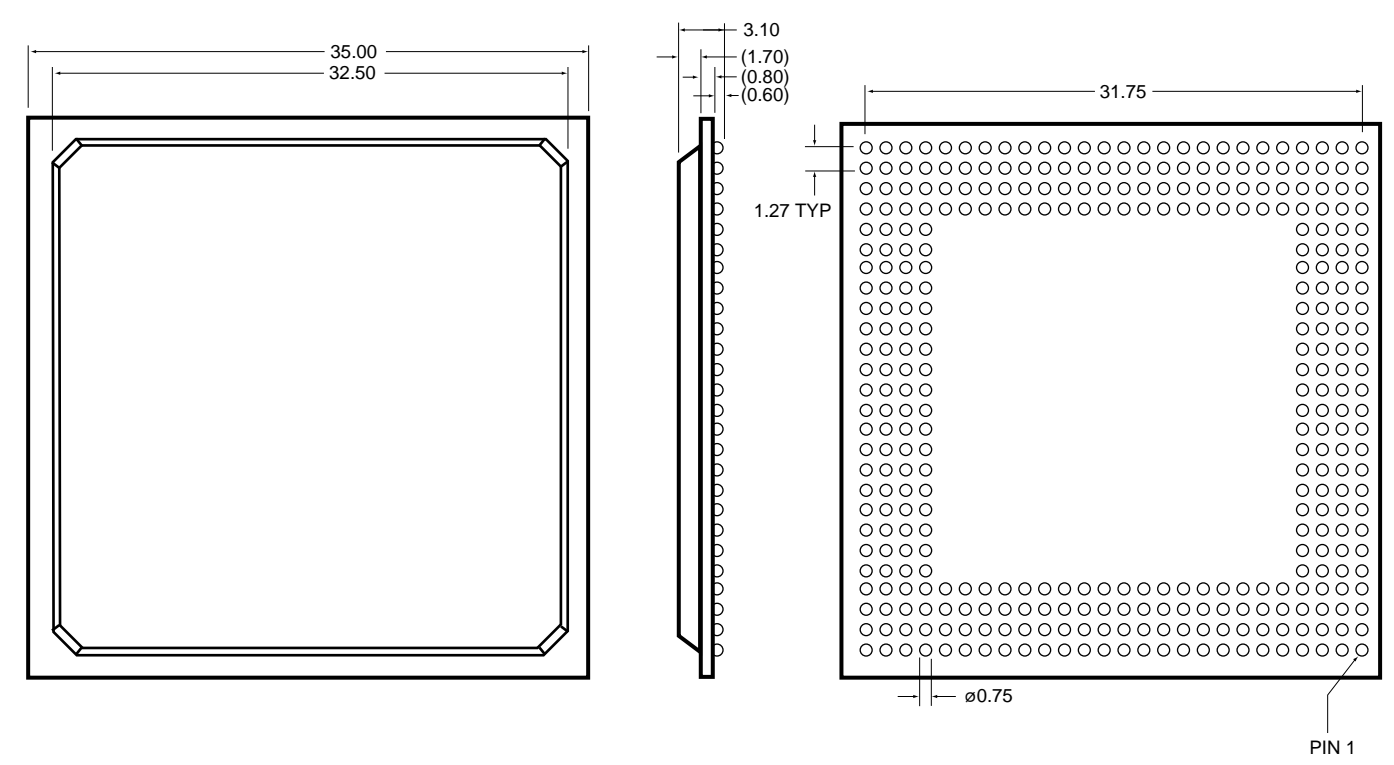
BGA576 (Type-C)



BGA256 (Type-B)



BGA352 (Type-B)



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