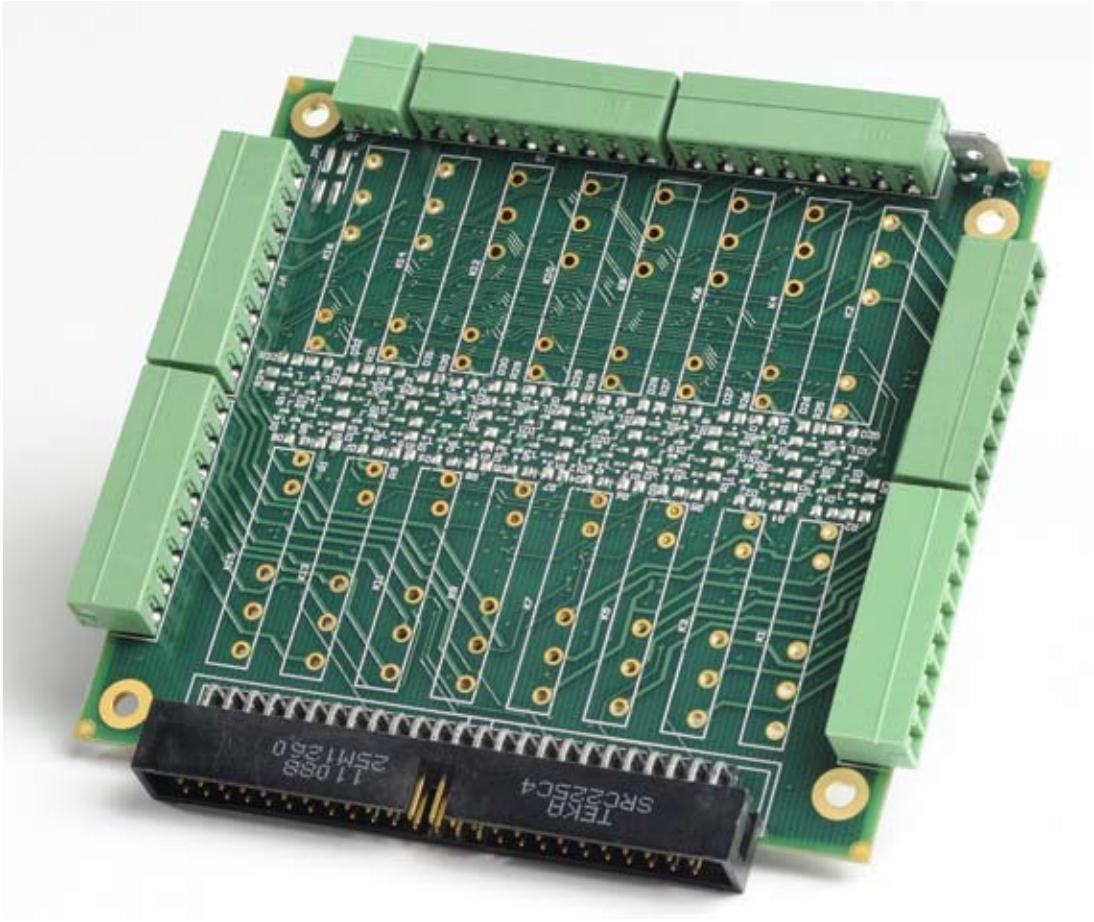
ISM-TRM-ISO-IN

24-Line, Isolated Input Signaling Conditioning Module

PRODUCT MANUAL



WinSystems, Inc.
715 Stadium Drive
Arlington, TX 76011

http://www.winsystems.com

MANUAL REVISION HISTORY

P/N 400-0357-000

Revision Date Code	ECO Number
120504	Initial Release
120522	

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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.

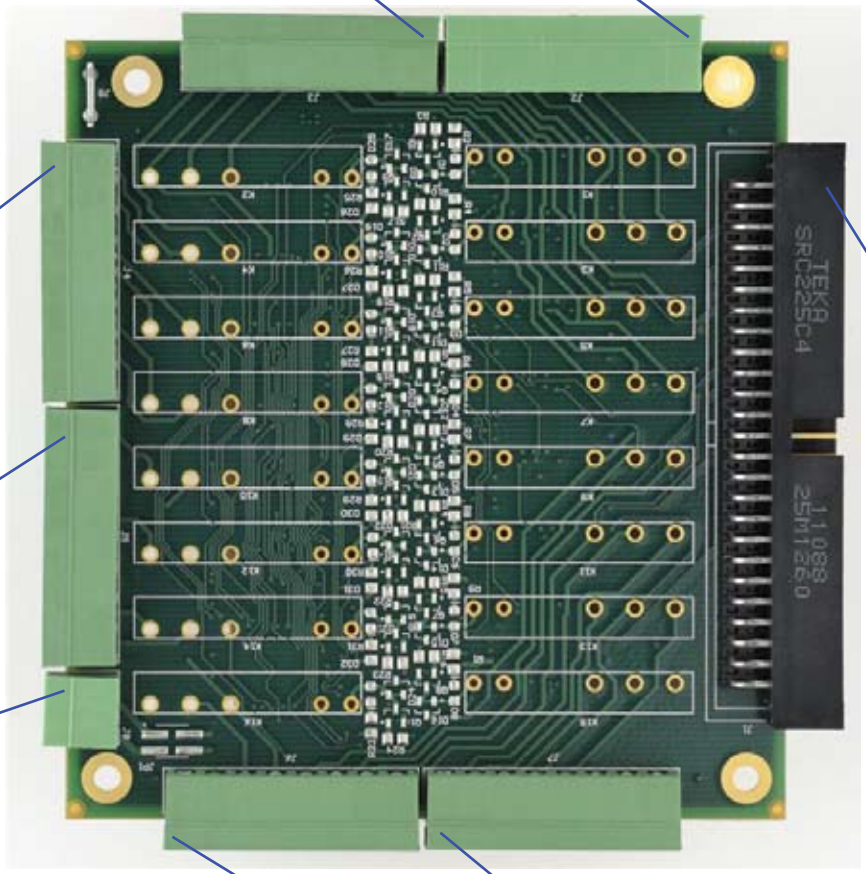
YOU MAY VOID YOUR WARRANTY AND/OR DAMAGE AN EMBEDDED PC BY FAILING TO COMPLY WITH THESE BEST PRACTICES.

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 & Jumpers)



RESERVED - JP1, J9

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

INTRODUCTION

This manual is intended to provide the necessary information regarding configuration and usage of the ISM-TRM-ISO-IN module. 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

Isolated Input Module

- Small form factor industrial I/O termination board
- 24 optically isolated and debounced inputs
- Input Voltage: 5-30V AC or DC
- 2500V isolation of signals
- Custom configurations with optically isolated outputs and/or relays available for OEM-specific applications
- Ribbon cabling directly compatible with WinSystems' single board computers (SBC) and individual I/O modules
- Pluggable quick disconnect terminal block connectors for field wiring
- RoHS compliant

Power

- +5V required, 1 mA typical

Industrial Operating Temperature

- -40°C to 85°C

Mechanical

- Dimensions: 3.6 x 3.8 inches (90 x 96 mm)
- Weight: 1.8 oz (51g)

System

The ISM-TRM-ISO-IN module provides 24 lines of optically isolated and digitally debounced inputs to provide easy connections and signal conditioning from field wiring. The board is needed for applications requiring signal isolation between an embedded computer and monitoring points. Isolation creates a barrier which will eliminate common mode voltage and prevents ground loops plus provides safety for industrial applications.

To interface with field wiring, the boards use a 3.5 mm pitch pluggable connector to insure a reliable connection with easy removal and insertion. A minimum of three micro-inches of gold plating is on all the connector mating surfaces. The connectors are located on three edges of the board and are grouped for 8-lines per edge. There are two signal lines associated for each bit since isolation is provided from the host interface.

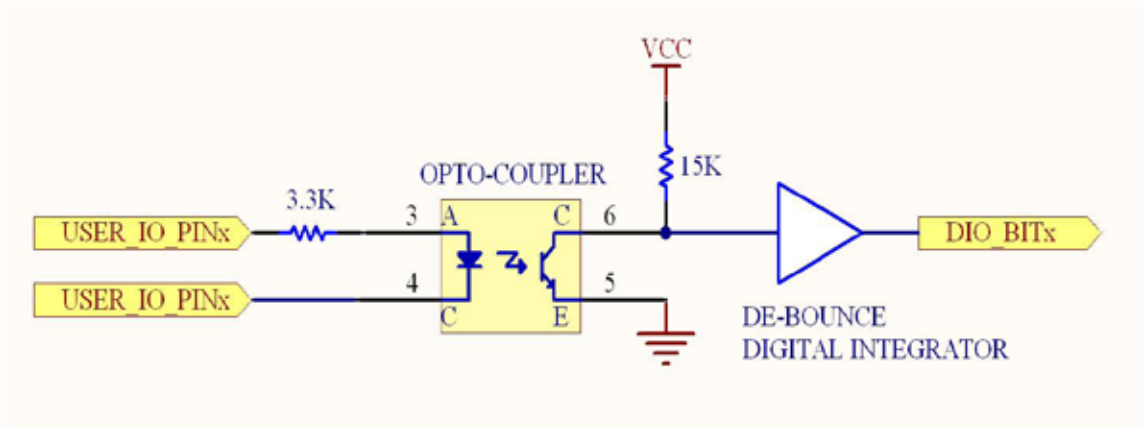
These boards will work with small form factor embedded PC and I/O modules that use WinSystems' WS16C48-compatible digital I/O controller connector pinout. It will also work with other manufacturers' products as well.

All these boards have the same physical dimensions and mounting holes as the 3.6 x 3.8 inches (90 x 96mm) Industry Standard Module (ISM). This allows ease of mechanical layout and packaging while offering excellent configuration flexibility.

FUNCTIONALITY

Isolated Input

Isolated input pair is wired to a photocoupler. Both the anode and cathode of the photocoupler LED are wired to a terminal block for jumper selection by the user. This gives the user the configuration flexibility of driving from either an active high or active low signal. The inputs can be driven by a source from 5 to 30 volts. Each input line is optically isolated from others and from the computer interface circuits. The isolation voltage rating between the input and output of the photocoupler device exceeds 2500V.



After the optical isolation circuit, each of the input lines has a MC14490 contact bounce eliminator. Its purpose is the elimination of extraneous level changes that result when interfacing with mechanical contacts from devices such as switches or relays. The circuit takes an input signal from a bouncing contact and generates a clean digital signal four clock periods after the input has stabilized. This results in about a 60 microsecond delay for debouncing. This circuit will remove bounce on both the “make” and “break” of a contact closure. It will pass up to a 34 KHz signal. Then the signal goes to a 50-pin header that allows easy connection to a single board computer or I/O board.

CONNECTOR REFERENCE

DIGITAL I/O

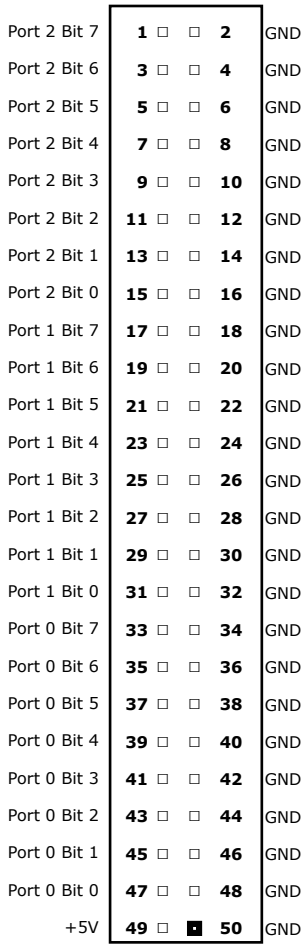
J1 - Digital I/O

Visual Index

PCB Connector: TEKA SRC225C425M126-0 (J1)

Mating Connector: ITW-PANCON 050-050-455A

J1
(Ports 0/1/2)



Digital I/O Connectors

The ISM-TRM-ISO-IN can interface with up to 24 open collector digital I/O bits. These 24 lines of digital I/O are terminated through a 50-pin connector at **J1**.

ISOLATED INPUT

D0, D1, D2, D3, D4, D5, D6, D7

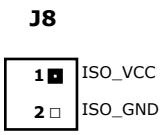
Visual Index

The ISM-TRM-ISO-IN module has 24 optically isolated inputs.

Control Pin	WS16C48 Reigster	User Signal	User IO	Opto LED
J1-1	**Port, 2, Bit 7**	IO_1	J2-1	U100A-Anode
		IO_2	J2-2	U100A-Cathode
J1-3	**Port 2, Bit 6**	IO_3	J2-3	U100B-Anode
		IO_4	J2-4	U100B-Cathode
J1-5	**Port 2, Bit 5**	IO_5	J2-5	U101A-Anode
		IO_6	J2-6	U101A-Cathode
J1-7	**Port 2, Bit 4**	IO_7	J2-7	U101B-Anode
		IO_8	J2-8	U101B-Cathode
J1-9	**Port 2, Bit 3**	IO_30	J5-6	U116A-Anode
		IO_29	J5-5	U116A-Cathode
J1-11	**Port 2, Bit 2**	IO_26	J5-2	U116B-Anode
		IO_25	J5-1	U116B-Cathode
J1-13	**Port 2, Bit 1**	IO_39	J6-7	U103A-Anode
		IO_40	J6-8	U103A-Cathode
J1-15	**Port 2, Bit 0**	IO_37	J6-5	U103B-Anode
		IO_38	J6-6	U103B-Cathode
J1-17	**Port 1, Bit 7**	IO_41	J7-1	U104A-Anode
		IO_42	J7-2	U104A-Cathode
J1-19	**Port 1, Bit 6**	IO_43	J7-3	U104B-Anode
		IO_44	J7-4	U104B-Cathode
J1-21	**Port 1, Bit 5**	IO_46	J7-6	U105A-Anode
		IO_45	J7-5	U105A-Cathode
J1-23	**Port 1, Bit 4**	IO_47	J7-7	U105B-Anode
		IO_48	J7-8	U105B-Cathode
J1-25	**Port 1, Bit 3**	IO_34	J6-2	U118A-Anode
		IO_33	J6-1	U118A-Cathode
J1-27	**Port 1, Bit 2**	IO_36	J6-4	U118B-Anode
		IO_35	J6-3	U118B-Cathode
J1-29	**Port 1, Bit 1**	IO_32	J5-8	U117A-Anode
		IO_31	J5-7	U117A-Cathode
J1-31	**Port 1, Bit 0**	IO_28	J5-4	U117B-Anode
		IO_27	J5-3	U117B-Cathode
J1-33	**Port 0, Bit 7**	IO_9	J3-1	U102A- Anode
		IO_10	J3-2	U102A-Cathode
J1-35	**Port 0, Bit 6**	IO_11	J3-3	U102B-Anode
		IO_12	J3-4	U102B-Cathode
J1-37	**Port 0, Bit 5**	IO_22	J4-6	U115A-Anode
		IO_21	J4-5	U115A-Cathode
J1-39	**Port 0, Bit 4**	IO_24	J4-8	U115B-Anode
		IO_23	J4-7	U115B-Cathode
J1-41	**Port 0, Bit 3**	IO_20	J4-4	U114A-Anode
		IO_19	J4-3	U114A-Cathode
J1-43	**Port 0, Bit 2**	IO_18	J4-2	U114B-Anode
		IO_17	J4-1	U114B-Cathode
J1-45	**Port 0, Bit 1**	IO_16	J3-8	U113A-Anode
		IO_15	J3-7	U113A-Cathode
J1-47	**Port 0, Bit 0**	IO_14	J3-6	U113B-Anode
		IO_13	J3-5	U113B-Cathode

J8 - Isolated Power

Visual Index



The ISO_VCC range is (5-30 VDC).

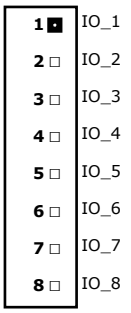
J2 - Terminal Block (1-8), J3 - Terminal Block (9-16), J4 - Terminal Block (17-24), J5 - Terminal Block (25-32), J6 - Terminal Block (33-40), J7 - Terminal Block (41-48)

Visual Index

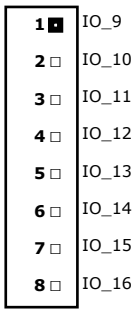
PCB Connector: **PHOENIX 1803332 (J2, J3, J4, J5, J6, J7)**
Mating Connector: **PHOENIX 1803633 (Housing)**

WinSystems provides reliable, pluggable quick disconnect terminal block connectors for field wiring at **J2**, **J3**, **J4**, **J5**, **J6**, and **J7**. Below are pinouts for the various terminal blocks.

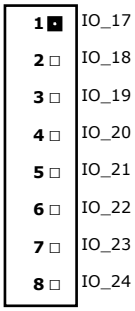
J2



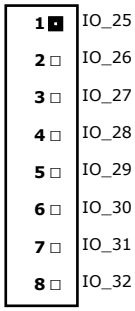
J3



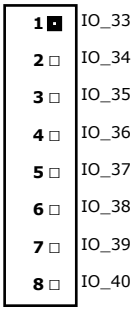
J4



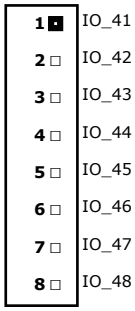
J5



J6



J7



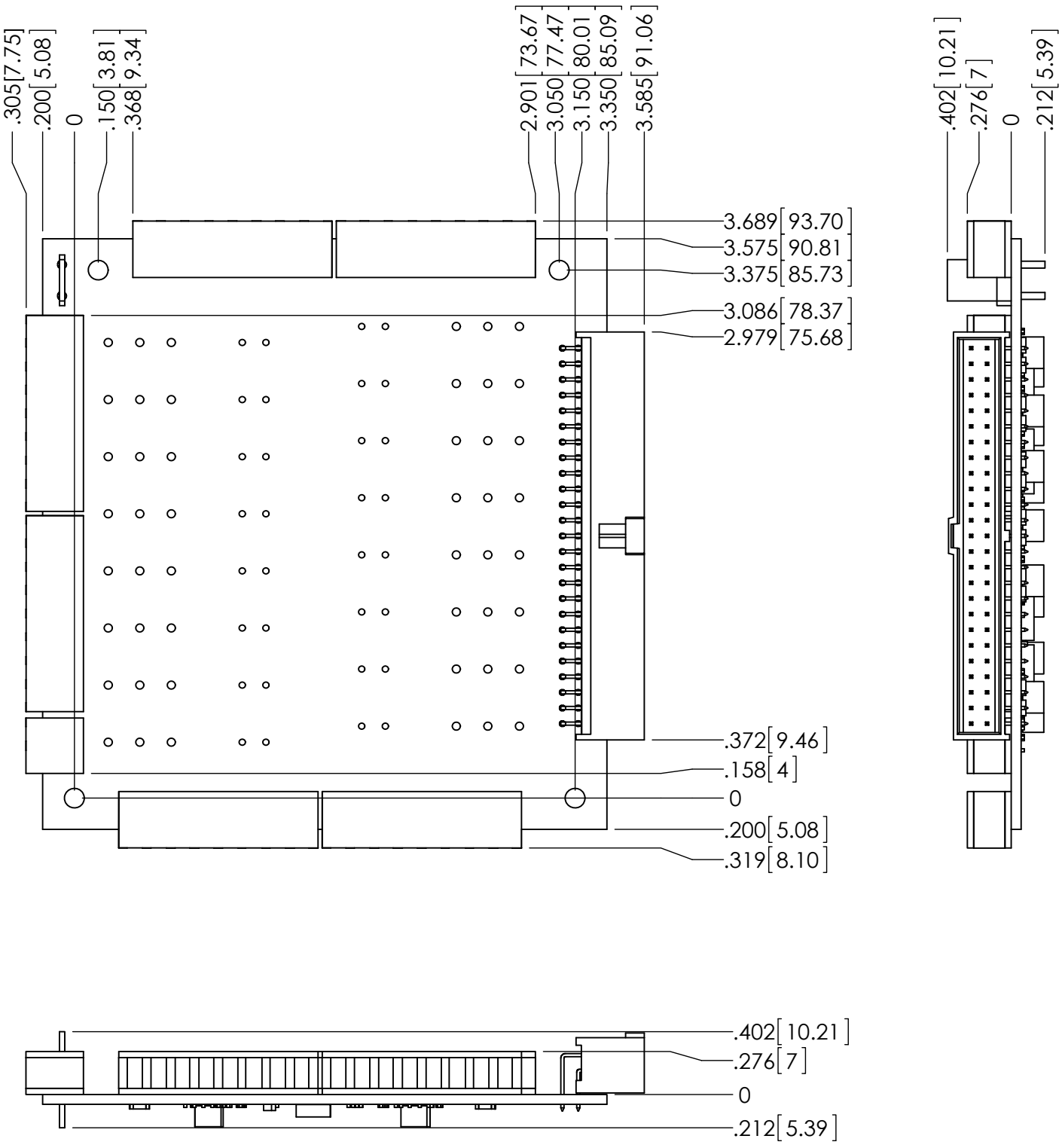
CABLES

Part Number	Description
Additional Cables	
CBL-129-4	4ft., ribbon cable, 50-pin. both ends with 50-pin socket termination

SPECIFICATIONS

Electrical	
VCC	±5V required, 1 mA typical
Mechanical	
Dimensions	3.6 x 3.8 inches (90 x 96 mm)
Weight	1.8 oz (51 g)
PCB	0.78 mil 4-Layer FR-4
Environmental	
Operating Temperature	-40°C to 85°C

MECHANICAL DRAWING



ISM-TERM-ISO-IN

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.

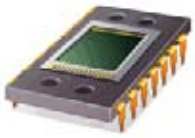
The single board computer requires +5V (±5%) to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

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/powered 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.

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 mouting 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.

OPERATIONS / PRODUCT MANUALS

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

Manual Updates
Operations/Product manuals are updated often. Periodicially 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.

WARRANTY INFORMATION

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

WinSystems warrants to Customer that for a period of two (2) years from the date of shipment any Products and Software purchased or licensed hereunder which have been developed or manufactured by WinSystems shall be free of any material defects and shall perform substantially in accordance with WinSystems' specifications therefore. With respect to any Products or Software purchased or licensed hereunder which have been developed or manufactured by others, WinSystems shall transfer and assign to Customer any warranty of such manufacturer or developer held by WinSystems, provided that the warranty, if any, may be assigned. Notwithstanding anything herein to the contrary, this warranty granted by WinSystems to the Customer shall be for the sole benefit of the Customer, and may not be assigned, transferred or conveyed to any third party. The sole obligation of WinSystems for any breach of warranty contained herein shall be, at its option, either (i) to repair or replace at its expense any materially defective Products or Software, or (ii) to take back such Products and Software and refund the Customer the purchase price and any license fees paid for the same. Customer shall pay all freight, duty, broker's fees, insurance charges for the return of any Products or Software to WinSystems under this warranty. WinSystems shall pay freight and insurance charges for any repaired or replaced Products or Software thereafter delivered to Customer within the United States. All fees and costs for shipment outside of the United States shall be paid by Customer. The foregoing warranty shall not apply to any Products of Software which have been subject to abuse, misuse, vandalism, accidents, alteration, neglect, unauthorized repair or improper installations.

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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.