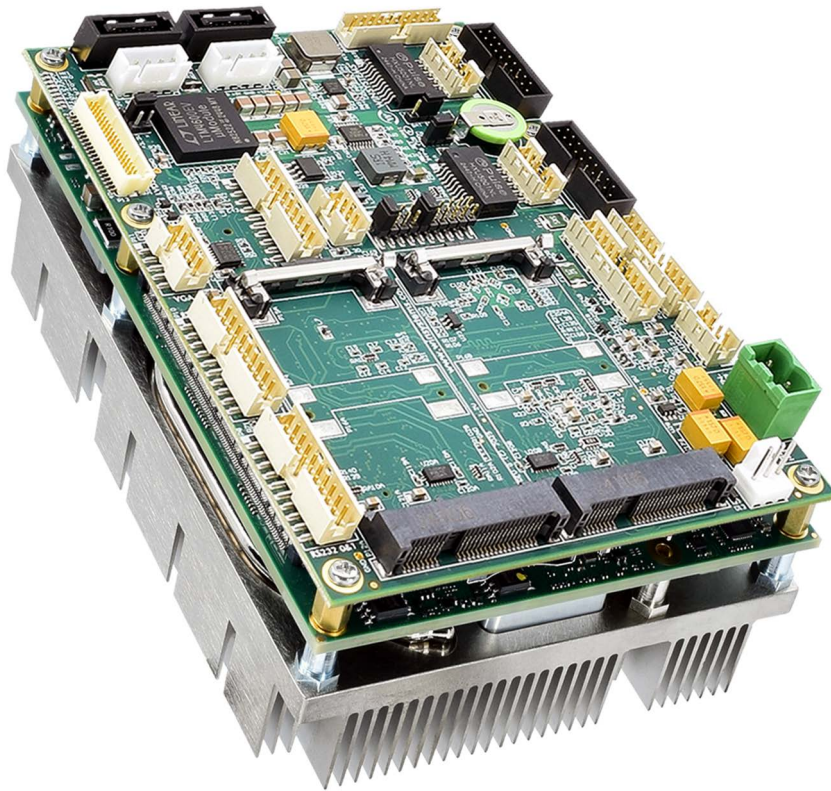# WINSYSTEMS®

SBC-477-TS570

Rugged Compact Carrier with Intel® Xeon®
W-11865MRE COM Express Type 6 Module,
Mini PCIe expansion and USB 3.0

Product Manual

Revision History

Copyright and Trademarks

Document Version	Last Updated Date	Brief Description of Change
v1.0	12/18/2024	Initial release
v1.1	12/20/2024	Added VGA section
v1.2	01/06/2025	Update unit weight
v1.3	06/20/2025	Updated warranty page and product images.
v1.4	07/14/2025	Updated product number, mechanical drawings and ordering information

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1. Before You Begin

Review the warnings in this section and the best practice recommendations (See "Best Practices" on page 38.) when using and handling the WINSYSTEMS SBC-477-TS570 module. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SBC-477-TS570 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 SBC-477-TS570. 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 SBC-477-TS570. 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 SBC-477-TS570.

3. Functionality

This SBC-477-TS570 COM and Carrier combination is a compact SBC board which matches the dimensions of a COM Express® Type 6 Basic module and offers the ultimate durability with locking, rugged pin headers.

The SBC-477-TS570 is ideal for space constrained applications, harsh environments, demanding conditions and supports extended temperature ranges of -40°C to +70°C.

The COM module is an industrial COM Express Type 6 Basic module with an Intel® Xeon® W-11865MRE processor. 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 SBC-477-TS570 supports Microsoft® Windows 10 IoT Enterprise Microsoft® Windows 11 IoT Enterprise and Linux (Ubuntu) operating systems. Drivers are available from the WINSYSTEMS website at https://www.winsystems.com/.
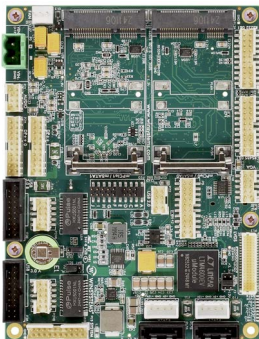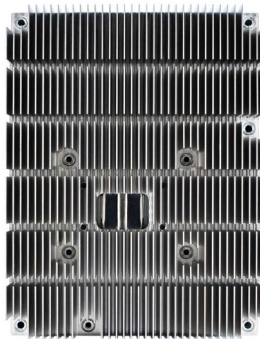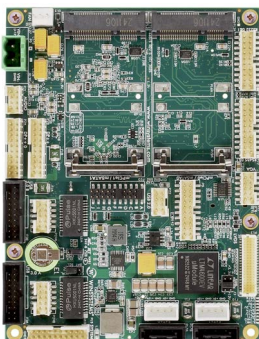
4. Product Features and Specifications

Carrier Board Features and Specifications	
Compatibility	COM Express Type 6 Modules PICMG COM Express® COM.0 R2.0
Processor	Intel® Xeon® W-11865MRE 8 Cores, 16 Threads (4.7GHz) Cache: 24 MB Power: 45W typical
Memory	Up to 96GB DDR4 SODIMM
Expansion	Mini PCIe Expansion: Both sockets have PCIe, USB and SATA signaling for mSATA operation. One socket support SIM Card expansion. • 2x Full length cards • 1x SIM Card option
Storage	• 2x mini PCIe slots that can be used for mSATA • 2x SATA ports with External Vertical Locking Connector
Network	2x Ethernet Ports • 1x Port 0, Intel I226IT, 2.5Gb from COM Express • 1x Port 1, 1Intel 82574I, 1Gb from Carrier
Security	• On-board discrete TPM 2.0 hardware security • vPro® Security Platform
GPIO	8-bit GPIO
USB 2.0	4 x USB 2.0 Ports (2 used for miniPCIe)
USB 3.0	4 x USB 3.0 Ports
Display	4K UltraHD 2x DisplayPort++ (DDI) interface, which can be used for DisplayPort, HDMI, DVI or VGA 1x VGA (Analog/CRT) 1x LVDS interface (single ch 24-bit, dual ch 48-bit)
Audio	HD Audio (Cirrus Logic CS4207 codec) 1x stereo input 1x stereo output
Serial	1x Console RS-232 port (TX/RX) 2x RS-232 (w/ full modem signals) 2x RS-422/485
Operating System	• Microsoft® Windows 11 IoT Enterprise • Microsoft® Windows 10 IoT Enterprise • Linux (Ubuntu) • Other x86 real-time OS
Software	• Custom configurable UEFI based AMI BIOS • System Management Libraries and Tools

Carrier Board Features and Specifications	
External Interfaces	• SMBus • 12C • Battery Low Indication • PC speaker Interface • System Status (S3 and Reset Outputs)
V$_{CC}$	Input: +12V DC input +/- 5% (5mm pitch terminal connector) (Recommend power supplies with > 120W power budget)
Battery	On-board RTC Battery 3V 48mAh (BR1125A) With option to select from RTC external battery)
I/0 Connectors	All low-profile shrouded locking ruggedized 2mm pitch headers. Can be mated to panel mountable cable set or MIL type connectors.
I/0	• 8-bit GPIO • 4x USB 2.0 (2 used for Mini PCIe) • 4x USB 3.0 • 2x Mini PCle • 1x Console RS-232 port (TX/RX) • 2x RS-232 (w/ full modem signals) • 2x RS-422/485 • SMBus • I2C
Mechanical Information	SBC-477-TS570-2 is 125mm x 95mm x 53mm SBC-477-TS570-3 is 125mm x 97mm x 53mm
Weight	SBC-477-TS570-2 is 590g / 20.8oz SBC-477-TS570-3 is 590g / 20.8oz
Thermal Solution	SBC-477-TS570-2 with Heatsink SBC-477-TS570-3 with Heatsink with fan
MTBF	717,128 hrs
Operating Temperature	-40°C to +70°C (-40°F to +158°F) (See NOTE below table)
Humidity (RH)	5% to 95% non-condensing
RoHS Compliant	Yes
CE Compliant	Yes
Warranty and Support	Limited two-year Warranty and Free Technical Support.

NOTE Requires appropriate custom thermal solution to achieve maximum 85°C. 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.

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

5.   Part Numbers / Ordering Information

Part Number	Description
SBC-477-TS570-2	With Heatsink
SBC-477-TS570-3	With Heatsink and Fan

Part Number	Top View	Bottom View
SBC-477-TS570-2		
SBC-477-TS570-3		

6. Product Overview

6.1 Block Diagram
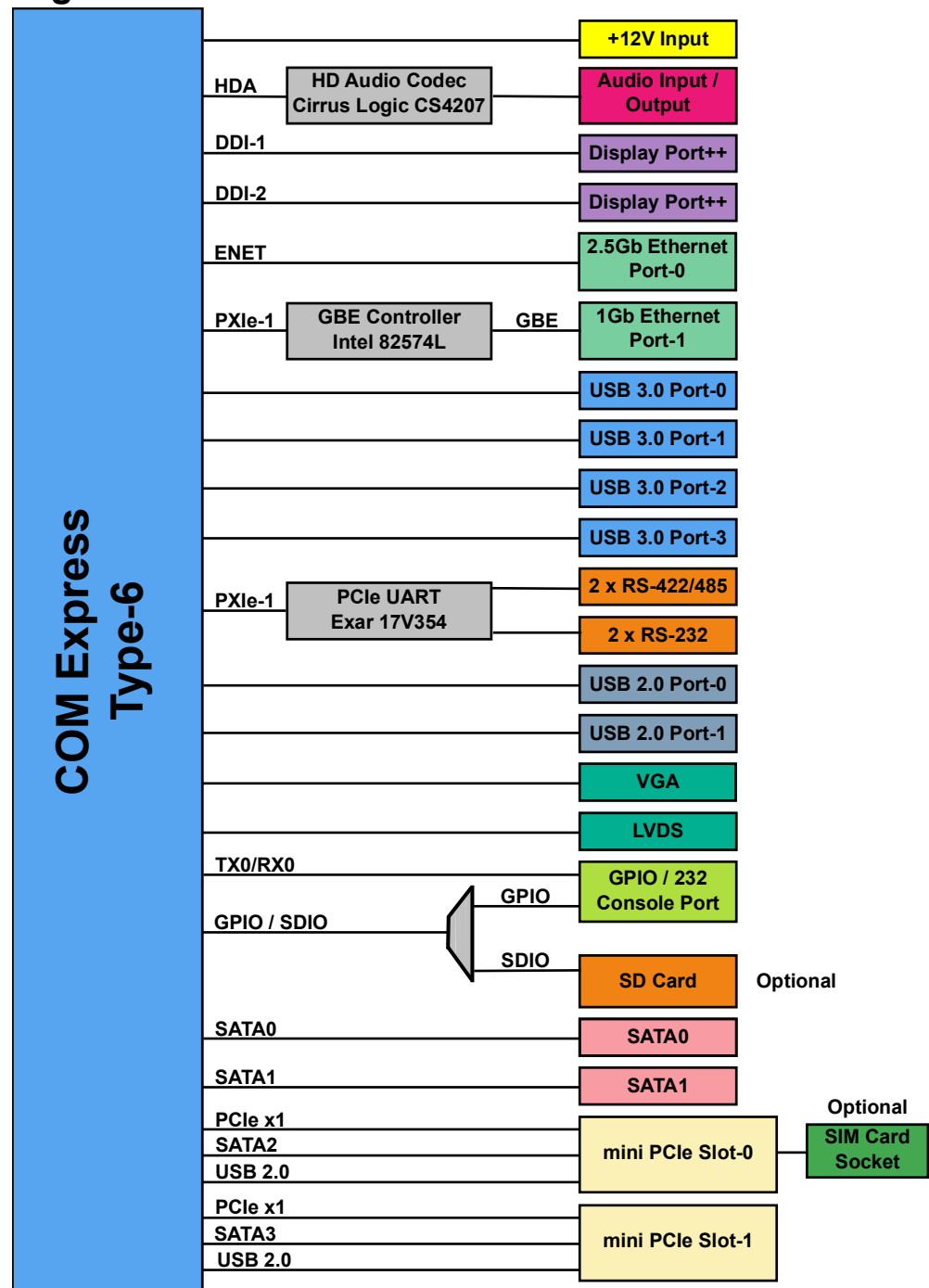
7. Connector Locations

This section describes the SBC-477-TS570 components and configuration.

Carrier Top View

COM Bottom View

SODIMM Sockets
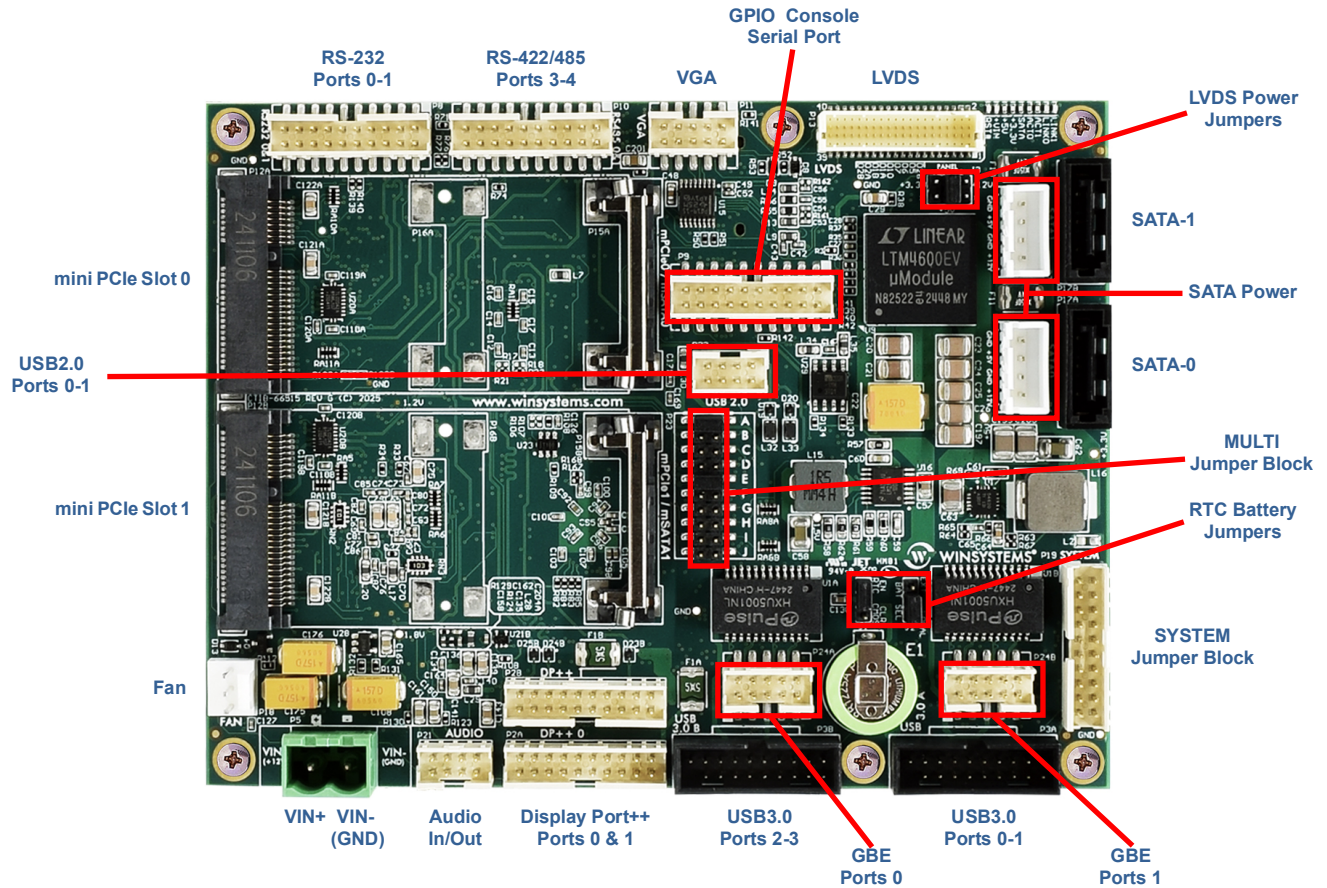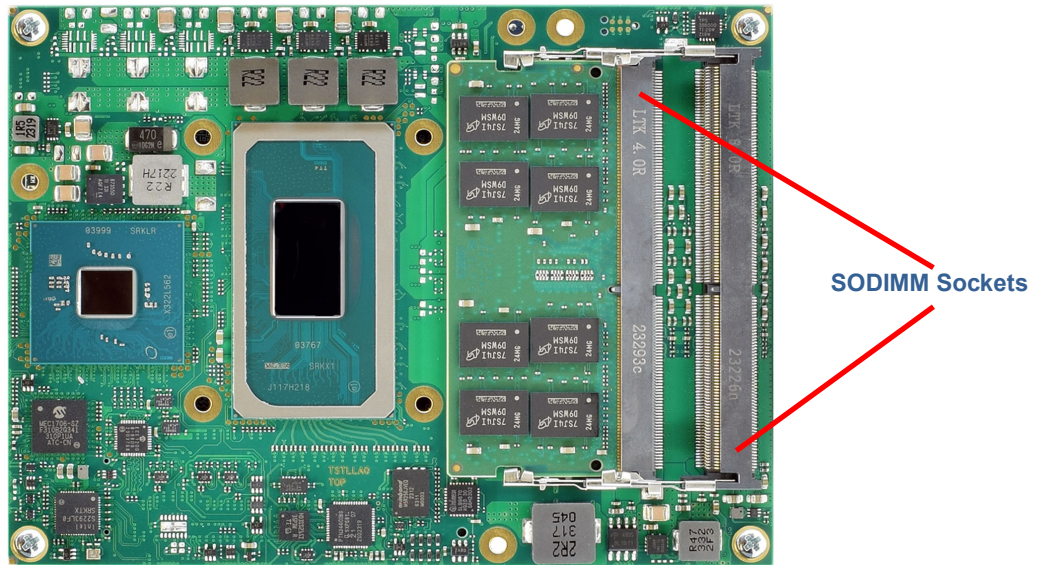
Carrier Bottom View

(Showing Options Below)

micro SD Card Slot P4

SIM Card Slot for mini PCIe/mSATA P20

(See NOTE Below)

NOTE SIM's Card option requires a WAN interface controller card that allows the device to connect to a wide area network.

8. Carrier Jumper and Connector Summary

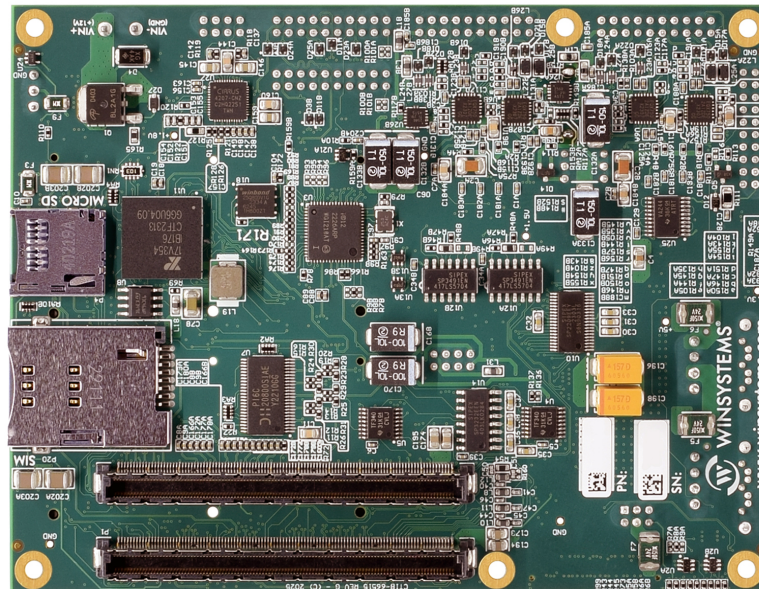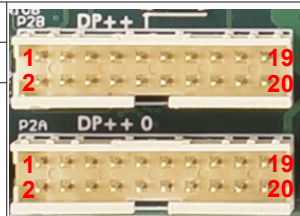| Item	Description	Reference
P2A P2B	DisplayPort ++ Video	page 16
P3A	USB 3.0 Ports 0, 1	page 17
P3B	USB 3.0 Ports 2,3	
P4	Micro SD card (Optional)	page 18
P5	+12VDC Power In	page 19
P6, P7	External SATA HDD Power	page 30
P8, P10	Asynchronous Serial Ports	page 20
P8	RS232 (Ports 1 & 2)	page 21
P9	GPIO and COM Express Type 6 simple serial	page 23
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P22	USB2.0 Connector	page 33
P23	Multifunction Jumper Block	page 34
P24A P24B	10/100/1000 Ethernet	page 33
J1	RTC Clear	page 20
J2	RTC Selection	page 20
J3	LVDS power selection	page 29

9. Detailed Feature Pinouts and Descriptions

9.1 DisplayPort ++ Video [P2A,P2B]

The SBC-477-TS570 Carrier features two DisplayPort++ connectors. This can be configured to output Display Port and HDMI/DVI.

The configuration of each interface is setup via the COM Express module's BIOS settings. Refer to the COM Express module's documentation for more details.

Function	DisplayPort++ Video Output Connectors			
Location	P2A, P2B			
Type	FCI 98414-G06-20LF, 2x10 2mm			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	DP0+	2	DP3+
	3	DP0-	4	DP3-
	5	GND	6	GND
	7	DP1+	8	DPAUX-
	9	DP1-	10	DPAUX+
	11	GND	12	GND
	13	DP2+	14	DP Hot Plug Detect
	15	DP2-	16	GND
	17	GND	18	GND
	19	DP Power	20	DP AUX SEL [1]

[1]- For **DP_AUX_SEL**-Cable assembly must tie high (+3.3V) for HDMI/DVI output and low (GND) for DisplayPort output.

9.2   HDMI / DVI / VGA from DisplayPort++

The SBC-477-TS570 DisplayPort++ connector can be used for display outputs other than DisplayPort. The use of HDMI, DVI or VGA can be done through a simple dongle or cable assembly like the ones shown below. These can be purchased from any OEM vendor (such as www.startech.com) or contact Winsystems.

9.3   USB 3.0 Ports [P3A,P3B]

The SBC-477-TS570 implements 4x USB 3.0 ports on two 19-pin headers, 2x USB 2.0 ports on 8-pin headers and 2x through the miniPCIe slots. Below is a description of the 19-pin USB 3.0 headers on the SBC-477-TS570 carrier.

Each USB 3.0 port is capable of bitrates of up to 5Gbps, as well as accepting USB 2.0 and below connections.

Function	Dual, USB 3.0			
Location	P3A, P3B			
Type	Intel Locking Motherboard Style 19-pin USB 3.0 connector			
Pinout	Pin	Description	Pin	Description
	-	-	1	P1-VBUS
	19	P2-VBUS	2	P1-SSRX-
	18	P2-SSRX-	3	P1-SSRX+
	17	P2-SSRX+	4	GND
	16	GND	5	P1-SSTX-
	15	P2-SSTX-	6	P1-SSTX+
	14	P2-SSTX+	7	GND
	13	GND	8	P1-D-
	12	P2-D-	9	P1-D+
	11	P2-D+	10	-
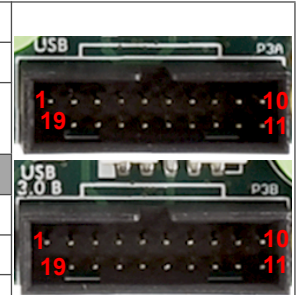
9.4   MicroSD Card [P4] (Optional)

The SBC-477-TS570 provides a Micro SD Card Slot at P4. This Micro SD Card slot sources the SDIO interface from the COM Express modules GPIO pins.

NOTE This SD card slot will ONLY operate if the COM Express module provides the SDIO interface over the GPIO pins. See below for the SDIO / GPIO mapping.

Also ensure **MULTI-JUMPER position "B"** is installed to select the SDIO interface.

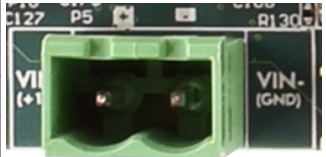| Function	micro SD Card Slot		
Locations	P4		
Type	Micro SD Card Socket Molex 502570-0893		
Pinout	**Pin**	**SDIO Signal**	**COM Express GPIO Mapping**
	1	SD D2	GPI2
	2	SD D3	GPI3
	3	SD CMD	GP01
	4	SD_VCC (+3.3V)	-
	5	SD CLK	GPO0
	6	GND	-
	7	SD D0	GPIO
	8	SD D1	GPI1
	9	GND	-
	10	SD CD#	GP03

micro SD Card Slot

9.5   Input Power [P5]

The SBC-477-TS570 is designed to be powered from a regulated single +12VDC power supply. The carrier board features a 5mm screw terminal style connector. The COM Express carrier generates all of the necessary voltages on board from this single input.

Function	Main Input Power			
Locations	P5			
Range	+12V DC (+/-5%)			
Type	2 Position 5mm pitch terminal connector Mating Connector: PN: 796634-2 MFG: TE Connectivity			
Power Supply	Recommend power supplies with > 120W power budget.			
Fuse	+12V is protected with a one-time 10A fuse, at F4.			
Pinout	**Pin**	**Signal**	**Description**	
	1	+12V	Power In	
	2	GND	Power Return	
	*DO NOT REVERSE POLARITY!			VIN+ VIN- +12V GND

9.6   RTC Battery [J1, J2]

The Panasonic Lithium battery (BR1225A/FA) provides 3V@48mAh to VBAT. VBAT is the supply for the RTC Clock of the COM Express module.

If the BR1225A is not sufficient for the application, an external battery can be connected to P19 with J2 selection jumper set appropriately.

NOTE The battery ships with a non-conductive label to prevent accidental discharge. It can be removed before installation.

Function	RTC Clear	
Locations	J1	
Type	1x3	
Pinout	Location	Description
	1-2	Enable RTC
	2-3	Clear CMOS

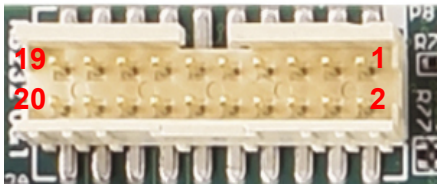| Function	RTC Battery Selection	
Locations	J2	
Type	1x3	
Pinout	Location	Description
	1-2	External battery
	2-3	Local On-board Battery

9.7   Asynchronous Serial Ports [P8, P1O]

The SBC-477-TS570 features four "external" serials ports. Portl and Port2 are standard RS-232 and Port3 and Port4 can be configured as RS-422/485. These serial ports are generated from on-board PCie 4-port UART the Exar 17V358

9.8   Software Support for the Exar 17V358

Additional drivers will be needed to properly operate the 4 additional serial ports on the COM Express carrier. Drivers for this functionality can be found on Winsystems website: https://www.winsystems.com/.

9.9 Serial Connector RS-232 [P8]
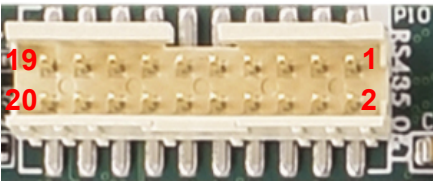
Function	RS232 Serial			
Location	P8			
Type	FCI 98424-G52-20LF, 2x10 2mm			

Pinout	Pin	Description	Pin	Description
	1	Port A, DCD	2	Port A, DSR
	3	Port A, RXD	4	Port A, RTS
	5	Port A, TXD	6	Port A, CTS
	7	Port A, DTR	8	Port A, RI
	9	GND	10	-
	11	Port B, DCD	12	Port B,DSR
	13	Port B,RXD	14	Port B,RTS
	15	Port B,TXD	16	Port B,CTS
	17	Port B,DTR	18	Port B,RI
	19	GND	20	-

9.10 Serial Connector RS-422/485 [P10]

Function	RS485 Serial
Location	P10
Type	FCI 98424-G52-20LF, 2x10 2mm

Pinout	Pin	Description
	1	Port A, RXD+
	3	Port A, TXD+
	5	Port A, TXD-
	7	Port A, RXD-
	9	GND
	11	Port B,RXD+
	13	Port B,TXD+
	15	Port B,TXD-
	17	Port B,RXD-
	19	GND

9.11 Serial Connector RS-422/485

The RS485 Control Jumpers are used for implementing the following RS485 modes of operations:

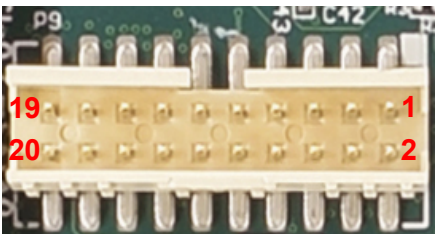- 1/2 Duplex Multidrop
- Full Duplex Multidrop

The UART RTS signals can be used for TX/RX control and can be enable via the MULTI jumper block. See below for the RS-422/485 circuit diagram.
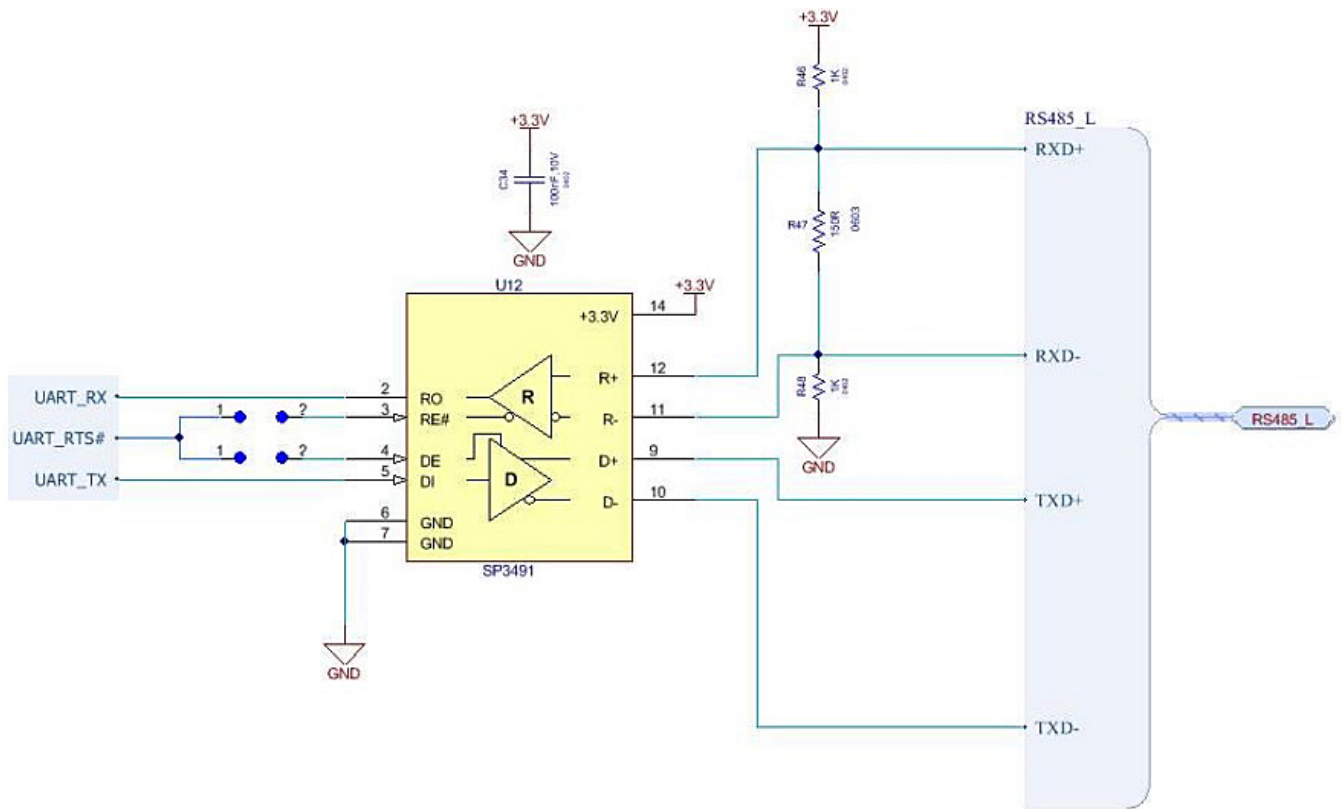
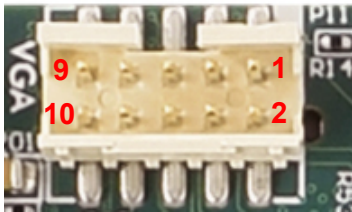Sample circuit shown (not exact circuit that is on-board)
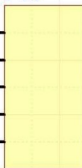
9.12 GPIO and Console Serial Port [P9]

The SBC-477-TS570 provides additional functionality of COM Express Type-6 specification.

Function	Console RS-232 / GPIO			
Location	P9			
Type	FCI 98424-G52-20LF			

Pinout	Pin	Description	Pin	Description
	1	GPIO Input 0	2	GPIO Output 3
	3	GPIO Input 1	4	GPIO Output 2
	5	GPIO Input 2	6	GPIO Output 1
	7	GPIO Input 3	8	GPIO Output 0
	9	GND	10	-
	11	-	12	-
	13	RS-232 RX	14	-
	15	RS-232 TX	16	-
	17	-	18	-
	19	GND	20	-

9.13 VGA Video [P11]

To allow for greater flexibility, the COM Express Type 6 Carrier provides a VGA Video Output. Routed directly from the COM Express Type-6 Module, this provides additional video output formats for operation. Please be advised that COMe modules with Sky lake series of Intel processors and newer no longer support a native VGA output as such some COMe Vendors have added an on-board DP to VGA in which may limit you display capabilities.

Function	Standard VGA			
Location	P11			
Type	FCI 98424-G52-10LF, 2x5 2mm header			
Pinout	Pin	Description	Pin	Description
	1	Red	2	GND
	3	Green	4	-
	5	Blue	6	SC DDC
	7	HSYNC	8	SD DDC
	9	VSYNC	10	GND

9.14 miniPCIe Slots [P12A, P12B]

Dual Function miniPCIe Slots

The SBC-477-TS570 has two special dual purpose functionality mini PCIe / mSATA slots. Each of these slots can accept either a mini PCIe module or a mSATA SSD module. These slots have special circuitry that allows for the selection between connecting PCIe lanes or SATA lanes.

Each of these slots are also provided with a USB 2.0 in addition to the PCIe as per the mini PCIe specification, see below for a block diagram of the slots functionality.

A SIM Card can be used in Slot-0 only.
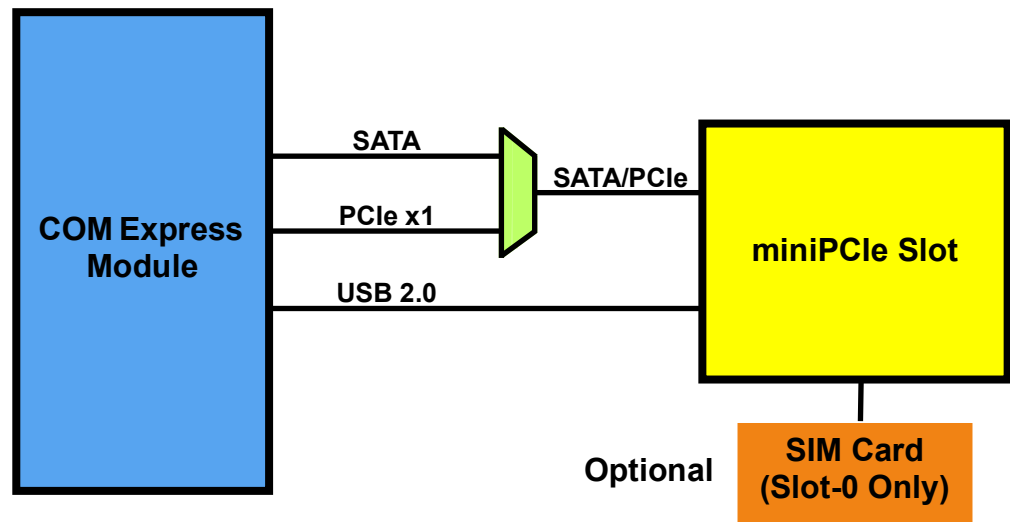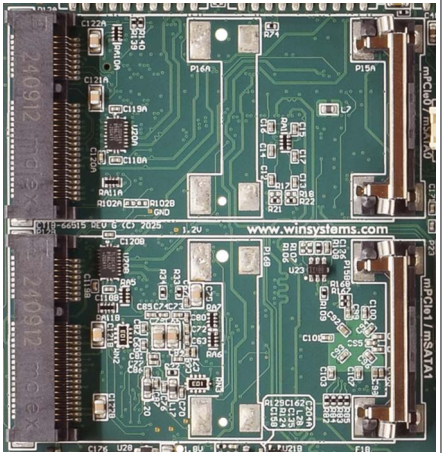
PCIe / SATA Dual Functionality Diagram

Selection between mSATA and miniPCIe is done on the MULTI-JUMPER block (P23)

Position	Jumper ON	Jumper OFF
C	Slot-0 miniPCIe selected	Slot-0 mSATA selected
D	Slot-1 miniPCIe selected	Slot-1 mSATA selected
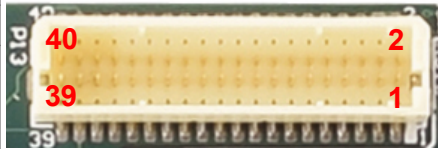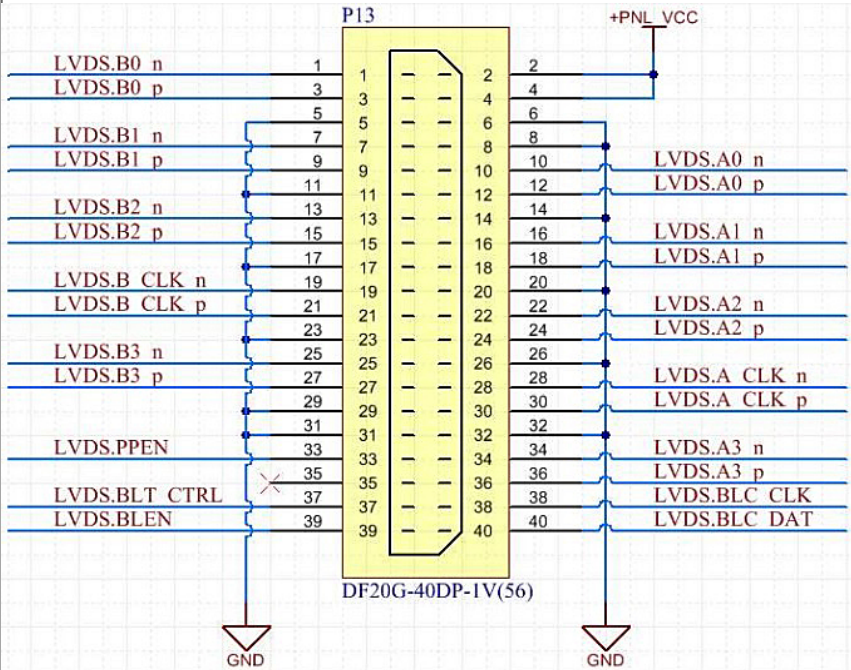
9.15 Full Length mini PCIe/mSATA Installation [P12A, P12B]

The SBC-477-TS570 comes with its latches in the full length position.

Function	mini PCIe / mSATA Slots
Location	P12A, P12B
Type	Standard miniPCIe Slots
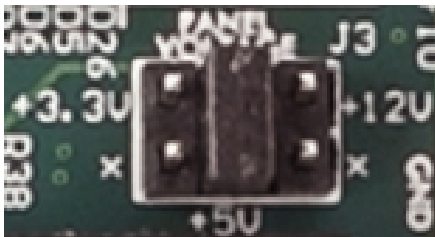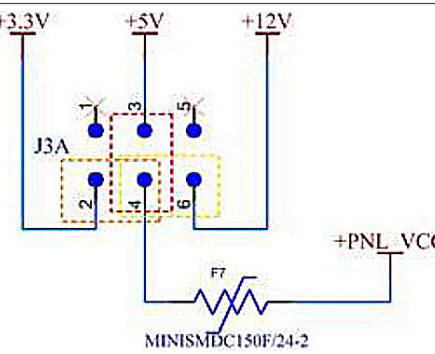
Position

mSATA Pinout

Pin Number	Description
1	NC
2	+3.3V
3	NC
4	GND
5	NC
6	+1.5V
7	NC
8	NC
9	GND
10	NC
11	NC
12	NC
13	NC
14	NC
15	GND
16	NC
17	NC
18	GND
19	NC
20	NC
21	RESV
22	NC
23	SATA TX+ To Host System
24	+3.3V
25	SATA TX- To Host System
26	GND
27	GND
28	+1.5V
29	GND
30	NC
31	SATA RX- From Host System
32	NC
33	SATA RX+ From Host System
34	GND
35	GND
36	NC
37	GND
38	NC
39	+3.3V
40	GND
41	+3.3V
42	NC
43	RESV
44	NC
45	NC
46	NC
47	NC
48	+1.5V
49	NC
50	GND
51	NC
52	+3.3V

miniPCIe Pinout

Pin Number	Description
1	NC
2	+3.3V
3	NC
4	GND
5	NC
6	+1.5V
7	CLKREQ#
8	UIM_PWR
9	GND
10	UIM_DATA
11	PCIe CLK+
12	UIM_CLK
13	PCIe CLK-
14	UIM_RESET
15	GND
16	UIM_VPP
17	NC
18	GND
19	NC
20	W_DISABLE#
21	RESV
22	NC
23	PCIe RX+ To Host System
24	+3.3V
25	PCIe RX- To Host System
26	GND
27	GND
28	+1.5V
29	GND
30	SMB_CLK
31	PCIe TX- From Host System
32	SMB_DATA
33	PCIe TX+ From Host System
34	GND
35	GND
36	USB D-
37	GND
38	USB D+
39	+3.3V
40	GND
41	+3.3V
42	NC
43	RESV
44	NC
45	NC
46	NC
47	NC
48	+1.5V
49	NC
50	GND
51	NC
52	+3.3V

9.16 LVDS Video [P13]

Function	LVDS Video
Location	P13
Type	Hirose DF20G-40DP-1V(56)

Pinout	

9.17 LVDS Panel VCC [J3]

The LVDS Panel VCC voltage is selected via the J3 jumper block. The current is limited to 1.5A

Function	LVDS Panel VCC voltage		
Location	J3		
Type	2x3		
Pinout	Location	Description	
	2-4	3.3V	
	3-4	5V	
	6-4	12V	

9.18 External SATA Ports [P17A, P17B]
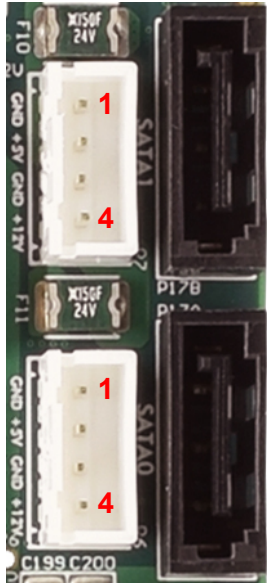
The SBC-477-TS570 provides two SAT A HDD connections as well as external power connectors for each drive.

Function	SATA host	
Location	P17A- SATA- 0 P17B - SATA-1	
Type	Industry standard vertical entry SATA host locking connector.	
Pinout	**Pin**	**Description**
	1	GND
	2	SATA_TX_P
	3	SATA_TX_N
	4	GND
	5	SATA_RX_N
	6	SATA_RX_P
	7	GND

9.19 External SATA HDD Power [P6, P7]
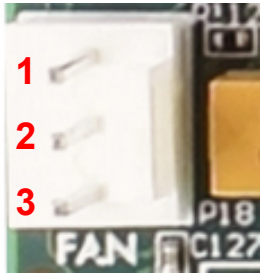
Function	SATA HDD Power	
Locations	P6, P7	
Carrier Connector PN	B4B-XH-AM(LF)(SN)(P) Manufacturer: JST	
Mating Connector PN	XHP-4 Manufacturer: JST	
Pinout	**Pin**	**Description**
	1	GND (Black)
	2	+5V (Red)
	3	GND {Black}
	4	+12V (Yellow)
	+12V and +5V are protected with 1200mA Raychem Poly fuses.	

NOTE The SATA power connectors are fused independently from the main +12V fuse that provides + 2V power to the board, i.e. the SATA power connectors are not double fused.

9.20 CPU Fan [P18]
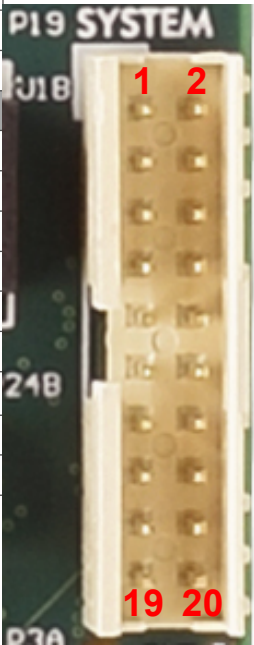
Function	Fan Power	
Locations	P18	
Type	Molex 22-23-2031	
Pinout	**Pin**	**Signal**
	1	Fan Tach
	2	+V
	3	GND
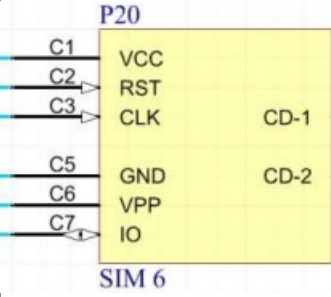
9.21 Miscellaneous Control Header [P19]
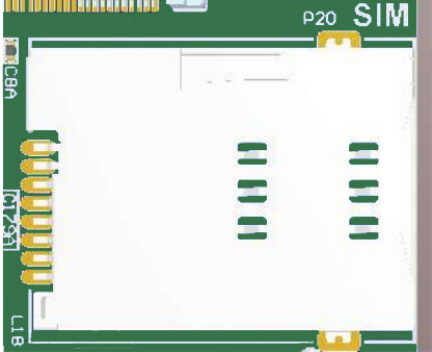
This misc header can be used to connect power button, reset button, PC speaker, I2C device and monitor other power rails. As well it provides the option of jumping the +5V rail to the +5VSB rail which may be needed by some modules.

Function	Miscellaneous Control Header			
Location	P19			
Type	FCI 98414-G06-20LF, 2x10 2mm			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	+5V	2	Speaker
	3	+5V	4	+5VSB
	5	Ext CMOS Bat	6	GND
	7	System Reset	8	GND
	9	Power Button	10	GND
	11	Batlow#	12	GND
	13	Sus_S3#	14	GND
	15	I2C.CLK	16	GND
	17	I2C.DAT	18	GND
	19	+5V	20	GND

9.22 SIM card slot [P20] (Optional)
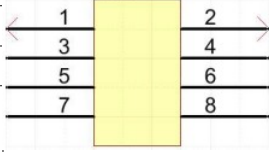
Function	SIM Socket
Location	P20
Type	Molex 0475530001
Pinout	

9.23 Audio Interface [P21]

The SBC-477-TS570 features HD Audio capabilities. 1 input (microphone) and 1 output (headphone) are available.
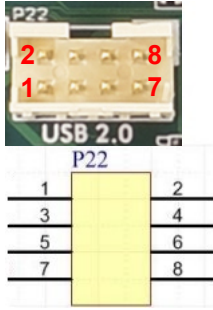
Function	Audio Connector			
Location	P21			
Type	FCI 98414-G06-08LF, 2x4 2mm			
Pinout	Pin	Description	Pin	Description
	1	-	2	-
	3	MicR	4	Micl
	5	GND	6	GND
	7	Head Phone R	8	Head Phone L

9.24 USB2.0 Connector [P22]

The SBC-477-TS570 has 2 external USB 2.0 ports. Each of these are directly sourced from the COM Express Type 6 module and do not go through any external hubs or bridges.

Function	USB 2.0			
Location	P22			
Type	FCI 98414-G06-08LF, 2x4 2mm			
Pinout	Pin	Description	Pin	Description
	1	Port A-VBUS	2	Port B-VBUS [1]
	3	Port A-D-	4	Port B-D-
	5	Port A-D+	6	Port B-D+
	7	Port A-GND	8	Port B-GND
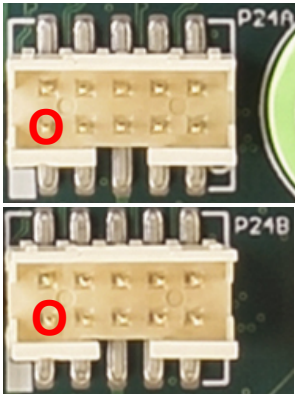
[1] - **B-VBUS**- This voltage can be disable for USB Client mode on USB port 6, by un-installing jumper P23 position A.

9.25 10/100/1000 Ethernet [P24A, P24B]

The SBC-477-TS570 features dual 10/100/1000 Ethernet Ports
Ethernet Port 0 is coming directly from the COM Express module.
Ethernet Port 1 is coming from an Intel 82574 PCIe PHY Controller located on the carrier.

Function	LAN Connector			
Location	P24A, P24B			
Type	FCI 98424-G52-10LF			
Pinout	Pin	Description	Pin	Description
	1	MX1-	2	MX1+
	3	MX2-	4	MX2+
	5	SHELL	6	SHELL
	7	MX3-	8	MX3+
	9	MX4-	10	MX4+

9.26 Software Support for the Intel 82574

Additional drivers will be needed to properly operate the GBE Port 0 on the COM Express carrier.

These drivers can be downloaded directly from link below.

https://www.intel.com/content/www/us/en/download-center/home.html?lang=eng&ProductFamily=Ethemet+Components&ProductLine=Ethemet+Controllers&ProductProduct=Intel%C2%AE+82574+Gigabit+Ethemet+Controller

9.27 Multifunction Jumper Block [P23]

The SBC-477-TS570 has a multi-function jumper that provides control for various interfaces and features. The "MULTI" jumper is located at P23.

Below are the full details of the MULTI jumper block functionality.

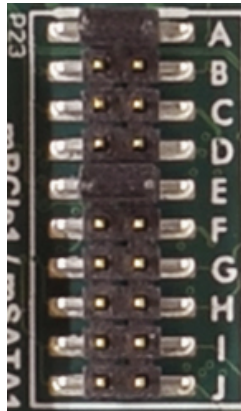| Position	Description	JUMPER IN	JUMPER OFF
A	USB Port-6 Client/Host	Port-6 USB Host enabled. Power connected	Port-6 USB Client enabled. Power Disconnected
B	SD Card/ GPIO Mux	SD Card Functionality is enabled	GPIO Functionality is enabled
C	mSATA / miniPCIe Slot-0 Selection	miniPCIe enabled	mSATA enabled
D	mSATA / miniPCIe Slot-1 Selection	miniPCIe enabled	mSATA enabled
E	PCIe UART EEPROM	Enable PCIe UART EEPROM	Disable PCIe UART EEPROM
F	PCIe UART - TRI State Enable	Enable TRI-State control for PCIe UART	Disable TRI-State control for PCIe UART
G	PCIe UART - 485 Port 0- RTS-TX Control	Enable RS-485 Port-0 RTS-TX Control	Disable RS-485 Port-0 RTS· TX Control
H	PCIe UART - 485 Port 0- RTS-RX Control	Enable RS-485 Port-0 RTS-RX Control	Disable RS-485 Port-0 RTS-RX Control
I	PCIe UART - 485 Port 1- RTS-TX Control	Enable RS-485 Port-1 RTS-TX Control	Disable RS-485 Port·1 RTS· TX Control
J	PCIe UART - 485 Port 1- RTS-RX Control	Enable RS-485 Port-1 RTS-RX Control	Disable RS-485 Port-1 RTS-RX Control

10. Typical Hardware Installation for +12V power input

1. Ensure all external system power supplies are off.
2. Install the necessary cables for the application. At a minimum, this would include:

   a) + 12V Power cable to the input power connector.
   b) Connect a video display cable VGA, HDMI, Display Port or LVDS.
   c) Keyboard and mouse via USB
   d) SATA Power and Signal to SATA HDD

   For the relevant cables, see the Cables and Cable Kit Information section of this manual

3. Connect the power cable to power supply
4. Switch on the power supply. DO NOT power up your COM Express system by plugging in live power.

11. Power Consumption Details

Below are the maximum ratings of the carrier.

Maximums	Amps	Watts
The absolute maximum total draw of all functionality on the carrier board (this value excludes current draw from the module).	4.00A	48W
Safety Protected Maximum Current Draw Rating for Module and Carrier (from in-line fuse).	10.00A	120W

NOTE COM Express Type-6 Module used for measurements - Intel Core i5 Ivy Bridge 2700MHz Quad-Core Processor with QM77 chipset.

12. PCI Express Allocation Details

Below is a listing of how the PCI Express Links are allocated on the carrier board.

COM Express PCI Express Link	Peripheral Connection
PCIe x1 -0	PCIe UART (Exar 17V354)
PCIe x1 -1	miniPCIe Slot 0
PCIe x1 -2	miniPCIe Slot 1
PCIe x1 -3	PCIe GBE PHY (Intel 82574)
PCIe x1 -4	No Connect
PCIe x1 -5	No Connect
PCIe x1 -6	No Connect
PCIe x1 -7	No Connect
PEG /PCIe x16	No Connect

13. USB Allocation Details

Below is a listing of how the USB Ports are allocated on the carrier board.

COM Express USB Port	Peripheral Connection
USB 3.0 Port 0	USB 3.0 A Connector (P3A)
USB 3.0 Port 1	USB 3.0 A Connector (P3A)
USB 3.0 Port 2	USB 3.0 B Connector (P3B)
USB 3.0 Port 3	USB 3.0 B Connector (P3B)
USB 2.0 Port 4	miniPCIe / mSATA Slot 0
USB 2.0 Port 5	miniPCIe / mSATA Slot 1
USB 2.0 Port 6	USB 2.0 Connector (P22)
USB 2.0 Port 7	USB 2.0 Connector (P22)

14. Cables

Cable Set	
Part Number	
CBL-SET-477-CNT-1	• SATA HDD Signal and Power Cable • Dual USB 2.0 to 8-Pin Minitek Cable • DisplayPort to 20-pin Minitek Cable • 20-Pin Minitek to Flying Leads • JR-45 to 10-Pin Minitek Cable • Dual Audio to 8-Pin Minitek Cable • VGA to 10-Pin Minitek Cable • Dual DB-9 to 20-Pin Minitek Cable • Dual USB 3.0 Panel Mount to 20-pin Locking Intl Style: Right Angle Inner Exit • Dual USB 3.0 Panel Mount to 20-pin Locking Intl Style: Right Angle Outer Exit • Dual USB 3.0 Panel Mount to 20-pin Locking Intl Style: Right Angle Vertical Exit

Contact Winsystems at https://winsystems.com/contact/ for cables options.

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SBC-477-TS570 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 SBC-477-TS570 typical load is not lower than the power supply's minimum load. If the SBC-477-TS570 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 SBC-477-TS570.

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 SBC-477-TS570 requires 12VDC input (+/- 5%) 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 SBC-477-TS570.

Gauge Wire

Use the largest gauge wire that the pin and connector manufacture allows. Most pin and 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 SBC-477-TS570 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 SBC-477-TS570

To avoid damage, mount the SBC-477-TS570 properly. Standoff kits are available and recommended for use with the SBC-477-TS570.

Placing the SBC-477-TS570 on mounting standoffs—Be careful when placing the SBC-477-TS570 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 SBC-477-TS570—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 SBC-477-TS570—Never use star washers or any fastening hardware that cut into the SBC-477-TS570.

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 pin-outs—Always check the pin-out 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.
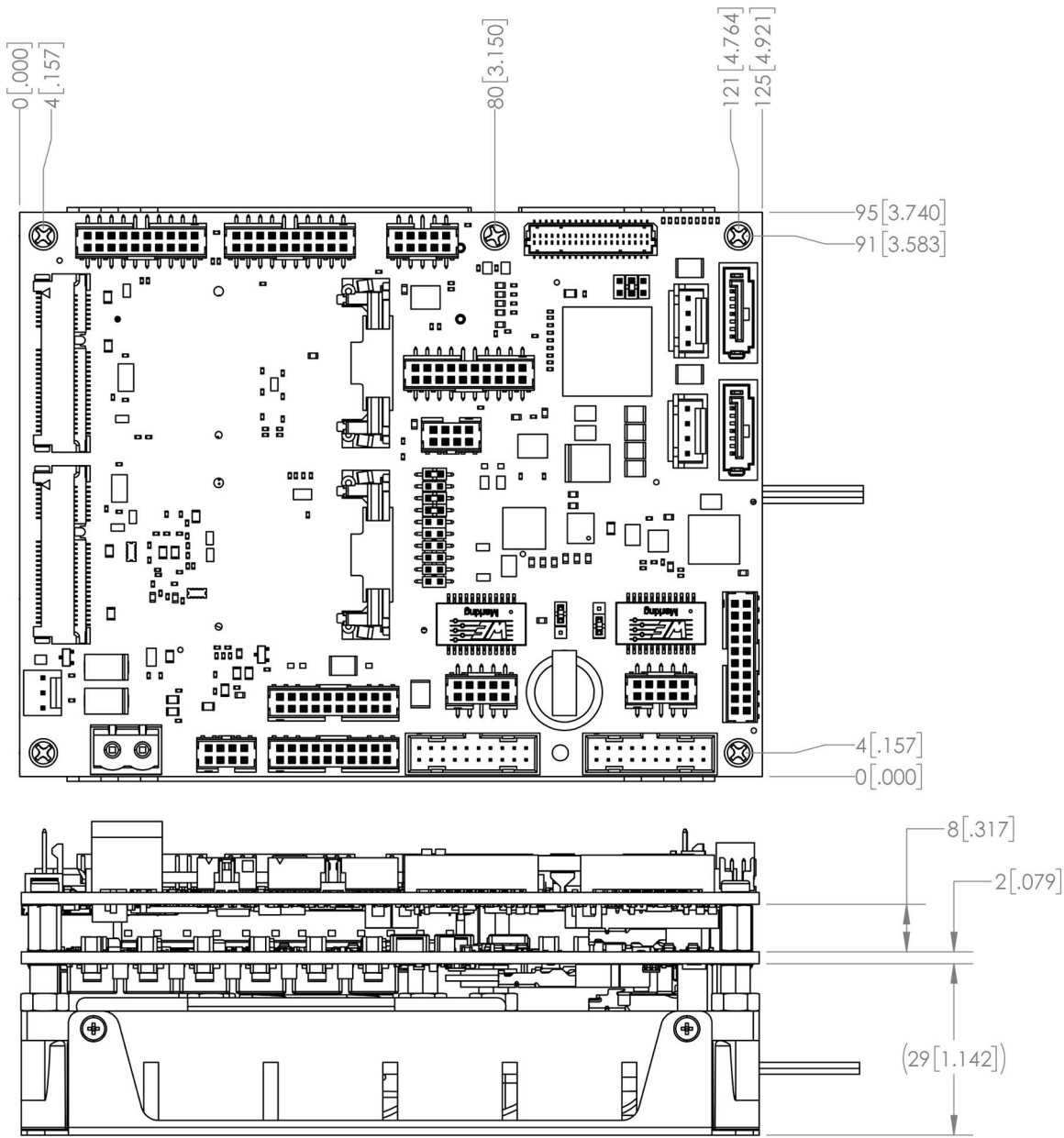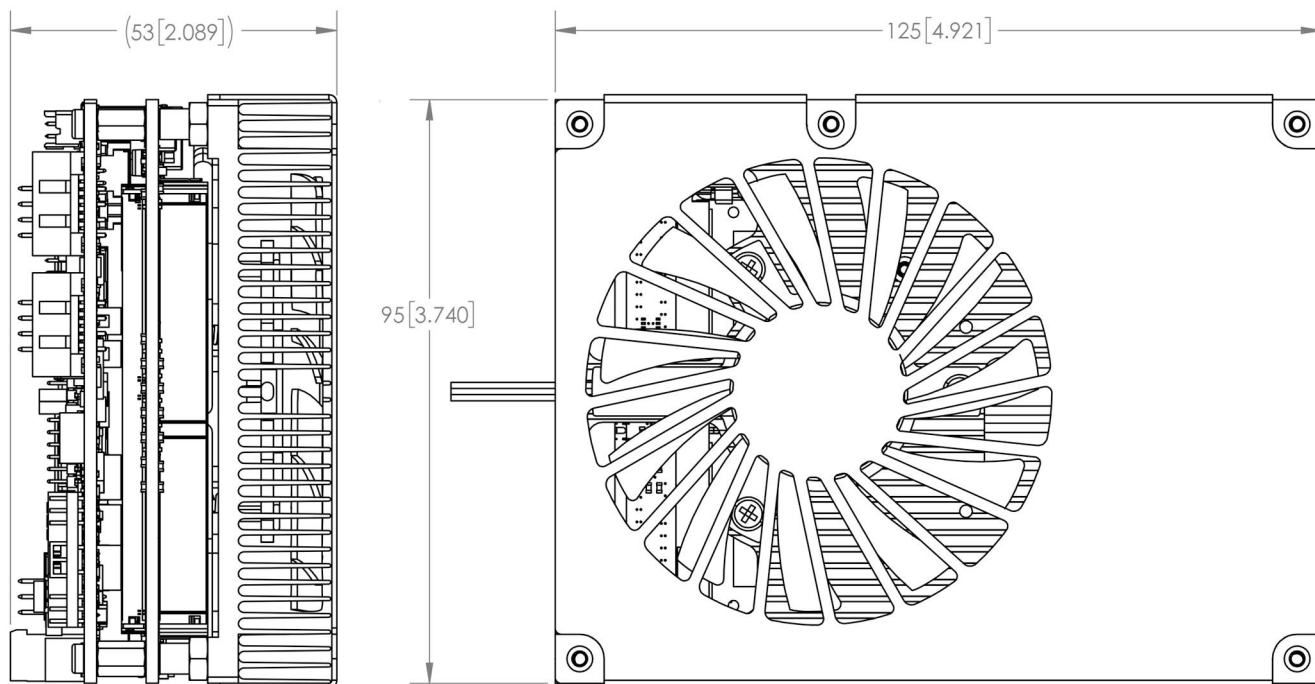
Appendix B. Mechanical Drawings

SBC-477-TS570-2

(14[.552])

0[.000]

8[.317]

(38[1.498])

125[4.921]

5[3.740]

SBC-477-TS570-3

(53[2.089])

125[4.921]

95[3.740]
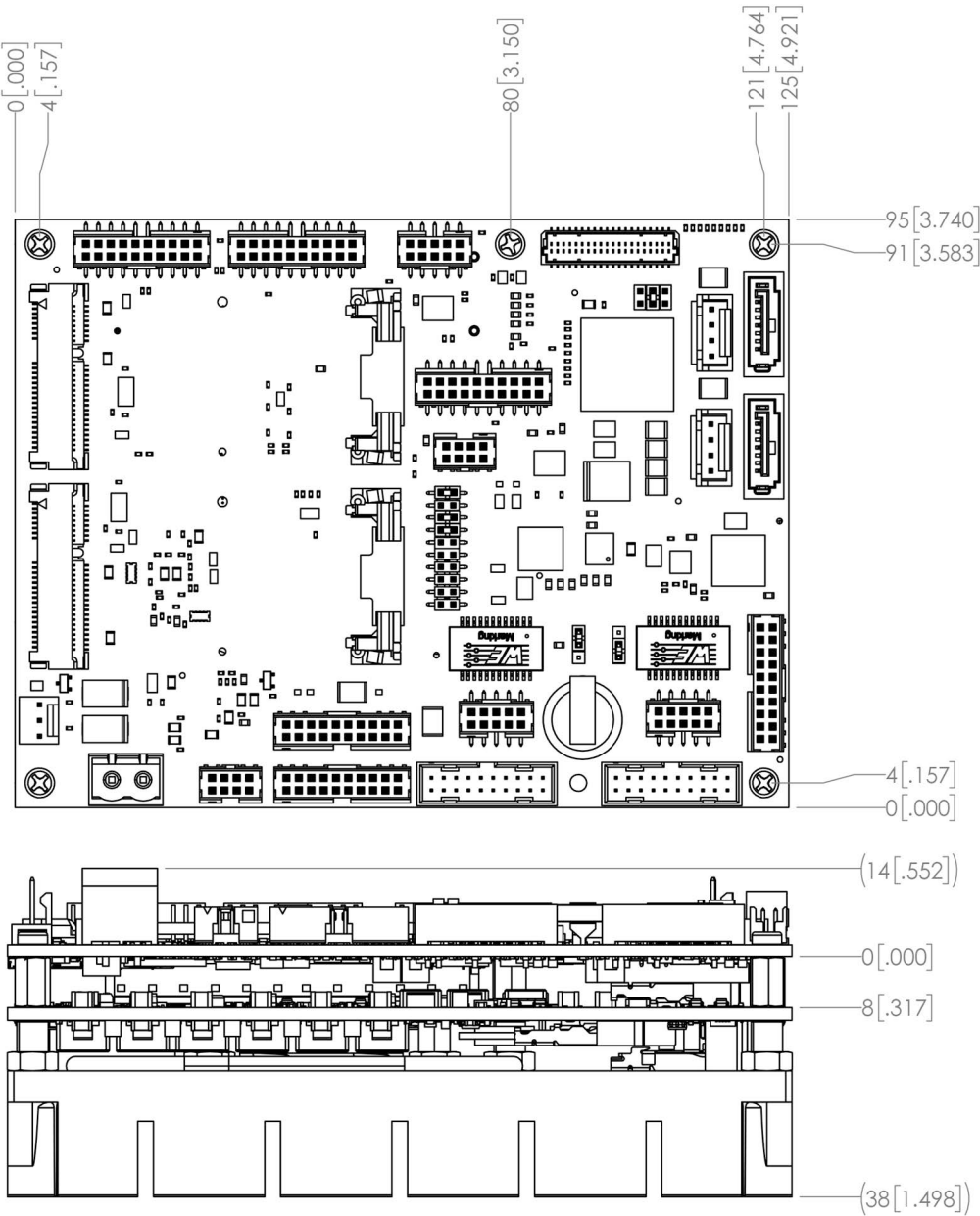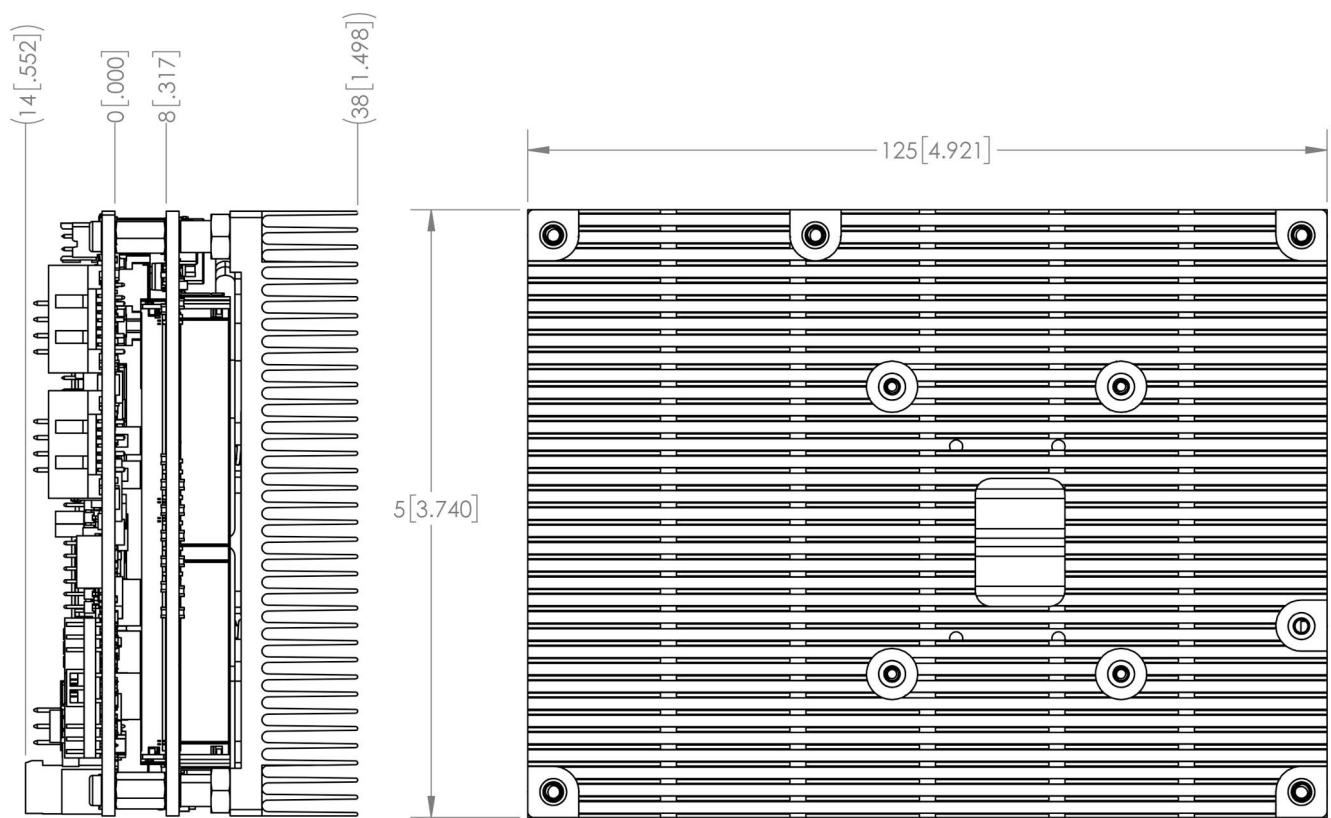
Appendix C. Warranty Information

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