C785S-IM-AA
C582S-IM-AA
C381S-IM-AA

User Manual

HIGH-DEFINITION MULTIMEDIA INTERFACE

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Appendix

About this manual

This manual provides information about the hardware and software features of your Single Board Computer, organized through the following chapters:

Chapter 1: Specifications Summary

This chapter details the hardware and software features of your Single Board Computer.

Chapter 2: Product Introduction

This chapter describes the features of the motherboard. It includes description of the connectors, and I/O ports on the motherboard.

Chapter 3: Upgrading your Single Board Computer

This chapter provides you with information on how to upgrade the memory modules, wireless modules, and hard disk drive / solid state drive of your Single Board Computer.

Chapter 4: BIOS Setup

This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

Appendix

This section includes notices and safety statements for your Single Board Computer.

Conventions used in this manual

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.

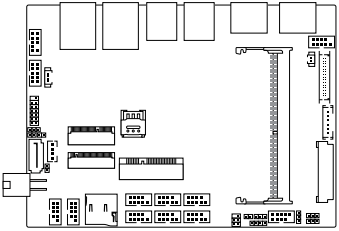
WARNING! This message contains important information that must be followed to keep you safe while performing certain tasks and prevent damage to your Single Board Computer's data and components.

Typography

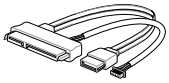
Bold text	Indicates a menu or an item to select.
Italic	This indicates sections that you can refer to in this manual.

Package contents

Your Single Board Computer package contains the following items:



C785S-IM-AA / C582S-IM-AA / C381S-IM-AA



SATA and power cable

NOTE:

- Some bundled accessories may vary with different models. For details on these accessories, refer to their respective user manuals.
- The device illustration is for reference only. Actual product specifications may vary with models.
- 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

Specifications Summary

C785S / C582S / C381S-IM-AA Specifications Summary

		C785S-IM-AA	C582S-IM-AA	C381S-IM-AA
Form factor		3.5", 146 x 105 mm		
Processor	**CPU**	Intel® Core™ i7-8565U Processor (SoC)	Intel® Core™ i5-8625U Processor (SoC)	Intel® Core™ i3-8145U Processor (SoC)
	Max. Speed	1.8GHz Quad-core	1.6GHz Quad-core	2.1GHz Quad-core
	L2 Cache	8MB	6MB	4MB
	Chipset	Integrated		
Memory		1x SO-DIMM, DIMM max. 16GB, DDR4 2400/2133 MHz, non-ECC, un-buffered memory		
Storage	**SATA port**	1 x SATA 6GB/s connector (Gen 3.0)		
	mSATA	1 x Full-Length mSATA slot (shared with Mini PCIe)		
Graphics	**Controller**	Intel® UHD Graphics 620		
	HDMI	1 x HDMI supports HDMI 1.4 up to 4096 x 2160 @ 24 Hz		
	DisplayPort	1 x DisplayPort supports DP 1.2a up to 4096 x 2304 @ 60 Hz		
	LVDS	1 x LVDS supports 1920 x 1200 @ 30 Hz (co-lay with eDP)		
	eDP (optional)	1 x eDP supports up to 4096 x 2304 @ 60 Hz (colay with LVDS)		
	Multi Display	DP+HDMI+LVDS DP+HDMI+eDP Supports up to 3 displays simultaneous under OS		
Expansion slot	**Mini PCIe**	1 x Full-Length Mini PCIe slot (shared with mSATA) 1 x On-board Nano-SIM socket		
	M.2	1 x M.2 Socket 1 with E key, type 2230 for WIFI/BT device and Intel® CNVi 1 x M.2 Socket 3 with M key, type 2242 (PCIE x4 mode & SATA mode)		
	Others	1 x Micro SD Card slot (on-board)		
Ethernet		1 x Intel® I219V, RJ-45 LAN port and 1 x Intel® I211AT, RJ-45 LAN port supports 10/100/1000Mbps		

(continued on the next page)

	C785S-IM-AA	C582S-IM-AA	C381S-IM-AA
Audio	Realtek ALC897/ALC887 High Definition Audio CODEC * **The audio codec may vary between motherboards, please consult your sales window for the motherboard's exact codec type.**		
Rear I/O	1 x DisplayPort 1 x HDMI port 4 x USB 3.2 Gen 2 Type-A ports 2 x RJ-45 LAN ports		
Internal connectors	6 x Serial ports (2 x RS-232/422/485, 4 x RS-232) 2 x USB 2.0 connectors (supports additional 4 USB 2.0 ports) 1 x 4-pin Chassis fan connector 1 x Chassis intrusion connector 1 x Front panel audio connector (AAFP) 1 x System panel connector 1 x Clear CMOS jumper 1 x SATA power connector 1 x LPC debug connector 1 x SMBus connector 1 x I2C connector 1 x 4-pin Power connector 1 x GPIO connector (8-bit)		
Watchdog Timer (H/W)	Yes		
Security	1 x SPI TPM connector		
Power Supply	DC 12-24V		
Operating System	Windows® 10 (64bit) Win10 Iot Enterprise Ubuntu RedHat Enterprise Fedora Workstation OpenSUSE		
Environment	Operating Temperature: -20°C ~ 60°C Non-operating Temperature: -40°C ~ 85°C		

NOTE: Specifications are subject to change without notice.

2

Product Introduction

2.1 Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.

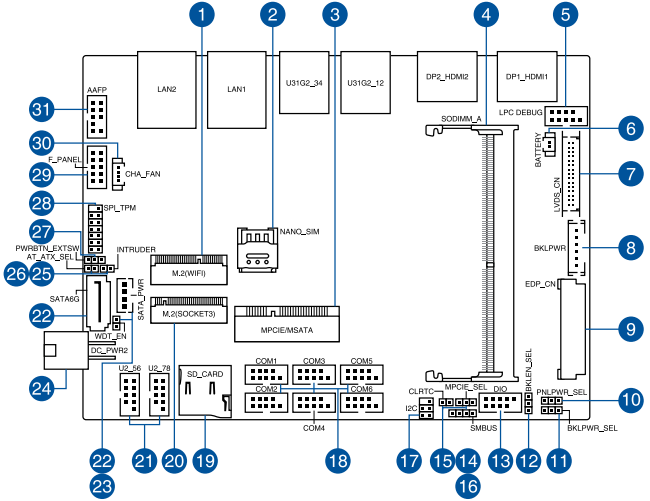
NOTE: The diagrams in this chapter are for reference only. The motherboard layout may vary with models.

IMPORTANT! Components shown in this section may require additional purchase. Refer to **Package contents** section for more information about the contents of your Single Board Computer package.

WARNING!

- Unplug the power cord from the wall socket before touching any component.
- Before handling components, use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, to avoid damaging them due to static electricity.
- Hold components by the edges to avoid touching the ICs on them.
- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
- Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

2.2 Motherboard layout



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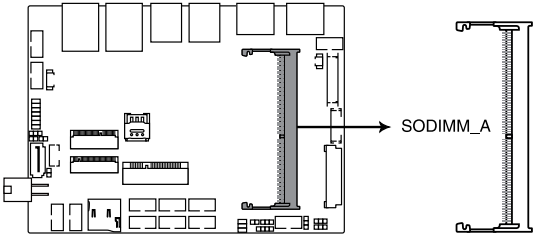
2.3 System memory

The motherboard comes with a Small Outline Dual Inline Memory Module (SODIMM) slot designed for DDR4 (Double Data Rate 4) memory modules.

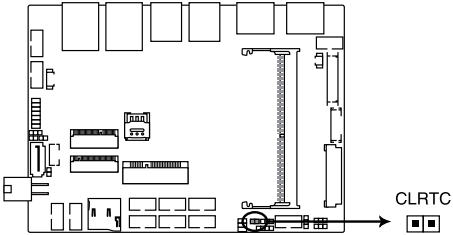


SODIMM slot

2.4 Onboard jumpers

1. Clear RTC RAM jumper

The Clear RTC RAM jumper allows you to clear the Real Time Clock (RTC) RAM in the CMOS, which contains the date, time, system passwords, and system setup parameters.



Clear CMOS jumper

To erase the RTC RAM:

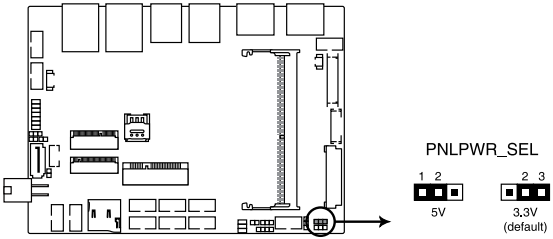
1. Turn OFF the computer and unplug the power cord.
2. Short-circuit pin 1-2 with a metal object or jumper cap for about 5-10 seconds.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

WARNING! DO NOT remove the jumper cap from its default position except when clearing the RTC RAM. Removing the jumper cap will cause system boot failure!

NOTE: If the steps above do not help, remove the onboard button cell battery and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the button cell battery.

2. LVDS Panel Power Selection jumper (on selected models)

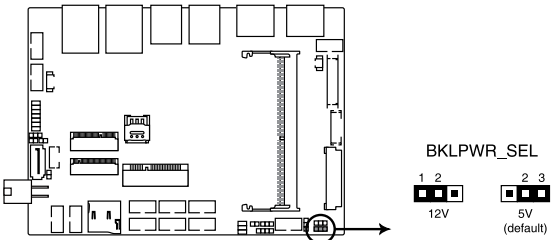
The LVDS Panel Power jumper allows you to select the voltage for the LVDS panel.



LVDS Panel Power Selection jumper

3. Back Light Power Selection jumper (on selected models)

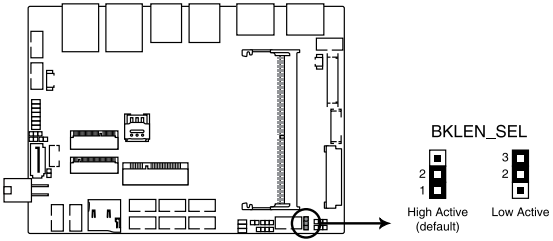
The Back Light Power Selection jumper allow you to select the voltage for the LVDS back light module.



Back Light Power Selection jumper

4. Back Light Power Enable jumper (on selected models)

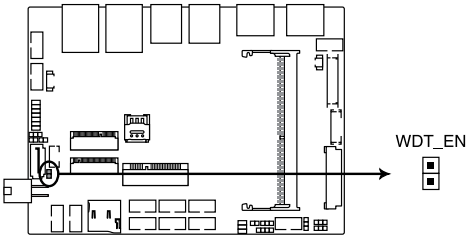
The Back Light Power Enable jumper allows you to configure the power setting for the panel.



Back Light Power Enable Mode jumper

5. HW WDT Enable jumper

A watchdog timer is an electronic timer that is used to detect and recover from computer malfunctions. The HW WDT (watchdog timer) Enable jumper allows the HW watchdog resets the system automatically even when the system crashes.

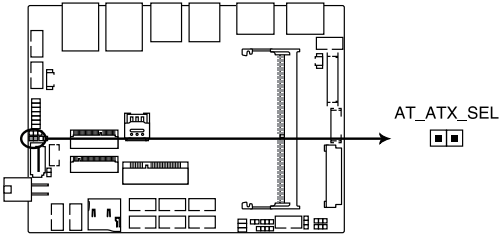


HW WDT Enable jumper

NOTE: The default setting for this jumper is set to HW WDT enabled with a jumper cap attached.

6. AT/ATX Mode Configuration jumper

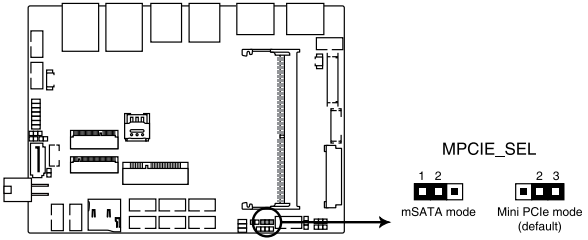
The AT/ATX Mode Configuration jumper allows you to switch between AT or ATX modes. The default setting for this jumper is set to ATX mode with a jumper cap attached, to switch to AT mode, remove the jumper cap.



AT/ATX Mode Selection jumper

7. Mini PCIe/mSATA configuration jumper

The Mini PCIe/mSATA configuration jumper allows you to select between Mini PCIe mode or mSATA mode. Set to pins 1-2 for mSATA mode, or set to pins 2-3 for Mini PCIe mode.

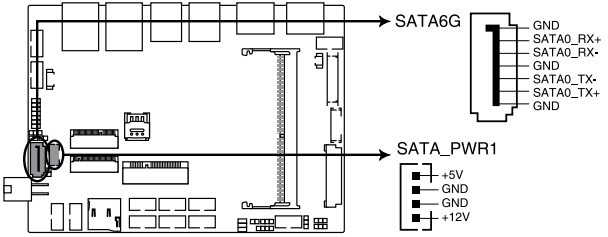


Mini PCIe/mSATA SEL jumper

2.5 Internal connectors

1. SATA 6Gb/s & SATA Power connector

The SATA 6Gb/s and SATA Power connectors allow you to connect SATA devices such as optical disc drives and hard disk drives via a SATA cable and power cable.



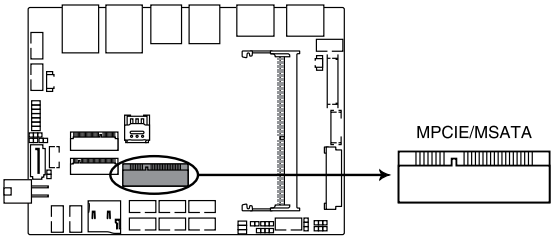
SATA_PWR1 & SATA6G connector

Connector type	Wafer HD 4P, 2.0mm pitch

NOTE: Ensure to use the bundled cable when connecting a storage device to this connector.

2. Mini PCIe/mSATA slot

The Mini PCIe/mSATA slot allows you to install a Mini PCIe or mSATA peripheral device.



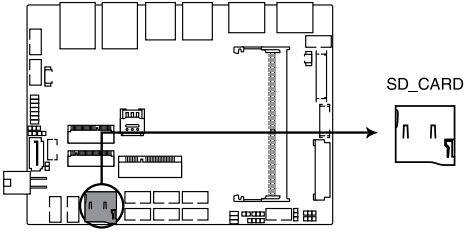
MPCIE/MSATA slot

NOTE:

- The Mini PCIe / mSATA peripheral device is purchased separately.
- We recommend using a PH1 screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the screw.
- The mSATA shares the same slot with a full-length Mini PCIe.

3. Micro SD Card slot

The Micro SD Card slot allows you to install a Micro SD card.

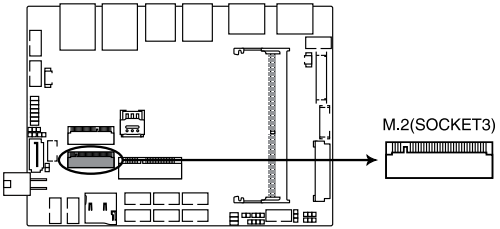


Micro SD CARD slot

NOTE: The Micro SD card is purchased separately.

4. M.2 slot

The M.2 slot allows you to install 2242 M.2 devices such as 2242 M.2 SSD modules.



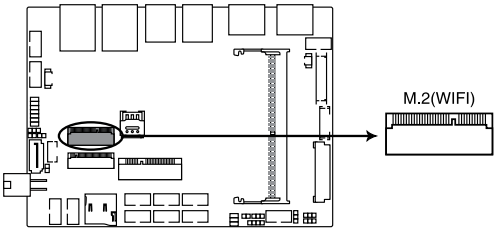
M.2(SOCKET3) slot

NOTE:

- The M.2 SSD module is purchased separately.
- We recommend using a PH1/sleeve screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the screw/standoff.
- This motherboard supports 2242 PCIe x4 and SATA SSD devices.

5. M.2 Wi-Fi slot

The M.2 Wi-Fi slot allows you to install an M.2 Wi-Fi module (E-key, type 2230).



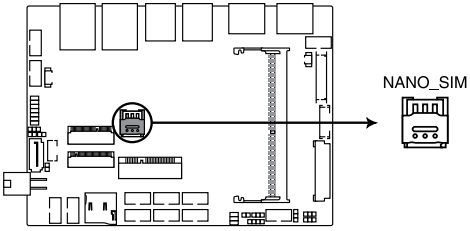
M.2(WIFI) slot

NOTE:

- The M.2 Wi-Fi module is purchased separately.
- We recommend using a PH1/sleeve screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the standoff.

6. Nano SIM Card slot

The Nano SIM Card slot allows you to install a Nano SIM card.

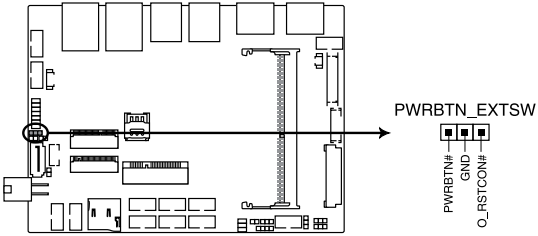


NANO SIM slot

NOTE: The Nano SIM card is purchased separately.

7. Power button connector

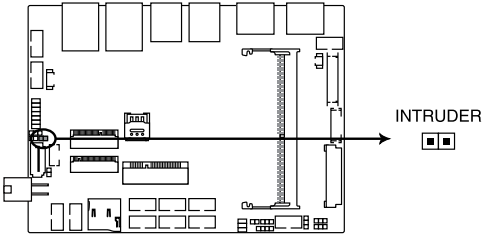
The Power Button connector allows you to connect an external power button.



Power button connector

8. Chassis Intrusion connector

The Chassis Intrusion connector allows you to connect a intrusion sensor or microswitch for the chassis intrusion detection feature. When you remove any chassis component, the sensor or microswitch triggers and sends a high level signal and records a chassis intrusion event.

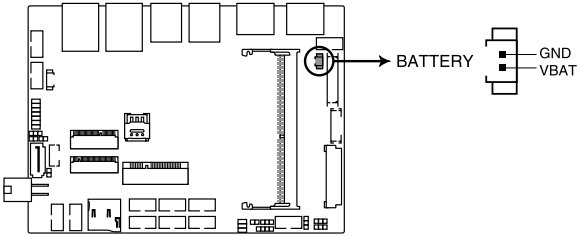


Chassis Intruder connector

NOTE: By default, a jumper cap that disables the intrusion detection feature is installed on the connector to prevent accidental triggers.

9. Battery connector

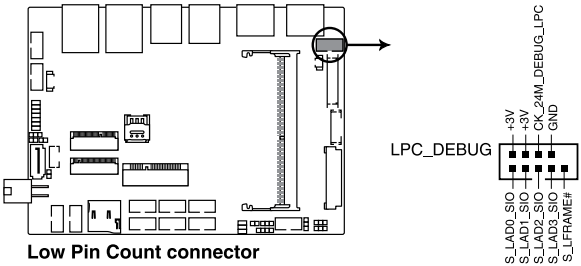
The Battery connector allows you to connect the lithium CMOS battery.



Battery connector

10. Low Pin Count connector

The Low Pin Count connector allows you to connect a low pin count (LPC) debug card that offers a faster, more efficient motherboard troubleshooting solution. When connected to a debug card, users can view error and debugging codes on the card and get a better idea of initialization and recovery processes.

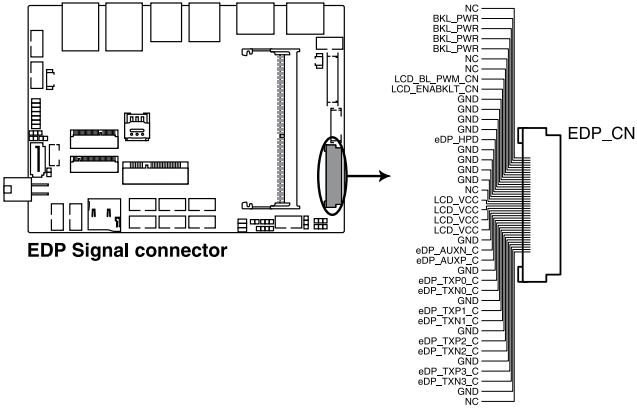


Low Pin Count connector

Connector type	BOX header 2x5p, K10, 2.0mm pitch

11. EDP Signal connector (on selected models)

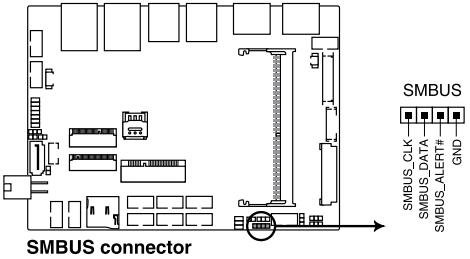
The EDP Signal connector allows you to connect an internal embedded DisplayPort.



Connector type	WtoB CON 40P 0.5MM,R/A ACES/88341-4001

12. System Management Bus connector

The System Management Bus (SMBus) connector allows you to connect SMBus devices. This connector is generally used for communication with the system and power management-related tasks.

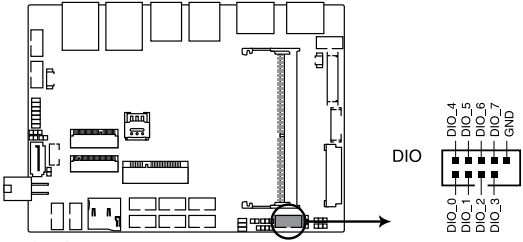


SMBUS connector

Connector type	Header 1x4p, 2.0mm pitch

13. GPIO connector

The GPIO connector allows you to connect a general purpose input/output module which allows you to customize the digital signal input/output.

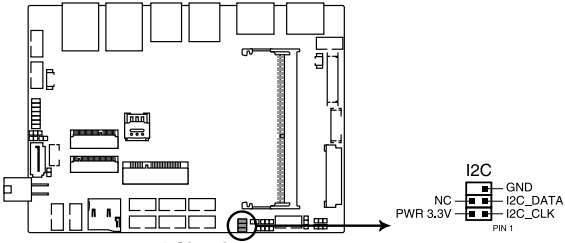


GPIO connector

Connector type	BOX header 2x5p, K9, 2.0mm pitch

14. I2C connector

The I2C (Inter-Integrated Circuit)connector allows you to connect an I2C compatible IoT security module.

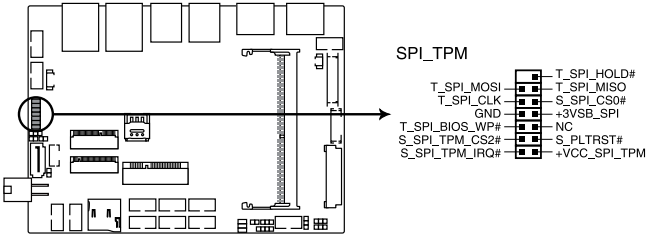


Inter-Integrated Circuit connector

Connector type	Header 2x3p, K6, 2.0mm pitch

15. SPI TPM connector

The SPI TPM connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

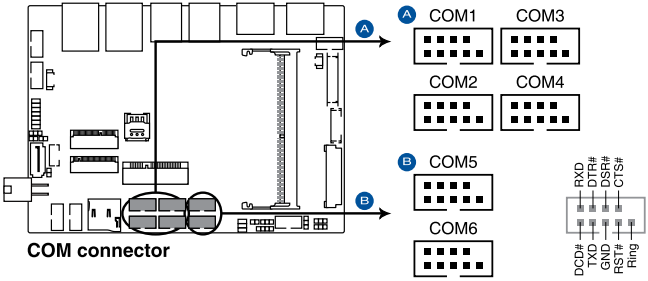


SPI TPM connector

Connector type	Header 2x7p,K14, 2.0mm pitch

16. Serial Port connector

The Serial (COM) Port connector allows you to connect a serial cable. Connect the 2x5p connector from the serial cable to this connector, then align and secure the DB-9 connector to the cut-out on the system chassis panel.



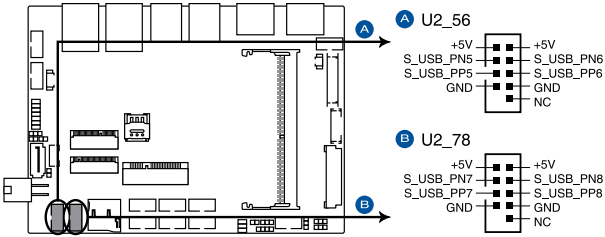
Connector type	BOX header 2x5p, K10, 2.0mm pitch

NOTE:

- The serial cable is purchased separately.
- **COM1** and **COM2** support RS-232/422/485.
- **COM 3**, **COM4**, **COM5**, and **COM6** support RS-232.

17. USB 2.0 connector

The USB 2.0 connector allows you to connect a USB module for additional USB 2.0 ports. The USB 2.0 connector provides data transfer speeds of up to 480 MB/s connection speed.



USB 2.0 connector

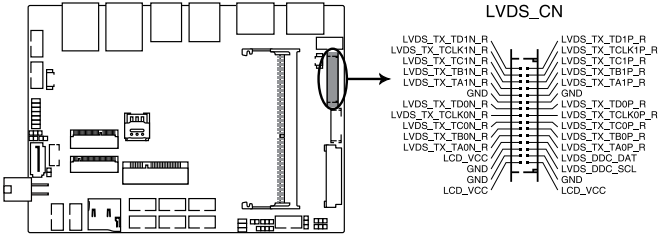
Connector type	BOX header 2x5p, K9, 2.0mm pitch

WARNING! DO NOT connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

NOTE: The USB 2.0 module is purchased separately.

18. LVDS connector (on selected models)

The LVDS connector allows you to connect a LCD monitor that supports a Low-voltage Differential Signaling (LVDS) interface.

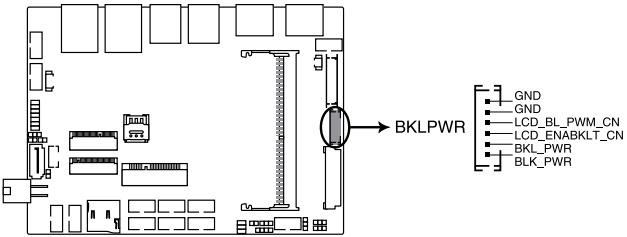


LVDS connector

Connector type	WAFER HD 2X15P 1.25MM pitch

19. Back Light Inverter Power connector (on selected models)

The Back Light Inverter Power connector is for the panel back light module power input.

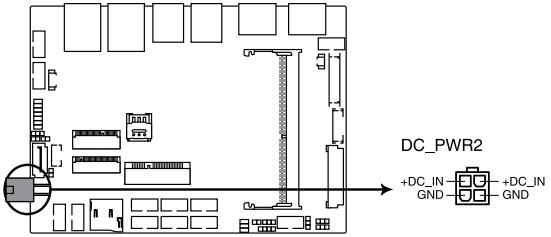


Backlight Inverter Power connector

Connector type	WAFER 6P 2.0mm pitch NATURAL S/T

20. DC-in 4-Pin Power connector

The DC-in 4-pin Power connector is for DC power input. Using a compatible power cable and power board, you may connect a suitable power supply with DC -in jacks.

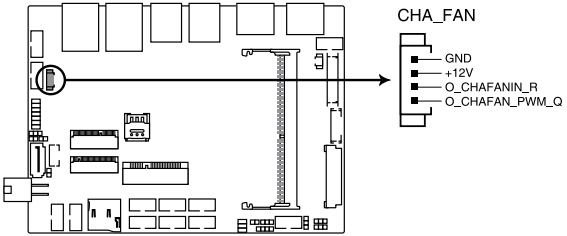


DC-in 4-pin Power connector

Connector type	POWER CON 4P R/A

21. Fan connector (on selected models)

The Fan connector allows you to connect a fan to cool the system.



FAN connector

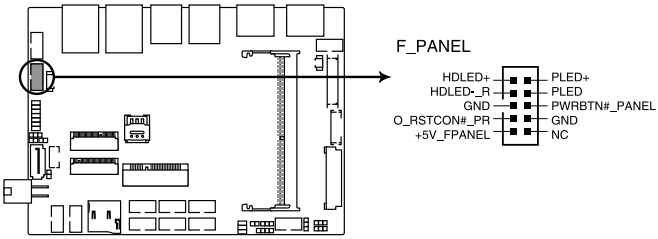
Connector type	WtoB CON 4P,1.25mm,S/T

WARNING!

- DO NOT forget to connect the fan cable to the fan connector. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!
- Ensure the cable is fully inserted into the connector.

22. System Panel connector

The System Panel connector supports several chassis-mounted functions.



Front Panel connector

Connector type	BOX header 2x5p 2.0mm pitch

- **System Power LED connector (PLED)**
  The 2-pin connector allow you to connect the System Power LED. The System Power LED lights up when the system is connected to a power source, or when you turn on the system power, and blinks when the system is in sleep mode.

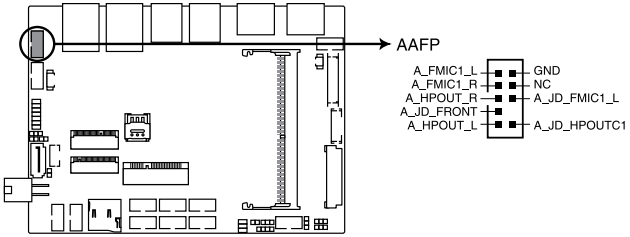
- **Storage Device Activity LED connector (HDLED)**
  The 2-pin connector allows you to connect the Storage Device Activity LED. The Storage Device Activity LED lights up or blinks when data is read from or written to the storage device or storage device add-on card.

- **Power Button/Soft-off Button connector (PWRBTN)**
  The 3-1 pin connector allows you to connect the system power button. Press the power button to power up the system, or put the system into sleep or soft-off mode (depending on the operating system settings).

- **Reset button connector (O_RSTCON)**
  The 2-pin connector allows you to connect the chassis-mounted reset button. Press the reset button to reboot the system.

23. Line Out / Mic connector

The Line Out / Mic connector is for a line out /microphone module that supports HD Audio. Connect one end of the line Out / mic module cable to this connector.



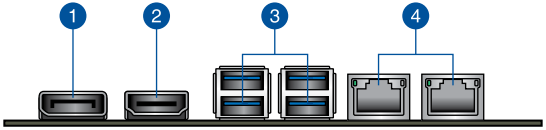
Line_out/Mic connector

Connector type	BOX header 2x5p, K8, 2.0mm pitch

NOTE: We recommend that you connect a high-definition line out / mic module to this connector to avail of the motherboard's high-definition audio capability.

2.6 I/O connectors

Front panel



Front panel connectors	
1.	DisplayPort
2.	HDMI port
3.	USB 3.2 Gen 2 ports
4.	LAN (RJ-45) port

3

Upgrading your Single Board Computer

IMPORTANT!

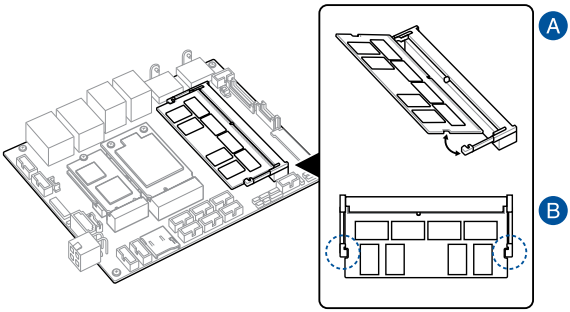
- Ensure that your hands are dry before proceeding with the rest of the installation process. Before installing any of the features in this guide, use a grounded wrist strap or touch a safely grounded object or metal object to avoid damaging them due to static electricity.
- Turn off the power of your Single Board Computer, and allow it to cool for at least 10 minutes before performing any installation/ uninstallation process.

NOTE: The illustrations in this section are for reference only. The slots may vary depending on model.

3.1 Installing memory modules

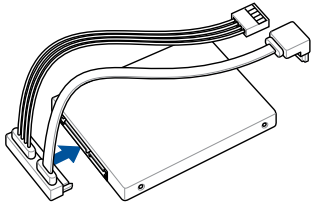
Your motherboard comes with a SO-DIMM memory slot that allow you to install a DDR4 SO-DIMM.

Align and insert the memory module into the slot (A) and press it down (B) until it is securely seated in place.

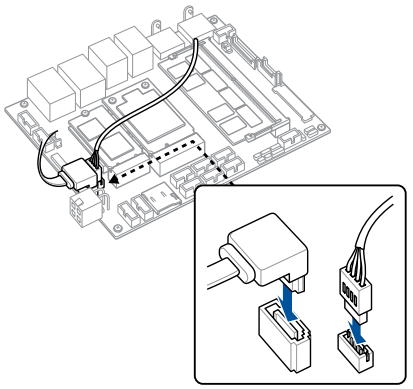


3.2 Installing 2.5” storage device

1. Connect the storage device cable to the storage device.



2. Connect the storage device cable to the **SATA6G** and **SATA_PWR** connectors on the motherboard.

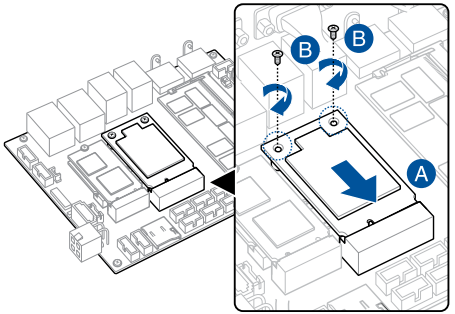


3.3 Installing a Mini PCIe or mSATA card

Your motherboard comes with a Mini PCIe/mSATA slot that allow you to install a Mini PCIe or mSATA peripheral card.

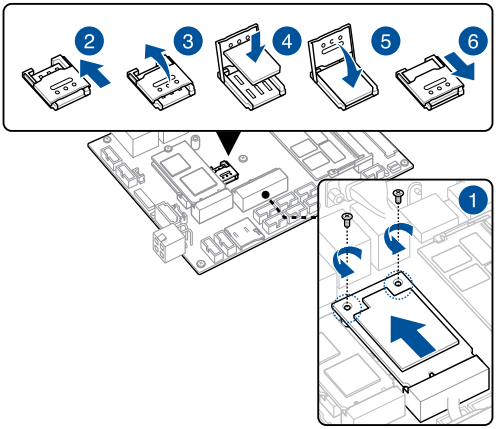
Align and insert the Mini PCIe or mSATA card into the slot (A) and press it down and secure it in place using two (2) screws.

NOTE: We recommend using a PH1 screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the screw(s).



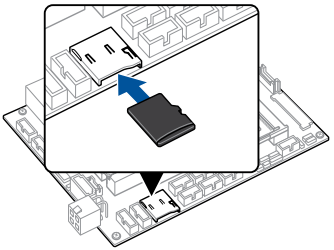
3.4 Installing a nano SIM card

1. (optional) Remove the mPCIe or mSATA card if there is a mPCIe or mSATA card installed by removing the two (2) screws securing the mPCIe or mSATA card first, then removing the mPCIe or mSATA card.
2. Push the nano SIM cover towards the front I/O of your motherboard.
3. Lift the nano SIM cover.
4. Place the nano SIM into the nano SIM slot.
5. Replace the nano SIM cover.
6. Push the nano SIM cover towards the rear of your motherboard to secure the nano SIM card.



3.5 Installing an SD card

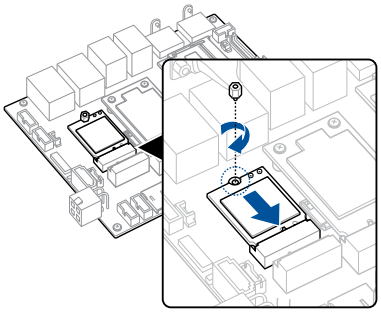
Insert your SD card into the SD card slot. Ensure that the SD card is pushed all the way into the SD card slot.



3.6 Installing a wireless card

1. Remove the M.2 standoff.
2. Align and insert the wireless card into its slot on the motherboard, then gently push down the wireless card on top of the screw hole and fasten it using the previously removed standoff.

NOTE: We recommend using a PH1/sleeve screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the standoff.



3. (optional) Connect the antennas to your wireless card.

NOTE:

- Connecting antennas to your wireless card may strengthen the wireless signal.
- A soft clicking sound indicates that the antenna has been securely attached on the wireless card.
- The antennas are purchased separately.

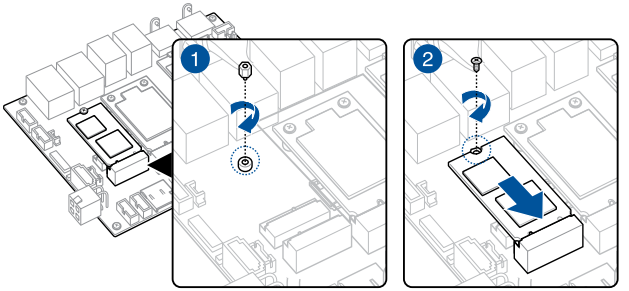
3.7 Installing an M.2 SSD

1. (optional) Replace the standoff if it has been removed.

   NOTE: We recommend using a PH1/sleeve screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the standoff.

2. Align and insert the M.2 SSD into its slot inside the Single Board Computer, then gently push down the M.2 SSD on top of the standoff and fasten it using a screw.

   NOTE: We recommend using a PH1 screwdriver with a torque of 2.0±0.2 kgf-cm when tightening the screw.



4

BIOS Setup

4.1 Getting to know your BIOS

The BIOS (Basic Input and Output System) stores system hardware settings such as Storage Device Configuration, Advanced Power Management, and Boot Device Configuration that are needed for system startup. Under normal circumstances, the default BIOS settings apply to most conditions to ensure optimal performance. DO NOT change the default BIOS settings except in the following circumstances:

- An error message appears on the screen during the system bootup and requests you to run the BIOS setup.
- You have installed a new system component that requires further BIOS settings or update.

WARNING! Inappropriate BIOS settings may result to instability or boot failure. We strongly recommend that you change the BIOS settings only with the help of a trained service personnel.

NOTE:

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- BIOS settings and options may vary due to different BIOS release versions. Please refer to the latest BIOS version for settings and options.

4.2 BIOS setup program

Use the BIOS Setup program to update the BIOS or configure its parameters. The BIOS screens include navigation keys and brief online help to guide you in using the BIOS Setup program.

Entering BIOS Setup at startup

To enter BIOS Setup at startup:

- Press <Delete> or <F2> during the Power-On Self Test (POST). If you do not press <Delete> or <F2>, POST continues with its routines.

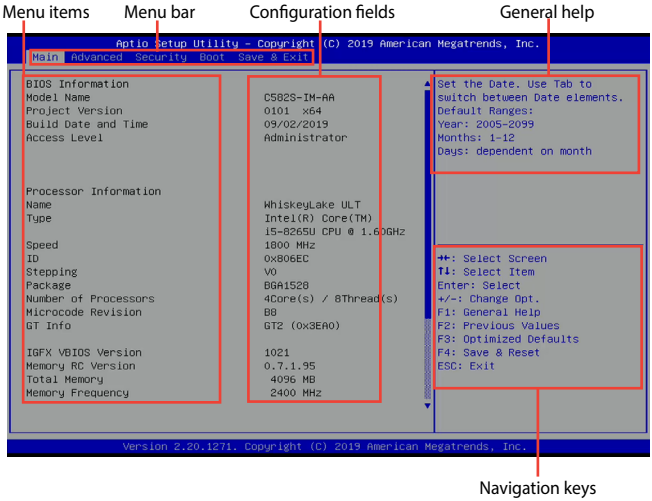
Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+<Delete> simultaneously.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first option.

BIOS menu screen

This section provides a brief introduction of the BIOS Interface of your Single Board Computer.



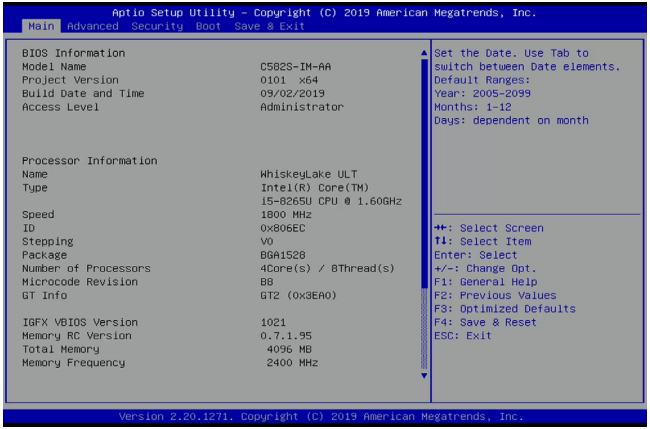
Menu bar

The menu bar on top of the screen has the following main items:

Main	For changing the basic system configuration
Advanced	For changing the advanced system settings
Security	For changing the security settings
Boot	For changing the system boot configuration
Save & Exit	For selecting the save and exit options or loading default settings

4.3 Main Menu

When you enter the BIOS Setup program, the Main menu screen appears. The Main menu provides you an overview of the basic system information, and allows you to set the system date and time. Scroll down to display the other BIOS items.



4.3.1 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

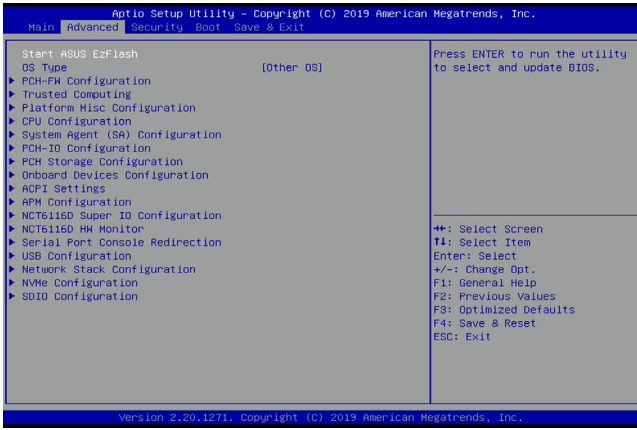
4.3.2 System Time [xx:xx:xx]

Allows you to set the system time.

4.4 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

WARNING! Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



Start ASUS EzFlash

Allows you to run ASUS EzFlash BIOS ROM Utility when you press <Enter>. Refer to the **ASUS EzFlash Utility** section for details.

WARNING! Ensure to back up your Bitlocker recovery key and suspend Bitlocker encryption in the operating system before updating your BIOS.

NOTE: For more details, refer to section *4.8.2 ASUS EzFlash Utility*.

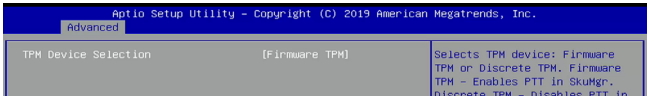
OS Type

[Windows UEFI mode] Allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.

[Other OS] Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

4.4.1 PCH-FW Configuration

The items in this menu allow you to configure Management Engine Technology Parameters.



TPM Device Selection

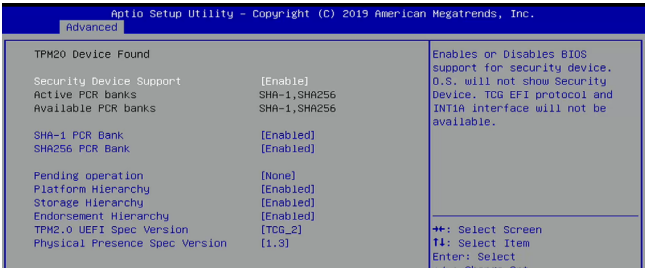
This item allows you to select the TPM device.

[Discrete TPM] Disables PTT in SkuMgr.

[Firmware TPM] Enables PTT in SKUMgr.

WARNING! When **[Firmware TPM]** is selected, PTT/Discrete TPM will be disabled and all data saved on it will be lost.

4.4.2 Trusted Computing



NOTE: All values changed here do not take effect until computer is restarted.

Security Device Support

Allows you to enable or disable the BIOS support for security device.
Configuration options: [Disable] [Enable]

NOTE: The following items appear only when **Security Device Support** is set to **[Enabled]**.

SHA-1 PCR Bank

Allows you to enable or disable SHA-1 PCR Bank.
Configuration options: [Disable] [Enable]

SHA256 PCR Bank

Allows you to enable or disable SHA256 PCR Bank.
Configuration options: [Disable] [Enable]

Pending operation

Allows you to schedule an operation for the Security Device.
Configuration options: [None] [TPM Clear]

NOTE: Your computer will reboot during restart in order to change the state of Security Device.

Platform Hierarchy

Allows you enable or disable the Platform Hierarchy.
Configuration options: [Disabled] [Enabled]

Storage Hierarchy

Allows you enable or disable the Storage Hierarchy.
Configuration options: [Disabled] [Enabled]

Endorsement Hierarchy

Allows you enable or disable the Endorsement Hierarchy.
Configuration options: [Disabled] [Enabled]

TPM2.0 UEFI Spec Version

Allows you to select the TCG2 spec version support.

[TCG_1_2] Compatible mode for Windows 8® / Windows® 10.

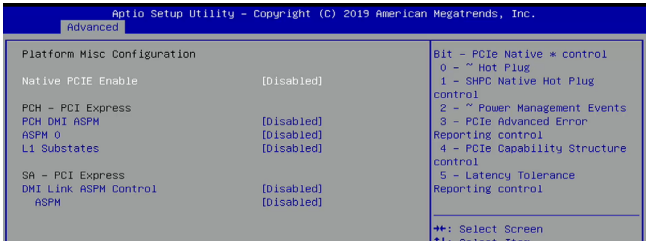
[TCG_2] Supports new TCG2 protocol and event format for Windows® 10 or later.

Physical Presence Spec Version

Select to tell the OS to support PPI Spec Version 1.2 or 1.3.
Configuration options: [1.2] [1.3]

NOTE: Some HCK tests might not support version 1.3.

4.4.3 Platform Misc Configuration



Native PCIE Enable

This item allows you to enhance the power saving feature of PCI Express and perform ASPM operations in the operating system..
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Native PCIE Enable** is set to **[Enabled]**.

Native ASPM

Configuration options: [Auto] [Disabled] [Enabled]

PCH - PCI Express

PCH DMI ASPM

This item allows you to control the Active State Power Management on both NB (NorthBridge) side and SB (SouthBridge) side of the DMI Link.
Configuration options: [Disabled] [Enabled]

ASPM 0

This item allows you to select the ASPM state for energy-saving conditions.
Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

L1 Substates

This item allows you to select the PCI Express L1 Substates settings.
Configuration options: [Disabled] [L1.1] [L1.1 & L1.2]

SA - PCI Express

DMI Link ASPM Control

This item allows you to enable or disable the control of Active State Power management on SA side of the DMI Link.

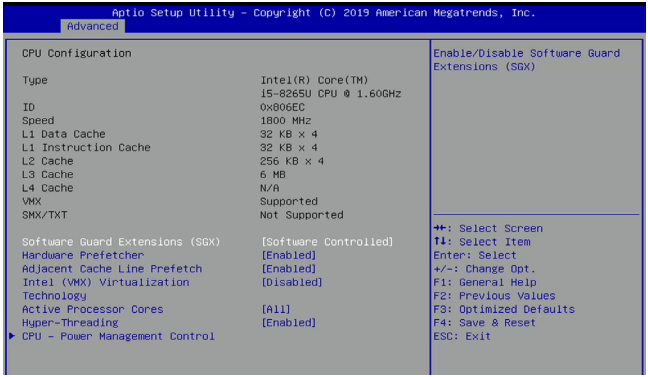
Configuration options: [Disabled] [L0s] [L1s] [L0sL1]

PEG - ASPM

This item allows you to control ASPM support for the PEG 0. This has no effect if PEG is not currently the active device.
Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

4.4.4 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.



Software Guard Extensions (SGX)

This item allows you to enable or disable Software Guard Extensions (SGX).
Configuration options: [Disabled] [Enabled] [Software Controlled]

Hardware Prefetcher

This item allows you to enable or disable the MLC streamer prefetcher.
Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch

This item allows you to enable or disable prefetching of adjacent cache lines.
Configuration options: [Disabled] [Enabled]

Intel (VMX) Virtualization Technology

When set to **[Enabled]**, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Configuration options: [Disabled] [Enabled]

Active Processor Cores

This item allows you to select the number of CPU cores to activate in each processor package.
Configuration options: [All] [1] - [3]

Hyper-Threading

This item is enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).
Configuration options: [Disabled] [Enabled]

CPU Power Management Configuration

This item allows you to manage and configure the CPU's power.

Boot performance mode

This item allows you to select the CPU performance state that the BIOS will set starting from reset vector.
Configuration options: [Max Battery] [Max Non-Turbo Performance] [Turbo Performance]

Intel(R) SpeedStep(tm)

This item allows more than two frequency to be supported.
Configuration options: [Enabled] [Disabled]

Intel(R) Speed Shift Technology

This item allows you to enable or disable Intel(R) Speed Shift Technology support. When enabled, CPPC v2 interface allows hardware controlled P-states.
Configuration options: [Enabled] [Disabled]

Turbo Mode

This item allows you to enable or disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available when enabled).
Configuration options: [Disabled] [Enabled]

CPU C-states

This item allows you to enable or disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Configuration options: [Disabled] [Enabled]

Enhanced C-States

This item allows you to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Configuration options: [Disabled] [Enabled]

C-State Auto Demotion

This item allows you to configure the C-state auto demotion.
Configuration options: [Disabled] [C1] [C3] [C1 and C3]

C-State Un-demotion

This item allows you to configure the C-state Un-demotion.
Configuration options: [Disabled] [C1] [C3] [C1 and C3]

Package C-State Demotion

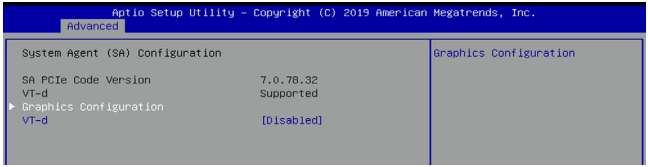
This item allows you to configure the Package C-State Demotion.
Configuration options: [Disabled] [Enabled]

Package C-State Un-demotion

This item allows you to configure the Package C-state Un-demotion.
Configuration options: [Disabled] [Enabled]

4.4.5 System Agent (SA) Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.



Graphics Configuration

This item allows you to select a primary display from CPU and PCIe graphical devices.

Graphics Turbo IMON Current

This item allows you to set the Graphics Turbo IMON supported current values
Configuration options: [14] - [31]

Skip Scanning of External Gfx Card

If set to [Enabled], it will not scan for External Gfx Card on PEG and PCH PCIe Ports.
Configuration options: [Disabled] [Enabled]

External Gfx Card Primary Display Configuration

Primary PEG

This item allows you to select PEG. Graphics device should be Primary PEG.
Configuration options: [Auto] [PEG11] [PEG12]

Primary PCIE

This item allows you to select PCIE. Graphics device should be Primary PEG.
Configuration options: [Auto] [PCIE1] - [PCIE19]

LCD Control

Primary IGFX Boot Display

This item allows you to select the Video Device which will be activated during POST. This has no effect if external graphics is present, Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.
Configuration options: [VBIOS Default] [EFP] [LFP] [EFP3] [EFP2] [EFP4]

NOTE: The following item appears only when **Primary IGFX Boot Display** is set to **[EFP]**, **[LFP]**, **[EFP3]**, **[EFP2]**, or **[EFP4]**.

Secondary IGFX Boot Display

This item allows you to select Secondary Display Device.
Configuration options: [EFP] [EFP3] [EFP2] [EFP4]

Pre-Defined LVDS Panel Type

This item allows you to select LVDS panel used by Internal Graphics Device by selecting the appropriate setup item.
Configuration options: [VBIOS Default] [640x480] [800x600] [1024x768] [1280x1024] [1400x1050(RB) LVDS1] [1400x1050 LVDS2] [1600x1200 LVDS] [1366x768 LVDS1] [1680x1050] [1920x1200] [1024x768 LVDS] [1280x800] [1920x1080 LVDS] [2048x1536 LVDS] [1366x768 LVDS]

Panel Scaling

This item allows you to select the LCD panel scaling option used by the Internal Graphics Device.
Configuration options: [Auto] [Off] [Force Scaling]

IGD Flat Panel

This item allows you to enable or disable IGD video output to onboard LVDS.
Configuration options: [Disabled] [LFP]

NOTE: The following items appear only when **IGD Flat Panel** is set to **[LFP]**.

Backlight Brightness

This item allows you to set VBIOS Brightness.
Configuration options: [0] - [255]

Backlight Control

This item allows you to set Back Light Control Setting.
Configuration options: [PWM Inverted] [PWM Normal]

Channel Select

Configuration options: [Dual Channel] [Single Channel]

Mode select

Configuration options: [8bit Mode(JEIDA)] [8bit Mode(VESA)] [6bit Mode(VESA and JEIDA)]

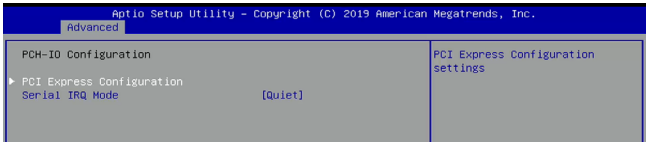
Panel Power Sequence Control

Configuration options: [Disabled] [Enabled]

VT-d

Allows you to enable virtualization technology function on memory control hub.
Configuration options: [Disabled] [Enabled]

4.4.6 PCH-IO Configuration



PCI Express Configuration

PCI Express Clock Gating

This item allows you to enable or disable PCI Express Clock Gating for each root port.

Configuration options: [Disabled] [Enabled]

PCI Express Root Port 5 / 9 / 12 / 14

PCI Express Root Port 5 / 9 / 12 / 14

This item allows you to control the PCI Express Root Port.
Configuration options: [Disabled] [Enabled]

Disable Gen2 Pll Shutdown and L1 Controller Power Gating

When enabled, disables Gen2 PLL Shutdown and L1 Controller power gating. Enable this option if using Titan Ridge A0/Alpine Ridge Thunderbolt controller.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **PCI Express Root Port 5 / 9 / 12 / 14** is set to **[Enabled]**.

Disable Gen2 Pll Shutdown and L1

[Built-In]	A built-in device is connected to this rootport. Slotimplemented bit will be clear.
[Slot]	This rootport connects to user-accessible slot. Slotimplemented bit will be set.

ASPM 4

This item allows you to select the ASPM state for energy-saving conditions.
Configuration options: [Disabled] [L0s] [L1] [L0sL1] [Auto]

L1 Substates

This item allows you to select the PCI Express L1 Substates settings.
Configuration options: [Disabled] [L1.1] [L1.1 & L1.2]

Gen3 Eq Phase3 Method

Configuration options: [Hardware] [Static Coeff.]

UPTP

This item allows you to set the Upstream Port Transmitter Preset.
Configuration options: [0] - [10]

DPTP

This item allows you to set the Downstream Port Transmitter Preset.
Configuration options: [0] - [10]

ACS

This item allows you to enable or disable the Access Control Services Extended Capability.
Configuration options: [Disabled] [Enabled]

PTM

This item allows you to enable or disable the Precision Time Meseaurement.
Configuration options: [Disabled] [Enabled]

DPC

This item allows you to enable or disable the Downstream Port Containment.
Configuration options: [Disabled] [Enabled]

EDPC

This item allows you to enable or disable the Rootport extensions for Downstream Port Containment.
Configuration options: [Disabled] [Enabled]

URR

This item allows you to enable or disable PCI Express Unsupported Request Reporting.
Configuration options: [Disabled] [Enabled]

FER

This item allows you to enable or disable PCI Express Device Fatal Error Reporting.
Configuration options: [Disabled] [Enabled]

NFER

This item allows you to enable or disable PCI Express Device Non-Fatal Error Reporting.
Configuration options: [Disabled] [Enabled]

CER

This item allows you to enable or disable PCI Express Correctable Error Reporting.
Configuration options: [Disabled] [Enabled]

CTO

This item allows you to enable or disable PCI Express Completion Timer TO.
Configuration options: [Disabled] [Enabled]

SEFE

This item allows you to enable or disable Root PCI Express System Error on Fatal Error.
Configuration options: [Disabled] [Enabled]

SENFE

This item allows you to enable or disable Root PCI Express System Error on Non-Fatal Error.
Configuration options: [Disabled] [Enabled]

SECE

This item allows you to enable or disable Root PCI Express System Error on Correctable Error.
Configuration options: [Disabled] [Enabled]

PME SCI

This item allows you to enable or disable PCI Express PME SCI.
Configuration options: [Disabled] [Enabled]

Hot Plug

This item allows you to enable or disable PCI Express Hot Plug.
Configuration options: [Disabled] [Enabled]

Advanced Error Reporting

This item allows you to enable or disable Advanced Error Reporting.
Configuration options: [Disabled] [Enabled]

PCIE Speed

This item allows you to configure PCIe Speed.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

Transmitter Half-Swing

This item allows you to enable or disable Transmitter half Swing.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

Detect Timeout

This item allows you to set the number of milliseconds reference code will wait for link to exit Detect State for enabled ports before assuming there is no device and potentially disabling the port.
Configuration options: [0] - [9999]

Extra Bus Reserved

This item allows you to set the number of Extra Bus Reserved (0-7) for bridges behind this Root Bridge.
Configuration options: [0] - [7]

Reserved Memory

This item allows you to set the amount of Reserved Memory for this Root Bridge (1-20) MB.
Configuration options: [1] - [20]

Reserved I/O

This item allows you to set the Reserved I/O (4K/8K/16K/20K) Range for this Root Bridge.
Configuration options: [4] - [20]

PCh PCIe LTR Configuration

LTR

This item allows you to enable or disable the PCH PCIE Latency Reporting.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **LTR** is set to **[Enabled]**.

Snoop Latency Override

[Disabled]	Disable Override.
[Manual]	Manually enter override values.
[Auto]	(Default) Maintain default BIOS flow.

NOTE: The following items appear only when **Snoop Latency Override** is set to **[Manual]**.

Snoop Latency Value

Allows you to set the LTR Snoop Latency Value of PCH PCIE.
Configuration options: [0] - [1023]

Snoop Latency Multiplier

Allows you to set the LTR Snoop Latency Multiplier of PCH PCIE.
Configuration options: [1 ns] [32 ns] [1024 ns] [32768 ns] [1048576 ns] [33554432 ns]

Non Snoop Latency Override

[Disabled]	Disable Override.
[Manual]	Manually enter override values.
[Auto]	(Default) Maintain default BIOS flow.

Non Snoop Latency Value

Allows you to set the LTR Non Snoop Latency Value of PCH PCIE.
Configuration options: [0] - [1023]

Non Snoop Latency Multiplier

Allows you to set the LTR Non Snoop Latency Multiplier of PCH PCIE.
Configuration options: [1 ns] [32 ns] [1024 ns] [32768 ns] [1048576 ns] [33554432 ns]

Force LTR Override

[Disabled]	LTR override values will not be forced.
[Enabled]	LTR override values will be forced and LTR messages from the device will be ignored.

LTR Lock

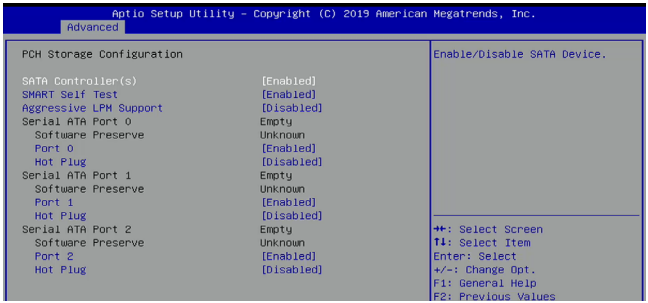
Allows you to enable or disable the PCIE LTR Configuration Lock.
Configuration options: [Disabled] [Enabled]

Serial IRQ Mode

Allows you to configure Serial IRQ mode.
Configuration options: [Quiet] [Continuous]

4.4.7 PCH Storage Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **[Empty]** if no SATA device is installed to the corresponding SATA port.



SATA Controller(s)

Allows you to enable or disable the Chipset SATA Controller.
Configuration options: [Disabled] [Enabled]

SMART Self Test

SMART (Self-Monitoring, Analysis and Reporting Technology) is a monitoring system that shows a warning message during POST (Power-On Self Test) when an error occurs in the hard disks.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **SATA Port Enable** is set to **[Enabled]**.

Aggressive LPM Support

This item is designed for LPM (link power management) support with a better energy saving conditions.
Configuration options: [Disabled] [Enabled]

Serial ATA Port 0-2

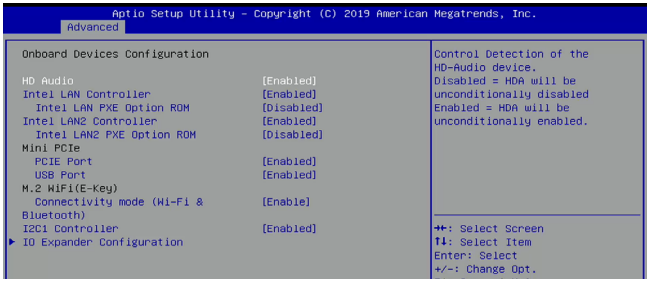
Port 0-2

Allows you to enable or disable the SATA port.
Configuration options: [Disabled] [Enabled]

Hot Plug

Allows you to enable or disable SATA Hot Plug Support.
Configuration options: [Disabled] [Enabled]

4.4.8 Onboard Devices Configuration



HD Audio Support

Allows you to enable or disable HD-Audio support.
Configuration options: [Disabled] [Enabled]

Intel LAN Controller

Allows you to enable or disable Intel LAN.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Intel LAN** is set to **[Enabled]**.

Intel LAN PXE Option ROM

Allows you to enable or disable Intel LAN PXE OPROM launch.
Configuration options: [Disabled] [Enabled]

Intel LAN 2 Controller

Allows you to enable or disable Intel LAN 2.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Intel LAN2 Controller** is set to **[Enabled]**.

Intel LAN 2 PXE Option ROM

Allows you to enable or disable Intel LAN 2 PXE OPROM launch.
Configuration options: [Disabled] [Enabled]

Mini PCIe

PCIE Port

Allows you to enable or disable Wi-Fi Controller.
Configuration options: [Disabled] [Enabled]

USB Port

Allows you to enable or disable Bluetooth Controller.
Configuration options: [Disabled] [Enabled]

M.2 WiFi(E-Key)

Connectivity mode (Wi-Fi & Bluetooth)

Allows you to enable or disable the Wi-Fi and Bluetooth connectivity module.
Configuration options: [Disabled] [Enabled]

I2C1 Controller

Allows you to enable or disable SerialIO Controller. If a given device is Function 0 PSF disabling is skipped. PSF default will remain and device PCI CFG Space will still be visible. This is needed to allow PCI enumerator access functions above 0 in a multifunction device.
Configuration options: [Disabled] [Enabled]

IO Expander Configuration

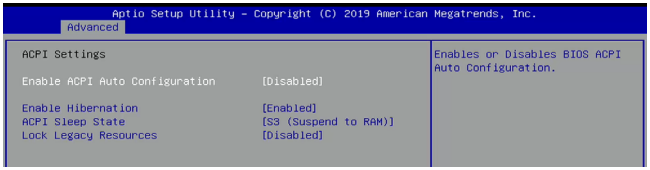
IO Expander GPIO 0-7

Direction

Allows you to select the direction of the GPIO.
Configuration options: [Output] [Input]

4.4.9 ACPI Settings

The items in this menu allow you to configure the system ACPI parameters.



Enable ACPI Auto Configuration

Allows you to enable or disable the BIOS ACPI Auto Configuration.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Enable ACPI Auto Configuration** is set to **[Disabled]**.

Enable Hibernation

Allows you to enable or disable the ability of the system to hibernate (OS/S4 Sleep State).
Configuration options: [Disabled] [Enabled]

IMPORTANT! This option may be not be effective with some OS.

ACPI Sleep State

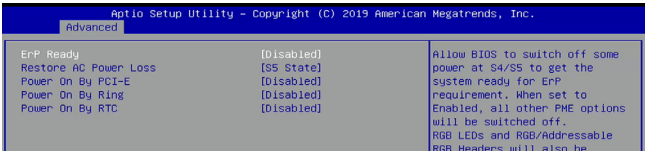
Allows you to select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
Configuration options: [Suspend Disabled] [S3 (Suspend to RAM)]

Lock Legacy Resources

Allows you to enable or disable the Lock of Legacy Resources.
Configuration options: [Disabled] [Enabled]

4.4.10 APM Configuration

Allows you to configure the Advance Power Management (APM) settings.



ErP Ready

Allows you to switch off some power at S4+S5 or S5 to get the system ready for ErP requirement. When set to **[Enabled]**, all other PME options will be switched off.
Configuration options: [Disabled] [Enabled(S4+S5] [Enabled(S5)]

Restore AC Power Loss

[S0] The system goes into ON state after an AC power loss.

[S5] The system goes into OFF state after an AC power loss.

[Last State] The system goes into either OFF or ON state, whatever the system state was before the AC power loss.

Power On By PCI-E

Allows you to enable or disable the wake-on-LAN function for the onboard LAN controller or other installed PCI-E LAN cards.
Configuration options: [Disabled] [Enabled]

Power On By Ring

[Disabled] Disables the Ring devices to generate a wake event.

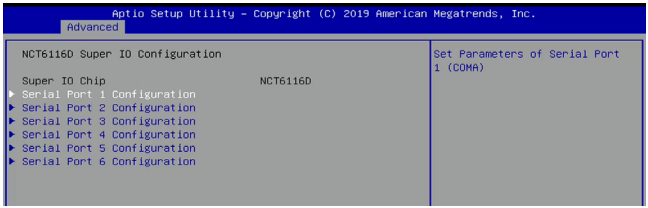
[Enabled] Enables the Ring devices to generate a wake event.

Power On By RTC

[Disabled] Disables RTC to generate a wake event.

[Enabled] When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/Minute/Second** will become user-configurable with set values.

4.4.11 NCT6116D Super IO Configuration



Serial Port 1-2 Configuration

Allows you to set the parameters of Serial Port 1-2.

Serial Port

Allows you to enable or disable Serial Port.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **Serial Port** is set to **[Enabled]**.

Mode Select

Configuration options: [RS232] [RS485] [RS422]

Change Settings

Allows you to choose the setting for Super IO device.
Configuration options: [Auto] [IO=3F8h; IRQ=4;] [IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

Serial Port 3-6 Configuration

Allows you to set the parameters of Serial Port 3-6.

Serial Port

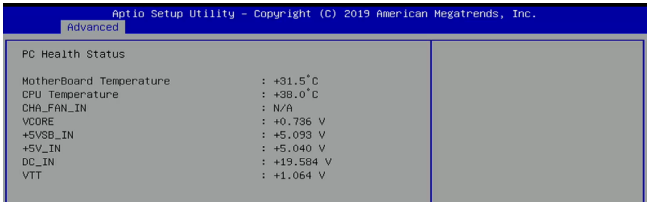
Allows you to enable or disable Serial Port.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **Serial Port** is set to **[Enabled]**.

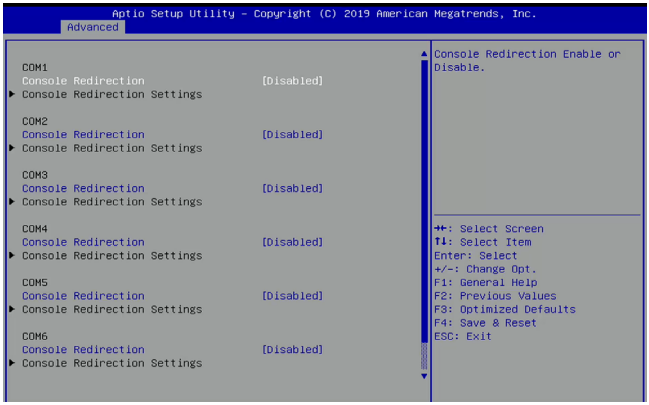
Change Settings

Allows you to choose the setting for Super IO device.
Configuration options: [Auto] [IO=3F8h; IRQ=4;] [IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

4.4.12 NCT6116D HW Monitor



4.4.13 Serial Port Console Redirection



COM1-6

Console Redirection

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

NOTE: The following item appears only when **Console Redirection** is set to **[Enabled]**.

Console Redirection Settings

This item becomes configurable only when you enable the **Console Redirection** item. The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Terminal Type

Allows you to set the terminal type.

[VT100]	ASCII char set.
[VT100+]	Extends VT100 to support color, function keys, etc.
[VT-UTF8]	Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
[ANSI]	Extended ASCII char set.

Bits per second

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds. Configuration options: [9600] [19200] [38400] [57600] [115200]

Data Bits

Configuration options: [7] [8]

Parity

A parity bit can be sent with the data bits to detect some transmission errors. **[Mark]** and **[Space]** parity do not allow for error detection.

[None]	None.
[Even]	parity bit is 0 if the num of 1's in the data bits is even.
[Odd]	parity bit is 0 if num of 1's in the data bits is odd.
[Mark]	parity bit is always 1.
[Space]	parity bit is always 0.

Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Configuration options: [1] [2]

Flow Control

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Configuration options: [None] [Hardware RTS/CTS]

VT-UTF8 Combo Key Support

Allows you to enable the VT-UTF8 Combo Key Support for ANSI/VT100 terminals.
Configuration options: [Disabled] [Enabled]

Recorder Mode

With this mode enabled only text will be sent. This is to capture Terminal data.
Configuration options: [Disabled] [Enabled]

Resolution 100x31

Allows you to enable or disable extended terminal resolution.
Configuration options: [Disabled] [Enabled]

Putty Keypad

This allows you to select the FunctionKey and Keypad on Putty.
Configuration options: [VT100] [Intel Linux] [XTERMR6] [SCO] [ESCN] [VT400]

Legacy Console Redirection Settings

Redirection COM Port

Allows you to select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
Configuration options: [COM1] [COM2] [COM3] [COM4] [COM5] [COM6]

Resolution

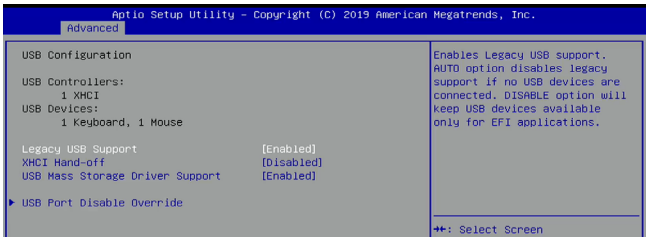
This allows you to set the number of rows and columns supported on the Legacy OS.
Configuration options: [80x24] [80x25]

Redirection After POST

This setting allows you to specify if Bootloader is selected than Legacy console redirection.

[Always Enable]	Legacy Console Redirection is enabled for Legacy OS.
[Bootloader]	Legacy Console Redirection is disabled before booting to Legacy OS.

4.4.14 USB Configuration



NOTE: The **USB Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

Legacy USB Support

[Disabled]	The USB devices can be used only for the BIOS setup program. It cannot be recognized in boot devices list.
[Enabled]	Enables the support for USB devices on legacy operating systems (OS).
[Auto]	Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

XHCI Hand-off

NOTE: This item is set to **[Disabled]** by default for the EHCI (enhanced host controller interface) support by XHCI drivers in operating systems.

[Disabled] Support XHCI by XHCI drivers for operating systems with XHCI support.

[Enabled] Support XHCI by BIOS for operating systems without XHCI support.

USB Mass Storage Driver Support

Allows you to enable or disable the USB Mass Storage driver support.
Configuration options: [Disabled] [Enabled]

USB Port Disable Override

Allows you to selectively enable or disable the corresponding USB port from reporting a Device connection to the controller.

U31G2_1-4

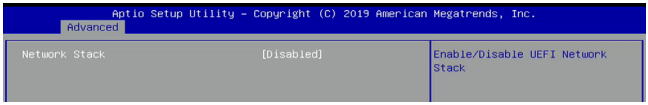
Allows you to enable or disable USB port. Once set to **[Disabled]**, any USB devices plugged into the connector will not be detected by BIOS or OS.
Configuration options: [Disabled] [Enabled]

U2_5-8

Allows you to enable or disable USB port. Once set to **[Disabled]**, any USB devices plugged into the connector will not be detected by BIOS or OS.
Configuration options: [Disabled] [Enabled]

4.4.15 Network Stack Configuration

Allows you to configure the network stack configuration.



Network Stack

Allows you to enable or disable UEFI Network Stack.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when **Network Stack** is set to **[Enabled]**.

Ipv4 PXE Support

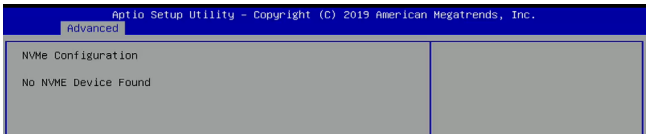
Enables or disables the Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
Configuration options: [Disabled] [Enabled]

Ipv6 PXE Support

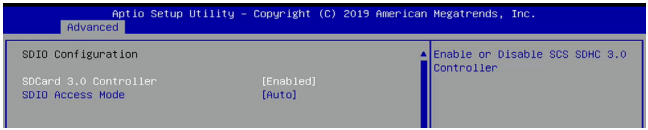
Enables or disables the Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created.
Configuration options: [Disabled] [Enabled]

4.4.16 NVMe Configuration

This menu displays the NVMe controller and Drive information of the connected devices.



4.4.17 SDIO Configuration



SDCard 3.0 Controller

This item allows you to enable or disable the SCS SDHC 3.0 Controller.
Configuration options: [Disabled] [Enabled]

SDIO Access Mode

[Auto] Access SD device in DMA mode if controller supports it, otherwise access SD device in PIO mode.

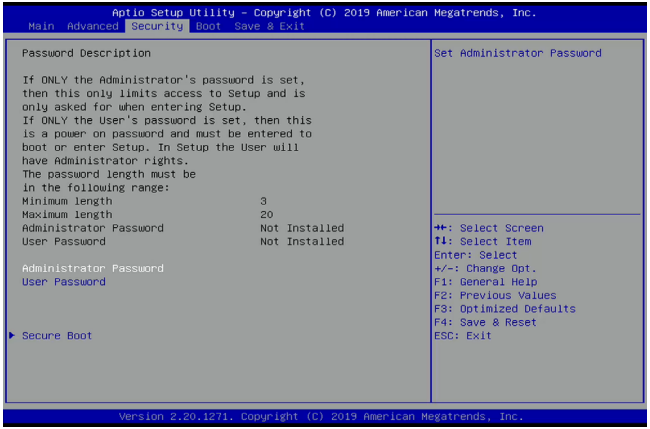
[ADMA] Access SD device in ADMA mode.

[SDMA] Access SD device in SDMA mode.

[PIO] Access SD device in PIO mode.

4.5 Security

This menu allows a new password to be created or a current password to be changed. The menu also enables or disables the Secure Boot state and lets the user configure the System Mode state.



Administrator Password

To set an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Create New Password box, key in a password, then press <Enter>.

3. Confirm the password when prompted.

To change an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

NOTE: To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password.

User Password

To set a user password:

1. Select the User Password item and press <Enter>.
2. From the Create New Password box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change a user password:

1. Select the User Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear a user password:

1. Select the Clear User Password item and press <Enter>.
2. Select Yes from the Warning message window then press <Enter>.

Secure Boot

Secure Boot can be enabled if the system is running in User mode with enrolled platform Key (EPK) or if the CSM function is disabled.
Configuration options: [Disabled] [Enabled]

Key Management

The Key Management item allows you to modify Secure Boot variables and set Key Management page.

Restore Factory Keys

Force System to User Mode. Configure NVRAM to contain OEM-defined factory default Secure Boot keys.

Reset to Setup Mode

Delete NVRAM content of all UEFI Secure Boot key databases.

Export Secure Boot Variables

Copy NVRAM content of source Boot variables to files in a root folder on a file system device.

Platform Key (PK)

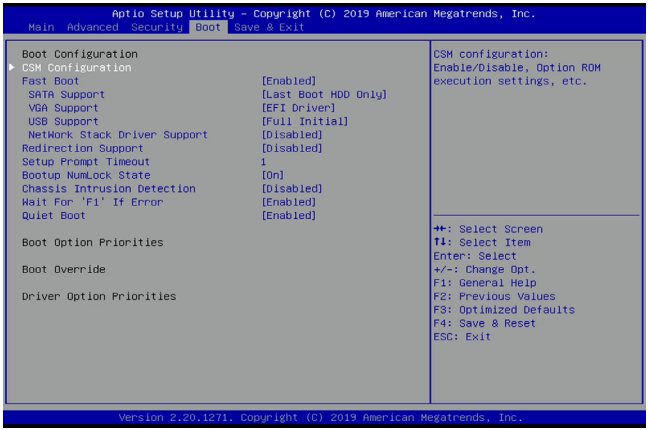
Configuration options: [Details] [Export] [Update] [Delete]

Key Exchange Keys / Authorized Signatures / Forbidden Signatures

Configuration options: [Details] [Export] [Update] [Append] [Delete]

4.6 Boot menu

The Boot menu items allow you to change the system boot options.



CSM Confiruration

NOTE: The options in this menu are only available if **Secure Boot** is set to **[Disabled]**.

CSM Support

This option allows you to enable or disable CSM Support.
Configuration options: [Disabled] [Enabled]

NOTE: The following items appear only when you set **CSM Support** to **[Enabled]**.

Boot Option filter

This option allows you to control the Legacy/UEFI ROMs priority.
Configuration options: [UEFI and Legacy] [Legacy only] [UEFI only]

Network / Storage / Video

This option allows you to control the execution of UEFI and Legacy PXE/ Storage/Video OpROM.
Configuration options: [Do not launch] [UEFI] [Legacy]

Other PCI devices

This item determines the OpROM execution policy for devices other than Network, Storage, or Video.
Configuration options: [Do not launch] [UEFI] [Legacy]

Fast Boot

[Disabled] Allows your system to go back to its normal boot speed.

[Enabled] Allows your system to accelerate the boot speed.

NOTE: The following items appear only when **Fast Boot** is set to **[Enabled]**.

SATA Support

[Last Boot SATA Devices Only] Only last boot SATA device will be available in POST.

[All SATA Devices] All SATA devices will be available in OS and POST.

VGA Support

[Auto] Only install the Legacy OpRom with Legacy OS and logo will not be shown during POST.

[EFI Driver] EFI driver will still be installed with the EFI OS.

USB Support

[Disabled] All USB devices will NOT be available until after OS boot.

[Full Initial] All USB devices will be available in OS and POST.

[Partial Initial] USB Mass Storage and specific USB port/device will NOT be available before OS boot.

Network Stack Driver Support

[Disabled] Network Stack Driver will be skipped.

[Enabled] Network Stack Driver will not be skipped.

Redirection Support

Allows you to enable or disable the Redirection function.
Configuration options: [Disabled] [Enabled]

Setup Prompt Timeout

Allows you to set the number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Configuration options: [1] - [65535]

Setup Prompt Timeout

Allows you to set the number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Configuration options: [1] - [65535]

Boot up NumLock State

[On] Set the power-on state of the NumLock to [On].

[Off] Set the power-on state of the NumLock to [Off].

Chassis Intrusion Detection

Allows you to enable or disable the chassis intrusion detection function.
Configuration options: [Disabled] [Enabled]

Wait For 'F1' If Error

Enable this item for the system to pause until the F1 key is pressed when any error occurs.
Configuration options: [Disabled] [Enabled]

Quiet Boot

Allows you to enable or disable the Quiet Boot option.
Configuration options: [Disabled] [Enabled]

Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.

NOTE:

- To access Windows® OS in Safe Mode, press <F8> after POST (Windows® 8 not supported).
- To select the boot device during system startup, press <F8> when the ASUS Logo appears.

Boot Override

These items displays the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

4.7 Save & Exit menu

The Save & Exit menu items allow you to save or discard your changes to the BIOS items.

NOTE: Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

Discard Changes and Exit

Exit System setup without saving any changes.

Save Changes and Reset

Exit System setup after saving the changes.

Restore Defaults

Restore/load default values for all the setup options.

4.8 Updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. **ASUS CrashFree BIOS**

   To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or gets corrupted.

2. **ASUS EzFlash**

   Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

4.8.1 ASUS CrashFree BIOS utility

The ASUS CrashFree BIOS is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

IMPORTANT! Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.
2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

WARNING! DO NOT shut down or reset the system while recovering the BIOS! Doing so would cause system boot failure!

NOTE: The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website at www.asus.com to download the latest BIOS file.

4.8.2 ASUS EzFlash Utility

The ASUS EzFlash Utility feature allows you to update the BIOS using a USB flash disk without having to use a DOS-based utility.

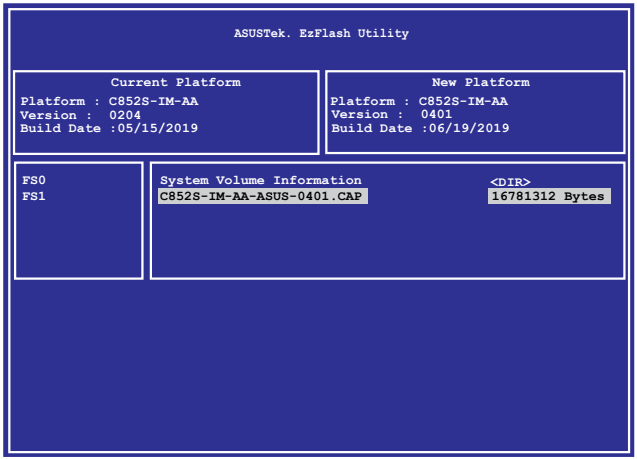
IMPORTANT! Download the latest BIOS from the ASUS website at www.asus.com before using this utility.

NOTE: The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

To update the BIOS using EzFlash Utility:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. Enter the BIOS setup program. Go to the **Advanced** menu to select **Start ASUS EzFlash** and press <Enter> to enable it.

WARNING! Ensure to back up your Bitlocker recovery key and suspend Bitlocker encryption in the operating system before updating your BIOS.



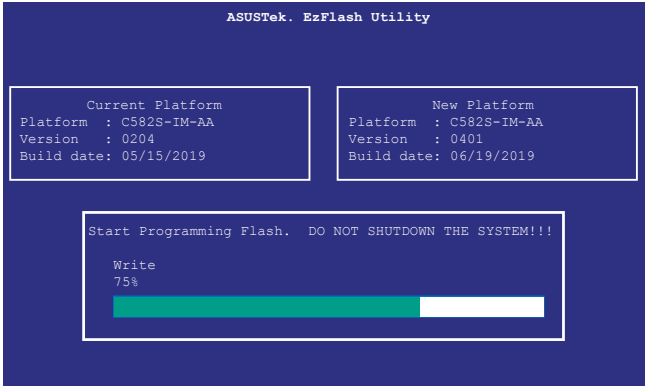
3. Press <Tab> to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS then press <Enter>.
5. Press <Tab> to switch to the **Folder** Info field.
6. Press the Up/Down arrow keys to find the BIOS file then press <Enter>.
7. Reboot the system when the update process is done.

WARNING

- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

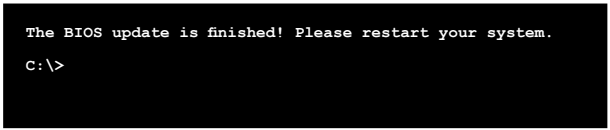
IMPORTANT! Ensure to load the BIOS default settings to ensure system compatibility and stability. Press <F5> and select Yes to load the BIOS default settings.

4. The utility verifies the file, then starts updating the BIOS file.



WARNING! DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

5. The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.



Appendix

Safety information

Your Single Board Computer is designed and tested to meet the latest standards of safety for information technology equipment. However, to ensure your safety, it is important that you read the following safety instructions.

Setting up your system

- Read and follow all instructions in the documentation before you operate your system.
- Do not use this product near water or a heated source.
- Set up the system on a stable surface.
- Peripherals with extended temperature tolerance (such as industrial grade DRAM, SSD, etc.) will allow this product to be used in environments with ambient temperatures between -20˚C and 60˚C, with a 0.1m/s air flow. If you plan to use a 2.5″ HDD with this product, please use this product in environments with ambient temperatures between 0˚C~45˚C, with a 0.1m/s air flow.
- The product should be used in environments with an ambient temperature of 45˚C when using the 65W adapter, whilst using HDD or SDD only and without the PoE module installed.
- If you use an extension cord, make sure that the total ampere rating of the devices plugged into the extension cord does not exceed its ampere rating.
- This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.
- Restricted Access Location:

  The equipment should only be installed in a Restricted Access Area where both these conditions apply:

  - access can only be gained by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and
  - access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.
- This device shall not be connected to an Ethernet network with outside plant routing.

Care during use

- Do not walk on the power cord or allow anything to rest on it.
- Do not spill water or any other liquids on your system.
- When the system is turned off, a small amount of electrical current still flows. Always unplug the power cord from the power outlets before cleaning the system.
- If you encounter the following technical problems with the product, unplug the power cord and contact a qualified service technician or your retailer.
  - The power cord or plug is damaged.
  - Liquid has been spilled into the system.
  - The system does not function properly even if you follow the operating instructions.
  - The system was dropped or the cabinet is damaged.
  - The system performance changes.

Lithium-Ion Battery Warning

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

NO DISASSEMBLY

The warranty does not apply to the products that have been disassembled by users

DO NOT throw the Single Board Computer in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical, electronic equipment, and mercury-containing button cell battery) should not be placed in municipal waste. Check local technical support services for product recycling.

Regulatory notices

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we publish the chemical substances in our products at ASUS REACH website at http://csr.asus.com/english/REACH.htm

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components, as well as the packaging materials. Please go to http://csr.asus.com/english/Takeback.htm for the detailed recycling information in different regions.

COATING NOTICE

IMPORTANT! To provide electrical insulation and maintain electrical safety, a coating is applied to insulate the device except on the areas where the I/O ports are located.

FCC RF Exposure Information

This device meets the government's requirements for exposure to radio waves. This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government. The exposure standard employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6 W/kg. Tests for SAR are conducted using standard operating positions accepted by the FCC with the EUT transmitting at the specified power level in different channels. The FCC has granted an Equipment Authorization for this device with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines. SAR information on this device is on file with the FCC and can be found under the Display Grant section of www.fcc.gov/oet/ea/fccid.

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

IMPORTANT! Outdoor operations in the 5.15~5.25 GHz band is prohibited. This device has no Ad-hoc capability for 5250~5350 and 5470~5725 MHz.

CAUTION! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ISED Radiation Exposure Statement for Canada

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. To maintain compliance with ISED RF exposure compliance requirements, please avoid direct contact to the transmitting antenna during transmitting. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Operation is subject to the following two conditions:

- This device may not cause interference and
- This device must accept any interference, including interference that may cause undesired operation of the device.

Compliance Statement of Innovation, Science and Economic Development Canada (ISED)

This device complies with Innovation, Science and Economic Development Canada licence exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES-003(A)/NMB-003(A)

Déclaration de conformité de Innovation, Sciences et Développement économique Canada (ISED)

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-003(A)/NMB-003(A)

Wireless Operation Channel for Different Domains

N. America	2.412-2.462 GHz	Ch01 through CH11
Japan	2.412-2.484 GHz	Ch01 through Ch14
Europe ETSI	2.412-2.472 GHz	Ch01 through Ch13

Regional notice for Singapore

Complies with IMDA Standards DB103778

This ASUS product complies with IMDA Standards.

Regional notice for Malaysia

MCMC
CIDF15000026

HDMI Trademark Notice

The terms HDMI, HDMI High-Definition Multimedia Interface, HDMI trade dress, and the HDMI Logos are trademarks or registered trademarks of HDMI Licensing Administrator, Inc.

ENERGY STAR® Qualified Product

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

All ASUS products with the ENERGY STAR® logo comply with the ENERGY STAR® standard, and the power management feature is enabled by default. The monitor is automatically set to sleep after 10 minutes of user inactivity; the computer is automatically set to sleep after 30 minutes of user inactivity. To wake your computer, click the mouse, press any key on the keyboard, or press the power button.

Please visit http://www.energystar.gov/powermanagement for detailed information on power management and its benefits to the environment. In addition, please visit http://www.energystar.gov for detailed information on the ENERGY STAR® joint program.

NOTE: ENERGY STAR® is NOT supported on FreeDOS and Linux-based operating systems.

Service and Support

Visit our multi-language website at https://www.asus.com/support.