WINSYSTEMS®

COMeT6-1100

COM Express® Type 6 Compact Module with 11th Gen. Intel® Core™ Processor, LPDDR4 RAM and Hardware TPM 2.0

Product Manual

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Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	11/30/2023	Initial release
v1.1	9/5/2025	Updated conformal coating, warranty and web links information

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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 COMeT6-1100 module. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the COMeT6-1100 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 COMeT6-1100. 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 COMeT6-1100. 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://www.winsystems.com/ for other accessories (including cable drawings and pinouts) that can be used with your COMeT6-1100.

3. Functionality

The COMeT6-1100 is an industrial COM Express Type 6 Compact module with an 11th Gen Intel Core™ i3/i5/i7 processor. This industrial module is designed and manufactured in the USA. The small form factor module is designed as a processor mezzanine that can be plugged onto a carrier board that contains user-specific I/O requirements.

COM Express modules allow users to retain the same carrier board design across scalable CPU series and over multiple generations of COM Express modules providing a long project lifetime. Updating a COM Express module to improve performance or replace an end of life processor

drastically improves time to market when revising existing projects. Users have the option to choose the default BIOS settings and layout, or request a custom branded configurable BIOS to support specific project requirements.

The COMeT6-1100 supports Windows 10 and Ubuntu operating systems. Drivers are available from the WINSYSTEMS website at https://www.winsystems.com/.

4. Features

The COMeT6-1100 provides the following features.

Industrial COM Express Module

- Form factor: COM Express Type 6 compact, 3.75 in x 3.75 in (95 mm x 95 mm)
- Made in the USA
- 11th Gen Intel Core i3/i5/i7 processor, formally Tiger Lake-UP3
- -40°C to +85°C operating temperature range
- Up to 32 GB LPDDR4 4266 MT/s system memory, supporting IBECC
- Standard 12 VDC input, +/- 10%

Security

- On-board discrete TPM 2.0 hardware security

Display and graphics

- Intel Gen12 graphics engine, with up to 96 EUs
- Up to 4 simultaneous and independent displays
- 3x digital display interface (DDI) to DisplayPort++ /HDMI/DVI
- 1x eDP (optional dual channel LVDS)
- 1x VGA (optional)

Network

- 1x 2.5G network via Intel i226 controller
- vPro support on i5 and i7 CPUs
- TSN support

Storage

- 2x SATA III (6 Gb/s) interfaces to carrier

Connectivity and I/O

- 5x PCIe x1 Gen 3.0 lanes configurable as 4x1 (default), 2 x2, 1 x4, 2 x1 + 1 x2, 1 x2 + 2 x1 and lane 4 (x1 only)

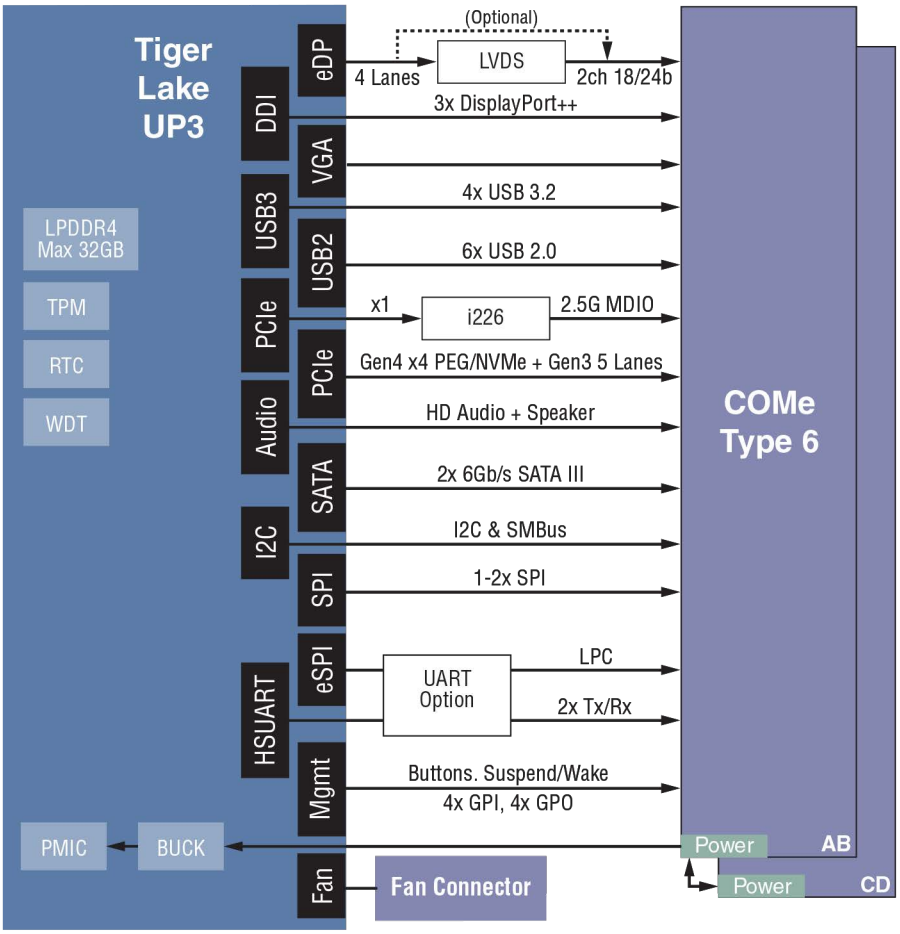
- 1x PCIe x4 Gen 4.0 lane configurable as x4 only (lanes 16, 17, 18, 19)/ PEG (PCIe Gen 4)
- 4x USB 3.2 Gen 1, 8x USB 2.0
- HD audio
- 2x UART
- 4x GPI, 4x GPO

Software

- Windows10 and Ubuntu
- Custom configurable UEFI based AMI BIOS
- System management libraries and tools (no system management but there is a hardware monitor and fan controller)

5. General Operation

5.1 System Block Diagram



6. Specifications

The COMeT6-1100 adheres to the following specifications and requirements.

Feature	Specification
Electrical	
V_{CC}	Supports standard 12 V input, +/- 10% CPU TDP = 28 W max.
Models	**COMET6-CCCCCCC-RRTV** **-1185GRE = CPU desginator (1185GRE, 1145GRE, 1115GRE)** **-32 = RAM size (8, 16, 32)** **-I = RAM temp (C=Comm, I=Ind, A=Auto)** **-L = Video option (E = eDP, L = LVDS)**
Processor	Intel Core i7-1185GRE* up to 2.8 (4.4) GHz Intel Core i5-1145GRE* up to 2.6 (4.1) GHz Intel Core i3-1115GRE* up to 3.0 (3.9) GHz
Mechanical	
Dimensions	3.75 in x 3.75 in (95 mm x 95 mm)
Weight	2.75 oz. (78 g), without heat sink
PCB thickness	0.078 in. (2.00 mm)
Environmental	
Temperature	-40 to +85°C (-40 to +185°F)[a]
Humidity (RH)	5% to 95% non-condensing
RoHS compliant	Yes
Operating Systems	
Runs Windows 10 and Ubuntu	

a. Requires thermal solution via heat spreader/heat sink or airflow. The maximum measurable temperature on any spot of the heat spreader or heat sink, and module surfaces must not exceed the operating temperature specified in the table above.

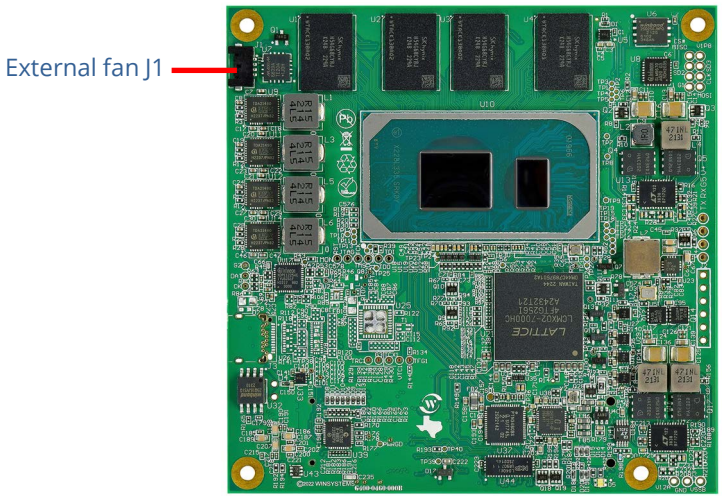
7. Configuration

This section describes the COMeT6-1100 components and configuration.

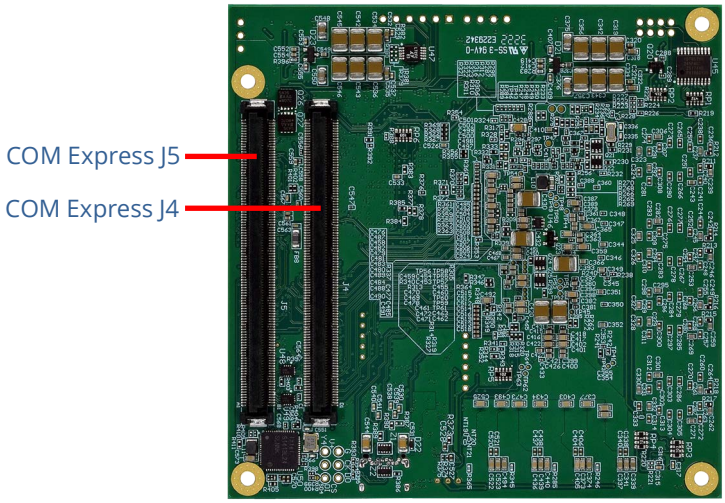
7.1 Component Layout

7.1.1 Top/Bottom Views

Connectors, top view



Connectors, bottom view



Item	Description	Reference
J1	External fan connector	page 13
J4	COM Express Type 6 compact module interface	page 14
J5	COM Express Type 6 compact module interface	page 16

7.2 Watchdog Timer (WDT)

7.2.1 WDT Register Usage

The Watchdog Timer (WDT) implemented in the COMeT6-1100 board's Field Programmable Gate Array (FPGA) 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 virtual registers that are exposed to Tiger Lake applications by the FPGA on the COMeT6-1100 board. The WDT can be programmed to count in either seconds or minutes; it has a minimum granularity of 1 second, and a maximum granularity of 255 minutes.

7.3 Real-time Clock/Calendar

A real-time clock is used as the AT-compatible clock/calendar. It supports a number of features including periodic and alarm interrupt capabilities. In addition to the time and date-keeping functions, the system configuration is kept in CMOS RAM contained within the clock section. A battery must be enabled for the real-time clock to retain time and date during a power down.

7.4 Configuration and Installation

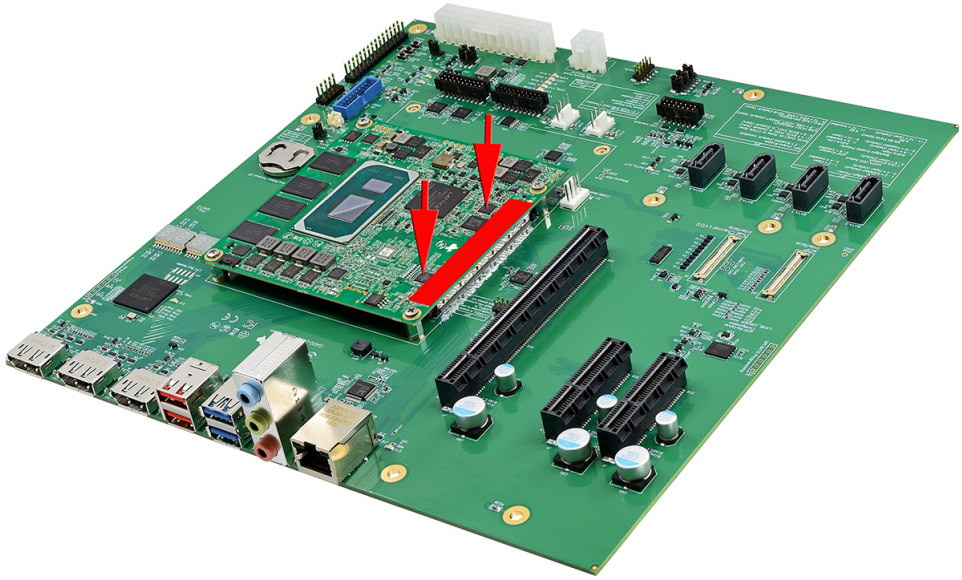
When installing the COMeT6-1100 onto a compatible COM Express Type 6 carrier board, please follow the instructions below to ensure there is no damage to the COMeT6-1100 or the carrier board.

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 COMeT6-1100 standoffs with the mounting holes on the carrier board.
2. Ensure that the COM Express Type 6 compact interface connectors (**J4** and **J5**) are nicely seated in the COMe connector sockets on the carrier board.
3. Apply pressure to the red region denoted in the following figure.

NOTE To minimize board flex on the carrier board, make sure that the carrier board is supported on the opposite side prior to applying pressure to the COMeT6-1100 module.

4. Insert and tighten down the screws supplied with your WINSYSTEMS heat spreader/ heat sink (sold separately). See “Accessories” on page 23 for a list of heat spreader and heat sink kits.



7.5 Thermal Management

WINSYSTEMS offers multiple heat spreader and heat sink kits to provide a way to transfer heat generated by the processor and other components away from the COMeT6-1100. Choosing a solution depends on how the system is used, as well as its environmental conditions. Dissipating heat away from the COMeT6-1100 is crucial for maintaining system performance and counteracting CPU throttling. Contact a WINSYSTEMS applications engineer at +1-817-274-7553 for more information on our heat spreader and heat sink kits.

7.5.1 Heat Spreader

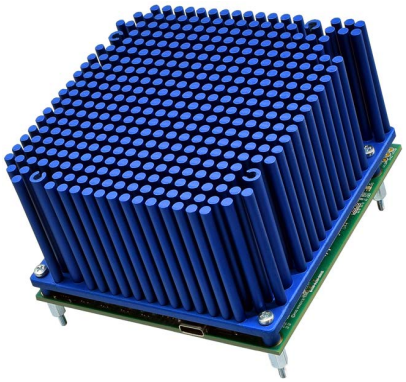
The WINSYSTEMS heat spreaders allow the COMeT6-1100 to be attached to a larger metal surface, allowing heat to dissipate across a larger surface area. This method of passive cooling is extremely efficient and does not require an external fan. The maximum measurable temperature on any spot of the heat spreader must not exceed the operating temperature specified in “Specifications” on page 8.

Heat spreader part numbers:

Item	Part Number	Description
Thermal solution	COMET6-460-SPRD-0	Heat spreader through-hole option, necessary hardware
Thermal solution	COMET6-460-SPRD-1	Heat spreader threaded option, necessary hardware

NOTE When using part numbers COMET6-460-SPRD-0 and COMET6-460-SPRD-1, apply thermal compound between the heat spreader and the larger metal surface. This increases the heat transfer efficiency.

7.5.2 Heat Sink



For projects that do not have a larger metal surface to attach the COMeT6-1100, WINSYSTEMS provides multiple heat sink solutions. Heat sinks are great for dissipating heat by natural convection or through active cooling with an external fan. The maximum measurable temperature on any spot of the heat sink must not exceed the operating temperature specified in “Specifications” on page 8.

NOTE WINSYSTEMS offers custom heat spreaders and heat sinks for your application. Contact WINSYSTEMS at 817-274-7553 and connect to one of our sales team members for your custom projects.

Heat sink part numbers:

Item	Part Number	Description
Thermal solution	COMET6-460-HTSK-0	Heat sink through-hole option, necessary hardware
Thermal solution	COMET6-460-HTSK-1	Heat sink threaded option, necessary hardware
Thermal solution	COMET6-460-HTSKF-0	Heat sink through-hole option, with fan, necessary hardware
Thermal solution	COMET6-460-HTSKF-1	Heat sink threaded option, with fan, necessary hardware

7.6 On-board Features

7.6.1 SATA III Storage (2x)

The COMeT6-1100 provides two PCH SATA controllers. The PCH controller is SATA 6 Gb/s capable and supports 6 Gb/s transfers with all capable SATA devices. The PCH SATA controller also supports SATA 3 Gb/s and 1.5 Gb/s transfer capabilities.

7.6.2 TPM 2.0

The COMeT6-1100 provides an on-board discrete TPM 2.0 hardware security chip.

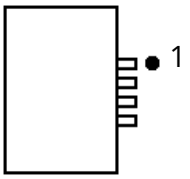
7.6.3 Memory

Up to 32 GB of soldered down LPDDR4 memory is available on the COMeT6-1100. This memory can operate up to 4266 MT/s.

7.7 Connectors

7.7.1 J1 - External Fan Connector

Layout and Pin Reference

Pin	Name
	
1	GND
2	V12A
3	TACH
4	PWM

Connector

- Pico-Lock PCB header, 1.00 mm pitch

  Part number: 503763-0491

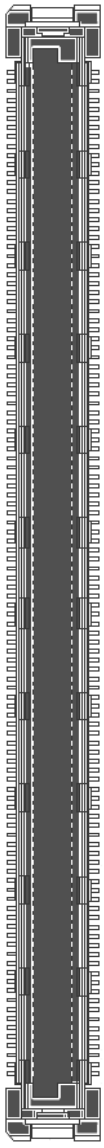
Matching Connector

- Molex Pico-Lock receptacle crimp housing, 1.00 mm pitch

  Part number: 503764-0401

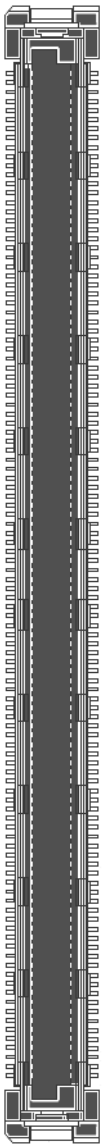
7.7.2 J4 - COM Express Type 6 Compact Module Interface Connector

Layout and Pin Reference Row C



Pin	Description	Pin	Description	Pin	Description
C1	GND(FIXED)	C38	DDI3_DDC_AUX_SEL	C75	PEG_RX7-
C2	GND	C39	DDI3_PAIR0+	C76	GND
C3	USB_SSRX0-	C40	DDI3_PAIR0-	C77	RSVD10
C4	USB_SSRX0+	C41	GND(FIXED)	C78	PEG_RX8+
C5	GND	C42	DDI3_PAIR01+	C79	PEG_RX8-
C6	USB_SSRX1-	C43	DDI3_PAIR1-	C80	GND(FIXED)
C7	USB_SSRX1+	C44	DDI3_HPD	C81	PEG_RX9+
C8	GND	C45	RSVD10	C82	PEG_RX9-
C9	USB_SSRX2-	C46	DDI3_PAIR2+	C83	RSVD10
C10	USB_SSRX2+	C47	DDI3_PAIR2-	C84	GND
C11	GND(FIXED)	C48	RSVD10	C85	PEG_RX10+
C12	USB_SSRX3-	C49	DDI3_PAIR3+	C86	PEG_RX10-
C13	USB_SSRX3+	C50	DDI3_PAIR3-	C87	GND
C14	GND	C51	GND(FIXED)	C88	PEG_RX11+
C15	DDI1_PAIR6+	C52	PEG_RX0+	C89	PEG_RX11-
C16	DDI1_PAIR6-	C53	PEG_RX0-	C90	GND(FIXED)
C17	RSVD10	C54	TYPE0#	C91	PEG_RX12+
C18	RSVD10	C55	PEG_RX1+	C92	PEG_RX12-
C19	PCIE_RX6+	C56	PEG_RX1-	C93	GND
C20	PCIE_RX6-	C57	TYPE 1#	C94	PEG_RX13+
C21	GND(FIXED)	C58	PEG_RX2+	C95	PEG_RX13-
C22	PCIE_RX7+	C59	PEG_RX2-	C96	GND
C23	PCIE_RX7-	C60	GND(FIXED)	C97	RSVD10
C24	DDI1_HPD	C61	PEG_RX3+	C98	PEG_RX14+
C25	DDI1_PAIR4+	C62	PEG_RX3-	C99	PEG_RX14-
C26	DDI1_PAIR4-	C63	RSVD10	C100	GND(FIXED)
C27	RSVD10	C64	RSVD10	C101	PEG_RX15+
C28	RSVD10	C65	PEG_RX4+	C102	PEG_RX15-
C29	DDI1_PAIR5+	C66	PEG_RX4-	C103	GND
C30	DDI1_PAIR5-	C67	RAPID_SHUTDOWN	C104	12V
C31	GND(FIXED)	C68	PEG_RX5+	C105	12V
C32	DDI2_CTRLDATA_AUX+	C69	PEG_RX5-	C106	12V
C33	DDI2_CTRLDATA_AUX-	C70	GND(FIXED)	C107	12V
C34	DDI2_DDC_AUX_SEL	C71	PEG_RX6+	C108	12V
C35	RSVD10	C72	PEG_RX6-	C109	12V
C36	DDI3_CTRLCLK_AUX+	C73	GND	C110	GND(FIXED)
C37	DDI3_CTRLCLK_AUX-	C74	DDI3_CTRLCLK_AUX-		

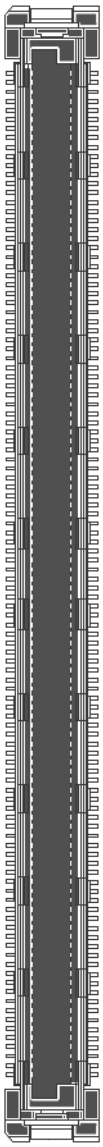
Layout and Pin Reference Row D



Pin	Description	Pin	Description	Pin	Description
D1	GND(FIXED)	D38	RSVD10	D75	PEG_TX7-
D2	GND	D39	DDI2_PAIR0+	D76	GND
D3	USB_SSTX0-	D40	DDI2_PAIR0-	D77	RSVD10
D4	USB_SSTX0+	D41	GND(FIXED)	D78	PEG_TX8+
D5	GND	D42	DDI2_PAIR1+	D79	PEG_TX8-
D6	USB_SSTX1-	D43	DDI2_PAIR1-	D80	GND(FIXED)
D7	USB_SSTX1+	D44	DDI2_HPD	D81	PEG_TX9+
D8	GND	D45	RSVD10	D82	PEG_TX9-
D9	USB_SSTX2-	D46	DDI2_PAIR2+	D83	RSVD10
D10	USB_SSTX2+	D47	DDI2_PAIR2-	D84	GND
D11	GND(FIXED)	D48	RSVD10	D85	PEG_TX10+
D12	USB_SSTX3-	D49	DDI2_PAIR3+	D86	PEG_TX10-
D13	USB_SSTX3+	D50	DDI2_PAIR3-	D87	GND
D14	GND	D51	GND(FIXED)	D88	PEG_TX11+
D15	DDI1_CTRLCLK_AUX+	D52	PEG_TX0+	D89	PEG_TX11-
D16	DDI1_CTRLDATA_AUX-	D53	PEG_TX0-	D90	GND(FIXED)
D17	RSVD10	D54	PEG_LANE_RV#	D91	PEG_TX12+
D18	RSVD10	D55	PEG_TX1+	D92	PEG_TX12-
D19	PCIE_TX6+	D56	PEG_TX1-	D93	GND
D20	PCIE_TX6-	D57	TYPE2#	D94	PEG_TX13+
D21	GND(FIXED)	D58	PEG_TX2+	D95	PEG_TX13-
D22	PCIE_TX7+	D59	PEG_TX2-	D96	GND
D23	PCIE_TX7-	D60	GND(FIXED)	D97	RSVD10
D24	RSVD10	D61	PEG_TX3+	D98	PEG_TX14+
D25	RSVD10	D62	PEG_TX3-	D99	PEG_TX14-
D26	DDI1_PAIR0+	D63	RSVD10	D100	GND(FIXED)
D27	DDI1_PAIR0-	D64	RSVD10	D101	PEG_TX15+
D28	RSVD10	D65	PEG_TX4+	D102	PEG_TX15-
D29	DDI1_PAIR1+	D66	PEG_TX4-	D103	GND
D30	DDI1_PAIR1-	D67	GND	D104	12V
D31	GND(FIXED)	D68	PEG_TX5+	D105	12V
D32	DDI1_PAIR2+	D69	PEG_TX5-	D106	12V
D33	DDI1_PAIR2-	D70	GND(FIXED)	D107	12V
D34	DDI1_DDC_AUX_SEL	D71	PEG_TX6+	D108	12V
D35	RSVD10	D72	PEG_TX6-	D109	12V
D36	DDI1_PAIR3+	D73	GND	D110	GND(FIXED)
D37	DDI1_PAIR3-	D74	PEG_TX7+		

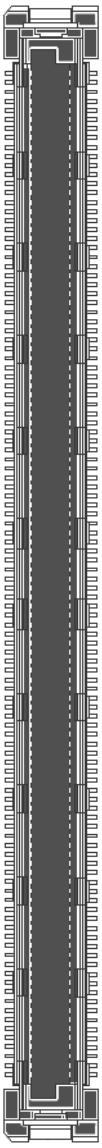
7.7.3 J5 - COM Express Type 6 Compact Module Interface Connector

Layout and Pin Reference Row A



Pin	Description	Pin	Description	Pin	Description
A1	GND(FIXED)	A38	USB67_OC#	A75	LVDS_A2+
A2	GBE0_MDI3-	A39	USB4-	A76	LVDS_A2-
A3	GBE0_MDI3+	A40	USB4+	A77	LVDS_VDD_EN
A4	GBE0_LINK100#	A41	GND(FIXED)	A78	LVDS_A3+
A5	GBE0_LINK1000#	A42	USB2-	A79	LVDS_A3-
A6	GBE0_MDI2-	A43	USB2+	A80	GND(FIXED)
A7	GBE0_MDI2+	A44	USB23_OC#	A81	LVDS_A_CK+
A8	GBE0_LINK#	A45	USB0-	A82	LVDS_A_CK-
A9	GBE0_MDI1-	A46	USB0+	A83	LVDS_I2C_CK
A10	GBE0_MDI1+	A47	VCC_RTC	A84	LVDS_I2C_DAT
A11	GND(FIXED)	A48	RSVD10	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(FIXED)	A88	PCIE_CLK_REF+
A15	SUS_S3#	A52	PCIE_TX5+	A89	PCIE_CLK_REF-
A16	SATA0_TX+	A53	PCIE_TX5-	A90	GND(FIXED)
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(FIXED)	A58	PCIE_TX3+	A95	SPI_MOSI
A22	SATA2_TX+	A59	PCIE_TX3-	A96	TPM_PP
A23	SATA2_TX -	A60	GND(FIXED)	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(FIXED)
A27	BATLOW#	A64	PCIE_TX1+	A101	SER1_TX
A28	(S)ATA_ACT#	A65	PCIE_TX1-	A102	SER1_RX
A29	HDA_SYNC	A66	GND	A103	LID#
A30	HDA_RST#	A67	GPI2	A104	VCC_12V
A31	GND(FIXED)	A68	PCIE_TX0+	A105	VCC_12V
A32	HDA_BITCLK	A69	PCIE_TX0-	A106	VCC_12V
A33	HDA_SDOUT	A70	GND(FIXED)	A107	VCC_12V
A34	BIOS_DIS0#/ESPI_SAFS	A71	LVDS_A0+	A108	VCC_12V
A35	THRMTRIP#	A72	LVDS_A0-	A109	VCC_12V
A36	USB6-	A73	LVDS_A1+	A110	GND(FIXED)
A37	USB6+	A74	LVDS_A1-		

Layout and Pin Reference Row B



Pin	Description	Pin	Description	Pin	Description
B1	GND(FIXED)	B38	USB45_OC#	B75	LVDS_B2+
B2	GBE0_ACT#	B39	USB5-	B76	LVDS_B2-
B3	LPC_FRAME#/ESPI_CS0#	B40	USB5+	B77	LVDS_B3+
B4	LPC_AD0/ESPI_IO_0	B41	GND(FIXED)	B78	LVDS_B3-
B5	LPC_AD1/ESPI_IO_1	B42	USB3-	B79	LVDS_BKLT_EN
B6	LPC_AD2/ESPI_IO_2	B43	USB3+	B80	GND(FIXED)
B7	LPC_AD3/ESPI_IO_3	B44	USB01_OC#	B81	LVDS_B_CK+
B8	LPC_DRQ0#/ESPI_ALERT0#	B45	USB1-	B82	LVDS_B_CK-
B9	LPC_DRQ1#/ESPI_ALERT1#	B46	USB1+	B83	LVDS_BKLT_CTRL
B10	LPC_CLK/ESPI_CK	B47	ESPI_EN#	B84	VCC_5V_SBY
B11	GND(FIXED)	B48	USB0_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(FIXED)	B88	BIOS_DIS1#
B15	SMB_ALERT#	B52	PCIE_RX5+	B89	VGA_RED
B16	SATA1_TX+	B53	PCIE_RX5-	B90	GND(FIXED)
B17	SATA1_TX-	B54	GPIO1/SD_CMD	B91	VGA_GRN
B18	SUS_STAT#/ESPI_RESET#	B55	PCIE_RX4+	B92	VGA_BLU
B19	SATA1_RX+	B56	PCIE_RX4-	B93	VGA_HSYNC
B20	SATA1_RX-	B57	GPIO2/SD_WP	B94	VGA_VSYNC
B21	GND(FIXED)	B58	PCIE_RX3+	B95	VGA_I2C_CK
B22	SATA3_TX+	B59	PCIE_RX3-	B96	VGA_I2C_DAT
B23	SATA3_TX-	B60	GND(FIXED)	B97	SPI_CS#
B24	PWR_OK	B61	PCIE_RX2+	B98	RSVD10
B25	SATA3_RX+	B62	PCIE_RX2-	B99	RSVD10
B26	SATA3_RX-	B63	GPO3/SD_CD#	B100	GND(FIXED)
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(FIXED)	B68	PCIE_RX0+	B105	VCC_12V
B32	SPKR	B69	PCIE_RX0-	B106	VCC_12V
B33	I2C_CK	B70	GND(FIXED)	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(FIXED)
B37	USB7+	B74	LVDS_B1-		

8. COM Express Type 6 Features

8.1 Input Power

The COMeT6-1100 supports standard 12 V input, +/- 10%. CPU TDP = 28 W max, software controllable to reduce to 15 W or 12 W TDP via the COMe Type 6 connector a **J4** and **J5**.

8.2 LVDS/eDP

WINSYSTEMS provides two BIOS options for the COMeT6-1100: an eDP output, or an optional dual channel LVDS output. The eDP output is powered by the integrated Intel Gen12 graphics engine, with up to 96 EUs and is capable of 4k resolution output at 24 bits per pixel and 60 Hz refresh rate.

The LVDS output is a population option that adds an LVDS bridge to the eDP output providing support for dual channel LVDS panels.

Contact a WINSYSTEMS application engineer for additional information.

8.3 Digital Display Interface (DDI)

The COMe module provides up to three digital display interfaces via DDI. VGA is also available. This output can be used for DisplayPort, HDMI, or DVI. This eDP output is powered by the integrated Intel Gen12 graphics engine, with up to 96 EUs and is capable of 4k resolution output at 24 bits per pixel and 60 Hz refresh rate.

8.4 HD Audio

HD audio signals from the 11th Gen. Intel Core processor are brought up through the COM Express Type 6 connector per PICMG specifications.

8.5 UART

The COMeT6-1100 provides two TTL compatible, 3.3 V HSUART channels to the COM Express Type 6 connector. If legacy UART's are required, a BIOS setting is available that replaces the two HSUARTS with two legacy UARTS (2F8, 3F8).

8.6 PCI Express

Five channels of PCI Express x1 Gen 3.0 and 1 channel of PCI Express x4 Gen 4.0 lanes are provided from the 11th Gen. Intel Core processor. Five PCIe lanes (channels 0-4) connect directly to the COM Express Type 6 connector (AB).

The four PCIe lanes (channels 0-3) can be arranged in different configurations as shown in the list below. Contact a WINSYSTEMS application engineer for additional information.

- Four x1 PCIe lanes (default)
- Two x1 PCIe lanes, one x2 PCIe lane
- Two x2 PCIe lanes

There is a single PCIe Gen 4.0 /PEG 4 with four lanes. It can only be arranged in this configuration:

- One x4 PCIe lane

The fifth PCIe lane can only be arranged in this configuration:

- One x1 PCIe Lane

8.7 USB Channels

Four channels of USB 3.2 Gen 1 (5 Gb/s), and eight channels of USB 2.0 are provided directly from the 11th Gen. Intel Core i3/i5/i7 processor to the COM Express Type 6 connector.

8.8 SATA 6 Gb/s

The COMeT6-1100 provides two SATA III (6 Gb/s) channels directly to COM Express Type 6 connector.

8.9 Ethernet

One Intel i226 2.5G Ethernet RGMII is provided via PCIe channel 6 (this is not configurable). See “PCI Express” for more information on PCIe lanes and configurations.

8.10 GPIO (General Purpose Input/Output)

The COMeT6-1100 provides 4x GPI and 4x GPO lanes. These GPI/O lanes are 3.3 V CMOS level and EAPI compatible.

8.11 LPC Bus

An LPC bus is provided for adding peripheral devices to the carrier board design. It allows the integration of low-bandwidth legacy I/O components within the system, which are typically provided by a Super I/O controller.

Furthermore, it can be used to interface firmware hubs and general-purpose inputs and outputs.

8.12 SPI Bus

The SPI bus is specifically designed for carrier board BIOS storage and the Trusted Platform Module (TPM). There is no SPI bus availability for external sensors and other peripherals.

8.13 I2C Bus

An I2C bus is provided for attaching external peripherals

9. BIOS Functionality

The COMeT6-1100 BIOS settings and option descriptions can be found in our supplemental COMeT6-1100 BIOS Manual.

9.1 Software Description

This section provides details on the AMI BIOS components to be used in the implementation of the COMeT6-1100 BIOS firmware.

9.1.1 Software Design Specification: UEFI Operating System Support

The BIOS supports the booting of the following UEFI compliant operating systems:

- Windows 10 x64, IoT Enterprise, IoT Core, and Professional
- Linux x64
- Most x86 operating systems

9.1.2 Software Design Specification: Legacy Operating System Support

The BIOS supports the booting of the following legacy OS capabilities:

- Compatibility support module (CSM)
- Legacy boot support
- Legacy option ROM support

9.1.3 Software Design Specification: Boot Device Configuration

The BIOS supports booting an OS from the following devices:

- USB mass storage device
- Serial ATA (SATA) device
- Network boot - PXE
- M.2 mass storage device

9.1.4 Software Design Specification: BIOS Update Mechanisms

The BIOS supports the following update mechanisms:

- BIOS update with UEFI shell
- Software utilities
- Flash recovery via USB mass storage device

9.1.5 Software Design Requirements: BIOS Components

The BIOS includes the following components:

- **Advanced Host Controller Interface (AHCI) support:** Provides SATA host controller functionality.
- **Display switching in setup:** Implements display switching using the UEFI GOP driver under the SETUP environment.
- **Boot order:** Generates the default boot order on the platform's first boot.
- **Boot/resume from S4 device:** Allows the platform to boot from the last S4 hibernated device, disregarding the current boot priority.
- **Cryptographic support:** Provides cryptographic related libraries, PPI, and UEFI protocols for security modules (secure FW update, secure boot, etc.)
- **Source level support:** Provides source level debug functionality for the BIOS project.
- **Fastboot:** Provides optimization of the boot time.
- **Fixed boot order:** Provides infrastructure that allows custom handling of available boot options to meet specific customer needs. Custom boot behavior may include different requests, such as always boot from specific device, default support of various kinds of grouping of boot devices.
- **Generic error logging:** Provides support for logging POST and runtime errors to the GPNV area.
- **Keyboard controller emulation** for USB keyboard/mouse.
- **Physical memory testing:** Supports testing of physical memory present in the system.
- RTC registration and ability to handle wakeup from S5 sleep state.
- **Secure boot support:** provides support and functionality to conform with UEFI 2.3.1 secure boot requirements and includes the following components:
  - Extended functionality of EFI NVRAM driver with support for authenticated EFI variables.
  - EFI image authentication module that installs EFI security architecture protocol with image authentication and image execution policy.

  - Secure boot variable (PK, KEK, db, and dbx) provisioning.
- Support for the booting to the built in UEFI shell.

9.2 BIOS Update with UEFI Shell

9.2.1 Scope

The Unified Extensible Firmware Interface (EFI or UEFI for short) is a new model for the interface between operating systems and firmware. It provides a standard environment for booting an operating system and running pre-boot applications.

An optional feature of a UEFI implementation is the ability to boot the system to a built-in shell. The UEFI shell provides a command prompt and a rich set of commands that extend and enhance the capability of the UEFI BIOS.

This section describes the process for updating the COMeT6-1100 BIOS firmware image using the built-in UEFI shell.

9.2.2 Process

1. Insert a USB flash drive containing the BIOS update program into a USB socket on the COMeT6-1100 platform.
2. Turn on the COMeT6-1100 and press the **ESC** or **DEL** key during the boot process, which starts the BIOS setup utility.
3. In the BIOS setup utility, use the cursor keys to highlight the **Save & Exit** menu option.
4. Use the cursor keys to select **UEFI: Built-In EFI Shell** from the list of boot devices displayed under the **Boot Override** section.
5. Press **Enter**.

   The COMeT6-1100 executes the built-in UEFI shell, and displays a list of attached storage devices. The USB flash drive shows up in the list; depending on other boot devices attached, it may be listed as **fs0**, **fs1**, etc.

6. From the UEFI shell command prompt, enter the following command where `N` is the number of the fs device representing the USB flash drive:

   ```
   fsN:
   ```

   Example: `fs1:`

   The shell prompt changes to indicate that device fsN is now the active storage device, e.g., `fs1:`

7. Execute the following command:

   ```
   ls
   ```

The output of the `ls` command is similar to the display listing available with the Linux list directory command. If the correct storage device was selected in step 6 above, the `ls` command should show the BIOS update program in the directory listing obtained with the ls command.

8. Assuming the BIOS update program is named `Update.efi`, enter the following command at the shell command prompt:

   ```
   Update.efi
   ```

   The BIOS update program begins executing.

9. When the update program completes, power cycle the platform to force the new BIOS image to load and execute.
10. Verify that the BIOS update was successful by comparing the displayed BIOS version with the version specified in the BIOS update notification.

10. Accessories

WINSYSTEMS provides accessories to complete your embedded computing solution. Contact WINSYSTEMS at 817-274-7553 and connect to one of our sales team members. They will guide you through product selection and customization options.

Accessory part numbers:

Item	Part Number	Description
COM Express® Type6 evaluation carrier board	ATX-M-CC462-T6	Micro-ATX COM Express® Type 6 Evaluation Carrier Board. Compatible with all standard PICMG-compliant COM Express Type 6 processor modules.
Cable Set	CBL-SET-462-1	Cable Set for Evaluation carrier board. Includes all necessary cables.

11. Software Drivers

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

12. Development Kit

The COMET6-DEVKIT-460-I7 is designed for rapid testing and evaluation of WINSYSTEMS' COM Express Type 6 processor modules. This DevKit ships with WINSYSTEMS' COMET6-1185GRE-32IL module and 11th Gen Intel® CORE™ i7 UP3-Class embedded processor.

The DevKit includes all essential components for quick and easy system setup so you can start programming right out of the box.

The included ATX-M-CC462-T6 evaluation carrier board is a standard MicroATX form factor and fully supports all the WINSYSTEMS COMeT6-1100 COM Express Type 6 modules with the Intel® 11th Gen CORE™ i3/i5/i7 processors, plus other OEM PICMG-compliant COM Express Type 6 modules.

Contact WINSYSTEMS at 817-274-7553 and connect to one of our sales team members for pricing and availability of DevKits.

Development Kit part numbers

Item	Part Number	Description
COM Express Type6 DevKit	COMET6-DEVKIT-460-17	This DevKit ships with WINSYSTEMS' COMET6-1185GRE-32IL module and 11th Gen Intel® CORE™ i7 UP3-Class embedded processor. **DevKit Contents** • COM Express Type 6 Module (i7, 32GB): COMET6-1185GRE-32IL • COM Express Type 6 Evaluation Carrier Board: ATX-M-CC462-T6-0-0 • Thermal Control Solution: COMET6-460-HTSKF-0 (heatsink with fan) • PCIE to NVME Adapter: TST-PCIE-NVME-X4 • NVME Drive (1TB) with Windows 10 pre-installed: OE462W10H30-460-PROG • DisplayPort Cable (x2): CBL-DP-6A • VGA Interface Cable: CBL-234-G-1-1.375C • SATA Cable (x2): CBL-SATA-701-20 • Serial Bus Cable (x2): CBL-SER2-202-12A • Dual USB A 3.0 Adapter with Panel Bracket: CBL-USB2-U03-08A • Dual USB A 2.0 Adapter with Panel Bracket: CBL-USB2-U12-11A • CAT8 Ethernet Cable: CBL-ENET-060A

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the COMeT6-1100 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 COMe Type 6 module and carrier board's typical load is not lower than the power supply's minimum load. If the COMe Type 6 module and carrier board 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 COMeT6-1100.

Use Proper Power Connections (Voltage)
When verifying the voltage, measure it at the power connector on the carrier board. Measuring it at the power supply does not account for voltage drop through the wire and connectors.

The COMeT6-1100 requires 12 V input (+/- 10%) to operate. Verify the power connections. Incorrect voltages can cause catastrophic damage.

Power Harness

Minimize the length of the power harness. This reduces the amount of voltage drop between the power supply and the COMeT6-1100.

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 embedded system. Do not hot-plug the COMeT6-1100 on a host carrier board 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.

Mounting and Protecting the COMeT6-1100

To avoid damage, mount the COMeT6-1100 properly. Standoff kits are available and recommended for use with the COMeT6-1100.

Placing the COMeT6-1100 on mounting standoffs—Be careful when placing the COMeT6-1100 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 COMeT6-1100—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. Traces are often routed in the inner layers right below, above, or around the mounting holes.

- Never use a drill or any other tool in an attempt to make the holes larger.
- Never use screws with oversized heads. The head could come in contact with nearby components causing a short or physical damage.
- Never use self-tapping screws; they 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.

Avoid cutting the COMeT6-1100—Never use star washers or any fastening hardware that cut into the COMeT6-1100.

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.

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 product has an Operations manual or Product manual.

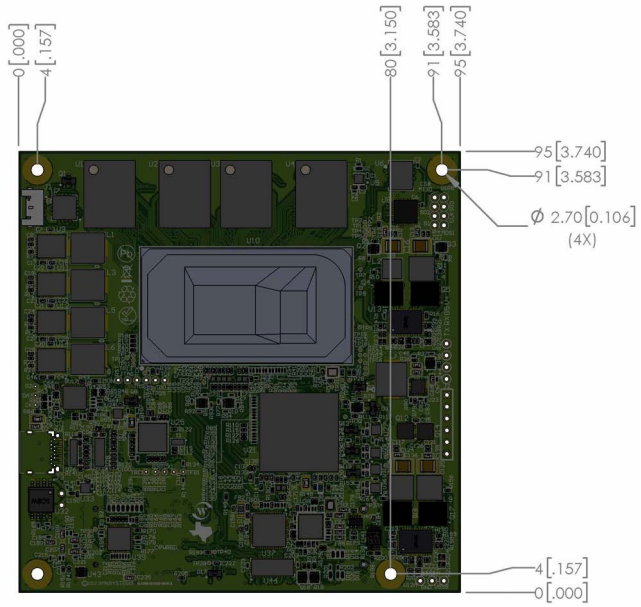
Periodic updates—Operations/product manuals are updated often. Periodically check the WINSYSTEMS website (https://www.winsystems.com/) for revisions.

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.

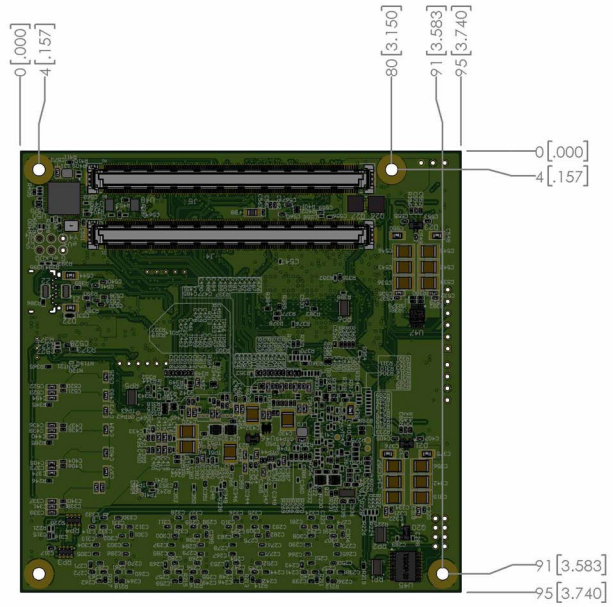
Contact an applications engineer—If a diagram or chart in a manual does not seem to match your board, or if you have additional questions, contact a WINSYSTEMS applications engineer at +1-817-274-7553.

Appendix B. Mechanical Drawings

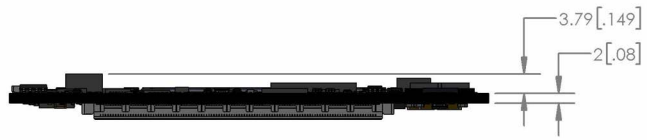
COMeT6-1100 Top View



COMeT6-1100 Bottom View



COMeT6-1100 Side View



Appendix C. Warranty Information

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