
**PC/104 Embedded Consortium**

*www.pc104.org*

# *EPIC™ & EPIC Express™ Specification*

## (Embedded Platform for Industrial Computing™)

**Version 3.0**
**June 23, 2008**

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# REVISION HISTORY

**Revision 1.0 – March 23, 2004**

a. Initial Release

**Revision 1.1 – July 16, 2004**

a. Minor dimensional and labeling corrections

**Revision 2.0 — February 27, 2006:**

a. Removed company specific information.
b. Added references to the PC/104 Embedded Consortium.
c. Updated address information for the PC/104 Embedded Consortium.
d. Corrected section numbering.
e. Included max vertical height table.
f. Included third PC/104, PC/104-*Plus*, and PCI-104 I/O Connector Overhang Zone
g. Corrected a dimension error in the mechanical drawing
h. Included PC/104 ISA and PCI connector mechanical drawings
i. Added missing text in Table 2: EPIC Vertical Clearance Zones.
j. Italicized "*Plus*" in "PC/104-*Plus*" throughout document.
k. Corrected decimal-place accuracy of measurements in sections 3.3.1, 4.2 and 4.3.
l. Added metric dimensions.
m. Changed font to Times New Roman throughout document.
n. Changed minimum operating temperature from -55° to -40° in Tables A-1 and A-2.
o. Added a new section as 4.1. to define descriptive terms used to refer to the locations of zones and components of the EPIC board. Changed uses of these terms throughout document to be consistent with their definitions and with Figure A-1.
p. Added mention the height restriction in the overlap of the PC/104 I/O Connector Overhang Zone with I/O Zone 1B (section 4.2.2)
q. Rotated Figure A-1 90° clockwise to be consistent with earlier versions of this specification.
r. Added Figure A-2 "Primary and Secondary Sides."
s. Clarified wording of section 4.2.2.
t. Revised Figure A-1 to include colors for various zones in the manner of earlier revisions.
u. Added PC/104 logo and web address to cover page.

**Revision 3.0 DRAFT — May 8, 2008:**

a. Added EPIC Express supporting PCIe/104 and PCI/104-Express
b. Added specification for stand-off
c. Cleaned up formatting of figures and tables
d. Changed appendix to chapters
e. Added new PC/104 logo
f. Changed EPIC Express drawing color to match EPIC drawing colors
g. Added notes to refer to PC/104, PC/104-*Plus*, PCI/104-Express specification for connector pinouts

**Revision 3.0 — June 23, 2008:**

h. Removed DRAFT after membership vote

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# 1. INTRODUCTION

The purpose of this document is to define a physical platform for mid-sized embedded Single Board Computer (SBC) with multiple I/O expansion options. Its size is midway between the industry standard PC/104 stackable format and EBX SBC format. This size board will support larger processors requiring large heat sinks. The added space also allows for combining features on an SBC which would normally be found on multiple PC/104 modules.

The key features of the platform are:

1. A board that is a small, industrial-grade embedded SBC with the option of I/O expansion via PC/104, PC/104-*Plus*, PCI-104, PCIe/104, PCI/104-Express, USB, Ethernet, etc.
2. A board that is a complementary form factor to EBX and PC/104.
3. A board that will emphasize I/O connector area.

Designers are always striving to add more functionality in less space. Advances in semiconductor density, packaging technology, and connector technology have made this possible. PC/104, PC/104-*Plus*, PCI-104, PCIe/104, and PCI/104-Express are recognized standards as well as EBX; however, there is no industry standard for a mid-size board.

This specification defines a new standard, open-architecture, embedded SBC platform that is larger than a PC/104 stackable board yet smaller than an EBX SBC board.

**Table 1-1 104, EPIC, and EBX Form Factor Size Comparison**

| Name | Primary Purpose | Dimensions | Board Area |
|---|---|---|---|
| PC/104 | Stackable PC | 3.550 x 3.775 inches (90.17 x 95.89 mm) | 13.401 $in^2$ (86.46 $cm^2$) |
| EPIC | SBC | 4.528 x 6.496 inches (115.00 x 165.00 mm) | 29.414 $in^2$ (189.75 $cm^2$) |
| EBX | SBC | 5.750 x 8.000 inches (146.05 x 203.20 mm) | 46.000 $in^2$ (296.77 $cm^2$) |

## 2. REFERENCE DOCUMENTS

This EPIC specification makes reference to, and is based on, the current versions of the following specifications:

| | | |
|---|---|---|
| PC/104 Specification | **PC/104 Embedded Consortium** | www.pc104.org |
| PC/104-*Plus* Specification | **PC/104 Embedded Consortium** | www.pc104.org |
| PCI-104 Specification | **PC/104 Embedded Consortium** | www.pc104.org |
| PCIe/104 and PCI/104-Express Specification | **PC/104 Embedded Consortium** | www.pc104.org |
| PCI Local Bus Specification Revision 2.2 | **PCI Special Interest Group** | www.pcisig.com |
| PCI Express Base Specification Revision 1.1 | **PCI Special Interest Group** | www.pcisig.com |
| ATX Specification Version 2.2 | **Intel Corporation** | www.intel.com |
| System Management Bus (SMBus) Specification Version 2.0 | **SBS Implementers Forum** | www.sbs-forum.org |
| INTEL description of PEG and SDVO in the 915/945/965 chipsets | **Intel** | www.intel.com |

Technical references about the PCI Express®, PCI™ and ISA buses themselves are available from numerous sources, including RTC Books (www.rtcbooks.com), Mindshare (www.mindshare.com), and others.

# 3. DIMENSIONS AND MOUNTING HOLES

## 3.1. EPIC Board Dimensions

The EPIC board dimensions measure 4.528 x 6.496 inches (115.00 x 165.00 mm).

Figure 5-1 Dimensions of the EPIC Form Factor with PC/104-*Plus* defines the overall dimensions, the precise location of the corner mounting holes of the board, and the location of the PC/104-*Plus* compatible stack, connector placement, and mounting holes. Metric equivalents are in parentheses.

Figure 5-3 Dimensions of the EPIC Express Form Factor with PCI/104-Express defines the overall dimensions, the precise location of the corner mounting holes of the board, and the location of the PCI/104-Express compatible stack, connector placement, and mounting holes. Metric equivalents are in parentheses.

## 3.2. Mounting Holes

Eight mounting holes are specified. There are four mounting holes inset on the outside corners of the board plus the four PC/104 mounting holes. It is recommended that all eight defined holes be used to provide the most rugged attachment of the EPIC board to its mounting bracket, base plate, or enclosure. The card can use exactly the same hardware as the PC/104 for all eight holes.

## 3.3. Expansion Bus Stack Location

EPIC provides a module stack location as defined by the PC/104, PC/104-*Plus*, and PCI-104 modules while EPIC Express provides a module stack location for PCIe/104 and PCI/104-Express modules.

Figure 5-1 Dimensions of the EPIC Form Factor with PC/104-Plus defines the precise location of this area, the PC/104 ISA and PCI expansion connectors, and the associated mounting holes.

Figure 5-3 Dimensions of the EPIC Express Form Factor with PCI/104-Express defines the precise location of this area, the PCI/104-Express PCIe® and PCI expansion connectors, and the associated mounting holes.

EPIC and EPIC Express are designed to work with all PC/104 Consortium bus architectures as shown in Figure 3-1 PC/104 Architecture Bus Options.

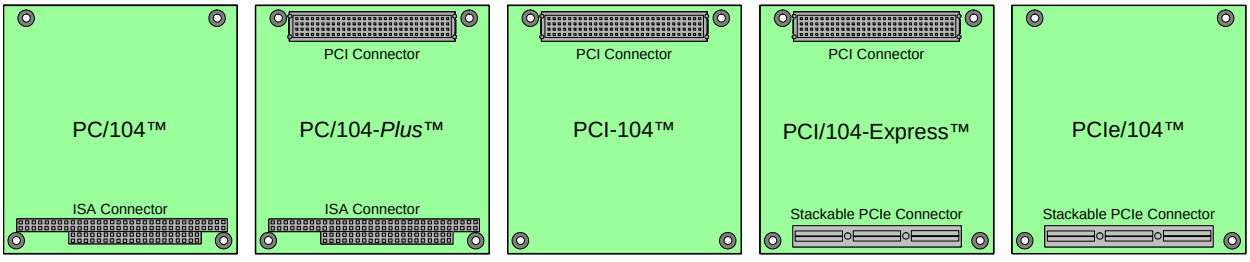



**Figure 3-1 PC/104 Architecture Bus Options**

Refer to the PC/104, PC/104-*Plus*, PCI-104, PCIe/104 and PCI/104-Express specifications for information on the full electrical and mechanical specifications associated with this location.

These specifications can be downloaded from the PC/104 Embedded Consortium website at www.pc104.org.

### 3.3.1. PC/104-*Plus* Expansion Bus Connectors

PC/104-*Plus* defines two buses. One is the 104-pin ISA connector pair (J1/J2) which consists of 64-pin and 40-pin pin-and-socket headers with 0.100-in. (2.54mm) pin-to-pin spacing. This bus is also found on the PC/104.

The second bus is the 120-pin PCI connector (J3), a high-density pin-and-socket connector with 2mm pin-to-pin spacing. This bus is also found on the PCI-104.

### 3.3.2. PCI/104-Express Expansion Bus Connectors

PCI/104-Express defines two buses. One is the 156-pin PCI Express connector pair which consists of 156-pin surface mount top and bottom. This bus is also found on the PCIe/104.

The second bus is the 120-pin PCI connector, a high-density pin-and-socket connector with 2mm pin-to-pin spacing. This bus is also found on the PCI-104.

### 3.3.3. Stack through Bus Option

The PC/104-*Plus* specification defines either stack through or non-stack through bus connectors. An EPIC board may be populated with either of these bus options. When fitted with stack through bus connectors, the EPIC board can be plugged onto another circuit board (often called a “baseboard”) and treated like a single-board computer “macro component”.

# 4. I/O AND VERTICAL CLEARANCE ZONES

The EPIC form-factor is subdivided into zones that are intended for various interfaces and components. Each of these zones, and their associated functions, are defined in Table 4-1Table 4-1 and are described below. Each zone has a specified vertical dimension within which all components of that zone must fit. Table 4-1 specifies the maximum component height within each EPIC zone.

**Table 4-1 EPIC Vertical Clearance Zones**

| Zone | Max. Component Height (in.) |
|---|---|
| I/O Zone 1A | None |
| I/O Zone 1B | None except in overlap area (See below) |
| I/O Zone 2 | None except in overlap area (See below) |
| I/O Zone 3 | None except in overlap area (See below) |
| Tall CPU and Power Zone | None |
| PC/104 Expansion Zone | 0.345 in. (8.76 mm) |
| PC/104 I/O Connector Zone | 0.345 in. (8.76 mm) |
| PC/104 I/O Connector Overhang Zone | 0.600 in. (15.24 mm) |

## 4.1. Definitions of Terms

The following terms will be used in describing the locations of the various zones and components on an EPIC Board.

### 4.1.1. Sides

The “primary” side is that side of the board which contains the CPU, I/O Breakouts and the PC/104 Stack Connectors. The “secondary” side is opposite the primary side.

### 4.1.2. Edges

The “lower” edge contains the I/O connectors (I/O Zone 1). The “upper” edge, opposite this, contains the PC/104 PCI connector and I/O Zone 3. The “left” edge is that edge closest to I/O Zone 1A and the “right” edge is that edge closest to I/O Zone 1B and I/O Zone 2. Please refer to Figure 5-1 Dimensions of the EPIC Form Factor with PC/104-*Plus* for a correct visual orientation of the edges relative to one another as described here.

## 4.2. I/O Zone 1

Zone 1 is defined for I/O connectors. It is split into Zone 1A and Zone 1B. This zone is located between the mounting holes along the lower edge of the board.

### 4.2.1. I/O Zone 1A

Zone 1A allows for deeper connectors, such as currently exists for Ethernet, CompactFlash, ExpressCard, and certain stackable molded PC-type connectors.

### 4.2.2. I/O Zone 1B

Zone 1B supports industry standard 0.100-inch (2.54 mm) IDC type connectors, terminal blocks, USB, and other molded PC-type connectors. Overlapping part of this zone is the PC/104 and

PCI-104 I/O Connector Zone as defined in their respective specifications. There is no height restriction in this overlapping area; however, there is a potential of interference of connectors between the PC/104, PC/104-*Plus*, or PCI-104 and the EPIC modules in this area.

There is also an overlapping between Zone 1B and Zone 2.

### 4.3. I/O Zone 2

Zone 2, located on the right edge of the EPIC board, is the second I/O zone. Because of the potential of interference of connectors between the PC/104, PC/104-*Plus*, or PCI-104 and the EPIC modules, connectors placed on the EPIC module in this overlapping area should not be higher than 0.600-inches (15.24 mm).

### 4.4. I/O Zone 3

Zone 3, located on the upper left edge of the EPIC board, is the third I/O zone. Because of the potential of interference of connectors between the PC/104, PC/104-*Plus*, or PCI-104 and the EPIC modules, connectors placed on the EPIC module in this overlapping area should not be higher than 0.600- inches (15.24 mm).

### 4.5. Tall CPU and Power Zone

The Tall CPU and Power Zone is for processors which require a larger fan and/or heatsink for proper cooling and for power supplies and power connectors. There is no height restriction in this zone.

For deeply embedded applications, power requirements and connector configurations will differ. Therefore, the location, specific connector, pin-out, and current per pin for power to the EPIC are not defined. However, a recommended robust power connector for PC-type designs is shown in Appendix B.

### 4.6. PC/104 Expansion Zone

This is the first of two areas within the PC/104, PC/104-*Plus*, PCI-104, PCI/104-Express, and PCIe/104 Expansion Stack Location that has a height restriction. This area must take into account the components hanging down from an expansion module. Components on the EPIC board should not be higher than 0.345 inches (8.76 mm).

### 4.7. PC/104 I/O Connector Zone

This is the second area within the PC/104, PC/104-*Plus*, PCI-104, PCI/104-Express, and PCIe/104 Expansion Stack Location that has a height restriction. This area must take into account the possibility of I/O connectors hanging down from an expansion module. Components on the EPIC board should not be higher than 0.345 inches (8.76 mm).

### 4.8. PC/104 I/O Connector Overhang Zone

The PC/104, PC/104-*Plus*, PCI-104, PCI/104-Express, and PCIe/104 specifications define three I/O Connector Overhang Zones for mating connectors and cables. Two of these zones overlap EPIC I/O Zones 1B and 2. There is a potential of interference of connectors between the PC/104, PC/104-*Plus*, PCI-104, PCI/104-Express, or PCIe/104 and the EPIC modules in this area.

# 5. MECHANICAL DIMENSIONS

## 5.1. EPIC

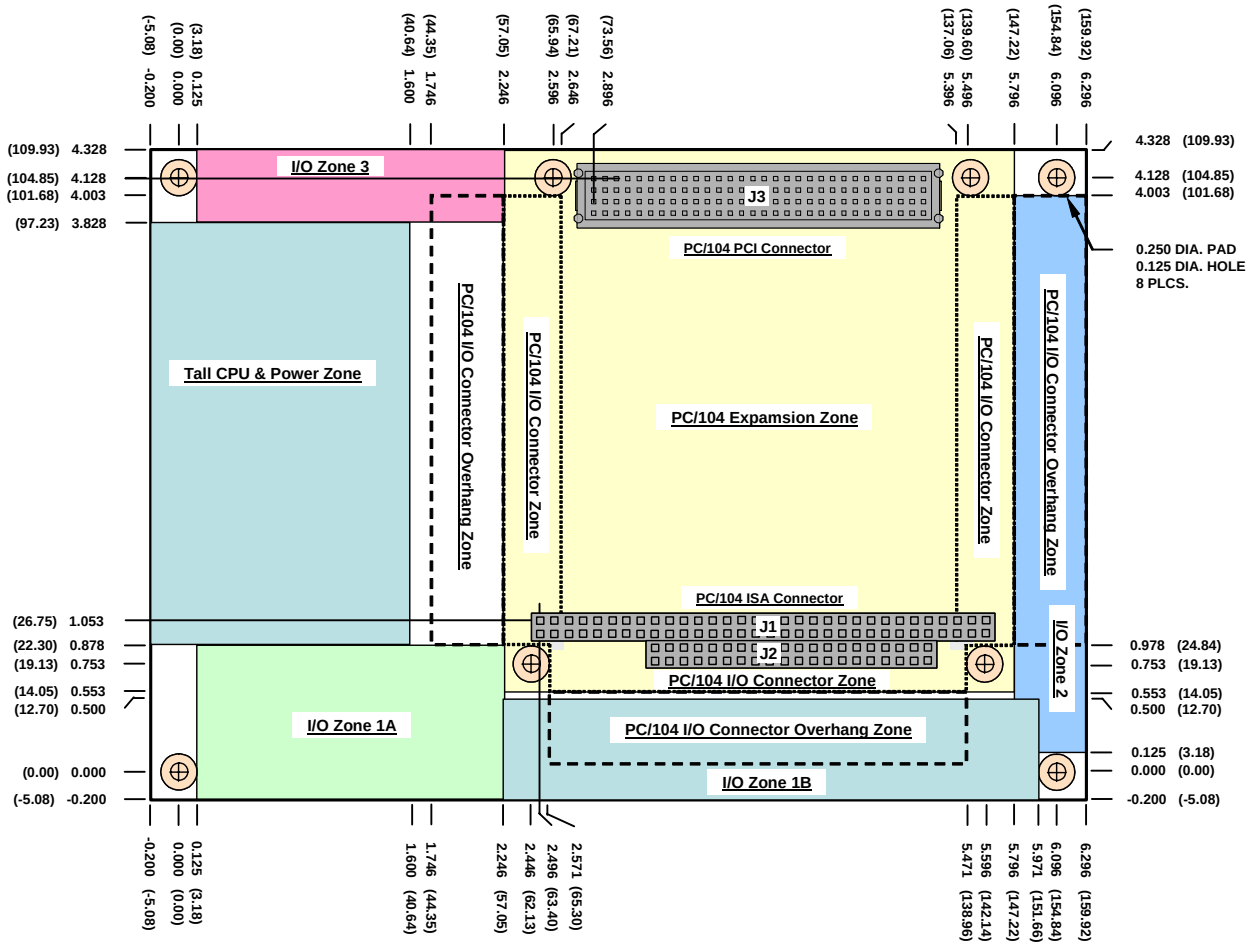



**Figure 5-1 Dimensions of the EPIC Form Factor with PC/104-*Plus***

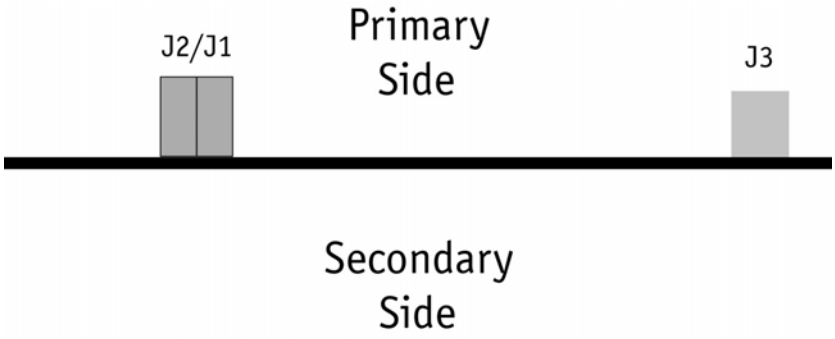



**Figure 5-2 Primary and Secondary Sides**

Note: For connector pinout and bus information refer to PC/104-*Plus* specification. Download specification from PC/104 Embedded Consortium at www.pc104.org.

## 5.2. EPIC Express

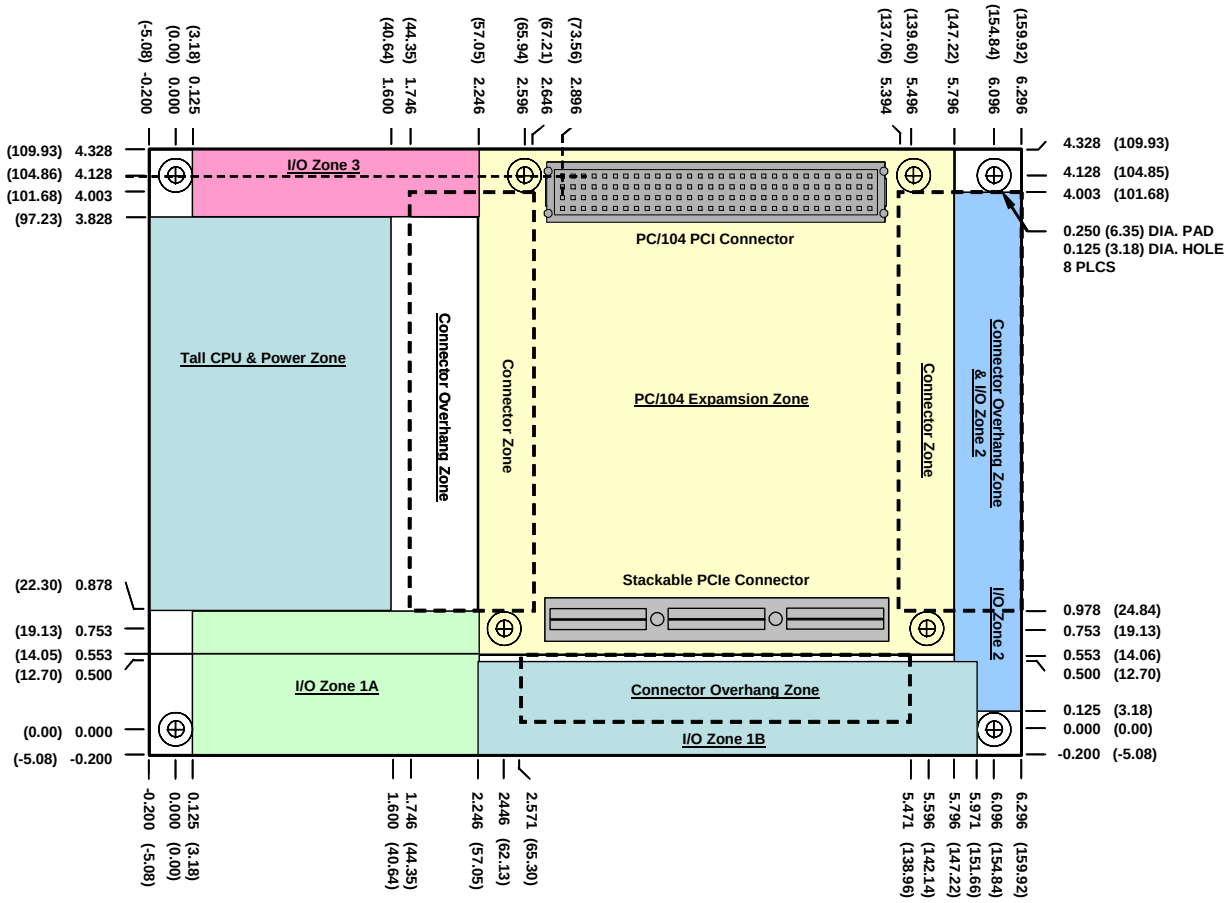



**Figure 5-3 Dimensions of the EPIC Express Form Factor with PCI/104-Express**

Note: For connector pinout, layout guide, and bus information refer to PCI/104-Express specification. Download specification from PC/104 Embedded Consortium at www.pc104.org.

# 6. CONNECTOR SPECIFICFATIONS

## 6.1. PCIe/104 PCI Express Connector

### 6.1.1. ASP-129637-03 or equivalent (Top Connector) Mechanical Drawings (Reference Only)

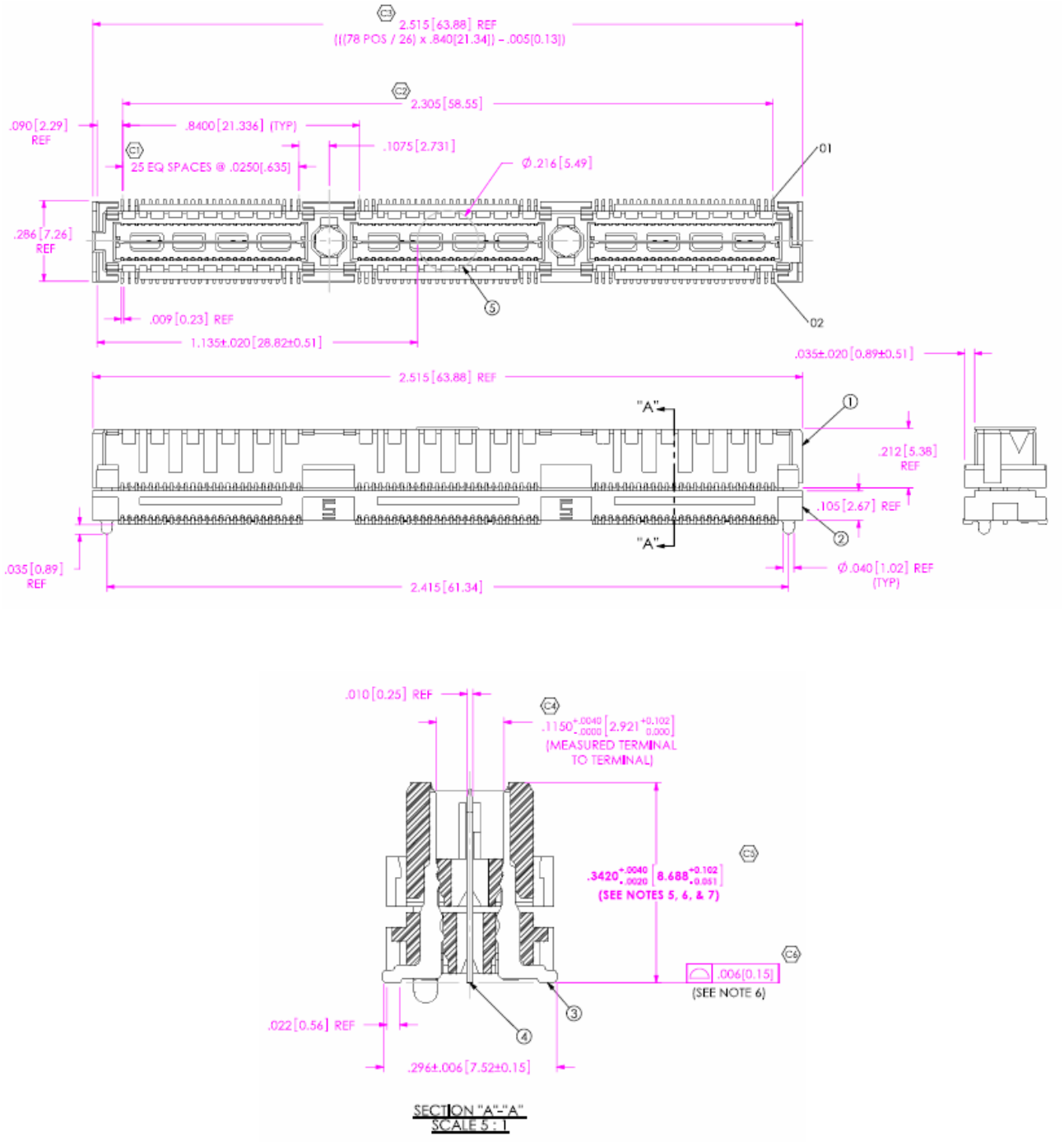



**Figure 6-1: ASP-129637-03 or equivalent Mechanical Drawings (Reference Only)**

### 6.1.2. ASP-129646-03 or equivalent (Bottom Connector) Mechanical Drawings (Reference Only)

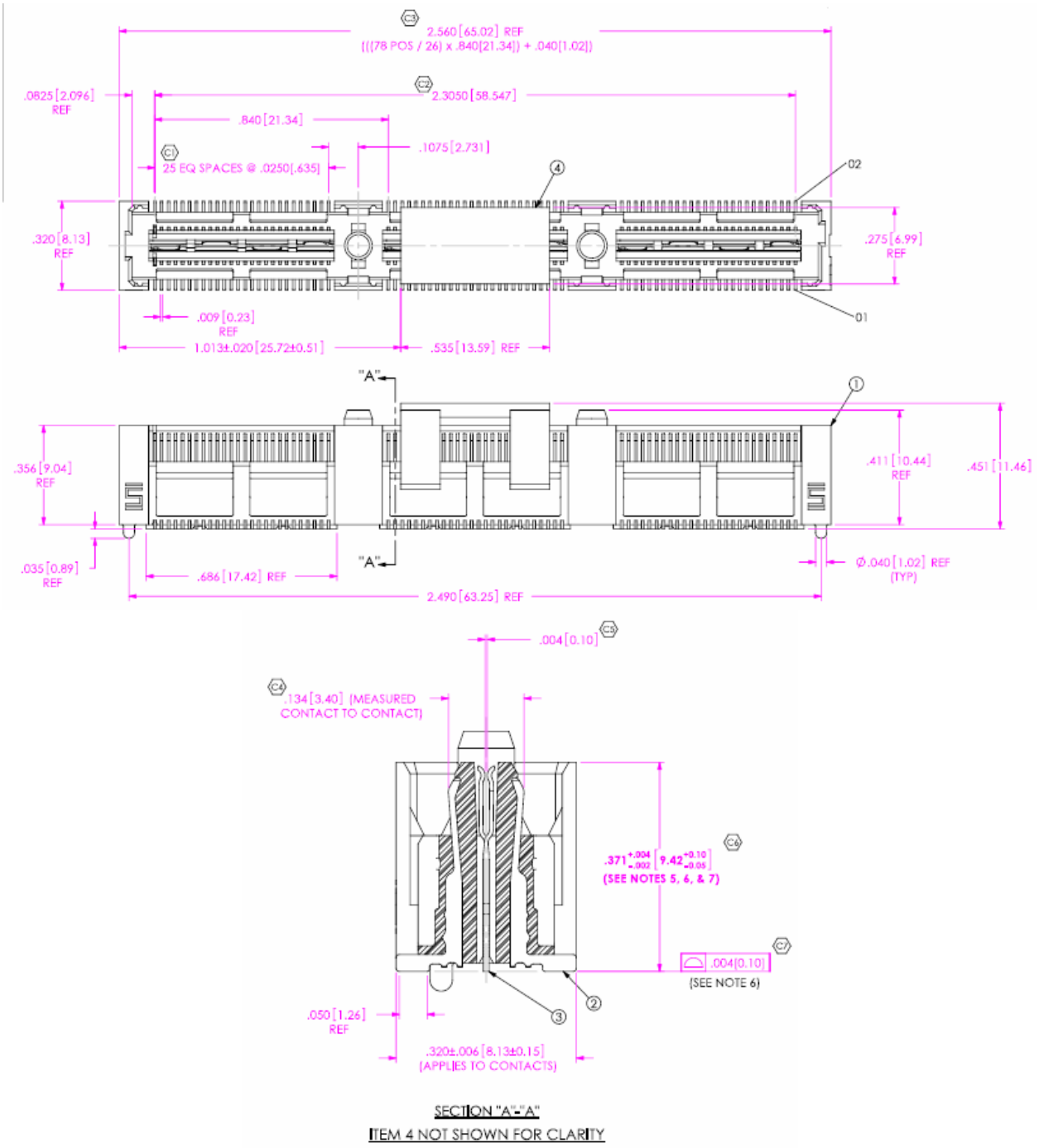



**Figure 6-2 ASP-129646-03 or equivalent Mechanical Drawings (Reference Only)**

### 6.1.3. PCIe/104 PCI Express Connector Specifications

**MATERIALS**

| | |
|---|---|
| Housing: | Liquid Crystal Polymer |
| Terminal & Ground Plane Material: | Phosphor Bronze |
| Terminal Plating: | Au over 50μ" (1.27μm) Ni |
| Plane Plating: | Au over 50μ" (1.27μm) Ni |
| Terminal and Plane Tails: | Tin |

**CONTACT FINISH**

| | |
|---|---|
| Socket Interface: | 30μ" Au |
| Terminal Interface: | 30μ" Au |
| Underplate: | 50μ" Ni |

**MECHANICAL PERFORMANCE**

| | |
|---|---|
| Insertion Force: | 13.9 lbs initial & 16.8 lbs @ 100 cycles |
| Withdrawal Force: | 9.8 lbs initial & 10.0 lbs @ 100 cycles |
| Normal Force @ nominal deflection: | 69 grams |
| Minimum stacking size: | 14.8mm |
| Nominal stacking size: | 15.24mm |
| Maximum stacking size: | 15.50mm |
| Contact wipe (at nom. Height): | .044" [1.22mm] |
| Ground Plane wipe (at nom. Height): | .059" [1.50mm] |
| Durability: | 50 cycles |
| Operating Temp: | -55 °C to 125 °C |

**ELECTRICAL PERFORMANCE**

| | |
|---|---|
| Positions | Three banks of 52 pins and 1 plane for 156 total pins and 3 planes |
| Contact Resistance (initial): | 30 mOhms |
| Contact Resistance (@ 1,000 cycles): | 50 mOhms |
| Contact Current Capacity: | 1.8A at 85 °C and with 20% Industry Standard Derating Factor |
| Ground Plane Resistance: | 0.5 mOhms |
| Ground Plane Current Capacity: | 8.4A at 85 °C and with 20% Industry Standard Derating Factor |
| Dielectric Withstanding Voltage: | 900 VAC |
| Working Voltage: | 300 VAC |
| Insulation Resistance: | 50,000 megaOhms |

**SOLDERABILITY**

| | |
|---|---|
| Maximum Processing Temperature: | 230 °C for 60 seconds or 260 °C for 20 seconds |

**HIGH FREQUENCY PERFORMANCE**

| | | |
|---|---|---|
| Differential Pair Impedance | 100 Ohms nominal +/- 10% | |
| Single-Ended Impedance | 50 Ohms nominal +/- 10% | |
| Differential Return Loss (SDD11): | -15dB @ 1.25 GHz; | -8dB @ 5 GHz |
| Differential Insertion Loss (SDD21): | -1dB @ 1.25 GHz; | -3dB @ 5 GHz |
| Differential Near End Crosstalk (SDD31): | -45dB @ 1.25 GHz; | -35dB @ 5 GHz |
| Differential Far End Crosstalk (SDD41): | -45dB @ 1.25 GHz; | -25 dB @ 5 GHz |

## 6.2. PCI-104 PCI Connector

NOTES:

1. PRESS FIT COMPLIANT PINS PER IEC 352-5 CAN BE USED INSTEAD OF SQUARE PINS AS SHOWN.
2. CONFIGURATION CAN BE MADE OF ONE OR MORE PIECES.

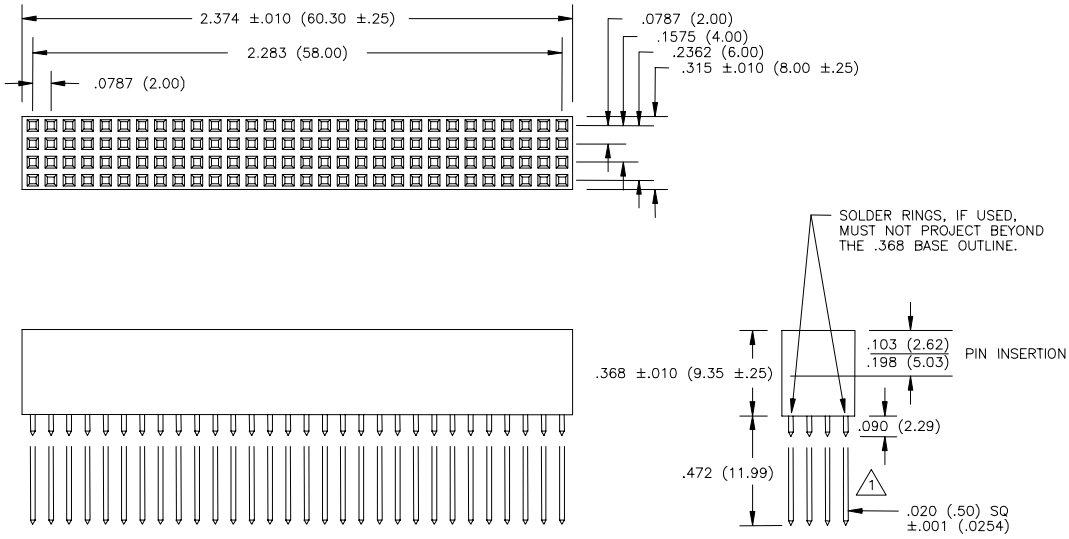



**Figure 6-3: PCI Connector**

NOTE:

1. LOCKING PEGS ARE NOT REQUIRED IF THE SHROUD IS PRESS FIT ONTO THE LONG CONNECTOR PINS OR OTHERWISE SECURED.

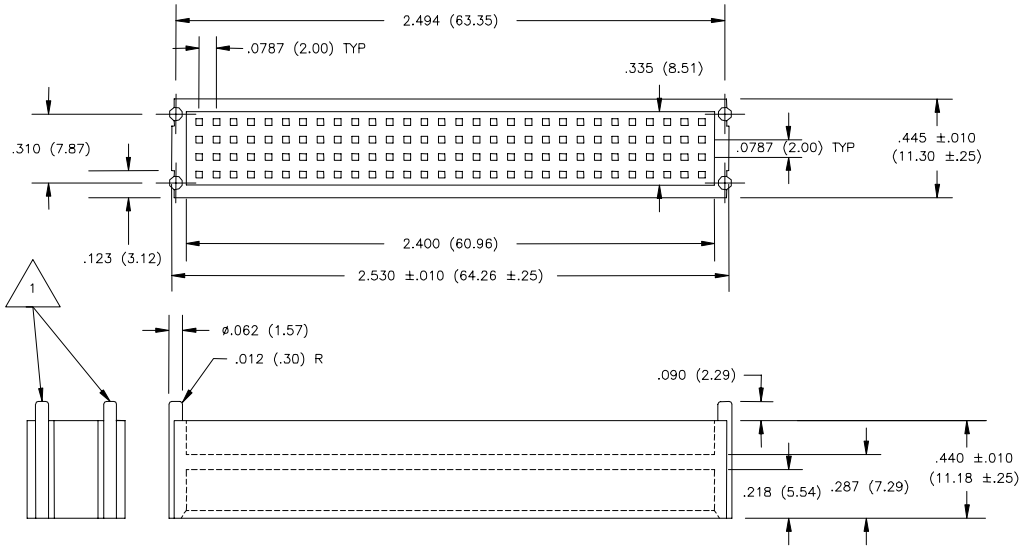



**Figure 6-4: PCI Connector Shroud (Reference Only)**

### 6.2.1. PCI-104 PCI Connector Specifications

**MATERIALS**

| | |
|---|---|
| Housing: | High Temp Thermoplastic, UL Rated 94-V0 |
| Contact: | Phosphor Bronze |
| Solder: | Tin-Lead (63-37), If Applicable |
| Solder Clip: | Aluminum Alloy, If Applicable |

**CONTACT FINISH**

| | |
|---|---|
| Female Interface: | 15 Microinches Minimum Hard Gold |
| Male Interface: | Gold Flash Minimum |
| Solder Tail: | 100 Microinches Minimum Solder |
| Underplate: | 50 Microinches Minimum Nickel |

**MECHANICAL PERFORMANCE**

| | |
|---|---|
| Insertion Force: | 2.5 Ounce per Pin Maximum |
| Withdrawal Force: | 1 Ounce per Pin Minimum |
| Normal Force: | 50 Grams Minimum (Per Beam) |
| Durability: | 50 Cycles Minimum |
| Operating Temp: | -40° C to +85° C Minimum |

**ELECTRICAL PERFORMANCE**

| | |
|---|---|
| Contact Resistance: | <30 Milliohms Maximum |
| Current Capacity: | 1 Amp Continuous Per Pin |
| Dielectric Strength: | 500 VAC |
| Insulation Resistance: | 5,000 Megohms Minimum |

## 6.3. PC/104 ISA Connector

NOTES:

1. PRESS FIT COMPLIANT PINS PER DIN 41612 PART 5 AND IEC 352-5 CAN BE USED INSTEAD OF SQUARE PINS AS SHOWN.
2. CONFIGURATION CAN BE MADE OF ONE OR MORE PIECES.

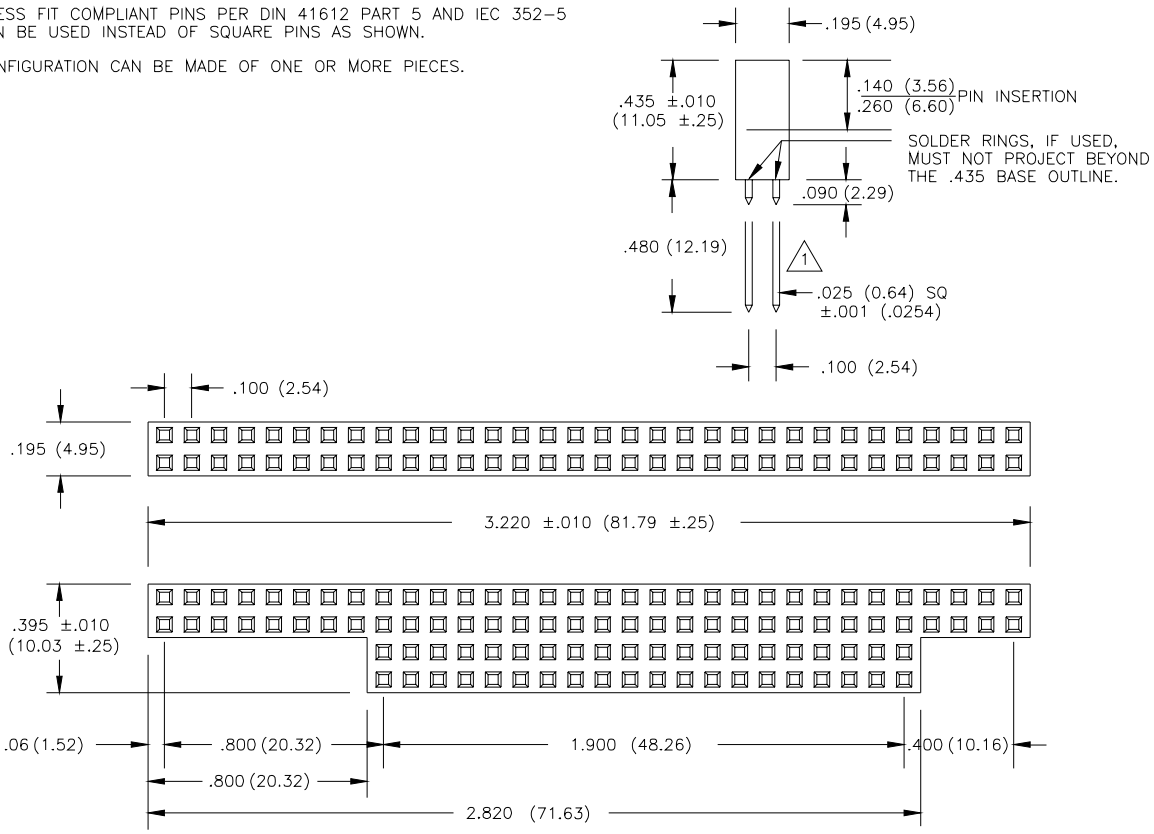



**Figure 6-5 8-Bit and 16-Bit ISA Connector (Reference Only)**

### 6.3.1. PCI-104 PCI Connector Specifications

**MATERIALS**

| | |
|---|---|
| Housing: | High Temp Thermoplastic, UL Rated 94-V0 |
| Contact: | Phosphor Bronze |
| Solder: | Tin-Lead (63-37), If Applicable |
| Solder Clip: | Aluminum Alloy, If Applicable |

**CONTACT FINISH**

| | |
|---|---|
| Female Interface: | 15 Microinches Minimum Hard Gold |
| Male Interface: | Gold Flash Minimum |
| Solder Tail: | 100 Microinches Minimum Solder |
| Underplate: | 50 Microinches Minimum Nickel |

**MECHANICAL PERFORMANCE**

| | |
|---|---|
| Insertion Force: | 3.5 Ounce per Pin Maximum |
| Withdrawal Force: | 1 Ounce per Pin Minimum |
| Normal Force: | 50 Grams Minimum (Per Beam) |
| Durability: | 50 Cycles Minimum |
| Operating Temp: | -40° C to +85° C Minimum |

**ELECTRICAL PERFORMANCE**

| | |
|---|---|
| Contact Resistance: | <30 Milliohms Maximum |
| Current Capacity: | 1 Amp Continuous Per Pin |
| Dielectric Strength: | 1000 VAC |
| Insulation Resistance: | 5,000 Megohms Minimum |

## 7. Power Connector

For maximum flexibility in meeting specialized customer needs, the EPIC standard does not define a mandatory power connector, its pin count, or pin definitions. These decisions are at the option of each manufacturer. In most cases, an off-the-shelf connector can provide the ruggedness and economy needed for standard industrial applications.

This appendix demonstrates two examples of a power connector scheme for an EPIC board. The first is a standard 10-pin rugged power connector that can be used for an embedded PC design. Its power connections are similar to what is used on motherboards. The second example demonstrates using a screw terminal block for systems that need just voltages only and no control signals.

### 7.1. 10-pin ATX-type Power Connector

The recommended practice below is based on the popular P1 connector that is defined by the ATX 2.1 compliant power supply specification. It is available from a number of different manufacturers, has a long-term source of supply, and is available throughout the world. It has been tested for shock and vibration and is proven to work well in harsh environments.

An ATX power connector specifies 20 pins. The example in this Appendix is a 10-pin functional subset of that specification. The pin-out of the original specification was not maintained so as to limit the connector size and cost.

Two signals not supported in this recommended practice for an EPIC power connector are -5V and PWR_OK. The –5V is a legacy voltage rarely used in embedded systems. Power OK is a “power good” signal that already exists on virtually all embedded computers.

The pin descriptions are the same as the ATX standard and there is a correspondence to the ATX wiring colors so that making an adapter cable is simplified.

**Table 7-1 Suggested 10-pin Power Connector for EPIC board**

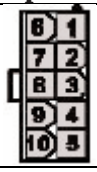
| ATX color | Desc | Pin# | Pin# | Desc | ATX color | Pin numbering (Top view) |
|---|---|---|---|---|---|---|
| Green | PS_ON | 1 | 6 | +5VSB | Purple |  |
| Black | COM | 2 | 7 | +5V | Red | |
| Black | COM | 3 | 8 | +5V | Red | |
| Yellow | +12V | 4 | 9 | -12V | Blue | |
| Orange | +3.3V | 5 | 10 | COM | Black | |



Table 7-1 illustrates the recommendations for various board design possibilities. A designer can choose as few as 4-pins up to as many as 10 depending upon the complexity of the EPIC board design. The pin definitions are progressive and the pin order is recommended to reduce the number of field variations that would lead to confusion. If a connector other than those shown here is used, it is recommended that the pin-out correspond to the Table 7-1 for the same reason.

Comments:

1) Pins 1, 2, 6, & 7 provide a +5V system solution.

2) Adding pins 3 & 8 give the same function for high power processors.
3) Minimal, non-ATX solution is implemented with pins 3, 4, 8, and 9. Pins 1 & 6 can be added for high power.
4) 3.3V is intended to power the PC/104-*Plus* stack.

Please note that PS_ON is an active low TTL signal that turns on the main rails of all the power supplies. If an EPIC board design does not support this function, then the pin should be tied to ground.

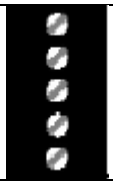
## 7.2. 5-pin Screw Terminal Power Connector

As an alternative to the ATX-style connector above, the recommended practice below is based on a rugged, removable screw terminal connector. Screw terminals allow power to be connected without the use of specialized crimping tools. Some of the lesser used voltages and signals are deleted in order to reduce the number of combinations.

The Table 7-2 below illustrates the recommendations for various board design possibilities. The design is progressive and the pin order is recommended to reduce the number of field variations that might cause confusion. If a connector other than those shown here is used, it is recommended that the pin-out correspond to the Table 7-2 below, for the same reason.

The pin descriptions are the same as the ATX standard and there is a correspondence to the ATX wiring colors so that making an adapter cable is simplified.

**Table 7-2 5-pin Screw Terminal Power Connector for EPIC board**

| ATX color | Desc | Pin# | Pin Numbering |
|---|---|---|---|
| Red | +5V | 1 |  |
| Black | COM | 2 | |
| Yellow | +12V | 3 | |
| Black | COM | 4 | |
| Orange | +3.3V | 5 | |

# 8. Standoff

## 8.1. Standoff Mechanical

Standoffs are used to ensure stacked boards retain their connectivity. The standoffs are preferably made from stainless-steel to provide for maximum strength and height tolerance. Pads must be provided for the standoffs, with the same plating as the pads for the PCIe connectors.

All critical dimensions are listed. It is up to the user to define the thread typed. The height of the standoff shall be 0.600" +/- 0.005". The width of the standoff must be able to fit on the Standoff pad called out on the Board Layout & Dimensions Section. The width of the threaded section must be able to fit into the standoff pad hole called out in the Board Layout & Dimensions Section.

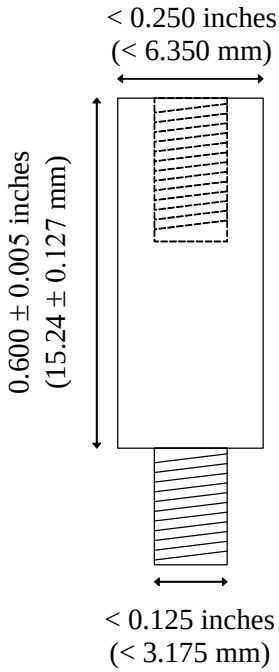



**Figure 8-1 Standoff Mechanical Dimensions**