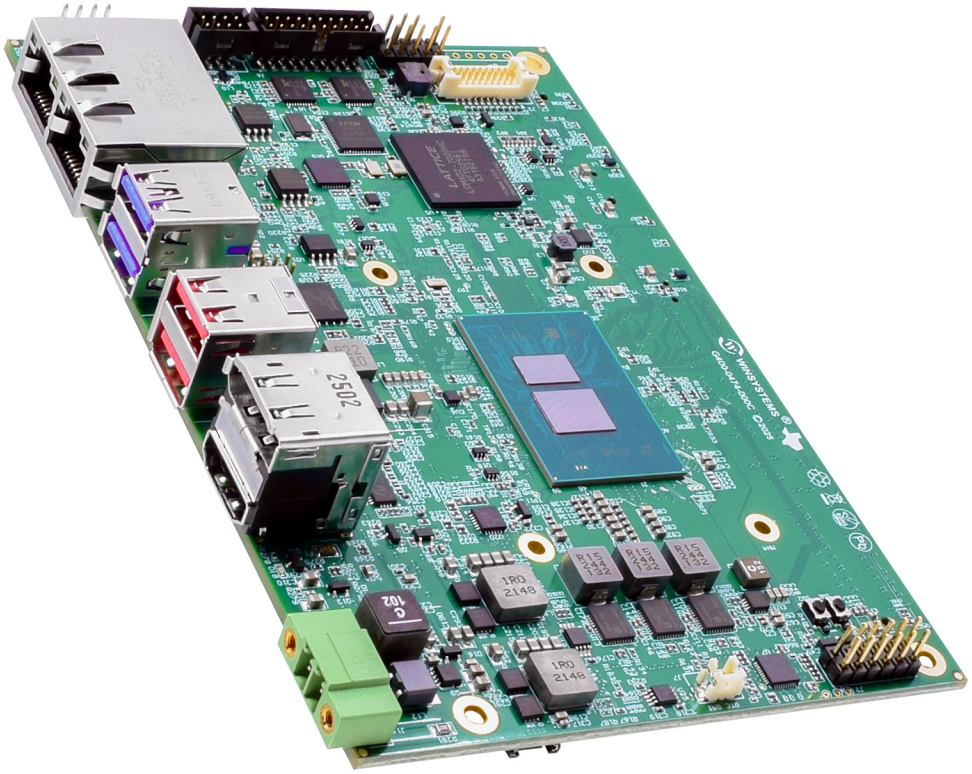
SBC35-474

Fanless Rugged Single Board Computer with Intel® Amston Lake Processors

Product Manual



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Revision History

Document Version	Last Updated Date	Brief Description of Change
v1.0	07/15/2026	Initial release
v1.1	07/23/2026	Added audio cable part number CBL-AUDIO-HD-474-12A Updated the x7433RE processor TDP Wattage, Power Input Ratings and PassMark Test Setup and Results
v1.2	08/21/2026	Updated Operating System and I/O specifications, Accessories information, and BIOS information. Added an Operating Systems section under accessories.
v1.3	10/07/2026	Updated photos, Features and Specifications, Power Consumption Details, Added JP2 Section, Updated BIOS Section

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1. Before You Begin

Review the warnings in this section and the best practice recommendations (see “Best Practices” on page 47) when using and handling the WINSYSTEMS SBC35-474 module. Following these recommendations provides an optimal user experience and prevents damage. Read through this document and become familiar with the SBC35-474 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 SBC35-474. While observing best practices, pay particular attention to the following:.

WARNING!

ESD-Sensitive Electronic Equipment

Observe ESD-safe handling procedures when working with this product.
Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.
Always store this product in ESD-protective packaging when not in use.

2. Introduction

This manual provides configuration and usage information for the SBC35-474. If you still have questions, contact Technical Support at +1-817-274-7553, Monday through Friday, between 8 AM and 5 PM Central Time.

3. Functionality

WINSYSTEMS' SBC35-474 is a rugged 3.5-inch single board computer (SBC) powered by an Intel Atom® x7000RE Series Amston Lake processor with integrated 16UE GPU. The SBC35-474 is engineered to power robust performance for latency-sensitive applications in embedded, industrial IoT, and communications markets with exceptional reliability.

Designed for flexibility to meet the needs of your specific application, the SBC35-474 features an M.2 E-Key slot and two B-Key slots that support a wide variety of I/O expansion modules with PCIe, SATA, USB3/2, Wi-Fi/ Bluetooth, cellular connectivity and more. It is built to perform in harsh industrial environments and operates from 40°C to +85°C.

With support for Windows 11, Ubuntu Linux, and other x86-compatible real-time operating systems, developers can build and deploy in their preferred environment. Customizations for other Linux distributions available upon request. It supports integrated AI data-type support on the CPU and a custom configurable UEFI based BIOS, to deliver power-efficient accelerated performance for real-time control and secure edge computing.

Find any available WINSYSTEMS-specific drivers for this product at https://winsystems.com/product/sbc35-474/.

4. Features and Specifications

Features and Specifications			
Part Number	SBC35-474		
Processor Options	Amston Lake, the Intel® Atom Processor x7000RE Series with industrial integrated GPU		
	Intel Atom® x7211RE Cores: 2 Speed: 1.0 (3.2) GHz Cache: 6 MB of L3 TDP: 6 W	Intel Atom® x7433RE Cores: 4 Speed: 1.5 (3.4) GHz Cache: 6 MB of L3 TDP: 9 W	Intel Atom® x7835RE Cores: 8 Speed: 1.3 (3.6) GHz Cache: 6 MB of L3 TDP: 12 W
OPERATING SYSTEM	Windows 11 IoT, Linux (tested on Lubuntu), and other x86 real-time OS NOTE: Operating systems can be installed on the onboard eMMC or on an optional SSD.		
SOFTWARE	Custom configurable UEFI based AMI BIOS System Management Libraries and Tools		
SECURITY	On-board discrete TPM 2.0 hardware security		
RAM	8GB or 16GB DDR5 SO-DIMM, 4800 MT/s. Supports In-Band ECC		
STORAGE	128GB eMMC on-board Optional MVNe or SATA		
DISPLAY	Triple display support with UHD Graphics 32EU integrated graphics up to 1.2 GHz HDMI 2.0 DisplayPort++ eDP VESA 40-pin or Optional LVDS		
AUDIO	HD Audio Realtek ALC888S Codec to 1x Line Out and 1x Mic In Intel Display Audio to HDMI and DisplayPort interfaces		
NETWORK	2x 2.5 GbE (Intel i226) RJ-45		
EXPANSION	M.2 E-Key 2230 (WiFi/Bluetooth®) M.2 B-Key 2280 (SATA, NVMe, or I/O) M.2 B-Key 2242/2252/2260/3042/3052/3060 (WAN/Cellular with Nano SIM or I/O)		
I/O	10x GPIO 2x USB 3.2 7x USB 2.0 (3 used for M.2) 2x Multi-Protocol Serial Ports (2mm HDR) I2C Nano SIM socket Watchdog Timer 1-255		
POWER	Wide Power Input**:** +9V to +36V		
POWER LEVELS	**x7211RE**-PL1: 6W, PL2: 9W	**x7433RE**-PL1: 9W, PL2: 12W	**x7835RE**-PL1: 12W, PL2: 15W
	See Power Consumption section for PassMark details.*		
THERMAL SOLUTIONS	1 = Heat Spreader	2 = Heatsink	3 = Heatsink & Fan
MECHANICAL	Dimensions: 106mm x 146mm x 22mm (4.15" x 5.75" x .86") Weight: 290g / 10.20oz	Dimensions: 106mm x 146mm x 32mm (4.15" x 5.75" x 1.26") Weight: 390g / 13.75oz	Dimensions: 106mm x 146mm x 32mm (4.15" x 5.75" x 1.26") Weight: 388g / 13.70oz

Features and Specifications	
ENVIRONMENTAL	• Industrial Temperature: -40°C to +85°C (-40ºF to +185°F) with appropriate thermal solution. (Heatsink & Heatsink & Fan) See NOTE below table.* • Humidity: 5% to 95% non-condensing • RoHS Compliant
MTBF	174,141 hrs
Warranty and Support	Limited two-year Warranty and Free Technical Support

NOTE Requires appropriate thermal solution to achieve maximum 85°C such as our optional heat sink or heat sink with fan. The maximum measurable temperature on any spot of the heat spreader, heat sink or heat sink with fan, 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. Power Consumption Details

5.1 Power Input Ratings

Below are the power input ratings for the SBC35-474.

Power Input Ratings			
Power	Input: Variable of +9V to +36V (With reverse power protection.) *Average power use under a standard load.		
Typical Power Use	Intel Atom® x7211RE Typical Power Use: 6W* TDP: 8W - 22W*	Intel Atom® x7433RE Typical Power Use: 9W* TDP: 10.5W - 27W*	Intel Atom® x7835RE Typical Power Use: 12W* TDP: 10W - 28.5W*
	*See Passmark® test results starting on page <Save & Exit>		

5.2 PassMark Information

What is PassMark®?

PassMark refers to both a software company and its popular benchmarking software, Performance Test, which is used to evaluate a computer's performance. The company is known for its benchmark tests that measure the performance of a computer's CPU, graphics, hard drive, and memory. The benchmark scores allow users to compare their PC's performance against millions of other computers worldwide.

PassMark (https://www.passmark.com/) has offered industry standard PC benchmarking and diagnostic solutions since 1998 and as such provides an industry accepted standardized way to measure and compare the power consumption of computers.

WINSYSTEMS uses a PassMark Performance Test that is a comprehensive benchmarking tool that evaluates the power performance of the SBC35-474. Below in Section 6 you can view the PassMark Test Results table which includes the SBC Setup showing you how the SBC was set up for the test. It also includes the Burn-In Features used and the BIOS Idle, OS Idle and the Load test results.

Contact an engineer if you have additional questions about the PassMark test results at https://winsystems.com/support/.

5.3 PassMark Test Setup and Results

Here is the PassMark Test Results table which includes the SBC Test Setup and the load test results for various standard PassMark setups.

PassMark® Test Setup and Results for SBC35-474-x7211RE-16GB-2									
SBC Test Setup									
OS: Windows 11 IOT **SW:** PassMark, HWInfo **Thermal:** Heatsink		**DC IN**	**BIOS PL1-PL2**	**Burn-In Feature**	**Idle (BIOS)**	**Idle (OS)**	**Setup 1 50% Load**	**Setup 2 50% Load**	**Setup 3 50% Load**
		12V	6W-9W		12.0W*	8W*	14.0W*	13.0W*	22.0W*
CPU	**Intel Atom x7211RE****				X	X	X	X	X
RAM	**16GB**				X	X	X	X	X
eMMC	**ATP 128GB**				X	X	X	X	X
DP (J10_DP)	**Sceptre 4K**				X	X	X	X	X
M.2, B-KEY (J500)	**M.2, Inno 80GB SATA**								X
M.2 B-KEY (J502)	**M.2, Inno 240GB NVME**								X
M.2 E-KEY (J504)	**Intel 9260 WIFI & BT**								X
USB2_1 (J13_T)	**Keyboard & Mouse**				X	X	X	X	X
USB2_2 (J13_B)	**USB2**				X	X	X	X	X
USB2_3 (J8_1,3,5,7)	**Innodisk 32GB USB3**								X
USB2_4 (J8_2,4,6,8)	**Innodisk 32GB USB3**								X
USB3.2_1 (J11_T)	**Innodisk 32GB USB3**								X
USB3.2_2 (J11_B)	**Innodisk 32GB USB3**								X
ENET_1 (J9A)	**loopback to J9B**							X	X
ENET_2 (J9B)	**loopback to J9A**							X	X
SOUND (J4)	**NA**								X
				CPU			X	X	X
				RAM				X	X
				Video				X	X
				2D Graphic					X
				3D Graphic 1x1920x1080			X		X
				Disk					X
				Sound					X
				Network				X	X
				GPGPU					X

*Instantaneous power draw can be higher.
**Boot Mode=Non-Turbo and Turbo Mode=Disable.

PassMark® Test Setup and Results for SBC35-474-x7433RE-16GB-2									
SBC Test Setup									
OS: Windows 11 IOT **SW:** PassMark, HWInfo **Thermal:** Heatsink		**DC IN**	**BIOS PL1-PL2**	**Burn-In Feature**	**Idle (BIOS)**	**Idle (OS)**	**Setup 1 50% Load**	**Setup 2 50% Load**	**Setup 3 50% Load**
		12V	9W-12W		12.0W*	10.5W*	16.5W*	14.0W*	27.0W*
CPU	**Intel Atom x7433RE****				X	X	X	X	X
RAM	**16GB**				X	X	X	X	X
eMMC	**ATP 128GB**				X	X	X	X	X
DP (J10_DP)	**Sceptre 4K**				X	X	X	X	X
M.2, B-KEY (J500)	**M.2, Inno 80GB SATA**								X
M.2 B-KEY (J502)	**M.2, Inno 240GB NVME**								X
M.2 E-KEY (J504)	**Intel 9260 WIFI & BT**								X
USB2_1 (J13_T)	**Keyboard & Mouse**				X	X	X	X	X
USB2_2 (J13_B)	**USB2**				X	X	X	X	X
USB2_3 (J8_1,3,5,7)	**Innodisk 32GB USB3**								X
USB2_4 (J8_2,4,6,8)	**Innodisk 32GB USB3**								X
USB3.2_1 (J11_T)	**Innodisk 32GB USB3**								X
USB3.2_2 (J11_B)	**Innodisk 32GB USB3**								X
ENET_1 (J9A)	**loopback to J9B**							X	X
ENET_2 (J9B)	**loopback to J9A**							X	X
SOUND (J4)	**NA**								X
				CPU			X	X	X
				RAM				X	X
				Video				X	X
				2D Graphic					X
				3D Graphic 1x1920x1080			X		X
				Disk					X
				Sound					X
				Network				X	X
				GPGPU					X

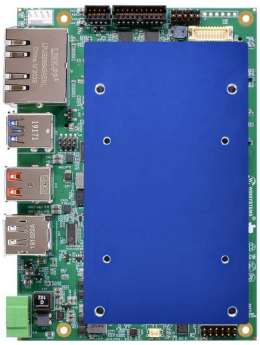
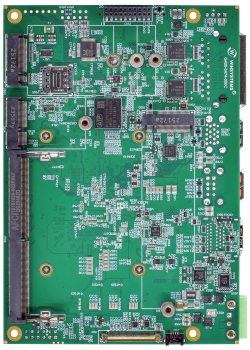
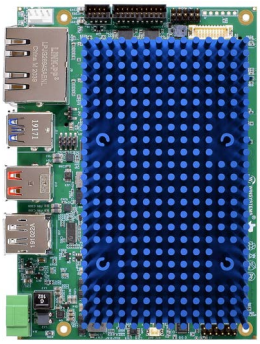
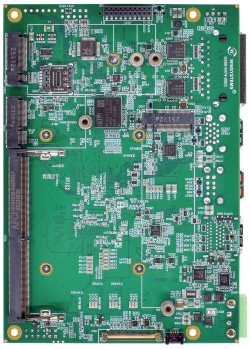
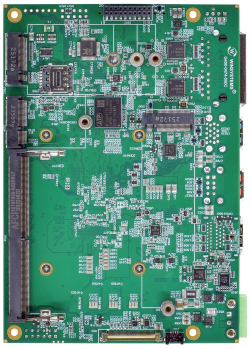
*Instantaneous power draw can be higher.
**Boot Mode=Non-Turbo and Turbo Mode=Disable.

PassMark® Test Setup and Results for SBC35-474-x7835RE-16GB-2									
SBC Test Setup									
OS: Windows 11 IOT **SW:** PassMark, HWInfo **Thermal:** Heatsink		**DC IN**	**BIOS PL1-PL2**	**Burn-In Feature**	**Idle (BIOS)**	**Idle (OS)**	**Setup 1 50% Load**	**Setup 2 50% Load**	**Setup 3 50% Load**
		12V	12W-15W		12.5W*	10.0W*	20.0W*	15.5W*	28.5W*
CPU	**Intel Atom x7835RE****				X	X	X	X	X
RAM	**16GB**				X	X	X	X	X
eMMC	**ATP 128GB**				X	X	X	X	X
DP (J10_DP)	**Sceptre 4K**				X	X	X	X	X
M.2, B-KEY (J500)	**M.2, Inno 80GB SATA**								X
M.2 B-KEY (J502)	**M.2, Inno 240GB NVME**								X
M.2 E-KEY (J504)	**Intel 9260 WIFI & BT**								X
USB2_1 (J13_T)	**Keyboard & Mouse**				X	X	X	X	X
USB2_2 (J13_B)	**USB2**				X	X	X	X	X
USB2_3 (J8_1,3,5,7)	**Innodisk 32GB USB3**								X
USB2_4 (J8_2,4,6,8)	**Innodisk 32GB USB3**								X
USB3.2_1 (J11_T)	**Innodisk 32GB USB3**								X
USB3.2_2 (J11_B)	**Innodisk 32GB USB3**								X
ENET_1 (J9A)	**loopback to J9B**							X	X
ENET_2 (J9B)	**loopback to J9A**							X	X
SOUND (J4)	**NA**								X
				CPU			X	X	X
				RAM				X	X
				Video				X	X
				2D Graphic					X
				3D Graphic 1x1920x1080			X		X
				Disk					X
				Sound					X
				Network				X	X
				GPGPU					X

*Instantaneous power draw can be higher.
**Boot Mode=Non-Turbo and Turbo Mode=Disable.

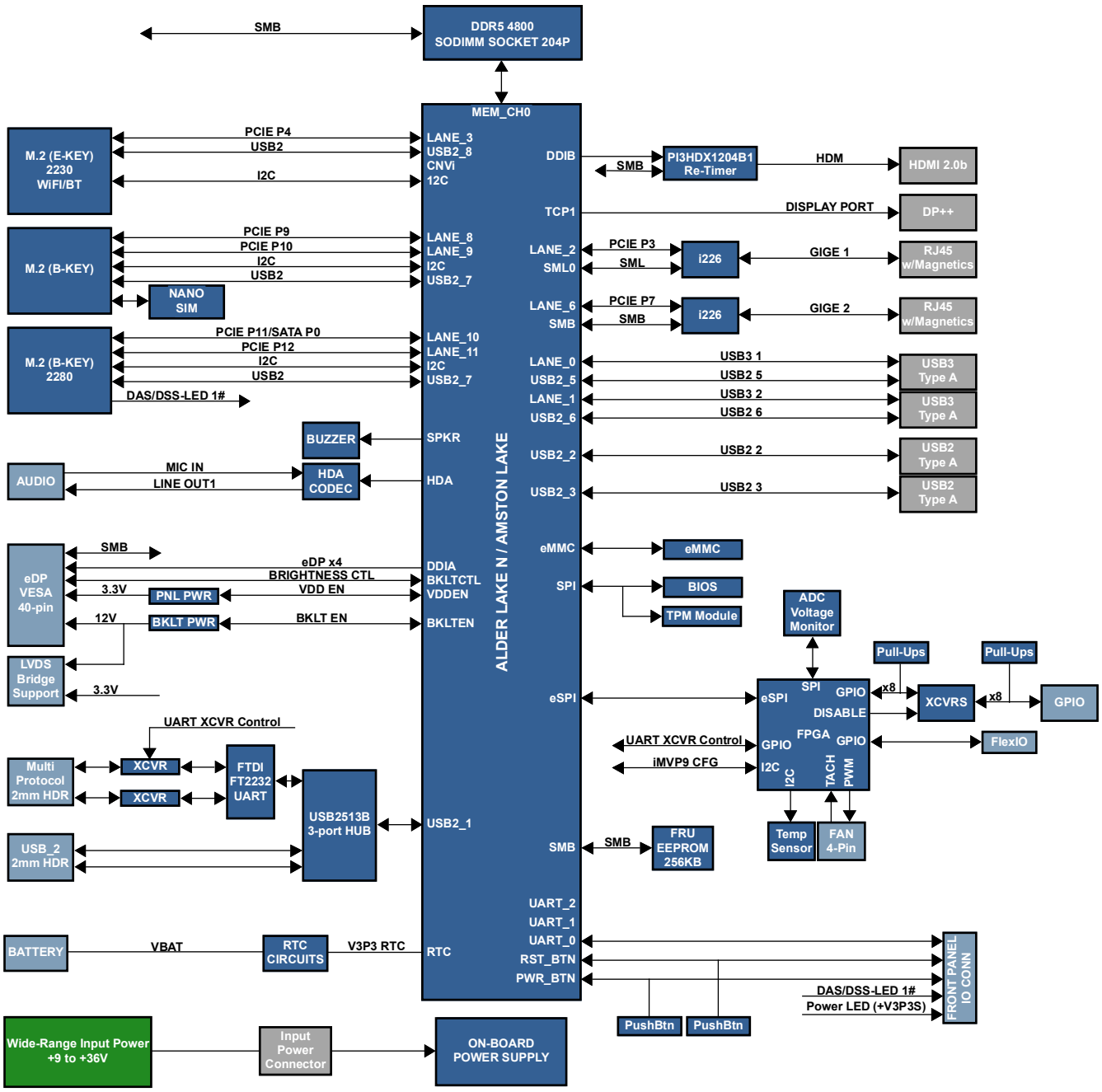
6. Part Numbers / Ordering Information

Part Numbers	Description
SBC-474-P-R-T	– **P** = Processor (x7211RE, x7433RE, x7835RE)
SBC-474-P-R-T	– **R** = DDR5 4800 MT/s SODIMM (8GB, 16GB)
SBC-474-P-R-T	– **T** = Thermal option (1 = Heatspreader, 2 = Heatsink, 3 = Heatsink with fan)

Part Numbers	Top View	Bottom View
SBC35-474-P-R-1 (Heatspreader)		
SBC35-474-P-R-2 (Heatsink)		
SBC35-474-P-R-3 (Heatsink with fan)		

7. Product Overview

7.1 Block Diagram

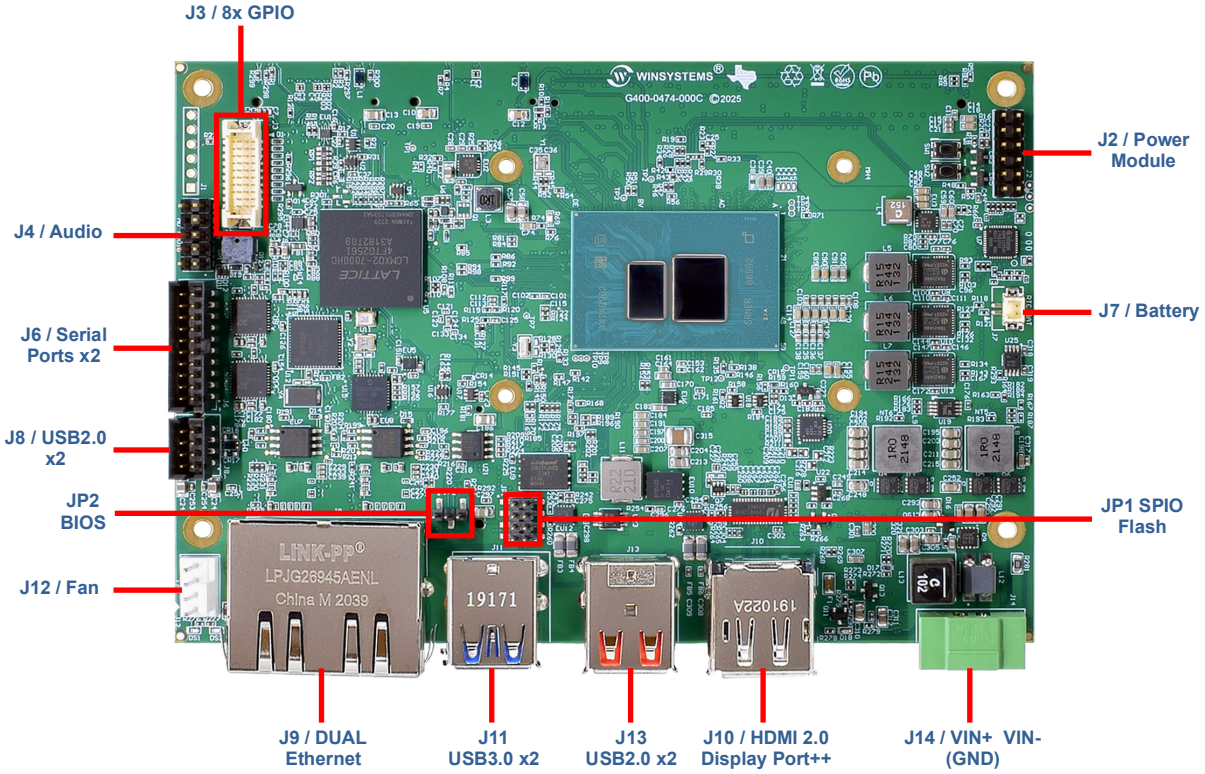


8. I/O Connector & Jumper Locations

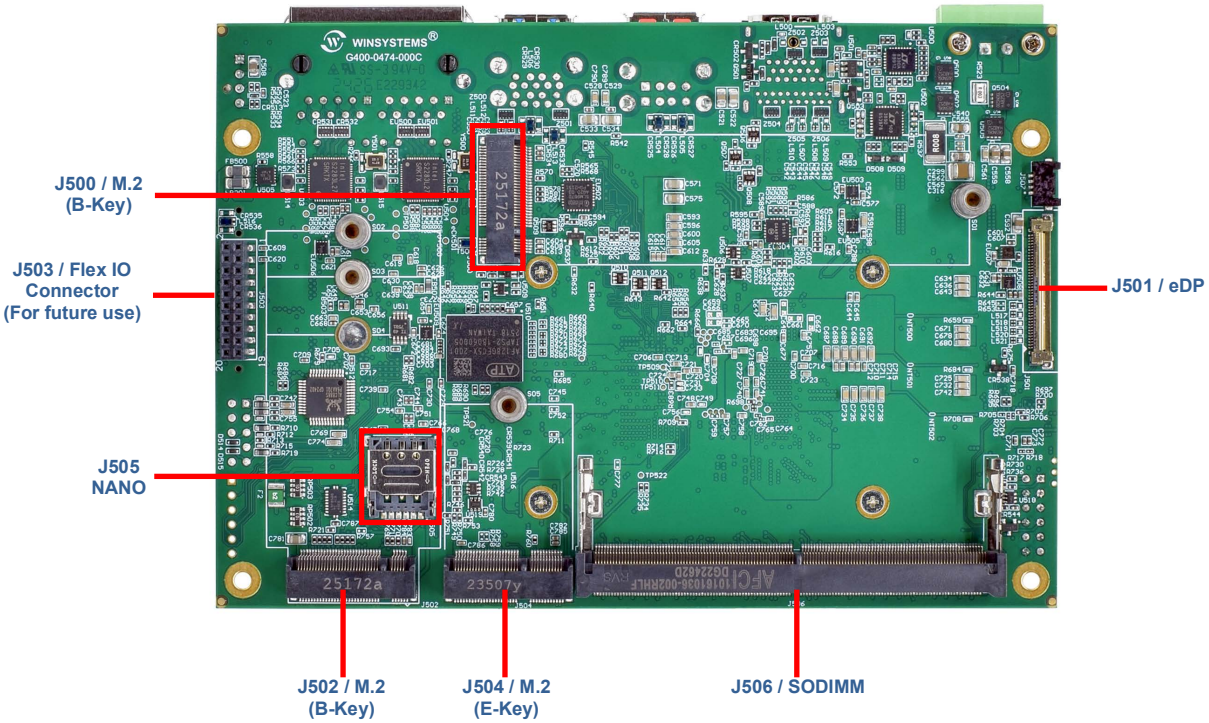
This section describes the SBC35-474 Connector & Jumper locations.

8.1 Component Layout

8.1.1 SBC Top View



8.1.2 SBC Bottom View



8.2 Jumper and Connector Summary

Item	Description	Reference
J2	Power Module (HDR)	page <Save & Exit>
J3	GPIO Connector	page <Save & Exit>
J4	HD Audio Header	page <Save & Exit>
J6	Serial Ports (RS232/422/485) Header	page <Save & Exit>
J7	Battery Connector	page <Save & Exit>
J8	USB 2.0 Ports x2 (2mm HDR)	page <Save & Exit>
J9	Dual Ethernet Connector (RJ45)	page <Save & Exit>
J10	Display Port DP++ (Top Connector)	page <Save & Exit>
J10	HDMI 2.0b (Bottom Connector)	page <Save & Exit>
J11	USB 3.0 Ports 0 & 1 (Type A)	page <Save & Exit>
J12	External Fan Header	page <Save & Exit>
J13	USB 2.0 Ports 2 & 3 (Type A)	page <Save & Exit>
J14	VIN Power Connector	page <Save & Exit>
J500	M.2 (B-Key)	page <Save & Exit>
J501	Embedded DisplayPort (eDP)	page <Save & Exit>
J502	M.2 (B-Key)	page <Save & Exit>
J503	Flex IO Connector (For future use.)	page <Save & Exit>
J504	M.2 (E-Key)	page <Save & Exit>
J505	NANO SIM Slot	page <Save & Exit>
J506	SODIMM Socket	page <Save & Exit>
JP1	SPIO Flash Jumper Block	page <Save & Exit>
JP2	BIOS Restore Jumper Block	page <Save & Exit>

9. Watchdog Timer (WDT)

The Watchdog Timer (WDT) can be used to automatically reset the system if a software lock-up prevents an application or service from periodically refreshing the watchdog timer. The WDT can be programmed to count in either seconds or minutes, with timeout values ranging from 1 second to 255 minutes.

The WDT is controlled through a set of EC virtual registers on the FPGA that can be configured through the BIOS. Refer to section 11.3.1, “WINSYSTEMS Super IO Configuration” on page 46 for WDT settings.

10. 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.

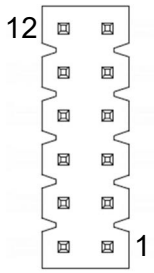
11. Connectors

11.1 J2 - Front Panel IO (HDR)

The SBC35-474 features a Front Panel IO header.

This configuration is used for an external Power Switch, Power Indicator LED, Reset Switch and a Hard Drive Activity LED Indicator.

Function	Front Panel IO (HDR)			
Location	J2			
Type	12 POS Straight Header 0.100 Spacing			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	HDD LED+	2	PLED+
	3	HDD LED-	4	GND
	5	GND	6	PWR_CONN_D
	7	RST_PUSH_N_D	8	GND
	9	+V3P3S	10	UART0_RXD
	11	UART0_TXD	12	GND



Connector

- Through-Hole .025" Sq Post Header (2.54 mm) .100" Pitch
- Part Number: 200-TSW10626GD

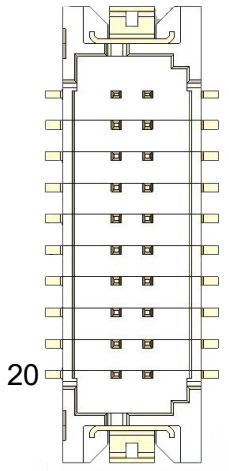
Matching Connector

- IDSD Slim Body Double-Row IDC Socket Assemblies, 0.100" Pitch
- Part Number: IDSD-06-D-08.00-G

11.2 J3 - GPIO General-Purpose Input/Output Header

The SBC35-474 supplies eight 5 V-tolerant GPIO lines with rising/falling edge event sense interrupt generation.

Function	GPIO			
Location	J3			
Type	Double Row Straight Pin Header 1.25MM			
Cable Number	CBL-DIO8-101-12A			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	GPIO 00	2	GND
	3	GPIO 01	4	GND
	5	GPIO 02	6	GND
	7	GPIO 03	8	GND
	9	GPIO 04	10	GND
	11	GPIO 05	12	GND
	13	GPIO 06	14	GND
	15	GPIO 07	16	GND
	17	+V5S_GPIO	18	GND
	19	+V5S_GPIO	20	GND



Connector

- Hirose CONN HEADER SMD 20POS 1.25MM

Part Number: DF13EA-20DP-1.25V(52)

Matching Connector

- Hirose Double Row Socket 20POS 1.25MM

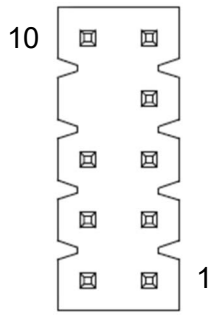
Part Number: DF13-20DS-1.25C

11.3 J4 - HD Audio Header

The HD audio header supports sample rates ranging from 44.1 to 192 kHz. The left and right front audio channels provide concurrent independent stereo sound output (multiple streaming).

NOTE J4 requires an audio cable.

Function	Audio Input/Output & Mic			
Location	J4			
Type	Double Row Straight Pin Header 1.25MM			
Cable Number	CBL-AUDIO-HD-474-12A			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	MIC1L	2	HDA_GND
	2	MIC1R	4	NC
	5	OUTR	6	MIC_JD
	7	HDA_GND	8	-
	9	OUTL	10	OUT_JD



Connector

- Samtec Classic PCB Header Strips, 0.100" pitch

Part Number: TSW-105-07-G-D-008

Matching Connector

- IDSD Slim Body Double-Row IDC Socket Assemblies, 0.100" Pitch

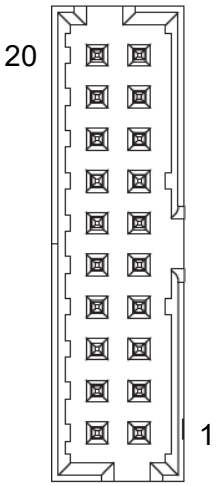
Part Number: IDSD-05-D-08.00-G

11.4 J6 - Serial Ports (RS232/422/485) Header

The SBC35-474 provides two Serial Port connections through a Molex Milli-Grid header.

NOTE Refer to "WINSYSTEMS Super IO Configuration" on page 46 for your BIOS serial port settings.

Function	Serial Port Connections			
Location	J6			
Type	Molex Milli-Grid header			
Cable Number	CBL-SER2-202-12A			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	TX- / DATA-	2	MPS1 DSR
	3	TX+ /DATA+	4	MPS1 RTS
	5	RX+	6	MPS1 CTS
	7	RX-	8	MPS1 RI
	9	GND	10	NC
	11	TX- / DATA-	12	MPS2 DSR
	13	TX+ /DATA+	14	MPS2 RTS
	15	RX+	16	MPS2 CTS
	17	RX-	18	MPS2 RI
	19	GND	20	NC



Connector

- Molex 2.00mm Pitch, Milli-Grid PCB Header, Dual Row, Vertical, Surface Mount, Shrouded, 20 Circuits

Part Number: 87832-2020

Matching Connectors

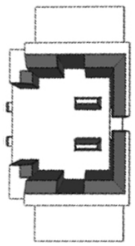
- Molex 2.00mm Pitch, Milli-Grid Receptacle Housing, 20 Circuits, Center Polarization, Side Latches

Part Number: 51110-2051

11.5 J7 - Battery Connector

An external battery connected to the SBC35-474 provides standby power for the real-time clock.

Optional 3V 255 mAH removable battery available.

Function	For external battery connection				
Location	J7				
Type	CONN HEADER SMD 2POS 1.25MM				
Battery Part Number	BAT-LPC-BR2330				
Pinout	**Pin**	**Description**	**Pin**	**Description**	
	1	VBAT	2	GND	

Connector

- Hirose Connector Header Surface Mount 2 position 0.049" (1.25mm)

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

Matching Connectors

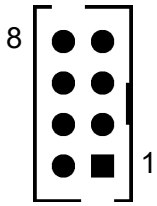
- Hirose 2 position Rectangular Connectors - Housings Receptacle Beige 0.049" (1.25mm)

Part Number: DF13-2S-1.25C

11.6 J8 - USB 2.0 Ports x2

J8 provides two USB 2.0 ports supplying 500 mA minimum continuous current per channel.

Function	For external USB connection			
Location	J8			
Type	Shrouded Header HDR 8 POS 2mm			
Cable Number	CBL-USB2-006-12A			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	+V5A	2	+V5A
	3	USBDWN_1_DN	4	USBDWN_2_DN
	5	USBDWN_1_DP	6	USBDWN_2_DP
	7	GND	8	GND



Connector

- Molex 2.00mm Pitch, Milli-Grid PCB Header, Dual Row, Vertical, Surface Mount, Shrouded, 8 Circuits

Part Number: 878320806

Matching Connectors

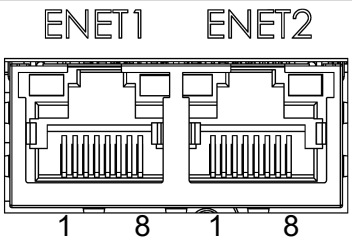
- Molex 2.00mm Pitch, Milli-Grid Receptacle Housing, 8 Circuits, Center Locking Ramp, Polarization Rib

Part Number: 511100856

11.7 J9 - Dual Ethernet Connector (RJ45)

Two Intel i226 2.5 Gigabit Ethernet controllers provide standard IEEE 1588 protocol time stamping (PTP). Each Ethernet interface includes 2.5G data transfer speeds, 10/100/1000 Mbps multi speed, full, and half-duplex operation.

Function	Ethernet Connection		
Location	J9		
Type	RJ45 connector		
Pinout	**Pin**	**Function**	**Description**
	1	TX_D1+	Transceive Data+
	2	TX_D1-	Transceive Data-
	3	RX_D2+	Receive Data+
	4	BI_D3+	Bi-Directional Data+
	5	BI_D3-	Bi-Directional Data-
	6	RX_D2-	Receive Data-
	7	BI_D4+	Bi-Directional Data+
	8	BI_D4-	Bi-Directional Data-



Connector

- Link-PP Int'l Technology Gigabit dual-port RJ45 connector with integrated magnetics and LEDs

Part Number: LPJT244260AENL

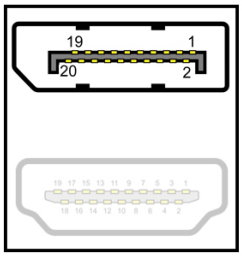
Matching Connectors

- Standard Gigabit Ethernet cables with RJ45 connectors

11.8 J10 - Display Port DP++ 1.4 (Top Connector)

The DisplayPort++ 1.4 connector supplies both video and high definition (HD) audio. It can handle both standard DisplayPort signals and TMDS signals for HDMI/DVI. It can support up to 4K at 120Hz, 8K at 60Hz (with DSC), and HDR. It offers a 32.4 Gbps bandwidth and supports DSC 1.2 for visually lossless compression.

Function	Supplies both video and high definition (HD) audio.					
Location	J10 (Top Connector)					
Type	Standard full-size 20-pin DisplayPort.					
Pinout	**Pin**	**Name**	**Description**	**Pin**	**Name**	**Description**
	1	ML_Lane 0 (p)	Lane 0 (positive)	2	GND	Ground
	3	ML_Lane 0 (n)	Lane 0 (negative)	4	ML_Lane 1 (p)	Lane 1 (positive)
	5	GND	Ground	6	ML_Lane 1 (n)	Lane 1 (negative)
	7	ML_Lane 2 (p)	Lane 2 (positive)	8	GND	Ground
	9	ML_Lane 2 (p)	Lane 2 (negative)	10	ML_Lane 3 (p)	Lane 3 (positive)
	11	GND	Ground	12	ML_Lane 3 (n)	Lane 3 (negative)
	13	CONFIG1	CONFIG1	14	CONFIG2	CONFIG2
	15	AUX_CH (p)	Auxiliary Channel (positive)	16	GND	Ground
	17	AUX_CH (n)	Auxiliary Channel (negative)	18	Hot Plug	Hot Plug Detect
	19	RETURN	Return for Power	20	DP_PWR	Power for connector (3.3 V 500 mA)



Connector

- Rego Electronics HDMI, DisplayPort & DVI Connectors DisplayPort + HDMI Type A Combo Connector

Part Number: 915DPHD-1752A1AD0

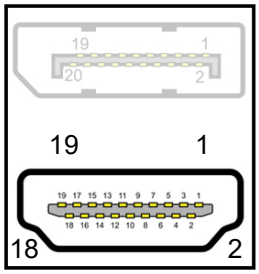
Matching Cables

- Standard DisplayPort compliant cables

11.9 J10 - HDMI 2.0 (Bottom Connector)

The High Definition Multimedia Interface (HDMI) provides crisp, clear audio and video. It supports 18 Gbps bandwidth, enabling 4K video at 60Hz, high-fidelity audio (32 channels) and 32 audio channels and 1536 kHz audio sample rate.

Function	Provides audio and video.			
Location	J10 (Bottom Connector)			
Type	Standard full size HDMI 2.0 connector			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	D2+	2	D1_Sheild
	3	D2-	4	D1+
	5	D1-_Sheild	6	D1-
	7	D0+	8	D0_Sheild
	9	D0-	10	CK+
	11	CK_Sheild	12	CK-
	13	CEC	14	HEC
	15	DDC_CLK	16	DDC_DAT
	17	GND	18	+5V
	19	HOT_PLUG_DET		



Connector

- Rego Electronics HDMI, DisplayPort & DVI Connectors DisplayPort + HDMI Type A Combo Connector

Part Number: 915DPHD-1752A1AD0

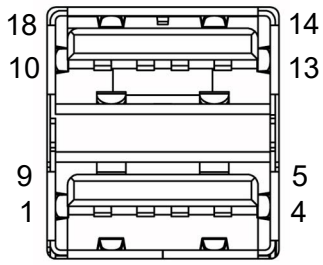
Matching Cables

- Standard DisplayPort compliant cable. Works with existing High-Speed (Category 2) cables.

11.10 J11 - USB 3.2 Ports 0 & 1 (Type A)

The SBC35-474 provides two USB 3.2 Gen 1 Type A ports at J11. The top connector is Port 0 and the bottom connector is Port 1. These ports supply 1A minimum continuous current per channel and 5 Gbps transfer speeds.

Function	USB 3.0 with 5 Gbps transfer speeds			
Location	J11			
Type	Type A ports			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	USBVCC	10	USBVCC
	2	D-	11	D-
	3	D+	12	D+
	4	GND	13	GND
	5	RX-	14	RX-
	6	RX+	15	RX+
	7	GND	16	GND
	8	TX-	17	TX-
	9	TX+	18	TX+



Connector

- Molex Conn USB Type A Receptacle 18 POS 2/2.5mm RA Through Hole 2 Port Emboss T/R

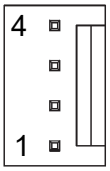
Part Number: 48406-0003

Matching Connectors

- Standard Type A USB compliant cable

11.11 J12 - External Fan Header

The fan voltage output of this connector is 12V. You can use this J12 connector to connect an external fan such as our SBC35-474-P-R-3.

Function	Power for an external fan		
Location	J12		
Type	4 POS 2.54mm Header		
Pinout	**Pin**	**Description**	
	1	GND	
	2	FAN_VCC	
	3	FAN_TACH	
	4	FAN_PWM	

Connector

- Molex KK 254 Vertical Header, with Friction Lock, 4 Circuits, 3.50mm PC Tail Length

Part Number: 47053-1000

Matching Connectors

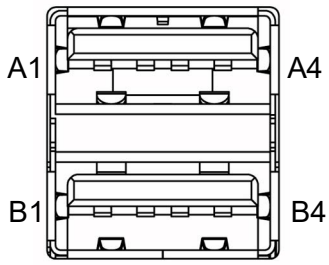
- Molex KK 254 Crimp Housing, Friction Ramp with Polarizing Ribs, 4 Circuits

Part Number: 538-22-01-3047

11.12 J13 - USB 2.0 Ports 2 & 3 (Type A)

J13 provides two USB 2.0 Gen 1 Type A ports. The top connector is Port 2 and the bottom connector is Port 3. The USB 2.0 ports supply 500 mA maximum continuous current and 480 Mbps transfer speed.

Function	USB 2.0 with 480 Mbps transfer speeds			
Location	J13			
Type	Type A ports			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	A1	USBVCC	B1	USBVCC
	A2	D-	B2	D-
	A3	D+	B3	D+
	A4	GND	B4	GND



Connector

- Molex connector receptacles USB2.0 Type A 8POS R/A

Part Number: USBR-A-D-S-O-TH

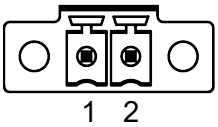
Matching Connectors

- Standard Type A USB compliant cable

11.13 J14 - VIN Power Connector

Use this connection to supply power to the SBC35-474. This computer supports a wide range DC input power from 9 V to 36 V.

Function	Power input for the SBC			
Location	J14			
Type	Terminal Block Header 3.81MM			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	+VIN	2	GND



NOTE This board has reverse power protection.

Connector

- Phoenix Terminal Block Header 2POS 90DEG 3.81MM

Part Number: 1827868

Matching Connectors

- Phoenix Terminal Block Plug 2POS STR 3.81MM

Part Number: 1827703

11.14 J500 - M.2 (B-Key)

The M.2 expansion socket provides support for B-key, 2280 modules. The M.2, B-key interface provides PCIe Gen 2 x2, 1x SATA channel, and 1x USB 2.0. B-key modules typically support M.2 SSDs.

Function	Provides PCIe Gen 2 x2, 1x SATA channel, and 1x USB 2.0. B-key modules typically support M.2 SSDs.			
Location	J500			
Type	M.2 (NGFF) Socket 67POS B-key Connector			
Pinout	**Pin**		**Pin**	
	74	3.3 V/VBAT	75	CONFIG_2
	72	3.3 V/VBAT	73	VIO_CFG (I) or GND
	70	3.3 V/VBAT	71	GND
	68	SUSCLK (O)(0/1.8V/3.3V)	69	CONFIG_1
	66	SIM DETECT (O)	67	RESET# (O)(0/1.8V)
	64	COEX_RXD (I)(0/1.8V)	65	ANTCTL3 (I)(0/1.8V)
	62	COEX_TXD (O)(0/1.8V)	63	ANTCTL2 (I)(0/1.8V)
	60	COEX3 (I/O)(0/1.8V)	61	ANTCTL1 (I)(0/1.8V)
	58	NC	59	ANTCTL0 (I)(0/1.8V)
	56	NC	57	GND
	54	PEWAKE# (I/O)(0/1.8V/3.3V)	55	REFCLKp
	52	CLKREQ# (I/O)(0/1.8V/3.3V)	53	REFCLKn
	50	PERST# (O)(0/1.8V/3.3V)	51	GND
	48	GPIO_4 (I/O)(0/1.8V)	49	PETp0/SATA-A+
	46	GPIO_3 (I/O)(0/1.8V)	47	PETn0/SATA-A-
	44	GPIO_2 (I/O)/ALERT# (I)/(0/1.8V)	45	GND
	42	GPIO_1 (I/O)/SMB_DATA (I/O)/(0/1.8V)	43	PERp0/SATA-B-
	40	GPIO_0 (I/O)/SMB_CLK (I/O)/(0/1.8V)	41	PERn0/SATA-B+
	38	DEVSLP (O)	39	GND
	36	UIM_PWR (I)	37	PETp1/USB3.1-36 UIM_PWR (I) Tx+/SSIC-TxP
	34	UIM_DATA (I/O)	35	PETn1/USB3.1-Tx-/SSIC-TxN
	32	UIM_CLK (I)	33	GND
	30	UIM_RESET (I)	31	PERp1/USB3.1-Rx+/SSIC-RxP
	28	PLA_S2# (I)/GPIO_8 (I/O) (0/1.8V)	29	PERn1/USB3.1-Rx-/SSIC-RxN
	26	GPIO_10 (I/O) (0/1.8V)	27	GND
	24	GPIO_7 (I/O) (0/1.8V)	25	DPR (O) (0/1.8V)
	22	GPIO_6 (I/O)(0/1.8V)	23	GPIO_11 (I/O) (0/1.8V)
	20	GPIO_5 (I/O)(0/1.8V)	21	CONFIG_0
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
	10	GPIO_9/DAS/DSS (I/O)/LED_1# (I)(0/3.3V)	11	GND
	8	W_DISABLE1# (O)(0/1.8V/3.3V)	9	USB_D-
	6	FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V)	7	USB_D+
	4	3.3 V	5	GND
	2	3.3 V	3	GND
			1	CONFIG_3

Connector

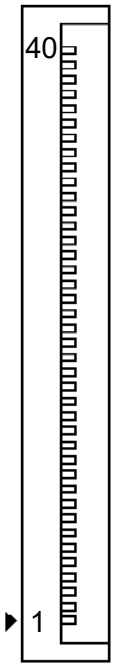
- ATTEND Technology connector M.2 (NGFF) Socket 67POS
  Part Number: 123A-58B01

11.15 J501 - Embedded DisplayPort 1.4 (eDP)

The SBC35-474 supports one embedded DisplayPort (eDP) interface.

NOTE In the BIOS settings, eDP is the default setting. BIOS setting must match the use of this port, else the system will hang up requiring the use of JP2 to reset the BIOS. Then restart the system.

Function	Embedded DisplayPort 1.4 (eDP)					
Location	J501					
Type	0.5 mm pitch, Horizontal mating type Micro-coaxial connector					
Cable Number	CBL-EDP1-012A					
Pinout	**Pin**	**Name**	**Description**	**Pin**	**Name**	**Description**
	1	NC	Not connected	21	VCC	+3.3 VDC
	2	GND	Ground	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	GND	Ground
	9	TX1-	eDP data 1-	29	GND	Ground
	10	TX1+	eDP data 1+	30	GND	Ground
	11	GND	Ground	31	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



NOTE Optional LVDS interface upon request.

Connector

- Micro-coaxial connector with lock (VESA standard connector)
  Part Number: 20455-040E-12

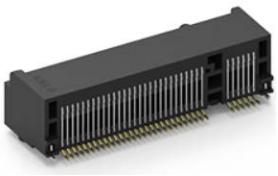
Matching Connectors

- Micro-coaxial plug (VESA standard connector)
  Part Number: 20453-340T-12

NOTE This matching connector above is a sample version. This part number may not fit your application.

11.16 J502 - M.2 (B-Key)

The M.2 expansion socket provides support for B-key, 2242, 2260, 3042, and 3052 modules. The M.2, B-key interface provides PCIe Gen 2 x2, and 1x USB 2.0. B-key modules typically support M.2 SSDs.

Function	Provides PCIe Gen 2 x2, and 1x USB 2.0. B-key modules typically support M.2 SSDs.			
Location	J502			
Type	M.2 (NGFF) Socket 67POS B-key Connector			
Pinout	**Pin**		**Pin**	
	74	3.3 V/VBAT	75	CONFIG_2
	72	3.3 V/VBAT	73	VIO_CFG (I) or GND
	70	3.3 V/VBAT	71	GND
	68	SUSCLK (O)(0/1.8V/3.3V)	69	CONFIG_1
	66	SIM DETECT (O)	67	RESET# (O)(0/1.8V)
	64	COEX_RXD (I)(0/1.8V)	65	ANTCTL3 (I)(0/1.8V)
	62	COEX_TXD (O)(0/1.8V)	63	ANTCTL2 (I)(0/1.8V)
	60	COEX3 (I/O)(0/1.8V)	61	ANTCTL1 (I)(0/1.8V)
	58	NC	59	ANTCTL0 (I)(0/1.8V)
	56	NC	57	GND
	54	PEWAKE# (I/O)(0/1.8V/3.3V)	55	REFCLKp
	52	CLKREQ# (I/O)(0/1.8V/3.3V)	53	REFCLKn
	50	PERST# (O)(0/1.8V/3.3V)	51	GND
	48	GPIO_4 (I/O)(0/1.8V)	49	PETp0/SATA-A+
	46	GPIO_3 (I/O)(0/1.8V)	47	PETn0/SATA-A-
	44	GPIO_2 (I/O)/ALERT# (I)/(0/1.8V)	45	GND
	42	GPIO_1 (I/O)/SMB_DATA (I/O)/(0/1.8V)	43	PERp0/SATA-B-
	40	GPIO_0 (I/O)/SMB_CLK (I/O)/(0/1.8V)	41	PERn0/SATA-B+
	38	DEVSLP (O)	39	GND
	36	UIM_PWR (I)	37	PETp1/USB3.1-36 UIM_PWR (I) Tx+/SSIC-TxP
	34	UIM_DATA (I/O)	35	PETn1/USB3.1-Tx-/SSIC-TxN
	32	UIM_CLK (I)	33	GND
	30	UIM_RESET (I)	31	PERp1/USB3.1-Rx+/SSIC-RxP
	28	PLA_S2# (I)/GPIO_8 (I/O) (0/1.8V)	29	PERn1/USB3.1-Rx-/SSIC-RxN
	26	GPIO_10 (I/O) (0/1.8V)	27	GND
	24	GPIO_7 (I/O) (0/1.8V)	25	DPR (O) (0/1.8V)
	22	GPIO_6 (I/O)(0/1.8V)	23	GPIO_11 (I/O) (0/1.8V)
	20	GPIO_5 (I/O)(0/1.8V)	21	CONFIG_0
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
		CONNECTOR KEY B		CONNECTOR KEY B
	10	GPIO_9/DAS/DSS (I/O)/LED_1# (I)(0/3.3V)	11	GND
	8	W_DISABLE1# (O)(0/1.8V/3.3V)	9	USB_D-
	6	FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V)	7	USB_D+
	4	3.3 V	5	GND
	2	3.3 V	3	GND
			1	CONFIG_3

Connector

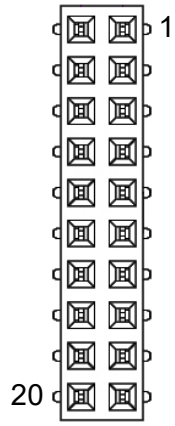
- ATTEND Technology connector M.2 (NGFF) Socket 67POS

Part Number: 123A-58B01

11.17 J503 - Flex IO Connector

NOTE This interface is reserved for future/custom IO expansion.

Function	For IO expansion boards			
Location	J503			
Type	CONN RCPT 20POS 0.079 GOLD SMD			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	+V12S	2	+V12S
	3	+V3P3S	4	+V3P3S
	5	FLXIO_00	6	FLXIO_00
	7	FLXIO_02	8	FLXIO_01
	9	GND	10	GND
	11	FLXIO_04	12	FLXIO_03
	13	FLXIO_06	14	FLXIO_05
	15	GND	16	GND
	17	FLXIO_08	18	FLXIO_07
	19	GCLK_0	20	GCLK_1



Connector

- Samtec 20 Position Receptacle Connector 0.079" (2.00mm) Surface Mount Gold

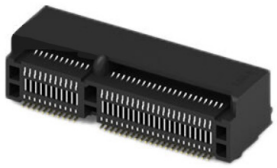
Part Number: SQW-110-01-F-D-VS-A-K-TR

Matching Connectors

- Any 2.00 mm Shrouded Terminal Strip or 2.00 mm Terminal Strip

11.18 J504 - M.2 (E-Key)

The M.2 expansion socket typically provides support for E-key, type 2230 form factor WiFi and Bluetooth modules. This connector supports PCIe Gen2 x1, SDIO, 1x USB 2.0, UART, and I2C interfaces.

Function	Provides PCIe Gen 2 x2, and 1x USB 2.0. B-key modules typically support M.2 SSDs.			
Location	J504			
Type	M.2 Socket, H5.8 E key 0.5 Pitch			
Pinout	**Pin**		**Pin**	
	74	3.3 V	75	GND
	72	3.3 V	73	RESERVED/REFCLKn1
	70	UIM_POWER_SRC/GPIO_1/PEWAKE1#	71	RESERVED/REFCLKp1
	68	UIM_POWER_SNK/CLKREQ1#	69	GND
	66	UIM_SWP/PERST1#	67	RESERVED/PERn1
	64	VIO 1.8 V	65	RESERVED/PERp1
	62	ALERT# (I)(0/1.8 V)	63	GND
	60	I2C_CLK (O)(0/1.8 V)	61	RESERVED/PETn1
	58	I2C_DATA (I/O)(0/1.8 V)	59	RESERVED/PETp1
	56	W_DISABLE1# (O)(0/1.8V/3.3V)	57	GND
	54	W_DISABLE2# (O)(0/1.8V/3.3V)	55	PEWAKE0# (I/O)(0/1.8V/3.3V)
	52	PERST0# (O)(0/1.8V/3.3V)	53	CLKREQ0# (I/O)(0/1.8V/3.3V)
	50	SUSCLK (O)(0/1.8V/3.3V)	51	GND
	48	COEX_TXD (O)(0/1.8V)	49	REFCLKn0
	46	COEX_RXD (I)(0/1.8V)	47	REFCLKp0
	44	COEX3 (I/O)(0/1.8V)	45	GND
	42	VENDOR DEFINED	43	PERn0
	40	VENDOR DEFINED	41	PERp0
	38	VENDOR DEFINED	39	GND
	36	UART_RTS (O)(0/1.8V)	37	PETn0
	34	UART_CTS (I)(0/1.8V)	35	PETp0
	32	UART_TXD (O)(0/1.8V)	33	GND
		CONNECTOR Key E		CONNECTOR KEY E
		CONNECTOR Key E		CONNECTOR KEY E
		CONNECTOR Key E		CONNECTOR KEY E
		CONNECTOR Key E		CONNECTOR KEY E
	22	UART_RXD (I)(0/1.8V)	23	SDIO_RESET#/_TX_BLANKING (O)(0/1.8V)
	20	UART_WAKE# (I)(0/3.3V)	21	SDIO_WAKE# (I) (0/1.8V)
	18	VIO_CFG (I)	19	SDIO_DATA3 (I/O) (0/1.8V)
	16	LED_2# (I)(OD)	17	SDIO_DATA2 (I/O) (0/1.8V)
	14	PCM_OUT/I2S_SD_OUT (O)(0/1.8V)	15	SDIO_DATA1 (I/O) (0/1.8V)
	12	PCM_IN/I2S_SD_IN (I)(0/1.8V)	13	SDIO_DATA0 (I/O) (0/1.8V)
	10	PCM_SYNC/I2S_WS (I/O)(0/1.8V)	11	SDIO_CMD (I/O) (0/1.8V)
	8	PCM_CLK/I2S_SCK (I/O)(0/1.8V)	9	SDIO_CLK/SYSCLK (O) (0/1.8V)
	6	LED_1# (I)(OD)	7	GND
	4	3.3 V	5	USB_D-
	2	3.3 V	3	USB_D+
			1	GND

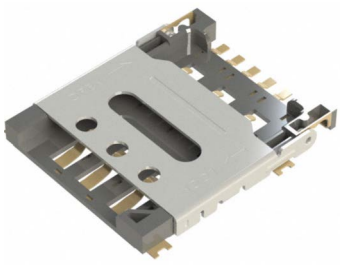
Connector

- ATTEND Technology connector M.2 Socket, H5.8 E key 0.5 Pitch

Part Number: 123A-58E01

11.19 J505 - NANO SIM Slot

This tiny, thumbnail-sized connector plays a pivotal role in enabling seamless connectivity and access to mobile networks. The Nano SIM's design incorporates a precisely engineered chip that stores and processes data, ensuring swift and reliable communication between the mobile device and the network. This advanced technology enables the Nano SIM to support high-speed data transmission, including 4G and 5G connectivity, empowering users to enjoy fast and responsive mobile experiences.



Connector

- CGT, Nano SIM Card Connector, Hinged Type, SMT, 6Pin, 1.43mm Profile

Part Number: SIM8060-6-1-14-00-A

11.20 J506 - SODIMM Socket

The DDR5 SO-DIMM connector will deliver high-speed and bandwidth. Being half the size of regular DIMMs, they lower power consumption and promote better thermal management.

- High density design of 0.50mm pitch saves board space
- High speed DDR5 digital validation
- Will provide different key positions that aid alignment
- SMT mechanical hold-downs
- Right angle orientation and vertical orientation for different customer preferences

Connector

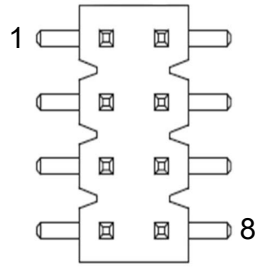
- AMPHENOL DIMM Connectors DDR5 SODIMM connector RA Surface Mount 262 Position 05mm Pitch

Part Number: 10161036-002RHLF

11.21 JP1 - SPIO Flash Header

This SPIO Flash Header Block is used for BIOS programing.

Function	BIOS Programming			
Location	JP1			
Type	Double Row Straight Pin Header 1.25MM			
Pinout	**Pin**	**Description**	**Pin**	**Description**
	1	+V3P3A_SPI	2	GND
	3	SPI_CS0	4	SPI0_CLK_FLASH0_R
	5	SPI0_MOSI_FLASH0_R	6	SPI0_MISO_FLASH0_R
	7	SPI0_WP_FLASH0_R	8	SPI0_HOLD_FLASH0_R



Connector

- Samtec Connector Header SMD 8POS 2MM

Part Number: TMM-104-01-L-D-SM-P-TR

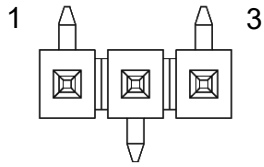
Matching Connector

- Samtec TCSD IDC Socket Cable Assembly, 2.00mm Pitch

Part Number: TCSD-04-D-13.73-01-L-N

11.22 JP2 - BIOS Restore Defaults

JP2 header is used to restore the BIOS to it's default settings.

Function	BIOS Restore Defaults		
Location	JP2		
Type	.079 cl Single Row - Surface Mount Terminal Strip Vertical Header, 1X3 2MM		
Pinout	**Pin**	**Description**	
	1	GND	
	2	BIOS_DEFAULTS_N	
	3	NC	

Default: Jumper pins 2 and 3 for normal operation.

Restore Defaults:

1. When the board is off, move the **JP2** jumper to pins 1 and 2.
2. During power up, press the **Esc** or **Del** keys to get to the BIOS setup screens.
3. Once powered up, move the **JP2** jumper back to pins 2 and 3 and hit Save & Exit under the Save & Exit tab in the BIOS setup screen.

Connector

- Samtec Connector Header SMD 3POS 2MM

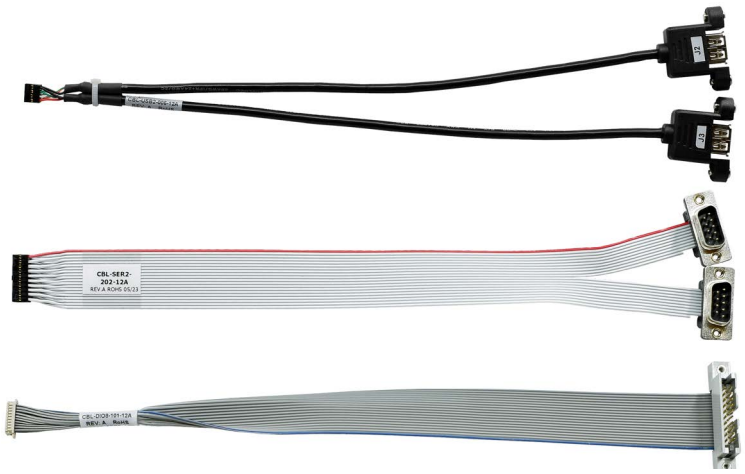
Part Number: TMM-103-01-L-S-SM-P-TR

12. Accessories

WINSYSTEMS provides cables, batteries, expansion cards, solid state drives, operating system, and other options to complete your embedded computing solution.

Contact WINSYSTEMS for your custom setup and questions at https://winsystems.com/contact/.

12.1 Cables

Cable Set: CBL-SET-474-1		
Part Numbers	**Reference**	**Description**
CBL-USB2-006-12A	J8	1x USB 2.0 2X4 PIN to Dual USB-A Panel Mount
CBL-SER2-202-12A	J6	1x Serial/CAN BUS 20 PIN to Dual DB-9,
CBL-DIO8-101-12A	J3	1x DIO to 2x10 2.54mm Centers
		
Cables		
Part Numbers	**Reference**	**Description**
CBL-EDP1-012A	J501	EDP, IPEX 40 PIN, 1:1,12" Long
CBL-AUDIO-HD-474-12A	J4	10 Pin 2.54mm Pitch to two 3.5mm Stereo Phono Jacks, 12” Long

12.2 Battery

Optional 3V 255 mAH removable battery available to be used on connector J7.

Battery		
Part Number	Reference	Description
BAT-LPC-BR2330	J7	3V 255 mAH removable battery

12.3 Operating Systems (OS)

WINSYSTEMS makes available the following OS versions, with licenses as applicable. The OS can be preloaded if desired, installed on the onboard 128GB eMMC or on an optional SSD. Get exact part numbers from your Sales rep.

NOTE These OS versions were used to test the SBC35-474.

- Windows 11 IoT ELTSC 24H2
- Lubuntu 26.04 LTS (Kernel 7.0.0)

13. BIOS Setup

13.1 BIOS Introduction

The BIOS provides an interface to modify the configuration. When the battery is removed, all the parameters will be reset.

BIOS Setup
Power on the embedded system and by pressing <Del> immediately allows you to enter the setup screens. If the message disappears before you respond and you still wish to enter the Setup, restart the system by turning it OFF and ON or pressing the RESET button.
You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

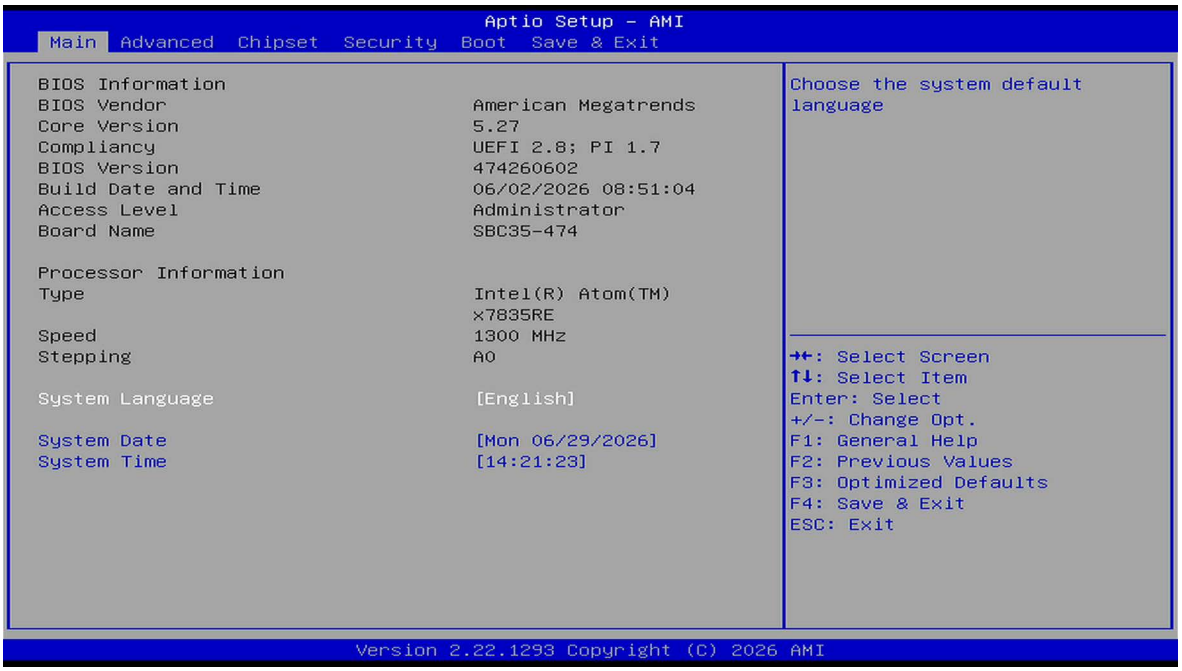
Control Keys	
<→> <←>	Select Screen
<↑> <↓>	Select Item
<Enter>	Select
<Page Up/+>	Increases the numeric value or makes changes
<Page Down/->	Decreases the numeric value or makes changes
<m> and <k>	Scroll up and down through long help content
<F1>	General Help
<F2>	Previous Value
<F3>	Load Optimized Defaults
<F4>	Save Configuration and Exit
<Tab>	Select Setup Fields
<Esc>	Exit BIOS Setup

General Help <F1>
The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

13.2 Main Setup

After you press <Del> when powering up or resetting the computer to enter the BIOS CMOS Setup Utility, the first thing you will see is the Main Setup tab shown below. This screen shows BIOS Information and allows you to set the System Language, System Date, and System Time. Use the arrow keys (↑↓) to select a feature.

In the top right of the screen you will see help information for the selected feature. In the bottom right of the screen are navigation instructions.

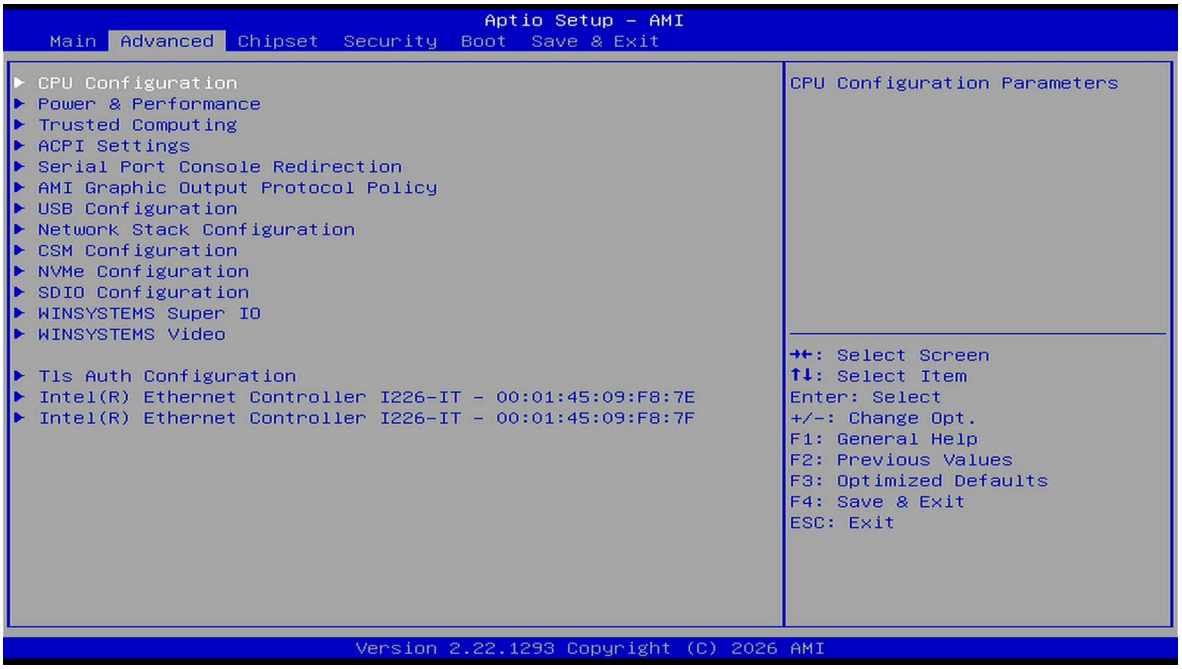


- **System Language** - The default is English. Use +/- to change selection options.
- **System Date** - Use <Tab> to switch between date elements.
- **System Time -** Use <Tab> to switch between time elements.

13.3 Advanced Setup

Select the Advanced tab to access the Advanced Setup menu, shown below.

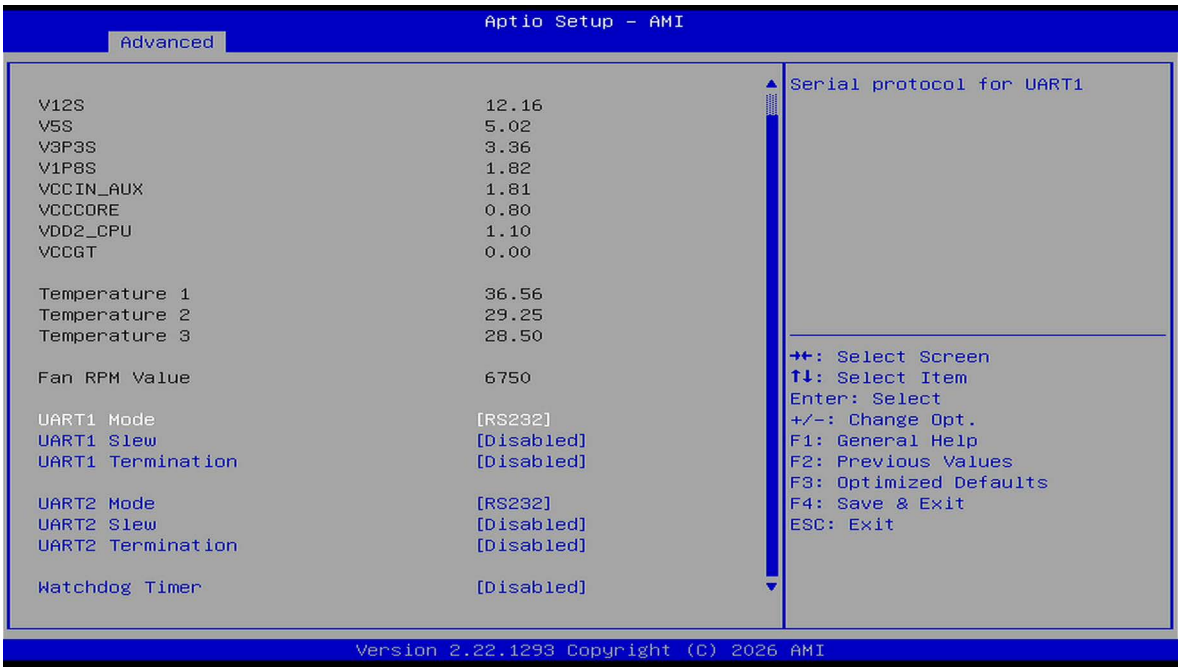
The features that you can change appear on the left side of the screen, with help and instructions on the right. Settings unique to the SYS35-474 FPGA options are found in the "WINSYSTEMS Super IO" menu. All other displayed features are standard AMI BIOS menus.



13.3.1 WINSYSTEMS Super IO Configuration

Scroll down the list of Advanced features to WINSYSTEMS Super IO and press <Enter> to select it. The screen will change to display these features, as shown below. Press <Esc> to return to the Advanced screen.

On the left side of the screen are live voltage readings, ambient temperature and fan speed, if applicable. Below these are the features you can change, with help and instructions on the right.



- **UART1 and UART2.** Each UART has Mode, Slew, and Termination options:

Mode - Default: RS232. Options: RS232, Internal Loopback, RS485 Half-Duplex, or RS422/RS485 Full-Duplex.

- **Slew** - Default: Disabled. Options: Enabled or Disabled.
- **Termination** - Default: Disabled. Options: Enabled or Disabled.

Watchdog Timer - Default: Disabled. Options: Enabled or Disabled. When Enabled, there are Mode and Time-out value options.

- **Mode** - Options: Minutes or Seconds.
- **Time-out*** - Options: 0 to 255.

* NOTE: Any value below 60 seconds will be treated as 60 seconds in order to prevent the system from restarting before the BIOS setup menu becomes accessible. A value of 0 effectively disables the watchdog.

Appendix A. Best Practices

The following paragraphs outline the best practices for operating the SBC35-474 in a safe, effective manner, that does not damage the board. Read this section carefully.

Power Supply

Avoid Electrostatic Discharge (ESD)
Observe ESD-safe handling procedures when working with this product.
Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.
Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The SBC35-474 contains a high number of I/O connectors with connection to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to WINSYSTEMS for repairs. This information is provided as a source of advice to help you prevent damaging your SBC35-474 (or any vendor's) embedded computer boards.

ESD Damage – This type of damage is usually almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board eventually simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced. To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However, these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause over-voltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However, our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Winsystems recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Some of our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply (i.e. almost all ICs). In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. **Check twice if your power supply or board does not reverse power protection before applying power!**

Bent connector pins – This type of problem is often only a cosmetic issue and is easily fixed by bending the pins back to their proper shape one at a time with needle-nose pliers. The most common cause of bent connector pins is when a cable or board is pulled off a connector by rocking it back and forth left to right, from one end of the connector to the other. As the board is rocked back and forth it pulls out suddenly, and the pins at the end get bent significantly. The same situation can occur when pulling a ribbon cable off of a pin header. If the pins are bent too severely, bending them back can cause them to weaken unacceptably or even break, and the connector must be replaced.

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 SBC35-474 typical load is not lower than the power supply's minimum load. If the SBC35-474 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 SBC35-474.

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

The SBC35-474 requires +9V to +36V 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 SBC35-474.

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 SBC35-474 circuit board.

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 SBC35-474

To avoid damage, mount the SBC35-474 properly. Standoff kits are available and recommended for use with the SBC35-474.

Placing the SBC35-474 on mounting standoffs—Be careful when placing the SBC35-474 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 SBC35-474—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 SBC35-474—Never use star washers or any fastening hardware that cut into the SBC35-474.

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.

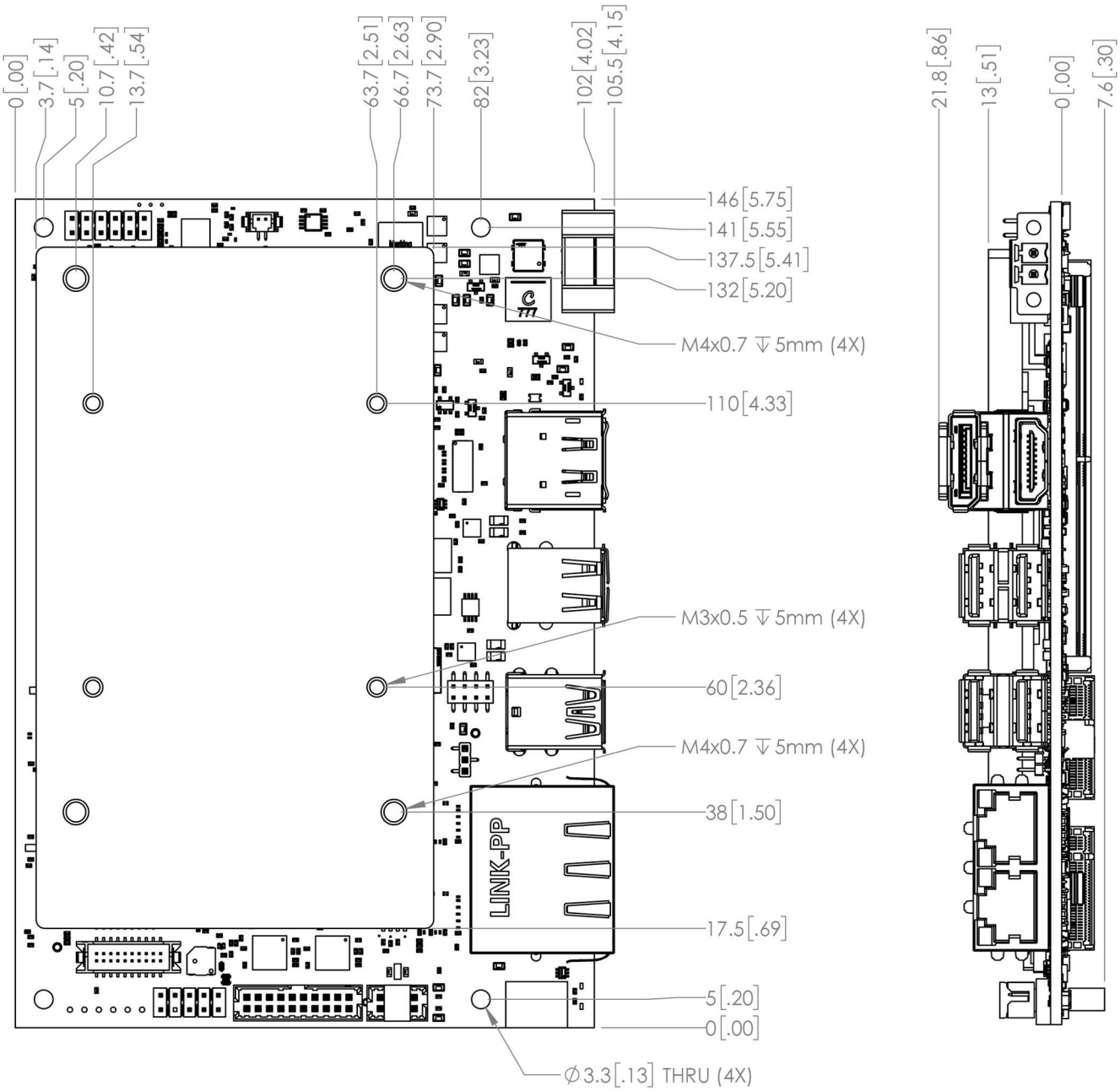
Periodic updates—Operations/product manuals may be updated often. Periodically check the WINSYSTEMS website (https://winsystems.com/product/sbc35-474/) for revisions.

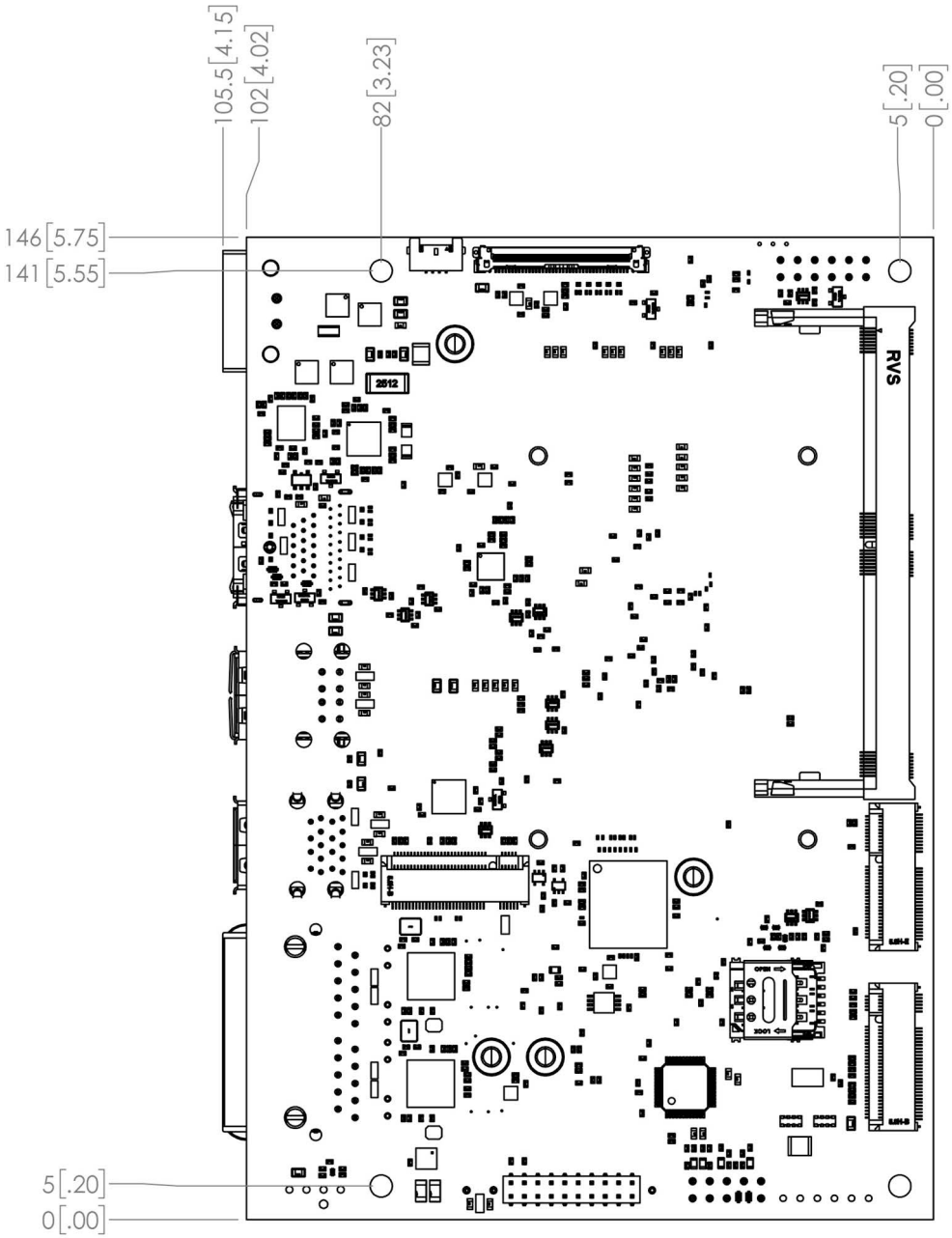
Check pin-outs—Always check the pin-out and connector locations in the manual before plugging in a cable. Many I/O modules have identical headers for different functions and plugging a cable into the wrong header can have disastrous results.

Contact an 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 engineer at +1-817-274-7553.

Appendix B. Mechanical Drawings

SBC35-474-P-R-1

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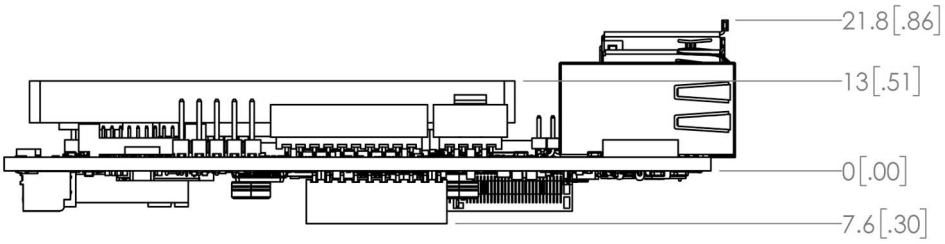
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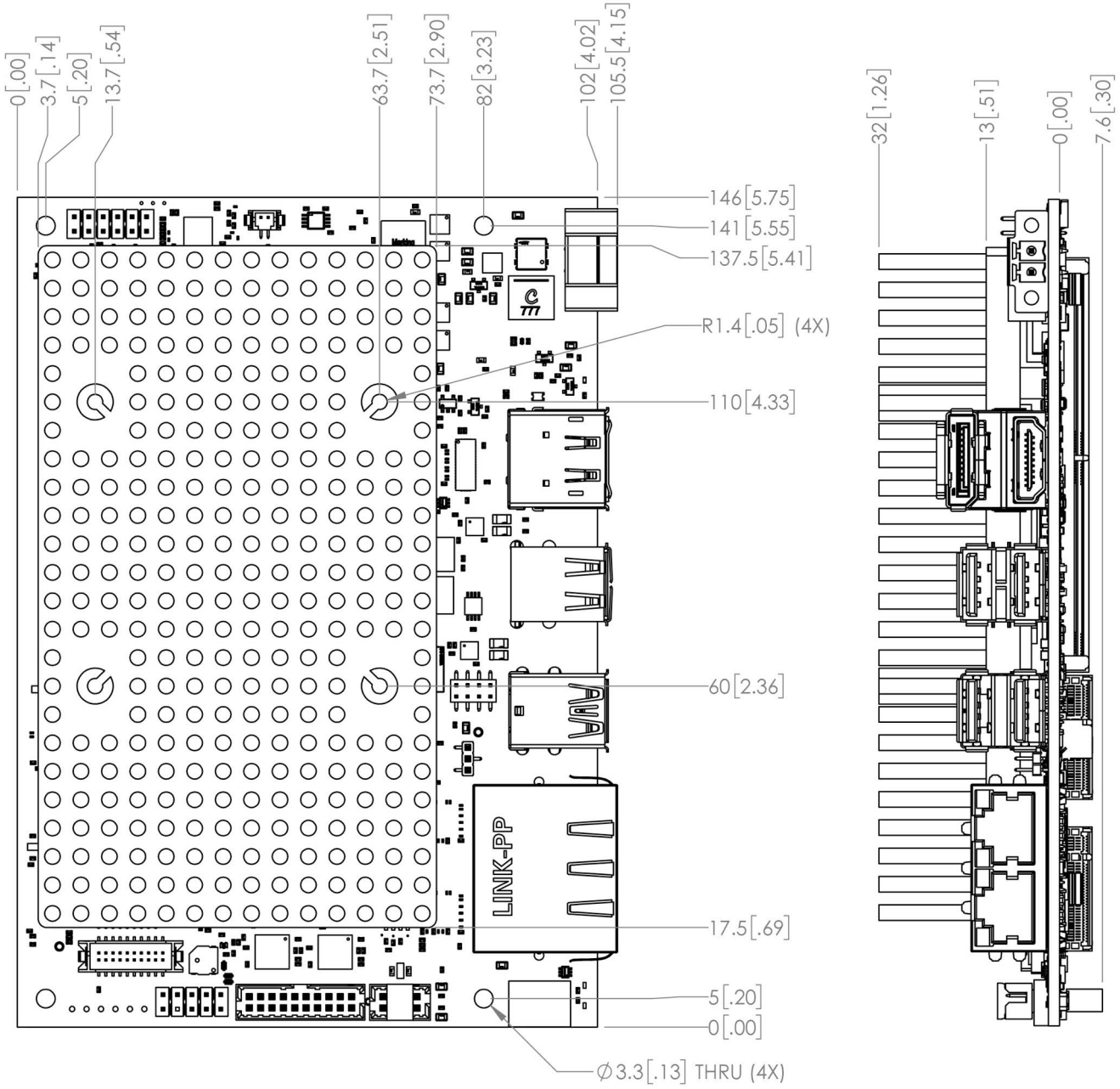

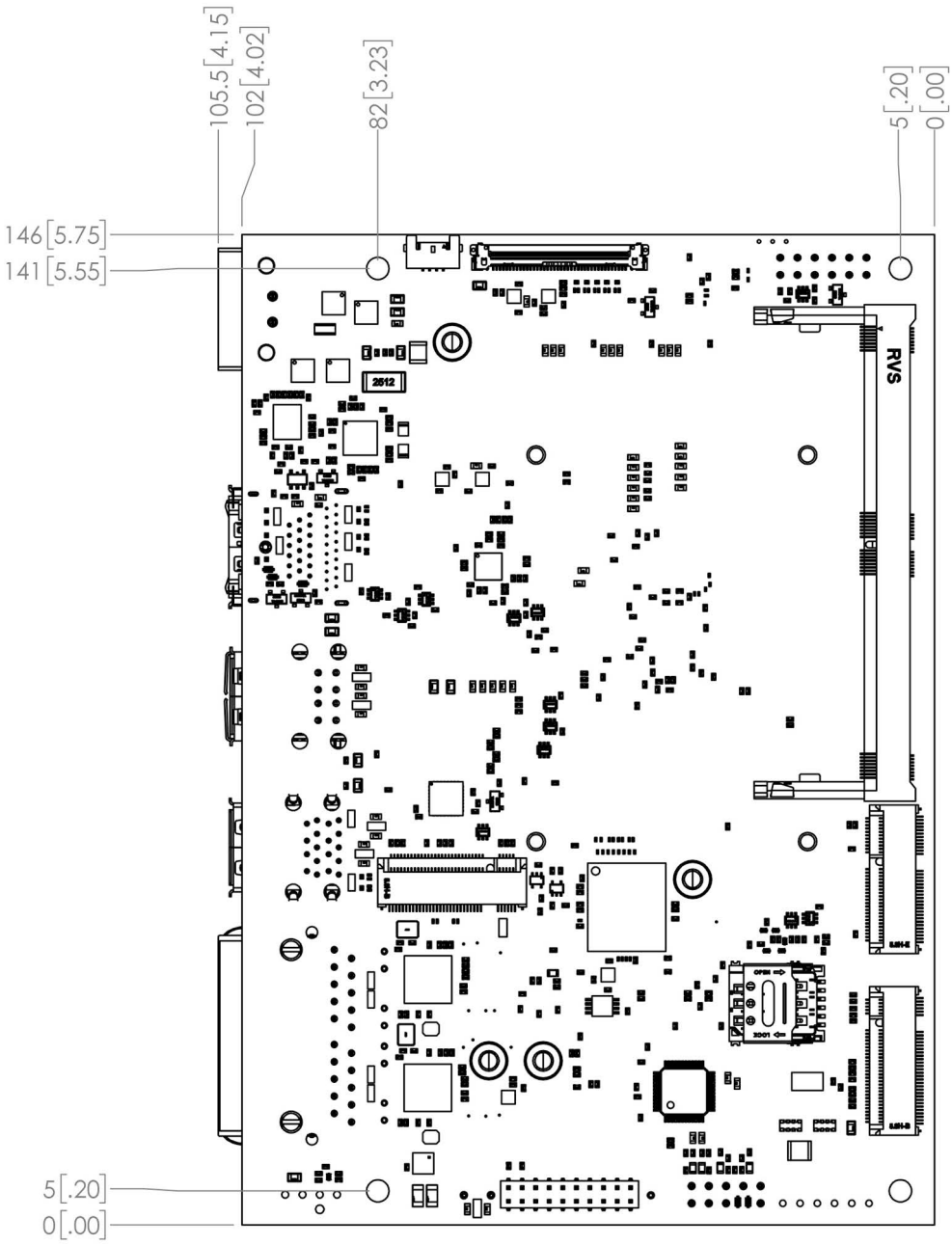
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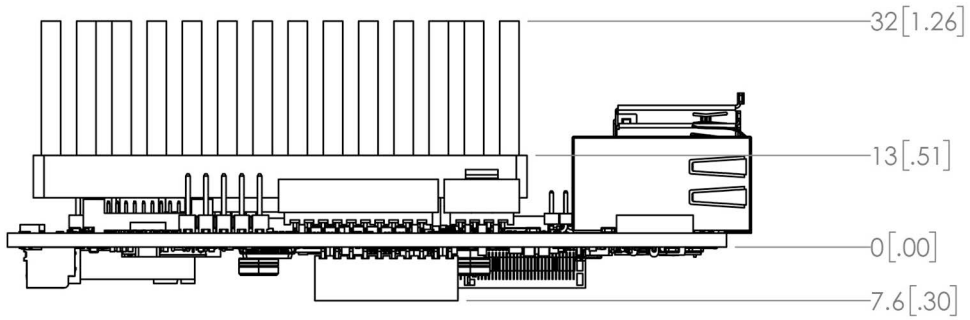
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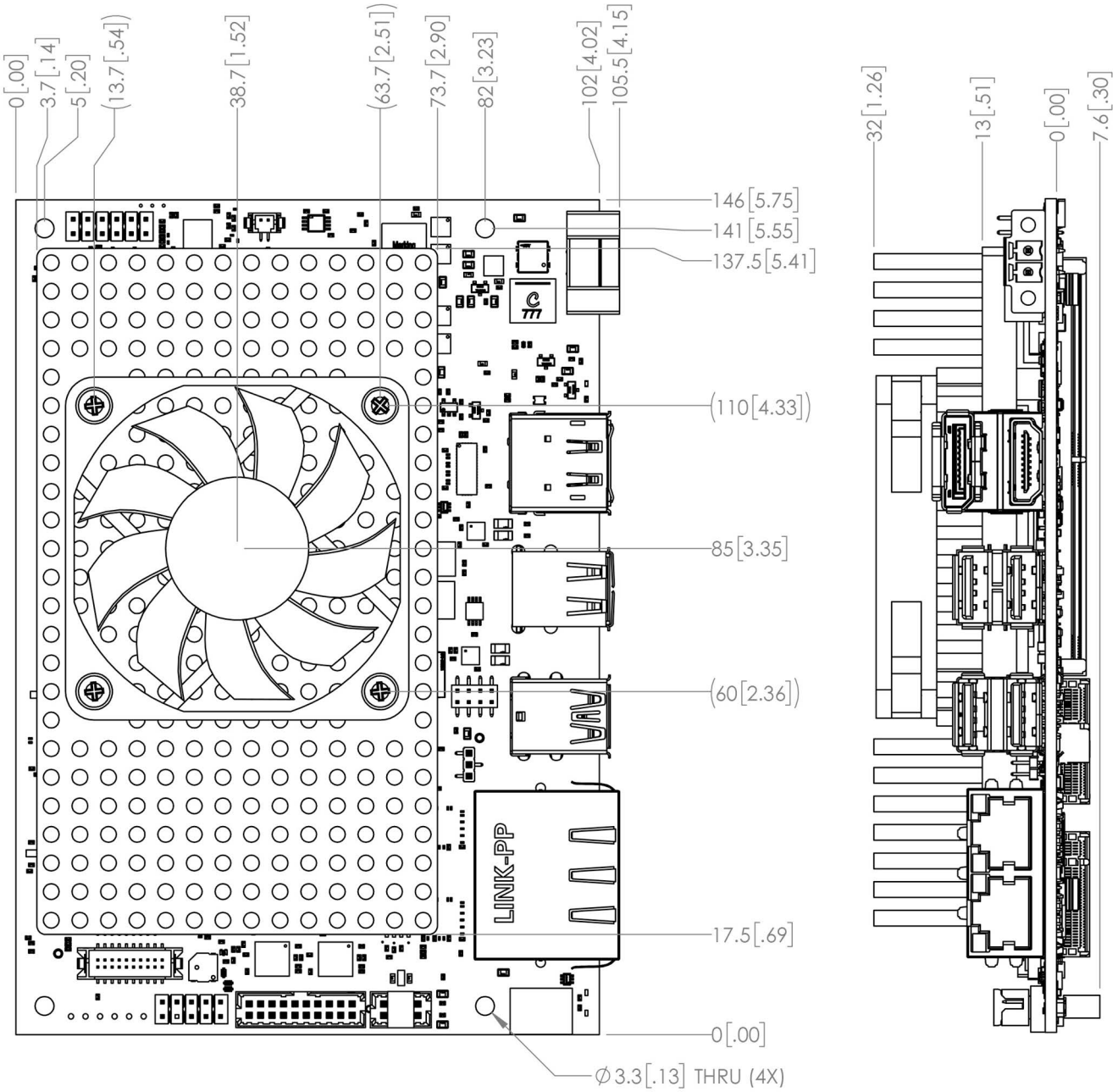

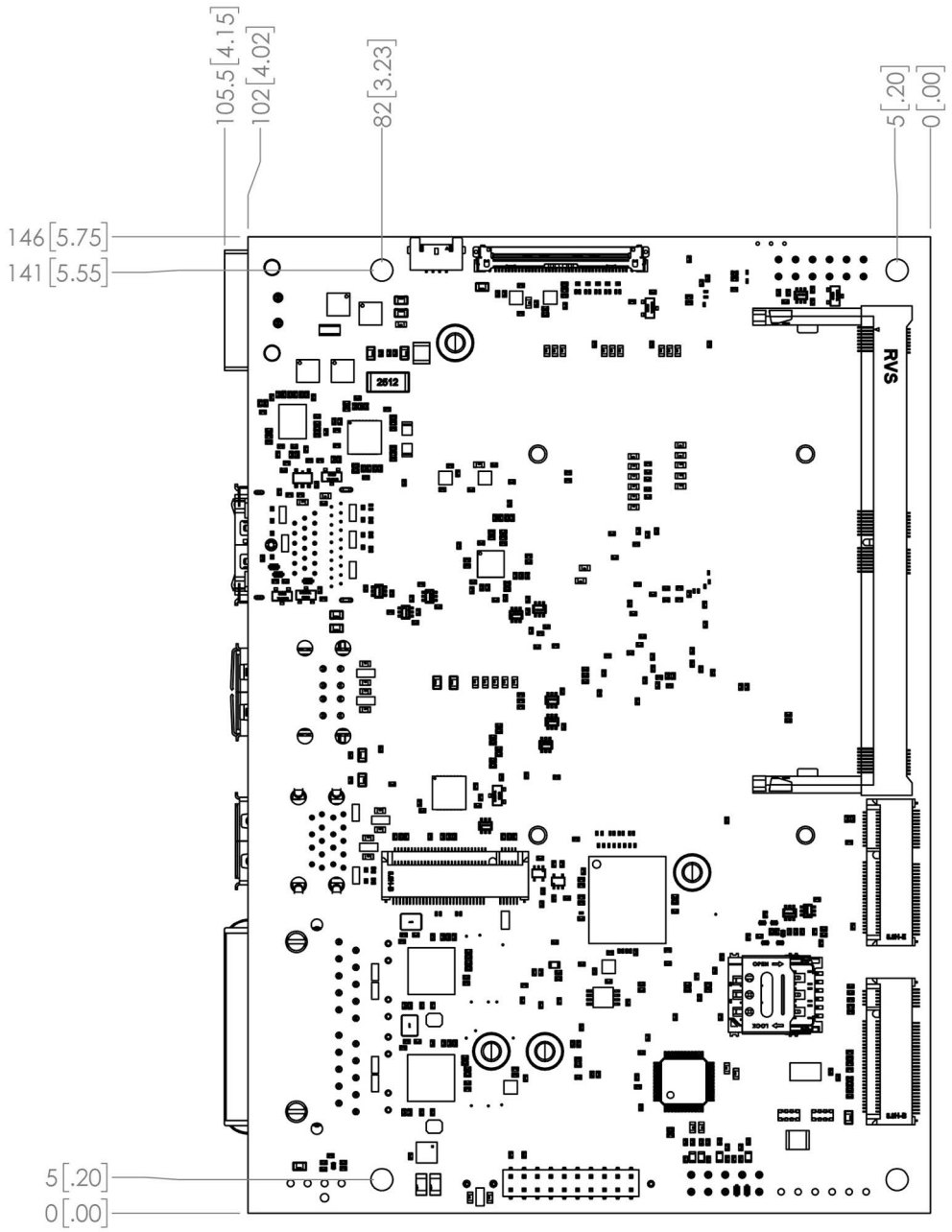
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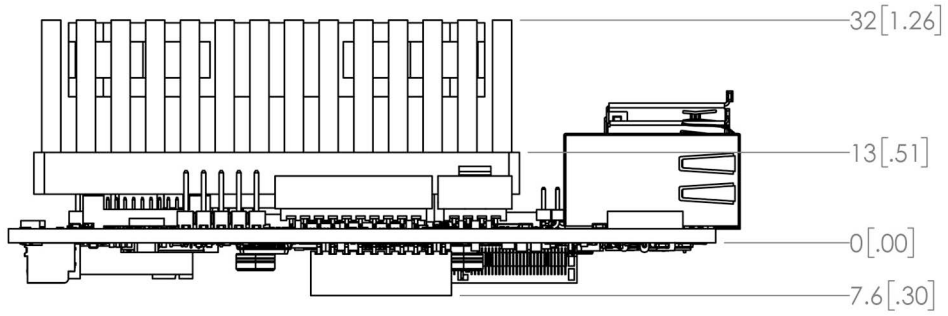
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Appendix C. Warranty Information

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