
Transition Socket Specifications

INTRODUCTION

Transition sockets are devices that allow MPLAB® ICE 2000 and 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. A shorter product development cycle, and
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 ARE THE CURRENTLY AVAILABLE TRANSITION SOCKETS?

Microchip Technology currently offers the following transition sockets for use with our emulator systems:

- PDIP – 28-lead, 0.300-inch Male to 0.600-inch Female
- SOIC – 8-, 14-, 18-, 20- and 28-lead
- SSOP – 20- and 28-lead
- QFP – 44-, 64- and 80-lead
- PLCC - 68- and 84-lead

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

Transition sockets available for each device adapter of the MPLAB ICE 4000 System are listed in the table below. For more on MPLAB ICE 4000 device adapters, see the *MPLAB ICE 4000 Processor Module and Device Adapter Specification* (DS51298).

TABLE 1: MPLAB ICE 4000 DEVICE ADAPTER DAF18-1

| Transition Socket | Usage |
|-------------------|---|
| XLT84L1 | PIC18C801 - 84 pin PLCC |
| XLT80PT | PIC18C801 - 80 pin TQFP PIC18F8620 - 80 pin TQFP PIC18F8720 - 80 pin TQFP |
| XLT68L1 | PIC18C601 - 68 pin PLCC |
| XLT64PT | PIC18C601 - 64 pin TQFP PIC18F6620 - 64 pin TQFP PIC18F6720 - 64 pin TQFP |

Please check the Microchip web site (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.

COMMENTS AND SUGGESTIONS ON TRANSITION SOCKET APPLICATIONS

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.

MPLAB® ICE

NOTES:

PDIP Transition Socket

XLT28XP

28-lead DIP 0.300-inch Male to 0.600-inch Female
Adapter Socket 8

SOIC Transition Socket

XLT08SO

8-lead DIP to 0.050-inch Adapter Socket 10
8-lead SOIC Header 11

XLT14SO

14-lead DIP to 0.050-inch Adapter Socket 12
14-lead SOIC Header 13

XLT18SO

18-lead DIP to 0.050-inch Adapter Socket 14
18-lead SOIC Header 15

XLT20SO1

20-lead DIP to 0.050-inch Adapter Socket 16
20-lead SOIC Header 17

XLT28SO

28-lead DIP to 0.050-inch Adapter Socket 18
28-lead SOIC Header 19

SSOP Transition Socket

XLT20SS

18-lead DIP to 0.8 mm Adapter Socket 21
20-lead SSOP Header 22

XLT20SS1

20-lead DIP to 0.8 mm Adapter Socket 23
20-lead SSOP Header 24

MPLAB® ICE

XLT28SS, XLT28SS2

| | |
|--|----|
| 28-lead DIP to 0.8 mm Adapter Socket | 25 |
| 28-lead SSOP Header | 26 |

MQFP/TQFP Transition Socket

XLT44PT

| | |
|---|----|
| 44-lead Transition Socket – Top View | 29 |
| 44-lead Transition Socket – Side View | 30 |

XLT64PT1, XLT64PT2, XLT80PT

| | |
|--|----|
| 64/80-lead Transition Socket – Top View | 31 |
| 64/80-lead Transition Socket – Side View | 32 |

PLCC Transition Socket

XLT68L1, XLT84L1

| | |
|--|----|
| 68/84-lead Transition Socket – Top View | 35 |
| 68/84-lead Transition Socket – Side View | 36 |

DFN/QFN Transition Sockets

XLT08DFN

| | |
|---|----|
| 8-lead DIP to 0.400-inch Adapter Socket | 39 |
|---|----|

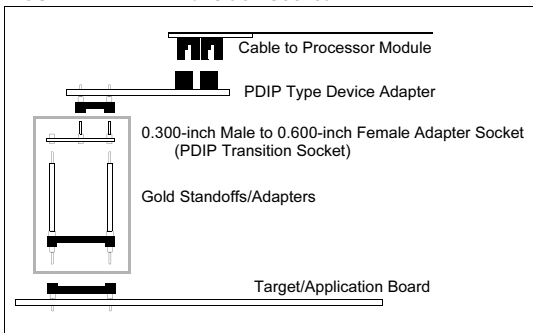
XLT28QFN

| | |
|--|----|
| 28-lead DIP to 0.600-inch Adapter Socket | 40 |
|--|----|

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.

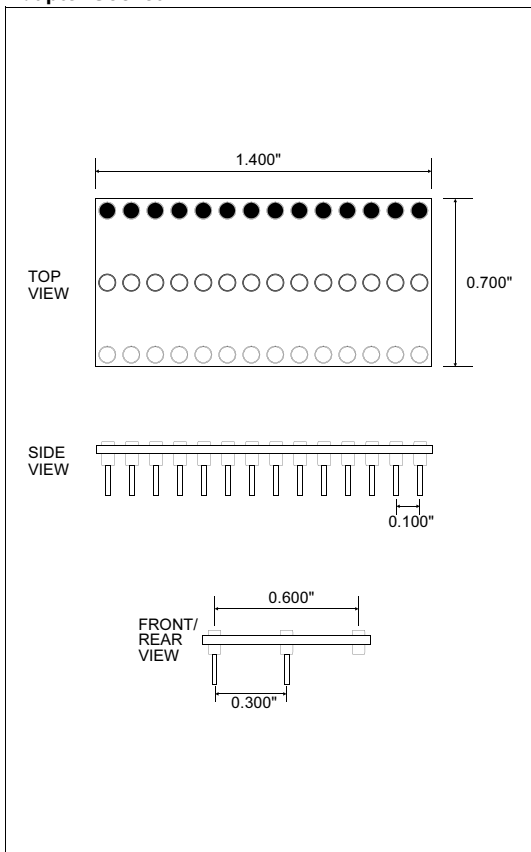
Microchip offers the following PDIP transition socket:

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

See the drawings in this section for layout dimensions.

XLT28XP

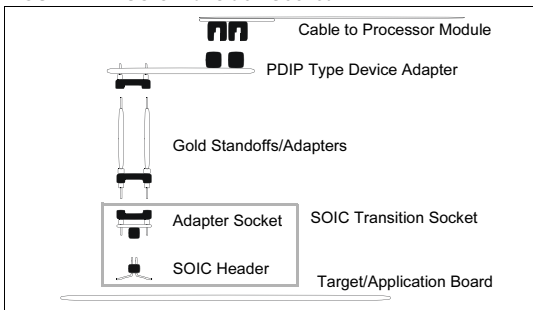
28-lead DIP 0.300-inch Male to 0.600-inch Female Adapter Socket



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 18-lead SOIC headers
- XLT20SO1: One adapter socket and three 20-lead SOIC headers
- XLT28SO: One adapter socket and three 28-lead SOIC headers

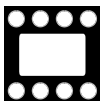
See the drawings in this section for layout dimensions.

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.

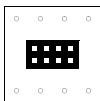
XLT08SO

8-lead DIP to 0.050-inch Adapter Socket

TOP
VIEW



BOTTOM
VIEW



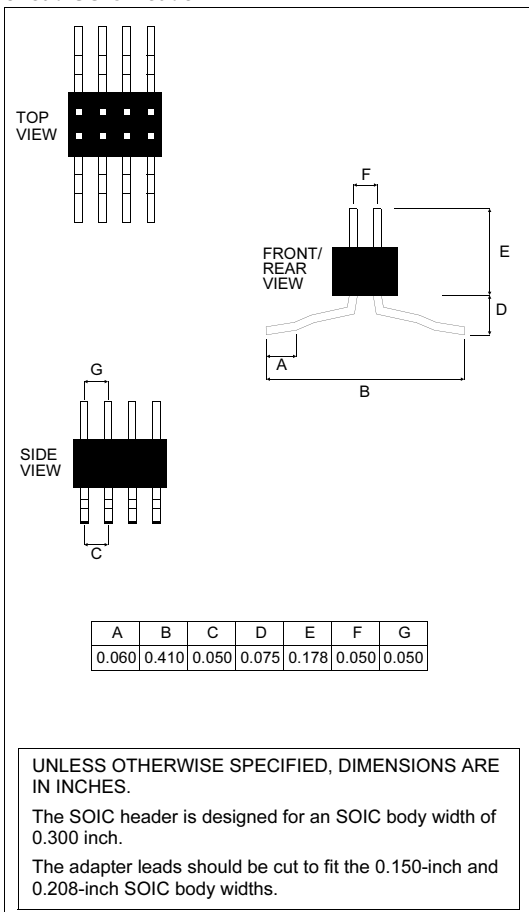
SIDE
VIEW



FRONT/
REAR
VIEW

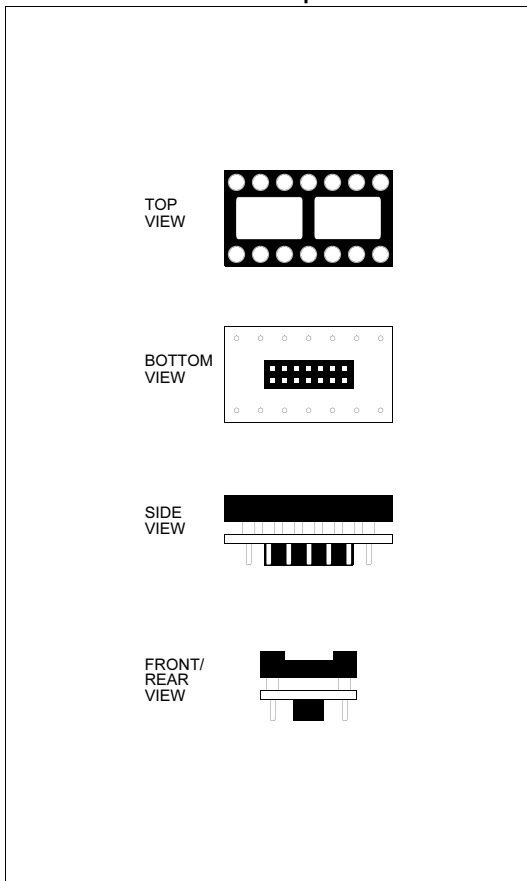


8-lead SOIC Header

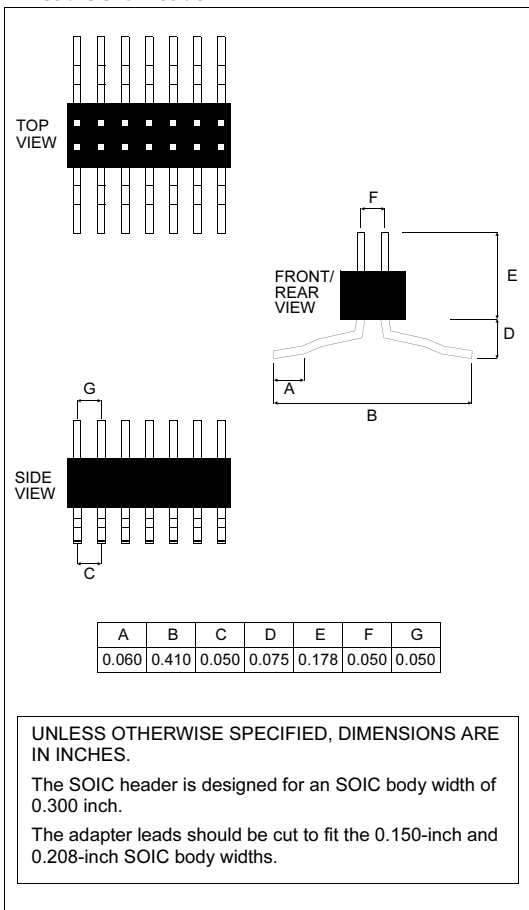


XLT14SO

14-lead DIP to 0.050-inch Adapter Socket



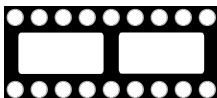
14-lead SOIC Header



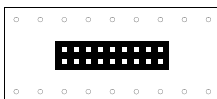
XLT18SO

18-lead DIP to 0.050-inch Adapter Socket

TOP
VIEW



BOTTOM
VIEW



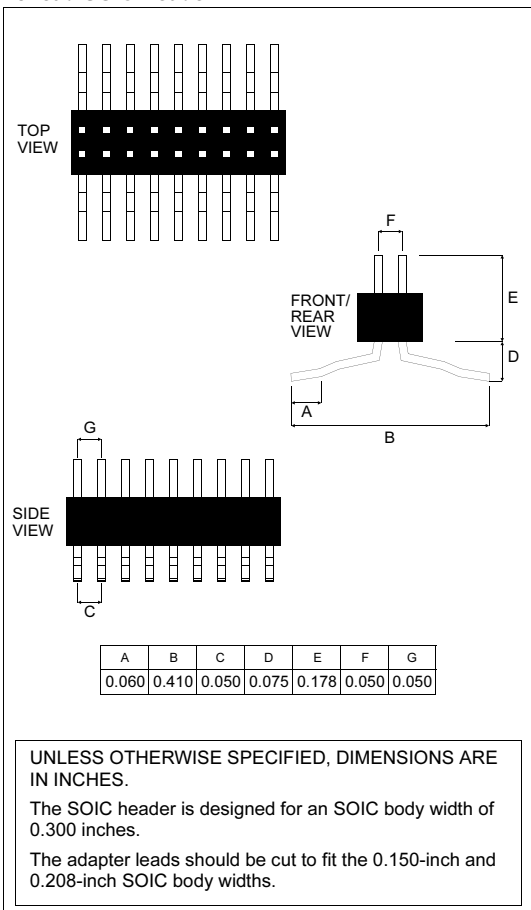
SIDE
VIEW



FRONT/
REAR
VIEW



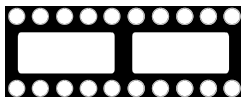
18-lead SOIC Header



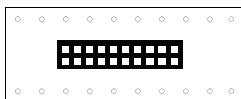
XLT20SO1

20-lead DIP to 0.050-inch Adapter Socket

TOP
VIEW



BOTTOM
VIEW



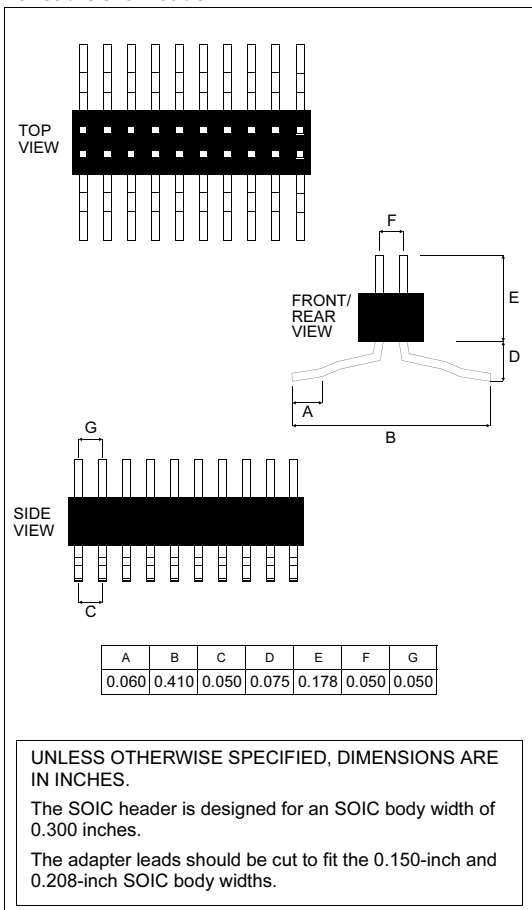
SIDE
VIEW



FRONT/
REAR
VIEW

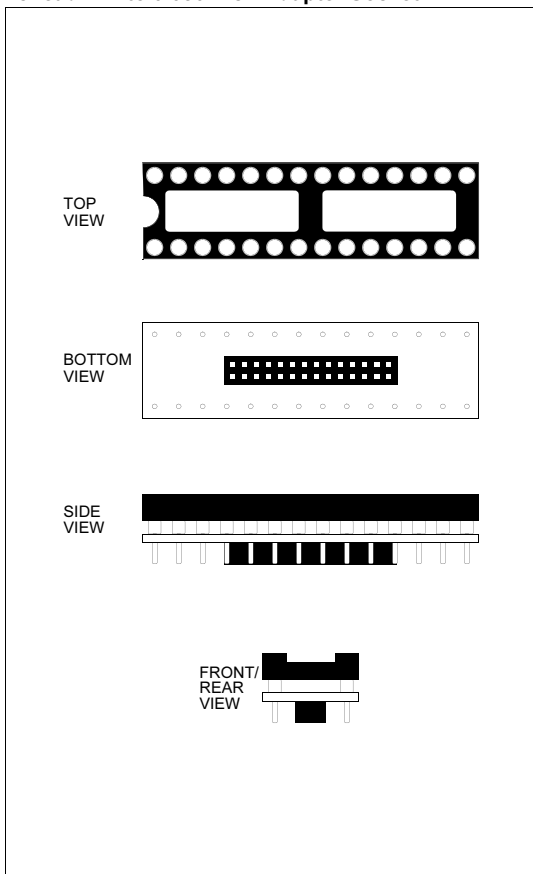


20-lead SOIC Header

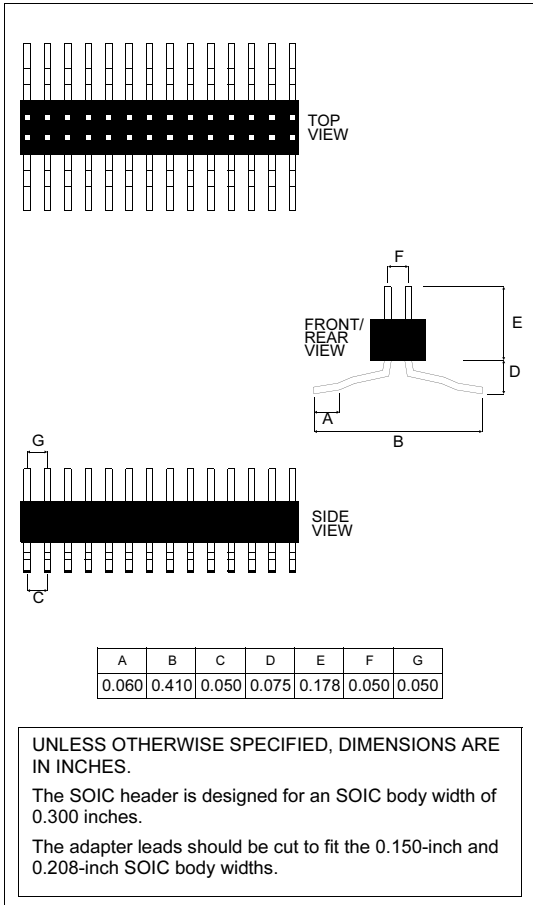


XLT28SO

28-lead DIP to 0.050-inch Adapter Socket



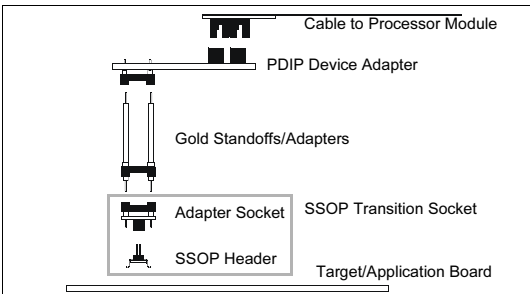
28-lead SOIC Header



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.

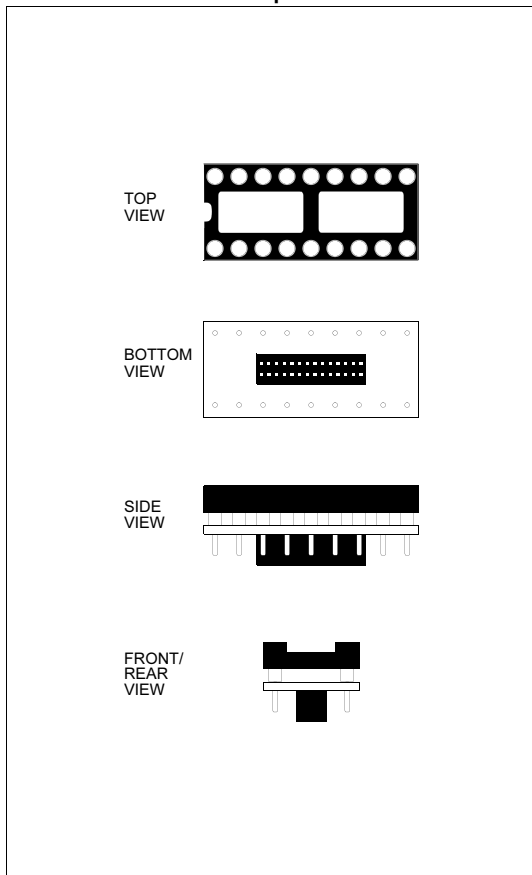
Microchip offers the following SSOP transition sockets:

- 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

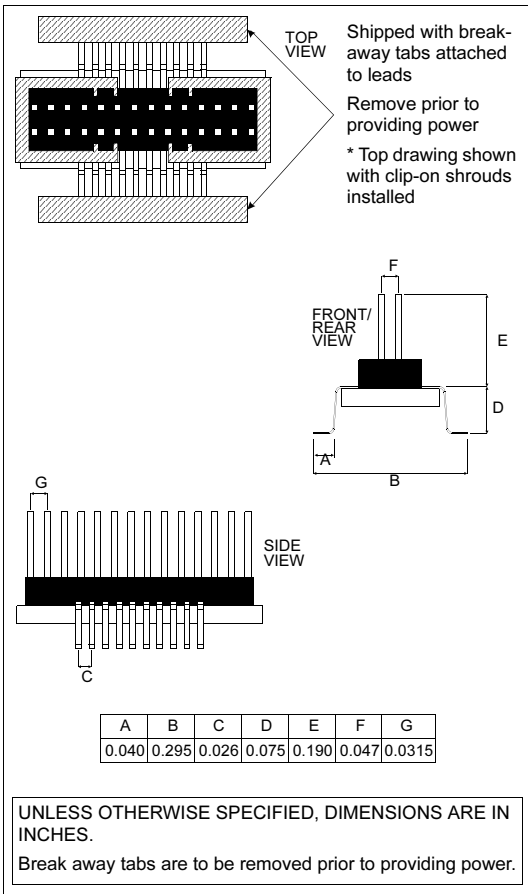
See the drawings in this section for layout dimensions and clearances for all components.

XLT20SS

18-lead DIP to 0.8 mm Adapter Socket

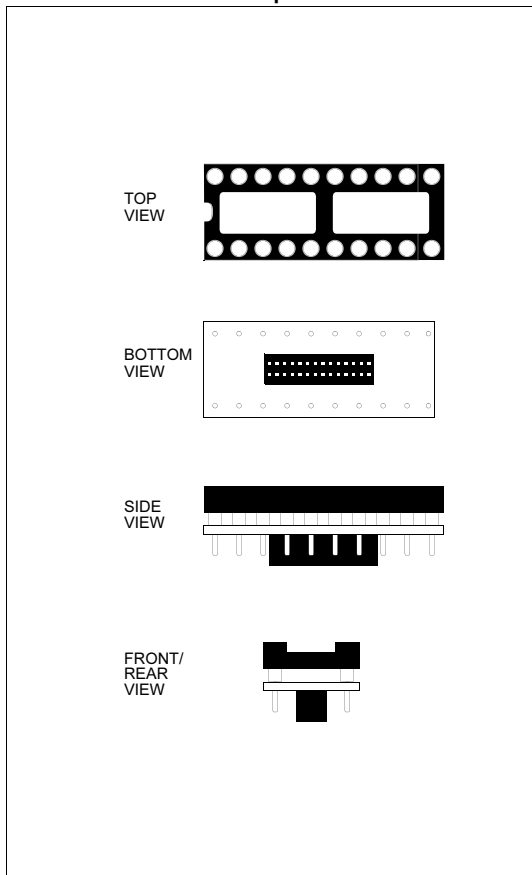


20-lead SSOP Header

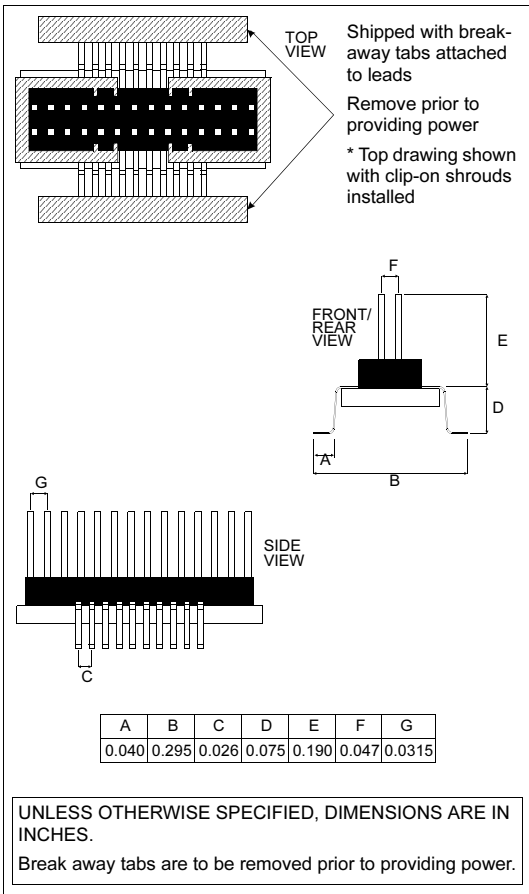


XLT20SS1

20-lead DIP to 0.8 mm Adapter Socket

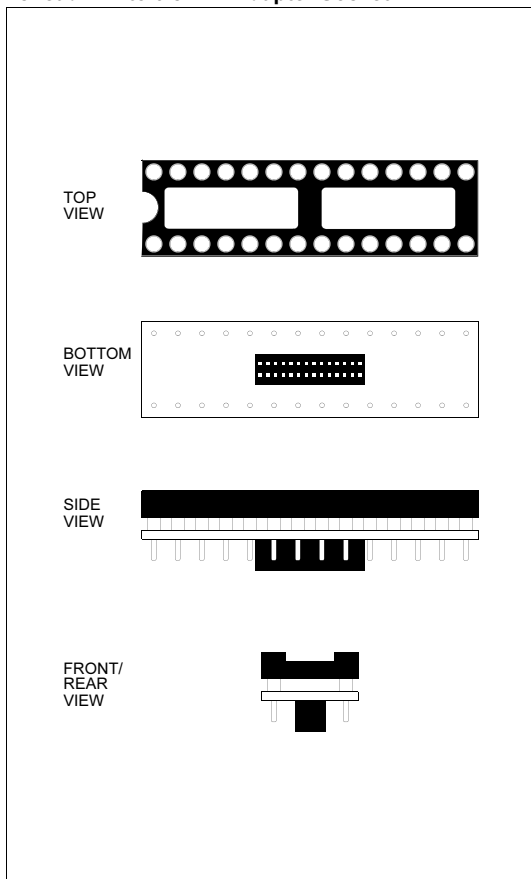


20-lead SSOP Header

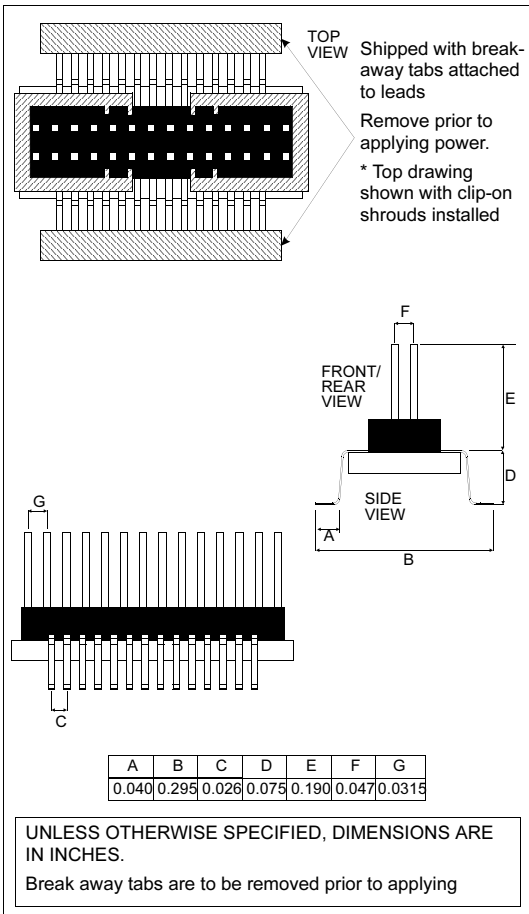


XLT28SS, XLT28SS2

28-lead DIP to 0.8 mm Adapter Socket



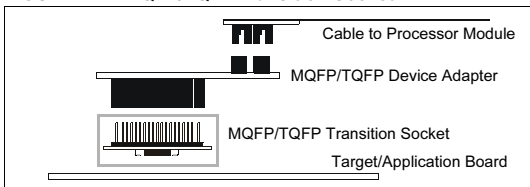
28-lead SSOP Header



MQFP/TQFP TRANSITION SOCKET

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

FIGURE 4: MQFP/TQFP Transition Socket



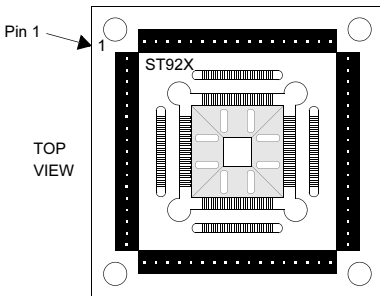
The MQFP/TQFP transition socket is required for use along with the MQFP/TQFP device adapters. The device adapter is equipped with four socket strips that interface with the transition socket.

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
- XLT64PT1: One 64-lead MQFP/TQFP transition socket, PIC16C92X
- XLT64PT2: One 64-lead MQFP/TQFP transition socket, PIC17CXXX
- XLT80PT: One 80-lead MQFP/TQFP transition socket

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

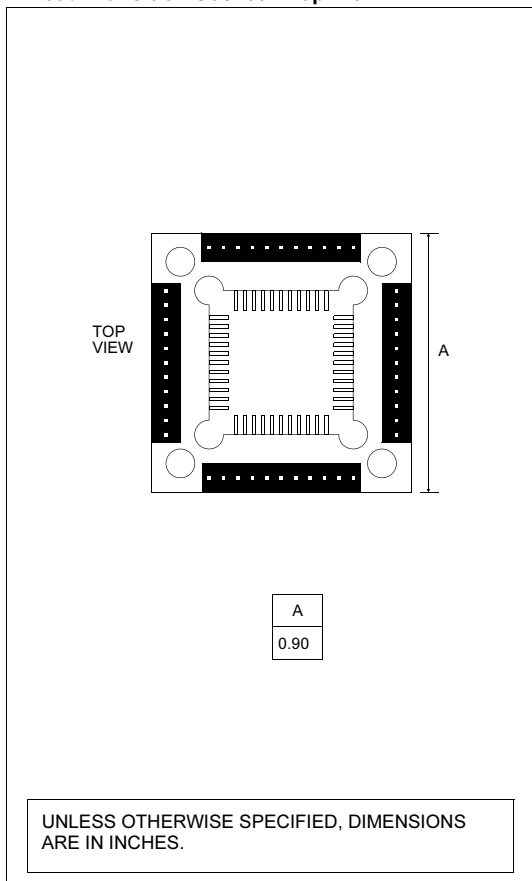


See the drawings in this section for layout dimensions and clearances for tall components.

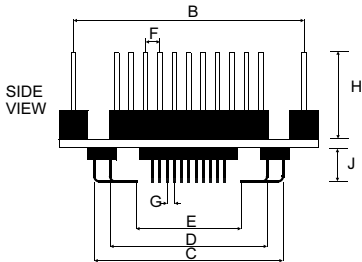
TQFP TRANSITION SOCKET SOLDERING TIPS

- Before soldering, consider keeping the break away tabs in place during soldering.
- Use controlled soldering iron tip temperatures between 300 and 325°C (570 to 615°F)
- If it is 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 Transition Socket – Top View**

44-lead Transition Socket – Side View

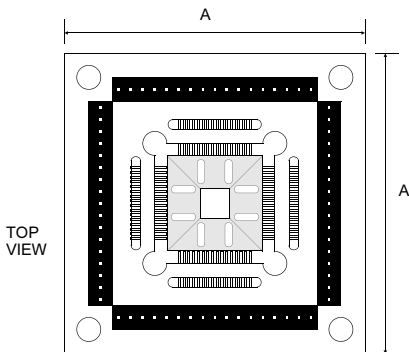


| B | C | D | E | F | G | H | J |
|------|------|------|-------|------|---------|-------|-------|
| 0.80 | 0.65 | 0.55 | 0.365 | 0.05 | 0.80 mm | 0.275 | 0.130 |

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

XLT64PT1, XLT64PT2, XLT80PT

64/80-lead Transition Socket – Top View



| | A |
|---------|------|
| 64-lead | 1.25 |
| 80-lead | 1.45 |

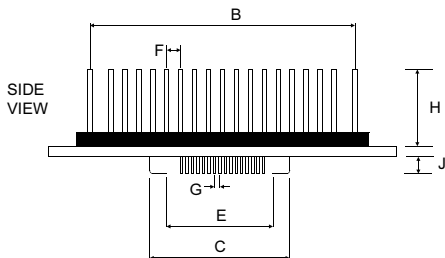
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

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.

64/80-lead Transition Socket – Side View



| | B | C | E | F | G | H | J |
|---------|------|-------|-------|------|--------|-------|-------|
| 64-lead | 0.95 | 0.500 | 0.400 | 0.05 | 0.5 mm | 0.275 | 0.095 |
| 80-lead | 1.15 | 0.575 | 0.475 | 0.05 | 0.5 mm | 0.275 | 0.095 |

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

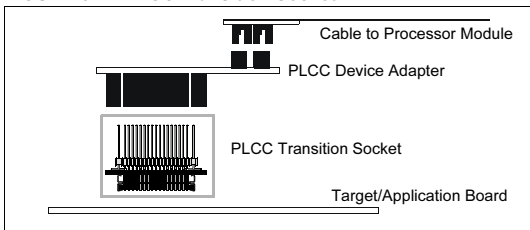
Drawing shown is for 64-lead.

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

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 device adapter is equipped with eight socket strips that interface with one of two transition sockets.

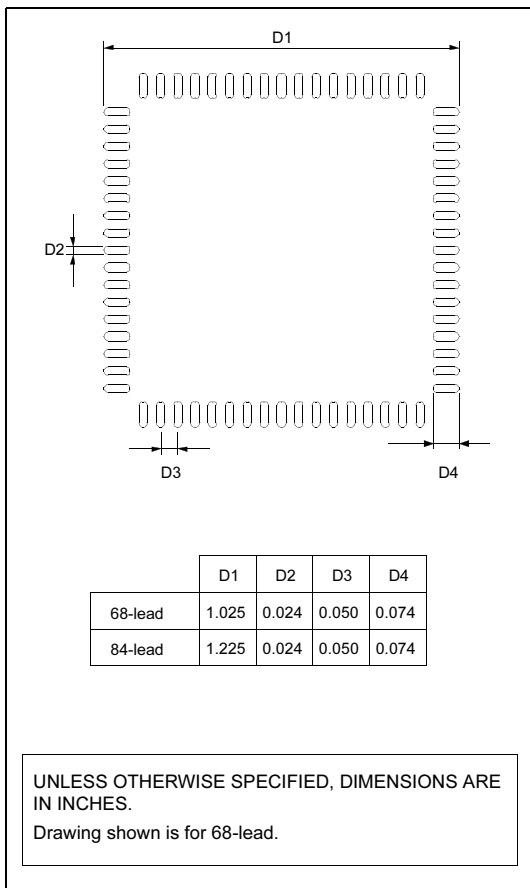
Note: To avoid solder bridging, do not place via's within 0.025-inch of the PLCC footprint. Also, any via's near the PLCC should be directly on the centerline of the pad.

Microchip offers the following PLCC transition sockets:

- XLT68L1: One 68-lead PLCC transition socket
- XLT84L1: One 84-lead PLCC transition socket

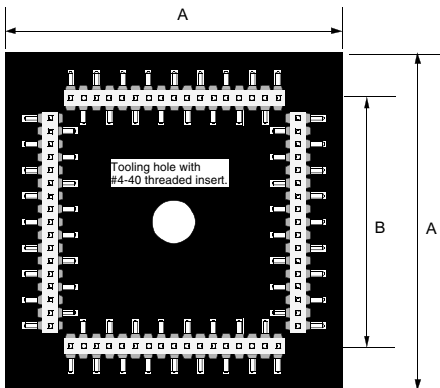
The PLCC transition socket is designed to be soldered to the target PCB PLCC surface mount pattern or inserted into a PLCC socket on the target PCB.

RECOMMENDED PCB LAYOUT



XLT68L1, XLT84L1

68/84-lead Transition Socket – Top View



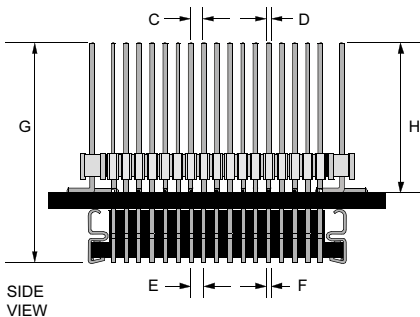
TOP VIEW

| | A | B |
|---------|-------|-------|
| 68-lead | 1.300 | 0.960 |
| 84-lead | 1.400 | 1.160 |

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

Drawing shown is for 68-lead.

68/84-lead Transition Socket – Side View



| | C | D | E | F | G | H |
|------------|-------|-------|-------|-------|-------|-------|
| 68/84-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, respectively.

FIGURE 6: DFN Transition Socket

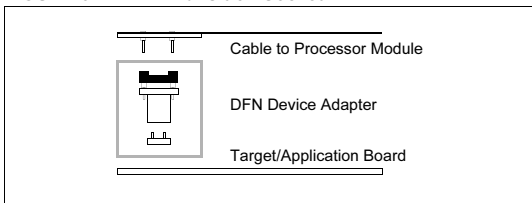
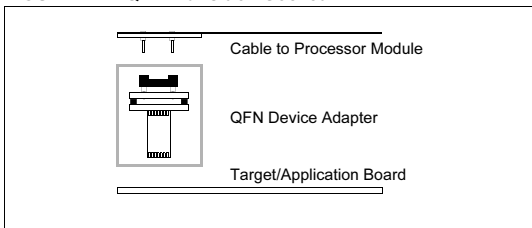


FIGURE 7: QFN Transition Socket



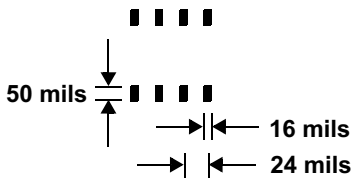
Microchip offers the following DFN/QFN transition sockets:

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

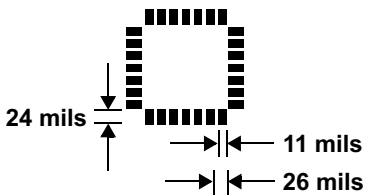
See the drawings in this section for layout dimensions.

MLF PADS LAYOUT

8-Pin DFN

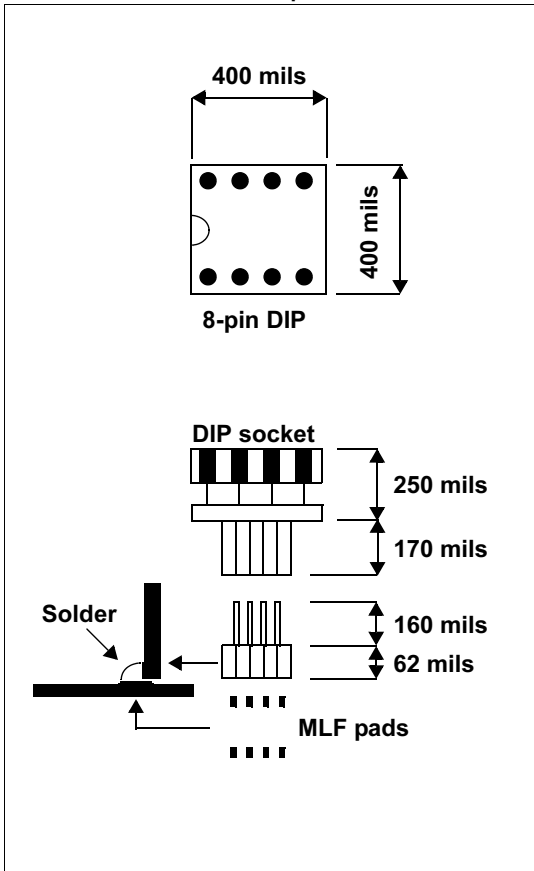


28-Pin QFN



XLT08DFN

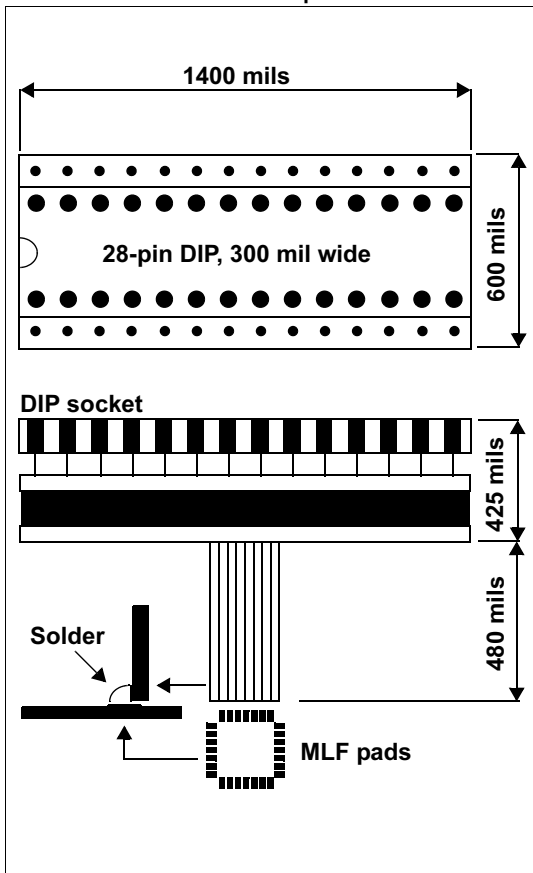
8-lead DIP to 0.400-inch Adapter Socket



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XLT28QFN

28-lead DIP to 0.600-inch Adapter Socket



NOTES:

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NOTES:

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10/22/02



Microchip received QS-9000 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona in July 1999 and Mountain View, California in March 2002. The Company's quality system processes and procedures are QS-9000 compliant for its PICmicro® 8-bit MCUs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, non-volatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001 certified.

