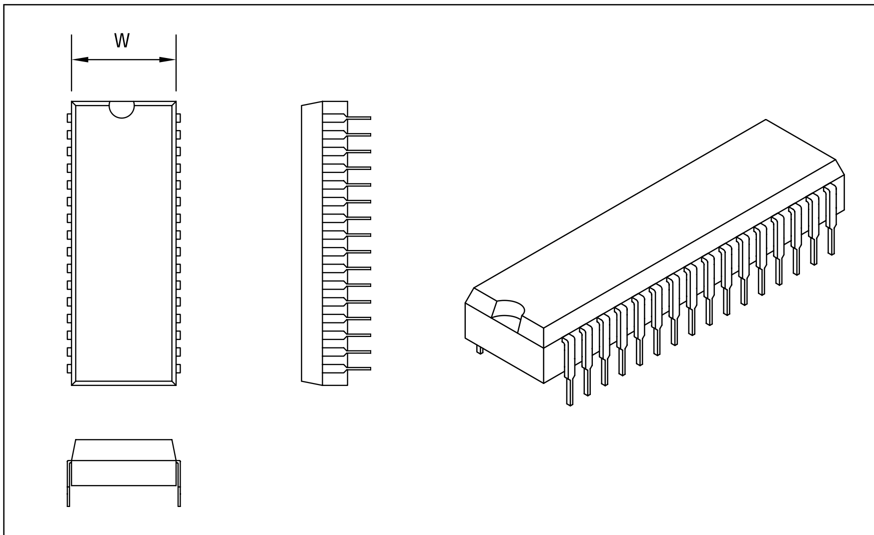
DUAL IN-LINE PACKAGE (DIP)



Description

The most popular first generation IC package type. DIP is a thru-hole device with typical lead spacing of 0.100″ on two sides of the package body. The body width varies: 0.300″, 0.400″, 0.600″ and 0.900″. Other hybrid types are still found. Today many DIP devices translate directly to SOIC or TSOP packages for higher density applications.

Package Variations

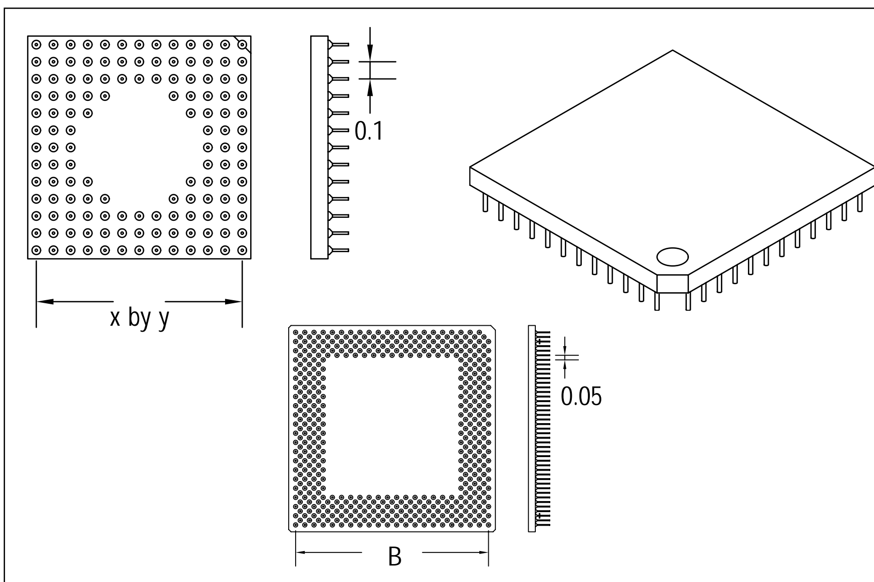
Shrink DIP (SDIP):
Shrink DIP packages usually have higher pin counts (i.e., 48 or 64 lead). They have a lead pitch of 0.70″ and a body size of either 0.600″ or 0.750″.

CRITICAL DATA:
- Pin Count
- Body Width -- Dimension W

TYPICAL CHARACTERISTICS

LEAD COUNT:	8 - 64
LEAD PITCH:	0.1″
BODY WIDTH:	0.300″, 0.400″, 0.600″, 0.900″
BODY SHAPE:	Rectangular

PIN GRID ARRAY (PGA)



Description

Second generation package. Still thru-hole, but package size is reduced by moving pins to the underside of the package in a grid pattern. The pins are located on a 0.1″ grid in various patterns.

Package Variations

Interstitial Pin Grid Array (IPGA): This package type carries additional pins on a 0.05″ offset pattern in between the pins of a regular PGA pattern. It almost doubles the available pins on the same package size as a standard PGA.

CRITICAL DATA:
- Pin Count
- Grid Size
- Grid Pattern

TYPICAL CHARACTERISTICS

LEAD COUNT:	68 - 450
LEAD PITCH:	0.1″
GRID SIZE:	10x10 to 24x24
BODY SHAPE:	Square
BODY SIZE:	typical grid size * 0.1″ + 0.1″

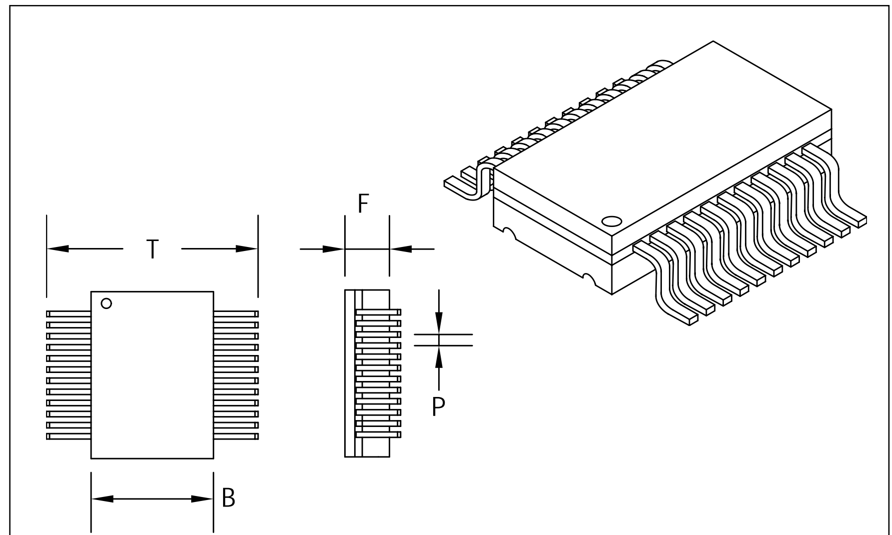
SMALL OUTLINE IC (SOIC) "A.K.A. GULL WING PACKAGE"

Description

The first surface-mount package to replace small pin count (i.e., 8-16) DIP packages. They are also called "Gull Wing" packages, referring to the shape of their pins. Lately, they are very popular for higher pin count (up to 64 pins), mostly memory types of ICs. At first, packages with a 50 mil (1.27mm) lead pitch dominated, but over the last few years various higher density versions became popular. These have acronyms such as SSOP, TSOP, TSSOP and so on, indicating features such as smaller (shrunk) pitch or thin package height.

Package Variations

SOP Pitch:	1.27mm
SSOP Pitch:	0.4, 0.5 or 0.65mm
TSOPs:	(see below)



CRITICAL DATA

- Pin Count
- Pitch -- Dimension P
- Body Width -- Dimension B
- Body Thickness -- Dimension F
- Tip to Tip Dimension -- Dimension T

TYPICAL CHARACTERISTICS

LEAD COUNT:	8 - 100
LEAD PITCH:	0.4, 0.5, 0.55, 0.65, 0.8, 1.0 and 1.27mm (0.05″)
BODY WIDTH:	3.9mm (0.155″) to 15mm+

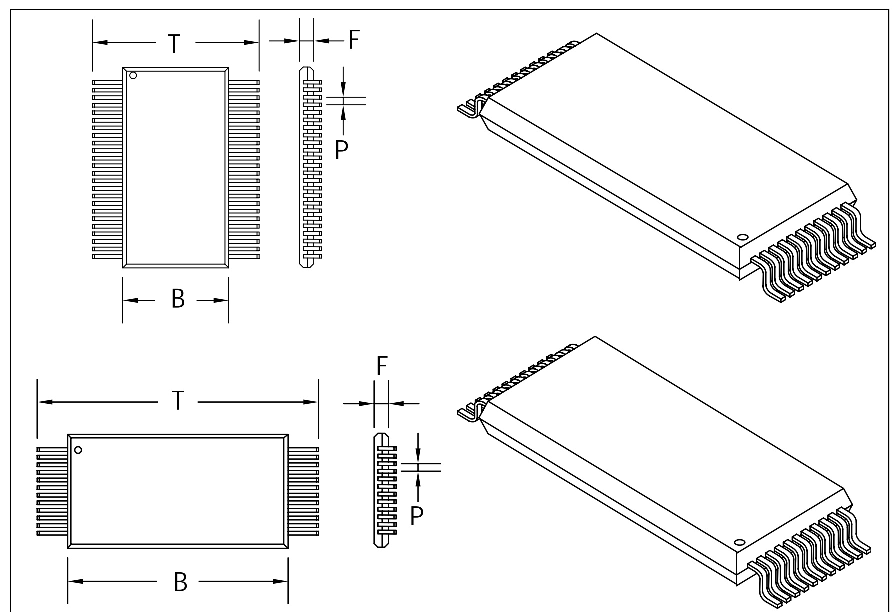
THIN SMALL OUTLINE PACKAGE (TSOP)

Description

The TSOP is a special variation of the SOIC, because the different versions of body width. Typically, "T" means a thin package. This is a very critical dimension for products like theDeltaClip. Note the two different appearances of this package and the three acronyms.

Package Variations

TSOP I Pitch:	0.5 or 0.55mm
TSOP II Pitch:	0.65, 0.8 or 1.25mm
TSSOP Pitch:	0.4, 0.5 or 0.65mm

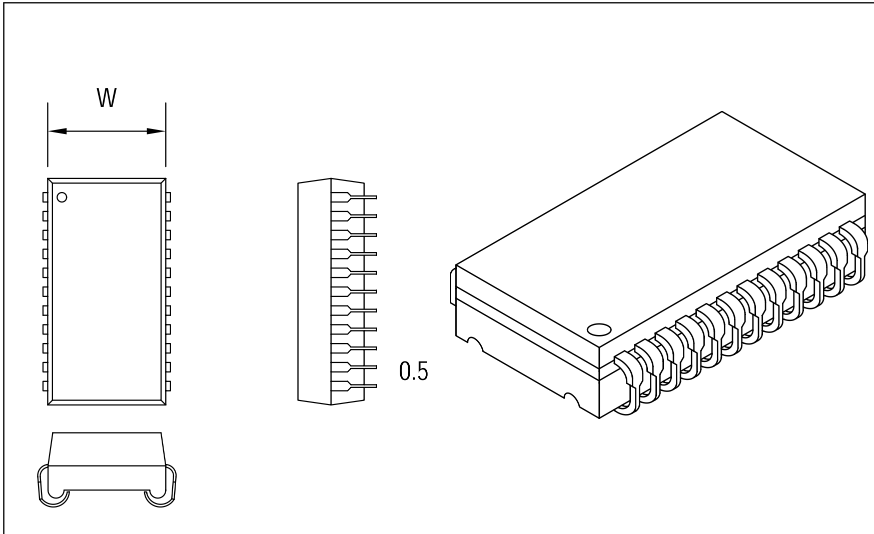


CRITICAL DATA

- Pin Count
- Pitch -- Dimension P
- Body Width -- Dimension B
- Body Thickness -- Dimension F
- Tip to Tip Dimension -- Dimension T

TYPICAL CHARACTERISTICS

LEAD COUNT:	8 - 100
LEAD PITCH:	0.4 to 1.25″
BODY SHAPE:	Rectangle
BODY SIZE:	grid size * 0.1″ + 0.1″, typical



SMALL OUTLINE J-LEADED (SOJ)

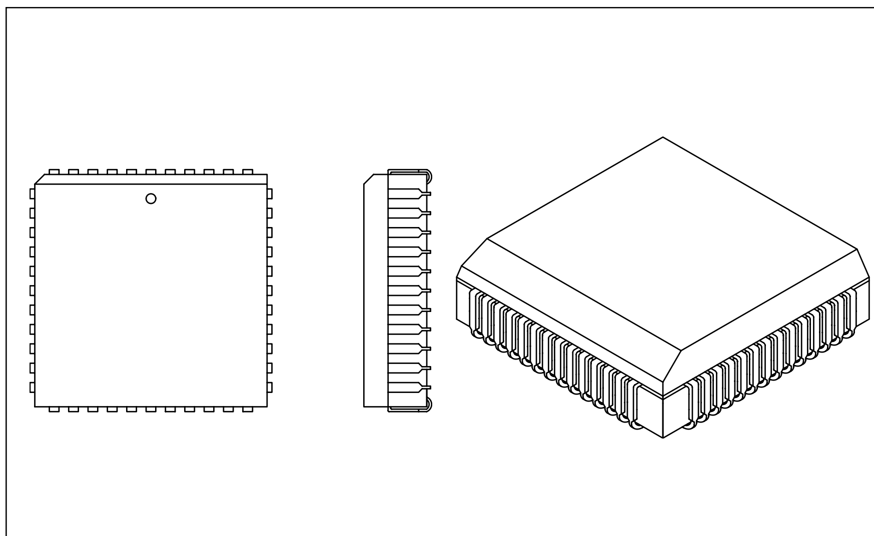
Description

The SOJ package began as a surface-mount equivalent to a thru-hole DIP. The lead pitch is reduced to 50 mil. Pins protrude on two sides of the plastic package body and curl under it. The lead looks like the letter "J", so this package is sometimes referred to as J-leaded.

CRITICAL DATA:
- Pin Count
- Body Width -- Dimension W

TYPICAL CHARACTERISTICS

LEAD COUNT:	8 - 64
LEAD PITCH:	0.050″
BODY WIDTH:	0.300″, 0.350″, 0.400″
BODY SHAPE:	Rectangular



PLASTIC LEADED CHIP CARRIER (PLCC) "A.K.A. J-LEADED"

Description

Third generation packaging and the first true surface-mount package. The PLCC package is a more popular version of the SOJ that has leads on all four sides.

Pitch and body sizes are fairly standard, so all you need is the pin count to specify an adapter.

Package Variations

Leadless Chip Carrier (LCC):
Ceramic body material with no physical pins.

J Leaded Chip Carrier (JLCC):
Ceramic body material with leads similar to PLCC package.

CRITICAL DATA:
- Pin Count

TYPICAL CHARACTERISTICS

LEAD COUNT:	18 - 84
LEAD PITCH:	0.5″
BODY WIDTH:	typical pin count /4 * 0.05″ + 0.1″
BODY SHAPE:	Rectangular and square

PLASTIC QUAD FLAT PACK (PQFP OR QFP)

Description

These are high-density, surface-mount packages with leads protruding on all four sides of the package. The QFP has the most variations of any package type and must be carefully specified for adapters.

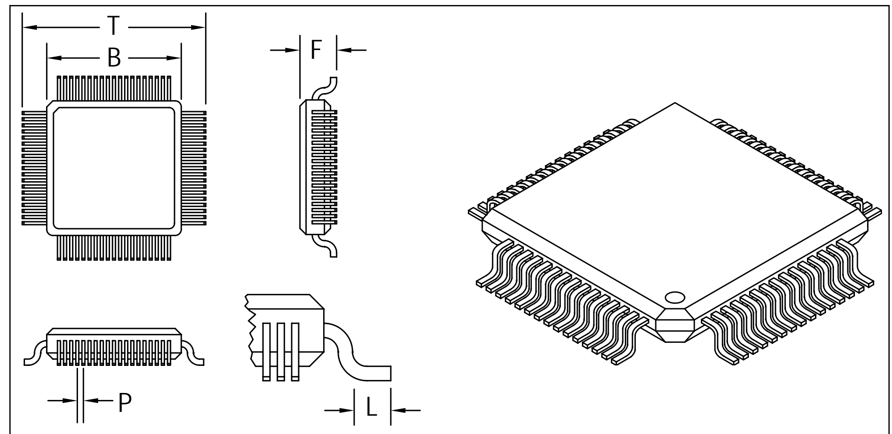
Package Variations

Ceramic Quad Flat Pack (CQFP):
General characteristics are similar to PQFP, but the body size can differ substantially.

Metal Quad Flat Pack (MQFP):
Package material is metal, and body size varies from PQFP and CQFP.

Thin Quad Flat Pack (TQFP):
A variant of the QFP package type with a body thickness of 2mm or less.

Very (small) Quad Flat Pack (VQFP):
Same as TQFP.



CRITICAL DATA

- Pin Count
- Lead Pitch -- Dimension P
- Body Size -- Dimension B
- Body Thickness -- Dimension F
- Tip-to-Tip Dimension -- Dimension T
- Foot Length -- Dimension L

TYPICAL CHARACTERISTICS

LEAD COUNT:	32 - 304
LEAD PITCH:	0.4, 0.5, 0.635 (0.025″), 0.65, 0.8, 1.0mm
BODY SHAPE:	square & rectangular
BODY SIZE:	7mm to 40mm

BALL GRID ARRAY (BGA)

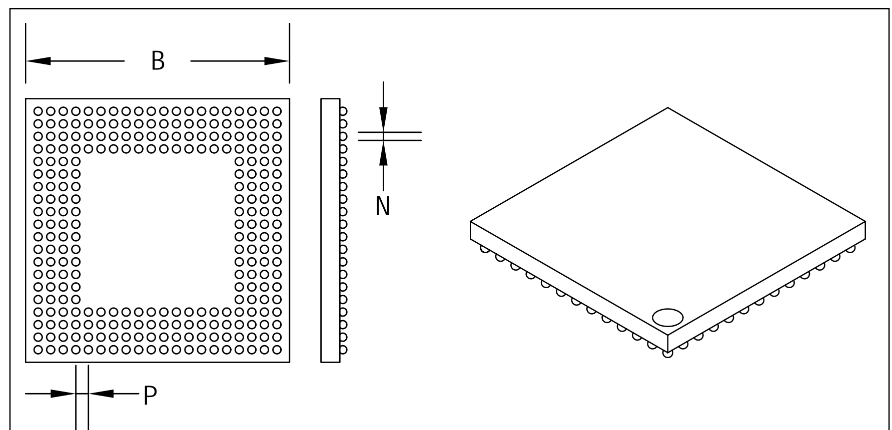
Description

One of the latest in high-density, surface-mount packages. The package is similar to PGA. BGA pin connections are solder balls, in a grid pattern, on the package bottom.

Package Variations

Micro BGA:
Same as BGA, except finer grids. There are three prevalent Micro BGA pitches: 0.65, 0.75 and 0.8mm.

Interstitial Ball Grid Array (IBGA):
This package type carries additional pins, in an offset pattern, in between the balls of a regular BGA pattern. It almost doubles the available connections on the same package size as a regular BGA.



CRITICAL DATA

- Pin Count
- Lead Pitch -- Dimension P
- Grid Size (x by y)
- Grid Pattern
- Ball Size -- Dimension N

TYPICAL CHARACTERISTICS

LEAD COUNT:	16 - 2400+
LEAD PITCH:	0.65, 0.75, 0.8, 1.0, 1.27, 1.5mm
GRID SIZE:	4x4 to 50x50
BODY SIZE:	square/rectangular
BODY WIDTH:	Varies with grid size and pitch