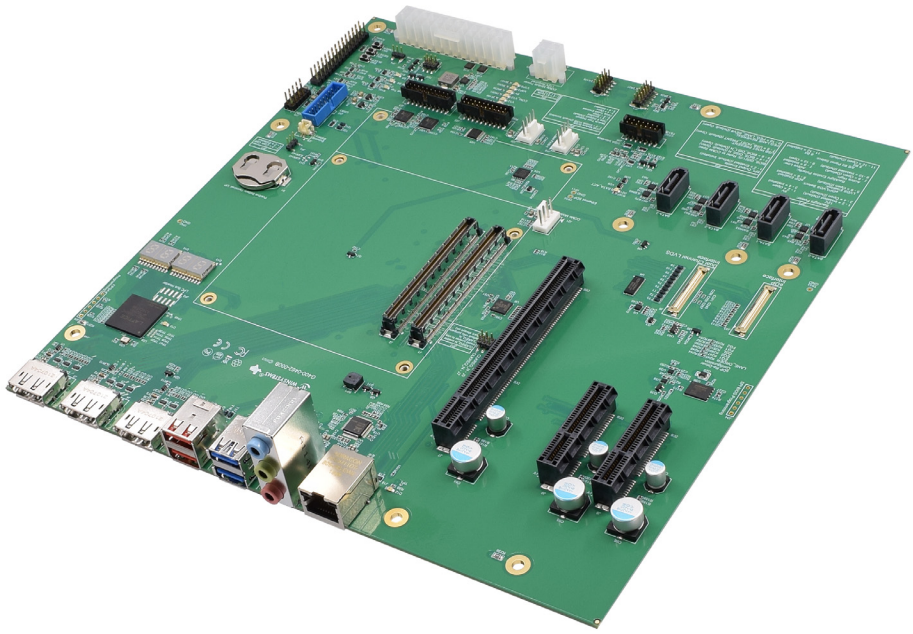
WINSYSTEMS®

ATX-M-CC462-T6

Industrial Micro-ATX Carrier for COM Express Type 6 Modules

Product Manual



WINSYSTEMS, Inc. | 2890 112th Street, Grand Prairie, Texas 75050 | 817-274-7553 | info@winsystems.com | www.winsystems.com

Revision History

Document Version	Last Updated Date	Brief Description of Change
V1.0	5/12/2023	Initial release

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1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 33) when using and handling the WINSYSTEMS ATX-M-CC462-T6 board. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the ATX-M-CC462-T6 before proceeding.

FAILING TO COMPLY WITH THESE BEST PRACTICES MAY DAMAGE THE ATX-M-CC462-T6 AND VOID YOUR WARRANTY.

1.1 Warnings

Only qualified personnel should configure and install the ATX-M-CC462-T6. 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 ATX-M-CC462-T6. 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/product/atx-m-cc462-t6/ for other accessories (including cable drawings and pinouts) that can be used with your ATX-M-CC462-T6.

3. Functionality

The ATX-M-CC462-T6 is an industrial Micro-ATX small form factor Type 6 reference carrier board designed to fully support WINSYSTEMS' COMeT6-1100 COM Express Type 6 Compact modules as well as third-party Type 6 Compact and Basic form factor modules. The carrier board adheres to the PICMG COM Express specifications providing compatibility with other COM Express Type 6 modules.

4. Features

The ATX-M-CC462-T6 provides the following features.

Carrier reference board

Compatibility for:

- COM Express Type 6 compact module
- COM Express Type 6 basic module
- 3x DisplayPort
- 1x VGA (header) (COM option)
- 1x eDP (population option on the COMET10-1100)
- 1x LVDS (population option on the COMET10-1100)

NOTE Supports four simultaneous displays.

The eDP and LVDS interfaces cannot be used at the same time. The COMET6-1100 or equivalent Type 6 COM module dictates which interface is available.

Ethernet

- 1x 2.5G from COM Express module on RJ45

Storage

- 4x SATA III (6 Gb/s) connector

Bus expansion

- 1x PCIe x16 connector
- 2x PCIe x4 connector

On-board I/O

Supported from Type 6 Module	Provided by ATX-M-CC462-T6
2x TTL serial ports	• 2x RS232 serial ports (3-wire) provided by onboard RS232 transceivers
LPC bus	• 2x RS232/422/485 serial ports (4-wire) provided by multi-protocol transceivers
4x USB 2.0 and 4x 3.2 Gen 1 ports	• 2x USB 3.2 Gen 1 ports (front panel I/O) • 2x USB 3.2 Gen 1 ports (header) • 2x USB 2.0 ports (front panel I/O) • 2x USB 2.0 ports (header)
GPIO signals	• 4x general purpose input (GPI) • 4x general purpose output (GPO)
HD audio signals	• Onboard HDA codec providing line out, line in, mic (front panel I/O)
Speaker output	• Onboard speaker output for beep tones

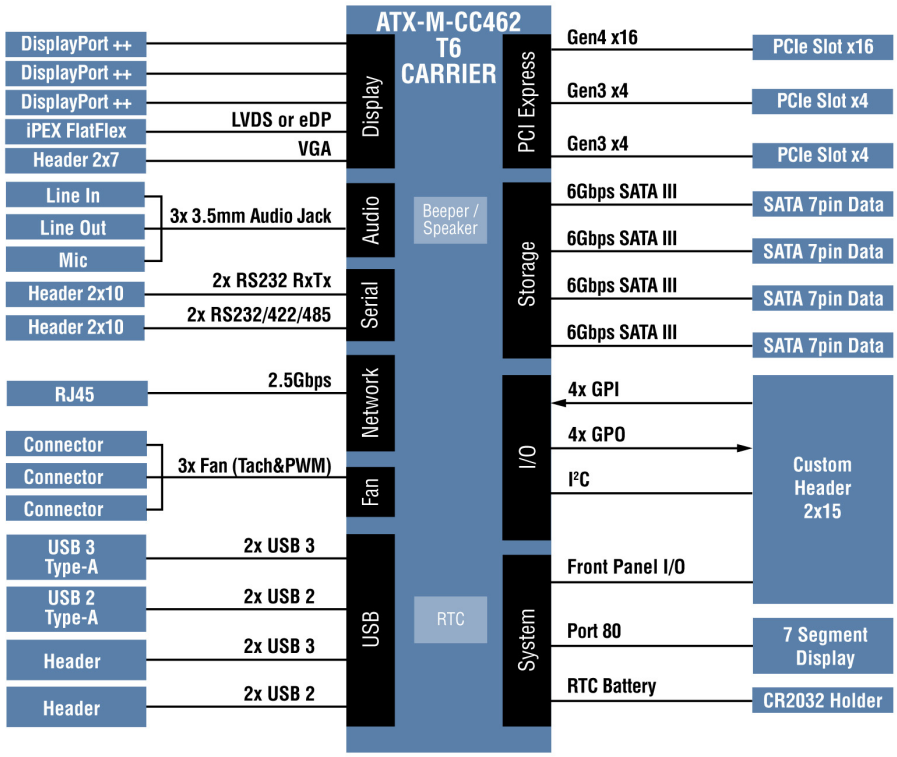
Power

- Supports input power: Standard ATX 24-pin and 4-pin 12v power connector (both required)
- RTC battery coin cell holder on board, plus additional connector for external battery.

Industrial operating temperature

- Carrier board: -40 to +85°C (-40 to +185°F)

4.1 System Block Diagram



This full-featured carrier board supports four independent video displays (three DisplayPort++ plus one of either VGA, LVDS, or eDP), 2.5 Gigabit Ethernet, four USB 3.2 Gen 1 ports, four USB 2.0 ports, four general-purpose inputs, four general-purpose outputs, stereo audio, and a watchdog timer.

The board also includes expansion capabilities via one PCIe x16 and two PCIe x4 connectors.

The ATX-M-CC462-T6 is a fully production ready platform and is a versatile and easily configured solution with customizable COM module, storage, and I/O options to suit the industrial use case. With design details available, the ATX-M-CC462-T6 is also an excellent reference design and evaluation carrier board for WINSYSTEMS Type 6 COM Express modules.

5. Specifications

The ATX-M-CC462-T6 adheres to the following specifications and requirements.

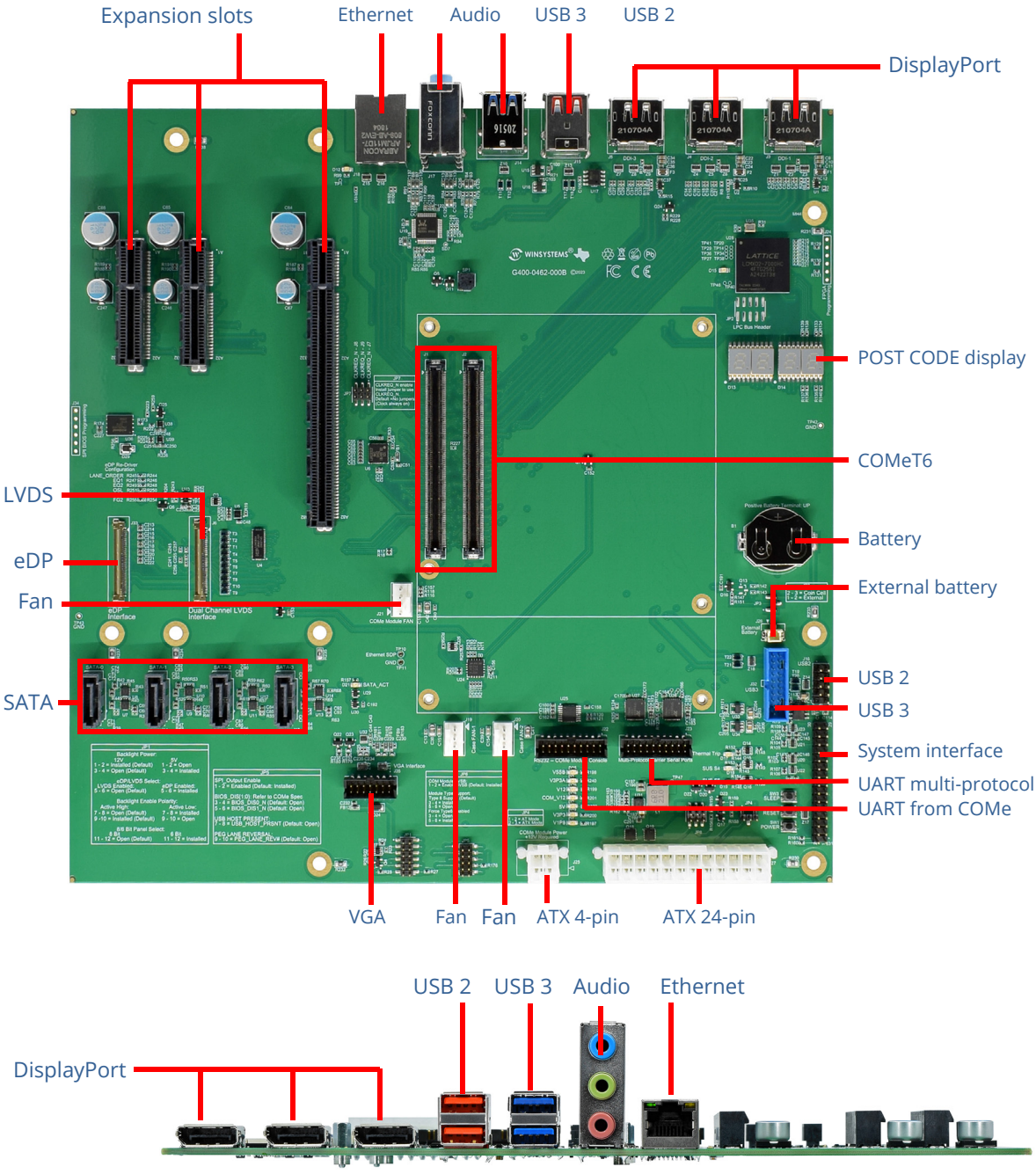
Feature	Specification
Electrical	
Power input	24 pin and 4 pin ATX 2.x power supply connections
Models	**ATX-M-CC462-T6**
Mechanical	
Dimensions	9.6 x 9.6 in. (243.84 x 243.84 mm) (Mini-ITX)
Weight	14.4 oz. (408.23 g), without COMe module
PCB thickness	0.078 in. (2 mm)
Environmental	
Temperature	-40 to +85°C (-40 to +185°F)
RoHS compliant	Yes

6. Configuration

This section describes the ATX-M-CC462-T6 components and configuration.

6.1 Component Layout

6.1.1 Top View



Item	Description	Reference
Electrical		
SW1	Power button	page 14
SW2	System reset button	page 14
SW3	Sleep button	page 15
B1	Internal coin cell battery	page 15
J19	Case Fan-1 connector	page 15
J20	Case Fan-2 connector	page 15
J21	COMe module fan connector	page 15
J25	COMe module power +12V required	page 16
J26	External battery connector	page 16
J27	ATX power connector 24-pin	page 17
Storage		
J10, J11, J12, J13	SATA-0, 1, 2, 3 connectors	page 17
Video and Audio		
J3, J4, J5	DisplayPort connectors	page 17
J6	Dual channel LVDS interface	page 18
J17	Audio I/O	page 18
J33	eDP interface	page 19
J35	VGA connector	page 20
SP1	Speaker	page 20
System I/O		
J1	COM Express AB connector Type 6 Rev. 3.0	page 21
J2	COM Express CD connector Type 6	page 23
J7	PCIE Gen4 x16 connector	page 25
J8, J9	PCIE Gen4 x4 connectors	page 27
J14	USB0/USB1 3.2 Gen1 2x front panel	page 27
J15	USB4/USB5 2.0 2x front panel	page 28
J16	USB6/USB7 2.0 2x header	page 28
J18	Ethernet 2.5 Gbps from COMe	page 28
J22	RS232 COMe module console	page 28
J23	Multi-protocol carrier serial ports	page 29
J31	Feature connector	page 29
J32	USB2/USB3 3.2 Gen1 2x header	page 31
Configuration Jumpers		
JP1	Back light power	page 12
JP3	External battery connector jumper	page 12
JP4	Power mode: AT/ATX	page 13
JP5	SPI select jumper	page 13
JP6	COM module support selection	page 13
JP7	Clock	page 13

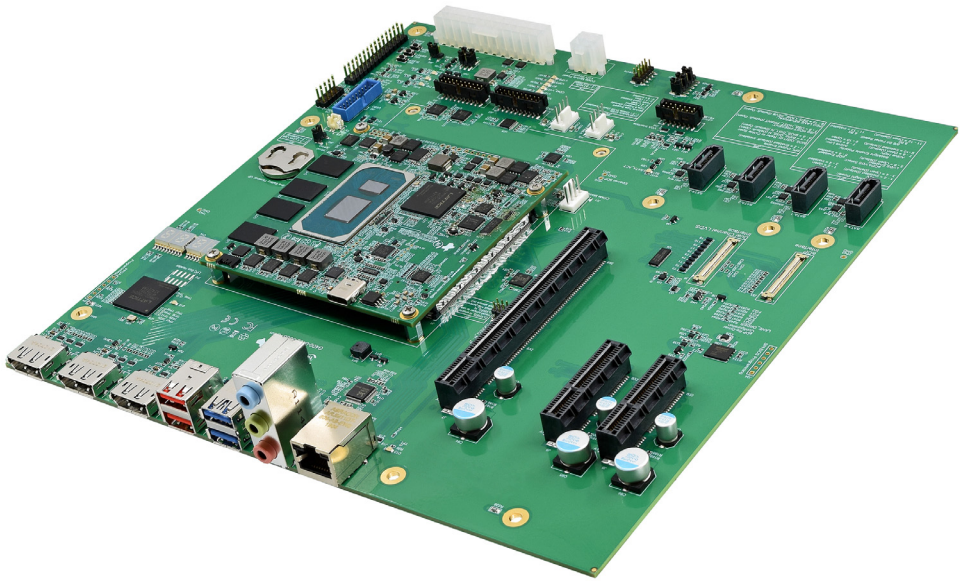
6.2 Configuration and Installation

When installing a Type 6 COM module onto a compatible COM Express Type 6 carrier board, follow the instructions below to ensure that there is no damage to the COM module or the carrier board.

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.

1. Align the COM module standoffs with the mounting holes on the carrier board.
2. Ensure that the COM Express Type 6 connector is firmly seated in the COMe connector socket on the carrier board.

NOTE To minimize board flex on the carrier board, make sure the carrier board is supported on the opposite side prior to applying pressure to the COM module.



6.3 Jumpers

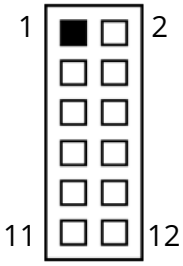
6.3.1 JP1 - Backlight Power

Do NOT install jumpers 1 - 2 and 3 - 4 at the same time.

Do NOT install jumpers 7 - 8 and 9 - 10 at the same time.

NOTE

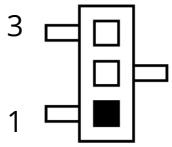
Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	12V installed (default)
		5V open
	3 - 4	12V installed (default)
		5V open
	5 - 6	eDP enabled installed (default)
		LVDS enabled open
	7 - 8	Open (default)
		Backlight active high
	9 - 10	Installed (default)
		Backlight active low
	11 - 12	S8/6 bit panel select: 8 bit open (default)/6 bit installed

6.3.2 JP3 - External/Internal Battery Connector

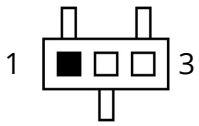
Select external battery connection or internal button cell battery for standby power for the real-time clock.

Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	External battery
	2 - 3 (default)	Internal coin cell

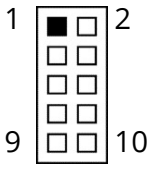
6.3.3 JP4 - Power Mode Jumper

Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	AT mode
	2 - 3 (default)	ATX mode

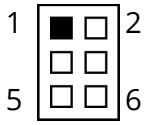
6.3.4 JP5 - Carrier Configuration

Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	SPI_Enabled (default: open)
	3 - 4	BIOS_DIS0_N (default: open)
	5 - 6	BIOS_DIS1_N (default: open)
	7 - 8	USB_HOST_PRSNT: (default: open)
	9 -10	PEG LANE REVERSAL: (default: open)

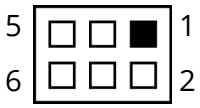
6.3.5 JP6 - COM Module Configuration

Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	Enabled 5VSB (default: installed)
	3 - 4	Type 6 support (default: installed)
		Force type 6 open
	5 - 6	Type 6 support open
		Force type 6 installed

6.3.6 JP7 - Clock Jumpers

Layout and Pin Reference

Diagram	Pin	Selection
	1 - 2	Connects PCI Express CLKREQ pins to the corresponding expansion connectors. Installed: CLKREQ connector to slot. Open: CLKREQ disconnected from slot.
	3 - 4	CLKREQ-J9
	5 - 6	CLKREQ-J8

6.4 LED Indicators

LED	Description	Color
D2	5V (carrier)	Green
D3	3.3V standby (carrier)	Green
D4	1.8V (carrier)	Green
D12	Link_1000 indicator	Green
D15	Carrier FPGA	Green
D17	Thermal trip indicator	Red
D18	SLP_S4 indicator	Yellow
D19	SLP_S5 indicator	Yellow
D25	5V standby (COMe nodule)	Green
D26	12V (carrier)	Green
D27	3.3V (carrier)	Green
D28	12V (COMe nodule)	Green

6.5 Connectors

NOTE SW1, SW2, and SW3 run in parallel with the feature connector pins on **J31**. (page 29) All switch functions are based on the BIOS settings on the COM module.

6.5.1 SW1 - Power Button

The ATX-M-CC462-T6 turns on automatically when power is applied to the computer and does not require the power button to be pressed.

The power button can be used to wake the computer after shutdown, sleep, or system standby if power is not removed.

This power button also functions with operating system power options, such as safely shutting down the computer or putting the computer to sleep.

Holding the power button for roughly 5 seconds performs a hard reset to the computer.

Below are switch positions for different program and boot modes.

6.5.2 SW2 - System Reset Button

The system reset button (SW2) instantly performs a hard reset to the computer.

To avoid potential operating system corruption, use the reset button only when the computer cannot safely shut down or restart due to a software crash or hardware fault. If the reset button operation is desired, an OS write protect filter is highly recommended.

6.5.3 SW3 - Sleep Button

The sleep button places the system to sleep. This power function is configurable in your operating system.

6.5.4 B1 - Internal Coin Cell Battery

The ATX-M-CC462-T6 accepts an external battery at **J26** or an internal coin cell battery at **B1**. Battery input is configured using jumper **JP3**. See "JP3 - External/Internal Battery Connector" on page 12.

B1 Battery type

CR2032 coin cell battery

6.5.5 J19, J20, J21- Case Fan-1, 2, and COMe Module Fan Power Output

Layout and Pin Reference

Diagram	Pin	Selection
 1	1	GND
	2	12 VCC
	3	TACH
	4	PWM

NOTE This is a standard 12V power connector from an ATX power supply.

Connector

- Molex KK 254 vertical header, with friction lock, 4 circuits

  Part number: 470531000

Matching Connector

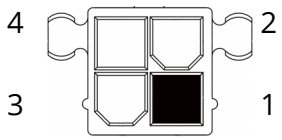
- KK 254 housing with polarization rib, 4 pin

  Part number: 470541000

6.5.6 J25 - COMe Module Power +12V Required

+12 volts required.

Layout and Pin Reference

Diagram	Pin	Selection
	1	Ground (GND)
	2	Ground (GND)
	3	Voltage in (+V12)
	4	Voltage in (+V12)

NOTE This is a standard 12V power connector from an ATX power supply.

Connector

- Molex Mini-Fit Jr. vertical header, 4.20 mm pitch

  Part number: 39299042

Matching Connector

- Molex Mini-Fit Jr. receptacle housing

  Part number: 39012040

6.5.7 J26 - External Battery Connector

An external battery connected to the ATX-M-CC462-T6 provides standby power for the real-time clock. An extended temperature lithium battery is available from WINSYSTEMS, part number BAT-LPC-BR2330.

NOTE Do not use **J26** and **B1** at the same time.

Layout and Pin Reference

Diagram	Pin	Selection
	1	VBAT
	2	GND

Connector

- Hirose DF13 series 1.25 mm 2-pin

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

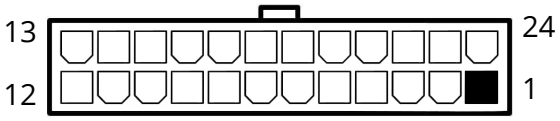
Matching Connector

- Hirose DF13C 1.25 mm 2-pin

  Part number: DF13-2S-1.25C

6.5.8 J27 - ATX Power Connector 24-pin

Layout and Pin Reference

Pin	Name	Pin	Name
			
1	+3.3V	13	+3.3V
2	+3.3V	14	-12
3	GND	15	GND
4	+5V	16	PS_ON (active low)
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWRGD	20	NC
9	+5V_SB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

Connector

- Molex Mini-Fit Jr. vertical header, 4.20 mm pitch

  Part number: 39299042

Matching Connector

- Molex Mini-Fit Jr. receptacle housing

  Part number: 39012040

6.5.9 J10, J11, J12, J13 - SATA-0, 1, 2, 3

The ATX-M-CC462-T6 supports four SATA 3 (6 Gbps) interface.

6.5.10 J3, J4, J5 - Display Ports

Standard full-size 20-pin DisplayPort (version 1.2).

6.5.11 J6 - Dual Channel LVDS Interface

The ATX-M-CC462-T6 supports one dual channel LVDS interface.

Layout and Pin Reference

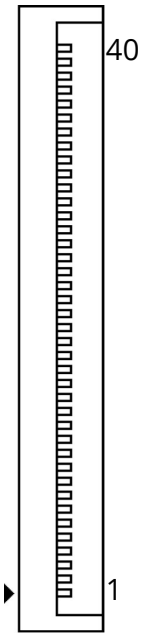


Diagram	Pin	Name	Description	Pin	Name	Description
	1	NC	Not connected	21	TX0+	LVDS data B0+
	2	FRC	Select 6 or 8 bit	22	TX1-	LVDS data B1-
	3	VCC	+3.3 VDC	23	TX1+	LVDS data B1+
	4	VCC	+3.3 VDC	24	TX2-	LVDS data B2-
	5	GND	Ground	25	TX2+	LVDS data B2+
	6	GND	Ground	26	CLK	Clock B-
	7	I2C	Optional	27	CLK	Clock B+
	8	I2C	Optional	28	TX2-	LVDS data B3-
	9	GND	Ground	29	TX2+	LVDS data B3+
	10	TX0-	LVDS data A0-	30	BLK_GND	Ground
	11	TX0+	LVDS data A0+	31	BLK_GND	Ground
	12	TX1-	LVDS data A1-	32	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	13	TX1+	LVDS data A1+	33	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	14	TX2-	LVDS data A2-	34	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	15	TX2+	LVDS data A2+	35	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	16	CLK	Clock A-	36	BL_Enable	Backlight enable
	17	CLK	Clock A+	37	BL_CTRL	Backlight control
	18	TX3-	LVDS data A3-	38		Ground
	19	TX3+	LVDS data A3+	39		Ground
	20	TX0-	LVDS data B0-	40		Ground

6.5.12 J17 - Audio I/O

Three 1/8th in. (3.5 mm) HD audio jacks are provided. The Type 6 module supports HD audio signals to the ATX-M-CC462-T6, which provides a Realtek ALC888S-VD HD audio codec.

Audio Connectors

Number	Description
J17	Line input/blue Line output/green Microphone input/red

6.5.13 J33 - eDP Interface

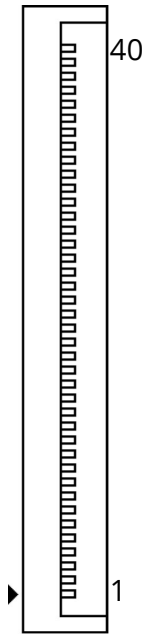
The ATX-M-CC462-T6 supports one embedded DisplayPort (eDP) interface.

The eDP and LVDS interfaces cannot be used at the same time. The COMe module dictates which interface is being used.

eDP configuration options are available via jumper **JP1** on page 13. Options include backlight voltage, and backlight enable.

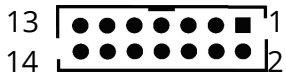
NOTE eDP Select (pins 5 - 6) on **JP1** must be jumpered for eDP operation.

Layout and Pin Reference

Diagram	Pin	Name	Description	Pin	Name	Description
	1	NC	Not connected	21	VCC	+3.3 VDC
	2	GND	Select 6 or 8 bit	22	NC	Not connected
	3	TX3-	eDP data 3-	23	GND	Ground
	4	TX3+	eDP data 3+	24	GND	Ground
	5	GND	Ground	25	GND	Ground
	6	TX2-	eDP data 2-	26	GND	Ground
	7	TX2+	eDP data 2+	27	HPD	Hot plug detect
	8	GND	Ground	28	BL_GND	Ground
	9	TX1-	eDP data 1-	29	BL_GND	Ground
	10	TX1+	eDP data 1+	30	BL_GND	Ground
	11	GND	Ground	31	BL_GND	Ground
	12	TX0-	eDP data 0-	32	BL_Enable	Backlight enable
	13	TX0+	eDP data 0+	33	BL_PWM_DIM	Backlight PWM dimming control
	14	GND	Ground	34	NC	Not connected
	15	AUX+	eDP auxiliary channel+	35	NC	Not connected
	16	AUX-	eDP auxiliary channel-	36	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	17	GND	Ground	37	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	18	VCC	+3.3 VDC	38	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	19	VCC	+3.3 VDC	39	BL_PWR	Backlight power (+5 VDC or +12 VDC)
	20	VCC	+3.3 VDC	40	NC	Not connected

6.5.14 J35 - VGA Connector

Layout and Pin Reference

Diagram	Pin	Selection	Pin	Selection
	1	VGA_RED	2	GND
	3	VGA_GRN	4	GND
	5	VGA_BLUE	6	GND
	7	HSYNC	8	GND
	9	VSYNC	10	GND
	11	DDC_DAT	12	GND
	13	DDC_CLK	14	GND

Connector

- Molex Milli-Grid header, shrouded with locking window

  Part number: 87832-1420

Matching Connector

- Molex Milli-Grid receptacles (with locking ramp)

  Part number: 51110-1451

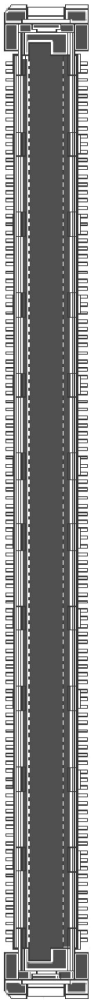
Warning
Do not use receptacle with center polarization key.

6.5.15 SP1 - Speaker

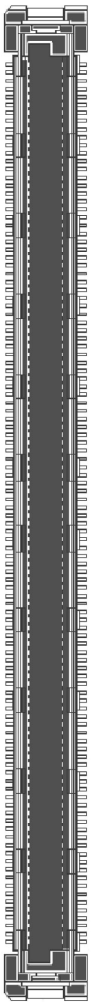
An on-board speaker, SP500, is available for sound generation. The BIOS activates the speaker to beep during POST failure. Each error has its own unique beep code dictated by the COM Express module attached.

6.5.16 J1 - COM Express AB ConnectorType 6 Rev 3.0

Layout and Pin Reference Row A

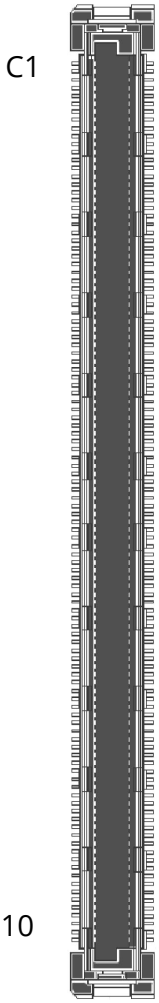
Diagram	Pin	Description	Pin	Description	Pin	Description
	A1	GND	A38	USB_6_7_OC#	A75	LVDS_A2+/eDP_TX0+
	A2	GBE0_MDI3-	A39	USB4-	A76	LVDS_A2-/eDP_TX0-
	A3	GBE0_MDI3+	A40	USB4+	A77	LVDS_VDD_EN
	A4	GBE0_LINK100#	A41	GND	A78	LVDS_A3+
	A5	GBE0_LINK1000#	A42	USB2-	A79	LVDS_A3-
	A6	GBE0_MDI2-	A43	USB2+	A80	GND
	A7	GBE0_MDI2+	A44	USB_23_OC#	A81	LVDS_A_CK+/eDP_TX3+
	A8	GBE0_LINK#	A45	USB0-	A82	LVDS_A_CK+/eDP_TX3+
	A9	GBE0_MDI1-	A46	USB0+	A83	LVDS_I2C_CK
	A10	GBE0_MDI1+	A47	VCC_RTC	A84	LVDS_I2C_DAT
	A11	GND	A48	RSVD	A85	GPI3
	A12	GBE0_MDI0-	A49	GBE0_SDP	A86	RSVD
	A13	GBE0_MDI0+	A50	LPC_SERIRQ/ESPI_CS1#	A87	eDP_HPD
	A14	GBE0_CTREF	A51	GND	A88	PCIE_CLK_REF+
	A15	SUS_S3#	A52	PCIE_TX5+	A89	PCIE_CLK_REF-
	A16	SATA0_TX+	A53	PCIE_TX5-	A90	GND
	A17	SATA0_TX-	A54	GPI0	A91	SPI_POWER
	A18	SUS_S4#	A55	PCIE_TX4+	A92	SPI_MISO
	A19	SATA0_RX+	A56	PCIE_TX4-	A93	GPO0
	A20	SATA0_RX-	A57	GND	A94	SPI_CLK
	A21	GND	A58	PCIE_TX3+	A95	SPI_MOSI
	A22	SATA2_TX+	A59	PCIE_TX3-	A96	TPM_PP
	A23	SATA2_TX-	A60	GND	A97	TYPE10#
	A24	SUS_S5#	A61	PCIE_TX2+	A98	SER0_TX
	A25	SATA2_RX+	A62	PCIE_TX2-	A99	SER0_RX
	A26	SATA2_RX-	A63	GPI1	A100	GND
	A27	BATLOW#	A64	PCIE_TX1+	A101	SER1_TX
	A28	SATA_ACT#	A65	PCIE_TX1-	A102	SER1_RX
	A29	HDA_SYNC	A66	GND	A103	LID#
	A30	HDA_RST#	A67	GPI2	A104	VCC_12V
	A31	GND	A68	PCIE_TX0+	A105	VCC_12V
	A32	HDA_BITCLK	A69	PCIE_TX0-	A106	VCC_12V
	A33	HDA_SDOUT	A70	GND	A107	VCC_12V
	A34	BIOS_DIS0#/ESPI_SAFS	A71	LVDS_A0+/eDP_TX2+	A108	VCC_12V
	A35	THRMTRIP#	A72	LVDS_A0-/eDP_TX2-	A109	VCC_12V
	A36	USB6-	A73	LVDS_A1+/eDP_TX1+	A110	GND
	A37	USB6+	A74	LVDS_A1-/eDP_TX1-		

Layout and Pin Reference Row B

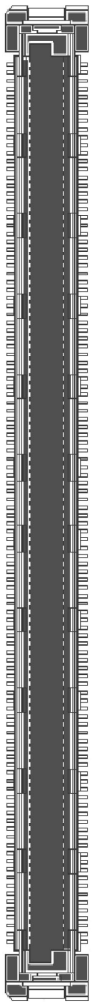
Diagram	Pin	Description	Pin	Description	Pin	Description
 B1 B110	B1	GND	B38	USB_45_OC#	B75	LVDS_B2+
	B2	GBE0_ACT#	B39	USB5-	B76	LVDS_B2-
	B3	ESPI_CS0#/LPC_FRAME#	B40	USB5+	B77	LVDS_B3+
	B4	ESPI_IO_0/LPC_AD0	B41	GND	B78	LVDS_B3-
	B5	ESPI_IO_1/LPC_AD1	B42	USB3-	B79	LVDS_BKLT_EN
	B6	ESPI_IO_2/LPC_AD2	B43	USB3+	B80	GND
	B7	ESPI_IO_3/LPC_AD3	B44	USB_0_1_OC#	B81	LVDS_B_CK+
	B8	ESPI_ALERT0#/LPC_DRQ0#	B45	USB1-	B82	LVDS_B_CK-
	B9	ESPI_ALERT1#/LPC_DRQ1#	B46	USB1+	B83	LVDS_BKLT_CTRL
	B10	ESPI_CK/LPC_CLK	B47	ESPI_EN#	B84	VCC_5V_SBY
	B11	GND	B48	USB_HOST_PRSNT	B85	VCC_5V_SBY
	B12	PWRBTN#	B49	SYS_RESET#	B86	VCC_5V_SBY
	B13	SMB_CK	B50	CB_RESET#	B87	VCC_5V_SBY
	B14	SMB_DAT	B51	GND	B88	BIOS_DIS1#
	B15	SMB_ALERT#	B52	PCIE_RX5+	B89	VGA_RED
	B16	SATA1_TX+	B53	PCIE_RX5-	B90	GND
	B17	SATA1_TX-	B54	GPO1	B91	VGA_GRN
	B18	ESPI_RESET#/SUS_STAT#	B55	PCIE_RX4+	B92	VGA_BLU
	B19	SATA1_RX+	B56	PCIE_RX4-	B93	VGA_HSYNC
	B20	SATA1_RX-	B57	GPO2	B94	VGA_VSYNC
	B21	GND	B58	PCIE_RX3+	B95	VGA_12C_CK
	B22	SATA3_TX+	B59	PCIE_RX3-	B96	VGA_I2C_DAT
	B23	SATA3_TX-	B60	GND	B97	SPI_CS#
	B24	PWR_OK	B61	PCIE_RX2+	B98	RSVD
	B25	SATA3_RX+	B62	PCIE_RX2-	B99	RSVD
	B26	SATA3_RX-	B63	GPO3	B100	GND
	B27	WDT	B64	PCIE_RX1+	B101	FAN_PWMOUT
	B28	HDA_SDIN2	B65	PCIE_RX1-	B102	FAN_TACHIN
	B29	HDA_SDIN1	B66	WAKE0#	B103	SLEEP#
	B30	HDA_SDIN0	B67	WAKE1#	B104	VCC_12V
	B31	GND	B68	PCIE_RX0+	B105	VCC_12V
	B32	SPKR	B69	PCIE_RX0-	B106	VCC_12V
	B33	I2C_CK	B70	GND	B107	VCC_12V
	B34	I2C_DAT	B71	LVDS_B0+	B108	VCC_12V
	B35	THRM#	B72	LVDS_B0-	B109	VCC_12V
	B36	USB7-	B73	LVDS_B1+	B110	GND
	B37	USB7+	B74	LVDS_B1-		

6.5.17 J2 - COM Express CD Connector

Layout and Pin Reference Row C

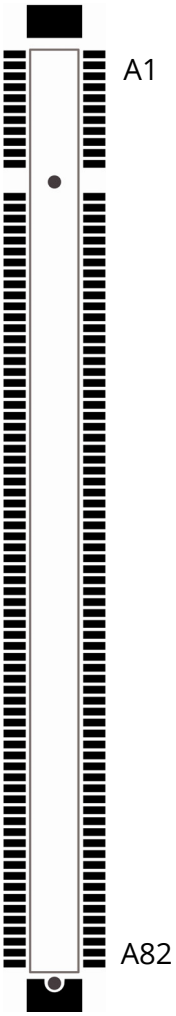
Diagram	Pin	Description	Pin	Description	Pin	Description
 C1 C110	C1	GND	C38	DDI3_DDC_AUX_SEL	C75	PEG_RX7-
	C2	GND	C39	DDI3_PAIR0+	C76	GND
	C3	USB_SSRX0-	C40	DDI3_PAIR0-	C77	RSVD
	C4	USB_SSRX0+	C41	GND	C78	PEG_RX8+
	C5	GND	C42	DDI3_PAIR1+	C79	PEG_RX8-
	C6	USB_SSRX1-	C43	DDI3_PAIR1-	C80	GND
	C7	USB_SSRX1+	C44	DDI3_HPD	C81	PEG_RX9+
	C8	GND	C45	RSVD	C82	PEG_RX9-
	C9	USB_SSRX2-	C46	DDI3_PAIR2+	C83	RSVD
	C10	USB_SSRX2+	C47	DDI3_PAIR2-	C84	GND
	C11	GND	C48	RSVD	C85	PEG_RX10+
	C12	USB_SSRX3-	C49	DDI3_PAIR3+	C86	PEG_RX10_
	C13	USB_SSRX3+	C50	DDI3_PAIR3-	C87	GND
	C14	GND	C51	GND	C88	PEG_RX11+
	C15	DDI1_PAIR6+	C52	PEG_RX0+	C89	PEG_RX11-
	C16	DDI1_PAIR61	C53	PEG_RX0-	C90	GND
	C17	RSVD	C54	TYPE0#	C91	PEG_RX12+
	C18	RSVD	C55	PEG_RX1+	C92	PEG_RX12-
	C19	PCIE_RX6+	C56	PEG_RX1-	C93	GND
	C20	PCIE_RX6-	C57	TYPE1#	C94	PEG_RX13+
	C21	GND	C58	PEG_RX2+	C95	PEG_RX13-
	C22	PCIE_RX7+	C59	PEG_RX2-	C96	GND
	C23	PCIE_RX7-	C60	GND	C97	RSVD
	C24	DDI1_HPD	C61	PEG_RX3+	C98	PEG_RX14+
	C25	DDI1_PAIR4+	C62	PEG_RX3-	C99	PEG_RX14-
	C26	DDI1_PAIR4-	C63	RSVD	C100	GND
	C27	RSVD	C64	RSVD	C101	PEG_RX15+
	C28	RSVD	C65	PEG_RX4+	C102	PEG_RX15_
	C29	DDI1_PAIR5+	C66	PEG_RX4-	C103	GND
	C30	DDI1_PAIR5-	C67	RSVSD	C104	VCC_12V
	C31	GND	C68	PEG_RX5+	C105	VCC_12V
	C32	DDI2_CTRLCLK_AUX+	C69	PEG_RX5-	C106	VCC_12V
	C33	DDI2_CTRLDATA_AUX-	C70	GND	C107	VCC_12V
	C34	DDI2_DDC_AUX_SEL	C71	PEG_RX6+	C108	VCC_12V
	C35	RSVD	C72	PEG_RX6-	C109	VCC_12V
	C36	DDI3_CTRLCLK_AUX+	C73	GND	C110	GND
	C37	DDI3_CTRLDATA_AUX-	C74	PEG_RX7+		

Layout and Pin Reference Row D

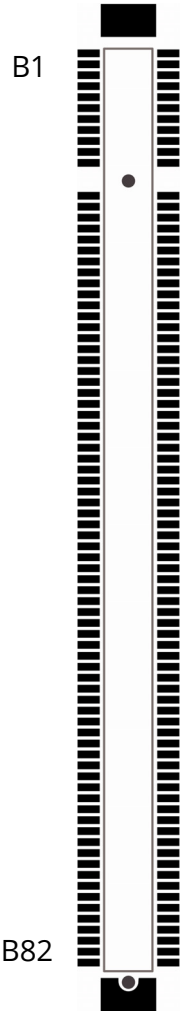
Diagram	Pin	Description	Pin	Description	Pin	Description
 D1 D110	D1	GND	D38	RSVD	D75	PEG_TX7-
	D2	GND	D39	DDI2_PAIR0+	D76	GND
	D3	USB_SSTX0-	D40	DDI2_PAIR0-	D77	RSVD
	D4	USB_SSTX0+	D41	GND	D78	PEG_TX8+
	D5	GND	D42	DDI2_PAIR1+	D79	PEG_TX8-
	D6	USB_SSTX1-	D43	DDI2_PAIR1-	D80	GND
	D7	USB_SSTX1+	D44	DDI2_HPD	D81	PEG_TX9+
	D8	GND	D45	RSVD	D82	PEG_TX9-
	D9	USB_SSTX2-	D46	DDI2_PAIR2+	D83	RSVD
	D10	USB_SSTX2+	D47	DDI2_PAIR2-	D84	GND
	D11	GND	D48	RSVD	D85	PEG_TX10+
	D12	USB_SSTX3-	D49	DDI2_PAIR3+	D86	PEG_TX10-
	D13	USB_SSTX3+	D50	DDI2_PAIR3-	D87	GND
	D14	GND	D51	GND	D88	PEG_TX11+
	D15	DDI1_CTRLCLK_AUX+	D52	PEG_TX0+	D89	PEG_TX11-
	D16	DDI1_CTRLDATA_AUX-	D53	PEG_TX0-	D90	GND
	D17	RSVD	D54	PEV_LANE_RV#	D91	PEG_TX12+
	D18	RSVD	D55	PEG_TX1+	D92	PEG_TX12-
	D19	PCIE_TX6+	D56	PEG_TX1-	D93	GND
	D20	PCIE_TX6-	D57	TYPE2#	D94	PEG_TX13+
	D21	GND	D58	PEG_TX2+	D95	PEG_TX13-
	D22	PCIE_TX7+	D59	PEG_TX2-	D96	GND
	D23	PCIE_TX7-	D60	GND	D97	RSVD
	D24	RSVD	D61	PEG_TX3+	D98	PEG_TX14+
	D25	RSVD	D62	PEG_TX3-	D99	PEG_TX14-
	D26	DDI1_PAIR0+	D63	RSVD	D100	GND
	D27	DDI1_PAIR0-	D64	RSVD	D101	PEG_TX15+
	D28	RSVD	D65	PEG_TX4+	D102	PEG_TX15-
	D29	DDI1_PAIR1+	D66	PEG_TX4-	D103	GND
	D30	DDI1_PAIR1-	D67	GND	D104	VCC_12V
	D31	GND	D68	PEG_TX5+	D105	VCC_12V
	D32	DDI1_PAIR2+	D69	PEG_TX5-	D106	VCC_12V
	D33	DDI1_PAIR2-	D70	GND	D107	VCC_12V
	D34	DDI1_DDC_AUX_SEL	D71	PEG_TX6+	D108	VCC_12V
	D35	RSVD	D72	PEG_TX6-	D109	VCC_12V
	D36	DDI1_PAIR3+	D73	GND	D110	GND
	D37	DDI1_PAIR3-	D74	PEG_TX7+		

6.5.18 J7 - PCIE GEN4 Connector 164POS

Layout and Pin Reference Row A

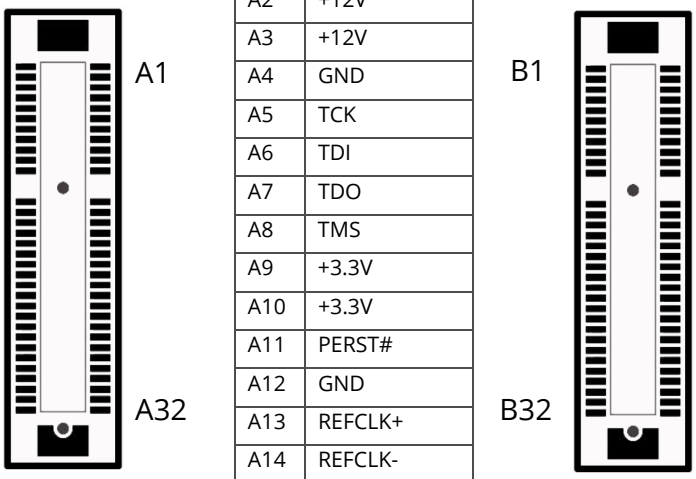
Diagram	Pin	Description	Pin	Description	Pin	Description
	A1	PRSNT1#	A29	HSIp(3)	A57	HSIn(9)
	A2	+12V	A30	HSIn(3)	A58	GND
	A3	+12V	A31	GND	A59	GND
	A4	GND	A32	Reserved	A60	HSIp(10)
	A5	TCK	A33	Reserved	A61	HSIn(10)
	A6	TDI	A34	Ground	A62	GND
	A7	TDO	A35	HSIp(4)	A63	GND
	A8	TMS	A36	HSIn(4)	A64	HSIp(11)
	A9	+3.3V	A37	GND	A65	HSIn(11)
	A10	+3.3V	A38	GND	A66	GND
	A11	PERST#	A39	HSIp(5)	A67	GND
	A12	GND	A40	HSIn(5)	A68	HSIp(12)
	A13	REFCLK+	A41	GND	A69	HSIn(12)
	A14	REFCLK-	A42	GND	A70	GND
	A15	GND	A43	HSIp(6)	A72	GND
	A16	HSIp(0)	A44	HSIn(6)	A72	HSIp(13)
	A17	HSIn(0)	A45	GND	A73	HSIn(13)
	A18	GND	A46	GND	A74	GND
	A19	Reserved	A47	HSIp(7)	A75	GND
	A20	GND	A48	HSIn(7)	A76	HSIp(14)
	A21	HSIp(1)	A49	GND	A77	HSIn(14)
	A22	HSIn(1)	A50	Reserved	A78	GND
	A23	GND	A51	GND	A79	GND
	A24	GND	A52	HSIp(8)	A80	HSIp(15)
	A25	HSIp(2)	A53	HSIn(8)	A81	HSIn(15)
	A26	HSIn(2)	A54	GND	A82	GND
	A27	GND	A55	GND		
	A28	GND	A56	HSIp(9)		

Layout and Pin Reference Row B

Diagram	Pin	Description	Pin	Description	Pin	Description
	B1	+12V	B29	GND	B57	GND
	B2	+12V	B30	PWRBRK#	B58	HSOp(10)
	B3	+12V	B31	PRSNT2#	B59	HSOn(10)
	B4	GND	B32	GND	B60	GND
	B5	SMCLK	B33	HSOp(4)	B61	GND
	B6	SMDAT	B34	HSOn(4)	B62	HSOp(11)
	B7	GND	B35	GND	B63	HSOn(11)
	B8	+3.3V	B36	GND	B64	GND
	B9	TRST#	B37	HSOp(5)	B65	GND
	B10	+3.3Vaux	B38	HSOn(5)	B66	HSOp(12)
	B11	WAKE#	B39	GND	B67	HSOn(12)
	B12	CLKREQ#	B40	GND	B68	GND
	B13	GND	B41	HSOp(6)	B69	GND
	B14	HSOp(0)	B42	HSOn(6)	B70	HSOp(13)
	B15	HSOn(0)	B43	GND	B72	HSOn(13)
	B16	GND	B44	GND	B72	GND
	B17	PRSNT2#	B45	HSOp(7)	B73	GND
	B18	GND	B46	HSOn(7)	B74	HSOp(14)
	B19	HSOp(1)	B47	GND	B75	HSOn(14)
	B20	HSOn(1)	B48	PRSNT2#	B76	GND
	B21	GND	B49	GND	B77	GND
	B22	GND	B50	HSOp(8)	B78	HSOp(15)
	B23	HSOp(2)	B51	HSOn(8)	B79	HSOn(15)
	B24	HSOn(2)	B52	GND	B80	GND
	B25	GND	B53	GND	B81	PRSNT2#
	B26	GND	B54	HSOp(9)	B82	Reserved
	B27	HSOp(3)	B55	HSOn(9)		
	B28	HSOn(3)	B56	GND		

6.5.19 J8, J9 - PCIE GEN4 Connector 64POS

Layout and Pin Reference Row A and B Mating



Row A	Pin	Description	Row B	Pin	Description
	A1	PRSNT1#		B1	+12V
	A2	+12V		B2	+12V
	A3	+12V		B3	+12V
	A4	GND		B4	GND
	A5	TCK		B5	SMCLK
	A6	TDI		B6	SMDAT
	A7	TDO		B7	GND
	A8	TMS		B8	3.3V
	A9	+3.3V		B9	TRST#
	A10	+3.3V		B10	+3.3Vaux
	A11	PERST#		B11	WAKE#
	A12	GND		B12	CLKREQ#
	A13	REFCLK+		B13	GND
	A14	REFCLK-		B14	HSOp(0)
	A15	GND		B15	HSOn(0)
	A16	HSIp(0)		B16	GND
	A17	HSIn(0)		B17	PRSNT2#
	A18	GND		B18	GND
	A19	Reserved		B19	HSOp(1)
	A20	GND		B20	HSOn(1)
	A21	HSIp(1)		B21	GND
	A22	HSIn(1)		B22	GND
	A23	GND		B23	HSOp(2)
	A24	GND		B24	HSOn(2)
	A25	HSIp(2)		B25	GND
	A26	HSIn(2)		B26	GND
	A27	GND		B27	HSOp(3)
	A28	GND		B28	HSOn(3)
	A29	HSIp(3)		B29	GND
	A30	HSIn(3)		B30	PWRBRK#
	A31	GND		B31	PRSNT2#
	A32	Reserved		B32	GND

6.5.20 J14 - USB0/USB1 3.2 Gen1 2x Front Panel

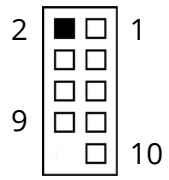
The Type 6 module supports four USB 3.2 Gen 1 ports to the ATX-M-CC462-T6, which provides two USB 3.2 Gen 1 ports to **J14**. These ports supply 1 A maximum continuous current and 5 Gbps transfer speed.

6.5.21 J15 - USB4/USB5 2.0 2x Front Panel

The Type 6 module supports four USB 2.0 ports to the ATX-M-CC462-T6, which provides two USB 2.0 ports to **J15** and two USB 2.0 ports to each Mini-Card #1-3. These ports supply 500 mA maximum continuous current and 480 Mbps transfer speed.

6.5.22 J16 - USB6/USB7 2.0 2x Header

Layout and Pin Reference

Diagram	Pin	Description	Pin	Description
	1	VUSB6 (V5A)	2	VUSB7 (V5A)
	3	USBD6_N	4	USBD7_N
	5	USBD6_P	6	USBD7_P
	7	GND	8	GND
	9	NO PIN	10	NC

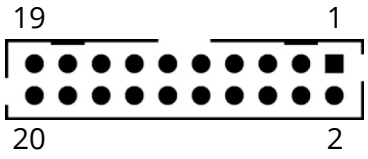
6.5.23 J18 - Ethernet 2.5Gbps from COMe

The Type 6 module supports one 2.5 Gigabit Ethernet port to the ATX-M-CC462-T6, which provides one Ethernet port to the right RJ45 connection on **J18**.

6.5.24 J22 - RS232 COMe Module Console

The Type 6 module supports two TTL serial ports to the ATX-M-CC462-T6, which provides two RS232 serial ports (3-wire port consisting of TX/RX and GND) via on-board RS232 transceivers.

Layout and Pin Reference

Pin	Description	Pin	Description
			
1	NC	2	NC
3	RX1	4	NC
5	TX1	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	NC
13	RX2	14	NC
15	TX2	16	NC
17	NC	18	NC
19	GND	20	NC

Connector

- Molex Milli-Grid header, shrouded with center polarization slot and locking windows

  Part number: 87832-2020

Matching Connectors

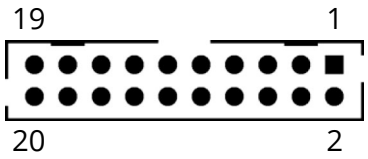
- Molex Milli-Grid receptacles with center polarization key and locking ramps

  Part number: 51110-2051

6.5.25 J23 - Multi-Protocol Carrier Serial Port

The Type 6 module supports an LPC bus to the ATX-M-CC462-T6, which provides two RS232/422/485 serial ports via on-board multi-protocol transceivers.

Layout and Pin Reference

Pin	Description	Pin	Description
			
1	DCD1/ TX-/ DATA-	2	DSR1
3	RXD1/ TX+/ DATA+	4	RTS1
5	TXD1/ RX+	6	CTS1
7	DTR1/ RX-	8	RI1
9	GND	10	NC
11	DCD2/ TX-/ DATA-	12	DSR2
13	RXD2/ TX+/ DATA+	14	RTS2
15	TXD2/ RX+	16	CTS2
17	DTR2/ RX-	18	RI2
19	GND	20	NC

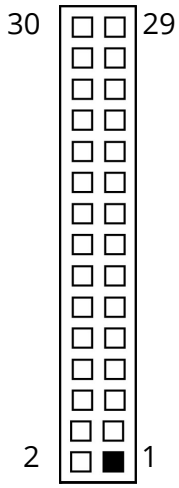
6.5.26 J31 - Feature Connector

NOTE The ATX-M-CC462-T6 turns on automatically when power is applied to the computer and does not require the power button to be pressed.

- A momentary switch that shorts pins 5 and 6 together on **J31** activates the power button input.

- A momentary switch that shorts pins 7 and 8 together on **J31** activates the system reset input.
- A momentary switch that shorts pins 9 and 10 together on **J31** activates the sleep input.

Layout and Pin Reference

Diagram	Pin	Description	Pin	Description
	1	HDD_LED+	2	PLED+
	3	HDD_LED-	4	PLED-
	5	GND	6	PWR_BTN#
	7	SYSRESET#	8	GND
	9	GND	10	SLEEP#
	11	LID#	12	GND
	13	BATLOW#	14	GND
	15	THRM#	16	GND
	17	3.3V Standby	18	I2C_DAT
	19	GND	20	I2C_CLK
	21	GPI0	22	GPO0
	23	GPI1	24	GPO1
	25	GPI2	26	GPO2
	27	GPI3	28	GPO3
	29	GND	30	GND

Connector

- Molex Milli-Grid header, shrouded with center polarization slot and locking windows

  Part number: 87832-2020

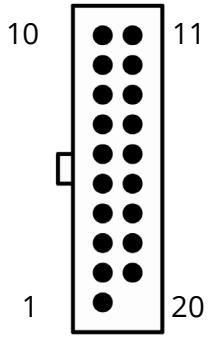
Matching Connectors

- Molex Milli-Grid receptacles with center polarization key and locking ramps

  Part number: 51110-2051

6.5.27 J32 - USB3 3.2 Gen1 2x Header

Layout and Pin Reference

Diagram	Pin	Description	Pin	Description
	10	NC	11	USB2_P
	9	USB_P	12	USB2_N
	8	USB_N	13	GND
	7	GND	14	USB3TX_P
	6	USB3TX_P	15	USB3TX_N
	5	USB3TX_N	16	GND
	4	GND	17	USB3RX_P
	3	USB3RX_P	18	USB3RX_N
	2	USB3RX_N	19	VUSB(V5A)
	1	VUSB(V5A)	20	NO PIN

Connector

- Amphenol Icc Box header for USB3.0.1100 2.0MM PIT

  Part number: G823J201240BHR

Matching Connectors

- Molex Milli-Grid receptacles with center polarization key and locking ramps

  Part number: 51110-2051

7. Accessories and Cables

WINSYSTEMS cables and batteries simplify connection to the ATX-M-CC462-T6. The following table lists available items.

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

Item	Part Number	Connection	Description
COM module	COMET6-1185GRE-32IL	Type 6 COM interface	Intel Core-I7, 32 GB DDR, LVDS, VPRO, INDUSTRIAL TEMP
COM nodule	COMET6-1145GRE-16IL	Type 6 COM interface	Intel Core-I5, 16 GB DDR, LVDS, VPRO, INDUSTRIAL TEMP

Item	Part Number	Connection	Description
Com module	COMET6-1115GRE-8IL	Type 6 COM interface	Intel Core-I3, 32 GB DDR, LVDS, INDUSTRIAL TEMP
Cable	TCBL-DP-6A	J3, J4, J5-DisplayPort	DISPLAY PORT CABLE, 6 FT
Cable	CBL-234-G-1-1.375B	J35-VGA	ROHS CABLE 14 POS, 2.0 MM TO 15 POS, FEMALE, D-SUB
Cable	CBL-SATA-701-20	J10, J11, J12, J13-SATA	SATA DATA CABLE, LATCHING, STRAIGHT 20 IN LONG
Cable	CBL-SER2-202-12A	J22, J23-COM/SERIAL	SERIAL/CAN BUS, 20P, 2 MM TO DSUB-9
Cable	CBL-USB2-U03-08A	J14-USB3 (dual)	DUAL USB 3.0 CABLE W/BRACKET
Cable	CBL-USB2-U12-11A	J13-USB2 (dual)	DUAL USB 2.0 CABLE W/BRACKET 0.1 IN HEADER
Cable	CBL-ENET-060A	J17-RJ45 patch cable	Ethernet CAT8 6 FT black
Standoff hardware	KIT-COM-8MM-STANDOFF	Used to mount COM module to carrier board	COME, G0462, M2.5 X 0.45 X 8 MM HEX, MALE/FEMALE STANDOFF KIT

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the ATX-M-CC462-T6 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. Recommended maximum power supply input rating for the ATX-M-CC462-T6 is based on the COM module, peripherals, and power supply of choice.

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 ATX-M-CC462-T6.

Use proper power connections (voltage)
When verifying the voltage, measure it at the power connector on the ATX-M-CC462-T6. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

The ATX-M-CC462-T6 has two power connectors at **J25** and **J27**. A standard ATX power supply 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 ATX-M-CC462-T6. We recommend DC power input wires/cable with a flammability rating of VW-1 or better.

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 or disconnecting a COM module.

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.

Mounting and Protecting the I/O Module

To avoid damage, mount the ATX-M-CC462-T6 properly. Standoff kits are available and recommended for use with the ATX-M-CC462-T6. See the table on page 31 for the items contained in each kit.

Placing the ATX-M-CC462-T6 on mounting standoffs—Be careful when placing the ATX-M-CC462-T6 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 board.

Do not bend or flex the ATX-M-CC462-T6—Bending or flexing can cause irreparable damage. Embedded computer modules 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

embedded computer module 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. The mounting holes are also connected to ground through resistors. If resistors need to be removed, please contact customer service for support.

- 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 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 provide the support the embedded computer module 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 embedded computer module to be flexed.

Avoid cutting the ATX-M-CC462-T6—Never use star washers or any fastening hardware that cut into the ATX-M-CC462-T6.

Avoid over-tightening 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.

Avoid conductive surfaces—Never allow the embedded computer module to be placed on a conductive surface. Many embedded systems use a battery to back up the clock-calendar and CMOS memory. A conductive surface such as a metal bench can short the battery causing premature failure.

Conformal Coating

Applying conformal coating to a WINSYSTEMS product does not in itself void the product warranty, if it is properly removed prior to return. Coating can 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.

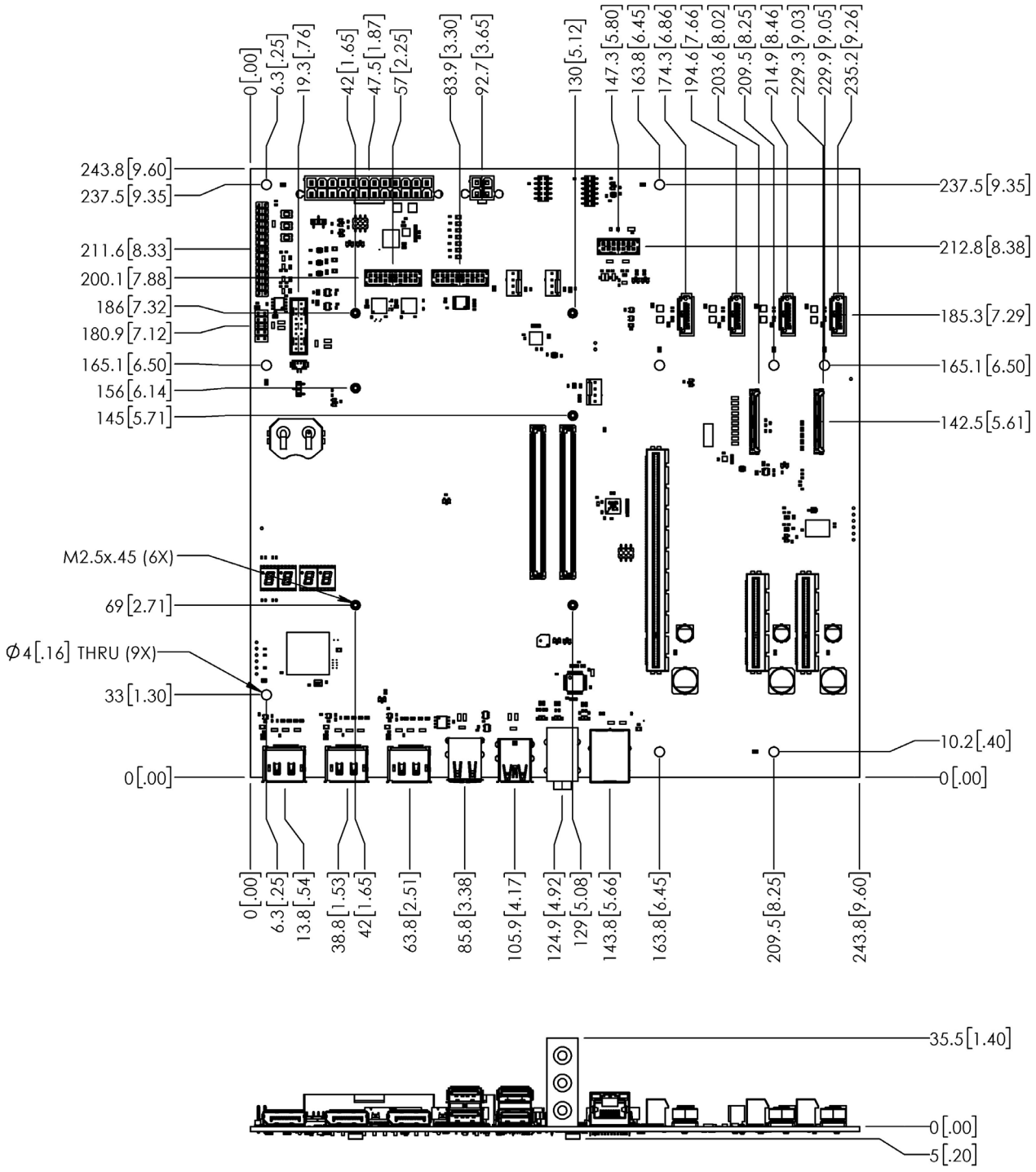
Periodic updates—Operations/product manuals are updated often. Periodically check the WINSYSTEMS website (http://www.winsystems.com) for revisions.

Check pinouts—Always check the pinout and connector locations in the manual before plugging in a cable. Many 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

ATX-M-CC462-T6 Mechanical Drawings



Appendix C. Warranty Information

WINSYSTEMS warrants 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 defects and shall perform substantially in accordance with WINSYSTEMS' specifications therefor. 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. 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 and other fees and 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 or Software which have been subject to abuse, misuse, vandalism, accident, alteration, neglect, unauthorized repair or improper installation.

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Title to the Products shall remain vested in WINSYSTEMS until complete payment is made by Customer. Title to any Software shall remain vested in WINSYSTEMS, or WINSYSTEMS' licensor from whom WINSYSTEMS has obtained marketing rights, both before, during and after the term of the License. Nonpayment when due of the purchase price for any Products or the License fees for any Software, or, if applicable, taxes and/or the cost of any freight and insurance for any Products and/or Software, shall entitle WINSYSTEMS to take possession of the Products and/or Software without notice to Customer or prejudice to WINSYSTEMS' rights under contract or any other legal remedy.

Until title to the Products pass in accordance with the provision set out above, except with the prior written approval of WINSYSTEMS, no Products shall be modified, altered, moved or in any way assigned, sublet, mortgaged or charged nor may Customer part with possession of all or part of the same.

There are no understandings, agreements or representations, express or implied, other than those set forth herein. This Order embodies the entire agreement between the parties and may be waived, amended or supplemented only by a written instrument executed jointly by WINSYSTEMS and Customer as evidenced only by the signature of duly authorized officers of each party. The foregoing terms and conditions of any order which may be issued by Customer for the purchase of Products or licensing of Software hereunder.

In the event this Order is placed in the hands of an attorney or collection agency by WINSYSTEMS to collect any sums due hereunder to WINSYSTEMS, Customer shall pay all reasonable attorney's fees, expenses, collection and court costs incurred by WINSYSTEMS.

THIS AGREEMENT SHALL BE GOVERNED AND CONSTRUED UNDER THE TEXAS UNIFORM COMMERCIAL CODE AND THE APPLICABLE LAWS OF THE STATE OF TEXAS. THE PARTIES ACKNOWLEDGE THAT ANY ACTION BROUGHT HEREUNDER SHALL ONLY BE BROUGHT IN A COURT OF COMPETENT JURISDICTION IN TARRANT COUNTY, TEXAS.

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.