

PPM-PS397-POE-1

25W Power over Ethernet PD PC/104-Plus Power Supply

PCM-PS397-POE-1

25W Power over Ethernet PD PC/104 Power Supply

ISM-PS397-POE-1

25W Power over Ethernet PD Embedded Power Supply

PRODUCT MANUAL



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MANUAL REVISION HISTORY

P/N G400-0397-000 (PPM-PS397-POE-1, PCM-PS397-POE-1, ISM-PS397-POE-1)

Revision Date Code	ECO Number
130404	
130715	
170103	16-63 - Reduced -12V max

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BEFORE YOU BEGIN

WinSystems offers best practice recommendations for using and handling WinSystems embedded PCs. These methods include valuable advice to provide an optimal user experience and to prevent damage to yourself and/or the product.

YOU MAY VOID YOUR WARRANTY AND/OR DAMAGE AN EMBEDDED PC BY FAILING TO COMPLY WITH THESE BEST PRACTICES.

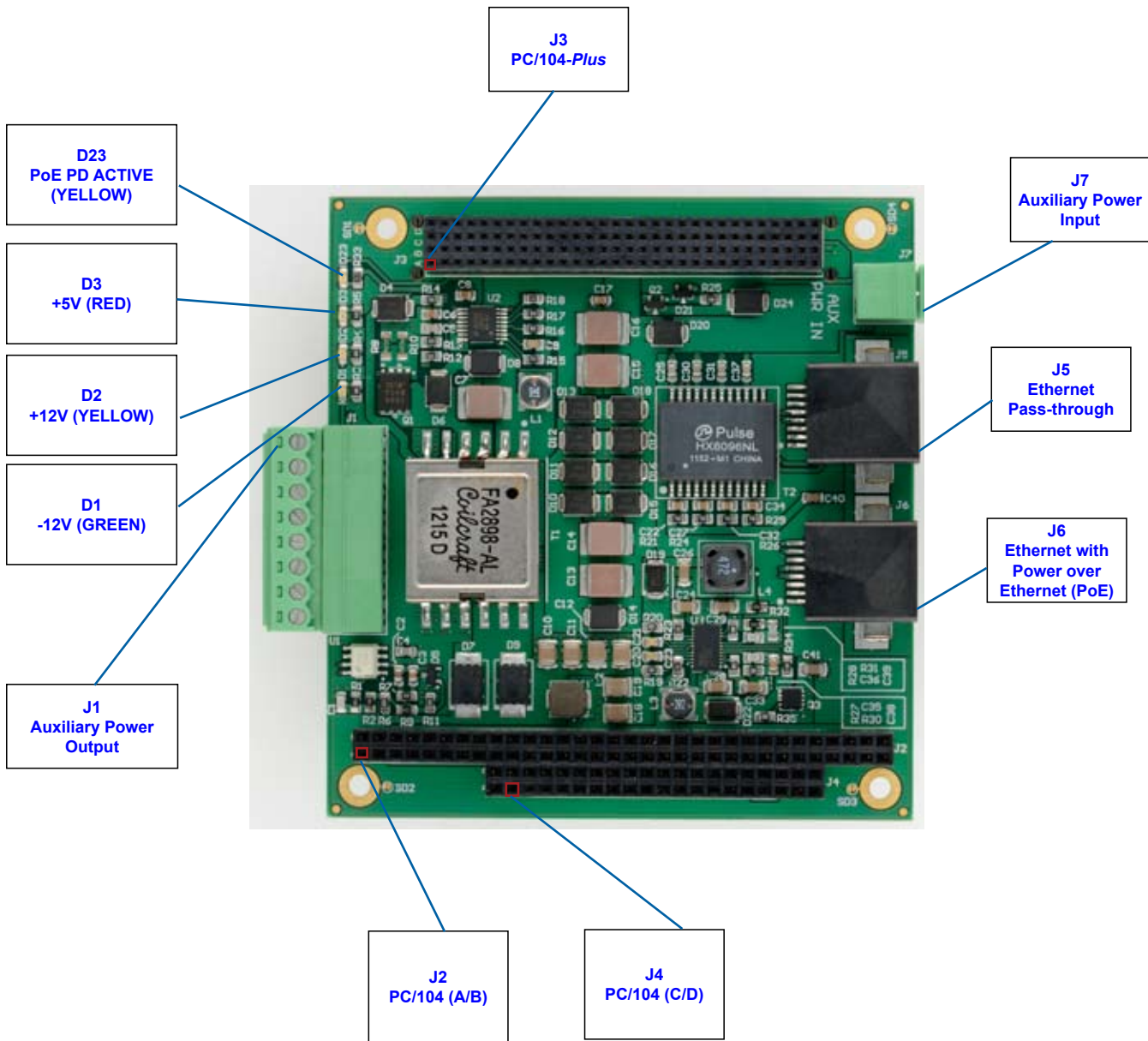
Reference [Appendix - A](#) for **Best Practices**.



Please review these guidelines carefully and follow them to ensure you are successfully using your embedded PC.

For any questions you may have on WinSystems products, contact our Technical Support Group at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

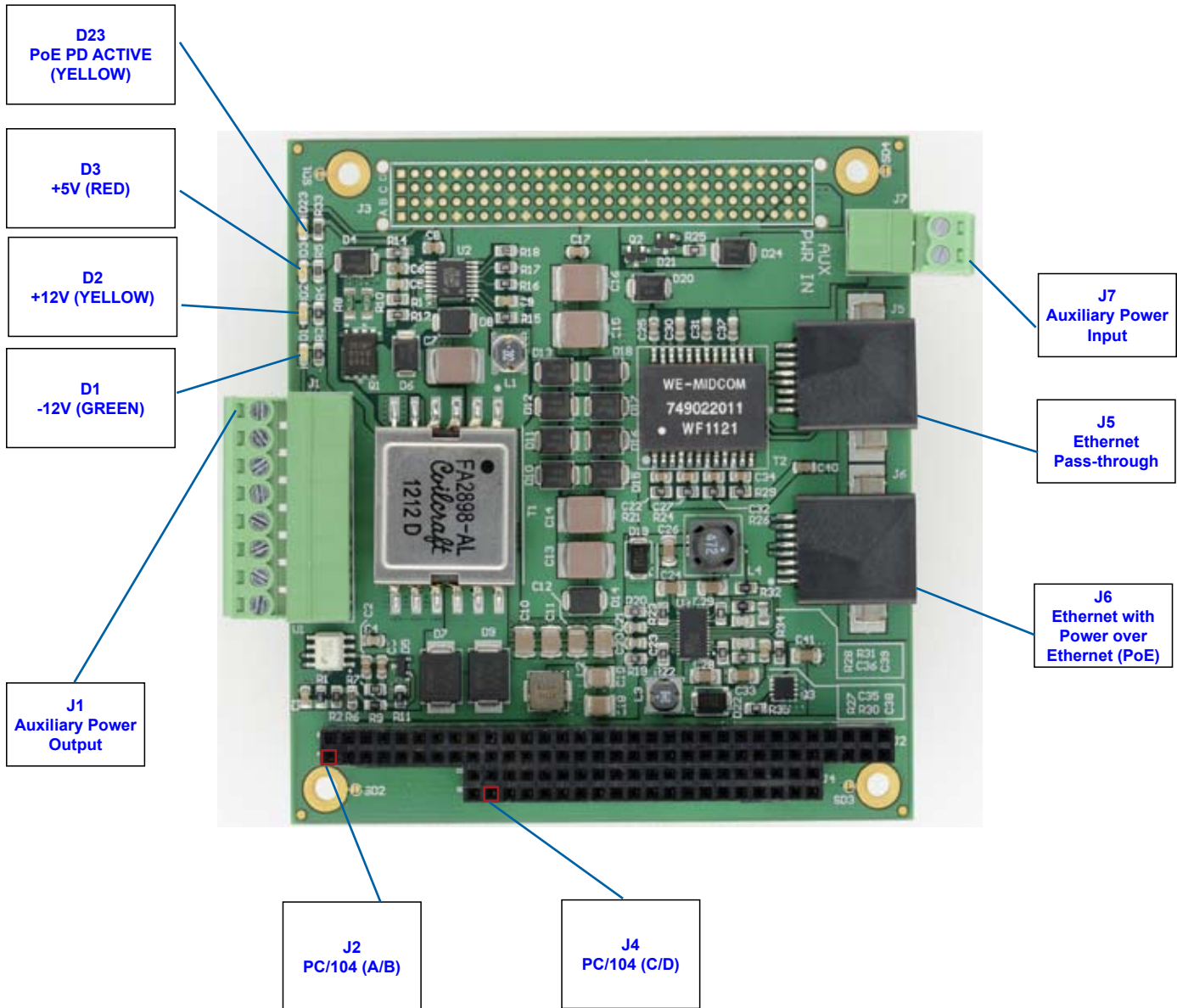
Visual Index - Top View (Connectors & LEDs) - PPM-PS397-POE-1



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NOTE: The reference line to each component part has been drawn to Pin 1, and is also highlighted with a square, where applicable.

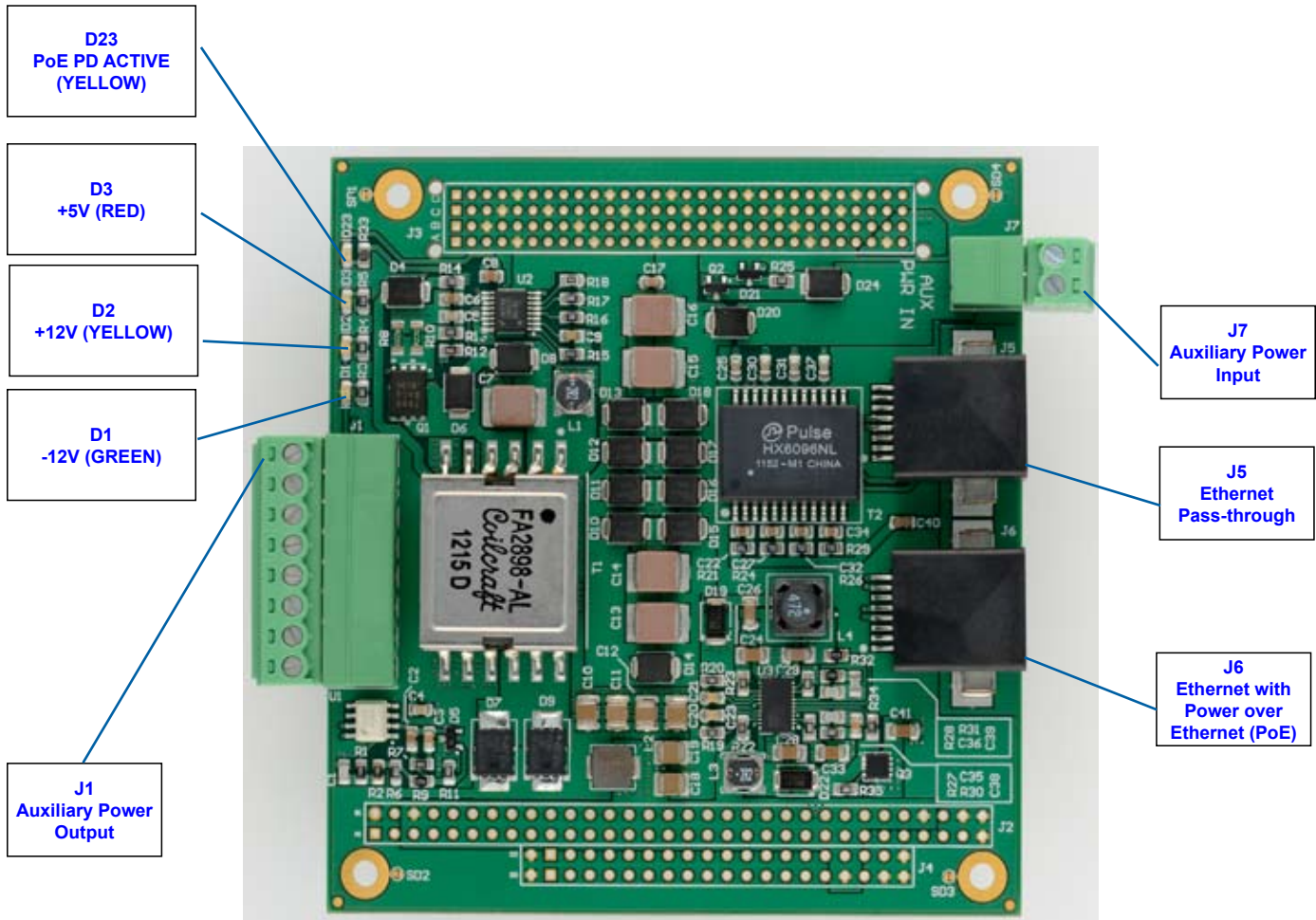
Visual Index - Top View (Connectors & LEDs) - PCM-PS397-POE-1



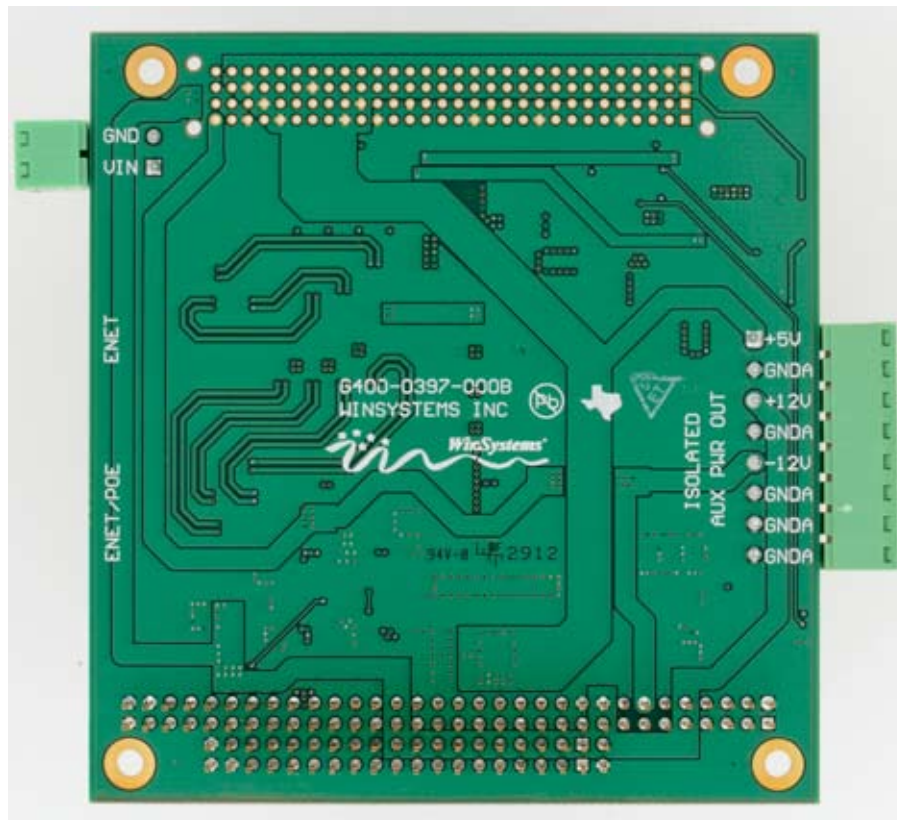
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NOTE: The reference line to each component part has been drawn to Pin 1, and is also highlighted with a square, where applicable.

Visual Index - Top View (Connectors & LEDs) - ISM-PS397-POE-1



**Visual Index - Bottom View -
PPM-PS397-POE-1, PCM-PS397-POE-1, ISM-PS397-POE-1**



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INTRODUCTION

This manual is intended to provide the necessary information regarding configuration and usage of the PPM-PS397-POE-1, PCM-PS397-POE-1, and ISM-PS397-POE-1 power supplies. WinSystems maintains a Technical Support Group to help answer questions not adequately addressed in this manual. Contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

FEATURES

Power Supply Modules

- PC/104-*Plus* Powered Device (PD) power supply for Power over Ethernet (PoE) applications (PPM-PS397-POE-1)
- PC/104 Powered Device (PD) power supply for Power over Ethernet (PoE) applications (PCM-PS397-POE-1)
- Powered Device (PD) power supply for Power over Ethernet (PoE) applications (ISM-PS397-POE-1)

Power over Ethernet (PoE)

- PoE input voltage: 42-57 VDC
- 802.3af/at compliant with Class 4 signature
- Dual Polarity Power Sourcing Equipment (PSE) supported

Input Voltage

- Auxiliary 16-60 VDC input supported
- Four LEDs provide indication of the DC power input and output voltages

Output Voltage

- Isolated voltage outputs with up to 25W combined power provided: +5VDC, +12VDC, and -12VDC
- Over current protection (OCP) and over voltage protection (OVP) for all outputs
- Line and load regulation ± 100 mV for all outputs
- High efficiency
- Fast transient response
- No minimum load required for regulation

Bus Expansion

- PC/104-*Plus* (PPM-PS397-POE-1)
- PC/104 (PCM-PS397-POE-1)
-

Industrial Operating Temperature

- -40°C to 85°C
- No fan or heat sink required

Mechanical

- PC/104-*Plus*-compliant (PPM-PS397-POE-1)
- PC/104-compliant (PCM-PS397-POE-1)
- Dimensions: 3.6 x 3.8 inches (90 x 96 mm)
- Weight: 3.94 oz (112g) (PPM-PS397-POE-1)
- Weight: 3.56 oz (101g) (PCM-PS397-POE-1)
- Weight: 2.84 oz (81 g) (ISM-PS397-POE-1)

Additional Features

- RoHS compliant

FUNCTIONALITY

System

The PPM-PS397-POE-1 is an isolated 25W, PC/104-*Plus* form factor, 802.3af/at compliant, PoE PD power supply. The Class 4 signature supports up to twice the power of 802.3af/at compliant PD devices. The PPM-PS397-POE-1 is designed to power a single board computer from DC power extracted from a CAT5 cable sourced by an 802.3af/at compliant PSE device configured as either an endpoint or midspan device.

The PPM-PS397-POE-1 accepts positive or negative polarity power in the 42 – 57 VDC range from the RJ-45 Ethernet interface. It converts the power to three rails: +5 VDC @ up to 5.0A, +12 VDC @ up to 1.0A, and -12 VDC @ up to 500 mA. These three output power rails are wired to the PC/104-*Plus*, PC/104, and auxiliary output connectors. The combined output power for the three rails must not exceed 25W, with a maximum of 12W available from the combination +12V and -12V.

The PPM-PS397-POE-1 can alternatively take power from an auxiliary input power connector rather than from the Ethernet PoE interface. The auxiliary input power range is from 16 – 60 VDC.

The auxiliary input is dominant. When present, it will always power the PD regardless of the state of the PoE. power. If auxiliary power is connected, the PS397 will not draw any power from the PoE interface. The auxiliary power input is hot-swap capable.

From the input voltage source, an isolated converter topology is used to produce a +5V @ 5.0A isolated power rail which then feeds two tandem +12V and -12V converters. Each output is short circuit protected and current limited. A minimum load is not needed to bring the supply into regulation.

The xxx-PS397-POE-1 will show up as a Class 4 device during two event PoE discovery. When used with a Type 2 PSE, such as WinSystems PPM-GIGE-2-POE, the device can provide up to 25W of power. Higher PoE voltages may be required to prevent PSE current limits at the upper power limits, typically 50V DC minimum for Type 2 PSE devices. When used with a PSE that does not recognize the Class 4 signature or that requires dynamic link layer protocol, the PSE may default to Class 0 and limit power to 12.5W.

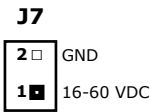
CONNECTOR REFERENCE

POWER

J7 - Auxiliary Power Input 16-60 VDC



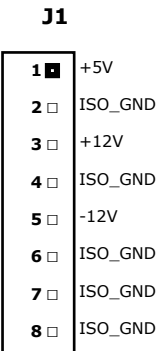
PCB Connector: PHOENIX 1803277 (J7)
Mating Connector: PHOENIX 1803578



J1 - Auxiliary Power Output



PCB Connector: PHOENIX 1803332 (J1)
Mating Connector: PHOENIX 1803633



J6 - Ethernet with PoE Power



PCB Connector: MOLEX 43743-8101 (J6)

J6

1	■	PoE-E0_P
2	□	PoE-E0_N
3	□	PoE-E1_P
4	□	PoE-E2_P
5	□	PoE-E2_N
6	□	PoE-E1_N
7	□	PoE-E3_P
8	□	PoE-E3_N

J5 - Ethernet Pass-through



PCB Connector: MOLEX 43743-8101 (J5)

J5

1	■	E0_P
2	□	E0_N
3	□	E1_P
4	□	E2_P
5	□	E2_N
6	□	E1_N
7	□	E3_P
8	□	E3_N

LED INDICATORS

LEDs (PoE PD and Isolated Output)



Four individual LED indicators provide visual status of the PoE PD and the isolated output voltages. **D23** provides a status indication that the PS397 outputs are being derived from the PoE power provided from **J6**. **D23** will not be lit when power is supplied from Auxiliary power. See table below for signal definitions.

J6
(Ethernet with PoE)

LED	Function	Color
D1	-12V	GREEN
D2	+12V	YELLOW
D3	+5V	RED
D23	PoE PD Active	YELLOW

PCB Connector: **TEKA PC232-A-1A7-M (J2)**
TEKA PC220-A-1A7-M (J4)

The PC/104 bus is electrically equivalent to the 16-bit ISA bus. Standard PC/104 I/O cards can be populated on PPM-PS397-POE-1 and PCM-PS397-POE-1's connectors, located at **J2** and **J4**. The interface does not support hot swap capability. The PC/104 bus connector pin definitions are provided below for reference. Refer to the [PC/104 Bus Specification](#) for specific signal and mechanical specifications.

J4 (C/D)				J2 (A/B)			
GND	D0 ■	□	C0	GND			
MEMCS16#	D1	□	C1	SBHE#			
IOCS16#	D2	□	C2	LA23			
IRQ10	D3	□	C3	LA22			
IRQ11	D4	□	C4	LA21			
IRQ12	D5	□	C5	LA20			
IRQ15	D6	□	C6	LA19			
IRQ14	D7	□	C7	LA18			
DACK0#	D8	□	C8	LA17			
DRQ0	D9	□	C9	MEMR#			
DACK5#	D10	□	C10	MEMW#			
DRQ5	D11	□	C11	SD8			
DACK6#	D12	□	C12	SB9			
DRQ6	D13	□	C13	SD10			
DACK7#	D14	□	C14	SD11			
DRQ7	D15	□	C15	SD12			
+5V	D16	□	C16	SD13			
MASTER#	D17	□	C17	SD14			
GND	D18	□	C18	SD15			
GND	D19	□	C19	KEY			

IOCHK#	A1 ■	□	B1	GND			
SD7	A2	□	B2	RESET			
SD6	A3	□	B3	+5V			
SD5	A4	□	B4	IRQ			
SD4	A5	□	B5	-5V			
SD3	A6	□	B6	DRQ2			
SD2	A7	□	B7	-12V			
SD1	A8	□	B8	SRDY#			
SD0	A9	□	B9	+12V			
IOCHRDY	A10	□	B10	KEY			
AEN	A11	□	B11	SMEMW#			
SA19	A12	□	B12	SMEMR#			
SA18	A13	□	B13	IOW#			
SA17	A14	□	B14	IOR#			
SA16	A15	□	B15	DACK3#			
SA15	A16	□	B16	DRQ3			
SA14	A17	□	B17	DACK1#			
SA13	A18	□	B18	DRQ1			
SA12	A19	□	B19	REFRESH#			
SA11	A20	□	B20	BCLK			
SA10	A21	□	B21	IRQ7			
SA9	A22	□	B22	IRQ6			
SA8	A23	□	B23	IRQ5			
SA7	A24	□	B24	IRQ4			
SA6	A25	□	B25	IRQ3			
SA5	A26	□	B26	DACK2#			
SA4	A27	□	B27	TC			
SA3	A28	□	B28	BALE			
SA2	A29	□	B29	+5V			
SA1	A30	□	B30	OSC			
SA0	A31	□	B31	GND			
GND	A32	□	B32	GND			

= Active Low Signal

NOTES:

1. Rows C and D are not required on 8-bit modules.
2. B10 and C19 are key locations. WinSystems uses key pins as connections to GND.
3. Signal timing and function are as specified in ISA specification.
4. Signal source/sink current differ from ISA values.

PCB Connector: TEKA 2MR430-A7WM-368-00

The PC/104-Plus is electrically equivalent to the 33 MHz PCI bus and is terminated to a 120-pin, nonstackthrough connector. The standard PC/104-Plus I/O modules can be populated on PPM-PS397-POE-1's PC104-Plus bus.

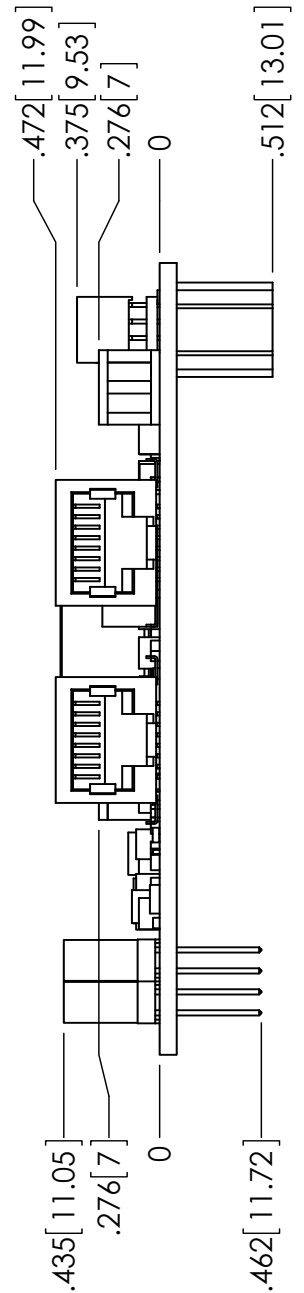
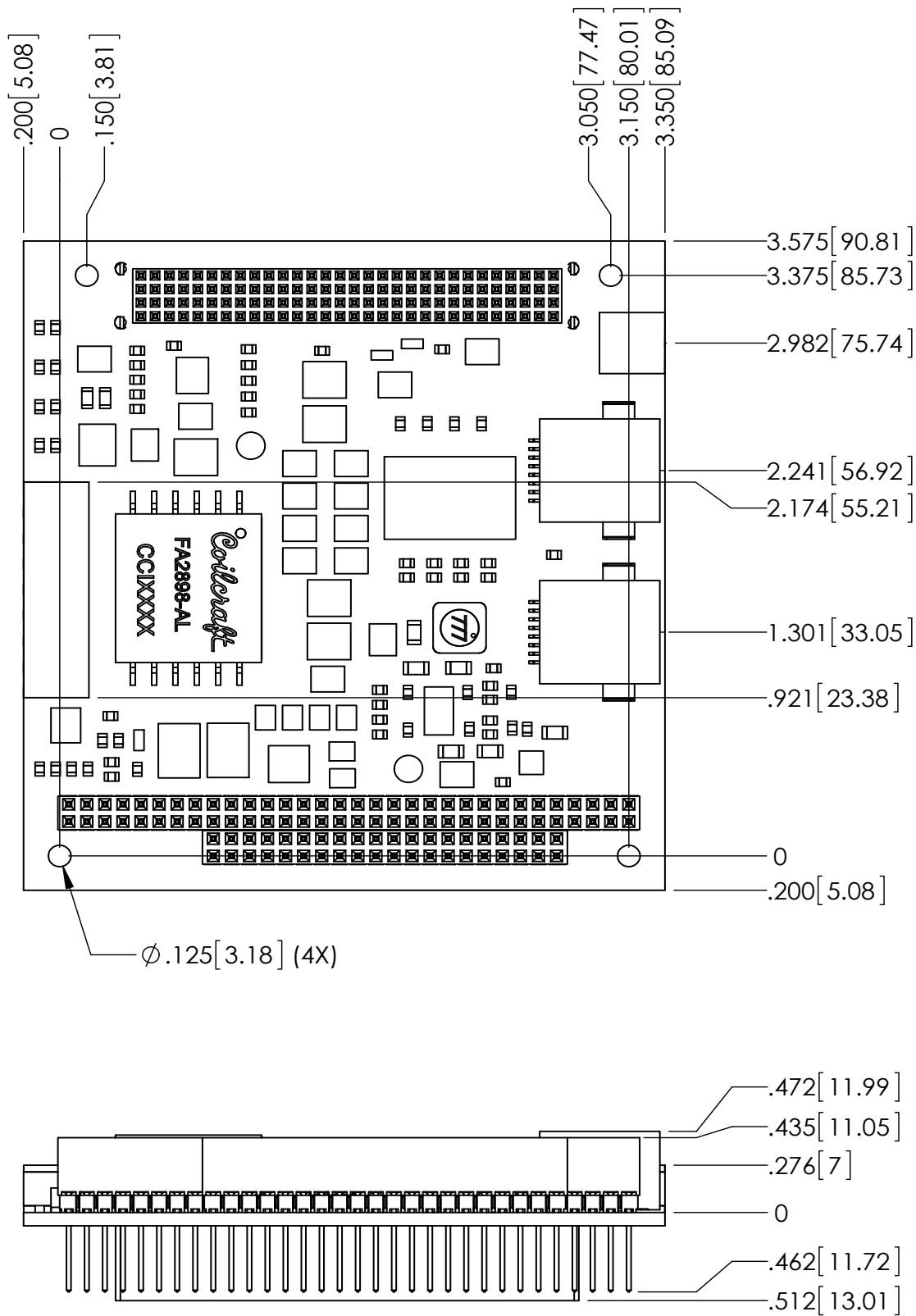
The interface does not support hot swap capability. The PC/104-Plus bus connector is located at **J3**. Refer to the [PC/104-Plus Bus Specification](#) for specific signal and mechanical specifications. The pin definitions are:

PIN	A	B	C	D
1	GND	RESERVED	+5V	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0#	AD007	GND	AD06
5	GND	AD009	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1#	AD15	+3.3V
9	SERR#	GND	RESERVED	PAR
10	GND	PERR#	+3.3V	RESERVED
11	STOP#	+3.3V	LOCK#	GND
12	+3.3V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3V
14	GND	AD16	+3.3V	C/BE2#
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3#	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	VI/O
24	GND	REQ2#	+5V	GNT0#
25	GNT1#	VI/O	GNT2#	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD#	+5V	RST#
29	+12V	INTA#	INTB#	INTC#
30	-12V	REQ3#	GNT3#	GND

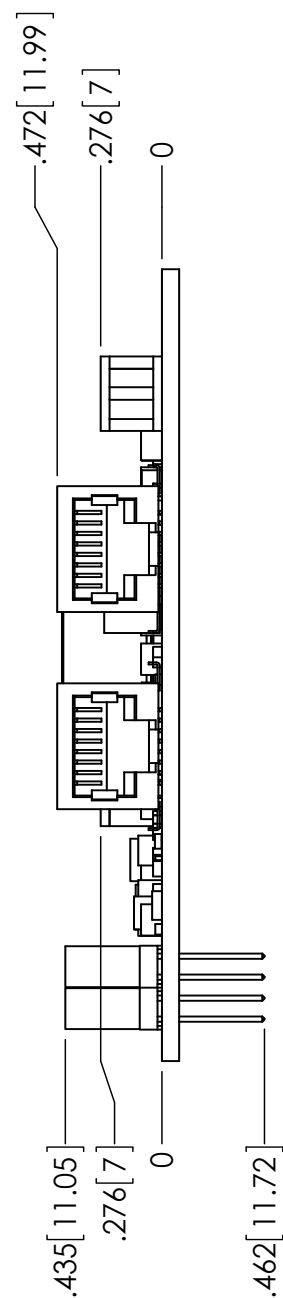
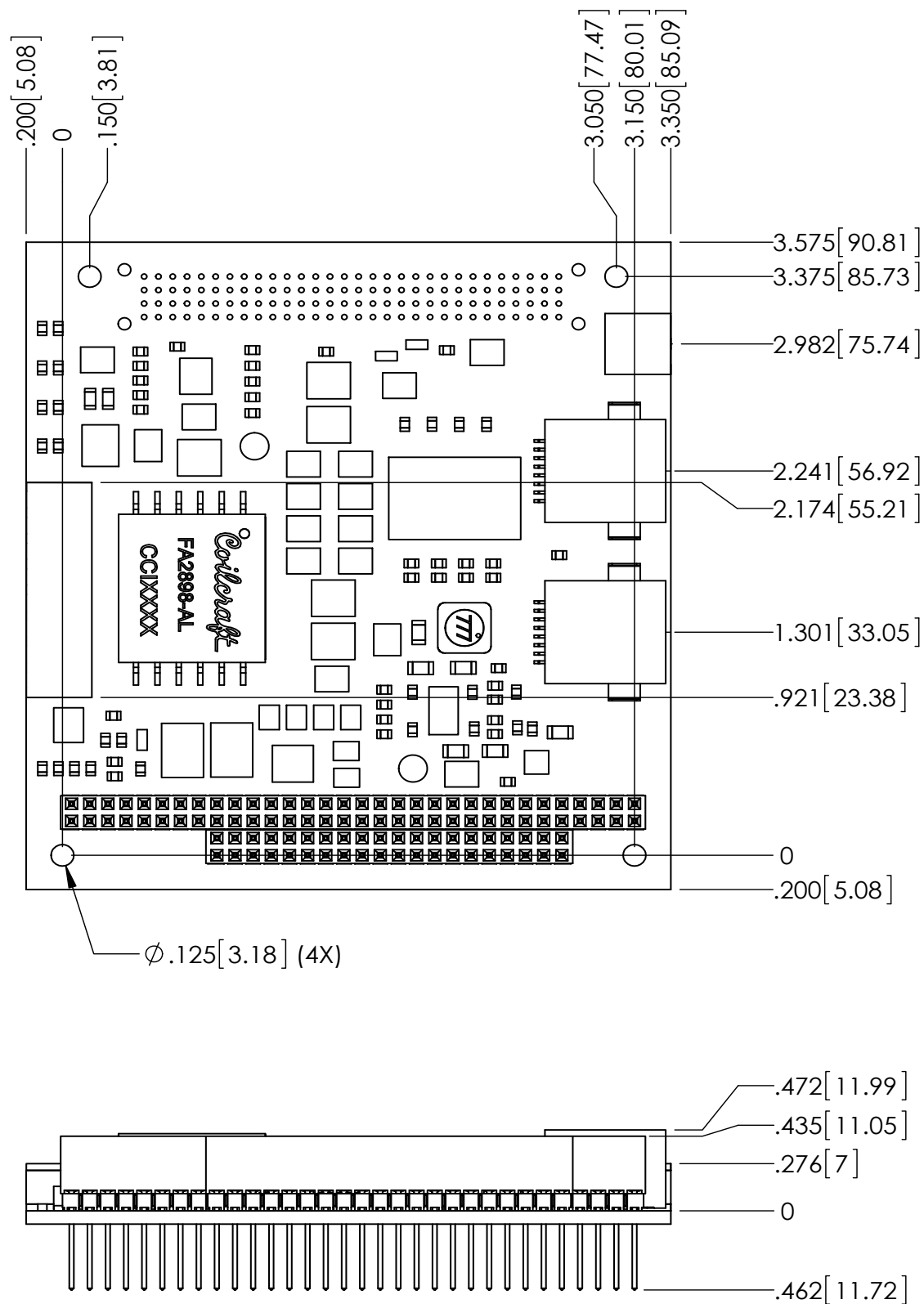
SPECIFICATIONS

MODELS				PPM-PS397-POE-1 PCM-PS397-POE-1 ISM-PS397-POE-1			
Electrical (Input)							
Auxiliary Voltage In			16-60 VDC				
PoE Voltage In			42-57 VDC				
Electrical (Outputs)							
Output	V _{OUT}	I _{OUT} Current Limit	Load Regulation	Line Regulation	Ripple	Output Isolation	Power
1	+5V	5.0A	100 mV	100 mV	<100 mV	1500 VAC	25W ≤ 12W from 12V*
2	+12V	1.0A	100 mV	100 mV	<150 mV	1500 VAC	12W ≤ 12W from 12V*
3	-12V	500 mA	100 mV	100 mV	<150 mV	1500 VAC	6W ≤ 12W from 12V*
* - The combined output power for the three rails must not exceed 25W, with a maximum 12W available from the combination +12V and -12V.							
MTBF			2,632,863 hours MIL-217 Part Count Reliability method using Manufacturer’s Failure Rate Data				
Mechanical							
Dimensions			3.6 x 3.8 inches (90 x 96 mm)				
Weight			3.94 oz (112g) (PPM-PS397-POE-1) 3.56 oz (101g) (PCM-PS397-POE-1) 2.84 oz (81g) (ISM-PS397-POE-1)				
Printed Circuit Board			0.078 inches 4-Layer FR4				
Environmental							
Operating Temperature			-40°C to 85°C ambient				
Humidity			5% to 95% non-condensing				
Random Vibration			MIL-STD-202G, Method 214A, Condition D .1g/Hz (11.95g rms), 20 minutes per axis, 3 axis				
Mechanical Shock			MIL-STD-202G, Method 213B, Condition A 50g half-sine, 11 ms duration per axis, 3 axis				

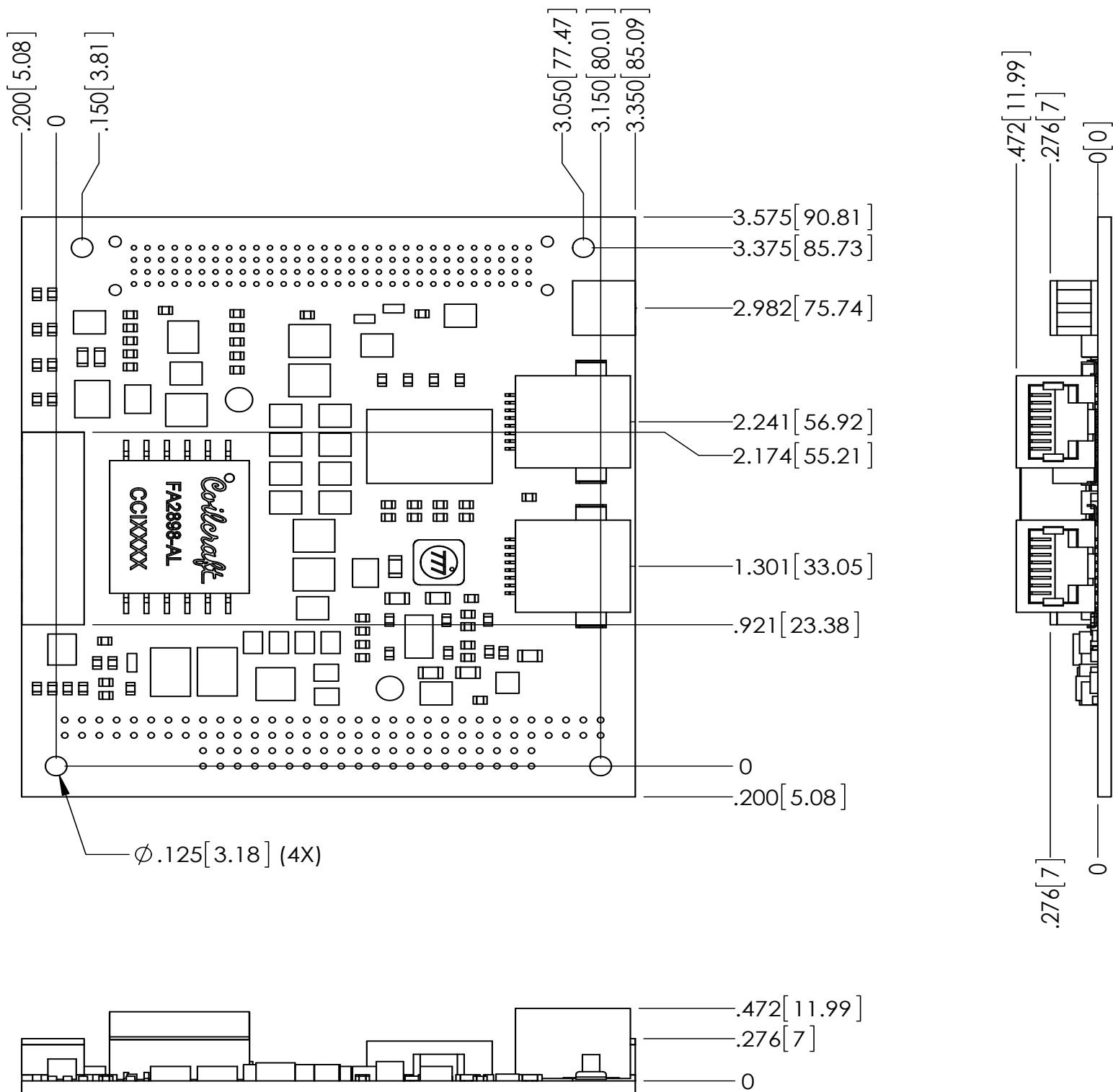
MECHANICAL DRAWING



PPM-PS397 MECHANICAL



PCM-PS397 MECHANICAL



ISM-PS397 MECHANICAL

APPENDIX - A

BEST PRACTICES

POWER SUPPLY

The power supply and how it is connected to the Single Board Computer (SBC) is very important.



Avoid Electrostatic Discharge (ESD)

Only handle the SBC and other bare electronics when electrostatic discharge (ESD) protection is in place. Having a wrist strap and a fully grounded workstation is the minimum ESD protection required before the ESD seal on the product bag is broken.

Power Supply Budget

Evaluate your power supply budget. It is usually good practice to budget 2X the typical power requirement for all of your devices.

Zero-Load Power Supply

Use a zero-load power supply whenever possible. A zero-load power supply does not require a minimum power load to regulate. If a zero-load power supply is not appropriate for your application, then verify that the single board computer's typical load is not lower than the power supply's minimum load. If the single board computer does not draw enough power to meet the power supply's minimum load, then the power supply will not regulate properly and can cause damage to the SBC.



Use Proper Power Connections (Voltage)

When verifying the voltage, you should always measure it at the power connector on the SBC. Measuring at the power supply does not account for voltage drop through the wire and connectors.

The single board computer requires +5V ($\pm 5\%$) to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

Populate all of the +5V and ground connections. Most single board computers will have multiple power and ground pins, and all of them should be populated. The more copper connecting the power supply to the single board computer the better.

Adjusting Voltage

If you have a power supply that will allow you to adjust the voltage, it is a good idea to set the voltage at the power connector of the SBC to 5.1V. The SBC can tolerate up to 5.25V, so setting your power supply to provide 5.1V is safe and allows for a small amount of voltage drop that will occur over time as the power supply ages and the connector contacts oxidize.

Power Harness

Minimize the length of the power harness. This will reduce the amount of voltage drop between the power supply and the single board computer.

Gauge Wire

Use the largest gauge wire that you can. Most connector manufacturers have a maximum gauge wire they recommend for their pins. Try going one size larger; it usually works and the extra copper will help your system perform properly over time.



Contact Points

WinSystems' boards mostly use connectors with gold finish contacts. Gold finish contacts are used exclusively on high speed connections. Power and lower speed peripheral connectors may use a tin finish as an alternative contact surface. It is critical that the contact material in the mating connectors is matched properly (gold to gold and tin to tin). Contact areas made with dissimilar metals can cause oxidation/corrosion resulting in unreliable connections.

Pin Contacts

Often the pin contacts used in cabling are not given enough attention. The ideal choice for a pin contact would include a design similar to Molex's or Trifurcons' design, which provides three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

POWER DOWN

Make sure the system is **completely off/powering down** before connecting anything.



Power Supply OFF

The power supply should always be off before it is connected to the single board computer.

I/O Connections OFF

I/O Connections should also be off before connecting them to the single board computer or any I/O cards. Connecting hot signals can cause damage whether the single board computer is powered or not.

MOUNTING AND PROTECTING THE SINGLE BOARD COMPUTER

Do Not Bend or Flex the SBC

Never bend or flex the single board computer. Bending or flexing can cause irreparable damage. Single board computers are especially sensitive to flexing or bending around Ball-Grid-Array (BGA) devices. BGA devices are extremely rigid by design and flexing or bending the single board computer can cause the BGA to tear away from the printed circuit board.

Mounting Holes

The mounting holes are plated on the top, bottom and through the barrel of the hole and are connected to the single board computer's ground plane. Traces are often routed in the inner layers right below, above or around the mounting holes.

Never use a drill or any other tool in an attempt to make the holes larger.

Never use screws with oversized heads. The head could come in contact with nearby components causing a short or physical damage.

Never use self-tapping screws; they will compromise the walls of the mounting hole.

Never use oversized screws that cut into the walls of the mounting holes.

Always use all of the mounting holes. By using all of the mounting holes you will provide the support the single board computer needs to prevent bending or flexing.

MOUNTING AND PROTECTING THE SINGLE BOARD COMPUTER (continued)



Plug or Unplug Connectors Only on Fully Mounted Boards

Never plug or unplug connectors on a board that is not fully mounted. Many of the connectors fit rather tightly and the force needed to plug or unplug them could cause the single board computer to be flexed.

Avoid cutting of the SBC

Never use star washers or any fastening hardware that will cut into the single board computer.

Avoid Overtightening of Mounting Hardware

Causing the area around the mounting holes to compress could damage interlayer traces around the mounting holes.

Use Appropriate Tools

Always use tools that are appropriate for working with small hardware. Large tools can damage components around the mounting holes.

Placing the SBC on Mounting Standoffs

Be careful when placing the single board computer on the mounting standoffs. Sliding the board around until the standoffs are visible from the top can cause component damage on the bottom of the single board computer.

Avoid Conductive Surfaces

Never allow the single board computer to be placed on a conductive surface. Almost all single board computers use a battery to backup the clock-calendar and CMOS memory. A conductive surface such as a metal bench can short the battery causing premature failure.

ADDING PC/104 BOARDS TO YOUR STACK

Be careful when adding PC/104 boards to your stack.

Never allow the power to be turned on when a PC/104 board has been improperly plugged onto the stack. It is possible to misalign the PC/104 card and leave a row of pins on the end or down the long side hanging out of the connector. If power is applied with these pins misaligned, it will cause the I/O board to be damaged beyond repair.

CONFORMAL COATING

Applying conformal coating to a WinSystems product will not in itself void the product warranty, if it is properly removed prior to return. Coating may change thermal characteristics and impedes our ability to test, diagnose, and repair products. Any coated product sent to WinSystems for repair will be returned at customer expense and no service will be performed.

OPERATIONS / PRODUCT MANUALS

Every single board computer has an Operations manual or Product manual.



Manual Updates

Operations/Product manuals are updated often. Periodically check the WinSystems website (<http://www.winsystems.com>) for revisions.

Check Pinouts

Always check the pinout and connector locations in the manual before plugging in a cable. Many single board computers will have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

Contact an Applications Engineer with questions

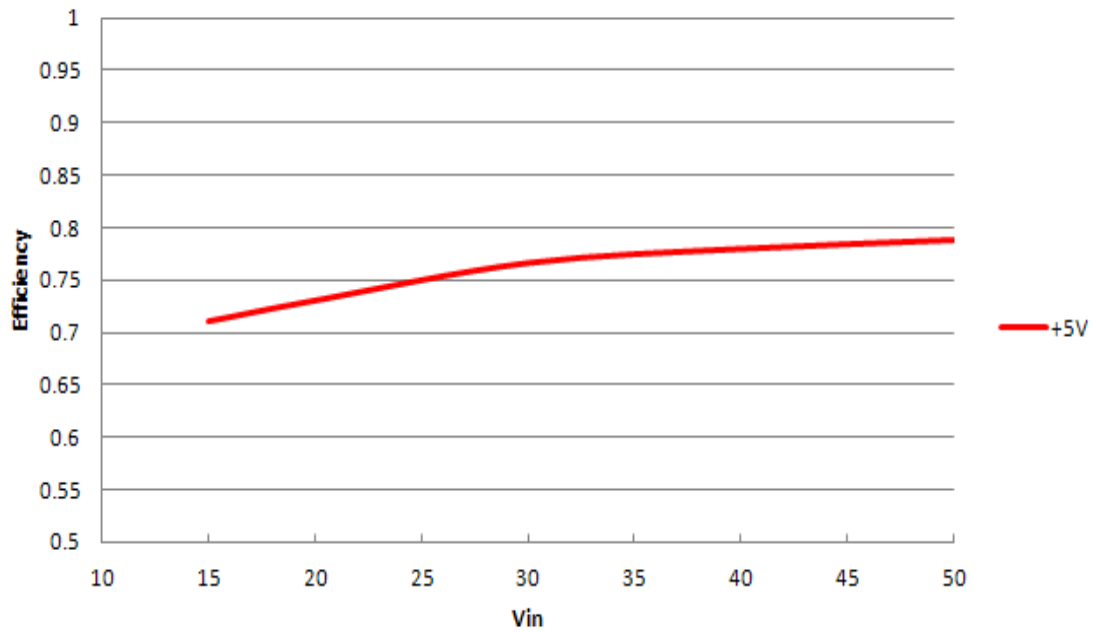
If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact your Applications Engineer.

APPENDIX - B

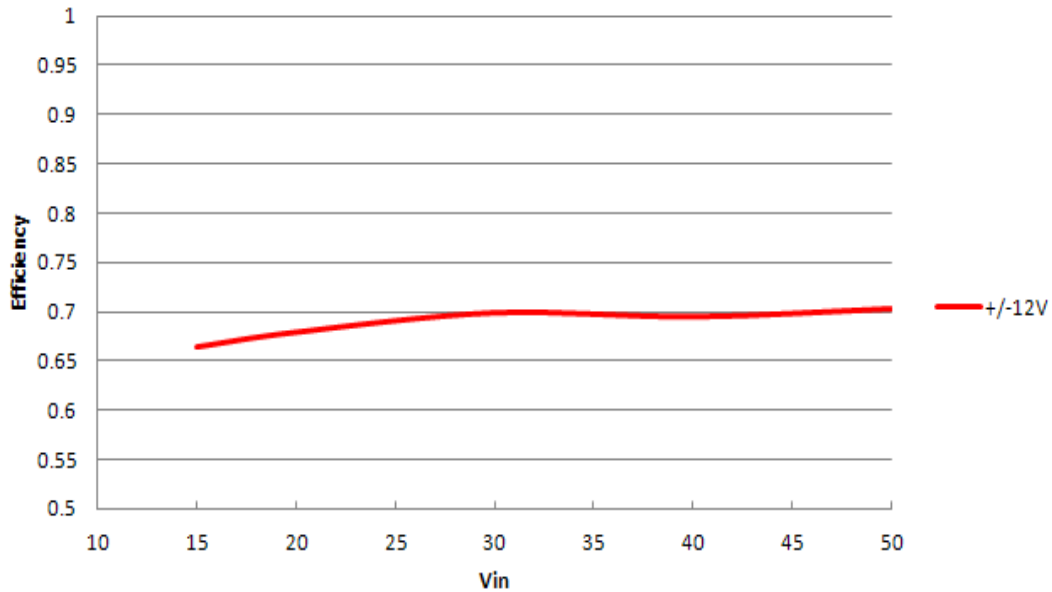
EFFICIENCY MEASUREMENTS

CONVERTER EFFICIENCY

Converter Efficiency



Converter Efficiency



WARRANTY INFORMATION

(<http://www.winsystems.com/company/warranty.cfm>)

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WARRANTY SERVICE

1. To obtain service under this warranty, obtain a return authorization number. In the United States, contact the WinSystems' Service Center for a return authorization number. Outside the United States, contact your local sales agent for a return authorization number.
2. You must send the product postage prepaid and insured. You must enclose the products in an anti-static bag to protect from damage by static electricity. WinSystems is not responsible for damage to the product due to static electricity.