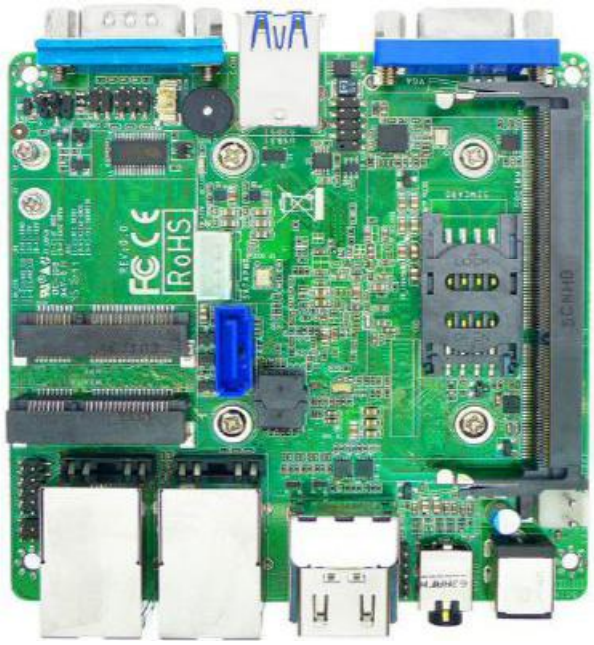
User Manual



APL-NUC-N3350

A NUC embedded solution on

Intel® Dual-core Processor

(Apollo Lake Family)

Version 1.0

Copyright

Trademarks Acknowledgement

Revision History

Revision	Date	Remark
1.0	June 3, 2019	First version release

Contents

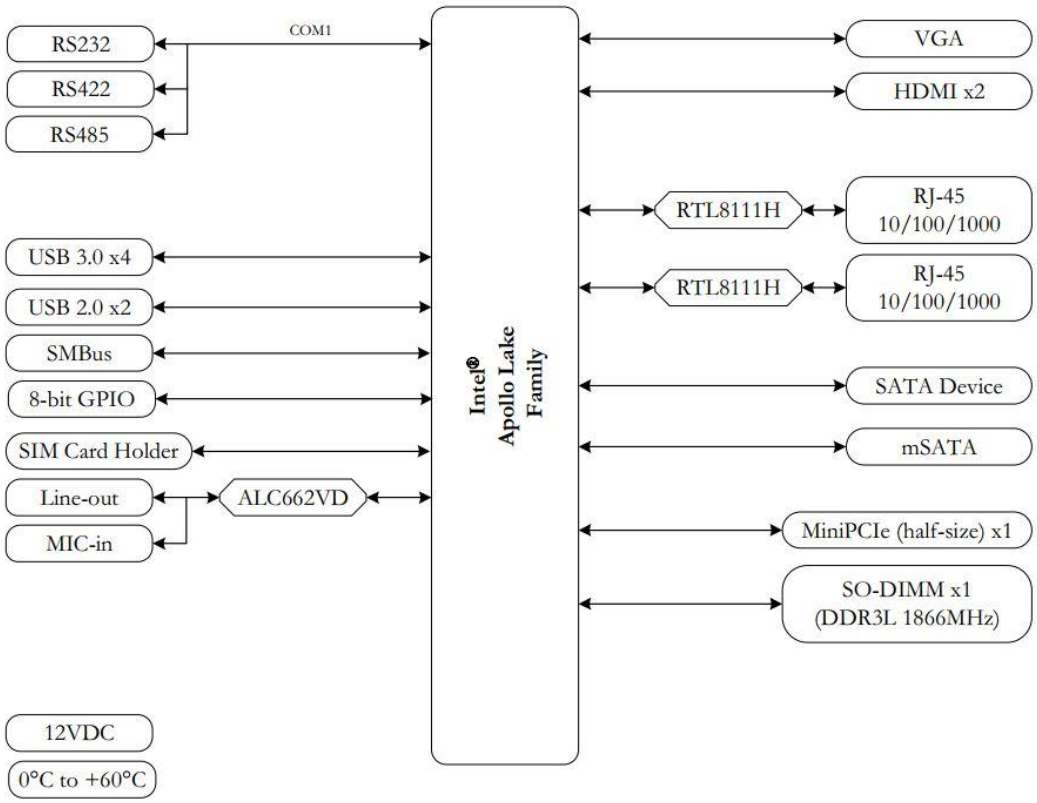
1 General Information

1.1 Overview

APL-NUC-N3350, a standard 3.5" embedded solution for industrial application based on Intel® Apollo Lake Dual-Core CPU with DDR3L RAM support up to 8GB, provides stable and powerful computing performance.

APL-NUC-N3350 supports 2x Gigabit LAN, 1x COM, 6x USB, SMBus, 8-bit GPIO, Audio, 1x MiniPCIe, SIM card holder, HDMI, VGA, and 2 storage options SATA interface and mSATA interface for development use.

1.2 Block diagram



1.3 Specifications

Processor	Intel® Apollo Lake N3350 2.40GHz (Burst) 1.10GHz Dual Core		
System Memory	DDR3L 1866MHz memory support up to 8GB in SO-DIMM slot x1		
BIOS	AMI BIOS		
Display	Intel® HD Graphics with MultiDisplay support HDMI : Maximum resolution support up to 3840 x 2160 @ 30Hz VGA: Maximum resolution support up to 1920 x 1200 @ 60Hz		
Audio	Realtek ALC662VD HD Audio		
LAN	Realtek 8111H Gigabit Ethernet Controller		
Expansion	MiniPCIe (half-size) x1		
Disk Support	mSATA x1	SATA interface x1	
I/O Interface	8-bit GPIO x1 SMBus x1 USB (ver. 3.0) x4	COM x1 SIM Card holder x1 VGA x1	HDMI x2 USB (ver. 2.0) x2
Connectors	4-pin wafer for SATA Power out x1 5-pin header for SMBux x1 7-pin SATA connector for SATA x1 9-pin D-sub connector for COM x1 10-pin header for 8-bit GPIO x1 15-pin D-sub connector for VGA x1 HDMI connector x2	MiniPCIe slot x1 MiniPCIe slot for mSATA x1 Power Jack for 12VDC input x1 Phone Jack for Line-out/MIC-in x1 RJ45 connector for GigaLan x2 SIM card holder x1 USB connector for USB3.0 x4	
Power Requirement	12VDC standard input from power jack or internal 2-pin power connector support for ATX/AT mode		
Operating Temp.	0°C to 60°C		
Dimensions	101.6 x 101.6 mm		
O/S Support	Windows 10	Linux	

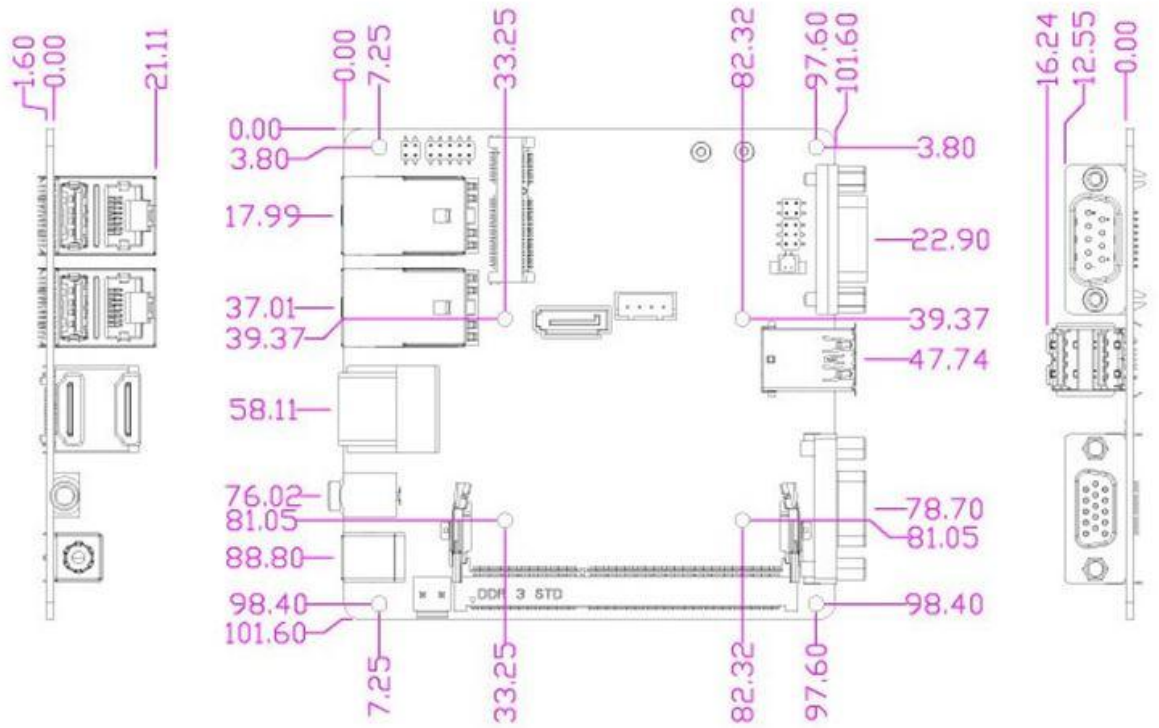
1.4 Ordering Information

1.4.1 APL-NUC-N3350

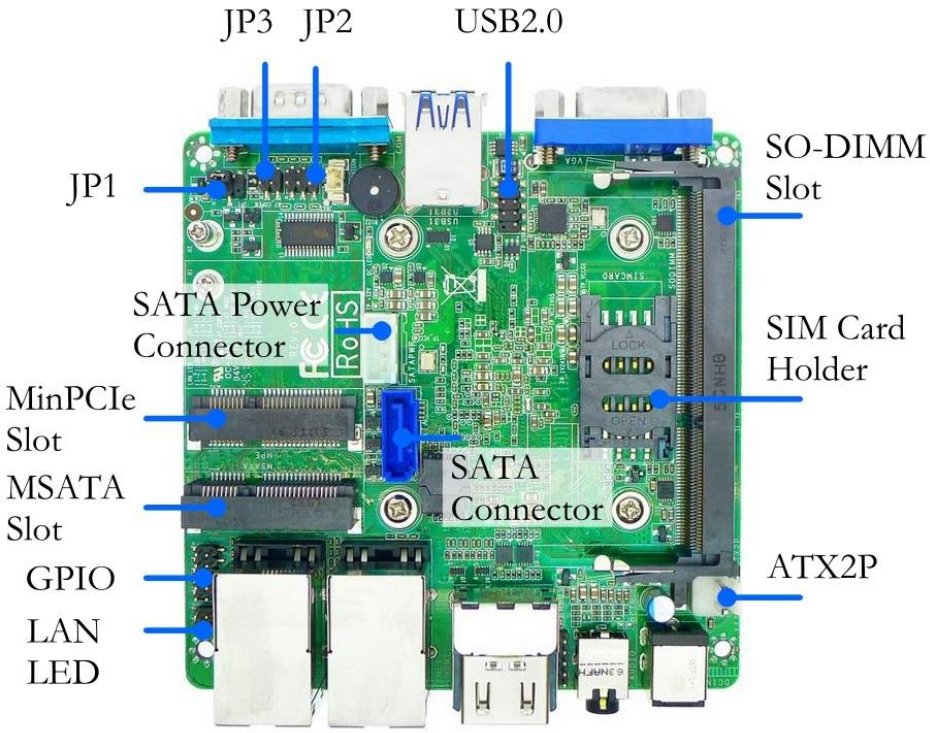
Product Name	APL-NUC-N3350
Processor	Intel® Apollo Lake N3350 2.40GHz (Burst) 1.10GHz Dual Core
System Memory	DDR3L 1866MHz memory support up to 8GB in SO-DIMM socket x1
Extension	MiniPCIe (half-size) x1
Disk Support	mSATA, SATA Drive
Display	VGAx 1, HDMI x2
Audio	Line-out/MIC-in
GigaLAN	2
COM	1 (RS232/422/485)
USB3.0	4
USB2.0	2
SMBus	1
8-bit GPIO	1
SIM Card Holder	Support

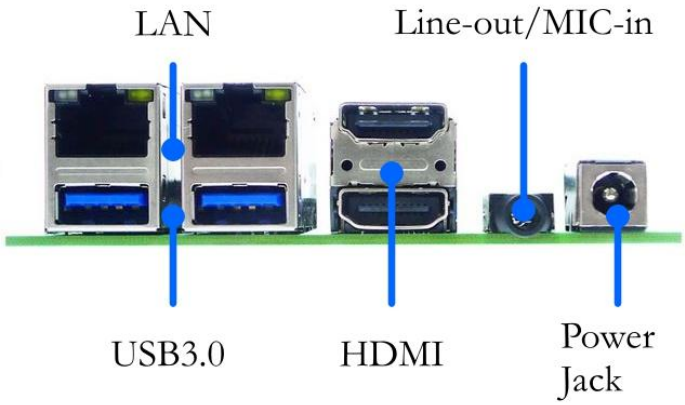
2 Hardware Information

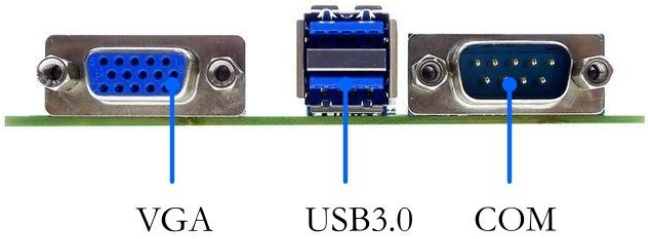
2.1 Dimension

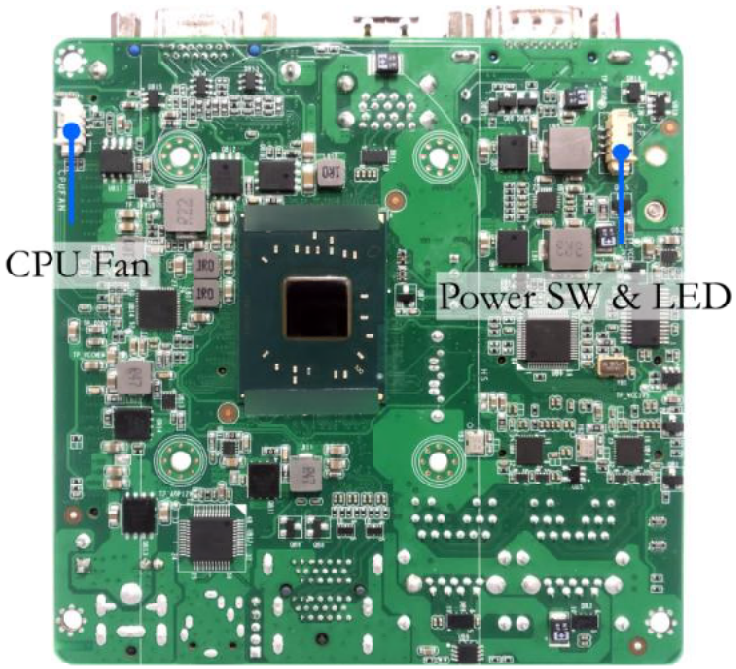


2.2 Board Outline






VGA
USB3.0
COM

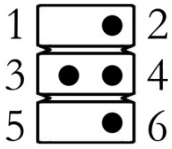

CPU Fan
Power SW & LED

2.3 Connector and Jumper Summary

Nbr.	Name	Type of Connections	Nbr of Pin
JP1	Function Select for Pin 9 on COM1	Function setting for Pin9 of COM1	4
JP2	Header for RTC, CMOS, and TXE Function	Function setting for RTC, CMOS, and TXE Function	6
JP3	Header for Case Open Message Display and AT Mode	Function setting for AT mode and Case Open Message Display	4
ATX2P	12VDC Power Input	2-pin header for 12VDC Power Input	2
---	SATA Connector	7-pin connector for SATA Device	7
---	SATA Power Connector	4-pin power connector for SATA Device	4
---	GPIO	Pin Header for GPIO	10
---	USB2.0	Pin Header for USB2.0 Device	9
---	SMBus	Pin Header for SMBus Device	5
---	LAN LED	Pin Header for LAN Activity LED	4
---	CPU Fan	Wafer for CPU Fan	3
---	Power SW & LED	Wafer for Power Switch and Power LED	4

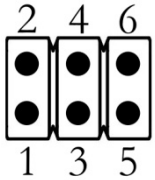
2.4 Pin Assignments & Jumper Settings

JP1: Function Select for Pin 9 on COM1



Pin	Status	Assignment
2 – 4	Closed	RS232
3 – 4	Closed	5V
4 – 6	Closed	12V

JP2: Header for RTC, CMOS, and TXE function

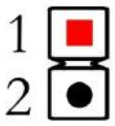


Pin	Status	Assignment
1 – 2	Closed	RTC Reset
3 – 4	Closed	Clear CMOS
5 – 6	Closed	TXE Override

JP3: Header for Case Open Message Display and AT Mode

Pin	Status	Assignment
1 – 2	Open	ATX Mode
1 – 2	Closed	AT Mode
3 – 4	Open	---
3 – 4	Closed	Case Open Message Display

ATX2P: 12VDC Power Input

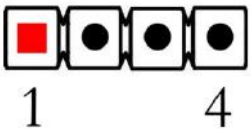


Pin	Assignment
1	+12V
2	GND

SATA Connector

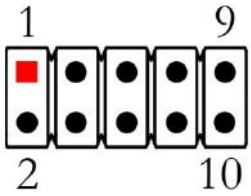
Pin	Assignment
1.	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SATA Power Connector



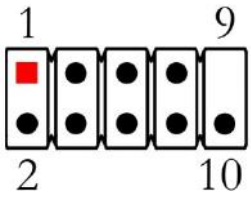
Pin	Assignment
1	+5V
2	GND
3	GND
4	+12V

GPIO Port Header



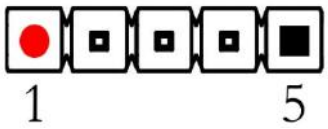
Pin	Assignment	Pin	Assignment
1.	GPIO20	2	GPIO21
3	GPIO22	4	GPIO23
5	GPIO24	6	GPIO25
7	GPIO26	8	GPIO27
9	GND	10	GND

USB2.0



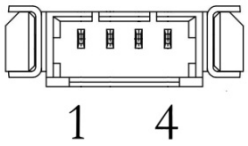
Pin	Assignment	Pin	Assignment
1.	VCC	2	VCC
3	DATA-	4	DATA-
5	DATA+	6	DATA+
7	GND	8	GND
9	---	10	NC

SMBus



Pin	Assignment
1	SMBUS_CLK
2	SMBUS_DATA
3	SMBUS_ALERT#
4	GND
5	3VSB

Power SW & LED

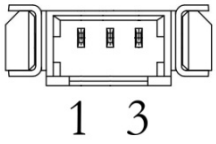


Pin	Assignment
1	VCC
2	GND
3	POWER_LED-
4	POWER_LED+

LAN LED

Pin	Assignment
1	LAN1_LED_VCC
2	LAN1_LED_ACT
3	LAN2_LED_VCC
4	LAN2_LED_ACT

CPU Fan



Pin	Assignment
1	VCC
2	GND
3	Fan Detect

3 BIOS

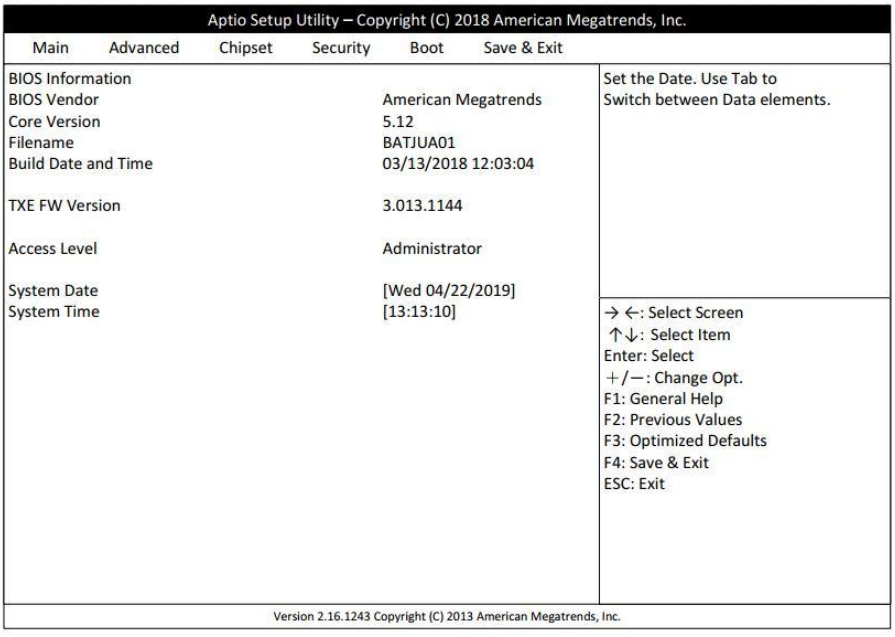
The AMI BIOS is preinstalled on APL-NUC-N3350 to bridge board computer and operating system and is stored in CMOS RAM for retaining BIOS configuration. Through AMI BIOS, user can modify basic system configuration for application requirement.

In this chapter, a brief BIOS introduction will be given to user who would to change BIOS configuration for application demand.

3.1 Entering BIOS Setup

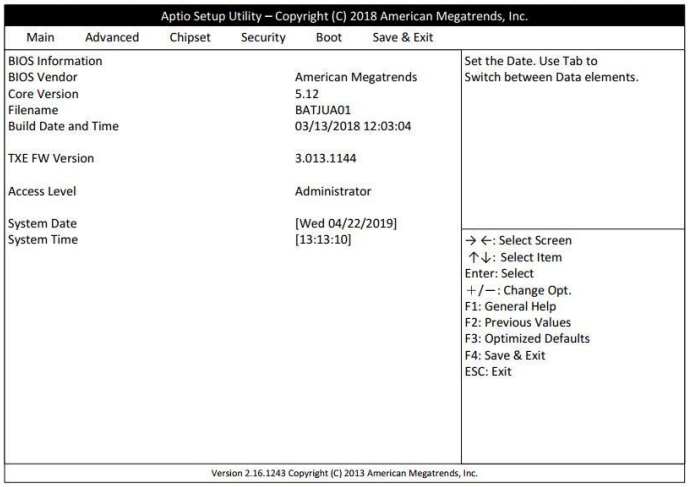
Press <Delete> key to enter BIOS Setup while the system is powering on. Once entering BIOS Setup, you will see an image as the following shown with six menu bars Main, Advance, Chipset, Boot, and Save & Exit at the top of BIOS menu.

Menu	To change basic system configuration
Advanced	To change advanced system configuration
Chipset	To change system chipset configuration
Security	Password setting
Boot	To change system boot setting
Save & Exit	To save configuration change or to reload default configuration setting



3.2 Main

To change basic system configuration with system date and time.
<Tab> key is used to switch between elements.

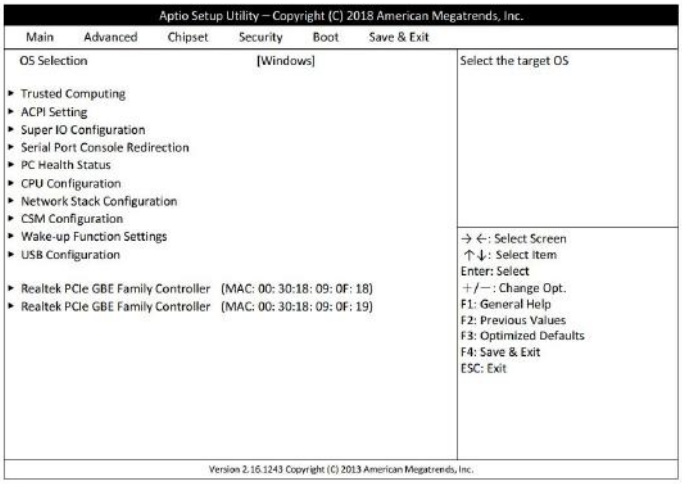


System Date Set the Date. Use Tab to switch between Date elements.

System Time Set the Time. Use Tab to switch between Time elements.

3.3 Advanced

To change advanced system I/O configuration



OS Selection Select the target OS

[Windows], [Intel Linux], [MSDOS] *Please be noted that OS mode should be matched to OS drivers you would like to install, otherwise issues will arise when installing drivers.

Trusted Computing Trusted Computing Settings

Security Device Support Enable or Disable BIOS support for security device. O.S. will not show Security Device TCG EFI protocol and INT1A interface will not be available

[Disabled], [Enabled]

SHA-1 PCR Bank Enable or Disable SHA-1 PCR Bank

[Disabled], [Enabled]

SHA256 PCR Bank Enable or Disable SHA256 PCR Bank

[Disabled], [Enabled]

ACPI Setting System ACPI Parameters

ACPI Sleep State Select the highest ACPI sleep stare the system will enter when the SUSPEND button is pressed

[S3 (Suspend to RAM)], [Suspend Disabled]

Super IO Configuration System IO Chip Parameters

Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA)
Serial Port	Enable or Disable Serial Port (COM)
[Disabled], [Enabled]	
Change Settings	Select an optimal settings for Support IO
[Auto], [IO=3F8h; IRQ=4],	Device
[IO=2F8h; IRQ=3],	
[IO=3E8h; IRQ=4],	
[IO=2E8h; IRQ=3]	
Transmission Mode Select	
[RS422], [RS232], [RS485]	
Mode Speed Select	RS232/RS422/RS485 Speed Select
[RS232/RS422/RS485=250Kbps]	
[RS232=1Mbps. RS422/RS485=10Mbps]	
Serial Port FIFO Mode	
[16-Byte FIFO], [32-Byte FIFO],	
[64-Byte FIFO], [128-Byte FIFO]	
ERP Support	Energy-Related Products function.
[Disabled], [Enabled]	Disable ERP to active all wake-up functions
Case Open Detect	Detect if case have even been opened. Show
[Disabled], [Enabled]	message in POST
WatchDog Reset Timer	Support WDT reset function
[Disabled], [Enabled]	
WatchDog Wake-up Timer	Support WDT Wake-up
[Disabled], [Enabled]	
Serial Port Console Redirection	Serial Port Console Redirection
Console Redirection	Console Redirection Enable or Disable
[Disabled], [Enabled]	
Console Redirection Settings	The settings specify how the host computer and the remote computer and the remote computer (which the user is using) will exchange date. Both computers should have the same or compatible settings.
Terminal Type	Emulation: ANSI: Extended ASCII char set.
[VT100], [VT100+],	VT100: ASCII char set. VT100+: Extends
[VT-UTF8], [ANSI]	VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map

	Unicode chars onto 1 or more bytes.
Bits per second *[9600], [19200], [38400], [57600], [115200]*	Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits *[7], [8]*	Data Bits
Parity *[None], [Even], [Odd], [Mark], [Space]*	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the date 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. Mark and Space Parity do not allow for error detection.
Stop Bits *[1], [2]*	Stop bits indicate the end of a serial date 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.
Flow Control *[None], [Hardware RTS/CTS]*	Flow control can prevent data loss from buffer overflow. When sending date, if the r receiving buffers are full, a 'stop' signal can be sent to stop the date 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.
VT-UTF8 Combo Key Support *[Disabled], [Enabled]*	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
Recorder Mode *[Disabled], [Enabled]*	With this mode enabled only test will be sent. This is to capture Terminal data.
Resolution 100x31 *[Disabled], [Enabled]*	Enables or disables extended terminal resolution
Legacy OS Redirection Resolution *[80x24], [80x25]*	On Legacy OS, the Number of Rows and Columns supported redirection.
Putty KeyPad *[VT100], [LINUX], [XTERM86], [SCO],*	Select Function Key and Key pad on Putty.

[ESCN], [VT400]	
Redirection After BIOS POST *[Always Enable], [Bootloader]*	The Settings specify if Bootloader is selected then Legacy console redirection is disabled before booting to Legacy OS. Default value is Always Enable with means Legacy console Redirection is enabled for Legacy OS.
Legacy Console Redirection Settings	Legacy Console Redirection Settings
Legacy Serial Redirection Port *[COM1]*	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages
Console Redirection *[Disabled], [Enabled]*	Console Redirection Enable or Disable
Console Redirection Settings	The settings specify how the how the host Computer and the remote computer (which the user is using) will exchange date. Both computers should have the same or compatible settings.
Terminal Type *[VT100], [VT100+], [VT-UTF8], [ANSI]*	VT-UTF8 is the preferred terminal type for out-of-band management, The next best choice is VT100+ and then VT100, See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.
Bits per second *[9600], [19200], [38400], [57600], [115200]*	Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Flow Control *[None], [Hardware RTS/CTS], [Software Xon/Xoff]*	Flow control can prevent data loss from buffer overflow. When sending date, if the r receiving buffers are full, a 'stop' signal can be sent to stop the date 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.
PC Health Status	Monitor hardware status
Serial Port 1 Configuration	
CPUFAN Smart Mode *[Disabled], [Enabled]*	
CPUFAN Full-Speed Temperature	

CPUFAN Full-Speed Duty
CPUFAN Idle-Speed Temperature
CPUFAN Idle-Speed Duty

CPU Configuration	CPU Configuration Parameters
VT-d	Enable/Disable CPU VT-d
[Disabled], [Enabled]	
EIST	Enable/Disable Intel SpeedStep
[Disabled], [Enabled]	
C-States	Enable/Disable C States
[Disabled], [Enabled]	
Enhanced C-States	Enable/Disable C1E. When enabled,
[Disabled], [Enabled]	CPU will switch to minimum speed when all cores enter C-State
Max Package C State	Controls the Max Package C State that
[PC2], [PC1], [C0]	the processor will support
Max Core C State	This option controls the Max core C State
[Fused Value], [Core C10], [Core C9], [Core C8], [Core C8], [Core C6], [Core C1], [Unlimited]	cores will support
Network Stack Configuration	Network Stack Settings
Network Stack	Enable/Disable UEFI Network Stack
[Disabled], [Enabled]	
CSM Configuration	CSM configuration: Enable/Disable, Option ROM execution settings, etc.
Boot Option Filter	This option controls Legacy/UEFI priority
[UEFI and Legacy], [Legacy Only] [UEFI Only]	
Network	Controls the execution of UEFI and
[Do not Launch], [UEFI], [Legacy]	Legacy PXE OpROM
Storage	Controls the execution of UEFI and
[Do not Launch], [UEFI], [Legacy]	Legacy Storage OpROM
Video	Controls the execution of UEFI and
[Do not Launch], [UEFI], [Legacy]	Legacy Videp OpROM
Other PCI Devices	Determines OpROM execution policy
[Do not Launch], [UEFI], [Legacy]	for devices other than Network, Storage, or

	Video
Wake-up Function Settings	
Wake-up System with Fixed Time *[Disabled], [Enabled]*	Enable or disable system wale-up by RTC alarm. When this function is enabled, system will wake on the timer (hr:min:sec) specified
Wake-up System with Dynamic Time *[Disabled], [Enabled]*	Enable or disable system wale-up by RTC alarm. When this function is enabled, system will wake on the (current time) + (Increase minute(s))
USB3.0 Wake-up from S4 *[Disabled], [Enabled]*	USB Wake-up is affected by ERP function in S4. Please disable ERP before activating this function in S4.
USB2.0 Wake-up from S4 *[Disabled], [Enabled]*	USB Wake-up is affected by ERP function in S4. Please disable ERP before activating this function in S4.
USB Configuration	USB Configuration Parameters
Legacy USB Support *[Disabled], [Enabled]. [Auto]*	Enables Legacy USB support. Auto option disables legacy support if no USB devices are connected. DISABLED option will keep USB devices available only for EFI applications.
XHCI Hand-off *[Disabled], [Enabled]*	This is a workaround for OSes without XHCI hand-off support The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support *[Disabled], [Enabled]*	Enable/Disable USB Mass Storage Driver Support
USB Transfer Time-out *[1 sec], [5 sec], [10 sec], [20 sec]*	The time-out value for Control, Bulk, and Interrupt transfers
Device Reset Time-out *[1 sec], [5 sec], [10 sec], [20 sec]*	USB mass storage device Start Unit command time-out
Device Power-up Delay *[Auto], [Manual]*	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a hub port the delay is taken from Hub descriptor.

Realtek PCIe GBE Family Controller (MAC:00:30:18:09:0F:18)

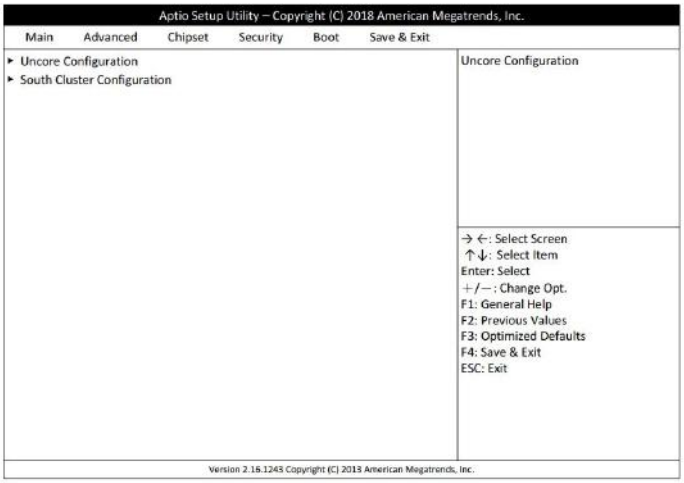
Get driver information and configure Realtek Ethernet controller parameter

Realtek PCIe GBE Family Controller (MAC:00:30:18:09:0F:18)

Get driver information and configure Realtek Ethernet controller parameter

3.4 Chipset

To change system I/O configuration based on North Bridge and South Bridge chipset



Uncore Configruation — Uncore Configuration

GTT Size — Select the GTT Size
[2MB], [4MB] , [8MB]

DMT Pre-Allocated — Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device
[64MB], [96MB], [128MB], [160MB], [192MB], [224MB], [256MB], [288MB], [320MB], [352MB], [384MB], [416MB], [448MB], [480MB], [512MB]

DVMT Total Gfx Memory — Select DVMT 5.0 Total Graphic Memory Size used by the Internal Graphics Device
[128M], [256M], [MAX]

Primary IGFX Boot Display — Select the Video Device wich will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported inly on primary display.
[Auto], [CRT], [HDMI1], [HDMI2]

Secondary IGFX Boot Display — Select Secondary Display Device
[Auto], [CRT], [HDMI1], [HDMI2]

South Cluster Configuration — South Cluster Configuration

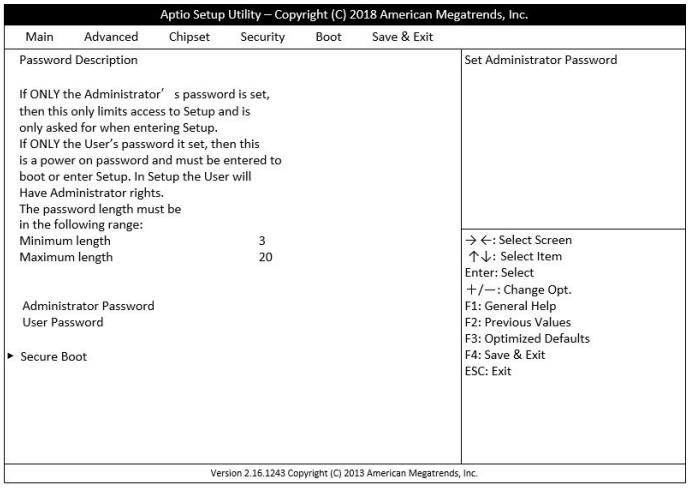
PCI Express Configuration — PCI Express Configuration Settings

Peer Memory Write Enable — Peer Memory Write Enable/Disable
[Disabled], [Enabled]

Compliance Mode *[Disabled], [Enabled]*	Compliance Mode Enable/Disable
Onboard PCIE LAN1 *[Disabled], [Enabled]*	
Onboard PCIE LAN2 *[Disabled], [Enabled]*	
SATA Configuration	Press <Enter> to select the SATA Device Configuration Setup options
SATA Controller *[Disabled], [Enabled]*	Enables or Disables the Chipset SATA Controller. The Chipset SATA controller supports the 2 black internal SATA ports (up to 3Gb/s supported per port)
SATA Mode Selection *[AHCI]*	Determines how SATA controller(s) operate
SATA Port *[Disabled], [Enabled]*	Enable or Disable SATA Port
mSATA *[Disabled], [Enabled]*	Enable or Disable SATA Port
HD-Audio Support *[Disabled], [Enabled]*	Enable/Disable HD-Audio Support
System Sate after Power Failure *[Always On], [Always Off], [Former State]*	Specify what state to go to when power is re-applied after a power failure

3.5 Security

Password setting for system security



Administrator Password Set Administrator Password

User Password Set User Password

Secure Boot Customizable Secure Boot Settings

Secure Boot Control Secure Boot can be enabled if

1. System running in User mode with enrolled Platform Key (PK)
2. CSM function is disabled

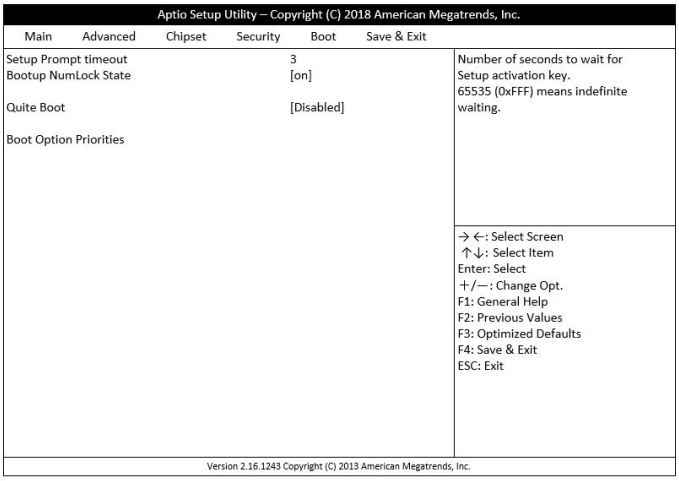
[Disabled], [Enabled]

Secure Boot Mode Secure Boot Mode – Custom & Standard, Set UEFI Secure Boot Mode to STANDARD mode or CUSTOM mode, this change is effect after save. And after reset, the mode will return to STANDARD mode

[Standard], [Custom]

3.6 Boot

To change system boot setting



Setup Prompt Timeout
[2]

Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.

Bootup NumLock State
[On], [Off]

Select the keyboard NumLock state

Quiet Boot
[Disabled], [Enabled]

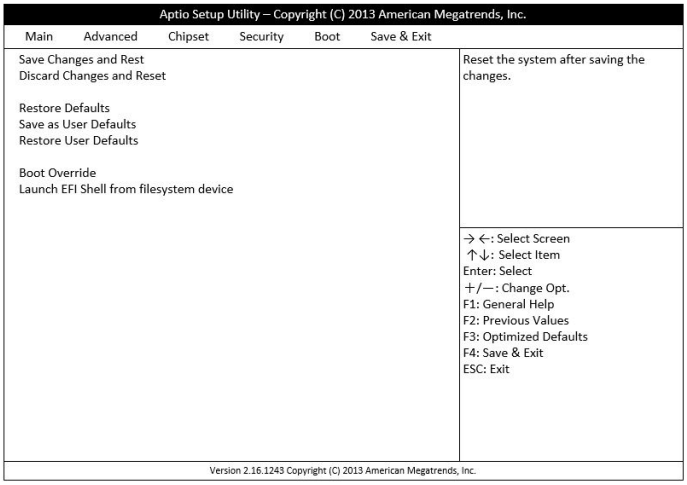
Enables or disables Quiet Boot option

Boot Option #1
[UEFI: Built-in EFI Shell], [Disabled]

Set the system boot order

3.7 Save & Exit

To save configuration change or to reload default configuration setting



Save Changes and Reset Reset the system after saving the changes.

Discard Changes and Reset Reset the system setup without saving any changes.

Restore Defaults Reset/Load Default values for all the setup options

Save as User Defaults Save the changes done so far as User Defaults

Restore as User Defaults Restore the User Defaults to all the setup options

UEFI: Built-in EFT Shell

Launch EFT Shell from filesystem device

Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices

Technical Support Directly from ICOP

To offer you more accurate and specific solutions for the technical situations you have, please prepare the information below before contacting ICOP:

—Product name and serial number

—Description of the H/W environment (i.e.: working temperature, I/O board information, information of connection between main board and IO boards, and/or other devices, etc)

—Description of the S/W environment (i.e: operating system, version, application software, and/or other related information, etc.)

—A detailed description and photos of the technical situation

—Any complement or technical situations you want ICOP more focusing on

User Manual Feedback

To make this user manual more complete, if you have any comments or feedbacks to this manual, please feel free to write to info@icop.com.tw or contact your ICOP sales representative.

Warranty

This product is warranted to be in good working order for a period of one year (12 months) from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it without additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise is accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description. Should you have questions about warranty and RMA service, please contact us directly.

ICOP Technology Inc.
Address: No. 15 Wugong 5th Road, Xinzhuang Dist.
New Taipei City, Taiwan (R.O.C.) 24890
TEL: +886-2-8990-1933
FAX: +886-2-8990-2045
Mail: info@icop.com.tw
Website: http://www.icop.com.tw