NUC 14 Essential

NUC14MNK
NUC14MNK-B
NUC14MNB

Technical Product Specifications (TPS)

Regulatory Model: NUC14MNK
NUC14MNB

HIGH-DEFINITION MULTIMEDIA INTERFACE

E25722
Revised Edition V2
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Contents

About this document

This technical product specification includes information on the following NUC SKUs and only applies to the standard ASUS NUC14MN with BIOS identifiers MNTWLCPX.XXXX or MNADLCPX.XXXX:

- **NUC Mini PC**
  Memory, M.2 solid state drive, and Windows 11 Home Operating System included in the NUC system
- **NUC Kit (barebones)**
  Memory, M.2 solid state drive, and operating system not included

  NOTE: Memory and M.2 solid state drive are purchased separately for this SKU.

- **NUC Board**
  Memory, wireless card, M.2 solid state drive, and operating system not included

  NOTE: Memory, M.2 solid state drive, and wireless card are purchased separately for this SKU.

- **Technical Product Specification (TPS)**
  Specifies the board layout, components, connectors, power requirements, environmental limits, integration features, and BIOS features.

Audience

This technical product specification is intended to provide information about the NUC Mini PC, NUC Kit, and NUC Board to vendors, system integrators, and other engineers and technicians who need this level of information. For steps to setup the NUC Mini PC or NUC Kit, refer to the User Guide located at www.asus.com/support.

How this document is organized

This guide contains the following parts:

- **Chapter 1: Product Specification**

  This chapter provides an overview of the specifications of the NUC system.

- **Chapter 2: Product Introduction**

  This chapter provides you with the figures, layouts, physical description of the system, and detailed features.

- **Chapter 3: Technical references**

  This chapter details technical references and considerations.

- **Chapter 4: BIOS Support**

  This chapter provides an overview of BIOS features.

Conventions used in this guide

To highlight key information in this manual, some text are presented as follows:

IMPORTANT! This message contains vital information that must be followed to complete a task.

NOTE: This message contains additional information and tips that can help complete tasks.

WARNING! This message contains important information that must be followed to keep you safe while performing certain tasks and prevent damage to your NUC system's data and components.

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.
x.x A	Amperes.

Production Identification Information

ASUSTeK NUC Product NUC 14 Essential Identification Information

Product Name	NUC 14 Essential
NUC14MNK	Mini PC
NUC14MNK-B	Kit
NUC14MNB	Board

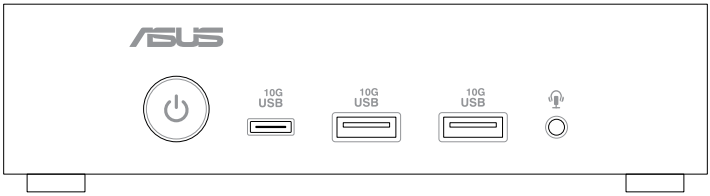
Where to find more information

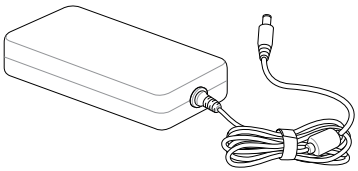
Refer to the following sources for additional information and for product and software updates.

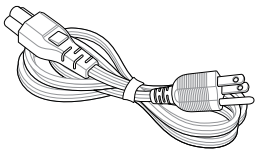
1. **ASUS website**

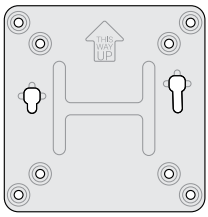
   The ASUS website (www.asus.com) provides updated information on ASUS hardware and software products.

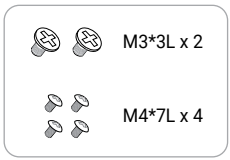
Package contents











NOTE:

- The most up-to-date and accurate product specifications are available on www.asus.com for download.
- Product and accessory images are for illustrative purposes only. The actual appearance and specifications may vary depending on the model.
- The bundled power adapter may vary depending on the model and the country (or region) of sale.
- Some bundled accessories may vary depending on the model. For details on these accessories, refer to their respective user manuals.
- If the device or its components fail or malfunction during normal and proper use within the warranty period, bring the warranty card to the ASUS Service Center for replacement of the defective components.

1. Product Specification

1.1 Specifications

Mini PC SKUs

The NUC Mini PC is a small form factor PC system. The NUC Mini PC comes with RAM, storage, and operating system pre-installed.

ASUS Project Code	NUC14MNK			
Product Name	NUC 14 Essential Mini-PC			
Processor	Intel® N150 Processor, TDP 6W	Intel® N250 Processor, TDP 6W	Intel® Core™ 3 N355 Processor, TDP 15W	Intel® N97 Processor, TDP 12W
Chipset	Integrated			
Graphics	Intel® Graphics			Intel® UHD Graphics
AC Cord	US, EU, AU, UK, CN, TW, JP(Type A), IN or No Cord			
Memory	1 x SO-DIMM, up to DDR5-4800, 16GB*1			
Storage	1 x M.2 2280/2242 PCIe Gen3x4, supports 128GB~4TB NVMe or SATA SSD			
Wireless Network	Intel® Wi-Fi 6E AX211 (Gig+), Bluetooth® 5.3			
LAN	1 x Realtek Ethernet Controller RTL8125D-CG, 2.5G			
Audio	Realtek ALC3251			
TPM	fTPM or TPM 2.0 chip			
Card Reader	-			
HDMI CEC	Yes, HDMI CEC one touch play supported			
Front I/O Ports	1 x USB 3.2 Gen2 Type-C® 2 x USB 3.2 Gen2 Type-A 1 x 3.5mm Headset Jack			
Back I/O Ports	1 x USB 3.2 Gen2 Type-C® w/ DisplayPort 1.4 (HBR3) 2 x USB 3.2 Gen2 Type-A 1 x USB 2.0 Type-A 1 x HDMI 2.1 (TMDS Compatible) 1 x DisplayPort 1.4 (HBR2) 1 x RJ45 LAN 1 x DC-in			
Side I/O Ports	1 x Kensington Lock			
Power Supply	19VDC, 3.42A, 65W Power Adapter			
Dimensions (W x D x H)	135mm x 115mm x 36mm			
Weight (grams)	480g			
OS	Windows 11 Home 64-bit Windows 11 IoT 64-bit			

Kit SKUs

The NUC Kit is a small form factor PC barebones kit. The NUC Kit consists of the processor, chipset, memory slot, wireless, Bluetooth, M.2 storage slot, integrated heat sink and fan.

NOTE: RAM, storage and operating system is not included.

ASUS Project Code	NUC14MNK-B			
Product Name	NUC 14 Essential Kit			
Processor	Intel® N150 Processor, TDP 6W	Intel® N250 Processor, TDP 6W	Intel® Core™ 3 N355 Processor, TDP 15W	Intel® N97 Processor, TDP 12W
Chipset	Integrated			
Graphics	Intel® Graphics			Intel® UHD Graphics
AC Cord	US, EU, AU, UK, CN, TW, JP(Type A), IN or No Cord			
Memory	1 x SO-DIMM, up to DDR5-4800, 16GB*1			
Storage	1 x M.2 2280/2242 PCIe Gen3x4, supports 128GB~4TB NVMe or SATA SSD			
Wireless Network	Intel® Wi-Fi 6E AX211 (Gig+), Bluetooth® 5.3			
LAN	1 x Realtek Ethernet Controller RTL8125D-CG, 2.5G			
Audio	Realtek ALC3251			
TPM	fTPM or TPM 2.0 chip			
Card Reader	-			
HDMI CEC	Yes, HDMI CEC one touch play supported			
Front I/O Ports	1 x USB 3.2 Gen2 Type-C® 2 x USB 3.2 Gen2 Type-A 1 x 3.5mm Headset Jack			
Back I/O Ports	1 x USB 3.2 Gen2 Type-C® w/ DisplayPort 1.4 (HBR3) 2 x USB 3.2 Gen2 Type-A 1 x USB 2.0 Type-A 1 x HDMI 2.1 (TMDS Compatible) 1 x DisplayPort 1.4 (HBR2) 1 x RJ45 LAN 1 x DC-in			
Side I/O Ports	1 x Kensington Lock			
Power Supply	19VDC, 3.42A, 65W Power Adapter			
Dimensions (W x D x H)	135mm x 115mm x 36mm			
Weight (grams)	470g			
OS	Windows 11 64-bit Ubuntu 24.04 LTS 64-bit RedHat Enterprise Linux 64-bit			

Board SKUs

The NUC Board is a small form factor main board for use in embedded systems, custom enclosures, and integrated systems. The board consists of the processor, chipset, memory slot, storage slot, slot for wireless card, integrated heat sink and fan.

NOTE: Chassis, RAM, storage, wireless card and operating system are not included.

ASUS Project Code	NUC14MNB			
Product Name	NUC 14 Essential Board			
Processor	Intel® N150 Processor, TDP 6W	Intel® N250 Processor, TDP 6W	Intel® Core™ 3 N355 Processor, TDP 15W	Intel® N97 Processor, TDP 12W
Chipset	Integrated			
Graphics	Intel® Graphics			Intel® UHD Graphics
AC Cord	US, EU, AU, UK, CN, TW, JP(Type A), IN or No Cord			
Memory	1 x SO-DIMM, up to DDR5-4800, 16GB*1			
Storage	1 x M.2 2280/2242 PCIe Gen3x4, supports 128GB~4TB NVMe or SATA SSD			
Wireless Network	-			
LAN	1 x Realtek Ethernet Controller RTL8125D-CG, 2.5G			
Audio	Realtek ALC3251			
TPM	fTPM or TPM 2.0 chip			
Card Reader	-			
HDMI CEC	Yes, HDMI CEC one touch play supported			
Front I/O Ports	1 x USB 3.2 Gen2 Type-C® 2 x USB 3.2 Gen2 Type-A 1 x 3.5mm Headset Jack			
Back I/O Ports	1 x USB 3.2 Gen2 Type-C® w/ DisplayPort 1.4 (HBR3) 2 x USB 3.2 Gen2 Type-A 1 x USB 2.0 Type-A 1 x HDMI 2.1 (TMDS Compatible) 1 x DisplayPort 1.4 (HBR2) 1 x RJ45 LAN 1 x DC-in			
Side I/O Ports	-			
Internal Headers	2 x Serial Port Headers			
Power Supply	19VDC, 3.42A, 65W Power Adapter			
Dimensions (W x D x H)	121.6mm x 108mm x 24.64mm			
Weight (grams)	182.4g			
OS	Windows 11 64-bit Ubuntu 24.04 LTS 64-bit RedHat Enterprise Linux 64-bit			

1.2 Feature Summary

The tables below summarizes the major features of the NUC system.

Board Dimensions	4.79in. x 4.25in. x 0.97in. (121.6mm x 108mm x 24.64mm)
Chassis Dimensions	5.31in. x 4.53in. x 1.42in. (135mm by 115mm x 36mm) (including feet)
Processor	ASUS NUC Boards, Kits, and Mini PCs NUC14MN Standard products have a soldered-down processor from the list below. • Intel® N97 Processor • Intel® N150 Processor • Intel® N250 Processor • Intel® Core™ 3 N355 Processor
Memory	One 262-pin 1.1 V DDR5 SDRAM Small Outline Dual Inline Memory Module (SO DIMM) socket. • Support for DDR5 4800 MHz SO DIMMs • Support for 16 Gb and 24 Gb technology • Support for up to 16 GB of system memory with one SO-DIMM using 16 GB memory modules • Support for non-ECC memory • Support for 1.1 V JEDEC memory only 2 Gb, 4 Gb and 8Gb memory technology (SDRAM Density) is not supported
Graphics	Integrated graphics support for processors with Intel® Graphics and UHD Graphics Technology: • Supports up to triple 4K60Hz displays (1x DP + 1 x DP/Type-C® + 1 x HDMI 2.1 TMDS Compatible) • HDR (High Dynamic Range) support • Three display pipes – supporting blending, color adjustments, scaling, and dithering • Support for HDCP 1.4 and 2.2 • Codecs supported are detailed in Section 3.1
Audio	The processor supports three High-Definition audio streams on three digital ports simultaneously. The processor supports the following audio formats over HDMI* and DisplayPort*: AC-3 Dolby* Digital, Dolby* Digital Plus, DTS-HD*, LPCM, 192 Khz/24 bit, 6 Channel, and Dolby* TrueHD, DTS-HD Master Audio*. HD Audio support using the Realtek ALC3251. 1 x 3.5mm Headset Jack More information about software and drivers can be found at https://www.asus.com/support/Download-Center/

(continued on next page)

Storage	One M.2 PCIe Gen3x4 connector supporting M.2 22x80 or 22x42 (key type M) for NVMe or SATA
Communication	Intel® Wi-Fi 6E AX211 (Gig+) M.2 2230 module. • 802.11ax R2 2x2, both with 160Mhz channel support + Bluetooth® v5.3 • Maximum transfer speed up to 2.4 Gbps Gigabit (10/100/1000/2500 Mbps) LAN subsystem using the Realtek RTL8125D-CG Gigabit Ethernet Controller. • PCIe 3.1 5GT/s support for x1 width (Lane) • Single-port integrated multi-gigabit (up to 2.5G) – standard IEEE 802.3 Ethernet interface for 2500BASE-T, 1000BASE-T, 100BASE-TX, 10BASE-TE connections (IEEE 802.3, 802.3u, 802.3bz, and 802.3ab) • Full wake up support (S4 WOL not supported) • Supports for packets up to 9.5 KB (Jumbo Frames) To obtain drivers visit https://www.asus.com/support/Download-Center/
USB Ports and Headers	2 x USB 3.2 Gen 2 ports via Type-C® (1 front panel and 1 back panel) 4 x USB 3.2 Gen 2 ports (2 front panel and 2 back panel) 1 x USB 2.0 port (1 back panel) 2 x Serial port headers For more information about the location of the USB ports and headers see **Rear View** section. For more information about the pinout of the USB ports and headers see **Signal Tables for the Connectors and Header** section.
TPM	Intel® Platform Trust Technology (Intel® PTT) supported on all SKUs - TPM 2.0 Compliant. Optional discrete TPM 2.0 available by request. More information about TPM and Intel® PTT is available on https://www.asus.com/support/
Power	AC Adapter • 65W 19VDC, 3.42A power adapter Power Input • 19VDC ± 5% with DC voltage protection
Operating Temperature	0°C-35°C
BIOS	ASUS BIOS resident in the Serial Peripheral Interface (SPI) Flash device. Support for Advanced Configuration and Power Interface (ACPI), Plug and Play, and System Management BIOS (SMBIOS).
Operating System (Mini PCs only)	ASUS NUC Mini PC NUC14MN ships with: • Windows® 11 Pro 64-bit **or** • Windows® 11 Home Plus 64-bit **or** • Windows® 11 Home 64-bit preinstalled. For a full list of latest supported operating systems, Please visit www.asus.com/support.

(continued on next page)

Hardware Monitor Subsystem	Hardware monitoring subsystem including: • Voltage sense to detect out of range power supply voltages • Thermal sense to detect out of range thermal values • One processor fan header • Fan sense input used to monitor fan activity • Fan speed control

Additional Features

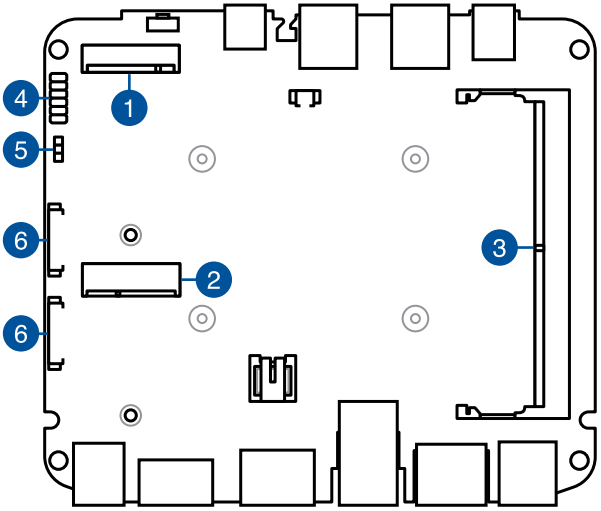
Chassis Replaceable Lids	ASUS NUC Mini PCs and Kits NUC14MN ship with a replaceable lid that allows you to replace the cover of the NUC with a full range of cosmetic and functional lids.
HDMI CEC One Touch Play WMI	Built-in support for HDMI CEC is available on the HDMI port, which may be enabled in the BIOS for display power control, as well as via a WMI supporting other HDMI CEC functions.
Sustained Operation	Qualified for 24x7 sustained operation.
Auto RTC Reset	A Real-Time Clock (RTC) reset will be triggered after three consecutive unsuccessful boot attempts.
Delayed AC Start	Short delay after AC power is applied before unit is ready to power on to protect the system against voltage fluctuations in environments where multiple devices are being powered on simultaneously.
Reflectivity	All surfaces meet 20GE (20 Gloss Level/Gloss Units) of shininess by measurement of Glanz.
Kensington Security Slot	Available on the left side of the chassis when viewed from the front.
VESA Mount	ASUS NUC Mini PCs and Kits NUC14MN ship with a VESA mount and screws for attaching the system to compatible screens and monitors.

2. Product Introduction

2.1 Board Layout

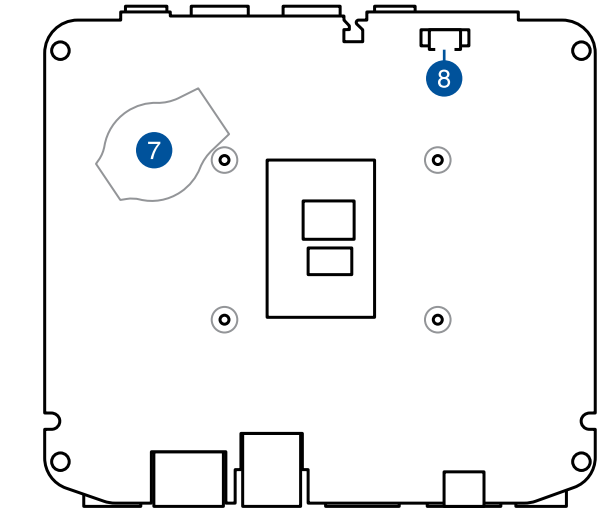
The illustration below shows the location of the major components on the motherboard.

Top view

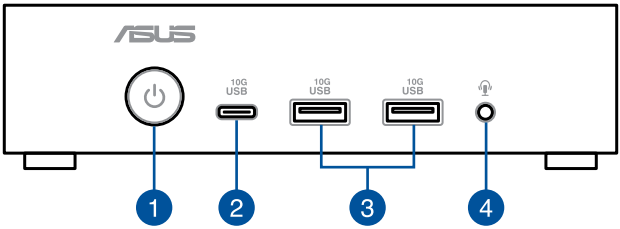


1. M.2 2242/2280 module connector (Key Type M) (NVMe or SATA)
2. M.2 2230 module connector (Key Type E) (WiFi)
3. DDR5 SO-DIMM Socket
4. Front panel header
5. BIOS security jumper
6. Serial port connectors
7. CMOS battery
8. CPU fan connector

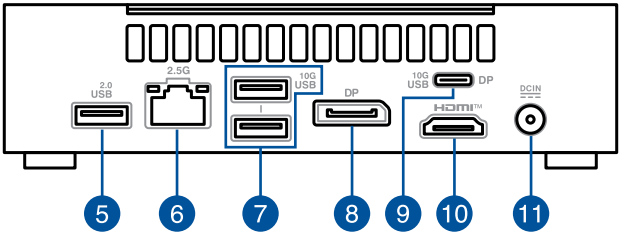
Bottom view



2.2 Front view



2.3 Rear view



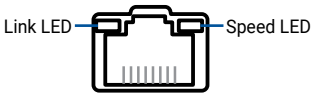
1. Power button
2. USB 10Gbps Type-C® port
3. USB 10Gbps Type-A port
4. Headphone/Headset/ Microphone jack
5. USB 2.0 Type-A port
6. LAN Port
7. USB 10Gbps Type-A port
8. DisplayPort
9. USB 10Gbps Type-C® port with DisplayPort
10. HDMI™ port
11. Power input

NOTE: Type-C® port power profiles:
- 5V @ 3A (rear)
- 5V @ 1.5A (front)

Display resolution table:

Port	HDMI	DisplayPort	DisplayPort over USB-C®
Video Output	HDMI 2.1 TMDS Compatible	DisplayPort 1.4 (HBR2)	DisplayPort 1.4 (HBR3)
Resolution/Refresh 1080P	1080P (1920 x 1080) @ 120Hz	1080P (1920 x 1080) @ 120Hz	1080P (1920 x 1080) @ 120Hz
Resolution/Refresh 4K	4K (3840 x 2160) @ 60Hz	4K (3840 x 2160) @ 60Hz	4K (3840 x 2160) @ 60Hz

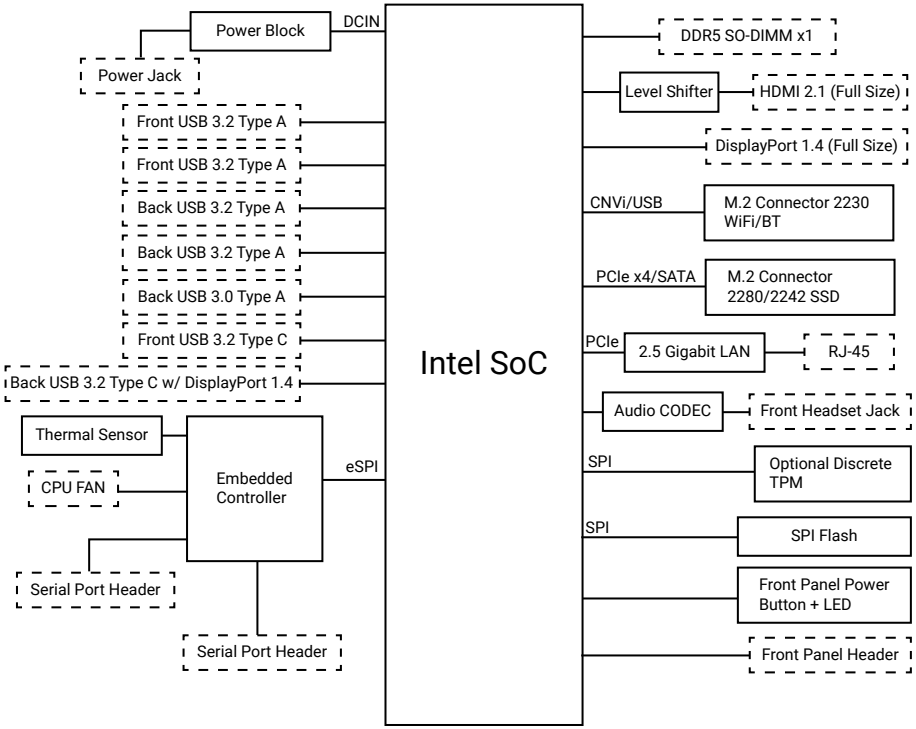
LAN port LED indications:



Link LED	
Status	**Description**
OFF	No link
GREEN	Linked
BLINKING	Data activity

Speed LED	
Status	**Description**
OFF	100 Mbps / 10 Mbps connection
YELLOW	1 Gbps connection
GREEN	2.5 Gbps connection

2.4 Block Diagram



2.5 Feature Descriptions

2.5.1 Graphics Subsystem

ASUS NUC Board NUC14MN with Intel® Processor N97 supports Intel® UHD Graphics.

ASUS NUC Board NUC14MN with Intel® Processor N150, N250 and Core™ 3 N355 supports Intel® Graphics.

Intel® UHD Graphics and Intel® Graphics

Intel® UHD Graphics and Intel® Graphics features the following:

- DirectX 12.1 support
- OpenGL 4.6 support
- OpenCL 3.0 support
- Vulkan 1.3 support
- Max HDMI resolution 3840x2160 at 60Hz
- Max DP resolution 3840x2160 at 60Hz

2.5.2 Real-Time Clock Subsystem

A coin-cell battery (CR2032) powers the real-time clock and CMOS memory. When the computer is not plugged into a wall socket, the battery has an estimated life of three years. When the computer is plugged in, the standby current from the power supply extends the life of the battery. The clock is accurate to ± 13 minutes/year at 25 ºC with 3.3 VSB applied via the power supply 5 V STBY rail

NOTE:

- If the battery and AC power fail, date and time values will be reset and the user will be notified during the POST.
- When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one. Please refer to **Board Layout** section for the location of the battery.
- System can power on from G3/AC power loss state without the Real-Time Clock battery.

Button cell and coin battery notice

1. Remove and immediately recycle or dispose of used batteries according to local regulations and keep out of reach of children. Do not incinerate or dispose of batteries in household trash.
2. If ingested or inserted inside any part of the body, call a local poison control center for treatment information. Even used batteries may cause serious injury or death.
3. This product uses CR2032 type batteries with a nominal voltage of 3V.
4. Do not attempt to recharge non-rechargeable batteries.
5. Do not forcibly discharge, recharge, disassemble, heat above the battery manufacturer's specified temperature rating, or incinerate. Doing so may result in injury or chemical burns caused by venting, leakage, or explosion.
6. When installing batteries, ensure that the polarity (+ and -) is correct.
7. Do not mix old and new batteries, or batteries of different brands or types (such as alkaline, carbon-zinc, or rechargeable batteries).
8. Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
9. Always completely secure the battery compartment. If the battery compartment cannot be securely closed, stop using the product, remove the batteries, and keep the batteries out of reach of children.

⚠ WARNING

- **INGESTION HAZARD**: This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN**.
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

NOTE:

- If the battery and AC power fail, date and time values will be reset and the user will be notified during the POST.
- When the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent battery.

2.5.3 Hardware Management Subsystem

- Voltage sense to detect out of range power supply voltages
- Thermal sense to detect out of range thermal values
- Fan sense input used to monitor fan activity
- Fan speed control

System States and Power States

Please refer to the table below for ACPI states supported by the processor.

State	Description
G0/S0/C0	**Full On:** CPU operating. Individual devices may be shut to save power. The different CPU operating levels are defined by Cx states.
GO/S0/Cx	**Cx State:** CPU manages C-states by itself and can be in lower power states.
G1	**Suspend-To-RAM (STR):** The system context is maintained in system DRAM, but power is shut to non-critical circuits. Memory is retained and refreshes continue. All external clocks are shut off; RTC clock and international oscillator clocks are still toggling.
G1/S4	**Suspend-To-Disk (STD):** The context of the system is maintained on the disk. All power is then shut to the system except to the logic required to resume. Externally appears the same as S5 but may have different wake events.
G2/S5	**Soft Off:** System context not maintained. All power is shut except for the logic required to restart. A full boot is required when waking.
G3	**Mechanical Off:** System context not maintained. All power shut except for the RTC. No “Wake” events are possible because the system does not have any power. This state occurs if the user removes the batteries, turns off a mechanical switch, or if the system power supply is at a level that is insufficient to power the “waking” logic.

Wake-up Devices and Events

Please refer to the table below for devices or specific events that can wake the computer from specific states.

Devices/events that wake up the system...	...from this sleep state	Comments
Power switch	S0iX, S4, S5	-
RTC alarm	S0iX, S4, S5	Option for monitor to remain in sleep state
LAN	S0iX, S5	"S5 WOL after G3" is supported; monitor to remain in sleep state
Bluetooth	S0iX	-
USB	S0iX, S4, S5	Wake S4, S5 controlled by BIOS option (not after G3)
PCIe	S0iX, S4	Via WAKE; monitor to remain in sleep state
HDMI CEC	S0iX, S4, S5	Wake S4, S5 controlled by BIOS option

NOTE:

- S4 implies operating system support only.
- Will not wake from Deep S4/S5. USB S4/S5 Power is controlled by BIOS. USB S5 wake is controlled by BIOS. USB S4 wake is controlled by OS driver, not just BIOS option.
- Windows Fast startup will block wake from LAN and USB from S5.
- WoL from S4 via Magic Packet is not supported.
- The use of these wake-up events from an ACPI state requires an operating system that provides full ACPI support. In addition, software, drivers, and peripherals must fully support ACPI wake events.

Optional Discrete Trusted Platform Module (TPM)

The optional discrete TPM version 2.0 is specifically designed to enhance platform security above-and-beyond the capabilities of today's software by providing a protected space for key operations and other security critical tasks. For more information contact ASUS sales.

NOTE: Support for TPM v2.0 requires a UEFI-enabled operating system, such as Microsoft Windows 11.

Optional TPM 2.0-compliant device: Novoton NPCT760AACYX TPM v2.0

3. Technical references

3.1 Signal Tables for the Connectors and Header

IMPORTANT!

Only the following connectors and headers have overcurrent protection:

- Rear USB Type A and USB Type-C®
- Front USB Type A and USB Type-C®
- DC Vin jack

All other connectors and headers are not overcurrent protected and should connect only to devices inside the computer's chassis, such as fans and internal peripherals. Do not use these connectors or headers to power devices external to the computer's chassis. A fault in the load presented by the external devices could cause damage to the computer, the power cable, and the external devices themselves.

Furthermore, improper connection of serial port header single wire connectors may eventually overload the overcurrent protection and cause damage to the board.

3.1.1 M.2 2280/2242 Module Connector

SSD support is provided via PCIe Gen3x4 NVMe or SATA on CPU attached. Please see the table below for M.2 2280/2242 connector signals.

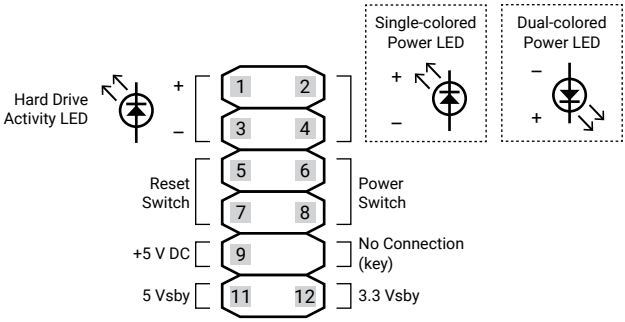
M.2 2280/2242 Module (Mechanical Key M) Connector			
Pin	**Signal Name**	**Pin**	**Signal Name**
74	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	75	GND
72	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	73	GND
70	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	71	GND
68	SUSCLK(32kHz) (O)(0/3.3V)	69	PEDET (NC-PCIe)
66	Connector Key	67	N/C
64	Connector Key	65	Connector Key
62	Connector Key	63	Connector Key
60	Connector Key	61	Connector Key
58	N/C	59	Connector Key
56	N/C	57	GND
54	PEWAKE# (I/O)(0/3.3V) or N/C	55	REFCLKP
52	CLKREQ# (I/O)(0/3.3V) or N/C	53	REFCLKN
50	PERST# (O)(0/3.3V) or N/C	51	GND
48	N/C	49	PETp0
46	N/C	47	PETn0
44	N/C	45	GND
42	N/C	43	PERp0
40	N/C	41	PERn0
38	DEVSLP (O)	39	GND
36	N/C	37	PETp1
34	N/C	35	PETn1
32	N/C	33	GND
30	N/C	31	PERp1
28	N/C	29	PERn1
26	N/C	27	GND
24	N/C	25	PETp2
22	N/C	23	PETn2
20	N/C	21	GND

(continued on next page)

M.2 2280/2242 Module (Mechanical Key M) Connector			
Pin	**Signal Name**	**Pin**	**Signal Name**
18	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	19	PERp2
16	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	17	PERn2
14	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	15	GND
12	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	13	PETp3
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	11	PETn3
8	N/C	9	GND
6	N/C	7	PERp3
4	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	5	PERn3
2	3.3V (4A total for pins 74, 72, 70, 18, 16, 14, 12, 4, 2 (0.5A per pin))	3	GND
		1	GND

3.1.2 Front Panel Header

Front Panel Header (2.0 mm Pitch)					
Pin	**Signal Name**	**Description**	**Pin**	**Signal Name**	**Description**
1	HDD_POWER_LED	Pull-up 750Ω to +5V	2	POWER_LED_MAIN	[Out] Front panel LED (main color) Pull-up 300Ω to +5V
3	HDD_LED#	[Out] HDD activity LED	4	POWER_LED_ALT	[Out] Front panel LED (alt color)
5	GROUND	Ground	6	POWER_SWITCH#	[In] Power switch
7	RESET_SWITCH#	[In] Reset switch	8	GROUND	Ground
9	+5V_DC (1A) (Vcc)	VCC5 (1A current rating)	10	Key	No pin
11	5Vsby (2A)	5VSB (2A current rating)	12	3.3Vsby (1A)	3VSB (1A current rating)



3.1.3 Hard Drive Activity LED Header

Pins 1 and 3 can be connected to an LED to provide a visual indicator that data is being read from or written to a hard drive.

3.1.4 Reset Switch Header

Pins 5 and 7 can be connected to a momentary single pole, single throw (SPST) type switch that is normally open. When the switch is closed, the board resets and runs the POST.

3.1.5 Power/Sleep LED Header

Pins 2 and 4 can be connected to a one- or two-color LED. The tables below show the possible LED states.

States for a One-Color Power LED	
LED Sate	**Description**
Off	Power off
Blinking	Standby
Steady	Normal operation

States for a Dual-Color Power LED	
LED Sate	**Description**
Off	Power off
Blinking (white)	Standby
Steady (white)	Normal operation

3.1.6 Power Switch Header

Pins 6 and 8 can be connected to a front panel momentary-contact power switch. The switch must pull the SW_ON# pin to ground for at least 50 ms to signal the power supply to switch on or off (the time requirement is due to internal debounce circuitry on the board). At least two seconds must pass before the power supply will recognize another on/off signal.

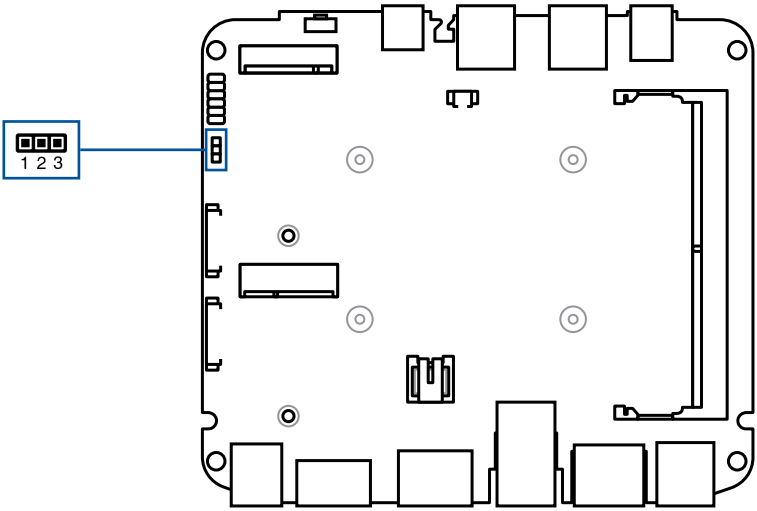
3.1.7 Serial Port Panel Headers

Serial Port Header (1.25 mm Pitch)					
Pin	**Signal Name**	**Description**	**Pin**	**Signal Name**	**Description**
1	RI	Ring Indicator	2	CTS	Clear to Send
3	RTS	Request to Send	4	DSR	Data Set Ready
5	GND	Ground	6	DTR	Data Terminal Ready
7	TXD#	Transmit Data	8	RXD#	Receive Data
9	DCD	Data Carrier Detect			

3.1.8 BIOS Security Jumper

CAUTION! Do not move a jumper with the power on. Always turn off the power and unplug the power cord from the computer before changing the jumper setting. Otherwise, the board could be damaged.

The illustration below shows the location of the BIOS Security Jumper. The 3-pin jumper determines the BIOS Security program's mode.



The table below describes the jumper settings for the three modes: normal, lockdown, and configuration.

BIOS Security Jumper Settings		
Function/ Mode	**Jumper Setting**	**Configuration**
Normal	1-2	The BIOS uses current configuration information and passwords for booting.
Lockdown	2-3	The BIOS uses current configuration information and passwords for booting, except: • All POST Hotkeys are suppressed (prompts are not displayed and keys are not accepted. For example, F2 for Setup, F10 for the Boot Menu). • Power Button Menu is not available (see **Power Button Menu** section). BIOS updates are not available except for automatic Recovery due to flash corruption.
Configuration	None	BIOS Recovery Update process if a matching *.cap file is found. Recovery Update can be canceled by pressing the Esc key. If the Recovery Update was canceled or a matching *.cap file was not found, a Config Menu will be displayed. The Config Menu consists of the following (followed by the Power Button Menu selections): [1] Suppress this menu until the BIOS Security Jumper is replaced. [2] Clear BIOS User and Supervisor Passwords. [3] Clear Trusted Platform Module. **WARNING!** Data encrypted with the TPM will no longer be accessible if the TPM is cleared. [F2] BIOS Setup Menu. [F4] BIOS Recovery. See **Power Button Menu** section.

3.1.9 Fan Header Current Capability

The table below lists the current capability of the fan headers.

Fan Header	Maximum Available Current
Processor fan	1 A

3.1.10 Power Supply Connector

The board has the following power supply connector:

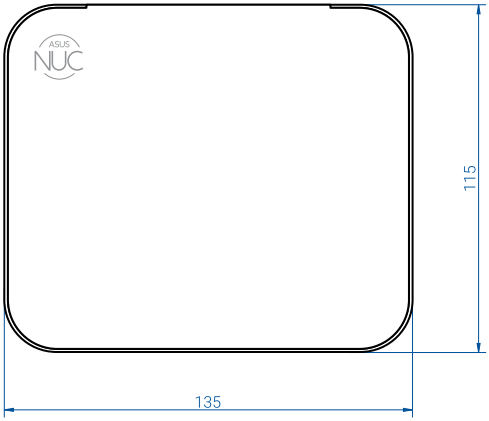
- **External Power Supply** - the board can be powered through a 19 V DC connector on the back panel. The back-panel DC connector is compatible with a 5.5 mm/OD (outer diameter) and 2.5 mm/ID (inner diameter) plug, where the inner contact is +12-20 V DC and the shell is GND. The maximum current rating is 10 A.

  NOTE: External power voltage, 19 (±5%) V DC, is dependent on the type of power supply used. System power requirements will depend on actual system configurations chosen by the integrator, as well as end user expansion preferences. It is the system integrator's responsibility to ensure an appropriate power budget for the system configuration is properly assessed based on the system-level components chosen.

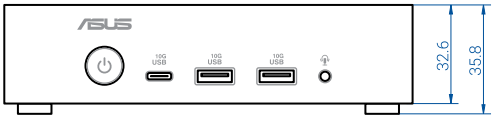
3.2 Mechanical Considerations

3.2.1 Chassis dimensions

The illustration below illustrates the dimensions for the chassis. Dimensions are given in millimeters. The chassis length is 115mm (front to back) and chassis width is 135mm (side to side).

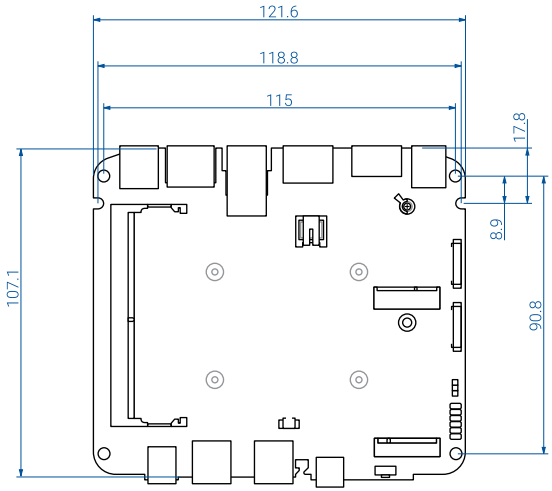


The illustration shows the height dimensions of the chassis. Dimensions are in millimeters. The height from the bottom of the system to the top of the system excluding the rubber feet is 32.6mm, and the height from the bottom of the system to the top of the system including the rubber feet is 35.8mm.

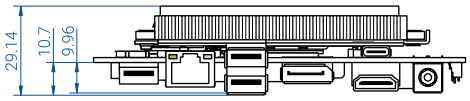


3.2.2 Form Factor

The board is designed to fit into a custom chassis. The illustration below illustrates the mechanical form factor for the board. Dimensions are given in millimeters. The outer dimensions are 108mm (front to back from furthest excursion of rear HDMI to front Type C) by 121.60mm (side to side). The mounting post centers are identified by the 115.00mm, 118.8mm, and 90.8mm measurements.



The illustration shows the height dimensions of the board. Dimensions are in millimeters. The tallest feature on the user accessible side of the board when in use is the double stack USB connector, and on the CPU side is the thermal module.



3.3 Thermal Considerations

IMPORTANT!

- Failure to ensure appropriate airflow may result in reduced performance of both the processor and/or voltage regulator or, in some instances, damage to the system.
  All responsibility for determining the adequacy of any thermal or system design remains solely with the system integrator. ASUS makes no warranties or representations that merely following the instructions presented in this document will result in a system with adequate thermal performance.
- Ensure that the ambient temperature does not exceed the system's maximum operating temperature. Failure to do so could cause components to exceed their maximum case temperature and malfunction. For information about the maximum operating temperature, see the environmental specifications in **Environmental** section.
- Ensure that proper airflow is maintained in the processor voltage regulator circuit. Failure to do so may result in shorter than expected product lifetime.

3.4 Environmental

The table below lists the environmental specifications for the system.

IMPORTANT! If the external ambient temperature exceeds 35°C, further thermal testing is required to ensure components do not exceed their maximum operating temperature.

Parameter	Specification
	Temperature
Sustained Storage Limits (i.e. warehouse)	-20°C ~ +40°C
Short Duration Limits (i.e. shipping)	-40°C ~ +60°C
Ambient Operating - NUC Mini PC	Up to 0°C ~ +35°C
Ambient Operating - NUC Kit	Up to 0°C ~ +35°C
Ambient Operating - NUC Board	Up to 0°C ~ +35°C
Humidity	0°C ~ +92°C Non-condensing humidity as defined by temperature vs dew point. For more information please visit https://www.asus.com/ca-en/support/faq/1052552/
*** Processor performance may automatically decrease when the system operates in the top 5°C of the ambient operating temperature ranges above.**	

(continued on next page)

Parameter	Specification		
Shock (Board)			
Unpackaged	50 g trapezoidal waveform		
	Velocity change of 170 inches/s^2		
Packaged	Free fall package drop machine set to the height determined by the weight of the package.		
	Product Weight (pounds)	Non-palletized Product drop height (inches)	Palletized drop heights (single product) (inches)
	<20	36	N/A
	21-40	30	N/A
	41-80	24	N/A
	81-100	18	12
	100-120	12	9
Shock (System)			
Unpackaged	25g trapezoidal waveform		
	Velocity = 250 inches/sec, 2 shock table drops in each of 6 directions		
Vibration (Board)			
Unpackaged	Random profile 5 Hz @ 0.01 g^2/Hz to 20 Hz @ 0.02 g^2/Hz(slope up) 20 Hz to 500 Hz @ 0.02 g^2/Hz (flat)		
	Input acceleration is 3.13g RMS		
Vibration (System)			
Unpackaged	Random profile 5 Hz @ 0.001 g^2/Hz to 20 Hz @ 0.01 g^2/Hz(slope up) 20 Hz to 500 Hz @ 0.01 g^2/Hz (flat)		
	Input acceleration is 2.20g RMS		
Packaged	Random Profile: 100 Hz to 200 Hz with a slope of -6 dB/Oct 5 Hz to 100 Hz @ 0.015 g^2/Hz (flat) 200 Hz @ 0.0038 g^2/Hz (flat)		
	Input acceleration is 1.48g RMS		

NOTE:

- The operating temperature of the system may be determined by measuring the air temperature from the junction of the heatsink fins and fan, next to the attachment screw, in a closed chassis, while the system is in operation.
- Before attempting to operate this system, the overall temperature of the system must be above the minimum operating temperature specified. It is recommended that the system temperature be at least room temperature before attempting to power on the system. The operating and non-operating environment must avoid condensing humidity.

4. BIOS Support

4.1 Introduction

The system uses an AMI BIOS core that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated through multiple methods (see **BIOS Updates** section). The SPI Flash contains the BIOS Setup program, POST, the PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support. The SPI Flash includes a flash memory device of either 32MB or 64MB depending on SKU.

The NUC14MN[x][x][x] product line has two BIOS options for different versions of the board, kit, or mini-pc. These BIOS options are not interchangeable between the two types of products, and they are "keyed" to the platform they are intended to be used with.

- The NUC14MNK15 / NUC14MNKN25 / NUCMNK35 uses the MNTWLCPX.XXXX structure and is intended for use with the boards using the Intel® Processor N150, N250, and N355.
- The NUC14MNK97 uses the MNADLCPX.XXXX structure and is intended for use with boards using the Intel® Processor N97.

The BIOS Setup program can be used to view and change the identification information and the BIOS settings for the system. The BIOS Setup program is accessed by pressing <F2> after the POST memory test beings and before the operating system boots.

4.2 BIOS Updates

The BIOS can be updated using one of the following methods:

- Express BIOS (Windows-based) Update
- F7 Update
- Power Button Menu Update
- UEFI Shell Update
- EZ Flash (BIOS Setup)

4.2.1 BIOS Recovery

It is unlikely that anything will interrupt a BIOS update; however, if an interruption occurs the BIOS could be unstable. The table below lists the drives and media types that can be used for BIOS recovery. The BIOS recovery media does not need to be made bootable.

Media Type	Can be used for BIOS recovery?
Hard disk drive (connected to SATA or USB)	Yes
USB flash drive	Yes
NVME SSD (M.2 interface)	Yes

NOTE: Supported file systems for BIOS recovery: NTFS (sparse, compressed, or encrypted files are not supported), FAT32, EXT.

4.3 Boot Options

In the BIOS Setup program, the user can choose to boot from a hard drive, removable driver, or the network. The default setting is for the hard drive to be the first boot device, the removable drive second, and the network third.

> **NOTE:** The network can be selected as a boot device. This selection allows booting from the onboard LAN or a network add-in card with a remote boot ROM installed. Pressing the <F12> key during POST automatically forces booting from the LAN. To use this key during POST, the User Access Level in the BIOS Setup program's Security menu must be set to Full.

4.3.1 Boot Device Selection During Post

Pressing the <F10> key during POST causes a boot device menu to be displayed. The menu displays the list of available boot devices.

4.3.2 Power Button Menu

As an alternative to Configuration Mode or normal POST hotkeys, the user can use the power button to access a menu with BIOS and boot options. The Power Button Menu is accessible via the following sequence:

1. System is in S4/S5 (not G3).
2. User pushes the power button and holds it down for 3 seconds.
3. The Front Panel Power Button LED will be on for the first 3 seconds. After 3 seconds, the LED will begin to blink in the following pattern: 0.25 seconds off, 0.25 seconds on, 0.25 seconds off to signal the user to release the power button.
4. User releases the power button before the 4-second shutdown override.

If this boot path is taken, the BIOS will use default settings, ignoring settings in VPD where possible. At the point where Setup Entry/Boot would be in the normal boot path, the BIOS will display the following prompt and wait for a keystroke:

If an unrecognized key is hit, then the BIOS will do nothing and wait for another keystroke. If one of the listed hotkeys is hit, the BIOS will follow the indicated boot path. Password requirements must still be honored.

Power Button Menu Options		
Keystroke	**Option**	**Description**
[ESC]	Normal Boot	-
[F2]	BIOS Setup Menu	-
[F3]	Disable Fast Boot	**NOTE:** Will only be displayed if at least one Fast Boot optimization is enabled. If Disable Fast Boot is selected, the BIOS will disable all Fast Boot optimizations and reset the system.
[F4]	BIOS Recovery	The BIOS will search for a matching .CAP file from the \EFI\Intel folder in the supported media with the supported file system. If a matching recovery capsule is found, the BIOS will display the following: **BIOS will Recover to <BIOSID> in 20 seconds.** **[ESC] Cancel Recovery** Recovery will proceed if not canceled via the ESC key within 20 seconds. The BIOS shall display the recovery progress. If a BIOS .CAP file was not detected (or the BIOS Recovery was canceled) then the BIOS will reset the system and continue normally to POST.
[F5]	Restore BIOS Settings	The BIOS will restore the current setup settings and the current defaults to the build time defaults in the case of a boot issue caused by setup variable changes.
[F7]	Update BIOS	BIOS Update during the BDS phrase. The BIOS will update independent of any OS loading and provides a menu UI accessible during boot up. This is not a recovery tool and will not overwrite a corrupt BIOS or ME firmware.
[F9]	Remote Assistance	**NOTE:** Will only be displayed if Remote Assistance is supported.
[F10]	Enter Boot Menu	-
[F12]	Network Boot	-

4.4 Hard Disk Drive Password Security Feature

The Hard Disk Drive Password Security feature blocks read and write access to the hard disk drive until the correct password is given. Hard disk drive passwords are set in BIOS Setup and are prompted for BIOS POST. For convenient support for resuming from S3, the system BIOS will automatically unlock drives on resume from S3. Valid password characters are A-Z, a-z, and 0-9. Passwords may be up to 32 characters in length.

The User hard disk drive password, when set, will be required on each power cycle until the Master Key or User hard disk drive password is submitted.

The Master Key hard disk drive password, when set, will not lock the drive. The Master Key hard disk drive password exists as an unlock override if the User hard disk drive password is forgotten. Only the User hard disk drive password, when set, will cause a hard disk to be locked on a system power cycle. The table below show the effects of setting the hard disk drive passwords.

Password Set	Password During Boot
Neither	None
Master only	None
User only	User only
Master and User Set	User

During every POST, if a User hard disk drive password is set, POST execution will pause with the following prompt to force the User to enter the Master Key or the User hard disk drive password:

“Enter Hard Disk Drive Password:”

Upon successful entry of the Master Key or User hard disk drive password, the system will continue with normal POST.

If the hard disk drive password is not correctly entered, the system will go back to the above prompt. The User will have three attempts to correctly enter the hard disk drive password. After the third unsuccessful attempt, the system will halt with the following message:

“Hard Disk Drive Password Entry Error”

A manual power cycle will be required to resume system operation.

4.5 BIOS Security Features

The BIOS includes security features that restrict access to the BIOS Setup program and who can boot the computer. A Supervisor and User password can be set for the BIOS Setup program and for botting the computer, with the following restrictions:

- The Supervisor password gives unrestricted access to view and change all the Setup options in the BIOS Setup program. This is Supervisor Mode.
- The User password gives restricted access to view and change Setup options in the BIOS Setup program. This is User Mode.
- If only the Supervisor password is set, pressing the <Enter> key at the password prompt of the BIOS Setup program allows the user restricted access to Setup.
- If both the Supervisor and User passwords are set, users can enter either the Supervisor or User password to access Setup. Users have access to Setup regardless of which password is used.
- Setting the User password restricts who can boot the computer. The password prompt will be displayed before the computer boots. If only the Supervisor password is set, the computer boots without asking for a password. If both passwords are set, the user can enter either password to boot the computer.
- For enhanced security, use different passwords for the Supervisor and User passwords.
- Valid password characters are A-Z, a-z, 0-9, and special characters. Passwords may be up to 20 characters in length.
- To clear a set password, enter a blank password after entering the existing password.

The table below shows the effects of setting the Supervisor password and User password. This table is for reference only and is not displayed on the screen.

Password Set	Neither	Supervisor only	User only	Supervisor and User set
Supervisor Mode	Any user can change all options	Can change all options	N/A	Can change all options
User Mode	Any user can change all options	Can change a limited number of options	Can change all options	Can change a limited number of options
Setup Options	None	Supervisor Password	Enter Password Clear User Password	Supervisor Password Enter Password
Password to Enter Setup	None	Supervisor	User	Supervisor or User
Password During Boot	None	None	User	Supervisor or User

4.6 BIOS Error Messages

The table below lists the error messages and provides a brief description of each.

Error Message	Explanation
CMOS Battery Failure	The battery may be losing power. Replace the battery soon.
CMOS Checksum Error	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then the memory may be bad.
CMOS Timer Not Set	The battery may be losing power. Replace the battery soon.
Processor Overheated	Processor overheated in previous boot.
Auto RTC Reset	The system triggers RTC clear to recover the system back to the normal condition from consecutive boot failure.