WINSYSTEMS®

SYS-444Q

Fanless Industrial Embedded Computer
NXP® i.MX 8M Processor, 4K UltraHD Video and Low Power Processing

Product Manual

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Revision History

Document Version	Last Updated Date	Brief Description of Change
v2.0	12/12/2023	Initial release
v2.1	04/26/2024	Updated weight of the unit
v2.2	07/25/2024	Removed Block Diagram
v2.3	08/06/2024	Updated system photos and drawings
v2.4	08/20/2025	Updated COM 1 and COM 2 chart
v2.5	08/20/2025	Updated conformal coating, warranty and web links information

Copyright and Trademarks

Trademark Acknowledgments

Table of Contents

1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 26) when using and handling the WINSYSTEMS SYS-444Q. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SYS-444Q before proceeding.

APPLYING CONFORMAL COATING AFTER PURCHASE WILL VOID YOUR WARRANTY. FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE PRODUCT AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the SYS-444Q. While observing best practices, pay particular attention to the following.

Avoid electrostatic discharge (ESD)
Only handle the circuit board 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.

2. Introduction

This manual provides configuration and usage information for the SYS-444Q. If you still have questions, contact Technical Support at (817) 274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

Refer to the WINSYSTEMS website at https://www.winsystems.com/ for other accessories (including cable drawings and pinouts) that can be used with your .

3. Functionality

The SYS-444Q is an industrial Pico-ITX computer based upon NXP’s i.MX 8M application processor and packed with dual Ethernet, industrial I/O, and expansion options.

The processor supports industry-leading video processing along with an Arm Cortex-M4 microcontroller for real-time subsystems making it an ideal fit for industrial IoT applications requiring performance in harsh conditions such as digital signage, industrial automation, energy, building automation, and others.

Solid state storage options include an mSATA socket and soldered down eMMC device for operating systems (OS) and applications.

Expansion options are provided through the Mini PCIe socket.

4. Features

The SYS-444Q provides the following features.

Performance for Industrial IoT Applications

- NXP® i.MX8M Industrial Processor, 1.3 GHz
- Quad Arm Cortex®-A53 for low-power processing
- Up to 4GB LPDDR4 RAM
- Wide Range Power Input (9 - 36 VDC)
- Fanless Wide Operating Temperature Range -40°C to +85°C
- TPM 2.0 Supported

Expansion and Customization Options

WinSystems provides additional cables, expansion cards, power supplies, and solid state drives to complete your embedded computing solution including data acquisition, communications, location, and other features. Our Application Engineers are available to guide you through product selection and customized options.

5. General Operation

The WINSYSTEMS SYS-444Q SBC features a quad-core processor and up to 4 GB of soldered down LPDDR4 RAM.

The SYS-444Q supports Linux and Android. Drivers are available from the WINSYSTEMS website. https://www.winsystems.com/.

6. Specifications

The SYS-444Q adheres to the following specifications and requirements.

Feature	Specification
System	
Processor	Arm® Cortex®-A53 based NXP® i.MX 8M processor with Cortex-M4 core
LAN Chipset:	2x Gigabit Ethernet ports (Front Panel I/O)
System Memory	Embedded LPDDR4 (up to 4GB)
BSP	UBOOT
Watchdog	Adjustable from 1 second to 255-minute reset
TPM	Hardware Security - Trusted Platform Module (TPM) 2.0 Enabled
Display	
HDMI	2.0a (4096 x 2160 at 60 Hz, HDR10)
Storage	
Soldered Down	eMMC
Expansion	MicroSD (Up to 2TB)
Expansion	
Mini PCIe	1x Full-size Mini PCIe
I/O	
USB	1x USB 3.1 Gen 1 (Front Panel I/O) 3x USB 2.0 (1x Front Panel I/O)
Serial	2x RS-232/422/485 Serial ports
GPIO	6x General Purpose Input/Output (GPIO) 1x MIPI-CSI (4-Lane) 1x SPI bus 1x I2C bus
Operating System	
Supports	Linux, Android
Power	
Power Mode	AT, ATX

Feature	Specification
V_{CC}	Supports a wide range DC input power: 9V to 36V
Power Connector	Phoenix Contact Terminal Block Header
Environment	
Operating Temperature	-40°C to 85°C (-40°F to +185°F) Relative Humidity 10% to 95% (non-condensing)
Certification	CE / RoHS Compliant
Physical	
Dimensions	6.5 in x 4.5 in x 2.5 in (165 mm x 11.3 mm x 3.5 mm)
Weight	1.53 lbs (24.5 oz), 695 g
Construction	Extruded Aluminum with Heavy Duty Metal
Mounting Options	Wall mounting SIDE / VESA / Din-Rail Mounting (Optional)

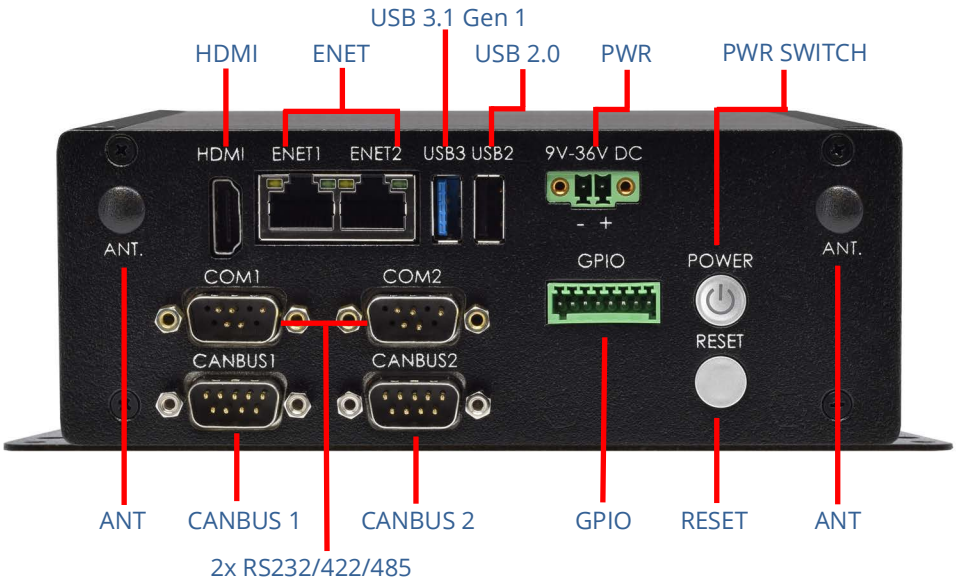
Contact Winsystems at https://winsystems.com/contact/ for more information.

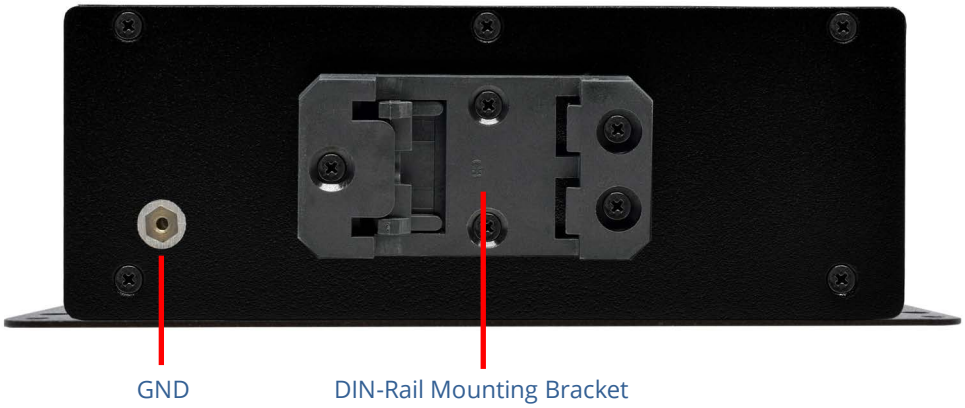
7. Configuration

This section describes the SYS-444Q components and configuration.

7.1 Component Layout

7.1.1 Front and Rear View





7.2 Watchdog Timer (WDT)

7.2.1 WDT Register Usage

The watchdog timer (WDT) implemented in the SYS-444Q board's i.MX 8M SOC can be used to reset the system if a lock-up prevents a software task from periodically resetting the watchdog timer. The WDT is controlled through a set of standard APIs available in the provided operating systems.

7.3 Real-time Clock / Calendar

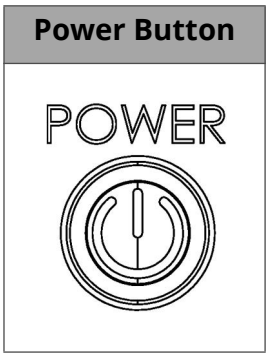
The SYS-444Q provides two different RTC options. Internal functionality of the i.MX 8M provides the first RTC for the system. The i.MX 8M based RTC maintains time as long as main power is connected, even when the system itself is turned off.

Additionally, an ultra-low current temperature compensated (TCXO) RTC with clock and calendar functions is provided. The RTC battery connector enables this second RTC to maintain time even when the SYS-444Q is disconnected from main power.

7.4 Connectors and Buttons

7.4.1 Power Button

The Power Button is located on the front IO panel right above the Reset Button. I controls power to the SYS-444-4-32. Once the fully powered power cable is connected to the unit, it will power up the system without pressing the Power Button. Once the system is up and running you can power off and on the system using the Power Button.



7.4.2 Reset Button

The Reset Button is located on the front IO panel right below the Power Button. The Reset Button is a hardware reset. Press the Reset Button to reset the system. It grounds SYS_RESET# for a full system reset and is used to restart the system after a crash.

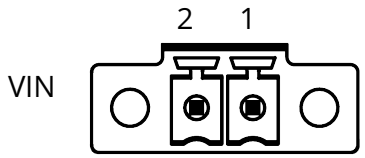
Reset Button

7.4.3 Power Input Connector

Use this connection to supply power to the SYS-444Q. This computer supports a wide range DC input power from 9 to 36 V. Once you connect a fully powered power cable to this connector for the first time, it will power on the system.

Layout and Pin Reference

Power Input Connector



Pin	Name	Pin	Name
1	Ground (GND)	2	Voltage In (VIN)

Connector

- Phoenix Contact terminal block header

  Part number: 1827868

Matching Connector

- Phoenix contact terminal block plug

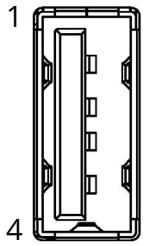
  Part number: 1827703

7.4.4 USB 2.0 Type-A Connector

The SYS-444Q-4-32 provides one USB 2.0 Type A port. This port supplies 500 mA maximum continuous current and 480 Mbps transfer speed.

Layout and Pin Reference

USB 2.0 Type-A Connector



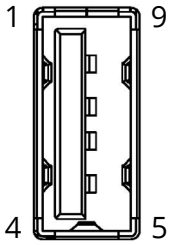
Pin	Name
1	USBVCC
2	D-
3	D+
4	GND

7.4.5 USB 3.1 Gen 1 Type-A Connector

The SYS-444Q-4-32 provides one USB 3.1 Gen 1 Type A port. This port supplies 1A maximum continuous current and 5 Gbps transfer speed. When using serial downloader mode, this USB port must be used. A USB 3.0 cable is not required during serial downloader mode.

Layout and Pin Reference

USB 3.1 Type-A Connector



Pin	Name
1	USBVCC
2	D-
3	D+
4	GND
5	RX-
6	RX+
7	GND
8	TX-
9	TX+

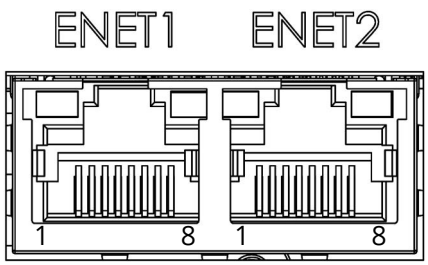
7.4.6 Ethernet (LAN) Dual RJ45

Two Gigabit Ethernet controllers provide standard IEEE 1588 and 802.1AS protocol timestamping. Each Ethernet interface includes 10/100/1000 Mbps multispeed, full, and half-duplex operation.

The left RJ45 port uses an Intel i210 Ethernet controller.

The right RJ45 port uses a RGMII PHY Ethernet controller.

Ethernet (LAN) Dual RJ45



Pin	Function	Description
1	TX_D1+	Transceive Data+
2	TX_D1-	Transceive Data-
3	RX_D2+	Receive Data+
4	BI_D3+	Bi-Directional Data+
5	BI_D3-	Bi-Directional Data-
6	RX_D2-	Receive Data
7	BI_D4+	Bi-Directional Data+
8	BI_D4-	Bi-Directional Data-

Connector

- Gigabit dual-port RJ45 connector with integrated magnetics and LEDs

Matching Connector

- Standard Gigabit Ethernet cables with RJ45 connectors

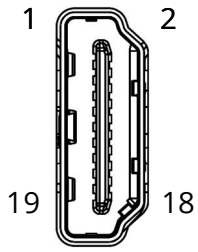
7.4.7 HDMI Connector

The High Definition Multimedia Interface (HDMI) provides crisp, clear audio and video.

Standard full size HDMI 2.0 connector located on the IO plate.

Layout and Pin Reference

HDMI Connector



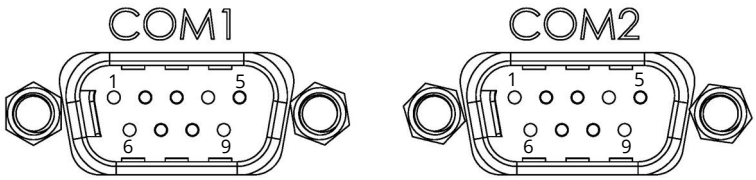
Pin	Name	Pin	Name
1	D2+	2	D1_Sheild
3	D2-	4	D1+
5	D1-_Sheild	6	D1-
7	D0+	8	D0_Sheild
9	D0-	10	CK+
11	CK_Sheild	12	CK-
13	CEC	14	HEC
15	I2C_CLK	16	I2C_DAT
17	GND	18	+5V
19	HOT_PLUG_DET		

7.4.8 COM 1 and COM 2

The SYS-444Q-4-32 is equipped with two serial ports (RS-232/422/485) on the front IO plate. Both serial channels use the advanced EXAR SP335E multiprotocol transceiver. Both ports are configurable and include options for 120-ohm receiver termination, slew rate, and protocol.

Layout and Pin Reference

COP Port Connectors



Pin	RS-232	RS-422	RS-485
1	N/A	N/A	N/A
2	RX	RX+	N/A
3	TX	TX-	DATA-
4	N/A	N/A	N/A
5	GND	GND	GND
6	N/A	N/A	N/A
7	RTS	RX-	N/A
8	CTS	TX+	DATA+
9	N/A	N/A	N/A

Connector

- Standard DB9 male connector.

Matching Connector

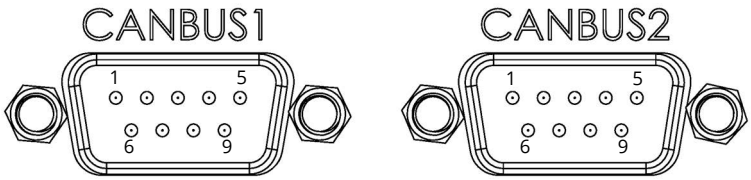
- Standard DB9 female connector.

7.4.9 CANBUS 1 and CANBUS 2

The SYS-444Q-4-32 provides 2 Isolated CANbus ports. These ports use Basic CAN 2.0B and support baud rates between 100k to 1000k. These CANbus ports also support Listen only mode and can send up to 6000 frames per second.

Layout and Pin Reference

CANBUS Connectors



Pin	Name
1	NC
2	CAN-L
3	GND
4	NC
5	NC
6	NC
7	CAN-H
8	NC
9	NC

Connector

- Standard DB9 male connector.

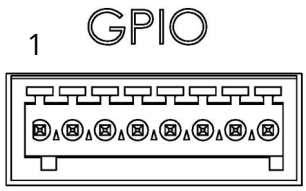
Matching Connector

- Standard DB9 female connector.

7.4.10 GPIO Connector

The SYS-444Q-4-32 provides 6 general purpose input/output connections that are 5-volt tolerant with rising/falling edge event sense interrupt generation.

Layout and Pin Reference

Power Input Connector


Pin	Name	Pin	Name
1	GPIO 0	2	GPIO 1
3	GPIO 2	4	GPIO 3
5	GPIO 4	6	GPIO 5
7	RESERVED	8	GND

Connector

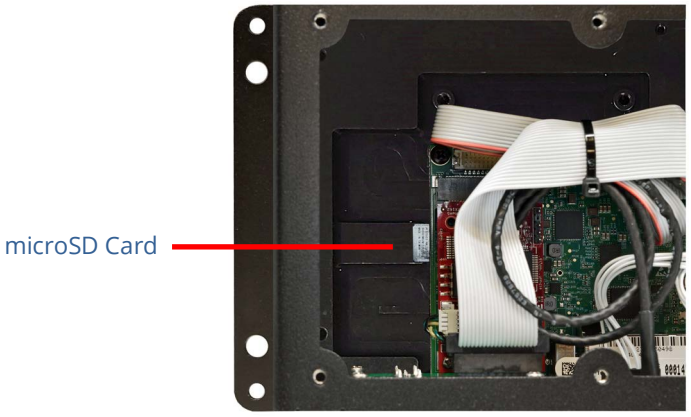
- Phoenix Contact 2.5mm Pitch 8 Pin PCB Header
- Part number: 1881613

Matching Connector

- Phoenix Contact 2.5mm Pitch 8 Pin Connector
- Part number: 1881383

7.4.11 J13 - microSD Socket

The SYS-444Q provides a microSD card socket for loading operating system or for additional storage.



7.4.12 J5 - Battery Header

An external battery connected to the SYS-444Q provides standby power for the real-time clock.

Layout and Pin Reference

Pin	Name
 1	
1	VBAT
2	GND

Connector

- Hirose DF13 series 1.25 mm 2-pin

  Part number: DF13C-2P-1.25V (51)

Matching Connector

- Hirose DF13C 1.25 mm 2-pin

  Part number: DF13C-2S-1.25C

7.5 Jumpers

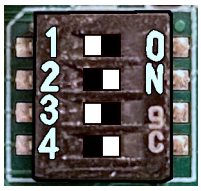
7.5.1 SW1 - Board Configuration Jumpers

Serial downloader mode allows for the SYS-444Q to be programmed via USB with a new UBOOT, kernel, and/or rootfs.

Below are switch positions for different program and boot modes.

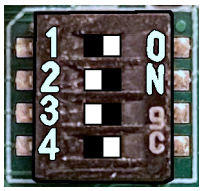
Serial Downloader Mode

1 = 0
2 = 1
3 = Do not care
4 = Do not care



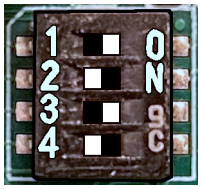
Boot from eMMC

1 = 1
2 = 0
3 = 0
4 = 1



Boot from uSD

1 = 1
2 = 0
3 = 1
4 = 0



7.6 LED Indicators

LED Reference

LED	Description	Color
D1	User LED	Green
D2	Status LED	Blue
D15	Backlight indicator	White
D16	5V VDD	Yellow
D17	3.3V VDD	Red
ETH1_LED1	Activity (blinking)	Green
ETH1_LED2	Link (solid)	Yellow
ETH2_LED1	Activity (blinking)	Green
ETH2_LED2	Link (solid)	Yellow

8. UBOOT Setup

8.1 Accessing UBOOT on the SYS-444Q

1. Using a host machine with a terminal emulator installed, plug a serial cable or serial-to-USB converter cable from the host machine to the SYS-444Q serial port 1.
2. Terminal serial port settings:

   Baud =115,200, Data = 8 bit, Parity = none, Stop = 1 bit, Flow = none

These instructions can also be found in our BSP Documentation at https://github.com/WinSystems/c444-manifest/wiki/BSP-Documentation.

8.2 UBOOT, SDK, and BSP Support

WINSYSTEMS community GitHub provides online documentation regarding UBOOT, Board Support Package (BSP) documentation, and Software Development Kit (SDK) documentation.

BSP documentation includes how to build a Yocto-based Linux image with Opkg Package Manager, and update UBOOT environment variables. A kernel, and SYS-444Q device trees are provided as well. See https://github.com/WinSystems/c444-manifest/wiki/BSP-Documentation.

SDK documentation provides a bundle of tools, libraries, and drivers that are used to support development and deployment of applications on the SYS-444Q. Yocto can build an SDK for the target platform, allowing developers to build and deploy applications, UBOOT, and the kernel remotely. See https://github.com/WinSystems/c444-manifest/wiki/SDK-Documentation.

9. Accessories

WINSYSTEMS accessories and batteries simplify connection to the SYS-444Q. The following table lists available items.

Go to https://www.winsystems.com/ for more information on WINSYSTEMS cables and batteries.

Item	Part Number	Connection	Description
Battery	BAT-LPC-BR2330	J5 - External battery header on page 20	(3V 255 mAH Removable Battery -40°C to +85°C) Hirose DF13C 1.25 mm 2-pin

10. Options

Option 3 Shown Below

(SYS-444Q-3)

Fully Loaded System

10.0.1 Option 1 Parts List (SYS-444Q-1) CANBus Only

Item	Part Number	Description
Hole Plugs	G527-3100-000	WIFI Antenna Hole Plugs
MiniPCIe Card	RS-INO-EMUC-B202-W1	INDUSTRIAL MINIPCIE CARD,DUAL ISO CAN 2.0B

10.0.2 Option 2 Parts List (SYS-444Q-2) WIFI Only

Item	Part Number	Description
Adapter Card for WIFI	ADP-MPCIE-M.2-WL	MINI-PCIE TO M.2 WIRELESS ADP.
WiFi 5 Card	RS-INT-9260-M2AE-2	INTEL WIFI5 AC9260 M.2 2230 A+E-KEY KIT WITH TWO ANTENNAS
I/O Shield (No CANBus Openings)	G555-0602-005A	No part number in ICIM. Need a description.

10.0.3 Option 3 Parts List (SYS-444Q-3) CANBus and WIFI

Item	Part Number	Description
Standoff	G527-030D-401	M2.5 X 0.45 X 6MM HEX,MALE/FEMALE,6MM" LENGTH
Screw	G527-000D-400	ROHS,SCREW,M2.5-.45 X 4,SS,PPH
MiniPCIe Card	RS-INO-EMUC-B202-W1	INDUSTRIAL MINIPCIE CARD,DUAL ISO CAN 2.0B
Adapter Card for WIFI	ADP-MPCIE-M.2-WL	MINI-PCIE TO M.2 WIRELESS ADP.
WiFi 5 Card	RS-INT-9260-M2AE-2	INTEL WIFI5 AC9260 M.2 2230 A+E-KEY KIT WITH TWO ANTENNAS

11. Software Drivers

Go to https://www.winsystems.com/ for information on available software drivers.

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SYS-444Q in a safe, effective manner, that does not damage the board. Read this section carefully.

Power Supply

Avoid electrostatic discharge (ESD)
Only handle the circuit board 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 twice 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 does not regulate properly and can cause damage to the SYS-444Q.

Use proper power connections (voltage)
When verifying the voltage, measure it at the power connector on the SYS-444Q. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

The SYS-444Q requires 9V to 36V to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

The SYS-444Q has a single power connector at J1. A single 9V-36V DC input and ground is required to power the board.

Power Harness

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the SYS-444Q.

Gauge Wire

Use the largest gauge wire that you can. Most connector manufacturers have a maximum gauge wire they recommend for their pins.

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 or Trifurcon designs, which provide three distinct points to maximize the contact area and improve connection integrity in high shock and vibration applications.

Power Down

Make sure that power has been removed from the system before making or breaking any connections.

Power supply OFF—Always turn off the power supply before connecting to the I/O Module. Do not hot-plug the SYS-444Q on a host platform that is already powered.

I/O connections OFF—Turn off all I/O connections before connecting them to the embedded computer modules or any I/O cards. Connecting hot signals can cause damage whether the embedded system is powered or not.

Conformal Coating

Conformal coating by any source other than WINSYSTEMS voids the product warranty and will not be accepted for repair by WINSYSTEMS. If such a product is sent to WINSYSTEMS for repair, it will be returned at customer expense and no service will be performed. A WINSYSTEMS product conformally coated by WINSYSTEMS will be subject to regular WINSYSTEMS warranty terms and conditions.

Operations/Product Manuals

Every Winsystems computer system and single board computer has an Operations manual or Product manual.

Periodic updates—Operations/product manuals are updated often. Periodically check the WINSYSTEMS website (https://www.winsystems.com/) for revisions.

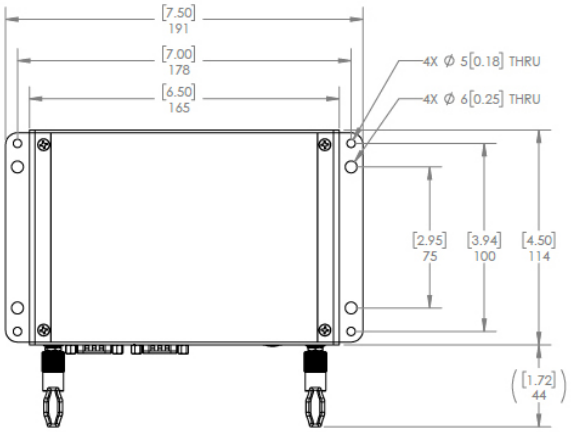
Check pinouts—Always check the pinout and connector locations in the manual before plugging in a cable. Many I/O modules have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

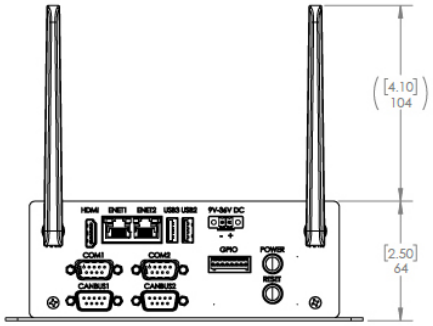
Contact an applications engineer—If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact a WINSYSTEMS applications engineer at +1-817-274-7553.

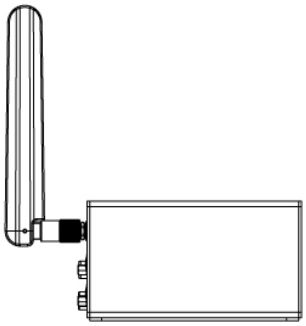
Appendix B. Mechanical Drawings

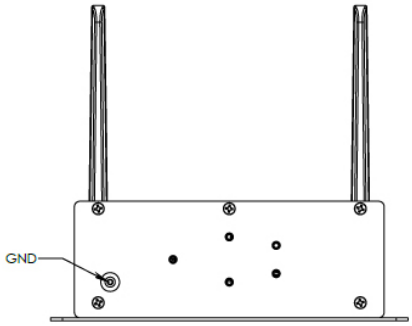
SYS-444Q Mechanical Drawings

Note:









Top measurement numbers are in inches.

Bottom measurement numbers are in millimeters.

Appendix C. Warranty Information

Full warranty information is at https://winsystems.com/company-policies/warranty/.