SYS-405Q-TCA7

Fanless Industrial Enclosed Computer with Intel® Atom® x6425RE Quad-Core Processor in Aluminum Enclosure

Product Manual

Revision History

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Document Version	Last Updated Date	Brief Description of Change
v1.0	09/16/2024	Initial release
v1.1	08/26/2025	Updated conformal coating, warranty and web links information

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Table of Contents

1. System Overview

The WinSystems SYS-405Q-TCA7 is a Single Board Computer (SBC) enclosed in a custom anodized aluminum enclosure. The SYS-405Q-TCA7 is a rugged, industrial system, capable of operating at extended temperatures without requiring a fan or heat-pipe. See "Introduction" on page 7. for details about this manual. For details about the SYS-405Q-TCA7, See "Functionality" on page 7. and page 8.

1.1 External Connectors, Ports, and Inputs

External connectors, ports, and inputs are on the SYS-405Q-TCA7 faceplate. See "The following code example for the watchdog timer is written in Basic:" on page 15. for details. Access the CFAST connector by removing the CFAST cover See "Access the Enclosure" on page 5. for location.

1.2 Access the Enclosure

Use a #2 Phillips head screwdriver to remove the nine screws (#6-32 Flat Head screws) that secure the enclosure top cover to the frame and mounting plate (see the following figure). After all screws are out, lift the cover and set it aside. The CFAST cover uses the same type of screws as

the enclosure top cover. See "Mechanical Drawings" on page 30. for dimensions.
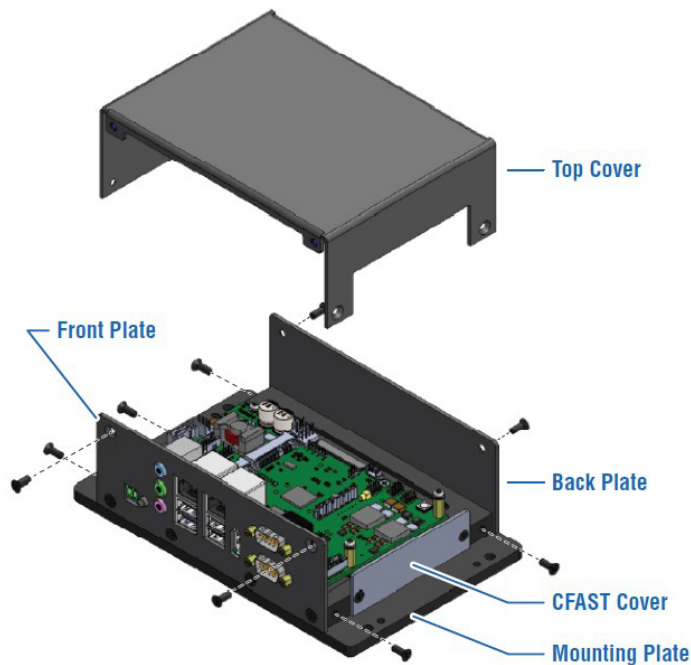
2. Before You Begin

Review the warnings in this section and the best practice recommendations See "Best Practices" on page 27. when using and handling the WINSYSTEMS SYS-405Q-TCA7. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SYS-405Q-TCA7 before proceeding.

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

2.1 Warnings

Only qualified personnel should configure and install the SYS-405Q-TCA7. 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.

3.   Introduction

This manual provides configuration and usage information for the SYS-405Q-TCA7. If you still have questions, contact Technical Support at +1-817-274-7553, Monday through Friday, between 8 AM and 5 PM Central Standard Time (CST).

Refer to the WINSYSTEMS website at https://winsystems.com for other accessories (including cable drawings and pinouts) that can be used with your SYS-405Q-TCA7.

4.   Functionality

The SYS-405Q-TCA7 is a high-performance, industrial, small form factor (SFF) Single Board Computer (SBC) capable of operating at high temperatures without a fan or heat-pipe. The processor for the unit is an Intel® Atom® x6425RE, integrated into the SYS-405Q-TCA7 using a Type 6 COM Express module. The low-profile thermal solution provides a rugged platform base that protects the PCB assembly and offers convenient four-point mounting. Information to configure and operate the SYS-405Q-TCA7 for most applications is included in this User Manual or on our website at https://winsystems.com

NOTE WinSystems can provide custom configurations for Original Equipment Manufacturer (OEM) clients. For details, please contact an Application Engineer through Technical Support (see contact information in the page 7).

5.   Product Features and Specifications

5.1   Features

This section describes the features that are included with the SYS-405Q-TCA7.

Processor

	SYS-405Q-TCA7
Processor	Intel Atom x6425RE
Core Speed	1.90 GHz
Number of Cores	4
L2 Cache	1.5 MB

Operating Systems (compatibility)

- Microsoft Windows
- Linux
- DOS

BSP

- UBOOT

Memory

- DDR4 3200MHz RAM (16GB or 32GB)

BIOS

- American Megatrends International

Video Interfaces

- 1x DisplayPort (4K UltraHD Video)

Ethernet

- 2x Gigabit Ethernet ports (Front Panel I/O)

Storage (Bootable)

- CFast Up to 32GB
- mSATA Up to 2TB

Serial Interface

- 1x USB 3.0 (Front Panel I/O)
- 3x USB 2.0 (Front Panel I/O)
- 2x RS-232/422/485 Serial ports

Expansion

- Mini PCIe 1x Full-size Mini PCIe

NOTE Expansion is internal configuration option only.

Audio

The SYS-405Q-TCA7 Intel® Atom® x6425RE processor uses the Realtek ALC888S-VD codec controller that provides both Digital and Analog channels. The controller has three jack detection pins and a built-in beep generator. The SYS-405Q-TCA7 supports the following audio interfaces: one digital (Display Port 1.1), two analog (Stereo Audio, Line-In/Line-Out/ Microphone).

- HD Audio supported
- Interfaces: Display Port 1.1, Line Out, Line In, Mic to 3.5 mm

Power

- Power Mode: AT, ATX
- Power Supply Voltage: Wide Range 10 - 50 VDC
- Power Connector: Phoenix Contact Terminal Block Header

Additional Features

- Watchdog timer from 1 second to 255 minutes (15,300 seconds) reset

TPM Hardware Security

- Trusted Platform Module (TPM) 2.0 Enabled

Temperature

- Operating temperature: Fanless -40 °C to +85 °C (-40 °F to +185 °F); SYS-405Q-TCA7 requires a minimum airflow of 200 LFPM above 80 °C (176 °F) if input voltage (VCC) is above 24 V DC.
- Storage temperature: -40C to +85C

Construction

- Rugged Aluminum Alloy with protective coating

Mounting Options

-

6. Specifications

The SYS-405Q-TCA7 system adheres to the following specifications and requirements.

SYS-405Q-TCA7 Specifications

Electrical	
V_{CC}	10 to 50 VDC ±5%, 15 Watts (maximum)
MTBF	14.5 Years
Battery: CR-2032	Chemical System: Li/MnO$_2$ Nominal Voltage: 3 V Rated Capacity: 225 mAh
Mechanical	
Mechanical Enclosure Dimensions	8 x 5 x 2.5 inches (203 mm x 127 mm x 63 mm)
Weight	2.65 lbs (1.20 kg)
Environmental	
Temperature	-40 °C to +85 °C (-40 °F to +185 °F)

Humidity (RH)	10% to 95% non-condensing
Mechanical Shock Testing	MIL-STD-202G, Method 213B, Condition A 50g half-sine, 11 ms duration per axis, 3 axis
Random Vibration Testing	MIL-STD-202G, Method 214A, Condition D .1g/Hz (11.95g rms), 20 minutes per axis, 3 axis
Certification	RoHS Compliant
Operating Systems	

- Microsoft Windows
- Linux
- DOS

7. Setup

Use the information in Section 7 to help locate and identify the connectors outlined in the following steps.

7.1 Power up

Plug in a compatible +10 to +50 VDC power source at J5. The first time power is applied, the SYS-405Q-TCA7 will boot automatically, bypassing the power button (SW1). After initial startup, briefly press the power button to turn the SYS-405Q-TCA7 on and off.

8. Configuration

This section describes the SYS-405Q-TCA7 components and configuration.

8.1   Component Layout

8.1.1   Edge Connections
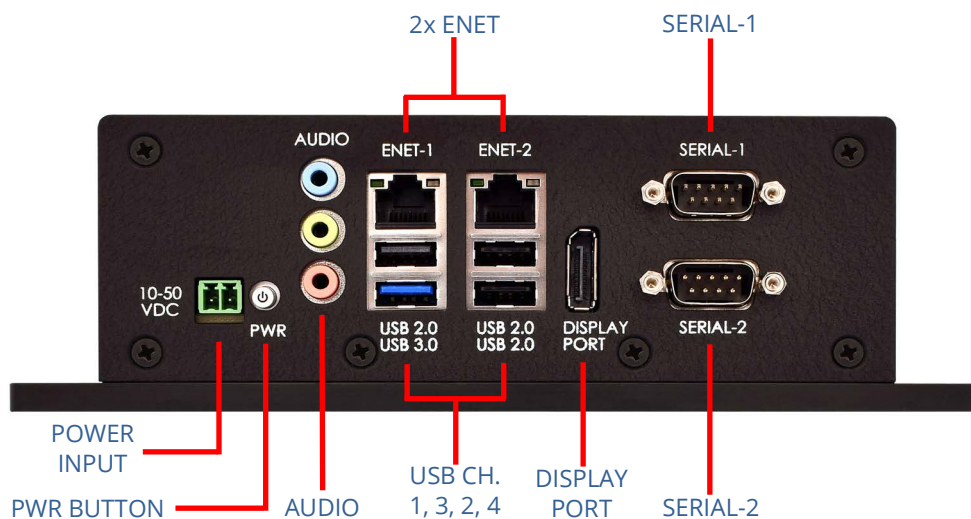
Edge Connections:

Connection	Reference
Power Input	page 17
Power Button	page 25
Audio: Line-In, Line-Out, and Mic In	page 18
Ethernet (Top Half of Connectors)	page 21
USB Channels 1 and 3 and Channels 2 and 4	page 22
Display Port 1.1	page 23
COM 1 and COM 2	page 23

8.2   Power

The SYS-405Q-TCA7 draws power through the J5 connector See "Power Input" on page 17. The main supply to the board is +10-50 V DC.

8.3   Watchdog Timer

The SYS-405Q-TCA7 features an advanced watchdog timer (WDT) that can be used to guard against software lockups. The timer is programmable from 1 second to 255 minutes.

NOTE Use a long timeout if the watchdog is enabled when trying to boot any operating system.

The watchdog can be enabled, disabled, or reset by writing the appropriate values to the configuration registers. The WDT is part of the embedded controller, which uses the following command sequence:

CMD Register:	0x66
Read Command	0x80
Write Command	0x81
Sync Command:	0x82
DATA Register:	0x62

The watchdog timer initialization requires that the CMD register be cleared and then configured to write the command, and then the data written. Example code for C and Basic are provided following the tables.

Watchdog Timer Control Register	
Offset Address: 0x06, Attribute: R/W, Size: 8 bit	
Bit	Description
7	Reserved
6	WDT event reset Software writes a 1 to this bit to clear the WDT event.
5:4	Watchdog Timer Output Modes. 00: Generating an internal reset and WDT pin is driven high until the unit resets. 01: Driving WDT pin high until cleared by software.
3:2	Reserved
1	Select WDT count mode. 0: Second Mode. 1: Minute Mode.
0	Disable / Enable the WDT function. 0: Disable 1: Enable

Watchdog Timer Control Register for Minutes	
Offset Address: 0x07, Attribute: R/W, Size: 8 bit	
Bit	Description
7:0	Timer Counter Register (Minutes) Watchdog timer time-out value in minutes (Default value = 0x00)

Watchdog Timer Control Register for Seconds	
Offset Address: 0x08, Attribute: R/W, Size: 8 bit	
Bit	Description
7:0	Timer Counter Register (Seconds) Watchdog timer time-out value in minutes (Default value = 0x00)

8.3.1 Example code (C WDT)

The following code example for the watchdog timer is written in C:

```
Offset = [Register]
Value = [Data]

VOID  Write_EC_SRAM(UINT8 Offset,UINT8 Value){
        UINT8  tmp,count;
        count=100;
        do{
                IoWrite8(0x66,0x82);
                pBS->Stall(1000); //uint=1us
                tmp=IoRead8(0x62);
                count--;
        }while (((tmp&0x10)==0) & (count>0));

        IoWrite8(0x66,0x81);
        Delay1MS(1);
        IoWrite8(0x62,Offset);
        Delay1MS(1);
        IoWrite8(0x62,Value);
}

int  Read_EC_SRAM(UINT8 Offset){
        UINT8  tmp,count;
        count=100;
        do{
                IoWrite8(0x66,0x82);
                pBS->Stall(1000); //uint=1us
                tmp=IoRead8(0x62);
                count--;
        }while (((tmp&0x10)==0) & (count>0));

        IoWrite8(0x66,0x80);
        Delay1MS(1);
        IoWrite8(0x62,Offset);
        Delay1MS(1);
        IoRead8(0x62,Value);
        return Value;
}
```

8.3.2 Example Code: Basic

The following code example for the watchdog timer is written in Basic:

```
3 PRINT TIME$;" ";DATE$
4 O=VAL(RIGHT$(TIME$,2))
5 C=&H66:D=&H62:W=&H81:R=&H80:TRON
6 P=INP(C): IF (P=0) THEN GOTO 10 ELSE IF (P=1) THEN PRINT INP(D) ELSE
IF (P=8) THEN  OUT D,6: GOTO 200
7 GOTO 6
9 REM write reg 08 with 05
10 TROFF
11 IF (INP(C)=0) THEN OUT C,W ELSE GOTO 11
20 IF (INP(C)=8) THEN OUT D,8 ELSE GOTO 20
30 IF (INP(C)=0) THEN OUT D,O ELSE GOTO 30
39 REM enable dog
40 IF (INP(C)=0) THEN OUT C,W ELSE GOTO 40
50 IF (INP(C)=8) THEN OUT D,6 ELSE GOTO 50
60 IF (INP(C)=0) THEN OUT D,1 ELSE GOTO 60
69 REM read counter
70 IF (INP(C)=0) THEN OUT C,R ELSE GOTO 70
80 IF (INP(C)=8) THEN OUT D,8 ELSE GOTO 80
90 IF (INP(C)=1) THEN T=INP(D) ELSE GOTO 90
100 IF (T<>T2) THEN PRINT T;: T2=T
110 FOR X=1 TO 10000: NEXT: GOTO 70
200 IF (INP(C)=1) THEN PRINT INP(D);"*" ELSE GOTO 200
210 GOTO 10
```

8.4   Connectors

8.4.1   System Management (J4)

NOTE   Systen Management is internal configuration option only.

System management functions and events use J4 for connectivity from the SBC and CPU to the rest of the system. This enables the SBC and System to properly notify and respond to Power, Sleep/Wake, Thermal, and Security events.

The SPI and I2C interfaces on this connector can also be used for additional system connectivity such as enclosure management, SMBus, or PMBus connectivity.

Pin 2 (LID#) indicates whether the system is on/off or opened/closed, and can be used for an intruder alert. If this bit is set, you can wire it to your system to initiate a system shutdown.

Optionally, you can use J4 to initiate sleep mode via Pin 3.

Pin 4 indicates thermal trip status. You can be notified of a thermal trip, and action (such as a system shutdown) is taken in response to the system overheating. More information regarding thermal protection signaling is provided in the table below.

Thermal Protection	Pin	Power Rail	Description
THRM#	6	3.3 V / 3.3 V	Input from off-Module temp sensor indicating an overtemp situation.
THRMTRIP#	4	3.3 V / 3.3 V	Active low output indicating that the CPU has entered thermal shutdown.

Layout and Pin Reference:

Pin	Name	Pin	Name
1	PWRBTN	2	LID#
3	SLEEP	4	THRMTRIP#
5	I^2C_CLK	6	THRM#
7	I^2C_DAT	8	WAKE
9	SYS_RESET	10	NC
11	SPI_PWR	12	VCC_5V
13	SPI_MISO	14	VCC_3.3V
15	SPI_CLK	16	GND
17	SPI_MOSI	18	GND
19	SPI_CS5	20	GND

8.4.2 Power Input

The SYS-405Q-TCA7 is capable of operating from +10 to +50 VDC (+/-5%). The green powerinput connector (J5) is located next to the power button on the edge of the board.

STOP

Warning
Do not reverse the positive and negative terminals when you connect power to theunit. This will void the warranty and damage the board.

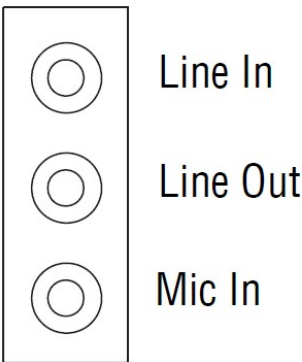| Power Connector (J5)	Power Button (SW1)

Additional Information

This connection is a Phoenix 1803277.

8.4.3 Audio: Line-In, Line-Out, and Mic In

The SYS-405Q-TCA7 uses 3.5 mm stereo line-in, line-out, and microphone jacks at J6.

Line In

Line Out

Mic In

8.4.4 External Battery Connector (J7) (Optional)

NOTE External Battery Connector is internal configuration option only.
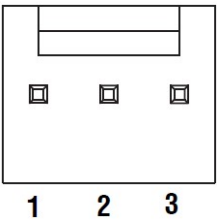
An external battery connected to the SYS-405Q-TCA7 board provides standby power for the real-time clock, CMOS, and optional GPS.

Extended temperature lithium batteries are available from WinSystems, part numbers:

- BAT-LTC-E-36-16-1
- BAT-LTC-E-36-27-1

The on-board battery is the default configuration on this product. The external battery is optional.

Layout and Pin Reference:

Connector	Pin	Name
1 2 3	1	GND
	2	VBAT
	3	GND

Additional Information

This connection is a Molex 22-11-2032.

8.4.5 MiniPCIe (J8)

NOTE MiniPCIe is internal configuration option only.

The SYS-405Q-TCA7 includes a MiniPCIe socket at J8.

Layout and Pin Reference:

Pin	Name	Pin	Name
1	WAKE#	2	3.3Vaux
3	NC	4	GND
5	NC	6	1.5V
7	CLKREQ#	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
Mechanical Key			
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	NC	46	LED_WPAN#
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3Vaux
NC = Not Connected			

8.4.6 MiniPCIe with SATA Support (J9)

NOTE MiniPCIe with SATA Support is internal configuration option only.

The SYS-405Q-TCA7 includes a MiniPCIe socket at J9. The socket automatically detects mSATA, providing a bootable media and storage interface.

Layout and Pin Reference:
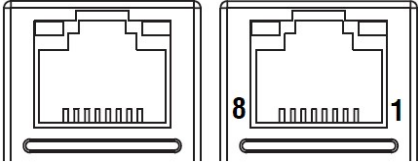

Pin	Name	Pin	Name
1	WAKE#	2	3.3Vaux
3	NC	4	GND
5	NC	6	1.5V
7	CLKREQ#	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
Mechanical Key			
17	NC	18	GND
19	NC	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	NC
37	GND	38	NC
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	NC	46	LED_WPAN#
47	NC	48	+1.5V
49	NC	50	GND
51	mSATA_DET	52	+3.3Vaux
NC = Not Connected			

8.4.7 Ethernet (Top Half of Connectors)

Two Intel I210 Gigabit Ethernet controllers provide standard IEEE 1588 and 802.1AS protocol timestamping. Each Ethernet interface includes 10/100/1000 MP/s multispeed, full, and half-duplex operation.

The pinout below describes both of the standard RJ45 Ethernet connectors.

Layout and Pin Reference:

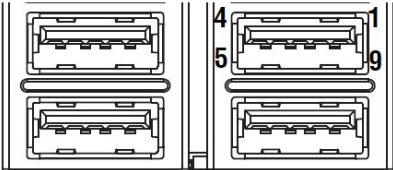| Pin	Function	Description
1	TX_D1+	Transceive Data+
2	TX_D1-	Transceive Data-
3	RX_D2+	Receive Data+
4	BI_D3+	Bi-Directional Data+
5	BI_D3-	Bi-Directional Data-
6	RX_D2-	Receive Data-
7	BI_D4+	Bi-Directional Data+
8	BI_D4-	Bi-Directional Data-

On-board Ethernet activity LEDs are built into the connectors.
There is one green LED (left) and one bi-color green/yellow LED (right).

LED	Activity	Ethernet Status
Left	Off	No Link
	Flashing (green)	Linked
Right	Off	No Link
	Off	Linked at 10 MB
	On (yellow)	Linked at 100 MB
	On (green)	Linked at 1 GB

8.4.8   USB Channels 1 and 3 and Channels 2 and 4

CH1 port provides USB 2.0 on the top left and **CH3** port provides USB 3.0 on bottom left. Both **CH2** and **CH4** ports provides USB 2.0.
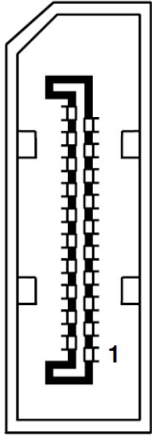
Pin Reference:

Pin	USB 3.0	USB 2.0
1	USBVCC	
2	D-	
3	D+	
4	GND	
5	RX-	
6	RX+	
7	GND	Not Present
8	TX-	
9	TX+	

8.4.9 Display Port 1.1

The Display Port 1.1 connector supplies both video and high definition (HD) audio. See the (XREF: Audio) section for more information.
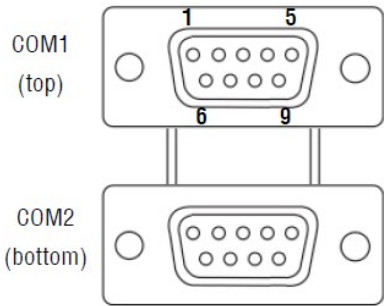
Layout and Pin Reference:

Connector	Pin	Name	Description	Pin	Name	Description
	1	ML_Lane 0 (p)	Lane 0 (positive)	2	GND	Ground
	3	ML_Lane 0 (n)	Lane 0 (negative)	4	ML_Lane 1 (p)	Lane 1 (positive)
	5	GND	Ground	6	ML_Lane 1 (n)	Lane 1 (negative)
	7	ML_Lane 2 (p)	Lane 2 (positive)	8	GND	Ground
	9	ML_Lane 2 (p)	Lane 2 (negative)	10	ML_Lane 3 (p)	Lane 3 (positive)
	11	GND	Ground	12	ML_Lane 3 (n)	Lane 3 (negative)
	13	CONFIG1	CONFIG1	14	CONFIG2	CONFIG2
	15	AUX_CH (p)	Auxiliary Channel (positive)	16	GND	Ground
	17	AUX_CH (n)	Auxiliary Channel (negative)	18	Hot Plug	Hot Plug Detect
	19	RETURN	Return for Power	20	DP_PWR	Power for connector (3.3 V 500 mA)

8.4.10 COM 1 and COM 2

The SYS-405Q-TCA7 is equipped with two on-board serial ports (RS-232/422/485) at J19. Both serial channels use the advanced EXAR SP339E multiprotocol transceiver. Both ports are configured in the BIOS and include options for 120-ohm receiver termination, slew rate, and protocol.
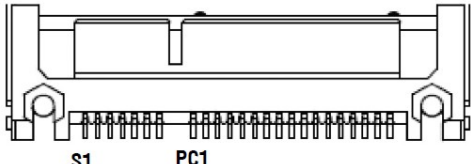
Layout and Pin Reference:

Connector	Pin	RS-232	RS-422	RS-485
	1	DCD	N/A	N/A
	2	RX	TX+	TX/RX+
	3	TX	RX+	N/A
	4	DTR	N/A	N/A
	5	GND	GND	GND
	6	DSR	TX-	TX/RX-
	7	RTS	RX-	N/A
	8	CTR	N/A	N/A
	9	RI	N/A	N/A

8.4.11 CFAST (SATA SSD) (J103)

NOTE CFAST is internal configuration option only.

The SYS-405Q-TCA7 supports CFAST storage at J103 located on the back of the board. CFAST is a small form factor SATA SSD. Access the CFAST connector by removing the CFAST cover (see "Access the Enclosure" on page 1 for location).

Layout and Pin Reference:

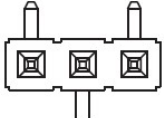| Pin	CFAST	Description	Pin	CFAST	Description
S1	SGND	Signal Ground	PC5	NC	No Connect
S2	A+	SATA Pair A	PC6	NC	No Connect
S3	A-		PC7	GND	Ground
S4	SGND	Signal Ground	PC8	LED1	LED Output
S5	B-	SATA Pair B	PC9	LED2	LED Output
S6	B+		PC10	IO1	Reserved
S7	SGND	Signal Ground	PC11	IO2	Reserved
Key			PC12	IO3	Reserved
Key			PC13	3.3 V	Power
PC1	CDI	Card Detect In	PC14	3.3 V	Power
PC2	GND	Ground	PC15	GND	Ground
PC3	NC	No Connect	PC16	GND	Ground
PC4	NC	No Connect	PC17	GND	Card Detect Out

8.4.12 Basic Input/Output System (BIOS) Programming Defaults (JP9)

NOTE This option requires removal of the enclosure cover.

If you have saved EEPROM values that prevent you from accessing BIOS menus, the board can be reset to factory defaults as follows:

1. Turn the system off.

2. Install a jumper on **JP9** pins 2-3.

3. Turn the system on and enter the BIOS Main Menu by pressing the **F2** key. Factory defaults will be loaded at this point.

4. Remove the jumper from **JP9**.

5. Select **Exit Saving Changes** from the **Exit Menu**.

Jumper Pin Reference:

| Connector	Jumper	Description
1 2 3	1-2	Normal operation
	2-3	Reset EEPROM to factory default values
	open	Normal operation (alternate)

8.5 Switches

8.5.1 Power Button

The Power Button (SW1), located on the front I/O panel next to the power connector(J5). It controls power to the SYS-405Q-TCA7. The first time you connect power to J5, the power button is bypassed and the board powers up automatically.

After the initial power up, press SW1 briefly to power the unit on or off, depending on the present state.

If the unit accidentally locks up and is unresponsive, press and hold SW1 for four (4) seconds to perform a hard restart.

Power Button (SW1)
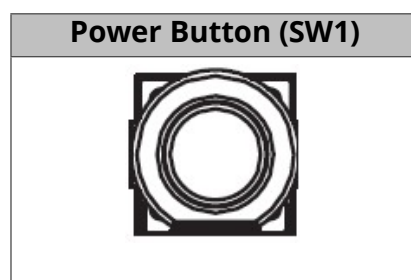
9. Cables and Software Drivers

Go to https://winsystems.com for cable information and software drivers.

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SYS-405Q-TCA7 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-405Q-TCA7.

> **Use proper power connections (voltage)**
> When verifying the voltage, measure it at the power connector on the SYS-405Q-TCA7. Measuring it at the power supply does not account for voltage drop through the wire and connectors.
>
> The SYS-405Q-TCA7 requires 10 - 50 VDC to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.
>
> The SYS-405Q-TCA7 has a single power connector at J5.

Power Harness

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the SYS-405Q-TCA7.

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-405Q-TCA7 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

Figure B–1: SYS-405Q-TCA7 Dimensions
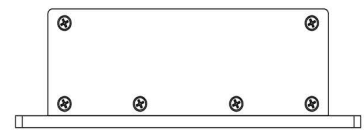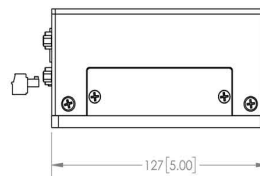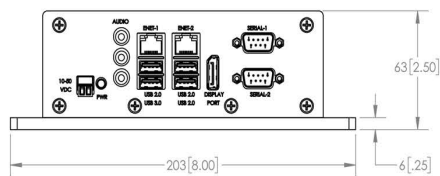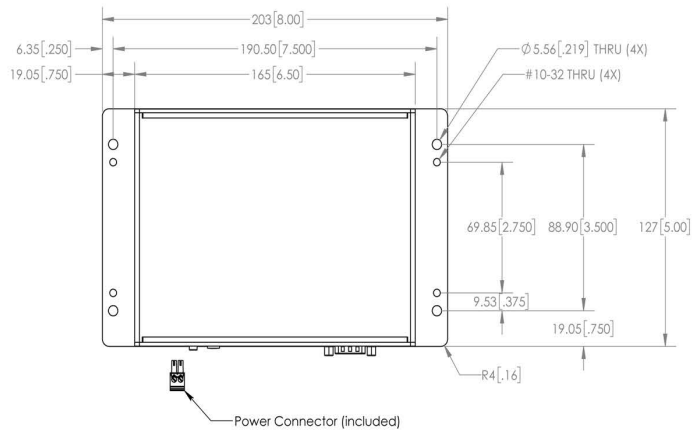
Dimensions are in millimeters (inches).

Appendix C. Warranty Information

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