Chimney Rock Technical Product Specification

LLN11CRCJ

LLN11CRCJB

Version 1.3, 8/08/2022

Preface

The purpose of this document is to provide a technical reference for customers and developers of the Simply NUC Chimney Rock family of products. Chimney Rock kit SKUs include LLN11CRCJ, and N11CRC JB.

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1 Description

1.1 Overview

The Simply NUC LLN11CRCJ, and LLN11CRCJB is a mini computer built with an 11th Generation Intel® Core Celeron processor.

Chimney Rock is an ultracompact Long Life NUC that delivers entry level performance for embedded applications. Featuring the latest 11th Gen Intel® Celeron™ embedded processors with Intel® UHD Graphics, and support for high-speed 3200MHz DDR4 memory, Chimney Rock is built to withstand the test of time with a 7-year commitment on supply.

Chimney Rock has the following features:

- Intel® Celeron® J6412
- ▪ Intel® UHD Graphics
- ▪ 2x DDR4-3200 SO-DIMM Sockets
- 1x M.2 22x80 M-key supporting
- NVMe x4 PCIe or SATA SSDs
- 1X M.2 22x80 M-Key Supporting SATA SSDs
- 1x HDMI 2.0b, 4K @ 60Hz
- 1x DisplayPort 1.4, 4K @ 60Hz
- 2x Realtek 1Gb LAN Ports
- Intel® Wi-Fi 6
- Bluetooth 5.0
- 2x USB 3.2 Gen2 Type-A
- 2x USB 3.2 Gen2 Type-C
- 2x USB 2.0 Type-A
- 1x 3.5mm Stereo Headset Jack
- 7.1 Multichannel Digital Audio via HDMI & DisplayPort
- TPM Down (Infineon 2.0)
- Replaceable Lid for Expandable Functionality
- Simply NUC Universal Chassis
- 19VDC 90W Power Supply Adapter
- 12V – 19V Input Power Supply Range

1.2 Processor

The Chimney Rock CPUs have the following features.

Table 1: CPU Features

Chimney Rock	**LLN11CRCJ**
Intel CPU	Intel Celeron J6412
Cores	4
Threads	4
L1 Cache	4x 32KB I-cache, 4x 32KB D-cache
L2 Cache	4MB
L3 Cache	NA
Base Speed (Turbo) [MHz]	2000 (2600)
TDP (Configurable)[W]	10W
Integrated Graphics	Intel UHD for 11th Gen

1.3 Integrated Graphics Processing Unit

The Chimney Rock CPU has an integrated Intel graphics processing unit with the following features.

Table 2: GPU Features

Chimney Rock	**LLN11CRCJ**
GPU	Intel UHD for 11th Gen
GPU Speed [MHz]	1250
GPU Compute Units	48 (384 Shader Processors)
GFLOPs	896
Maximum 1080p Displays	3
Maximum 4k Displays	3
Maximum Single Display Resolution	3840x2160, 60Hz
Display Interfaces	HDMI 2.0a, DP 1.4, 2x USB-C (DP 1.4 via DP Alt Mode)
Memory Size	System-Shared DDR4
API Support	DirectX 12 (12_1), OpenGL 4.6, OpenCL 2.0, Vulkan 1.1, Shader Model 6.4

1.4 Memory

Chimney Rock has two SO-DIMM sockets for system memory with the following features:

- 1.2V LP-DDR4 SDRAM SO-DIMMs supported
- Two memory channels with interleaved support
- Serial Presence Detect
- Unbuffered SO-DIMM support (both single- and dual-sided)
- Minimum 4GB SO-DIMM supported
- Up to 32GB SO-DIMMs supported per socket for a maximum total of 64GB of system memory
- Support for DDR4-3200 data rates

1.5 Storage

Chimney Rock has one M.2 key-M slot for a 2280 storage module supporting either a SATA or PCIe SSD.

SATA Interface

The M.2 slot is a key-M slot for a SATA 2280 M.2 module, up to 2TB in density. The SATA III port has a theoretical maximum transfer rate of 6Gbps.

PCIe Interface

The M.2 slot is a key-M slot for an PCIe 2280 M.2 module, up to 8TB in density. The PCIe 4.0 x4 interface on the port has a theoretical maximum transfer rate of 8GBps.

1.6 Networking

RJ-45 Connector for Networking Interface (LAN1)

Chimney Rock has two Realtek RTL8111G gigabit controllers that interfaces to on-board RJ-45 Ethernet connector (LAN1) to provide gigabit Ethernet connections. The RTL8111G controller features

- Integrated MAC + BASE-T PHY
- MDI standard IEEE 802.3 Ethernet interface for 2500BASE-T, 1000BASE-T, 100BASE-TX, and 10BASE-TE
- MDI lane swap
- IEEE 802.3 auto-negotiator
- IEEE 802.3x and IEEE 802.3z compliant flow control support with software-controllable Rx thresholds and Tx pause frames
- Automatic crossover detection function (MDI/ MDI-X)
- IEEE 1588 protocol and 802.1AS implementation

- Supporting Time Sensitive Networking (TSN) Capabilities (IEEE 802.1Qbu, 802.3br, 802.1Qbv, 802.1AS-REV, 802.1p,Q, and 802.1Qav)
- Supports IEEE 802.3az – Energy Efficient Ethernet (EEE)
- Smart Power Down (SPD) at S0 no link/Sx no link
- Full wake up support (APM an ACPI)
- MAC Power Management controls
- Power Management Protocol Offload (Proxying)
- Latency Tolerance Reporting (LTR)
- TCP/UDP, Ipv4 checksum offloads (Rx/ Tx)
- Transmit Segmentation Offloading (TSO) (Ipv4, Ipv6)
- Legacy, Message Signal Interrupt (MSI) and Message Signal Interrupt Extension (MSI-X)
- Support for packets up to 9.5 KB (Jumbo Frames)
- Descriptor ring management hardware for Transmit and Receive

Wireless Networking Interface

Chimney Rock has one M.2 key-E slot for a removable 2230 wireless module supporting a dual-banded radio with wireless and Bluetooth protocols. The radio module included with Chimney Rock is the Intel Wi-Fi 6 AX200 that features

- 2.4Ghz and 5Ghz bands
- Maximum bandwidth of 2.4Gbps
- 2x2 transmit/receive streams
- Supports IEEE WLAN standards IEEE 802.11a/b/d/e/g/h/i/k/n/r/u/v/w/ac/ax
- Supports authentications WPA and WPA2, 802.1X EAP-TLS, EAP-TTLS/MSCHAPv2, PEAPv0-MSCHAPv2 (EAP-SIM, EAP-AKA, EAP-AKA')
- 64-bit and 128-bit WEP,TKIP, 128-bit AES-CCMP, 256-bit AES-GCMP encryptions supported
- Bluetooth® 5.1, BLE

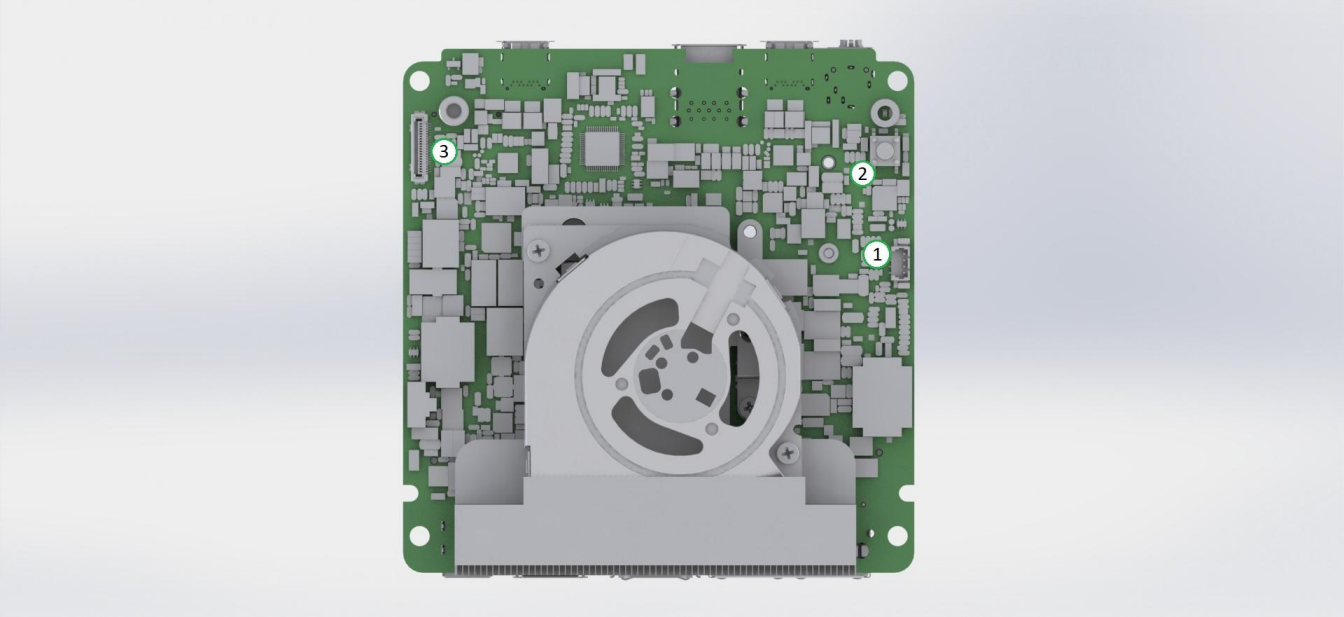
2 Technical Reference

2.1 Motherboard Headers

Headers – Top of Board

Headers on the top side of the motherboard are defined below.

Figure 1: Top Side Header Locations



Identifier	Header
1	Fan Header
2	Power Button
3	ESPI Connector

Table 3: Top Side Header Definitions

2.1.1.1 Battery Header

The battery header is a 1.25mm, 1x2 2-circuit, male header. The battery header is an input power supply from a coin-cell battery to power CMOS memory.

2.1.1.2 APU Fan Header

The APU fan header is a 1.25mm, 1x4 4-circuit, male header. The header is for a CPU cooling fan that can be speed detected and controlled, as well as displayed in the Hardware Monitor section of the BIOS.

Table 4: CPU Fan Header Pinout

Pin	Signal Definition
1	GND
2	5V
3	Fan Speed
4	Fan Speed Control

2.1.1.3 Power Button

The power button on the APU side of the Chimney Rock board can be used to power on and off the system in the absence of a Power-ON solution via the Front Panel header

Headers – Bottom of Board

Headers on the top side of the motherboard are defined below.

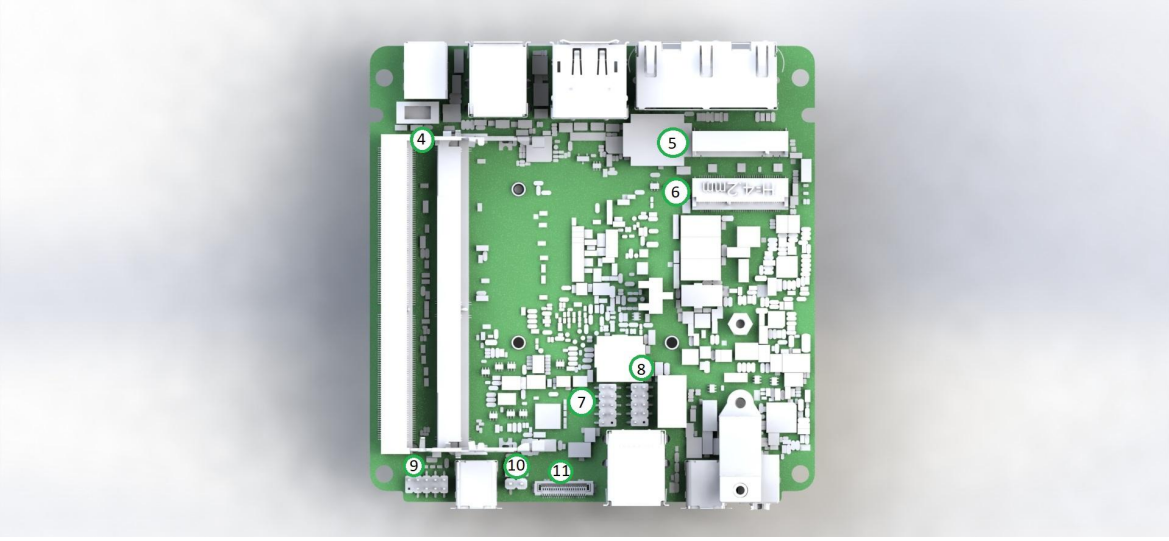


Figure 2: Bottom Side Header Locations

Identifier	Header
4	DDR4 SO-DIMM Socket
5	M.2 for Storage
6	M.2 for Radio
7	COM Header
8	USB2 Header
9	Front Panel Header
10	ATX/AT Jumper
11	SATA-III Connector

Table 5: Bottom-Side Header Definitions

2.1.1.4 DDR4 SO-DIMM Sockets

The Red Oak motherboard has two 260-pin SO-DIMM sockets for DDR4 memory and supports the following features:

- 1.2v DDR4 DIMMs with dual channel architecture
- DDR4-3200 speeds for a peak transfer rate of 25600MBps
- Non-ECC, unbuffered, single- or dual-sided SO-DIMMs
- 4GB to 64GB of total system memory
- Serial Presence Detect (SPD)
- DDR4 SDRAM organizations 1Rx8, 1Rx16 and 2Rx8 supported

2.1.1.5 M.2 for Storage

The M.2 storage socket supports both SATA III and PCI Express (PCIe) drives in a 2280 key-M module. SATA drives support a theoretical maximum transfer rate of 6Gbps, and PCIe drives utilizing PCIe Gen 4 can deliver up to 8GBps bandwidth.

Table 6: M.2 Key-M SSD Pinout

Pin	Signal	Signal	Pin
74	+3.3V	GND	75
72	+3.3V	GND	73
70	+3.3V	GND	71
68	NA	PEDET (NC-PCIe/GND-SATA)	69
66	CONNECTOR KEY	NA	67
64	CONNECTOR KEY	CONNECTOR KEY	65
62	CONNECTOR KEY	CONNECTOR KEY	63
60	CONNECTOR KEY	CONNECTOR KEY	61
58	NA	CONNECTOR KEY	59
56	NA	GND	57
54	PEWAKE# (I/O)(0/3.3V) or N/C	PEFCLKn	55
52	CLKREQ# (I/O)(0/3.3V) or N/C	PEFCLKn	53
50	PERST# (O)(0/3.3V) or N/C	GND	51
48	NA	PETp0/SATA-A+	49

Pin	Signal	Signal	Pin
46	NA	PETn0/SATA-A-	47
44	NA	GND	45
42	SMB_DATA	PERp0/SATA-B-	43
40	SMB_CLK	PERn0/SATA-B+	41
38	DEVSLP (O)	GND	39
36	NA	NA	37
34	NA	NA	35
32	NA	GND	33
30	NA	NA	31
28	NA	NA	29
26	NA	GND	27
24	NA	NA	25
22	NA	NA	23
20	NA	GND	21
18	+3.3V	NA	19
16	+3.3V	NA	17
14	+3.3V	GND	15
12	+3.3V	NA	13
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	NA	11
8	USB_D-	GND	9
6	USB_D+	NA	7
4	3.3V	NA	5
2	3.3V	GND	3
		GND	1

2.1.1.6 M.2 for Radio

The M.2 radio socket supports a wireless radio in a 2230 key-E module. The system includes an Intel AX200 dual-band Wi-Fi 6/Bluetooth v5.1 radio which can be removed, if necessary.

Table 7: M.2 Key-E Pinout

Pin	Signal	Signal	Pin
74	+3.3V	GND	75
72	+3.3V	NA	73
70	NA	NA	71
68	NA	GND	69
66	NA	NA	67
64	NA	NA	65
62	NA	GND	63
60	SMB_CLK	NA	61
58	SMB_DATA	NA	59
56	W_DISABLE2#	GND	57
54	W_DISABLE1#	WAKE0#	55
52	PERST0#	CLKREQ0#	53
50	SUSCLK	GND	51
48	NA	PEFCLKn	49
46	NA	PEFCLKp	47
44	NA	GND	45
42	NA	PERn0-	43
40	NA	PERp0	41
38	NA	GND	39
36	NA	PETn0	37
34	NA	PETp0	35

Pin	Signal	Signal	Pin
32	NA	GND	33
30	CONNECTOR KEY	CONNECTOR KEY	31
28	CONNECTOR KEY	CONNECTOR KEY	29
26	CONNECTOR KEY	CONNECTOR KEY	27
24	CONNECTOR KEY	CONNECTOR KEY	25
22	NA	NA	23
20	NA	NA	21
18	NA	NA	19
16	NA	NA	17
14	NA	NA	15
12	NA	NA	13
10	NA	NA	11
8	NA	NA	9
6	NA	NA	7
4	+3.3V	USB_D-	5
2	+3.3V	USB_D+	3
		GND	1

2.1.1.7 COM Header

The COM header is a 2.00mm, 2x5 9-circuit, male header. This header is intended to connect to a serial RS-232 interface.

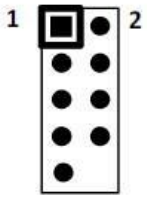


Figure 3: COM Header

Pin	RS-232 Signal	RS-422	RS-485
1	DCD	TX-	RTX-
2	RXD	TX+	RTX+
3	TXD	RX+	NA
4	DTR	RX-	NA
5	GND	GND	NA
6	DSR	NA	NA
7	RTS	NA	NA
8	CTS	NA	NA
9	RI#	NA	NA
10	Empty	NA	NA

Table 8: COM Header Pinout

2.1.1.8 USB 2.0 Header

The motherboard has one on-board 2.00mm, 2x5 9-circuit, male header that can be used to connect to two external USB 2.0 devices.

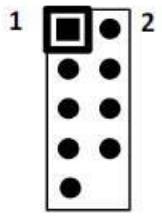


Figure 4: USB 2.0 Header

Pin	Signal
1	VCC
2	VCC
3	USB0-
4	USB1-
5	USB0+
6	USB1+
7	GND
8	GND
9	No Connect
10	Empty

Table 9: USB 2.0 Header Pinout

2.1.1.9 Front Panel Header

The front panel header is a 2.00mm, 2x5 9-circuit, male header. It connects to the front panel switches and LEDs.

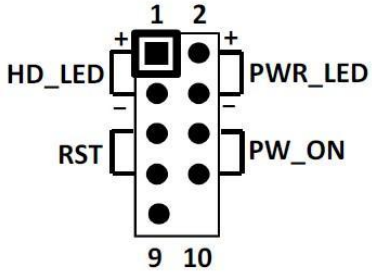


Figure 5: Front Panel Header

Pin	Header	Signal
1	HD_LED	HD_PWR
3		HD_Active
2	PWR_LED	PWR LED+
4		PWR LED-
5	RESET	GND
7		RST BTN
6	PW_ON	PWR BTN
8		GND
9	No Connect	+5V
10	Empty	Empty

Table 10: Front Panel Header Pinout

The HD_LED pins attach to a hard disk drive indicator LED to show the activity status of the hard disks.

The Power LED lit by the PWR_LED pins indicates the status of the system.

System Status	Power LED status
S0	LED is on
S1	LED will blink
S3	LED is off
S4	LED is off
S5	LED is off

Table 11: Power LED System Status

The RESET pins attach to a front panel RESET switch to restart the system when the switch is pressed.

The PW_ON pins attach to the front panel Power switch to turn the system on and off when the switch is pressed.

2.1.1.10 ATX/AT Jumper

The motherboard has a 2.54mm, 1x2 jumper to select between ATX and AT mode. The default mode for the board is ATX mode with the jumper open. In AT Mode, the Restore after AC Power Loss function will enable automatically without any BIOS setting, and the system will automatically boot when power is applied. AT mode is selected if the pins are shorted together.

2.1.1.11 SATA-III Connector

The motherboard has a 0.5mm 20-pin WTB LVDS connector with which to attach a SATA-III storage device.

Figure 6: SATA Connector

Table 12: SATA Connector Pinout

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	GND
6	RX-
7	RX+
8	GND
9	GND
10	GND
11	No Connect
12	5V
13	5V
14	5V
15	5V
16	5V
17	No Connect
18	GND
19	GND
20	GND

2.1.1.12 Clear CMOS Jumper

The motherboard has a 2.54mm, 1x3 3-circuit, male header for a 2-pin jumper that can be used to clear the CMOS data and reconfigure the system back to the default values stored in the ROM BIOS.

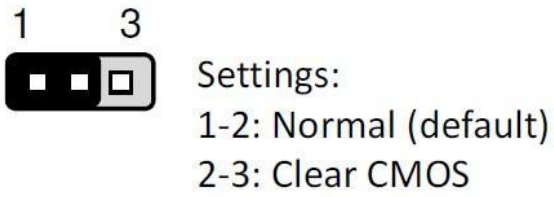


Figure 7: CMOS Header Settings

To clear the CMOS,

1. Turn off the system. Disconnect power to the unit.
2. Move the jumper from the “1-2” position to the “2-3” position for a few seconds.
3. Replace the jumper back to the “1-2” position.
4. Reconnect power to the unit, turn on the system and hold down the <DELETE> key to enter the BIOS setup.

2.2 Chassis I/O Connectors

Connectors – Front Panel

Front-side connector locations are shown below.

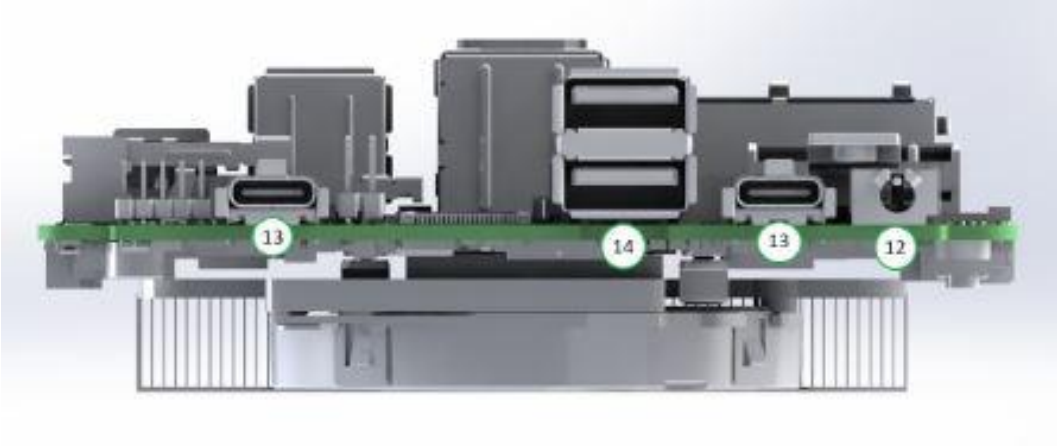


Figure 8: Front Side Connector Locations

Identifier	Connector
12	Audio Jack
13	Dual USB 3.2 Gen2 Type-C
14	Dual USB 3.2 Gen2 Type-A

Table 13: Front Side Connections Defined

The 3.5mm audio jack supports two-channel high-definition audio output and a microphone input in both TRRS (CTIA/AHJ and OMTP) standards. The TRRS standard used is auto-detectable by the hardware.

The two USB 3.2 Gen2 Type-A and Type-C ports on the front of the board support transfer speeds up to 10Gbps.

Connectors – Rear Panel

Connector locations shown on the back side of the motherboard are shown below.

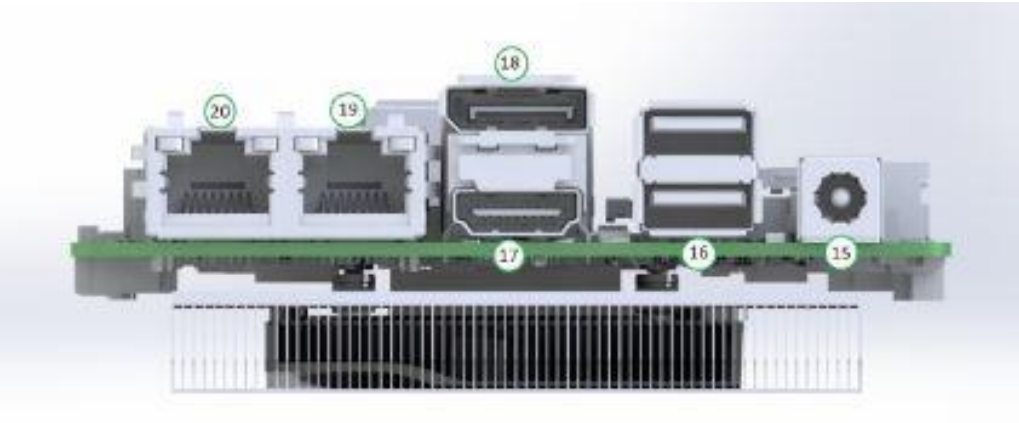


Figure 9: Back Side Connector Locations

Table 14: Back Side Connections Defined

Identifier	Connector
15	DC Power Input
16	Dual USB 3.2 Gen2 Type-A
17	HDMI Port
18	DisplayPort
19	RJ-45 for Gigabit Ethernet (LAN2)
20	RJ-45 for 2.5 Gigabit Ethernet (LAN1)

The system has a 12-19VDC input with 10% tolerance.

The two USB 3.2 Gen2 Type-A ports support transfer speeds up to 10Gbps.

The HDMI 2.0a port can support a maximum output resolution of 4096 x 2160, 60Hz.

The DisplayPort 1.4 port can support a maximum output resolution of 7680 x 4320, 60Hz.

The on-board RJ-45 gigabit Ethernet port is controlled by an Intel I219LM gigabit controller. For more information on the controller refer to RJ-45 Connector for Networking Interface (LAN2).

The on-board RJ-45 2.5 gigabit Ethernet port is controlled by an Intel I225LM gigabit controller. For more information on the controller refer to RJ-45 Connector for Networking Interface (LAN1).

2.3 Mechanical Dimensions

PCB Chassis Mount

The dimensions for the PCB to securely mount into a chassis are given in Figure 10.

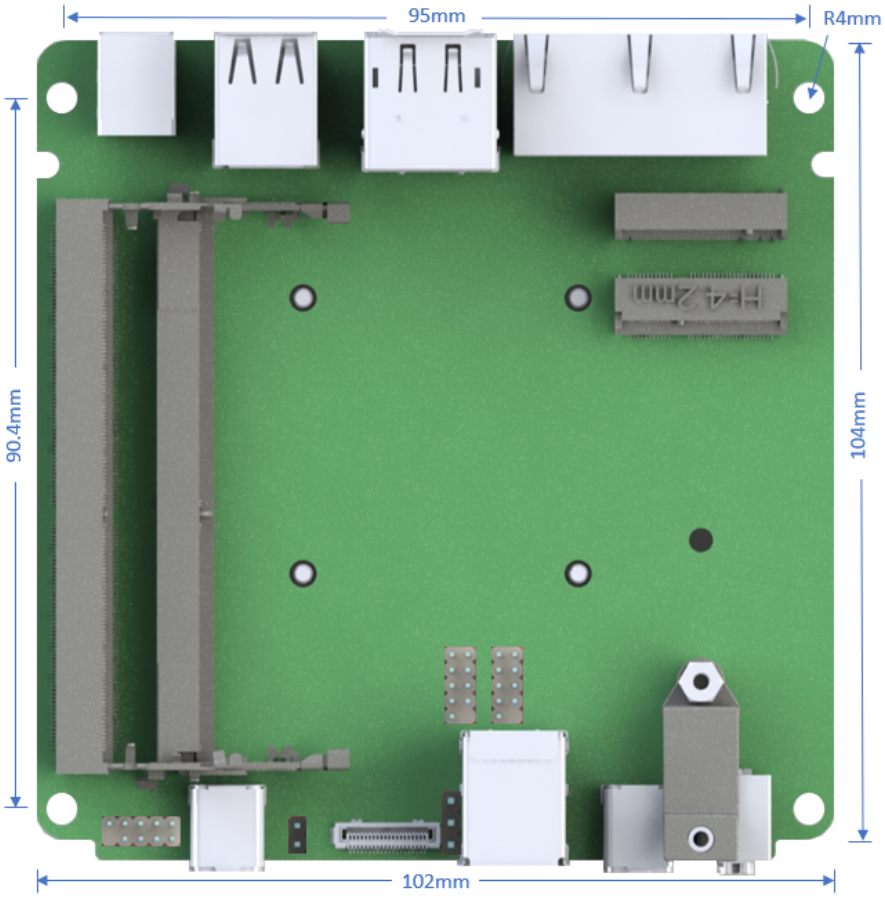


Figure 10: Motherboard Dimensions

System Height

The maximum height of a populated system is shown below.

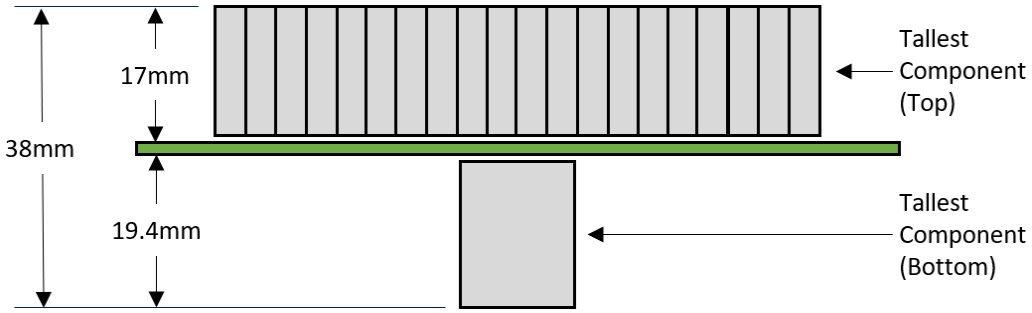


Figure 11: System Height

3 Environmental Specifications

Table 15: Environmental Specifications

Condition	Specification
Input Voltage	12V – 19V ±10%
Input Voltage Connector	5.5 x 2.5mm Barrel Plug
Recommended PSU Wattage	90W
Operating Temperature	0°C– 60°C
Operating Humidity	5% – 90%
Storage Temperature	-40°C – 85°C
Storage Humidity	5% – 90%

4 Version History

Version	Date	Comments
1.0	*7/28/2022*	*Initial Creation.*
1.1	*7/28/2022*	● *Updated Table 1: CPU Features* ● *Updated Table 2: GPU Features* ● *Updated Figure 1: Top Side Header Locations* ● *Updated Table 3: Top Side Header Definitions* ● *Updated Figure 2: Bottom Side Header Locations* ● *Updated Table 5: Bottom-Side Header Definitions* ● *Updated Figure 8: Front Side Connector Locations* ● *Updated Table 13: Front Side Connections Defined* ● *Updated Figure 9: Back Side Connector Locations* ● *Updated Table 14: Back Side Connections Defined*
1.2	*8/2/2022*	*Updated table of content*
1.3	*8/8/2022*	*Final technical check, update formatting, resized images and reorganize tables*