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## **Transition Socket Specifications**

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### **Introduction**

Transition sockets are devices that allow MPLAB® ICE 2000 and MPLAB ICE 4000 device adapters to interface to sockets on customer products that differ from the standard emulator adapter connection.

Embedded microcontrollers/microprocessors come in many different types of IC packages, (i.e., DIP, PLCC, SOIC, SSOP, MQFP, etc.). Typically, development cycle components are EPROM based and, as a result, are provided in larger windowed package formats such as DIP or PLCC. Production components are primarily preprogrammed ROM, OTP or Flash-based and are often in very compact SOIC, SSOP, MQFP or PQFP package formats.

The MPLAB ICE solution is transition sockets. A transition socket is specifically designed to provide compatibility between two differing types of IC package formats.

Transition sockets are typically composed of two parts: the DIP adapter socket and the SOIC/SSOP header. The DIP adapter socket is designed to plug into the emulator system's DIP device adapter on one side and the header on the other. The header is then soldered down to the target application.

The QFP Adapter is a single part soldered directly to the target application and fits into the QFP device adapter.

### **Why should I use transition sockets in my product design?**

There are two very significant advantages to using transition sockets:

1. Shorter product development cycle.
2. Reduced expense in the design, layout and prototype testing.

A typical product design cycle has two important phases: the prototype design phase and the production design phase. Traditionally, these phases were different simply because the prototype used a microcontroller with a different package type. However, with the availability of the transition sockets, the prototype design can be identical to the production design because a transition socket can be used to bridge the microcontroller package differences.

## **What transition sockets are currently available?**

Microchip Technology currently offers the transition sockets listed in the Table of Contents following this introductory section.

The *Product Line Card* (DS00148) lists the transition sockets available for each device adapter of the MPLAB ICE 2000 or 4000 System. For more on MPLAB ICE 2000 device adapters, see the *MPLAB ICE 2000 Processor Module and Device Adapter Specification* (DS51140). For more on MPLAB ICE 4000 device adapters, see the *MPLAB ICE 4000 Processor Module and Device Adapter Specification* (DS51298).

Please check the Microchip web site ([www.microchip.com](http://www.microchip.com)) for the most current version of all documents.

## **How can I obtain maximum benefit from the use of transition sockets?**

Attention to component placement should be considered to provide adequate clearance for the transition socket interface to the PCB footprint. This is especially true for any tall components such as connector headers, radial components or voltage regulators. Refer to the transition socket mechanical drawings for dimensions.

## Transition socket applications – comments and suggestions

Attention to component placement should be considered in mating the adapter sockets to the SOIC/SSOP headers. If visual alignment is difficult in your application, c-shaped end brackets have been included to aid in header-to-adapter socket alignment. Clip the brackets onto the SOIC/SSOP header.

The placement of via's around the Surface Mount Technology (SMT) layout area should be examined. Via's immediately adjacent to the end of a SMT pad may inadvertently come into contact with the header leads. Via's should be placed along the centerline of the SMT pad to lessen the chance of pin to pin shorts while soldering.

The SOIC header is designed for SOIC body width of 0.300-inch, the adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

For information on packaging dimensions, please refer to DS00049.

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# Transition Sockets

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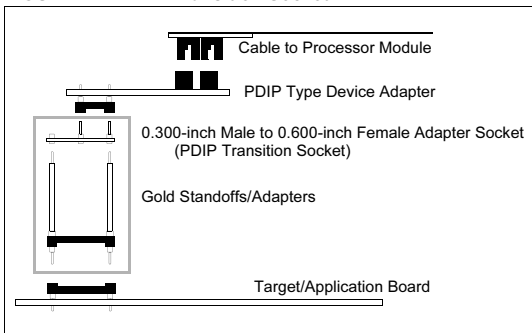


# Transition Sockets

## PDIP Transition Socket

A PDIP transition socket and associated hardware is shown in Figure 1.

**FIGURE 1: PDIP Transition Socket**



The PDIP transition socket is a 0.300-inch Male to 0.600-inch Female adapter socket.

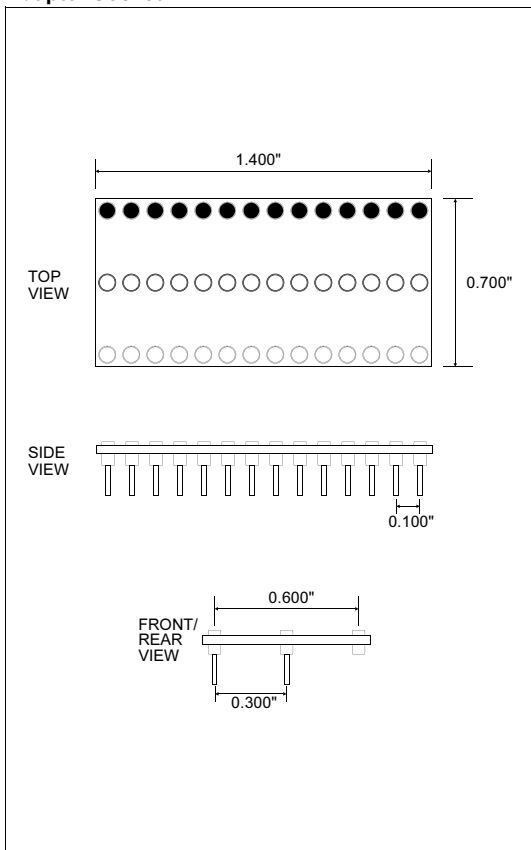
Microchip offers the following PDIP transition socket:

- XLT28XP: One 28-lead PDIP adapter socket and two 28-lead gold stand-offs

See the drawings in this section for layout dimensions.

## XLT28XP

### 28-lead DIP 0.300-inch Male to 0.600-inch Female Adapter Socket

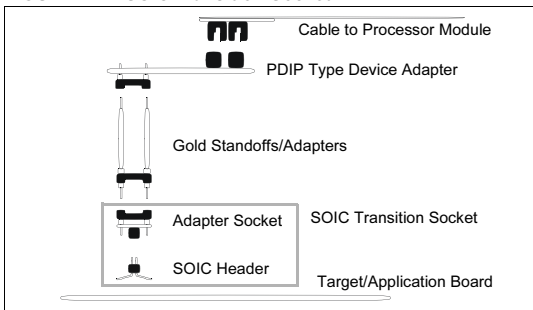


# Transition Sockets

## SOIC Transition Socket

An SOIC transition socket and associated hardware is shown in Figure 2.

**FIGURE 2: SOIC Transition Socket**



There are two components of the SOIC transition socket.

1. Adapter socket that connects to the PDIP device adapter.
2. SOIC header that is to be soldered down to the target application.

Microchip offers the following SOIC transition sockets:

- XLT08SO: One adapter socket and three 8-lead SOIC headers
- XLT14SO: One adapter socket and three 14-lead SOIC headers
- XLT18SO: One adapter socket and three 18-lead SOIC headers
- XLT20SO1: One adapter socket and three 20-lead SOIC headers
- XLT28SO: One adapter socket and three 28-lead SOIC headers

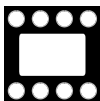
See the drawings in this section for layout dimensions.

**Note:** The SOIC header is designed for SOIC body width of 0.300 inch. The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

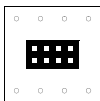
## XLT08SO

### 8-lead DIP to 0.050-inch Adapter Socket

TOP  
VIEW



BOTTOM  
VIEW



SIDE  
VIEW

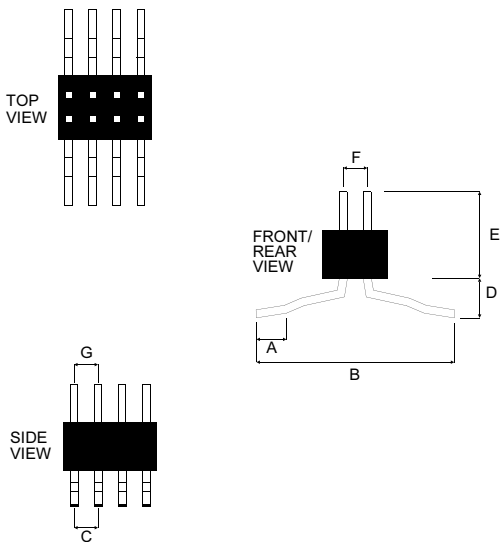


FRONT/  
REAR  
VIEW



# Transition Sockets

## 8-lead SOIC Header



A	B	C	D	E	F	G
0.060	0.410	0.050	0.075	0.178	0.050	0.050

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

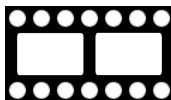
The SOIC header is designed for an SOIC body width of 0.300 inch.

The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

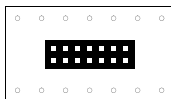
## XLT14SO

### 14-lead DIP to 0.050-inch Adapter Socket

TOP  
VIEW



BOTTOM  
VIEW



SIDE  
VIEW

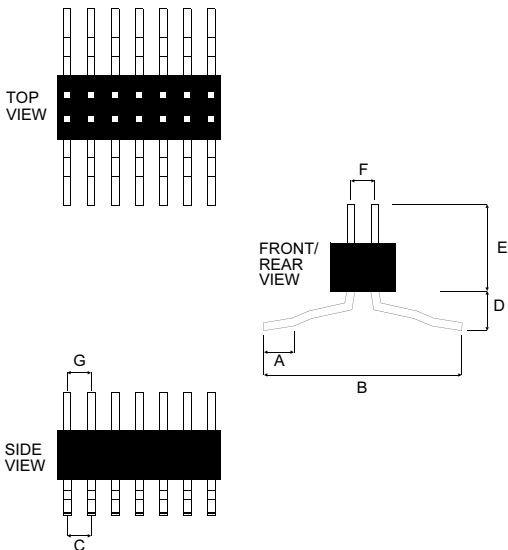


FRONT/  
REAR  
VIEW



# Transition Sockets

## 14-lead SOIC Header



A	B	C	D	E	F	G
0.060	0.410	0.050	0.075	0.178	0.050	0.050

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

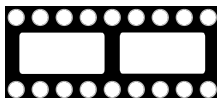
The SOIC header is designed for an SOIC body width of 0.300 inch.

The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

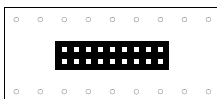
## XLT18SO

### 18-lead DIP to 0.050-inch Adapter Socket

TOP  
VIEW



BOTTOM  
VIEW



SIDE  
VIEW



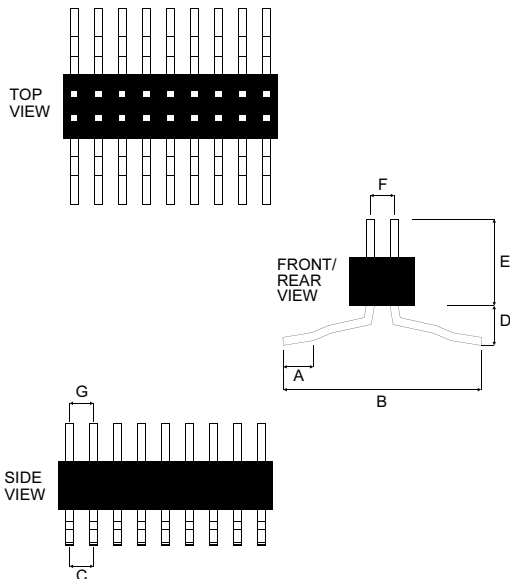
FRONT/  
REAR  
VIEW





# Transition Sockets

## 18-lead SOIC Header



A	B	C	D	E	F	G
0.060	0.410	0.050	0.075	0.178	0.050	0.050

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

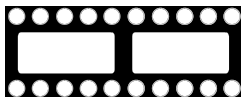
The SOIC header is designed for an SOIC body width of 0.300 inches.

The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

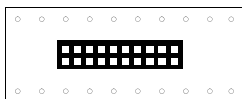
## XLT20SO1

### 20-lead DIP to 0.050-inch Adapter Socket

TOP  
VIEW



BOTTOM  
VIEW



SIDE  
VIEW

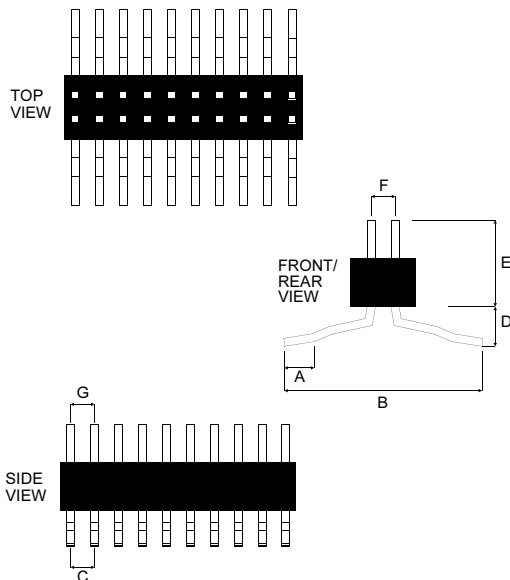


FRONT/  
REAR  
VIEW



# Transition Sockets

## 20-lead SOIC Header



A	B	C	D	E	F	G
0.060	0.410	0.050	0.075	0.178	0.050	0.050

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

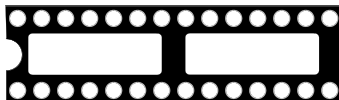
The SOIC header is designed for an SOIC body width of 0.300 inches.

The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

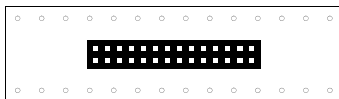
## XLT28SO

### 28-lead DIP to 0.050-inch Adapter Socket

TOP  
VIEW



BOTTOM  
VIEW



SIDE  
VIEW

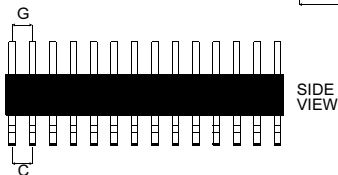
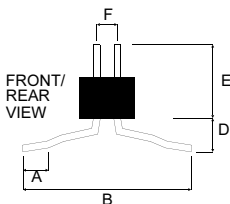
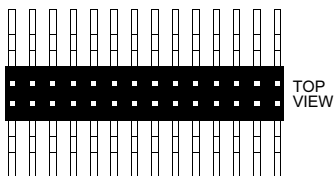


FRONT/  
REAR  
VIEW



# Transition Sockets

## 28-lead SOIC Header



A	B	C	D	E	F	G
0.060	0.410	0.050	0.075	0.178	0.050	0.050

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

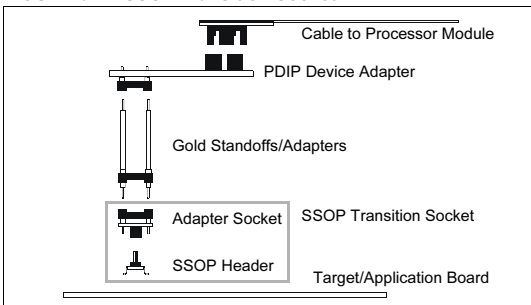
The SOIC header is designed for an SOIC body width of 0.300 inches.

The adapter leads should be cut to fit the 0.150-inch and 0.208-inch SOIC body widths.

## SSOP Transition Socket

An SSOP transition socket and associated hardware is shown in Figure 3.

**FIGURE 3: SSOP Transition Socket**



The SSOP transition sockets are similar to the SOIC transition sockets. There are two parts to the SSOP transition socket:

1. Adapter socket that connects to the PDIP device adapter.
2. SSOP header that gets soldered down to the target application.

**Note:** To keep the leads straight during assembly and shipping, the SSOP headers are shipped with break-away tabs attached to the leads. Please remove the break-away tabs before applying power to the target system. Be careful not to bend the leads prior to soldering to the target application.

# Transition Sockets

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Microchip offers the following SSOP transition sockets:

- XLT14SS: One adapter socket and three 14-lead SSOP headers
- XLT20SS: One adapter socket and three 20-lead SSOP headers
- XLT20SS1: One adapter socket and three 20-lead SSOP headers
- XLT28SS: One adapter socket and three 28-lead SSOP headers
- XLT28SS2: One adapter socket and three 28-lead SSOP headers for PIC16C55/57

See the drawings in this section for layout dimensions and clearances for tall components.

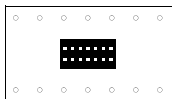
## XLT14SS

### 14-lead DIP to 0.8 mm Adapter Socket

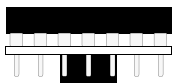
TOP  
VIEW



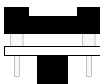
BOTTOM  
VIEW



SIDE  
VIEW



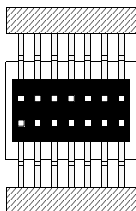
FRONT/  
REAR  
VIEW





# Transition Sockets

## 14-lead SSOP Header

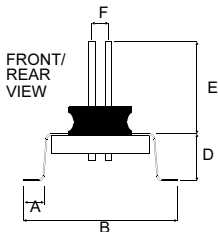


TOP  
VIEW

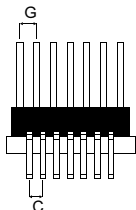
Shipped with break-away tabs attached to leads

Remove prior to providing power

\* Top drawing shown with clip-on shrouds installed



FRONT/  
REAR  
VIEW



SIDE  
VIEW

A	B	C	D	E	F	G
0.035	0.300	0.023	0.080	0.186	0.043	0.025

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Break away tabs are to be removed prior to providing power.

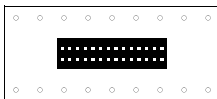
## XLT20SS

### 18-lead DIP to 0.8 mm Adapter Socket

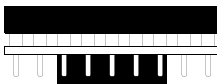
TOP  
VIEW



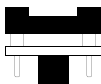
BOTTOM  
VIEW



SIDE  
VIEW

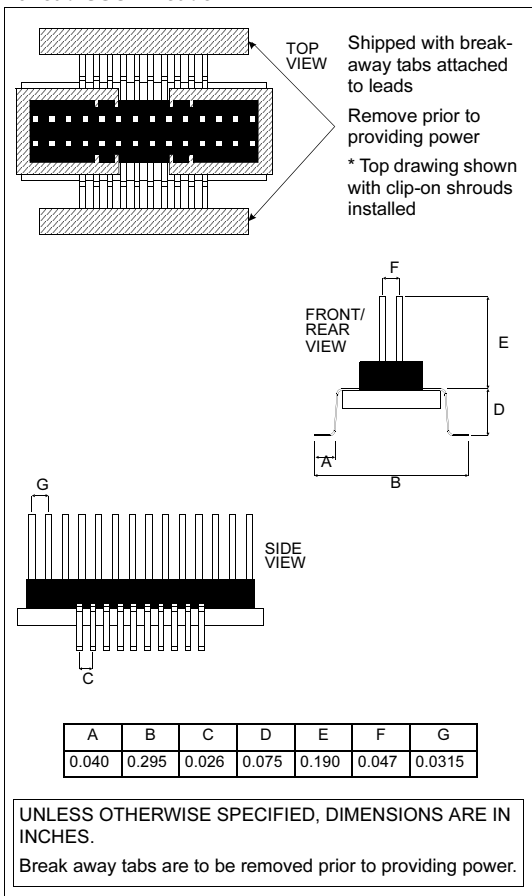


FRONT/  
REAR  
VIEW



# Transition Sockets

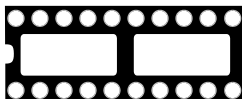
## 20-lead SSOP Header



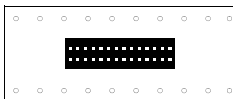
## XLT20SS1

### 20-lead DIP to 0.8 mm Adapter Socket

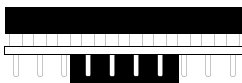
TOP  
VIEW



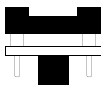
BOTTOM  
VIEW



SIDE  
VIEW

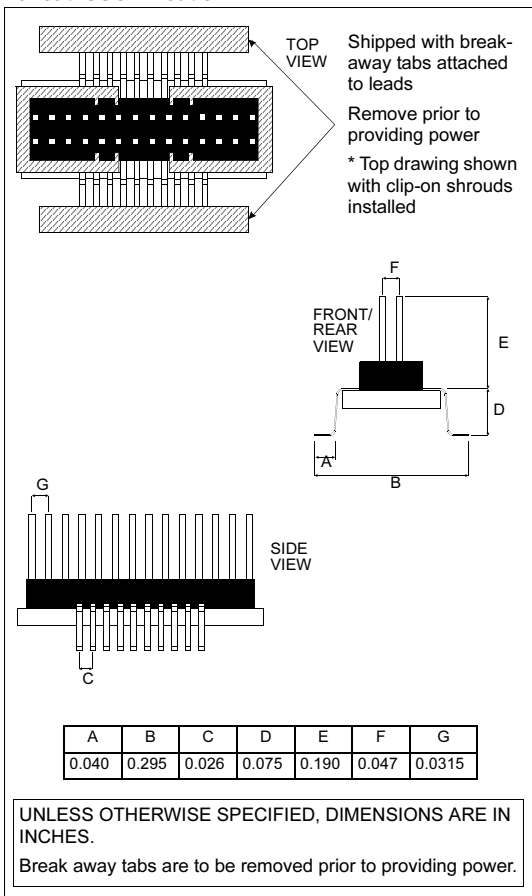


FRONT/  
REAR  
VIEW



# Transition Sockets

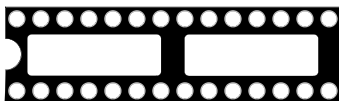
## 20-lead SSOP Header



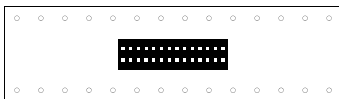
## XLT28SS, XLT28SS2

### 28-lead DIP to 0.8 mm Adapter Socket

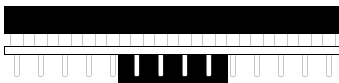
TOP  
VIEW



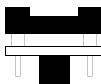
BOTTOM  
VIEW



SIDE  
VIEW

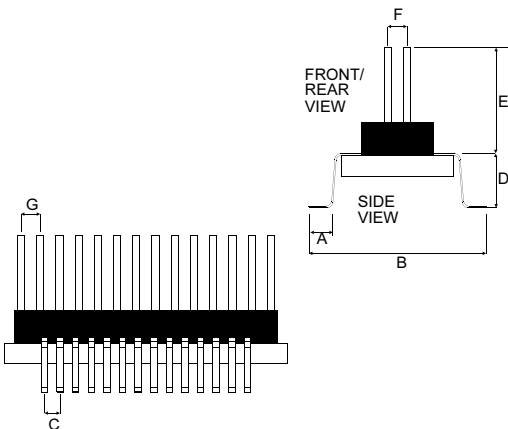
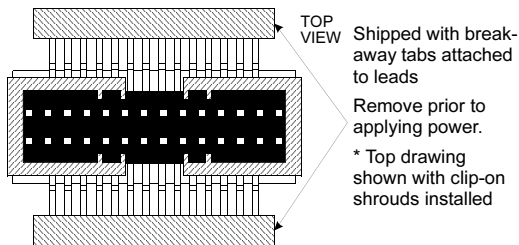


FRONT/  
REAR  
VIEW



# Transition Sockets

## 28-lead SSOP Header



A	B	C	D	E	F	G
0.040	0.295	0.026	0.075	0.190	0.047	0.0315

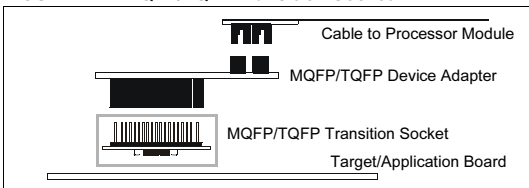
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Break away tabs are to be removed prior to applying power.

## MQFP/TQFP Transition Socket

An MQFP/TQFP transition socket and associated hardware is shown in Figure 4.

**FIGURE 4: MQFP/TQFP Transition Socket**



The MQFP/TQFP transition socket is required for use along with the MQFP/TQFP device adapters. The device adapter is equipped with four socket strips that interface with the transition socket.

**Note:** To avoid solder bridging, do not place via's within 0.025-inch of the MQFP/TQFP footprint. Also, any via's near the MQFP/TQFP should be directly on the centerline of the pad.

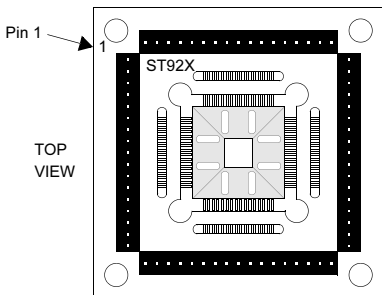
Microchip offers the following MQFP/TQFP transition sockets:

- XLT44PT: One 44-lead MQFP/TQFP transition socket, 0.80 mm
- XLT64PT1: One 64-lead MQFP/TQFP transition socket, 0.5 mm (PIC16C92X)
- XLT64PT2: One 64-lead MQFP/TQFP transition socket, 0.5 mm (PIC17CXXX)
- XLT64PT3: One 64-lead MQFP/TQFP transition socket, 0.8 mm (dsPIC30F)
- XLT80PT: One 80-lead MQFP/TQFP transition socket, 0.5 mm



# Transition Sockets

**Note:** The XLT64PT1 for the PIC16C92X is not symmetrical. Please note Pin 1 orientation prior to soldering to the target system.



See the drawings in this section for layout dimensions and clearances for tall components.

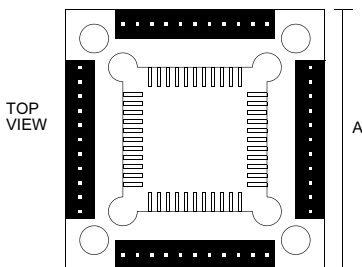
## TQFP Transition Socket Soldering Tips

- Before soldering, consider keeping the break away tabs in place during soldering.
- Use controlled soldering iron tip temperatures between 300°C and 325°C (570°F to 615°F)
- If possible, use a PACE mini wave soldering iron tip or an equivalent tip design.
- Plan to solder one (1 of 4) side first, then the opposite side, then remaining two sides.
- Soldering iron tip movement should be in direction of the leads (backward and forward), not across the leads; dragging the tip across the leads may cause lead damage.
- Use generous amounts of soldering flux to aid in the solder flow action.
- If the breakaway tabs are removed after soldering (using a dental pick or equivalent), any solder bridging between leads can be repaired by simply gently touching the soldering tip to the lead tip.

Remember the 64- and 80-pin TQFP headers are very delicate and can be damaged!

## XLT44PT

### 44-lead QFP to 0.8 mm Adapter Socket Top View

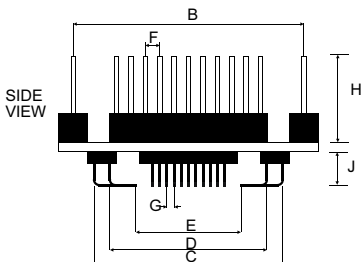


A
0.90

UNLESS OTHERWISE SPECIFIED, DIMENSIONS  
ARE IN INCHES.

# Transition Sockets

## 44-lead QFP to 0.8 mm Adapter Socket Side View

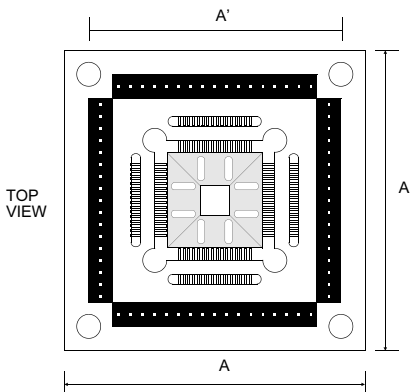


B	C	D	E	F	G	H	J
0.80	0.65	0.55	0.365	0.05	0.80 mm	0.275	0.130

UNLESS OTHERWISE SPECIFIED, DIMENSIONS  
ARE IN INCHES.

## XLT64PT1, XLT64PT2, XLT80PT

### 64/80-lead QFP to 0.5 mm Adapter Socket Top View



	A	B
XLT64PT1	1.25	1.050 +/- 0.005
XLT64PT2	1.25	1.050 +/- 0.005
XLT80PT	1.45	N/A

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

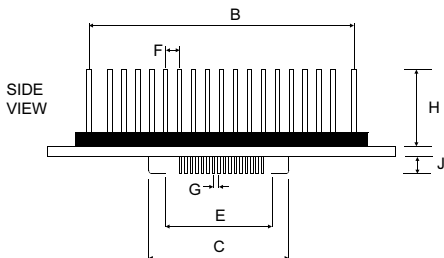
Drawing shown is for 64-lead.

This drawing shown with break away tabs attached to the leads.

Break away tabs are to be removed prior to applying power.

# Transition Sockets

## 64/80-lead QFP to 0.5 mm Adapter Socket Side View



	B	C	E	F	G	H	J
XLT64PT1	0.95	0.500	0.400	0.05	0.5 mm	0.275	0.095
XLT64PT2	0.95	0.500	0.400	0.05	0.5 mm	0.275	0.095
XLT80PT	1.15	0.575	0.475	0.05	0.5 mm	0.275	0.095

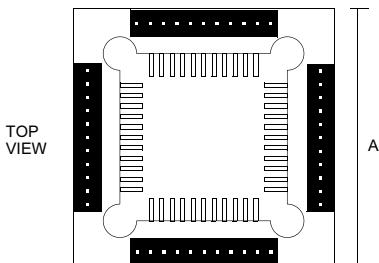
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Drawing shown is for 64-lead.

Break away tabs are to be removed prior to applying power.

## XLT64PT3

### 64-lead QFP to 0.8mm Adapter Socket Top View

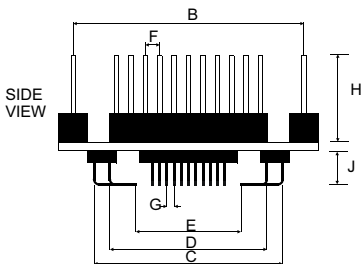


A
1.05

UNLESS OTHERWISE SPECIFIED, DIMENSIONS  
ARE IN INCHES.

# Transition Sockets

## 64-lead QFP to 0.8mm Adapter Socket Side View



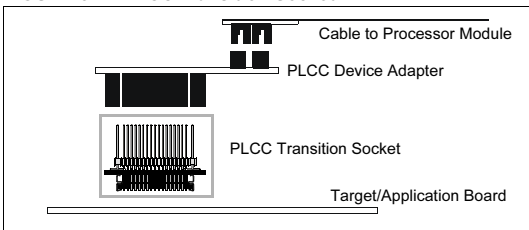
B	C	D	E	F	G	H	J
0.95	0.80	0.70	0.51	0.05	0.80 mm	0.275	0.140

UNLESS OTHERWISE SPECIFIED, DIMENSIONS  
ARE IN INCHES.

## PLCC Transition Socket

A PLCC transition socket and associated hardware is shown in Figure 5.

**FIGURE 5: PLCC Transition Socket**



The PLCC transition socket is required for use along with the PLCC device adapters. The DAF18-1 device adapter is equipped with eight socket strips that interface with one of two transition sockets. The DAF18-3 device adapter is equipped with four socket strips that interface with one transition socket.

The PLCC transition sockets are designed with a threaded insert in the center of the footprint so that a 4/40 screw can securely fasten the transition socket to the device adapter.

The PLCC transition sockets are designed to be soldered to the target PCB PLCC surface mount pattern or inserted into a PLCC socket on the target PCB.

**Note:** To avoid solder bridging, do not place via's within 0.025-inch of the PLCC footprint. Also, any via's near the PLCC should be directly on the centerline of the pad.

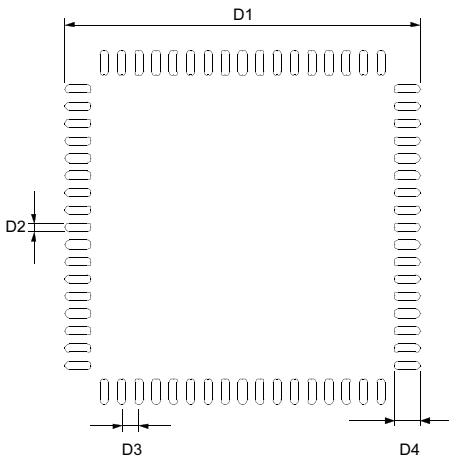
Microchip offers the following PLCC transition sockets:

- XLT44L2: One 44-lead PLCC transition socket – used exclusively with the DAF18-3 device adapter.
- XLT68L1: One 68-lead PLCC transition socket
- XLT84L1: One 84-lead PLCC transition socket



# Transition Sockets

## Recommended PCB Layout



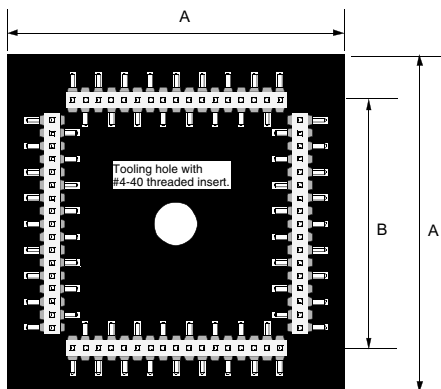
	D1	D2	D3	D4
44-lead	0.865	0.024	0.050	0.074
68-lead	1.025	0.024	0.050	0.074
84-lead	1.225	0.024	0.050	0.074

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Drawing shown is for 68-lead.

## XLT44L2, XLT68L1, XLT84L1

### 44/68/84-lead Transition Socket Top View



TOP VIEW

	A	B
44-lead*	1.100	0.800
68-lead	1.300	0.960
84-lead	1.400	1.160

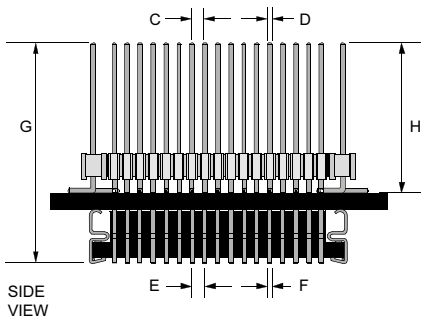
**\*Caution:** Pin 1 on the device adapter side (top of socket) is 180 degrees from pin 1 on the target side (bottom of socket.)

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Drawing shown is for 68-lead.

# Transition Sockets

## 44/68/84-lead Transition Socket Side View



	C	D	E	F	G	H
44-lead	0.050	0.018	0.050	0.017	0.850	0.588
68-lead	0.050	0.018	0.050	0.017	0.849	0.580
84-lead	0.050	0.018	0.050	0.017	0.849	0.580

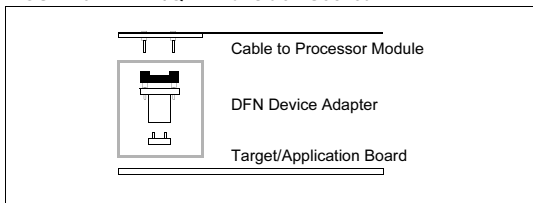
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE  
IN INCHES.

Drawing shown is for 68-lead.

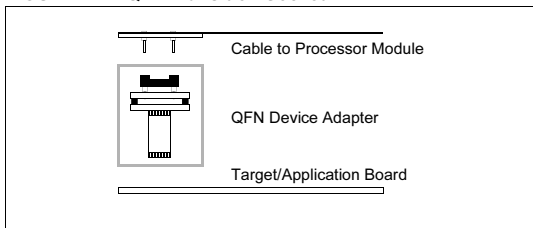
## DFN/QFN Transition Sockets

A DFN/QFN transition sockets and associated hardware are shown in Figure 6 and Figure 7.

**FIGURE 6: DFN/QFN Transition Socket**



**FIGURE 7: QFN Transition Socket**



Microchip offers the following DFN/QFN transition sockets:

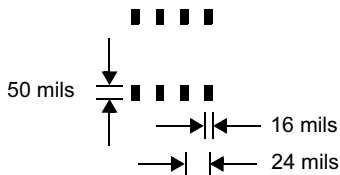
- XLT08DFN: One 8-lead DFN transition socket
- XLT28QFN: One 28-lead QFN transition socket
- XLT28QFN2: One 28-lead QFN transition socket
- XLT44QFN: One 44-lead QFN transition socket

See the drawings in this section for layout dimensions.

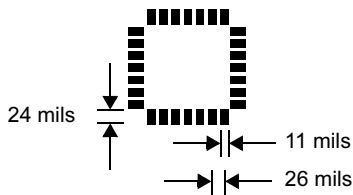
# Transition Sockets

## Recommended PCB Layout

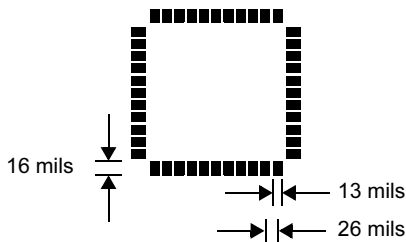
### 8-Pin DFN



### 28-Pin QFN

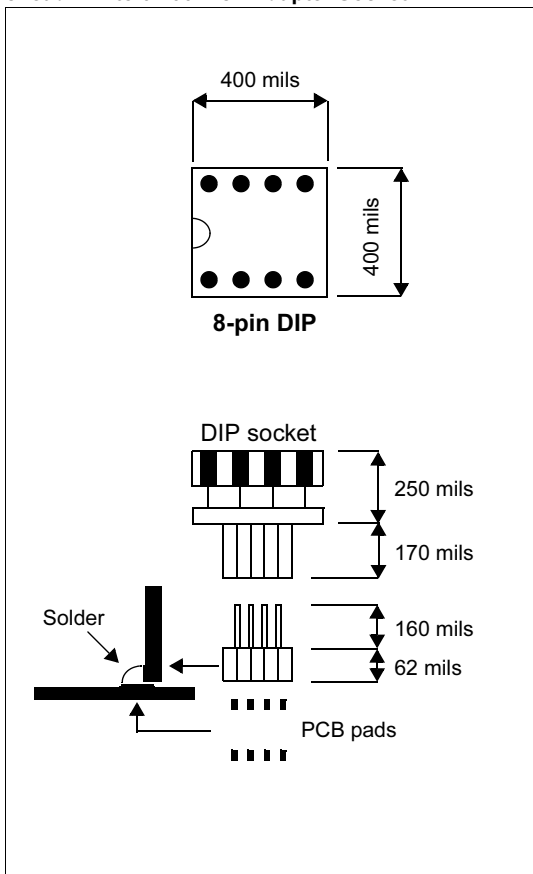


### 44-Pin QFN



## XLT08DFN

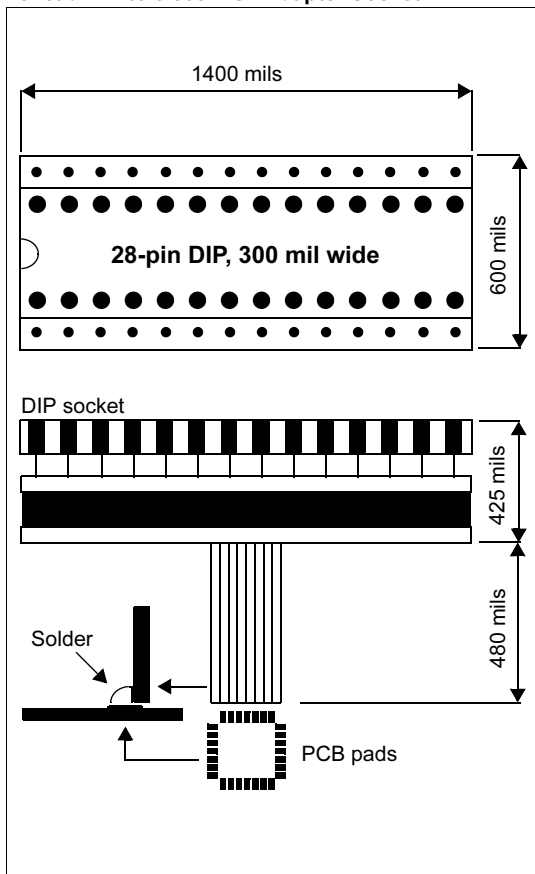
### 8-lead DIP to 0.400-inch Adapter Socket



# Transition Sockets

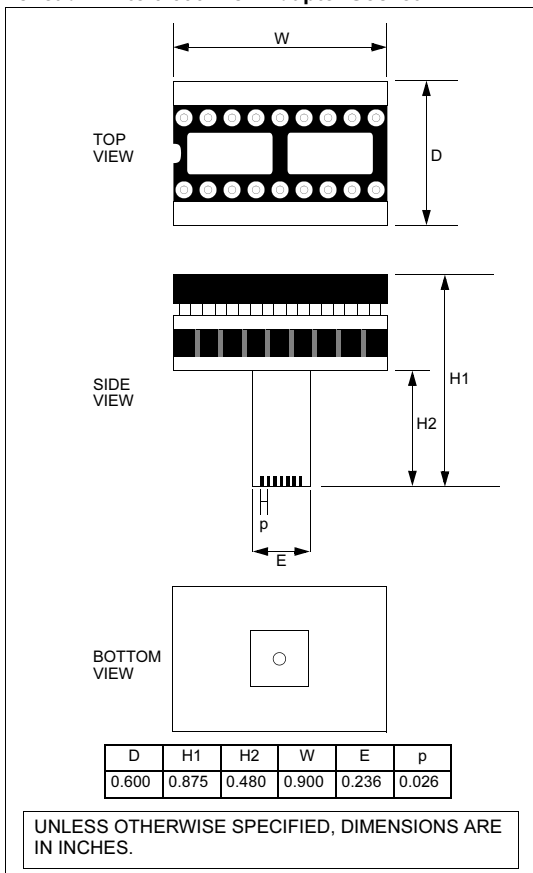
## XLT28QFN

### 28-lead DIP to 0.600-inch Adapter Socket



## XLT28QFN2

### 18-lead DIP to 0.600-inch Adapter Socket

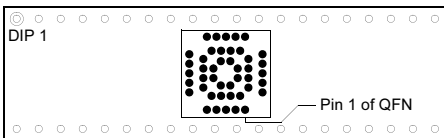
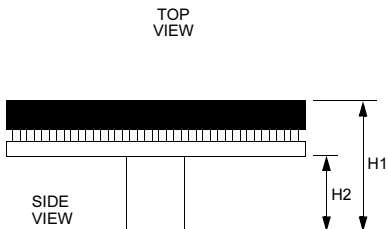
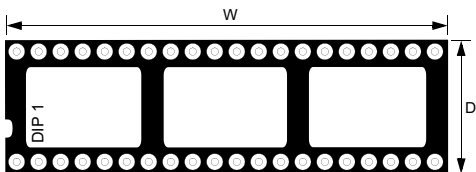




# Transition Sockets

## XLT44QFN

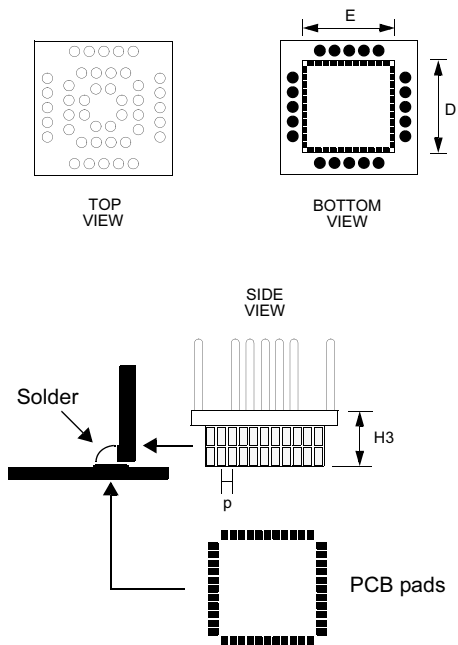
### 40-lead DIP to 0.600-inch Adapter Socket



D	H1	H2	W
0.695	0.730	0.50	2.058

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

## 44-lead QFN Header



D	E	H3	p
0.315	0.315	0.195	0.026

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

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