



Intel® NUC Assembly Element CMA2GB Product Specification

Revision 1.1

Regulatory Model: CM2GB

September 2023

Intel® NUC Assembly Element CMA2GB may contain design defects or errors known as errata that may cause the product to deviate from published specifications. Current characterized errata, if any, are documented in this product specification.

Revision History

Revision	Revision History	Date
1.0	First Release	April 2021
1.1	Updated Figure 3 to show pin one of connector G	September 2023

Disclaimer

This product specification applies only to the standard Intel® NUC Assembly Element CMA2GB.

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Preface

This Product Specification specifies the layout, components, connectors, power and environmental features for the Intel® NUC Assembly Element CMA2GB.

Intended Audience

This document is intended to provide technical information about Intel® NUC Assembly Element CMA2GB and its components to the vendors, system integrators, and other engineers and technicians who need this level of information. It is specifically *not* intended for general audiences.

What This Document Contains

Chapter	Description
1	A description of the NUC Assembly Element CMA2GB
2	A technical description of the NUC Assembly Element CMA2GB

Typographical Conventions

This section contains information about the conventions used in this specification. Not all of these symbols and abbreviations appear in all specifications of this type.

Notes, Cautions, and Warnings



NOTE

Notes call attention to important information.



CAUTION

Cautions are included to help you avoid damaging hardware or losing data.

Other Common Notation

#	Used after a signal name to identify an active-low signal (such as USBP0#)
GB	Gigabyte (1,073,741,824 bytes)
GB/s	Gigabytes per second
Gb/s	Gigabits per second
KB	Kilobyte (1024 bytes)
Kb	Kilobit (1024 bits)
kb/s	1000 bits per second
MB	Megabyte (1,048,576 bytes)
MB/s	Megabytes per second
Mb	Megabit (1,048,576 bits)
Mb/s	Megabits per second
TDP	Thermal Design Power
Xxh	An address or data value ending with a lowercase h indicates a hexadecimal value.
x.x V	Volts. Voltages are DC unless otherwise specified.
*	This symbol is used to indicate third-party brands and names that are the property of their respective owners.

Intel® NUC Assembly Element Information

NUC Assembly Element CMA2GB Identification Information

SA Revision	Product Code	Notes
M10099-302	BKCMA2GB	1

Notes:

1. The SA number is found on the bottom of the metal bracket.

Specification Changes or Clarifications

The table below indicates the Specification Changes or Specification Clarifications that apply to the Intel® NUC Assembly Element BKCMA2GB.

Specification Changes or Clarifications

Date	Type of Change	Description of Changes or Clarifications

Errata

Current characterized errata, if any, will be documented in Section 3 of this Product Specification.

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1 Product Description

1.1 Overview

The Intel® NUC Assembly Element CMA2GB is an assembly solution for the Intel® NUC Compute Element and consists of a connector for the NUC Compute Element to plug into along with input/output connectors, headers, a thermal solution, a fan and a metal bracket. The Intel® NUC Assembly Element CMA2GB requires a compatible Intel® NUC Compute Element to operate. For information on compatible devices for use with the Intel® NUC Assembly Element CMA2GB see <http://www.intel.com/NUCElements>.



NOTE

The Intel® NUC Assembly Element CMA2GB has been certified for use as a component in Information Technology Equipment in certain countries. The system integrator is responsible for testing and acquiring any additional country-specific regulatory approvals, including all system-wide certifications.

1.2 Feature Summary

Table 1 summarizes the major features of the Intel® NUC Assembly Element CMA2GB.

Table 1. Feature Summary

Assembly Size	117 millimeters by 147 millimeters by 25 millimeters
Graphics	<ul style="list-style-type: none"> • One HDMI* 2.0b connector on the assembly back panel • One HDMI 2.0b connector on the assembly edge • One Type C supporting DP 1.4a on the back panel • One eDP 1.4b¹ connector on the board edge • High-Bandwidth Digital Content Protection 2.3 support for content protection • DP1.4a – Up to 5120x3200x60Hz resolutions and refresh rates supported • HDMI 2.0b - Up to 4K @ 60 Hz resolutions and refresh rates supported
Audio	Intel® High Definition (Intel® HD) Audio via HDMI or DisplayPort
Storage	A single M.2 2280 Connector supporting PCIe x4 Gen4 ² NVMe storage
USB	<ul style="list-style-type: none"> • Four USB 3.x³ Ports on the back panel • Two USB 2.0 headers
Thunderbolt™	One Thunderbolt™ 4 (Type-C ⁴ , USB4, DP 1.4a) port on the back panel
Front Panel Header	Single 1x10 header
Wired LAN	<ul style="list-style-type: none"> • Intel® Ethernet Connection i219-LM • One RJ-45 jack on the back panel • Support for Intel® vPro™ Technology (a vPro™ enabled NUC Compute Element required)
Wireless LAN	Intel® NUC Compute Element supplies the solution, antennas will be required
Power Input	12-24 V DC
Compute Module Connector	Lotes APCI0468-P001A01 Edge Mount Connector
Thermal Solution	Heat Pipes, Ducting, Heat Sink Fins and Fan

¹ eDP 1.4x is determined by the Intel® NUC Compute Element.

² PCIe x4 speed is determined by the Intel® NUC Compute Element.

³ USB 3.x port speed is determined by the Intel® NUC Compute Element.

⁴ The Type-C port is only operational when an Intel® NUC Compute Element with Thunderbolt™ 4 support is connected.

To find information about...

Intel® NUC Compute Element
Intel® NUC Assembly Element Support
Intel® NUC Element Warranty Information
Available configurations for Intel® NUC Assembly Element
Intel Processors
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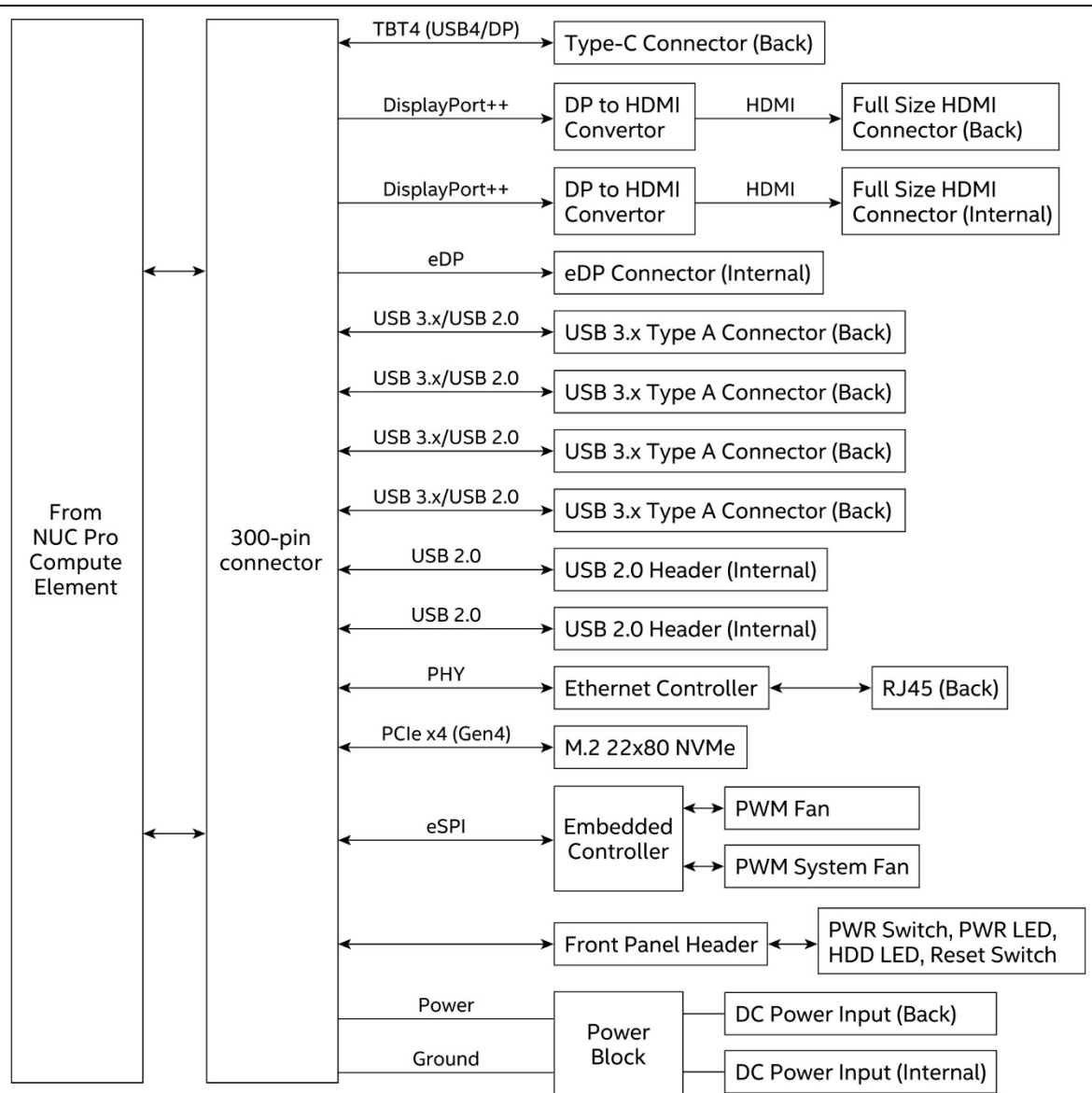
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2 Technical Reference

2.1 Block Diagram

Figure 1 is a block diagram of the major functional areas of Intel® NUC Assembly Element CMA2GB.

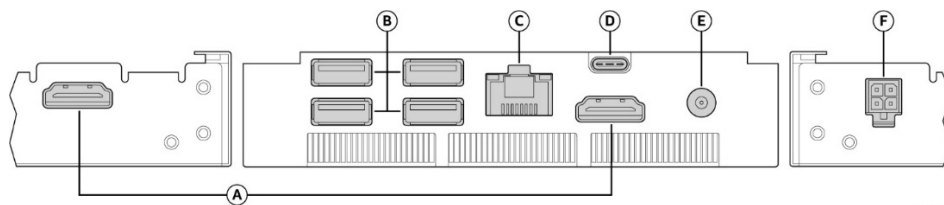


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Figure 1. CMA2GB Block Diagram

2.2 Features

The NUC Assembly Element CMA2GB has a 300-pin edge connector. Each side of the assembly, the back panel and the board have input/output connectors and headers. See the below figures for the locations of the connectors, headers and switches.



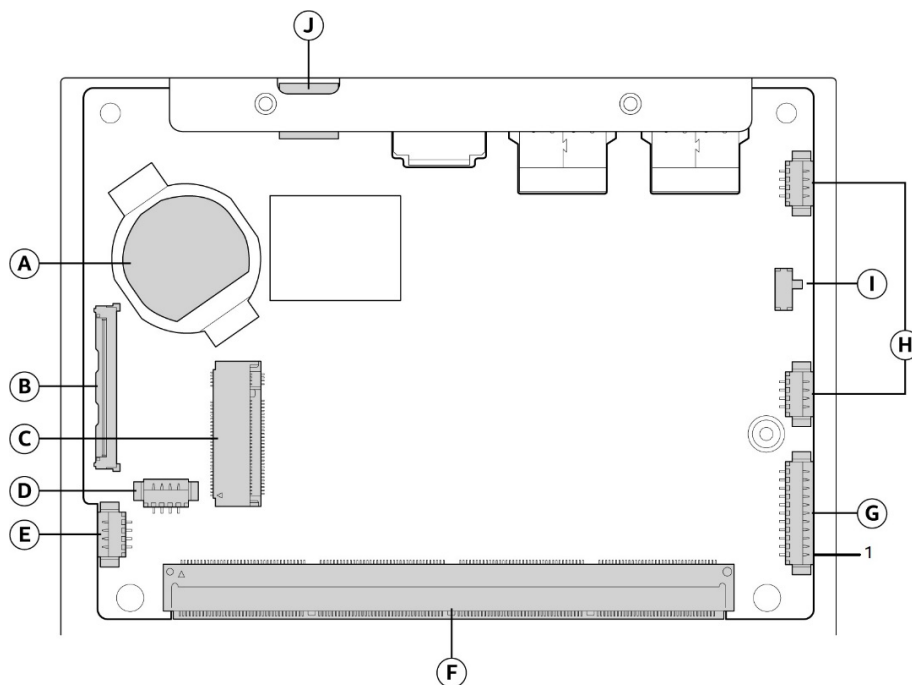
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Figure 2. Metal Bracket Features

Table 2. Metal Bracket Features

Item	Description	Item	Description
A	HDMI Ports	D	Thunderbolt™ 4 Port (USB4/DP)
B	USB 3.x ¹ Ports	E	Power Input Jack
C	Ethernet Connector (RJ-45)	F	2x2 Power Input Connector

¹ USB 3.x port speed is determined by the Intel® NUC Compute Element.



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Figure 3. Board Features

Table 3. Board Features

Item	Description	Item	Description
A	Battery	F	300-pin Connector
B	Embedded DisplayPort (eDP) Connector	G	Front Panel Headers
C	M.2 Connector	H	USB 2.0 Headers (white)
D	System Fan Header (black)	I	Wireless Enable/Disable Switch
E	Thermal Solution Fan Header (black)	J	Thunderbolt™ 4 Port (USB4/DP)

2.3 USB 2.0 Headers

The NUC Assembly Element CMA2GB has two white, 1x4, 1.25mm pitch right angled USB 2.0 headers.

Table 4. USB 2.0 Header Pinout

Pin	Signal Name	Description
1	+5 V DC	Voltage In
2	D-	Data Minus
3	D+	Data Positive
4	GND	Ground

2.4 Fan Headers

The NUC Assembly Element CMA2GB has two black, 1x4, 1.25mm pitch, right angled fan headers. One fan header is used for the NUC Compute Element thermal solution and the other fan header is used for a system fan.

Table 5. Fan Header Pinout

Pin	Signal Name	Description
1	GND	Ground
2	+5V_S0	Fan Power
3	FAN_TAC	Fan Speed
4	FAN_PWM	Fan Pulse Width Modulation

2.5 Front Panel Header

The NUC Assembly Element CMA2GB has a 1x11, 1.25mm pitch, right angle front panel header.

Table 6. Front Panel Header Pinout

Pin	Signal Name	Description
1	POWER_SWITCH#	[In] Power Switch
2	GND	Ground
3	POWER_LED_MAIN	[Out] Front Panel LED (main color)
4	POWER_LED_ALT	[Out] Front Panel LED (alternate color)
5	RSVD	Reserved
6	+5V_DC	Power, 1A (Vcc)
7	RSVD	Reserved
8	HDD_LED-	[Out] HDD activity LED
9	HDD_LED+	[Out] HDD activity LED with current limiting resistor
10	GND	Ground
11	RESET_SWITCH#	[In] Reset Switch

2.6 Embedded DisplayPort Connector

The NUC Assembly Element CMA2GB has a 1x40, 0.5mm pitch, right angled Embedded DisplayPort (eDP) connector.

Table 7. eDP Connector Pinout

Pin	Signal Name	Description
1	NC - RESERVED	Reserved for LCD manufacturer's use
2	H_GND	High Speed Ground
3	Lane3_N	Complement Signal Link Lane 3
4	Lane3_P	True Signal Link Lane 3
5	H_GND	High Speed Ground
6	Lane2_N	Complement Signal Link Lane 2
7	Lane2_P	True Signal Link Lane 2
8	H_GND	High Speed Ground
9	Lane1_N	Complement Signal Link Lane 1
10	Lane1_P	True Signal Link Lane 1
11	H_GND	High Speed Ground
12	Lane0_N	Complement Signal Link Lane 0
13	Lane0_P	True Signal Link Lane 0
14	H_GND	High Speed Ground
15	AUX_CH_P	True Signal Auxiliary Channel
16	AUX_CH_N	Complement Signal Auxiliary Channel
17	H_GND	High Speed Ground
18	LCD_VCC	LCD logic and driver power (Vcc3)
19	LCD_VCC	LCD logic and driver power (Vcc3)
20	LCD_VCC	LCD logic and driver power (Vcc3)
21	LCD_VCC	LCD logic and driver power (Vcc3)
22	NC	LCD Panel Self-Test Enable (Optional)
23	LCD_GND	LCD logic and driver ground
24	LCD_GND	LCD logic and driver ground
25	LCD_GND	LCD logic and driver ground
26	LCD_GND	LCD logic and driver ground
27	HPD	HPD signal pin
28	BL_GND	Backlight ground
29	BL_GND	Backlight ground
30	BL_GND	Backlight ground
31	BL_GND	Backlight ground
32	BL_ENABLE	Backlight On/Off
33	BL_PWM_DIM	PWM dimming control signal
34	NC - RESERVED	Reserved for LCD manufacturer's use
35	NC - RESERVED	Reserved for LCD manufacturer's use
36	BL_PWR	Backlight power (+Vin)
37	BL_PWR	Backlight power (+Vin)
38	BL_PWR	Backlight power (+Vin)
39	BL_PWR	Backlight power (+Vin)
40	NC - RESERVED	RESERVED for LCD manufacturer's use



NOTE

The eDP solution does not support power input greater than 21V.

2.7 Power Input Connector

The NUC Assembly Element CMA2GB has a 2x2, 1.25mm pitch right angled power input connector.

Table 8. Power Input Connector Pinout

Pin	Signal Name	Description	Pin	Signal Name	Description
1	Vin	Voltage In	3	GND	Ground
2	Vin	Voltage In	4	GND	Ground

2.8 Power Jack

The NUC Assembly Element has a power jack on the back panel.

- Dual barrel
- 2.5mm inner diameter
- 5.5mm outer diameter

See section **Error! Reference source not found.** for information on power requirements.

2.9 Power

The NUC Assembly Element requires a 12-24 \pm 8% V DC input via the back-panel power jack or the internal power connector. Both inputs provide delayed AC start as well as transient voltage suppression (TVS) at 26 V.



NOTE

Total power required will need to consider the NUC Compute Element power requirements, the NUC Assembly Element CMA2GB power requirements, the NUC Assembly Element CMA2GB thermal fan power requirements and any devices or peripherals that are plugged into the NUC Assembly Element CMA2GB.



NOTE

The NUC Assembly Element can power on from the G3/AC power loss state without the Real-Time Clock battery plugged in when a NUC Compute Element is connected.



CAUTION

It is strongly recommended to make sure that the NUC Assembly Element CMA2GB is powered off and AC power is removed before removing the NUC Compute Element from the board connector. Removing the NUC Compute Element from the board connector while powered on may cause damage to the NUC Compute Element, operating system corruption, create a no boot condition or result in data loss. If the Blue LED on the board is illuminated, do not remove the NUC Compute Element from the board connector.

CAUTION

Do not remove the AC power source without correctly powering down the NUC Assembly Element. Removing the AC power source while the NUC Assembly Element is operating may cause damage to the system, operating system corruption, create a no boot condition, result in data loss or result in unexpected conditions.

2.10 Wireless Enable/Disable Switch

The 2-position switch determines whether the wireless module on the NUC Compute Element is enabled or disabled. Figure 4 shows the location of the switch. Table 9 describes the switch settings.

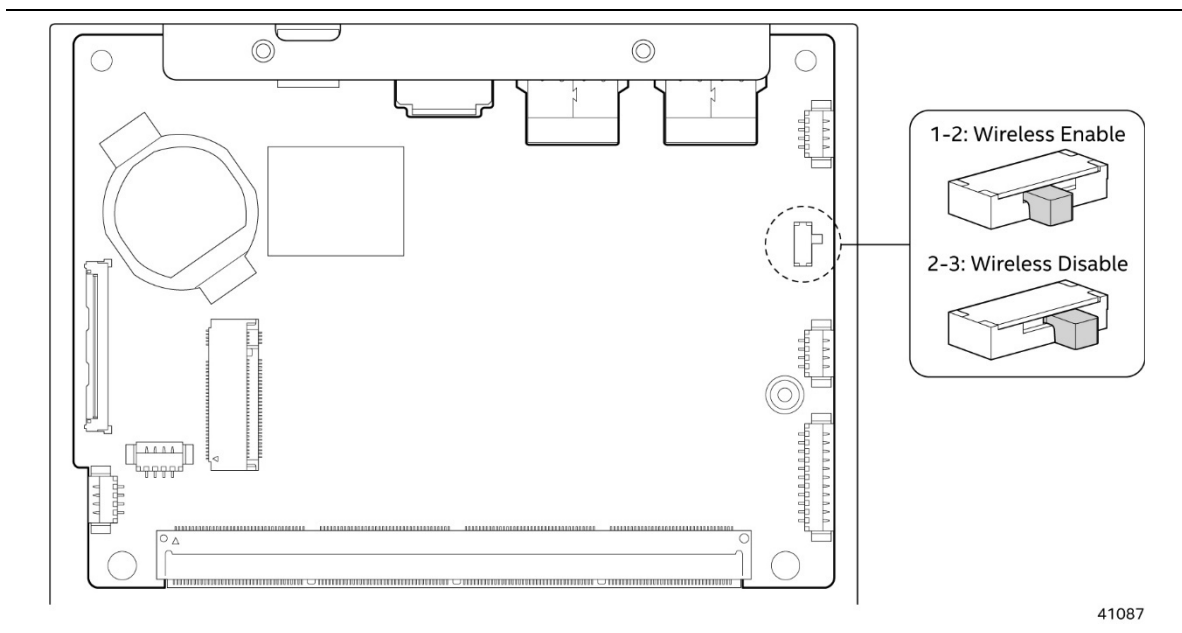


Figure 4. Wireless Enable/Disable Switch Location

Table 9. Wireless Enable/Disable Switch Settings

Function/Mode	Switch Setting	Configuration
Enable	1-2	Wireless and Bluetooth will be enabled on the NUC Compute Element
Disable	2-3	Wireless and Bluetooth will be disabled on the NUC Compute Element

CAUTION

Do not change the switch with the power on. Always turn off the power and unplug the power cord from the assembly before changing a switch setting. Otherwise, the board could be damaged.

2.11 Thunderbolt™ 4

Thunderbolt™ 4 is supported with up to 40 Gbps of data throughput, 5K (60Hz) monitor output, USB 4 connection, charging output capabilities up to 5V at 3A or 9V at 2A via the USB Type C connector on the back panel.

2.12 Intel® vPro® Technology

Intel® vPro™ Technology is a collection of platform capabilities that support enhanced manageability, security, virtualization and power efficiency.

For information about

Refer to

Intel® vPro® Technology

<http://support.intel.com/support/vpro/>

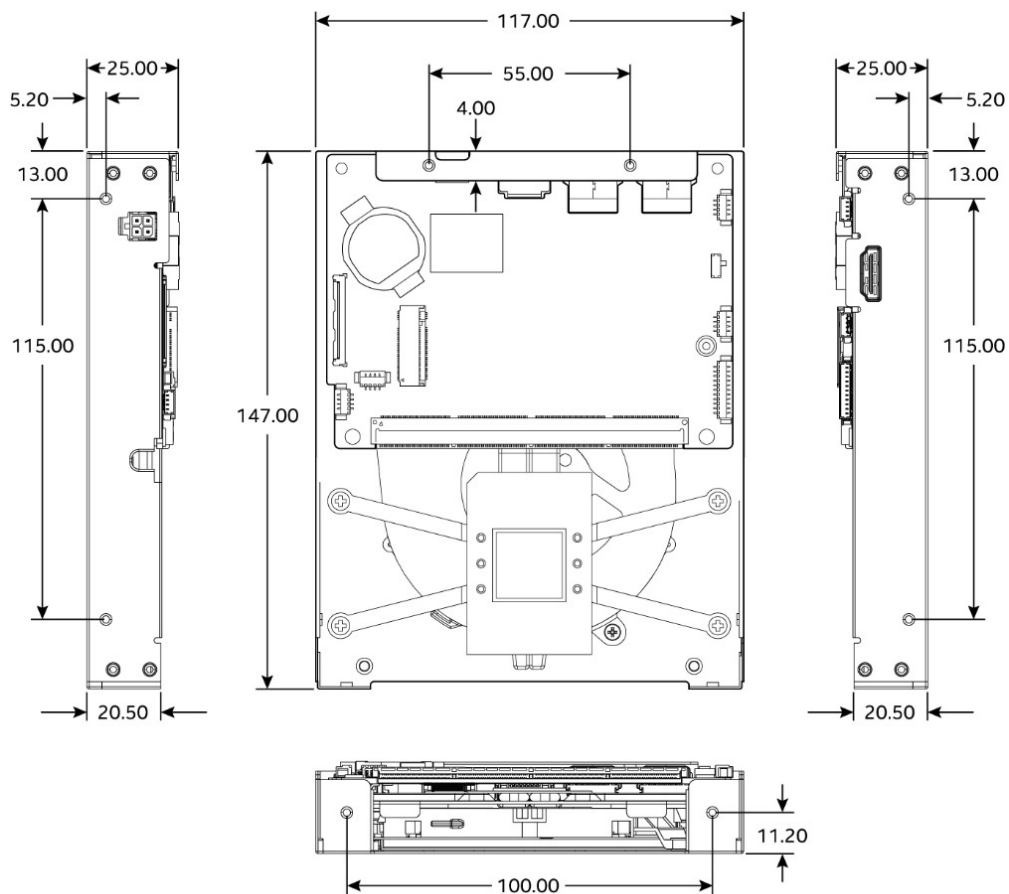


NOTE

Intel® vPro® Technology is only supported on the Intel® NUC Assembly Element if an Intel NUC Compute Element with Intel® vPro® Technology support is connected.

2.13 Mechanical

The following figure illustrates the mechanical form factor for the Intel® NUC Assembly Element CMA2GB. Dimensions are given in millimeters (mm).



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Figure 5. CMA2GB Assembly

2.14 Thermal

The Intel® NUC Assembly Element CMA2GB comes with a complete thermal solution for the Intel® NUC Compute Element. The thermal solution includes a cold plate with thermal interface material, heat pipes, heat sink and a fan. A second fan header is also provided for a system fan.

2.15 Environmental

Table 10 lists the environmental specifications for the Intel® NUC Assembly Element CMA2GB.

Table 10. Environmental Specifications

Parameter	Specification	
Temperature		
Non-Operating	-40 °C to +60 °C	
Operating (Assembly)	0 °C to +50 °C external ambient (external ambient temperature refers to the temperature at any location measured at 25mm around the NUC Assembly Element)	
Shock (Board)		
Unpackaged	25 g trapezoidal waveform	
	Velocity change of 250 inches/s ²	
Packaged	Free fall package drop machine set to the height determined by the weight of the package.	
	Product Weight (pounds)	Free Fall (inches)
	<20	36
	21-40	30
	41-80	24
	81-100	18
Vibration (Assembly)		
Unpackaged	5 Hz to 20 Hz: 0.01 g ² /Hz sloping up to 20 Hz @ 0.02 g ² /Hz	
	20 Hz to 500 Hz: 0.02 g ² /Hz (flat)	
	Input acceleration is 3.13 g RMS	
Packaged	5 Hz to 40 Hz: 0.015 g ² /Hz (flat)	
	40 Hz to 500 Hz: 0.015 g ² /Hz sloping down to 0.00015 g ² /Hz	
	Input acceleration is 1.09 g RMS	

Note: Before attempting to operate this Intel® NUC Assembly Element CMA2GB, the overall temperature of the system must be above the minimum operating temperature specified. It is recommended that the NUC Assembly Element CMA2GB temperature be at least room temperature before attempting to power on the system. The operating and non-operating environment must avoid condensing humidity.

3 Characterized Errata

This section of the document communicates product Errata for the Intel® NUC Assembly Element CMA2GB.

Errata are design defects or deviations from current published specifications for a given product. Published errata may or may not be corrected. Hardware and software designed to be used with any given processor stepping must assume that all errata documented for that process stepping are present on all devices.

There are no known characterized errata.