

# USER MANUAL

REVISION 0.1

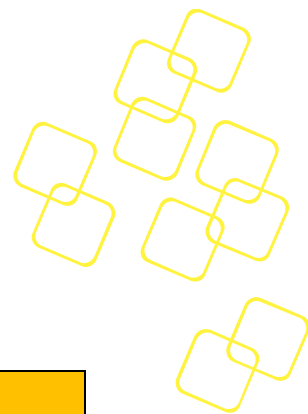
DATE 2016/10/30

## FWA-5020

### 1U HIGH-END NETWORK APPLIANCE

### BASED ON INTEL® XEON® E5-2600 V4 PROCESSORS





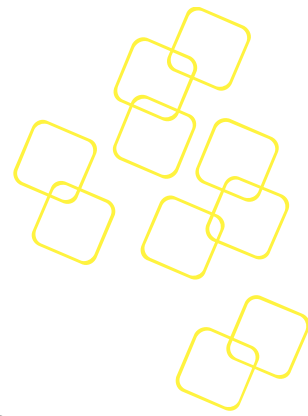
## Revision History

<b>Date [mm/dd/yyyy]</b>	<b>Revision</b>	<b>Modifications</b>
10/01/2016	0.1	Initial version draft

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## About this manual

Thank you for purchasing and using the Advantech FWA-5020.

The target audience of this manual includes users, administrators and technicians. This publication is a useful reference when installing, configuring, operating and managing the FWA-5020.

This manual is organized as follows:

- Section 1: Getting Started helps you with the first steps with the FWA-5020.
- Section 2: Product Specification provides a detailed description of the FWA-5020 and its features.
- Section 3: Configuration and Service describes how to change the FWA-5020's configuration or how to install and service replaceable items.
- Section 4: Tips, Tricks and Troubleshooting provides best practices and other information that may be helpful for operation and troubleshooting of the FWA-5020
- Appendices provide supplemental information referenced in the other sections of this document.

## Useful documents

If you cannot find the information you're looking for or need more detailed information on a specific topic, please refer to the list of additional documents and other sources of information below. Please contact your Advantech representative if you need help on obtaining these documents or still can't find what you're looking for.

- Advanced LAN Bypass User Manual
- Advantech IPMI User Manual
- Information on intel CPUs, Chipsets and NIC silicon can be found at [www.intel.com](http://www.intel.com)
- FWA-5020 Reference Platform Software User's Guide (for samples only)

## Warnings, Cautions and Notes



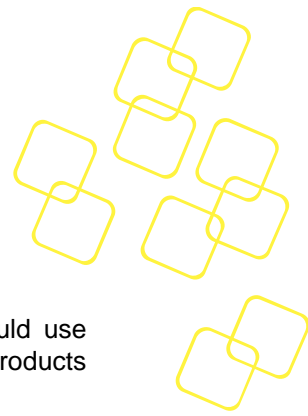
**Warning!** Warnings indicate conditions, which, if not observed, can cause personal injury.



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



**Note!** Notes provide additional information.



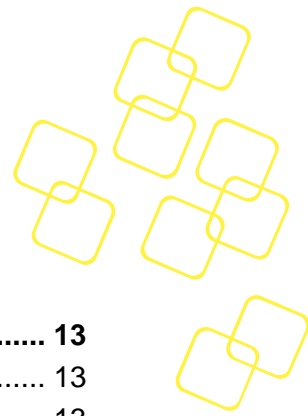
## We appreciate your input

Please let us know of any aspect of this product, including the manual, which could use improvement or correction. We appreciate your valuable input in helping make our products and documentation better.

Please send all such - in writing to: [ncg@advantech.com](mailto:ncg@advantech.com)

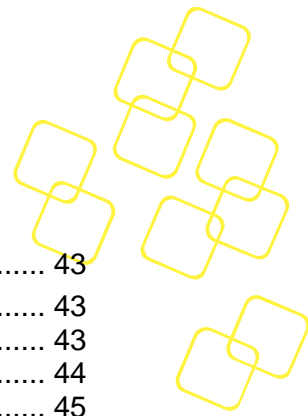
## Acknowledgements

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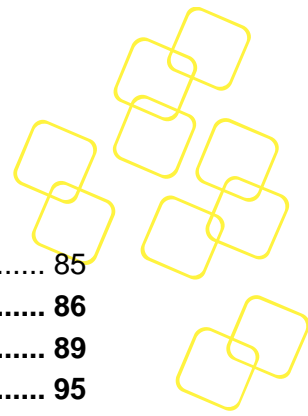


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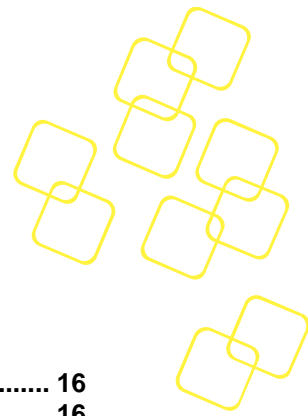
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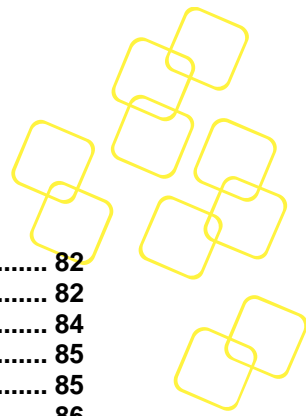
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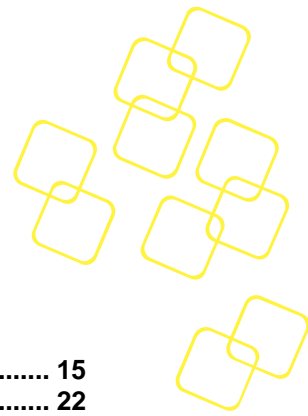
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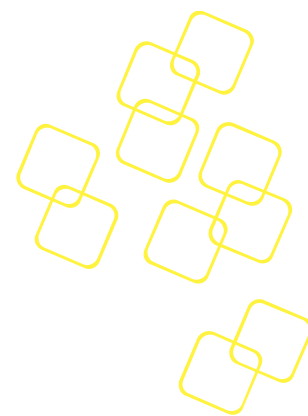


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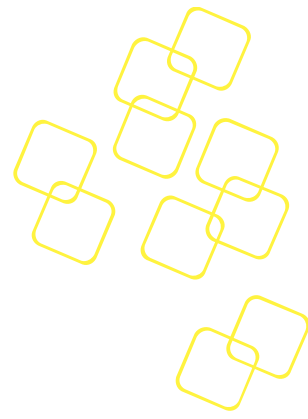
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## Glossary

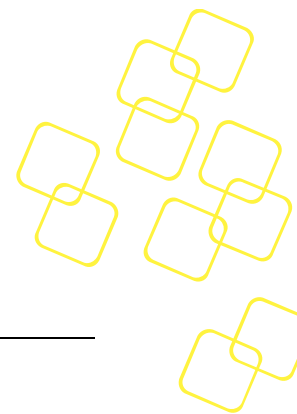
ACPI                                      Advanced Configuration and Power Interface



AHCI	Advanced Host Controller Interface
APIC	Advanced Programmable Interrupt Controller
BIOS	Basic Input Output System
BMC	Baseboard Management Controller
CPU	Central Processing Unit
EHCI	Enhanced Host Controller Interface
FRU	Field Replaceable Unit
FW	Firmware
GbE	Gigabit Ethernet
HPM	Hardware Platform Management
HWM	Hardware Monitor (chip)
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
LOM	Lights Out Management
MAC	Media Access Control
MTBF	Mean Time Between Failures
NIC	Network Interface Controller
NMC	Network Mezzanine Card
NVRAM	Non-volatile Random Access Memory
OOS	Out Of Service
PCH	Platform Controllers Hub
PCIe	PCI Express
PECI	Platform Environment Control Interface
PCI SIG	PCI Special Interest Group
PICMG	PCI Industrial Computer Manufacturers Group
POST	Power On Self Test
PSU	Power Supply Unit
PXE	Pre-boot Execution Environment
QAT	QuickAssist Technology
QPI	QuickPath Interconnect
RASUM	Reliability, Availability, Serviceability, Usability, Maintainability
RDIMM	Registered DIMM
RMCP	Remote Management Control Protocol
RX	Receive
SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface



SDR	Sensor Data Record
SerDes	Serializer/Deserializer
SOL	Serial Over LAN
SSD	Solid State Disk
SW	Software
TPM	Trusted Platform Module
TX	Transmit
UDIMM	Unbuffered DIMM
UHCI	Universal Host Controller Interface
USB	Universal Serial Bus



## 1. GETTING STARTED

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### 1.1 Safety Instructions

This section provides warnings that precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed during all phases of operation, service, and repair of this equipment. You should also employ all other safety precautions necessary for the operation of the equipment in your operating environment. If you are not sure about the precautions applicable to your operating environment, please contact your company's safety administrator. For basic information you may also refer to the safety precautions per IEC704-1 listed below although Advantech disclaims all responsibility for the accuracy of any statements contained therein and its applicability for your specific environment.

Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

Advantech intends to provide all necessary information to install and handle the FWA-5020 in this manual. Because of the complexity of this product and its various uses, we do not guarantee that the given information is complete. If you need additional information, contact your Advantech representative.

The product has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area as specified in section 2.3.

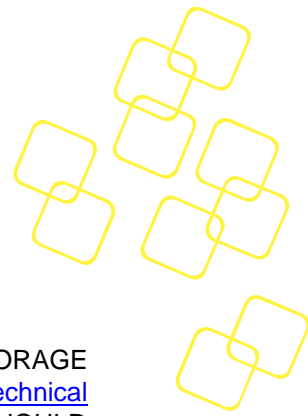
Only personnel trained by Advantech or persons qualified in electronics or electrical engineering are authorized to install, service or maintain the product. The information given in this manual is meant to complete the knowledge of a specialist and must not be used as replacement for qualified personnel. Operating personnel must not remove equipment covers. Only factory authorized service personnel or other qualified service personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment.

Do not install substitute parts or perform any unauthorized modification of the equipment or the warranty may be voided. Contact your local Advantech representative for service and repair to make sure that all safety features are maintained.

#### 1.1.1 Safety Precautions per IEC704-1

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Keep this equipment away from humidity.
4. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
5. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
6. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
7. All cautions and warnings on the equipment should be noted.
8. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.
9. Never pour any liquid into an opening. This may cause fire or electrical shock.
10. For safety reasons, the equipment should be opened only by qualified service personnel.
11. If one of the following situations arises, get the equipment checked by service personnel:
12. The power cord or plug is damaged.
13. Liquid has penetrated into the equipment.
14. The equipment has been exposed to moisture.





15. The equipment does not work well, or you cannot get it to work according
16. The equipment has been dropped and damaged.
17. The equipment has obvious signs of breakage.
18. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BEYOND THE RANGE SPECIFIED IN [Technical Specifications](#). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
19. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
20. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: The set of instructions is given according to IEC704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

### 1.1.2 Safety Precautions - Static Electricity

Follow instructions below to protect yourself from harm and the products from damage:

1. Be sure you are at an ESD workstation, or grounded with an ESD strap before opening the top cover or installing/removing any unit accessible from the outside. Doing so will discharge any static electricity that might have built up in your body.
2. Don't touch any components inside the system while the system is on.
3. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.
4. When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in the unit.
5. When transporting any electrical component, first place it in an antistatic container or packaging.



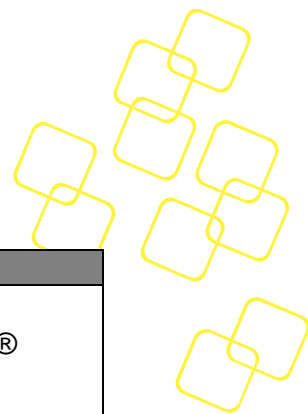
## 1.2 Unpacking







**Please check the delivery for completeness as you open the carton carefully. If any of the items listed in Table 1 is missing or damaged, please contact your Advantech representative.**

When opening the box, you will find the FWA-5020 embedded in protective foam and the accessory box embedded to the foam. Remove the accessory box first and then pull out the unit including the protective foam using both hands. Now, remove the foam and the plastic sleeve on the unit.

After unpacking the unit, please check for any visible damage of the unit and contact your Advantech representative in case of any issue.

Please note that unless agreed otherwise power cords need to be ordered separately. Please refer to section 2.6 for ordering information.



Item	Qty.	Image	Description
Network Appliance FWA-5020	1		1U High end Network Appliance based on Intel® Xeon-EP processors
Heatsink	1/2		-1 CPU SKU with 1 heatsink -2 CPU SKU with 2 heatsink
Accessory box	1		Accessory box for FWA-5020
	1		Console cable-Adapter cable RJ45 to DB9 2m for RS232.
	2		Rack-mount ear
	1		Screw Set(4pcs) for FWA-5020 Rack-mount kit

**Table 1: Packaging List**

### 1.3 Installation and Configuration

The FWA-5020 comes as a pre-configured system with CPUs, memory and peripherals installed in the unit. In the rare case that you procured a barebone system or need to install components in the FWA-5020 for any other reason, please refer to section 3.



### 1.3.1 Rack Mounting

The FWA-5020 appliance is designed to be installed in a standard 19-inch rack. Please follow the basic guidelines below for rack mounting:

1. Mount the mounting ears on the each side of the unit using the screws included.
  - 1) Locate the threaded mount holes on the chassis on the side, close to the front panel

2.



**Figure 1 : Mounting ear thread holes**

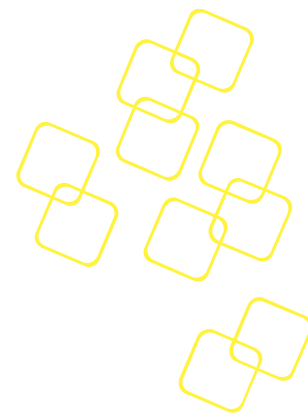
- 1) Place the mounting ear over the holes and insert the three screws. Do not tighten the screws immediately.



**Figure 2: Mounting ear screws inserted but not fastened yet**

- 2) After all screws have been inserted, hand tightened them using a PH2 screw driver to ensure secure installation.
3. Ensure the rack is adequate for the unit (weight) and the application.
4. Use the mounting hardware recommended by the rack manufacturer to mount the unit in the rack. Four mounting screws, compatible with the rack design, must be used and hand tightened to ensure secure installation
5. While Advantech does not supply support brackets, slide rails are available for separate order. Please refer to [section 2.6](#) for options.
6. Choose a mounting location where all four mounting holes line up with those of the mounting bars of the 19-inch cabinet.
7. Choose a mounting location that does not block any air inlet and air outlet areas of the unit, It is also recommended to factor in heat generated by adjacent equipment and to avoid exposure to direct sunlight when mounting the unit. If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum recommended ambient temperature per [section 2.3](#).
8. Route cables away from power lines, fluorescent lighting fixtures and sources of noise. Make sure that cables do not block air inlet and outlet areas.





9. Reliable grounding of rack-mounted equipment must be maintained.

### 1.3.2 Powering On

Before connecting the FWA-5020 to the power outlet, please make sure that the power rating of the outlet and the FWA-5020's PSU match. Please also make sure that the primary circuit and all power distribution is not overloaded. Inrush current and steady state power specifications for the FWA-5020 can be found in [appendix C](#) as well as the type label on the bottom of the unit.

Connect the power cord to the PSU module and then to the power outlet. The System has a DC on/off button next to the power connector.

The unit will automatically power on after power is supplied and push the DC on/off button to on position one times. The green LED on the front panel should be lit as the unit is under power.

Please refer to [section 2.4](#) for the location of front and rear panel elements.

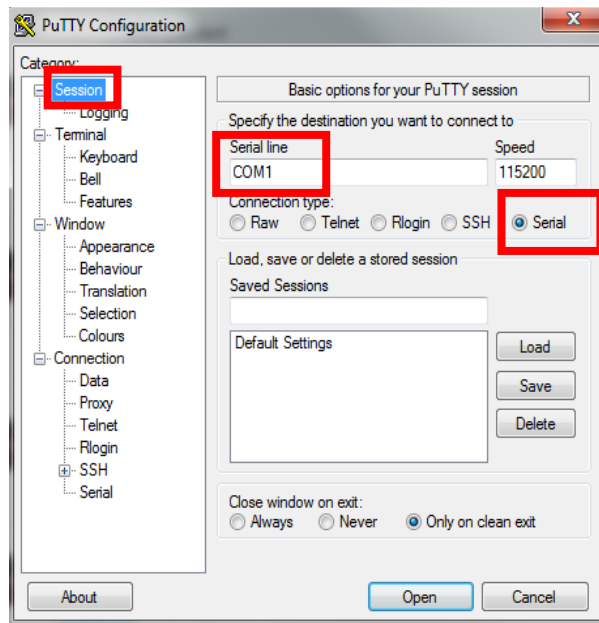
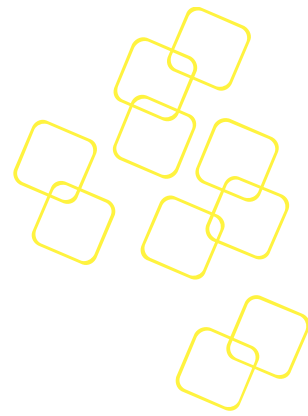
### 1.3.3 Connecting to the Console

FWA-5020 does not provide an interface for an external monitor in the standard configuration. BIOS output as well as OS output are provided via a serial terminal connection by default.

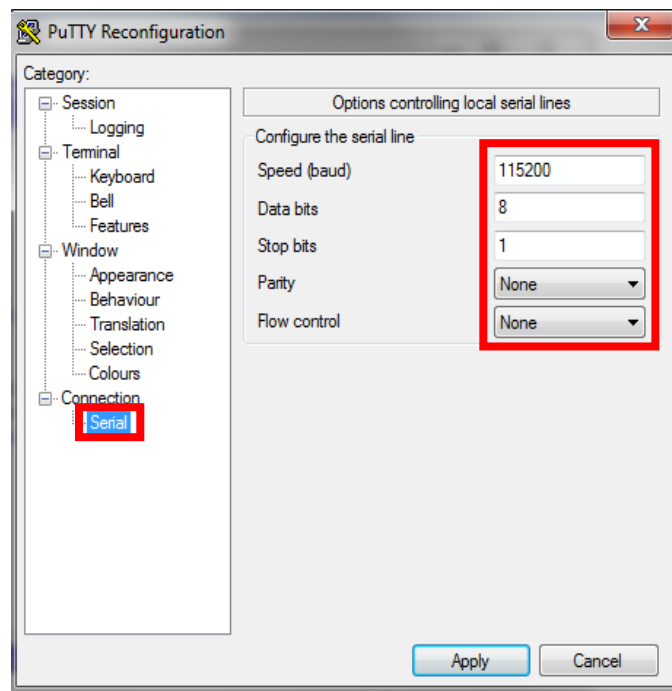
The remainder of this section describes how to configure PuTTY on a Windows platform for connection with the FWA-5020 serial console as a reference. Other terminal programs may be used in a similar way as well.

Open up PuTTY and begin the configuration as shown below. Please use the actual COM port's number on the client machine instead of "COM1".

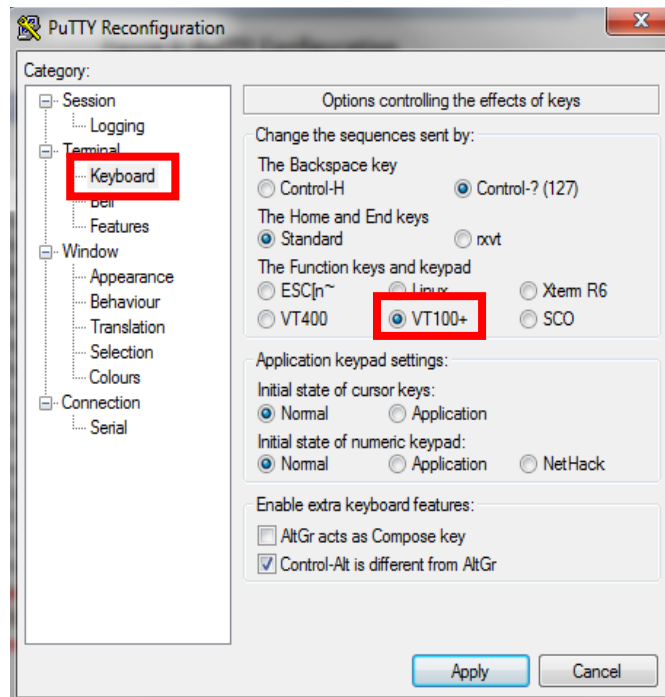
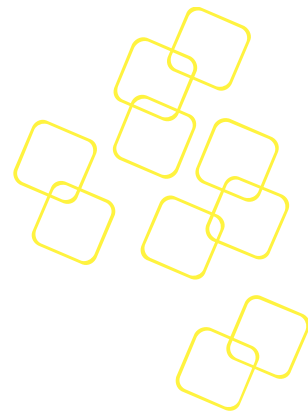
- Specify "COM1" under serial line and "115200" for speed, no parity, no flow control.
- Check Serial for connection type.
- Check "VT100+" for keypad in the keyboard submenu
- Check "Colour" or "Both" for "Indicate bolded text" in the colours submenu
- Click the "Open" button and a PuTTY terminal screen will appear.



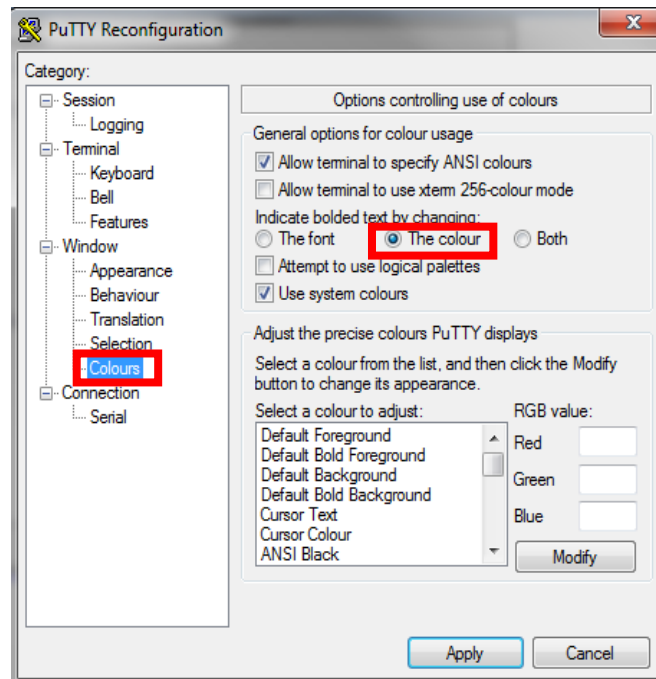
**Figure 3: PuTTY Session Configuration**



**Figure 4: PuTTY Serial Configuration**

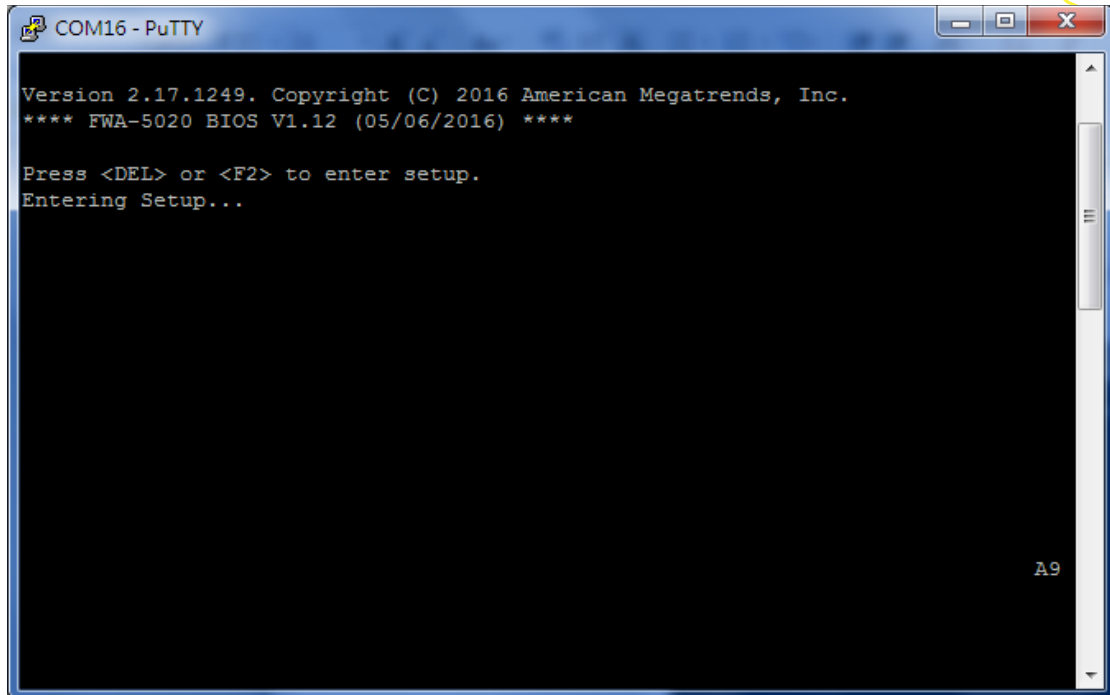


**Figure 5: PuTTY Keyboard Settings**



**Figure 6: PuTTY Colour Settings**

If the connection is successful you should be able to see the BIOS Power On (POST) screen after powering the unit:



**Figure 7: BIOS POST screen (example)**

Please note that the BIOS is doing some initial start up work while the console is still not active. It may take a while until the BIOS POST screen appears. On the other hand, the BIOS has been optimized for minimum boot time. The BIOS will move through POST quickly and immediately try to boot an OS according to the selected boot options in the BIOS:

In case you would extend the time the BIOS displays the POST screen and waits for a key press to enter the setup menu, you can do so via the BIOS setup menu. Please refer to [section 3.2](#) for details.

### 1.3.4 Installing an OS

Several options are available for OS installation:

- System comes with a preinstalled OS
- Install an image from a USB key
- Install an OS via network boot.

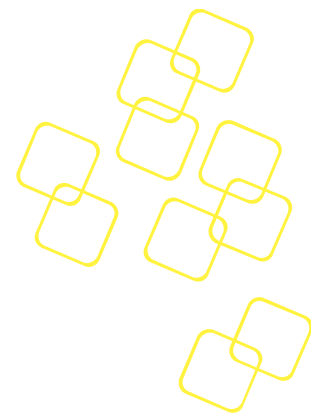
If you use Advantech's services to pre-install an OS, you can skip the following section.

#### 1.3.4.1 Pre-Installed reference OS

If you receive this manual along with a sample unit, the system will have a reference OS installed by default. The unit will be ready to boot the reference OS from the mass storage option selected.

#### 1.3.4.2 Installing and/or boot an OS from a USB key

To install an OS via USB and/or boot the appliance from an USB stick, please make sure the following BIOS options are configured properly:



Advanced Setup: USB Configuration: Mass Storage Driver = Enabled

To boot from a USB stick:

- 1) Create a Live USB stick using LiLi (available via <http://www.linuxliveusb.com/>) or a similar tool. Please make sure to configure the Linux for the operation with a serial console (115200bd, 8N1, no handshake). Enabling serial support in the Linux bootloader (grub or similar) as well as kernel debug messages via serial console may be valuable for potential troubleshooting.
- 2) Install the USB stick in one of the front ports. Make sure you have a serial console connection established via tools such as PuTTY as described earlier.
- 3) Power on the appliance.
- 4) The boot priority in the FWA-5020's BIOS is giving SATA devices higher priority than USB devices. This is a safety measure to avoid that any end user can tamper the unit when installed in the field with a bootable USB stick. So, in order to boot from the USB stick, you need to enter BIOS setup.

In BIOS setup menu, move to the "Boot" menu. You can either give the USB stick higher boot priority over SATA devices. Alternatively, you can select the USB stick in the "Boot Override" Menu. Boot Override will modify the boot order for a single boot process only and will automatically revert back to the original boot priority.

After making these changes leave the Setup Menu via "Save&Exit".

This will restart the appliance and it will boot from the USB stick.

#### **1.3.4.3 Installing an OS via network boot**

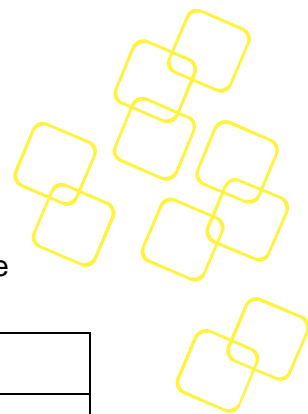
To install an OS via network, basically works the same way as booting an OS via USB stick described above.

The main difference is that instead of a Linux live image you need to install a network installer / a network installable image on the USB key. Network Installers or network installable iso images are available for most Linux distributions such as RedHat, Debian, Ubuntu and CentOS. For detailed information, please refer to the documentation of the related network installer and / or Linux distribution.

Please make sure you configure the network installer image properly for the Ethernet port / device of the FWA-5020 that you plan to sue for the installation.

#### **1.3.4.4 Booting an OS via network boot**

The FWA-5020 supports booting over network via PXE.



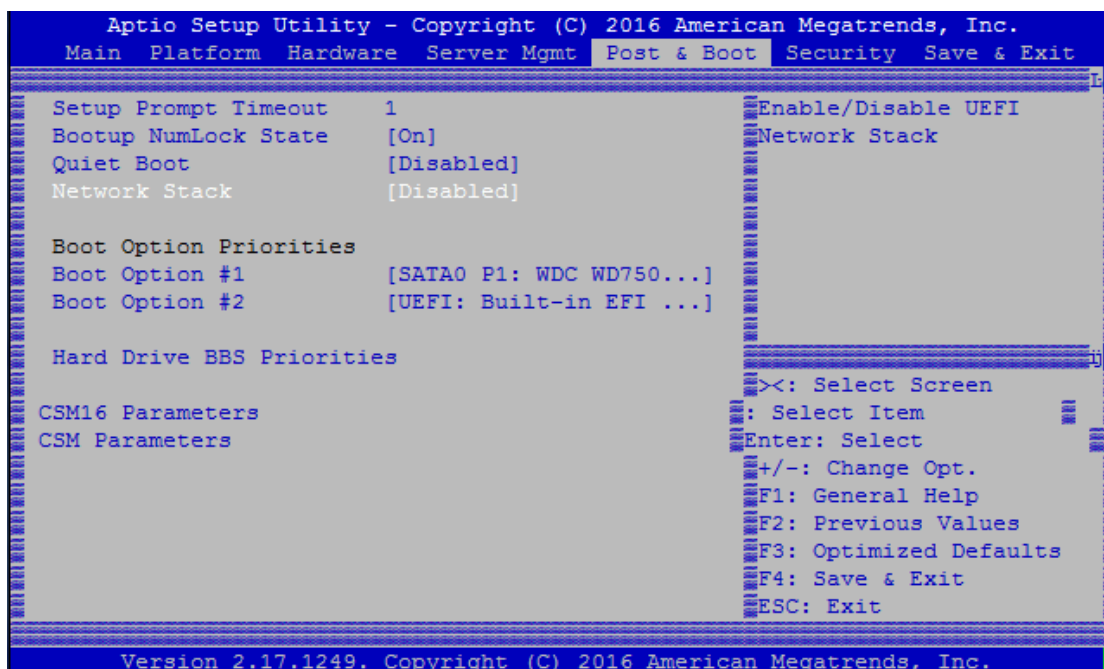
To boot an OS via network, please make sure the following BIOS options In the Advanced: Network Stack Configuration Menu are configured properly:

Network Stack	Enabled	Enables the UEFI Network Stack.
IPv4 PXE Support	Enabled Disabled	Enabled if PXE booting in an IPv4 network; disabled otherwise

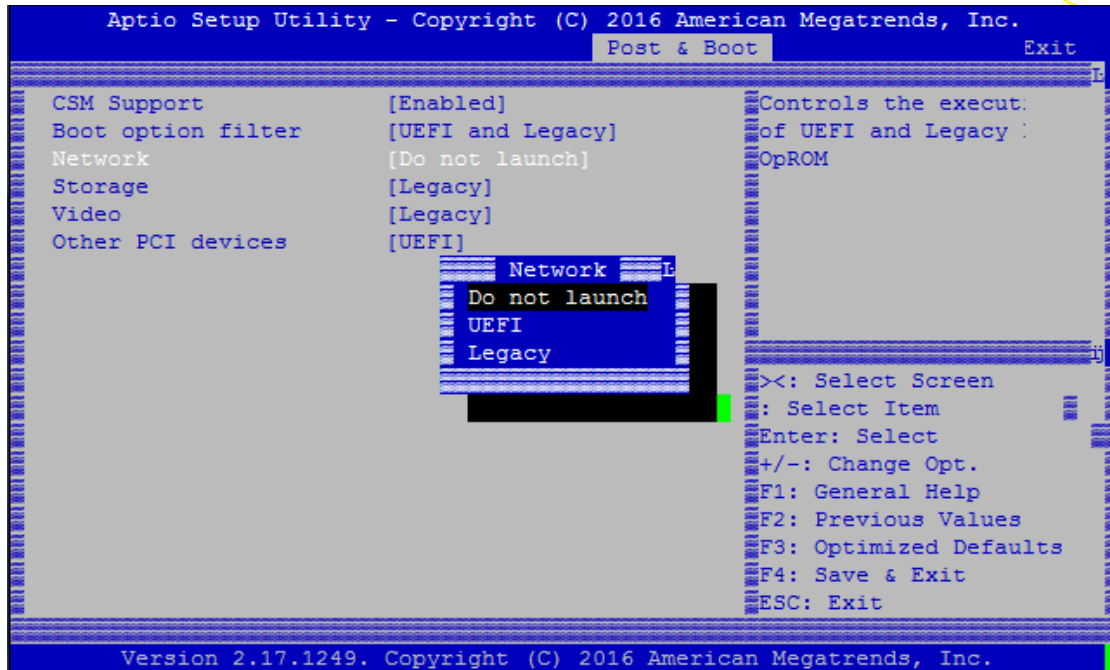
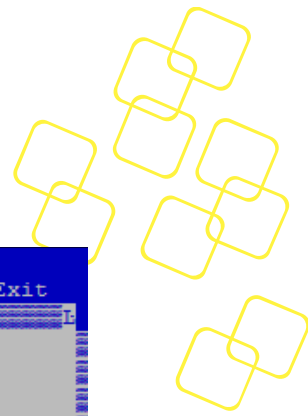
**Table 2: PXE BIOS Options**

Below are the steps to enable PXE boot.

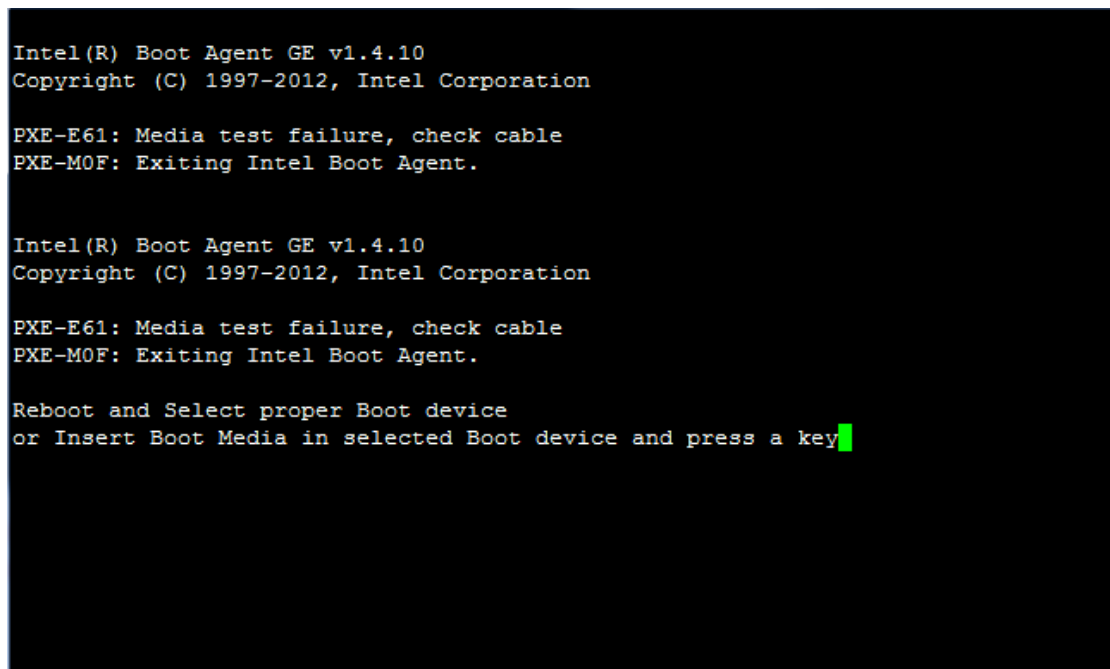
1. It needs to set BIOS/ Advanced-> Network Stack Configuration-> Network Stack as enabled (default setting is disabled)



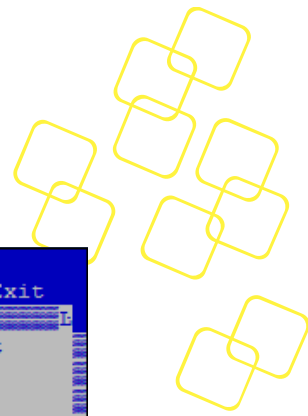
2. When set Network Stack is enabled, and then go to item of “ BIOS/ Advanced-> CSM Parameters -> Network” to enable PXE ROM function, set it as “Legacy” (IPV4 PXE) function .



3. Save BIOS and reboot system. The BIOS will show “Checking Media Presence.....”, if system is not connected PXE server, it will show “PXE-E61: Media test failure, check cable & PXE-MOF: Exiting Intel Boot Agent”



4. User may re-login in BIOS, choose BIOS/ boot item, it will has “Network Device BBS Priorities” item and set UEFI PXE LAN boot sequence priority.



```

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Main Platform Hardware Server Mgmt Post & Boot Security Save & Exit

Setup Prompt Timeout      1                Sets the system boot
Bootup NumLock State      [On]              order
Quiet Boot                [Disabled]
Network Stack             [Disabled]

Boot Option Priorities
Boot Option #1            [SATA0 P1: WDC WD750...]
Boot Option #2            [IBA GE Slot 0A00 v1410]
Boot Option #3            [UEFI: Built-in EFI ...]

Hard Drive BBS Priorities
Network Device BBS Priorities

CSM16 Parameters
CSM Parameters

><: Select Screen
: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
    
```

5. And please choose PXE Boot priority as “IBA GE Slot 0A00 v110” it is on board Mgmt GbE port.

```

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Post & Boot

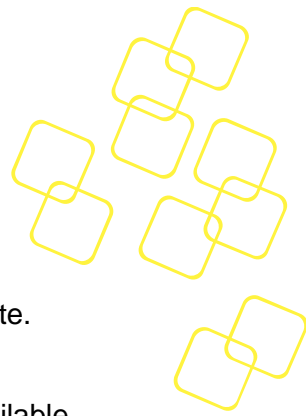
Boot Option #1            [IBA GE Slot 0A00 v1410] Sets the system boot
Boot Option #2            [IBA GE Slot 0B00 v1410] order

><: Select Screen
: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
    
```

PXE boot usually does not allow for OS installation over network as the PXE client will only load a single file from the boot server. Similarly, booting Linux over network is usually a two stage process. In the first step, a boot loader such a grub or mini OS such as SysLinux are loaded via PXE from the boot server. The boot loader or miniOS then load the actual target OS which usually consists of multiple files which decompressed and installed into a RAM disk. The detailed process and required configuration of such network install will heavily depend on the target OS and boot loader / miniOS used. Please refer to the related documentation available.





PXE boot requires a DHCP server and a TFTP server in the network to complete. DHCP Server and TFTP server are commonly run on the same machine and collectively referred to as “boot server”. Setting up such a boot server implies a couple of steps. How-to guides for setting up Linux as PXE boot server are available on the internet, e.g. [https://www.debian-administration.org/article/478/Setting up a server for PXE network booting](https://www.debian-administration.org/article/478/Setting_up_a_server_for_PXE_network_booting).

Please note that it is recommended to setup a separate network / subnet for network booting as the DHCP required for PXE booting may conflict with existing DHCP servers in your network.

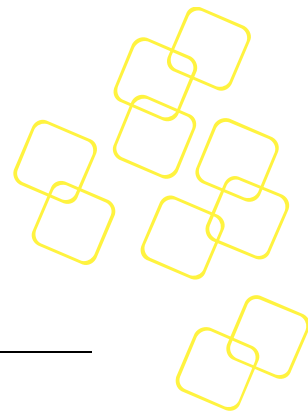


The PXE client in the FWA-5020 sends the system’s GUID as part of the DHCP Request. Some boot servers have mechanisms to automatically configure the target OS image based on the client system’s GUID. Using this mechanism allows to use the same boot server for network booting of different devices / appliances.

## 1.4 Getting Help: Technical Support and Assistance

In case the unit you received is a sample for evaluation, please contact your Advantech representative. For production units, please follow the process below:

1. Visit the Advantech web site at [www.advantech.com/support](http://www.advantech.com/support) to find the latest information about the FWA-5020 and related products.
2. Contact your distributor, sales representative, or Advantech’s customer service center for technical support if you need additional assistance. Worldwide contact information can be found on [www.advantech.com](http://www.advantech.com).
3. Please have the following information ready before you call / be sure to include this information in your email:
  - ◆ Product name and serial number
  - ◆ Description of your peripheral attachments
  - ◆ Description of firmware and software versions installed on the product
  - ◆ A complete description of the problem
  - ◆ The exact wording of any error messages
4. In case the unit needs to be send back for repair, please refer to **appendix E** for instructions.



## 2. PRODUCT SPECIFICATION

---

### 2.1 Overview

Based on the latest Intel® Xeon® processor platform, the FWA-5020 is a high-end 1U network appliance designed for maximum performance, scalability and functionality. One or two Intel® Xeon E5-2600 v4 processors (Broadwell-EP) provide the latest architectural enhancements, larger on chip cache memories as well as Intel® QuickPath Interconnects, running at up to 9.6GT/s for reduced cross-socket memory I/O latencies and increased throughput.

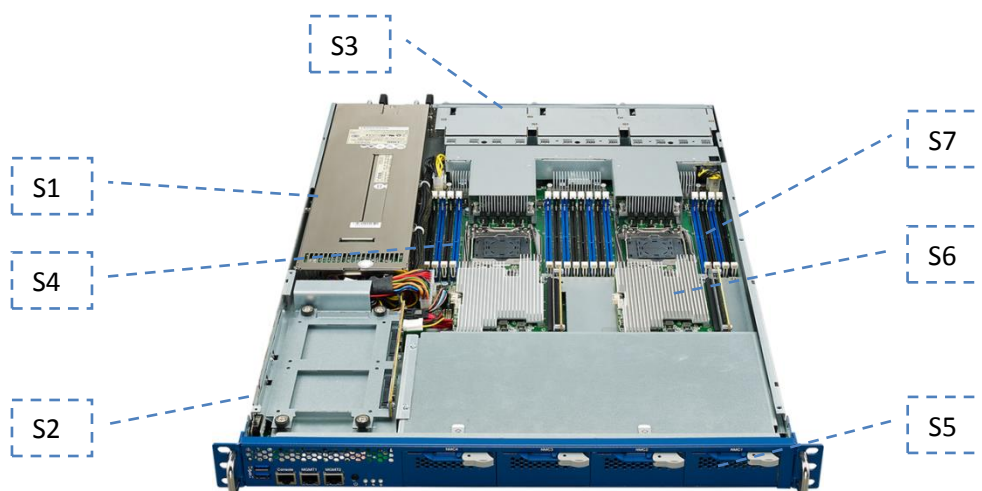
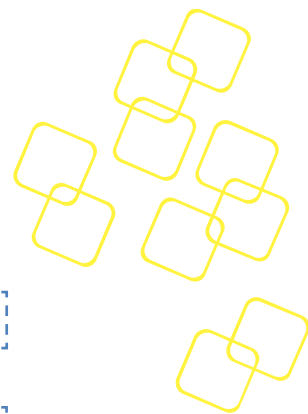
Each socket supports 4 DDR4 channels with speeds up to 2400 MHz for up to 512GB of ECC memory when using the latest RDIMM technology. Advanced RAS modes such as mirroring and sparing increase platform reliability. Advanced thermal system design enables support for processors with up to 145W on Standard SKUs. This allows the appliance to scale from mainstream 12 and 14 core CPUs to the highest performance 18 core processors available today.

The FWA-5020 integrates up to 4 GbE copper ports with advanced LAN bypass and two 10GbE SFP+ ports. Up to 4 Mezzanine Cards (NMC) slots provide an option to add configurable networking I/O including a broad choice of GbE, 10GbE and 40GbE modules.

Advanced Lights Out Management based on Aspeed's latest iBMC AST2400 and AMI's MegaRAC IPMI suite improves system manageability and reliability, providing platform thermal management, H/W monitoring and supervision. Remote firmware upgrade capability and hardware-based BIOS redundancy make the FWA-5020 an ideal 1U platform for mission critical and highly available networks

Front and rear hot swappable FRUs such as power and fan modules along with service friendly design features such as fan failure LEDs further help to reduce system down time and enhance serviceability. Management and IO elements include two management Ethernet ports, a console port, two USB 3.0 ports, a LCD module, LEDs for power/locate/alert indication and two front-loadable 2.5" SATA HDDs/SSDs.

The system is FCC,CE, CB,UL,CCC and RoHS compliant.



**Figure 8: System Overview (FWA-5020U-D0A1R)**

Component	Qty.	Description
S1	1	650w Redundant PSU
S2	1	2x 2.5" SSD/HDD bracket
S3	3	Rear system cooling fan module
S4	1	NAMB-5020 Motherboard
S5	1	4x PCIe expansion card (NMC)
S6	1	Proprietary Crypto x16 PCIe card (Optional)
S7	1	1 CPU supports 4 Channel (2 DIMM per Channel)

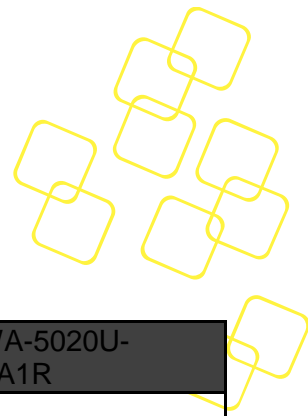
**Table 3: System components**

## 2.2 Product Versions

The FWA-5020 is available in the following standard configurations. Contact your Advantech representative for availability of other configuration options.

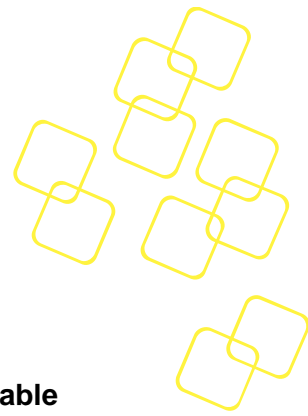
Model Name	Configurations
FWA-5020L-00A1R	-1 x Intel Xeon E5-2600 v4 socket up to 145W -8 x DDR4 RDIMM slots up to 256GB -2 x NMC slots
FWA-5020U-00A1R	-1 x Intel Xeon E5-2600 v4 sockets up to 145W -8 x DDR4 RDIMM up to 256GB -2 x NMC slots -4 x copper GbE ports with advanced LAN bypass -2 x SFP+ 10GbE ports
FWA-5020U-D0A1R	-2 x Intel Xeon E5-2600 v4 sockets up to 145W -16 x DDR4 RDIMM up to 512GB -4 x NMC slots -2 x Internal proprietary crypto PCIE card (Dual DH8955) supported (Optional)

**Table 4: Available Product Versions**









## 2.3 Technical Specifications

Category	Item	FWA-5020L-00A1R	FWA-5020U-00A1R	FWA-5020U-D0A1R
Type	Foam factor	1U	1U	1U
Processor System	CPU	Socket; 1x Intel E5-2600 v4 processor up to 145W TDP	Socket; 1x Intel E5-2600 v4 processor up to 145W TDP	Socket; 2x Intel E5-2600 v4 processor up to 145W TDP
Memory	Technology	DDR4 DIMMs (ECC RDIMM) Memory speed up to 2133 MHz		
	Capacity	Up to 256GB	Up to 256GB	Up to 512GB
Ethernet	Lan on Board	2 x Intel I210-AT 10/100/1000 Mbps Ethernet for Management	-2 x Intel I210-AT 10/100/1000 Mbps Ethernet for Management -4 x 1GbE RJ45 with advanced bypass -2 x 10GbE SFP+	2 x Intel I210-AT 10/100/1000 Mbps Ethernet for Management
	Expansion slots	2 x NMC modules with PCIe8 gen.3 interfaces		4 x NMC modules with PCIe8 gen.3 interfaces
PCIe card	PCIe	NA	NA	2 x internal proprietary x16 Crypto PCIE card (Dual DH8955) supported
Storage	SATA	2 x 2.5" hot-swappable SATA SSDs/HDDs at the front		2 x 2.5" SATA SSDs/HDDs internally
	Flash	2 x mSATA slots / 1 x USB DOM SSD	2 x mSATA slots / 1 x USB DOM SSD	NA
System management & Peripherals	USB	2 x USB ports		
	Serial	1 x RJ45 console port (RS232)		
	LCD Module	Yes	Yes	NA
PSU	IPMI	Supports IPMI 2.0, redundant BIOS and remote, failsafe BIOS update		
	Wattage	650w	650w	650w
Environment	Input	(AC) 100 ~ 240 V @ 50 ~ 60 Hz, full range (DC) -40 ~ - 72V, 12 ~ 24A	(AC) 100 ~ 240 V @ 50 ~ 60 Hz, full range (DC) -40 ~ - 72V, 12 ~ 24A	(AC) 100 ~ 240 V @ 50 ~ 60 Hz, full range (DC) -40 ~ - 72V, 12 ~ 24A
	Temperature Humidity	-0 ~ 40° C (32 ~ 104° F, operating) -5 ~ 85 % @ 40° C (104° F)		
Physical	Dimension	438 x 625 x 44 mm (W x L x H)		
	Weight	16 Kg		



The "Recommended NMC Module List" section for a list of currently available NMCs

**Recommended NMC Module List**

Part Number	NMC-0120	NMC-0121	NMC-0806	NMC-1008	NMC-4005	NMC-4006
						
Description	4-port GbE card	4-port GbE card	8-port GbE card	2-port 10 GbE card	4-port 10 GbE card	2-port 40 GbE card
LAN Controller	1 x Intel® I350-AM4	1 x Intel® I350-AM4	2 x Intel® I350-AM4	1 x Intel® 82599	1 x Intel® XL710	1 x Intel® XL710
Ports	4 x SFP	4 x RJ45	8 x RJ45	2 x SFP+	4 x SFP+	2 x QSFP
Other	With LAN bypass	With LAN bypass	With LAN bypass	With LAN bypass	Without LAN bypass	Without LAN bypass

For a full list of available / recommended NMC modules, please contact your Advantech representative.

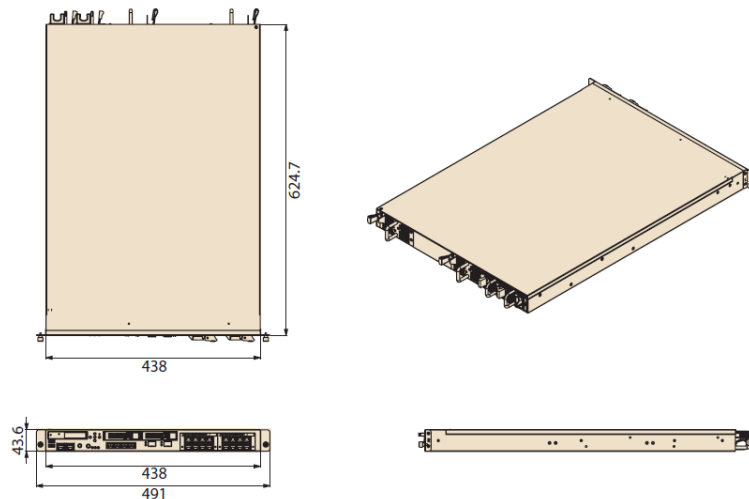
**Table 5: Specifications**

**2.3.1 System dimensions**

The system dimensions (in mm) are shown below:

**Dimensions**

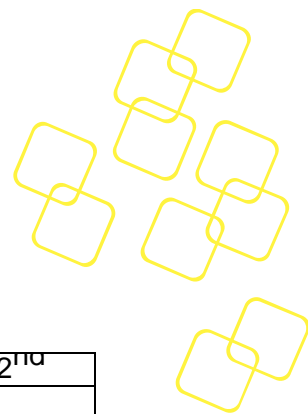
Unit: mm



**Figure 9: System Dimensions**

**2.3.2 Regulatory Compliance**

The Advantech FWA-5020 meets the specifications and regulations for safety and EMC defined in this chapter. Please contact your Advantech representative for a copy of the declaration of conformity or detailed test reports.



### 2.3.2.1 Safety

USA/Canada	UL 60950-1 2 <sup>nd</sup> Edition//CSA C22.2 No. 60950-1-07 2 <sup>nd</sup>
Europe	EN 60950-1:2006/A11:2009/A1:2010/A12:2011 EN 60950-1: A2:2013
International	CB Certificate and Report to IEC60950-1, 2 <sup>nd</sup> Edition and all international

**Table 6: Applicable Safety Regulations**

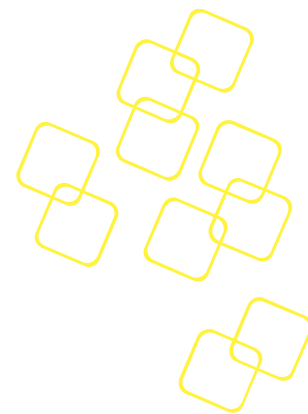
### 2.3.2.2 Electromagnetic Compatibility

USA	FCC 47 CFR Parts 15, Verified Class A Limit
Canada	ICES-003 Class A Limit
Europe	EMC Directive, 2004/108/EC EN55022, Class A Limit, Radiated & Conducted Emissions EN55024 Immunity Characteristics for ITE EN61000-4-2 ESD Immunity EN61000-4-3 Radiated Immunity EN61000-4-4 Electrical Fast Transient EN61000-4-5 Surge EN61000-4-6 Conducted RF EN61000-4-8 Power Frequency Magnetic Fields EN61000-4-11 Voltage Fluctuations and Short Interrupts EN61000-3-2 Harmonic Currents
International	CISPR 22, Class A Limit, CISPR 24 Immunity

**Table 7: Applicable EMC Regulations**

### 2.3.2.3 CE Mark

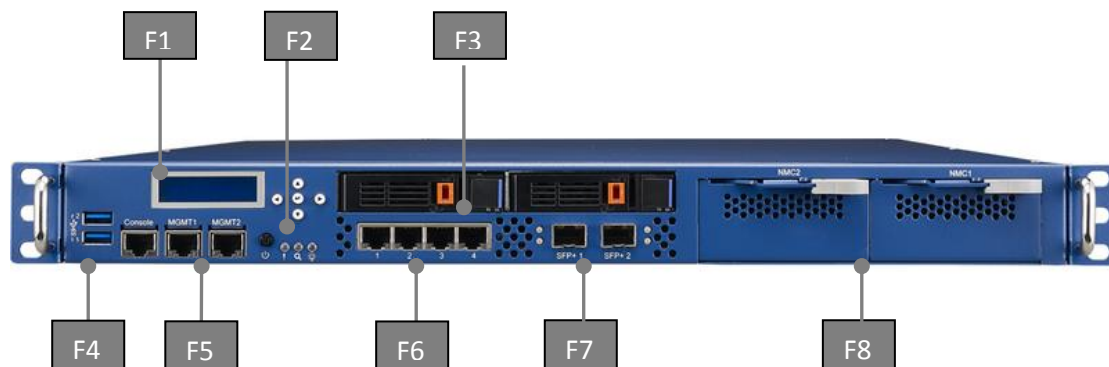
The CE marking on this product indicates that it is in compliance with the European Union EMC Directive 2004/108/EC, Safety Directive 2001/95/EC, Low Voltage Directive 2006/95/EC, and RoHS (recast) Directive 2011/65/EU.



## 2.4 Detailed Description

### 2.4.1 Front elements (FWA-5020U-00A1R)

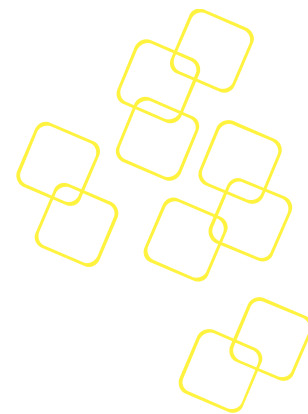
Please refer to [appendix A](#) for a description of connector pin definitions.



**Figure 10: System Front View**

Item	Element	Description
F1	LCM	Graphical LCD Module with 5 buttons
F2	LED	LED (System/Locate/ Alert)
F3	HDD LED	Hard disk activity LED (all SATA devices)
F4	Console + USB Connector	RS232 Console + Stacked Type A USB connector providing 2 USB2.0/3.0 ports
F5	Management Port 0/1	Management LAN Port 0/1
F6	Traffic Port 1~4	4x 1G w/bypass
F7	SFP+ Connector	2x 10G SFP+
F8	NMC slots	2 NMCs slot for NICs expansion

**Table 8: Front elements**



### 2.4.1.1 LED details

Three LEDs are provided at the front for signalling important system status at location F2 and F3.

**Figure 11: Front LEDs**

#### System Power state



LED color: Green  
FRU LED ID: 0x08  
LED will be 'on' when system powered on

#### Locate LED



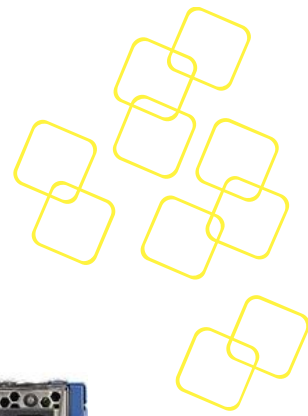
LED color: Blue  
FRU LED ID: 0x09  
LED will only be 'on' when following condition is met:  
1. Controlled by IPMI command "Chassis Identify" (IPMI Tool 28.5)

#### Alert LED



LED color: Amber  
FRU LED ID: 0x0a  
LED will only be 'on' when following faults being detected in following 2 modes:  
1. Local control mode: System Critical Events occurs. Configurable options are provided in PEF OEM action entries. See section 5.1.1 for more information  
2. Override mode: User can control this LED manually by PICMG command 'Set FRU LED State'





### 2.4.2 Rear Elements

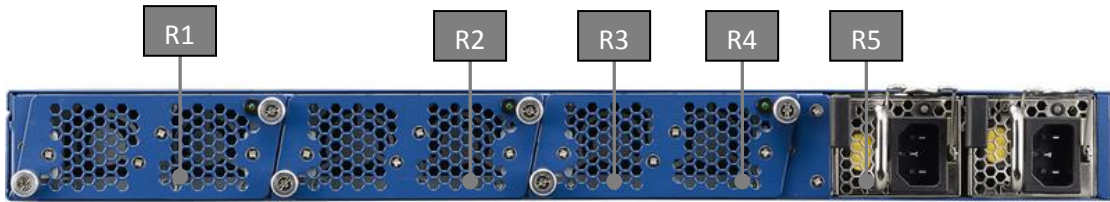


Figure 12: System Rear View

Item	Element	Description
R1	System fan	2or 3 Rear system fan module (by SKU)
R5	AC Power inlet	AC Power connector

Table 9: Rear elements

### 2.4.3 System block diagram

#### System Block Diagram

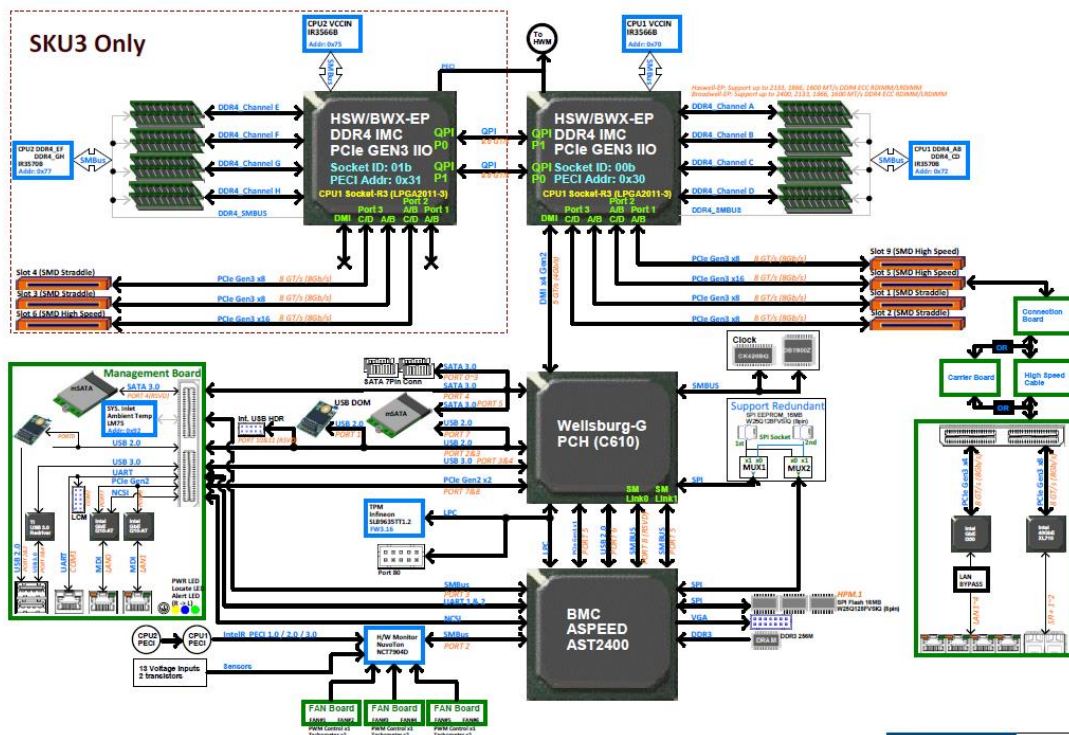


Figure 13: Block diagram



## 2.4.4 Processor(s)

The FWA-5020 supports Single or Dual Xeon E5-2600 v3/v4 processor. The table below gives an overview of the processor SKUs for Network and Storage infrastructure which can be supported on the FWA-5020:

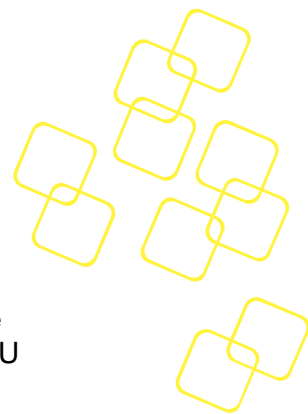
Feature	Xeon E5-2600 v3 (Haswell-EP)	Xeon E5-2600 v4 (Broadwell-EP)
Cores Per Socket	Up to 18	Up to 22
Threads Per Socket	Up to 36 threads	Up to 44 threads
Last-level Cache (LLC)	Up to 45 MB	Up to 55 MB
QPI Speed (GT/s)	2x QPI 1.1 channels 6.4, 8.0, 9.6 GT/s	
PCIe* Lanes/ Controllers/Speed(GT/s)	40 / 10 / PCIe* 3.0 (2.5, 5, 8 GT/s)	
Memory Population	4 channels of up to 3 RDIMMs or 3 LRDIMMs	+ 3DS LRDIMM&
Max Memory Speed	Up to 2133	Up to 2400
TDP (W)	160 (Workstation only), 145, 135, 120, 105, 90, 85, 65, 55	

**Table 10: Xeon-EP SKUs for Network and Enterprise Storage Infrastructure**

Please note that the Xeon E5-2600 is socket type on FWA-5020. The standard product configurations available including CPU options are listed in [section 2.2](#). If you're interested in the support of other CPU SKUs, please contact your Advantech representative.

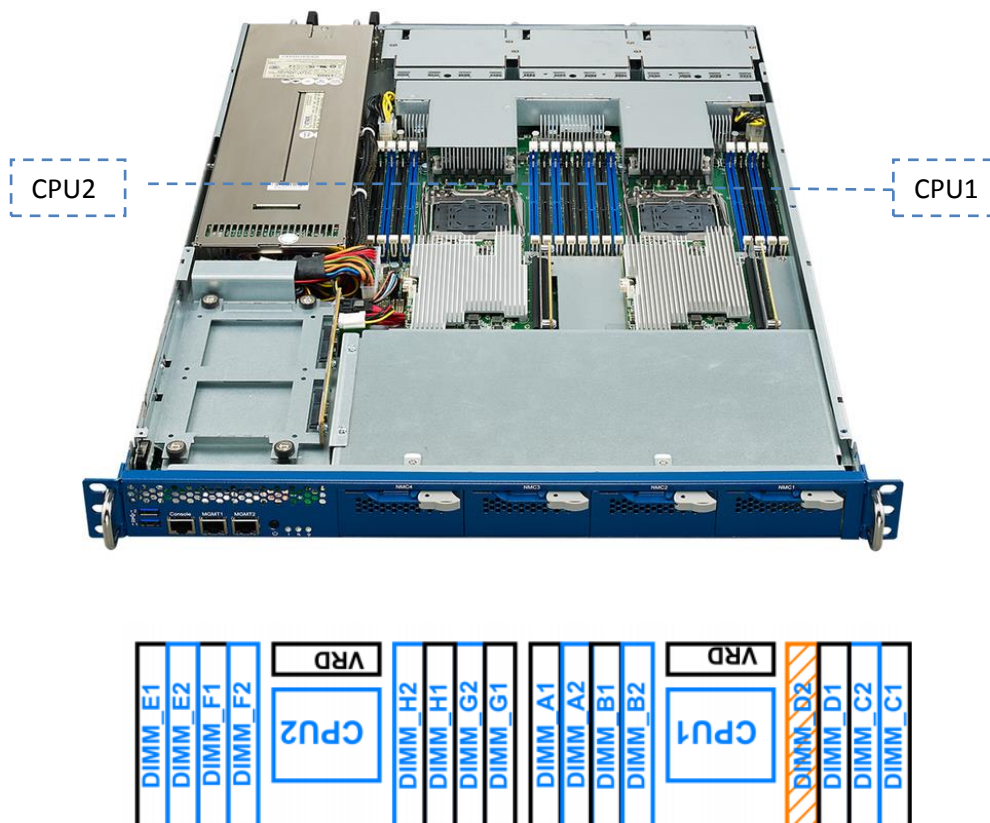


For details on the features of the Xeon E5-2600 processor, please refer to documentation available from Intel.



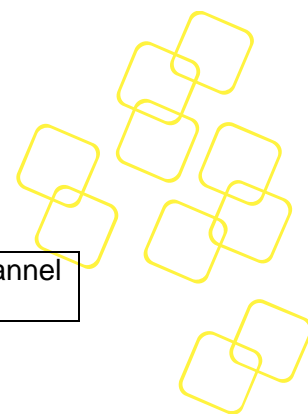
### 2.4.5 Memory

Four DDR4 RDIMMs is supported on the FWA-5020. The DIMMs reside on the CPU's memory channel (Up to 8Channel) and can support up to 2400MHZ (CPU SKU dependent).



**Figure 14: DIMM Location (FWA-5020U-D0A1R)**

CPU1 DDR4 DIMM SMBUS Address List			
Device Name	H/W Address	Device Address	Comment
DDR4 DIMM A1	SA[2:0]="000"	1010 000x (A0)	From CPU1 DDR4 Channel 01
DDR4 DIMM A2	SA[2:0]="001"	1010 001x (A2)	From CPU1 DDR4 Channel 01
DDR4 DIMM B1	SA[2:0]="100"	1010 100x (A8)	From CPU1 DDR4 Channel 01
DDR4 DIMM B2	SA[2:0]="101"	1010 101x (AA)	From CPU1 DDR4 Channel 01
DDR4 DIMM C1	SA[2:0]="000"	1010 000x (A0)	From CPU1 DDR4 Channel 23
DDR4 DIMM C2	SA[2:0]="001"	1010 001x (A2)	From CPU1 DDR4 Channel 23
DDR4 DIMM D1	SA[2:0]="100"	1010 100x (A8)	From CPU1 DDR4 Channel 23



DDR4 DIMM D2	SA[2:0]="101"	1010 101x (AA)	From CPU1 DDR4 Channel 23
--------------	---------------	----------------	---------------------------

CPU2 DDR4 DIMM SMBUS Address List			
Device Name	H/W Address	Device Address	Comment
DDR4 DIMM E1	SA[2:0]="000"	1010 000x (A0)	From CPU1 DDR4 Channel 01
DDR4 DIMM E2	SA[2:0]="001"	1010 001x (A2)	From CPU1 DDR4 Channel 01
DDR4 DIMM F1	SA[2:0]="100"	1010 100x (A8)	From CPU1 DDR4 Channel 01
DDR4 DIMM F2	SA[2:0]="101"	1010 101x (AA)	From CPU1 DDR4 Channel 01
DDR4 DIMM G1	SA[2:0]="000"	1010 000x (A0)	From CPU1 DDR4 Channel 23
DDR4 DIMM G2	SA[2:0]="001"	1010 001x (A2)	From CPU1 DDR4 Channel 23
DDR4 DIMM H1	SA[2:0]="100"	1010 100x (A8)	From CPU1 DDR4 Channel 23
DDR4 DIMM H2	SA[2:0]="101"	1010 101x (AA)	From CPU1 DDR4 Channel 23

**Table 11: DIMM mapping**

DIMM modules need to be populated in Dimm1 per channel as first priority. DDR4 modules will be recognized automatically. No manual adjustment is required.

It is recommended to use identical DIMMs on both sockets for best performance and reliability.

The following list summarizes the modules validated on the FWA-5020:

Vendor	Frequency	Capacity	Advantech PN
ADATA	DDR4-2133 MHz	4G	YDDR4-ADATA-4G
	DDR4-2133 MHz	8G	YDDR4-ADATA-8G
	DDR4-2133 MHz	16G	YDDR4-ADATA-16G
AQD-D4U16R21-HZ			
Advantech			

**Table 12: Validated DIMMs**

Please contact your Advantech representative for the most recent list of validated peripherals or if you would like to use modules not listed.

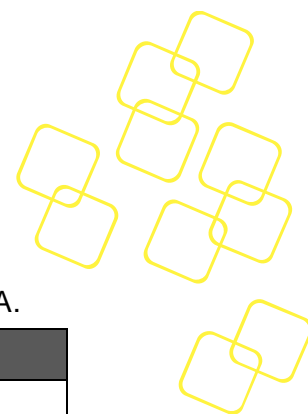
## 2.4.6 Chipset

The chipset / PCH functionality is integrated into the Xeon E5-2600 v3/v4

### 2.4.6.1 USB

The FWA-5020 supports two external USB2.0/3.0 ports which can be used to





connect low, full and high speed devices. The 5V supply rail supplied to external devices is current limited by a self resetting, electronic fuse to 500mA.

USB Port	USB Type	Implementation
1	2.0/3.0	Type A front panel connector
2	2.0/3.0	Type A front panel connector

**Table 13: USB Ports**

### 2.4.6.2 SATA

The PCH has two integrated SATA host controllers that support independent DMA operation and supports data transfer rates of up to 6.0 Gb/s (600 MB/s) on up to six ports while all ports support rates up to 3.0 Gb/s (300 MB/s) and up to 1.5 Gb/s (150 MB/s).

- The SATA controller contains two modes of operation—a legacy mode using I/O space, and an AHCI mode using memory space. Software that uses legacy mode will not have AHCI capabilities.
- Two mSATA ports support legacy mode. One port in on Mother Board and the one port to Management Module.
- Four ports SATA 3.0 to SATA 7pin connector

System SATA Port	Implementation	Controller	Controller Port
1	SATA header 1	SATA3	Port 0
2	SATA header 2	SATA3	Port 1
3	SATA header 3	SATA3	Port 2
4	SATA header 4	SATA3	Port 3
5	mSATA1	SATA3	Port 4
6	mSATA2	SATA3	Port 5

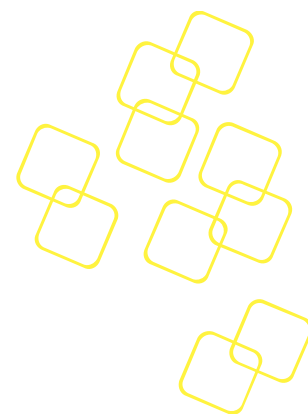
**Table 14: SATA Ports**

The following list summarizes the drives validated on the FWA-5020:

Please contact you Advantech representative for the most recent list of validated peripherals or if you would like to use modules not listed.

Vendor	Vendor PN (Capacity)	Advantech PN
<b>HDD Drive</b>		
WD	WD5000LUCT-63Y8HY0 500GB	
ADVANTECH	820 Series 2.5" SATA III SSD 640G	SQF-25M5-60G-S8C
WD	SATA 2.5" HDD 1T (24x7)	96ND1T-ST-WD5KE

**Table 15: Validated SATA drives**



### 2.4.6.3 Legacy Functions and IO

#### 2.4.6.3.1 SMBus

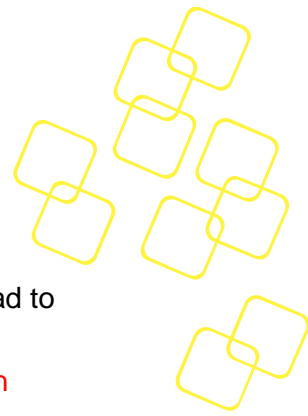
-SMBus version 2.0 with additional support for I2C devices.

-Each consists of two bi-directional bus lines; the Serial Data (SDA) line and the Serial Clock (SCLK) line.

-Connect to CK420BQ and DB1900Z.

Device Name	H/W Address	Device Address	Source	Comment
PMBUS CONN	TBD	TBD	Channel 1	For Power Supply
NCT7904 D	SA[0]="0"	0101 110x (5A)	Channel 2	For Voltage/Temp. Monitor
CAT24C02	SA[2:0]="110"	1010 110x (AC)	Channel 2	For BMC FRU, Sel and SDRR
Mini PCIe CONN	TBD	TBD	Channel 2	Reseved for mini PCIe
Front Panel CONN	TBD	TBD	Channel 2	Reseved for front panel conn
PCA9548	SA[2:0]="001"	1110 001x (E2)	Channel 2	For I2C Switch
LM75	SA[2:0]="010"	1001 010x (92)	Channel 3	For temperature sensor
DB104	TBD	1101 110x (DC)	Channel 3	For Clock Buffer
PCA9555 PW	SA[2:0]="101"	0100 011x (46)	Channel 4	For FAN Module LED Control
IR3566B	ADDR_PRO T=8 45ohm	0x70	Channel 4	For CPU1 Vcore Regulator
IR3570B	ADDR_PRO T=1. 78Kohm	0x72	Channel 4	For CPU1 Vdd_ABCD Regulator

**Table 16: SMBus Devices**



Most of the SMBus devices are only accessed by BIOS at system start up to determine and set system configuration. Tampering with these devices may lead to system instability and malfunction.

Information on the hardware monitor and how to access it is provided in [section 2.4.13](#).

Information reg. the FRU EEPROM can be found in [section 2.4.15](#).

### **2.4.7 Network interfaces (onboard)**

The FWA-5020 supports a total of 6 network ports by copper and 2x 10G SFP+ port fiber on board.

There are 2 i210 GbE LAN device for management(locations F5), and 1 i350 for “traffic” ports(locations F6), the i210 is a single LAN chip and i350 GbE LAN device is a four port LAN chip, compact, low power components that offer a fully integrated Gigabit Ethernet Media Access Control (MAC) and Physical Layer (PHY) port.

The i210 LAN chip and i350 LAN chip are connected from integrated PCH PCIe port. The LAN chip can support PCIe Gen1 and 10/100/1000 Mb/s.

The Fortivlle X710 supports 2x 10G SFP+ for front I/O expansion. (location: F7)

### **2.4.8 PCIe Expansion**

-2 std PCIe x8 for NMC expansion

-1 High speed x16 connector for either riser card or front I/O supports

Note: Riser card could supports proprietary crypto x16 PCIe card (PCIe-3021)

### **2.4.9 TPM Module**

-On board

-Infineon Infineon SLB 9635TT 1.2 TPM module is used in this design.

-The Firmware Version 3.17

-TCG-compliant Trusted Platform Module

-LPC interface

-Security architecture based on Infineon security controller family

-The I/O space 4Eh/4Fh

### **2.4.10 LCD Module**

Features

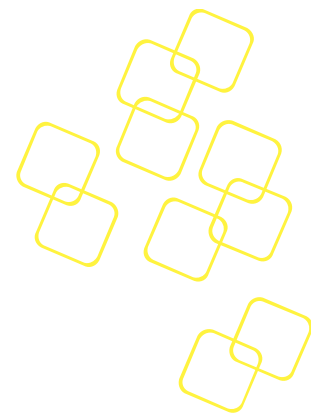
-21 columns × 4 lines text display

-128 × 32 dots graphic display

-Text wrap, scroll and inverse capability

-Built in characters plus 16 user defined characters

-Communicate over RS232 interface



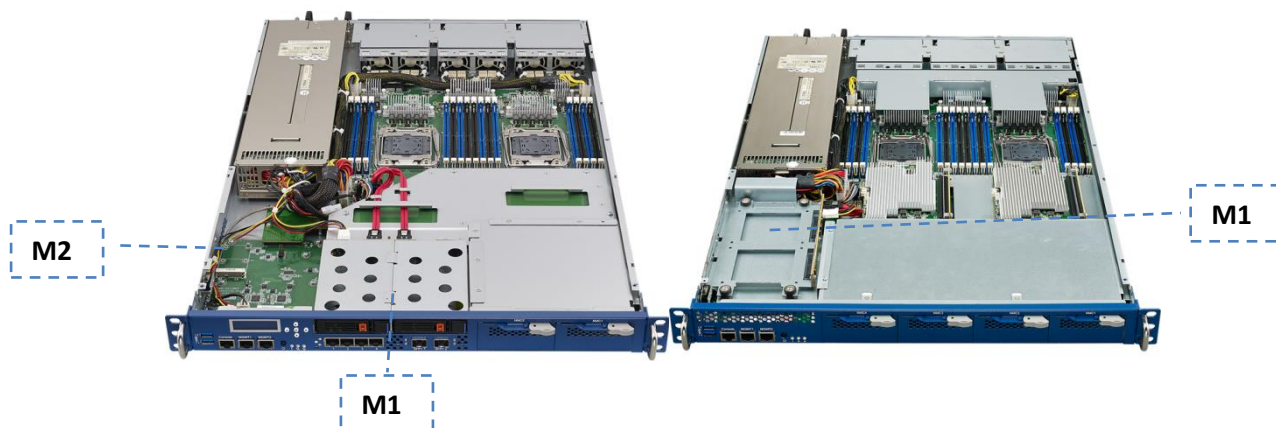
- Baud rate speed selection between 9600 and 19200 bps
- Programmable on/off and brightness of the LED backlight
- Horizontal and vertical bar charts
- 32 bytes reserved non-volatile memory spaces for user settings
- 5 buttons keypad
- Fit in a standard 3.5" floppy

### 2.4.11 Mass Storage

Up to four SATA devices and two m-SATA are supported by the FWA-5020. In the default configuration, two SATA 2.5"SSD/HDD devices are supported (location M1):

An onboard m-SATA socket with half/full size type support (location M2).

Note: The FWA-5020U-D0A1R can't support the m-SATA device due to mechanical limitation.



**Figure 15: Mass storage components**

### 2.4.12 BIOS

The FWA-5020's BIOS is based on AMI's APTIO BIOS and compliant to the UEFI, SMBIOS and ACPI specifications.

The BIOS performs probing, initialization and configuration of the FWA-5020 and initializes the OS boot process at the end of POST (Power On Self Test).

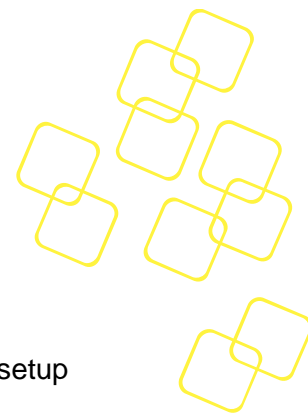
Regular BIOS output as well as the setup menu are displayed via the console port. Please refer to [section 1.3.3](#) reg. the console connection process.

The BIOS Setup Menu is described in detail in [section 3.2](#). BIOS Error Codes used during POST are described in [appendix B](#).

Please note that the FWA-5020 does not have any onboard POST Code LEDs onboard. A special POST code adapter is required to retrieve BIOS error codes.

All BIOS configuration parameters are stored in NVRAM, a dedicated section of the BIOS flash chip. Parameters are no longer stored in legacy CMOS RAM by the platform BIOS. I.e. BIOS configuration parameters will not be lost due to an empty battery.





#### **2.4.12.1 Password protection**

The BIOS supports and administrator password to restrict access to the BIOS setup menu to qualified and trusted personal, only.

#### **2.4.12.2 BIOS defaults**

The BIOS comes with a set of configuration parameters when shipped by Advantech referred to as “Optimized Defaults” or “factory defaults”. The user can change BIOS settings via the setup menu either temporarily or permanently by saving the changes as “User defaults”.

The BIOS loads Optimized Defaults by the option “Restore Defaults; and loads User defaults by the option “Restore User Defaults”. If no User defaults have been defined, the BIOS will do nothing.

### **2.4.13 Platform Management**

A Nuvoton NCT7904 Hardware Monitor Chip (HWM) provides hardware monitoring capabilities on the FWA-5020. The HWM chip is connector to the PCH's SMBus. Standard software packages such as “Imsensors” can be used on the host to provide sensor information under Linux. Advantech provides the required patch that adds support for the HWM chip and a system specific configuration file.

#### **Feature Details**

1. Voltage Monitor
2. Temperature Monitor
3. FAN Speed / Control Monitor
  - All fans in same module are rotate same percentage speed. Each fan module has itself fan status indicator used to show fan module status, when BMC detect fan speed.
4. PECI (PLATFORM ENVIRONMENT CONTROL INTERFACE)
  - Support PECI 1.0 / 2.0 / 3.0 full commands.
  - Support 2 CPU sockets and 2 domains per CPU address.
5. Watch Dog Timer function
  - Provide System Reset
6. Case open function
  - Intrusion detection go through this hardware monitor for rear top-cover open detection. There is another front top-cover open detection through another hardware monitor on NAMB-6520MGT management module.
  - Both can be identified in firmware with different events.

Please contact your Advantech representative if you wish to receive the Imsensors patch or, in case you want to implement your own hardware monitoring solution, to obtain more details regarding the hardware implementation.

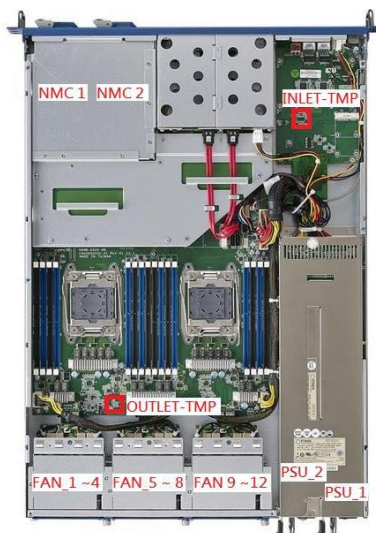


In addition to the HWM, the Xeon-EP CPU features integrated temperature sensors (1 per core) that are supported by the module of ipmitool:

```
[root@localhost ~]# ipmitool sdr | grep -i tmp
INLET-TMP      | 27 degrees C | ok
OUTLET-TMP     | 38 degrees C | ok
CPU_1-TMP      | 38 degrees C | ok
PCH-TMP        | 30 degrees C | ok
CPU_1-DIMMA-TMP | 32 degrees C | ok
CPU_1-DIMMB-TMP | 32 degrees C | ok
CPU_1-DIMMC-TMP | 33 degrees C | ok
CPU_1-DIMMD-TMP | 33 degrees C | ok
CPU_2-TMP      | 36 degrees C | ok
CPU_2-DIMME-TMP | 33 degrees C | ok
CPU_2-DIMMF-TMP | 33 degrees C | ok
CPU_2-DIMMG-TMP | 0 degrees C  | ok
CPU_2-DIMMH-TMP | 0 degrees C  | ok
```

**Figure 17: Display of CPU temperature**

The diagram below shows the location of the various temperature sensors:



**Figure 16: Thermal Sensor Locations (Same MB, but different SKU shown)**

Sensor	Description
INLET-TMP	The Sensor is located on the management board to track the air inlet temperature used to cool the system elements. Due to the location of the sensors, there is an offset to the ambient temperature outside the chassis.
OUTLET-TMP	The Sensor is located at the rear side of the mainboard, near to the fan modules, to track the air temperature exhausted from the FWA-5020.

**Table 18: Thermal Sensors**

### 2.4.14 Power Supplies

The FWA-5020 supports a 650W AC/DC redundant PSU. Technical specification for the power supply can be found in [appendix C](#).



### 2.4.15 Electronic label: FRU EEPROM

The FWA-5020 supports an onboard FRU EEPROM which can be accessed via SMBus 0 using afru. The table below shows the FRU EEPROM format:

DMI Table	Field in DMI Table	Field in System FRU	Parameter in afru_mfg
Type 1 <b>System Information</b>	Manufacturer	Product Manufacturer	PM
	Product Name	Product Name	PN
	Version	Product Version	PV
	Serial Number	Product Serial	PS
	SKU Number	Product Part Number	PPN
Type 2 <b>Base Board Information</b>	Manufacturer	Board Mfg	BM
	Product Name	Board Product	BP
	Version	Product Version	PV
	Serial Number	Board Serial	BS
Type 3 <b>Chassis Information</b>	Version	Chassis Part Number	CPN
	Serial Number	Chassis Serial	CS

**Table 19: FRU Data Synced to the DMI Tables**

Alternatively, FRU information is also embedded in DMI Tables 1/2/3 and can be displayed with DMI parsing tools like dmidecode.

For a detailed description of the FRUs functionality and the related software API, please refer to the Advantech\_Afru\_Utility\_User\_Guide\_Rev0\_1. ( Please contact your Advantech representative to get the doc)

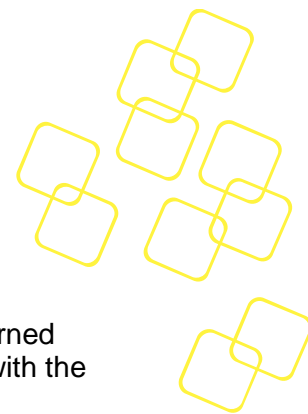
## 2.5 Advanced Platform features

### 2.5.1 Intrusion detection

The FWA-5020 supports chassis intrusion detection by default. If the top cover of the chassis is removed, this gets detected even when the box is unpowered or unplugged, and the corresponding sensor (see *Section 2.6.4.5*) will report the event.

### 2.5.2 BIOS POST Watchdog

The IPMI compliant BMC watchdog is used to monitor BIOS boot progress and



initiate a rollback when the BIOS is found to be corrupted.

The BIOS watchdog timeout is set to a predefined value of 300 seconds and automatically starts when the payload power for the x86 subsystem is being turned on or when a x86 reset is detected. The time out action is set to **Hard Reset**, with the timer use indicating **BIOS FRB2** use.

If the watchdog timer times out with this configuration, it triggers a BIOS chip failover followed by a system reset and a restart of the watchdog timer.

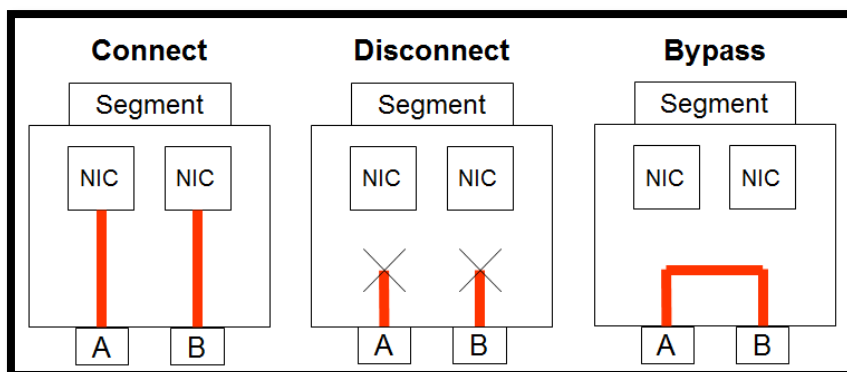
The BIOS does not touch the watchdog timer except the following situations:

1. It disables the watchdog right before jumping into the x86 OS boot loader so it doesn't trigger after BIOS execution. It could alternatively reconfigure the watchdog to act as boot watchdog (i.e. change timeout action), based on BIOS configuration.
2. It temporarily disables the watchdog once the BIOS setup menu is entered, so the watchdog does not trigger while the user is in the BIOS menu.

### 2.5.3 LAN Bypass

For a detailed description of the LAN Bypass functionality and the related software API, please refer to the Advanced LAN Bypass User's Manual.

LAN bypass allows automated or manual control of the connectivity between two LAN ports grouped into a bypass segment and the host:



**Figure 17: Connectivity options of LAN ports in a bypass segment**

In “connect” mode, the ports on a segment are connected to the host via NICs. Traffic will enter and leave the ports just like on a regular NIC.

In “disconnect” mode, the ports are disconnected from the host and from each other. No traffic can flow through the ports

In “bypass” mode, the two ports are disconnected from the host, but connected to each other. Traffic entering the system on one port will be sent out on the other port and vice versa.

“Bypass mode” is used to allow traffic to flow through the system when the system is in a non operational state such as loss of power or in case the application is unresponsive. Application health is monitored by a configurable watchdog.



“Disconnect” mode is typically used to block any traffic until the system has fully started up and the application SW is in a well defined state allowing to handle traffic properly.

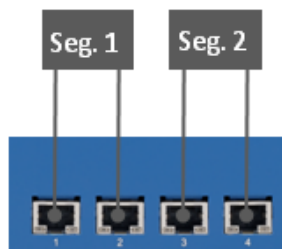
Connectivity can be auto controlled by a number of system events:

- **Power Up**  
Host system is turned on / powers up (DC on)
- **Power Down**  
Host system is turned off / powers down (DC off)
- **Power Reset**  
Host system is reset or rebooted
- **Watchdog Start**  
LAN bypass watchdog is started or strobed for the first time
- **Watchdog Timeout**  
LAN bypass watchdog timed out
- **External Trigger**  
Global Watchdog Trigger input (dedicated GPIO pin)

In addition to the event driven model, it is also possible to set the connectivity for a bypass segment via the SW API.

### 2.5.3.1 LAN Bypass Segments

The FWA-5020 supports four onboard traffic ports which are grouped into 2 bypass segments as shown below:



**Figure 18: Onboard LAN ports and bypass segments**

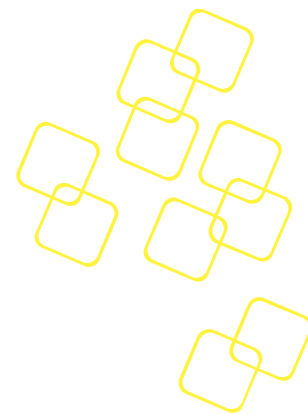
### 2.5.3.2 Bypass Watchdog Support

Each bypass segment is support by an independent watchdog timer. The timer basis is set to 100ms. Watchdog timeout periods can be set between 100ms and 6553.5 seconds (about 109 minutes).

The FWA-5020 also supports a global watchdog trigger which allows multiple bypass segments to be controlled at the same time. The global watchdog signal is connected between the two onboard bypass segments and also to the PCIe extension connector (for future use).

### 2.5.3.3 LED Behaviour

Advantech Advanced LAN bypass uses a LED to show the state of a bypass segment. Usually the bypass LED is implemented as a dual colour LED combined with a regular LAN port LED. The table below shows the status of the bypass LED,



only. For a complete description of port LEDs please refer to appendix A.3.2).

State	LED Status
CONNECT	Off
BYPASS	Solid Amber
DISCONNECT	Blinking Amber (1Hz)

**Table 20: Bypass States and LED behaviour**

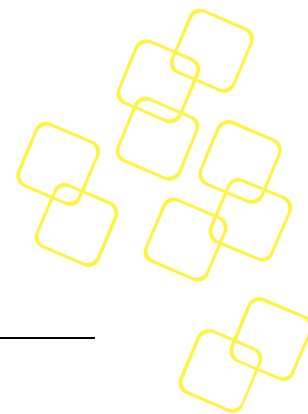
## 2.6 Available Accessories and Related Products

### 2.6.1 Accessories

The following accessories are available for ordering. Please contact your Advantech representative for a list of available and supported peripherals such as memory modules, hard disks and solid state drives

Model Name	Configurations
1702002600	Power cable 3P 180 cm, USA
1702002605	Power cable 3P 180 cm, Europe
1702031801	Power cable 3P 180 cm, UK
1700000237	Power cable 3P 180 cm, JP
9680016905	Repon Tool-Less Server slide, 26", for 438 Chass

**Table 21: Accessories**



## 3. CONFIGURATION AND SERVICE

---

### 3.1 Jumper Settings

There are a PIN HEADER 3x1P for BIOS Recovery Mode.

- 1-2(Default) Normal mode operation
- 2-3 ME Recovery mode (Debug)

### 3.2 BIOS Setup Menu

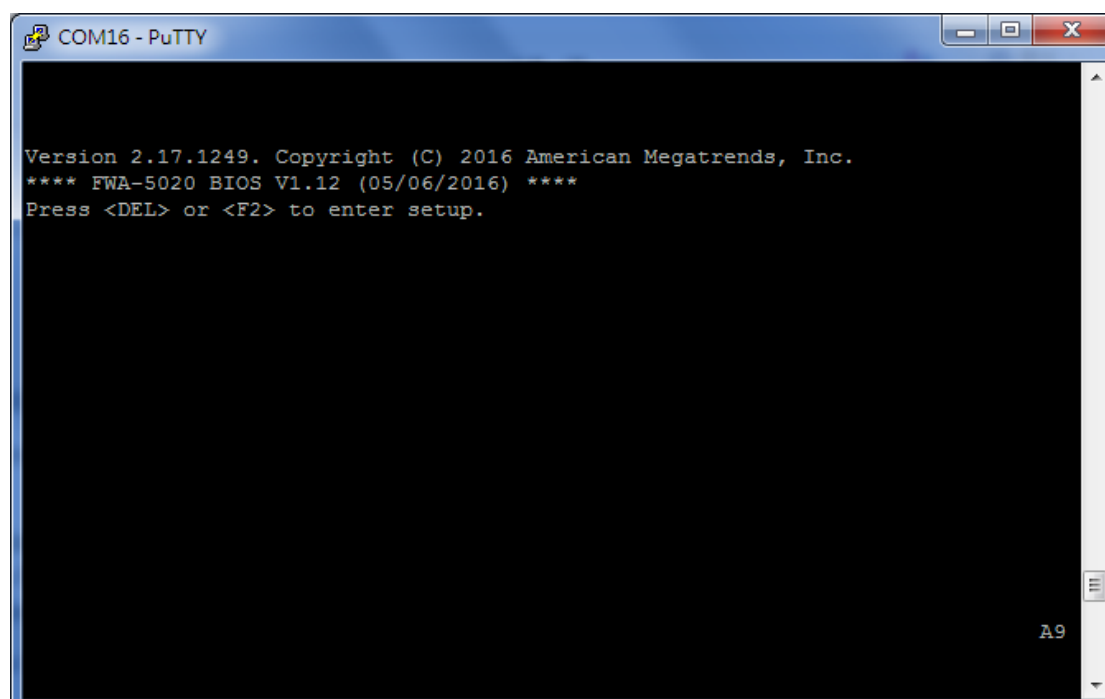
This section describes the FWA-5020's UEFI BIOS based on AMI's APTIO BIOS.

Users can modify BIOS settings and control the special features of the FWA-5020 using the BIOS setup menu.

Please note that Advantech supports shipping the FWA-5020 with custom BIOS defaults to simplify the deployment and integration for our customers. Please contact your Advantech representative if you want to receive more information regarding this service.



The BIOS Setup Menu can be entered via the BIOS POST screen displayed on the console interface:



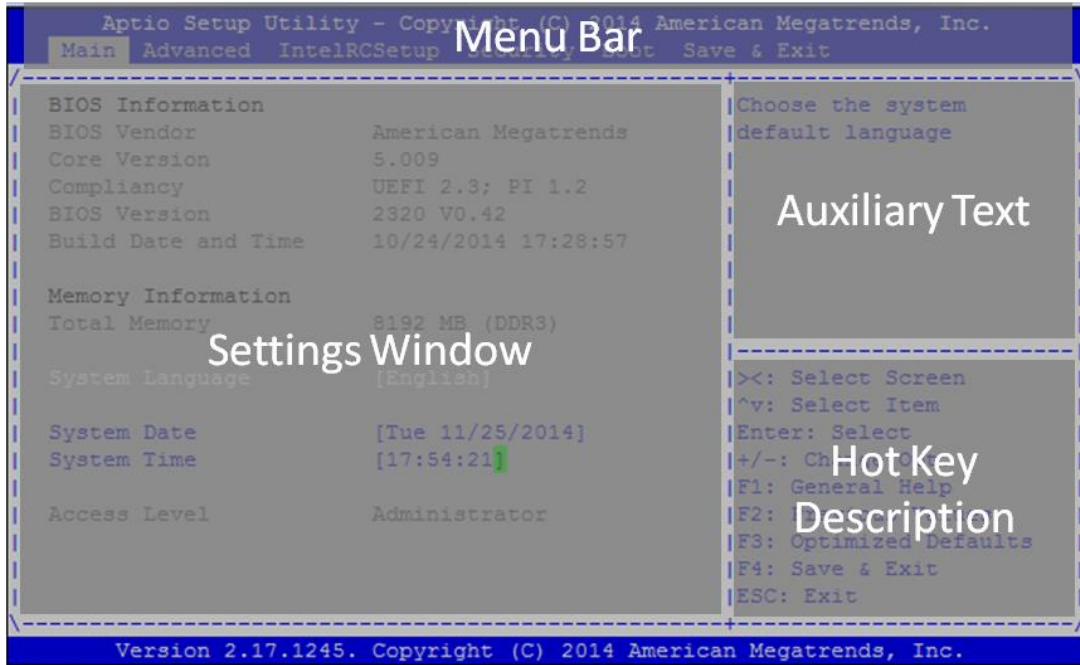
**Figure19: BIOS POST screen (example)**

BIOS Setup can be entered by hitting <DEL> or <F2> keys during POST.

The BIOS setup menu screens have a few main elements as shown below. The menu bar displays the selectable menu pages as tabs. The parameter window displays and allows configuration of the settings available in a given menu page or a



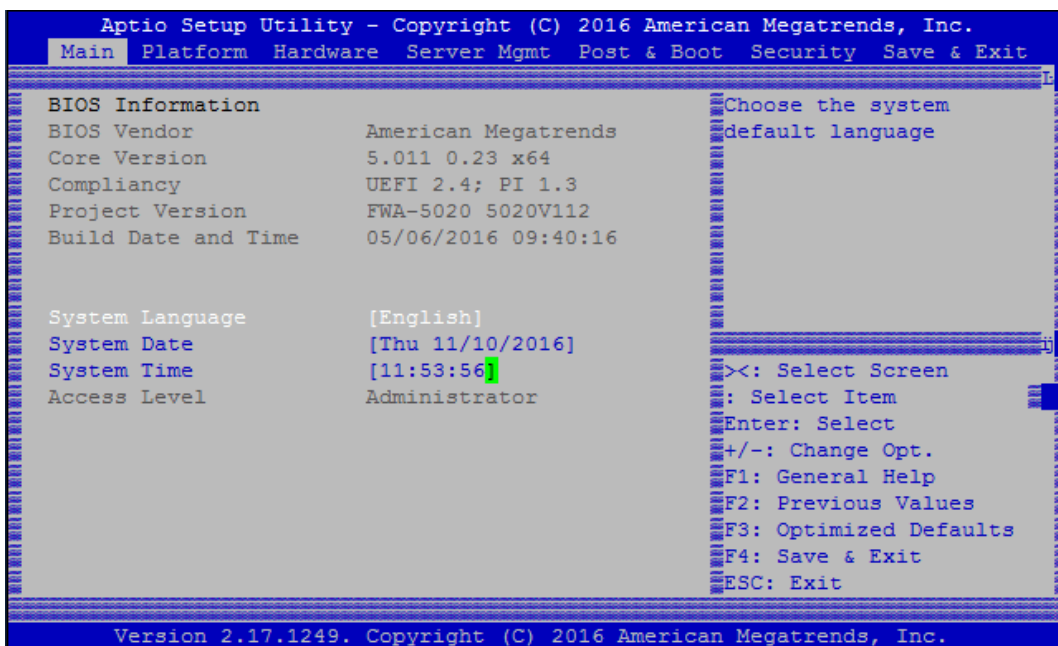
submenu thereof. Auxiliary text providing information about the selected setup item is displayed in the top right corner.



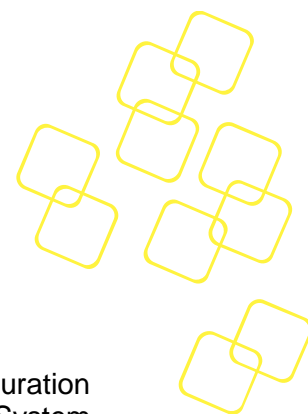
**Figure 20: BIOS Setup Screen Organization**

### 3.2.1 Main Setup Menu

If security protection has been enabled previously ( see chapter 3.2.4), you will be prompted for the BIOS password upon entering the BIOS Setup. After a successful check or if password protection has not been enabled, users will see the Main Setup screen shown below. Users can always return to the Main setup screen by selecting the Main tab.







**Figure 21: BIOS Setup Main screen**

The main setup page displays system a summary of system and BIOS configuration and status information. The fields on this page are read-only except for the System Date and Time setting.

Group	Setup item	Access / Options	Description
BIOS Information	BIOS Vendor	Display only	American Megatrends
	Core Version	Display only	Current AMI BIOS core version in use
	Compliance	Display only	UEFI Spec revision that the BIOS complies to
	Project Version	Display only	Advantech BIOS Version info EX: mmmm Vx.yz mmmm : model name X : major version Yz: minor version
	Build Date & Time	Display only	Shows BIOS build date and time
	NVRAM Version	Display only	Shows current NVRAM ver.
System Language		Display only	Selects the Setup Menu Language. Only English is supported on the FWA-5020.
System Date		MM/DD/YY	Displays and sets the system date as used by the BIOS
System Time		HH:MM:SS	Displays and sets the system time as used by the BIOS
Access Level		Display only	Shows the user privilege level according to the security settings. If password protection has not been enabled, this will default to "Administrator"

**Table 22: BIOS Setup: Main Menu**

### 3.2.1.1 Setting System Time and Date

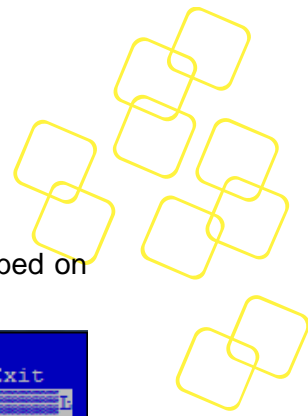
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

Please note that system time and date are set during manufacturing process according to factory's local time zone. You may need to update system time to reflect the desired time zone when you receive the unit.

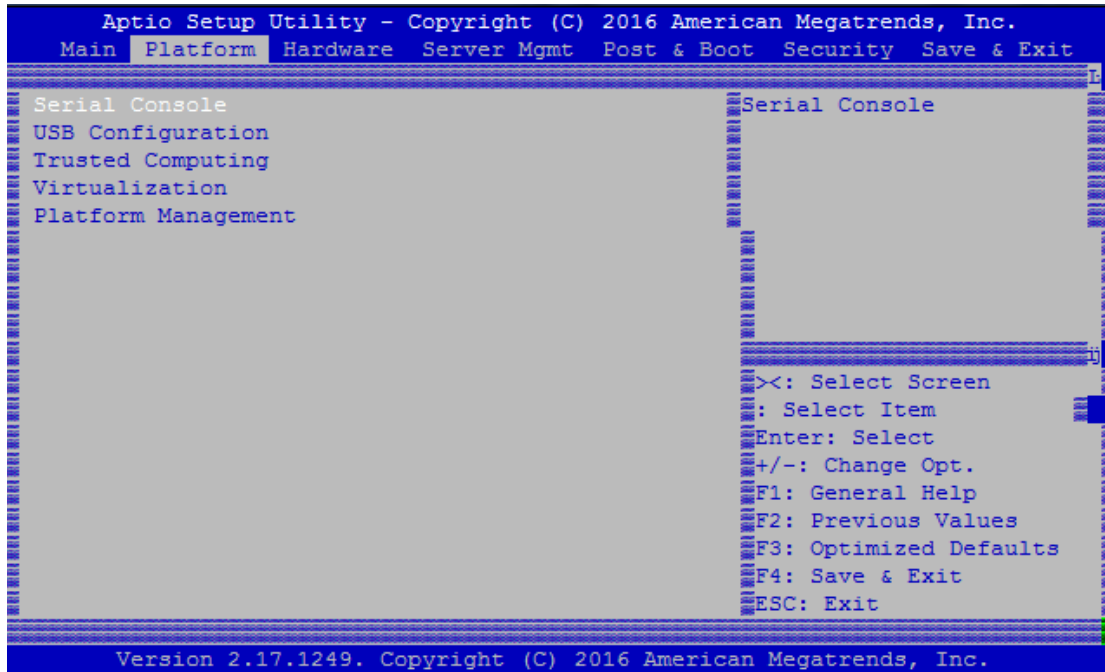


### 3.2.2 Platform Setup Menu

Select the Platform tab from the FWA-5020 setup screen to enter the Platform Setup screen. Users can select any of the items in the left frame of the screen, such as the Trusted Computing Configuration, to go to the sub menu for that item. Users can display a Platform BIOS Setup option by highlighting it using the <Arrow> keys.



The Platform BIOS Setup screen is shown below. The sub menus are described on the following pages.

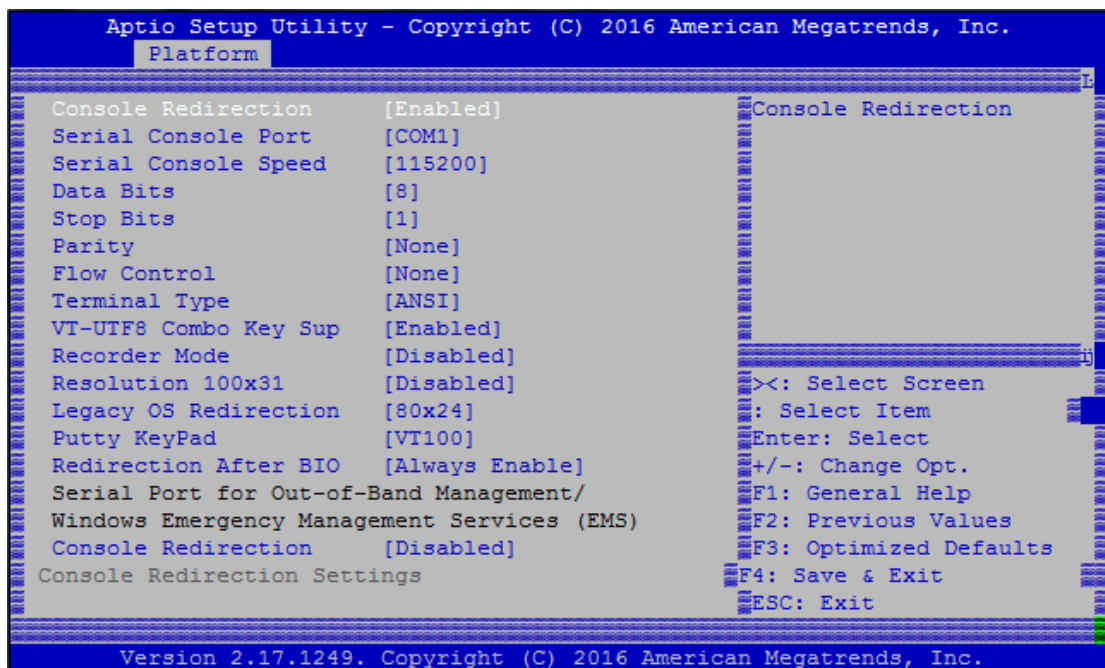


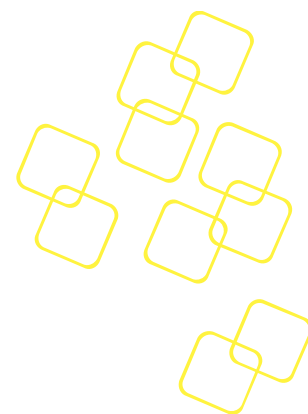
**Figure22: Platform Setup Main screen**

### 3.2.2.1 Serial Port Console Redirection

This sub menu allows you to change the settings used for the serial console.

Note that the serial console is always using COM1 which is connected to the front panel.





**Figure 23: Platform Setup: Console Redirection Menu**

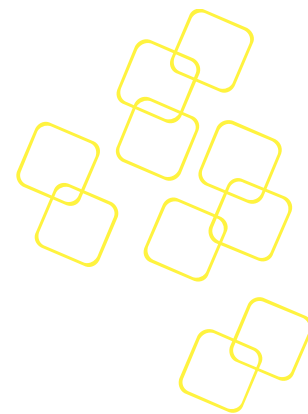
### 3.2.2.1.1 COM1 Console Redirection Settings

The settings for COM1 console can be accessed in this menu.

This sub menu allows you to change the settings used for the serial console. For example, users can define the terminal type, bits per second, data bits, parity, stop bits and others.

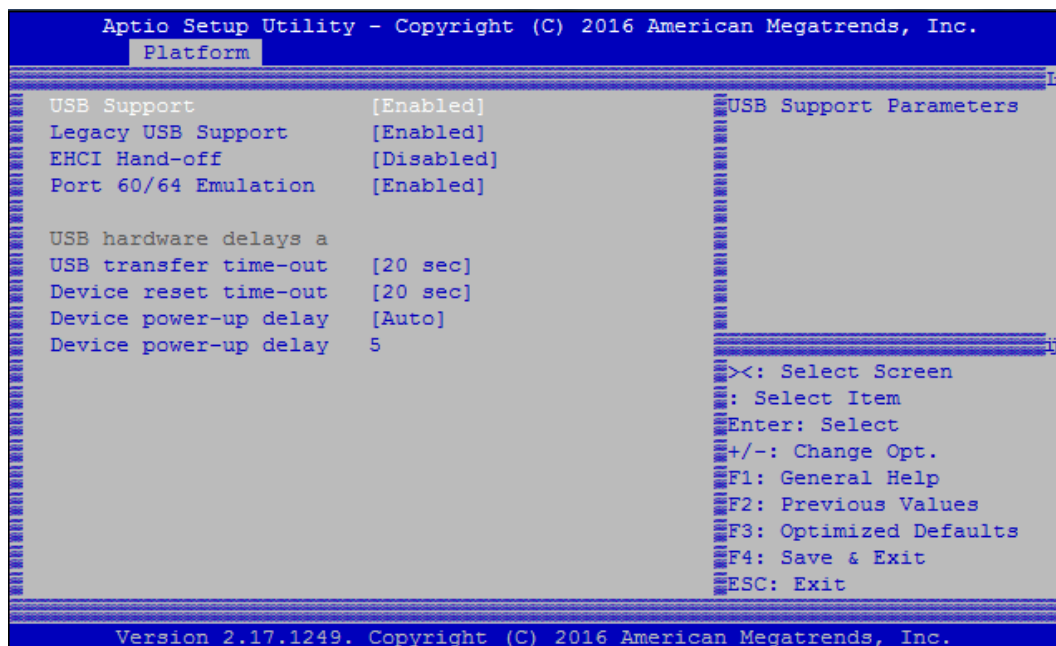
Setup item	Access / Options	Description
Terminal Type	ANSI / VT100 / VT100+ / VT-UTF8	Select the target terminal emulation type: - ANSI to use the Extended ASCII Character Set. - VT100 to use the ASCII Character set. - VT100+ to add color and function key support. - VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes.
Serial Console Speed	9600 / 19200 / 38400 / 57600 / 115200	Defines the baud rate.
Data Bits	7 / 8	Defines number of data bits in a character.
Parity	None / Even / Odd / Mark / Space	Defines the parity scheme used.
Stop Bits	1 / 2	Defines number of stop bits in a character.
Flow Control	None / Xon/Xoff	Defines the flow control scheme.
VT-UTF8 Combo Key	Disabled / Enabled	Enables VT-UTF8 Combination Key Support for ANSI / VT100 terminals
Recorder Mode	Disabled / Enabled	When Enabled the data displayed on a terminal will be captured and sent as text messages to a remote server.
Resolution 100x31	Disabled / Enabled	Enables or disables extended terminal resolution
Legacy OS redirection	80x24 / 80x 25	When using Legacy OS, this item specifies the Number of Rows and Columns supported
PuTTY Keypad	VT100 / LINUX / XTERMR6 / SCO / ESCN / VT400	Select Function Key and Key Pad Emulation on PuTTY.
Redirection after BIOS	Always Enable / BootLoader	This defines how long console redirection will be active: "BootLoader" means that legacy console redirection is disabled before booting into a Legacy OS. "Always Enable" means Legacy console Redirection is enabled permanently.

**Table 23: Platform Setup: COM1 Console Redirection Menu Items**



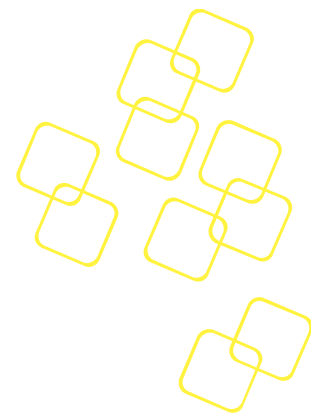
### 3.2.2.2 USB Configuration

This sub menu allows you to change the settings used for USB and to get an overview of the USB devices detected by the BIOS.



**Figure 24: Platform Setup: USB Configuration Menu**

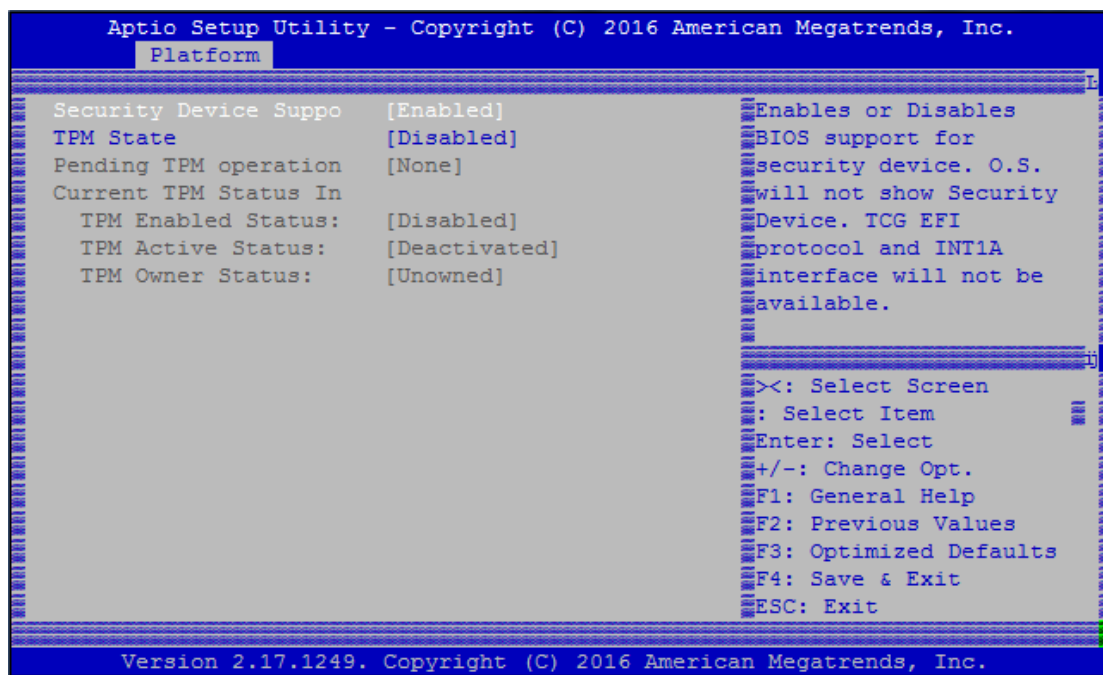
Group	Setup item	Access Options /	Description
None	USB Support	Enabled Disabled	Enables or disables the support for USB. If disabled, the USB EHCI controller will not be initialized by the BIOS.
	Legacy USB Support	Auto Enabled Disabled	Enables legacy support over USB to support Keyboard and Mouse
	EHCI Hand-Off	Enabled Disabled	Controls the hand off of EHCI ownership from BIOS to OS at boot time.
USB hardware delay	USB transfer time-out	1sec / 5sec / 10sec / 20sec	The time-out value for Control, Bulk, and Interrupt transfers.
	Device Reset time-out	10sec / 20sec / 30sec / 40sec	Time Out for a device to Reset
	Device power-up delay	Auto Manual	Maximum time the device will take before it properly reports itself to the Host Controller.
	Device power-up delay	5	



**Table 24: USB Configuration Menu**

**3.2.2.3 Trusted Computing**

Please note that Trusted Computing support is disabled by default in the factory defaults to save system boot time. If disabled, the Trusted Computing Menu will not display any status information.



**Figure 25: Platform Setup: Trusted Computing**

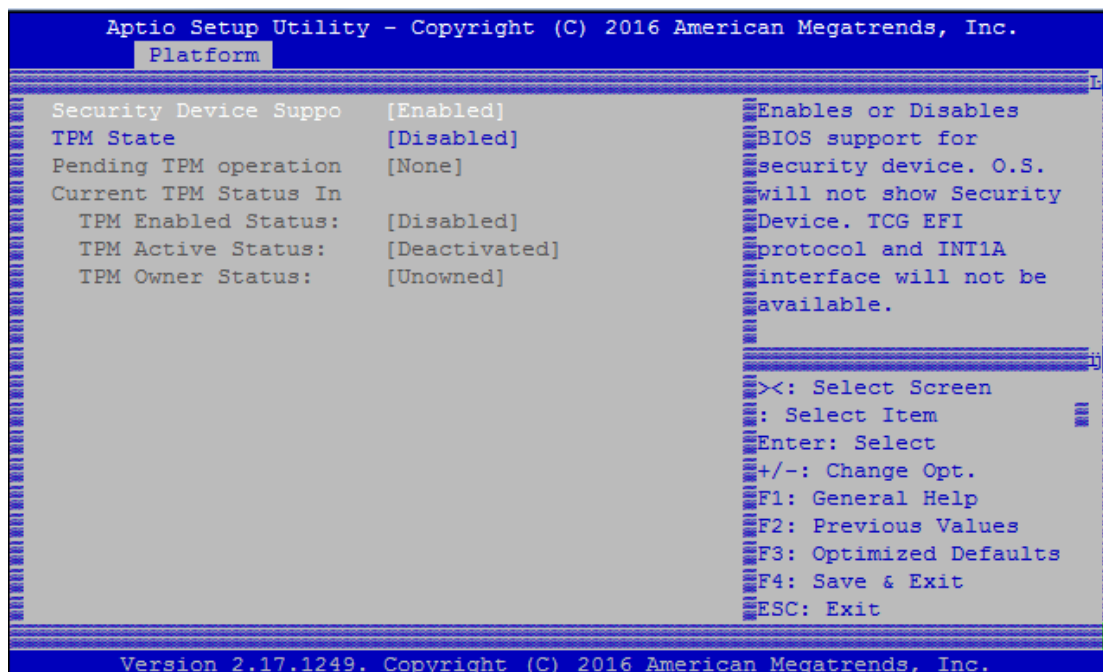
Group	Setup item	Access / Options	Description
Configuration	Security Device Supp	Auto TPM1.2 TPM2.0	Auto will support both or set the support for the TPM 1.2 or TPM2.0.
Current Status information	Support Turned Off	Display Only	Is displayed when TPM support is disabled
	TPM State	Display Only	Shows TPM Enablement Status
	TPM Active State	Display Only	Shows TPM Activation Status
	TPM Owner	Display Only	Shows Current TPM Owner

**Table 25: Trusted Computing Menu**



**3.2.2.3.1 Trusted Computing with TPM module installed**

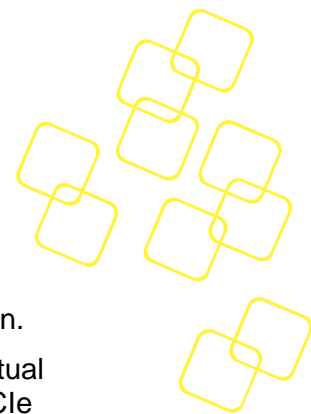
When system with TPM2.0 module installed, and the BIOS will auto detect it and the related setting will be shown in the BIOS setup menu as below.



**Figure 26: Platform Setup: Trusted Computing with TPM1.2**

Group	Setup item	Access / Options	Description
TPM Device Found	Security Device Supp	Enable Disable	BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
	TPM State	Enable Disable	Enable/Disable Security Device. NOTE: Your Computer will reboot during restart in order to change State of the Device.
	Pending operation	None Enable Take Ownership Disable Take Ownership TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Current TPM Status In	TPM Enabled Status	Enable	Display Only
	TPM Active Status	Activated	Display Only
	TPM Owner Status	Unowned	Display Only

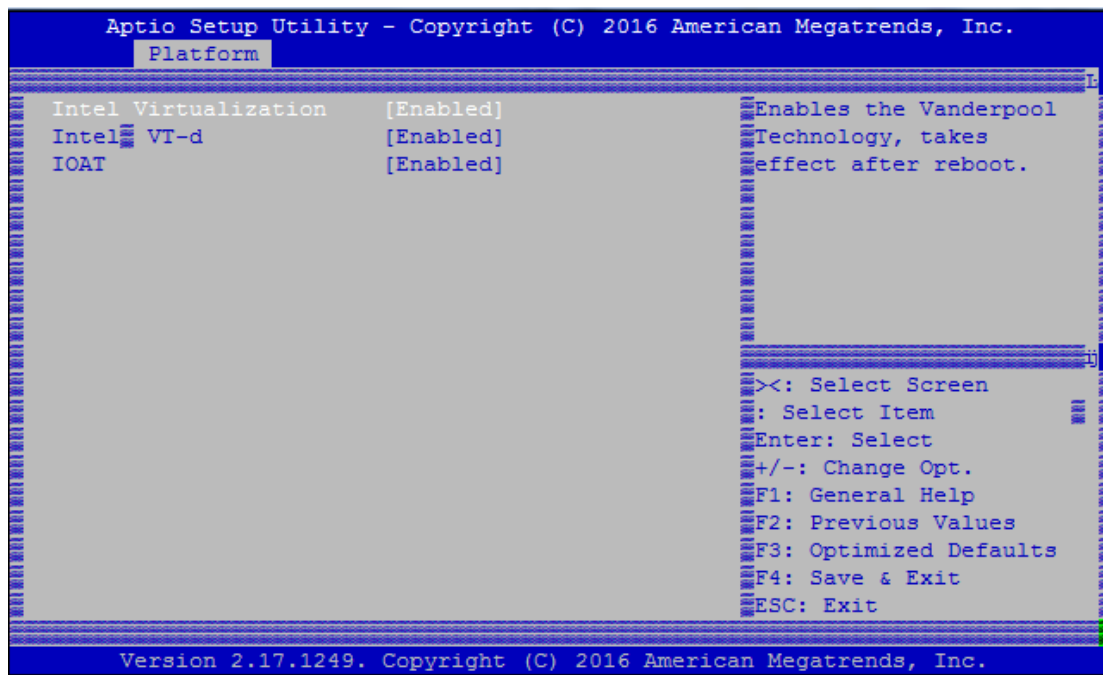
**Table 26: Trusted Computing Menu with TPM2.0**



### 3.2.2.4 Virtualization

This sub menu allows you to change the settings used for Virtualization function.

Intel® Virtualization Technology for Directed I/O (VT-d). Thus, BIOS handle virtual functions exposed by PCIe devices in case SR-IOV is supported, otherwise PCIe devices will be assigned to virtual machines in pass-through mode. This applies for all PCIe devices.



**Figure 27: Platform Setup: Virtualization**

Group	Setup item	Access / Options	Description
None	Intel Virtualization	Enable Disable	Enable/Disable Intel Virtualization Technology , take effect after reboot
	Intel VT-d	Enable Disable	Enable/disable Intel Virtualization Technology for Directed I/O (VT-d) by reporting the I/O device
	IOAT	Enable Disable	Enable/disable Intel I/O Acceleration Technology

**Table 27: Virtualization Menu**



### 3.2.2.5 Platform Management

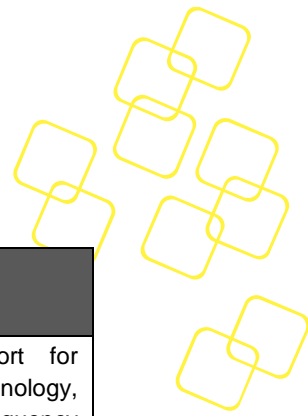
This sub menu allows you to change the settings used for related CPU utilization setting.

The default configuration for CPU was optimized setting for getting better performance for networking, so it is not recommend to change it.

```
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Platform
-----
Power Technology      [Custom]      Enable the power
EIST                  [Disabled]    management features.
P-state coordination  [HW_ALL]
CPU C3 report         [Disabled]
CPU C6 report         [Disabled]
Package C State limit [C0/C1 state]
Energy Performance Tu [Enabled]
Local x2APIC          [Disabled]
WHEA Support          [Disabled]
Bmc self test log
System Event Log
-----
><: Select Screen
: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
-----
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

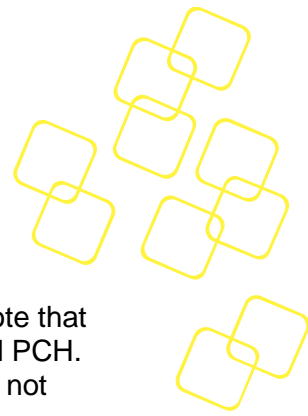
**Figure 28: Platform Setup: Platform Management**





Group	Setup item	Access / Options	Description
None	EIST	Enable Disable	Enable or disable BIOS support for Enhanced Intel SpeedStep Technology, When enabled, OS sets CPU frequency according load. When disabled, CPU frequency is set at max non-turbo.
	P-state coordination	HW_ALL	HW_ALL (hardware) coordination is recommended over SW_ALL and SW_ANY (software coordination).
	CPU C3 report	Enable Disable	Enable/Disable CPU C3(ACPI C2) report to OS. Recommended to be disabled.
	CPU C6 report	Enable Disable	Enable/Disable CPU C6(ACPI C2) report to OS Recommended to be enabled.
	Package C State limit	C0/C1 state C2 state C6(non Retention) state C6(Retention) state	Package C State limit. The "waking-up time" will be longer if Package C state limit setting is deep C state support.
	Energy Performance Tu	Enable Disable	Selects whether BIOS or Operating System chooses energy performance bias tuning.
	WHEA Support	Enable Disable	Enable or disable the WHEA support
BMC Self test log	Erase Log	Yes, On every reset	Erase Log Options
	When log is full	Clear Log	Select the action to be taken when log is full
System event log	SEL Components	Enable Disable	Change this to enable or disable all features of System Event Logging during boot.
	Erase SEL	No	Choose options for erasing SEL.
	When SEL is Full	Do Nothing	Choose options for reactions to a full SEL.
	Log EFI Status Codes	Error code	Disable the logging of EFI Status Codes or log only error code or only progress code or both

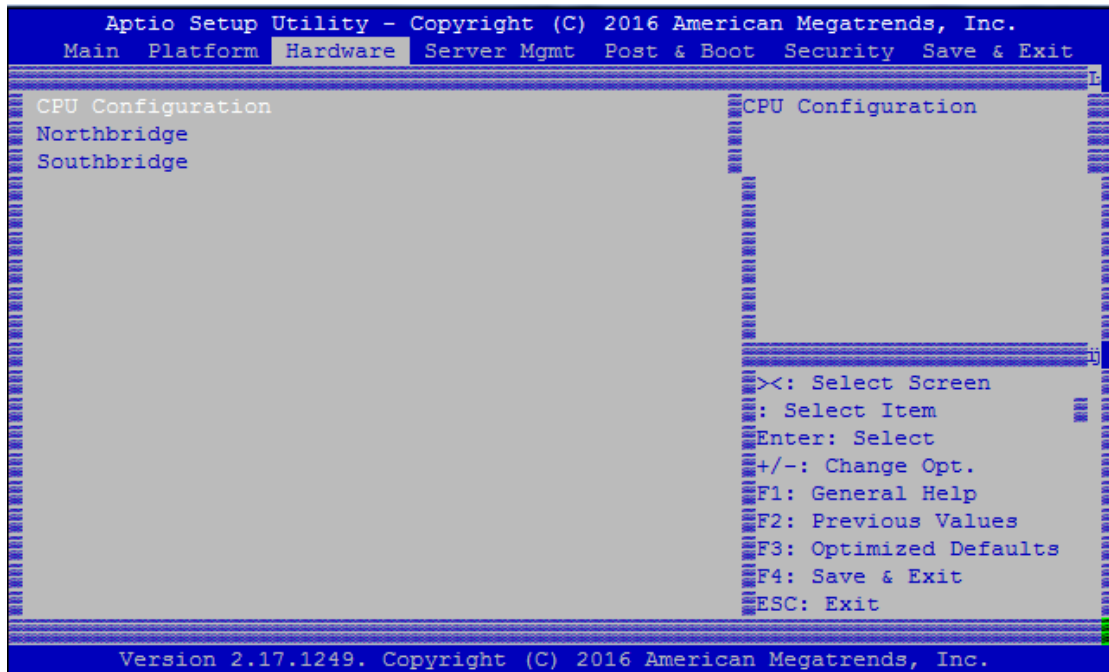
**Table 28: Platform Management Menu**



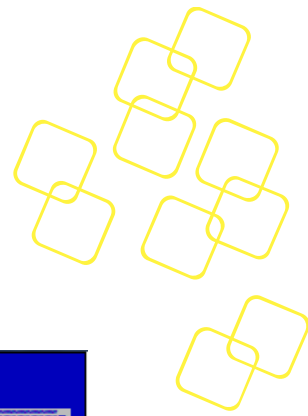
### 3.2.3 Hardware

This sub menu allows you to change the settings of the Intel chipset. Please note that “chipset” is a legacy term and the related functionality is split over the CPU and PCH. Similarly, the terms “South Bridge” and “North Bridge” are legacy terms and do not represent the silicon implementation any more. However, those terms are kept consistent with previous products to allow users to navigate more easily.

The sub menus are described on the following pages.

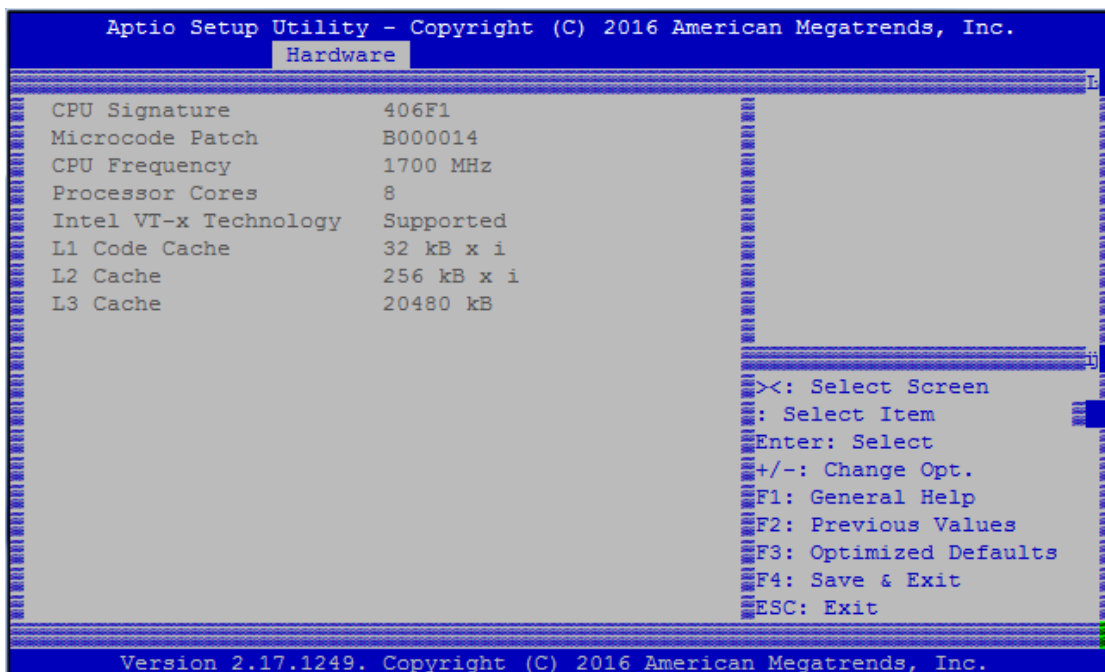
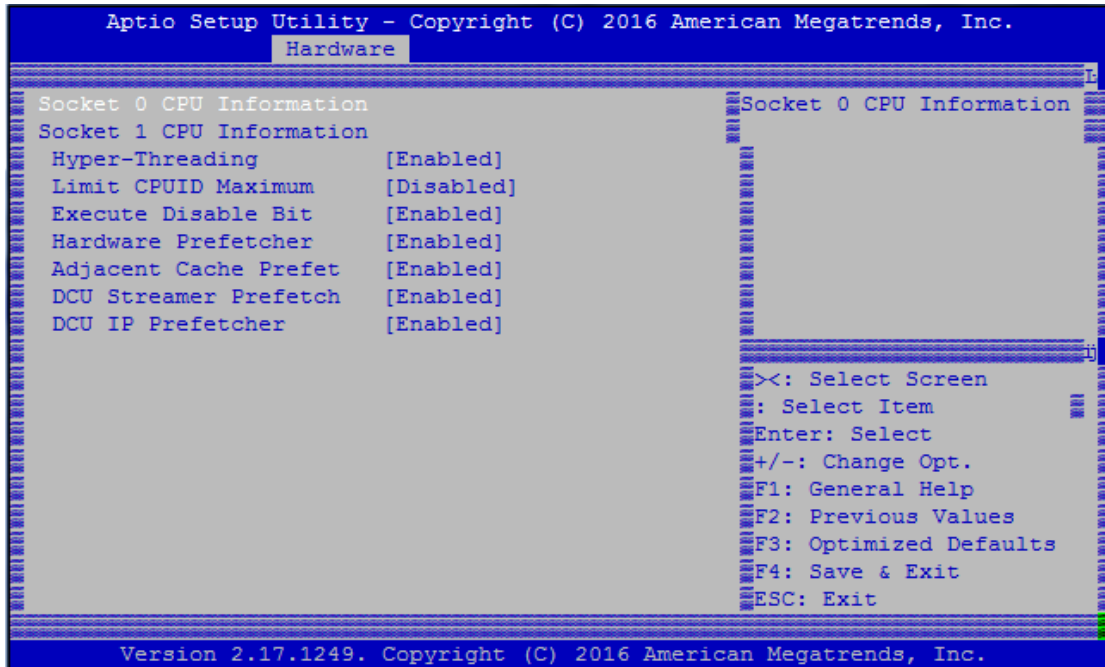


**Figure 29: Hardware Configuration Menu**

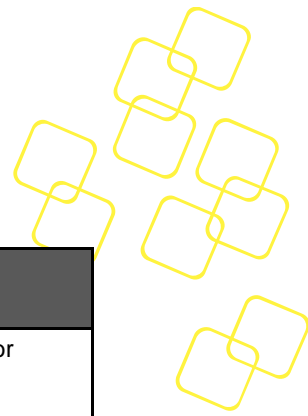


### 3.2.3.1 Hardware Setup: CPU Configuration

This menu supports configuration of the Xeon-EP CPU.



**Figure 30: Chipset: Processor Configuration Menu(FWA-5020U-D0A1R)**



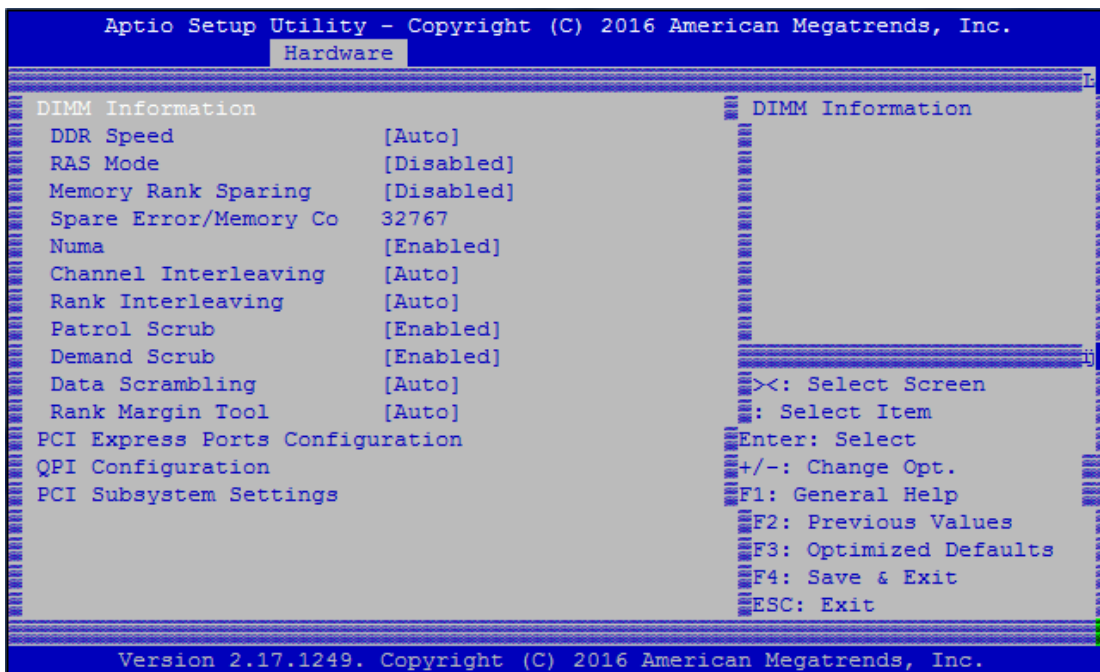
Group	Setup item	Access / Options	Description
Socket0 CPU information	CPU signature	Display only	Displays information on the processor installed
	Microcode Patch		
	CPU Frequency		
	Processor Cores		
	Intel VT-x Technology		
	L1 code Cache		
	L2 Cache		
	L3 Cache		
Socket1 CPU information	CPU signature	Display only	Displays information on the processor installed
	Microcode Patch		
	CPU Frequency		
	Processor Cores		
	Intel VT-x Technology		
	L1 code Cache		
	L2 Cache		
	L3 Cache		
None	Hyper-threading	Enable Disable	Enables Hyper Threading (Software Method to enable/disable logical processor threads.
	Limit CPUID Maximum	Disable Enable	
	Execute Disable Bit	Enable Disable	Execute Disable Bit allows the processor to classify areas in memory where application code can be executed and cannot preventing certain classes of malicious buffer overflow attacks when combined with a supporting operating system.
	Hardware Prefetcher	Enable Disable	Enable or disable Hardware Prefetcher feature. = MLC Streamer Prefetcher (MSR 1A4h Bit[0])
	Adjacent Cache Line Prefetch	Enable Disable	Enable or disable Adjacent Cache Prefetch feature. = MLC Spatial Prefetcher (MSR 1A4h Bit[1])
	DCU Streamer Prefetch	Enable Disable	Enable or disable DCU Streamer Prefetcher feature. DCU streamer prefetcher is an L1 data cache prefetcher (MSR 1A4h [2]).
	DCU IP Prefetcher	Enable Disable	Enable or disable DCU IP Prefetcher feature. DCU IP prefetcher is an L1 data cache prefetcher (MSR 1A4h [3]).

**Table 29: Processor Configuration Menu**

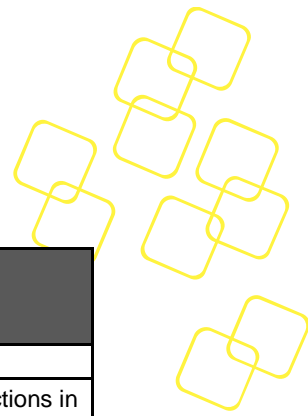


### 3.2.3.2 Hardware Setup: North Bridge Configuration

This menu helps to clarify the configuration of the memory controller and related features

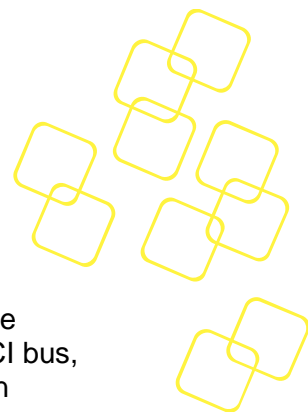


**Figure 31: NorthBridge Configuration Menu**



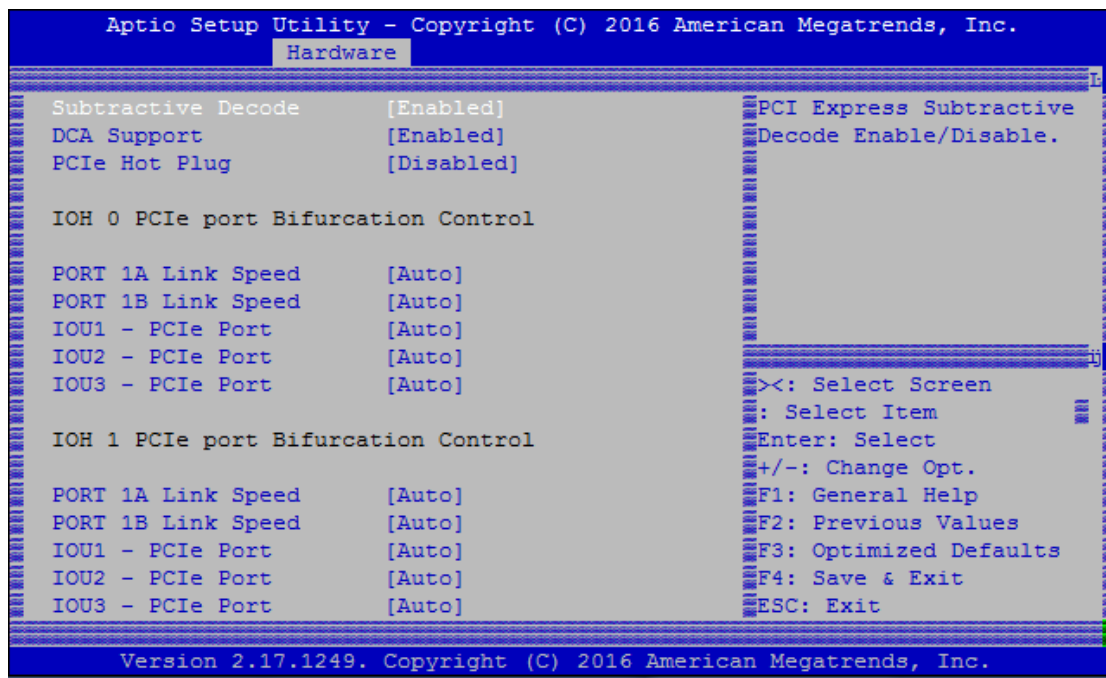
Group	Setup item	Access / Options	Description
	DIMM Information	Display only	
	DDR Speed	Auto 1333 1600 1867 2133 (MHz)	Maximum Memory Frequency Selections in Mhz. Do not select Reserved
	RAS Mode	Disabled Mirror Mode Lockstep Mode	MEnable/Disable RAS modes. Enabling Sparing and Mirroring is not supported. In case if enabled, Sparing will be selected.
	Memory Rank Sparing	Disabled Enabled	Enable/Disable RMemory Rank Sparing
	Spare Error/Memory Co	32767	ESpare Error/Memory Correctable Threshold (1 - 32767 )
	Numa	Disabled Enabled	EEnable or Disable Non uniform Memory Access (NUMA).
	Channel Interleaving	Auto 1-way Interleave 2-way Interleave 3-way Interleave 4-way Interleave	ESelect Channel Interleaving setting
	Rank Interleaving	Auto 1-way Interleave 2-way Interleave 3-way Interleave 4-way Interleave	Select Crank Interleaving setting
	Patrol Scrub	Disabled Enabled	SEnable/Disable Patrol Scrub
	Demand Scrub	Disabled Enabled	Enable/Disable PDemand Scrub
	Data Scrambling	Auto Disabled Enabled	Enable/s data scrambling
	Rank Margin Tool	Auto Disabled Enabled	Enables dthe rank margin tool to run after DDR3 memory training
PCI Express Ports Configuration	NA	NA	NA
QPI Configuration	NA	NA	NA
PCI subsystem Settings	NA	NA	NA

**Table 30: Northbridge Configuration Menu**



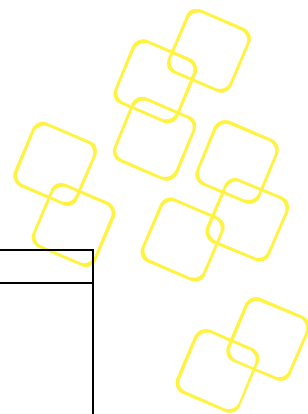
### 3.2.3.3 PCI Express Port Configuration

This sub-menu contains settings for the PCIe subsystem. Some menu items are referred to as “PCI” settings. Although the FWA-5020 does not implement a PCI bus, these settings still apply to the platform as PCIe is using the same configuration mechanism as PCI.



**Figure 32: Hardware Setup: PCI Subsystem**

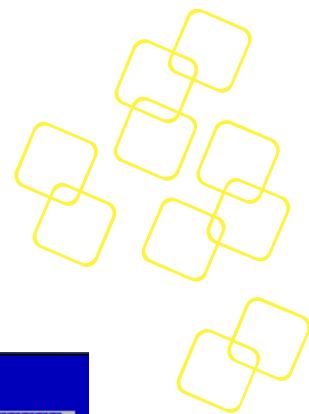
Group	Setup item	Access / Options	Description
None	Subtractive Decode	Enabled Disable	PCI Express Subtractive Decode Enable/disable
	PCIe Hot Plug	Enabled Disable	Enable PCIe hot plug
	Above 4G Decoding	Enabled Disable	Enables or Disables 64bit capable Devices to be Mapped above 4GB in the Address Space.
	SR-IOV Support	Enabled Disable	Enable this for support Dingle Root IO virtualization
	Above 4G Decoding	Enabled / Disabled	Enables or Disables 64bit capable Devices to be Mapped above 4GB in the Address Space.
IOH 0 PCIe port Bifurcation Control	PORT 1A Link Speed	GEN1 GEN2 GEN3 AUTO	Change PCI Express Devices Settings.
	PORT 1B Link Speed	GEN1 GEN2 GEN3	Change PCI Express Devices Settings.



		AUTO	
	IOU1 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation
	IOU2 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation
	IOU3 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation
IOH 1 PCIe port Bifurcation Control	PORT 1A Link Speed	GEN1 GEN2 GEN3 AUTO	Change PCI Express Devices Settings.
	PORT 1B Link Speed	GEN1 GEN2 GEN3 AUTO	Change PCI Express Devices Settings.
	IOU1 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation
	IOU2 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation
	IOU3 - PCIe Port	x4x4x4x4 x4x4x8 x8x4x4 x8x8 x16 Auto	Select PCIe port bifurcation

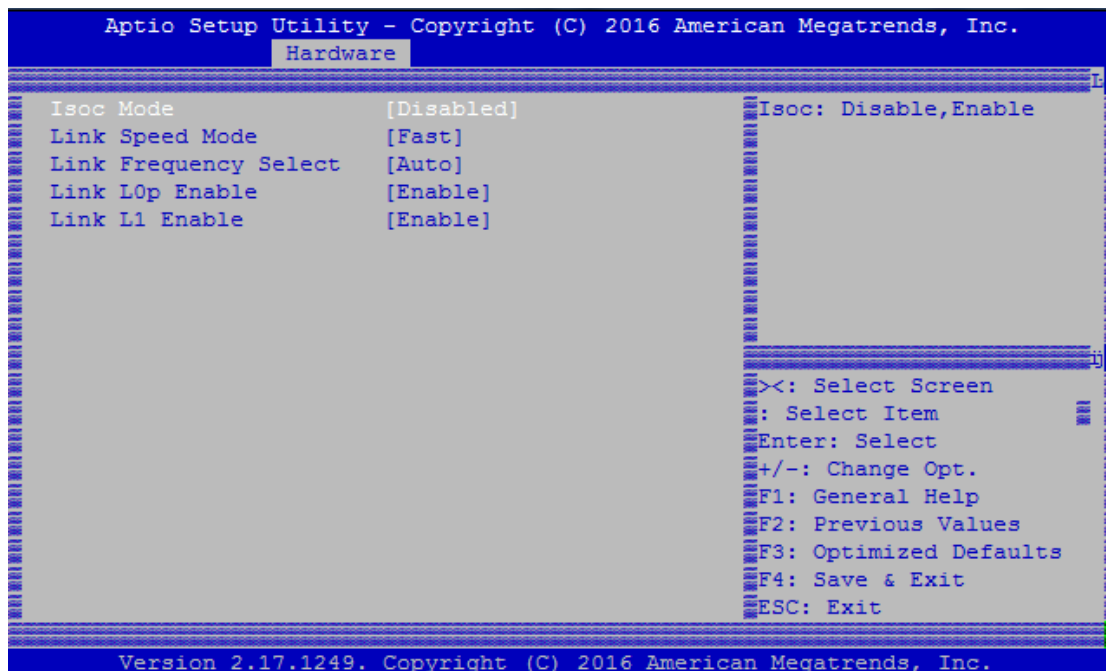
**Table 31: Hardware Setup: PCI Subsystem Menu Items**





### 3.2.3.4 QPI Configuration

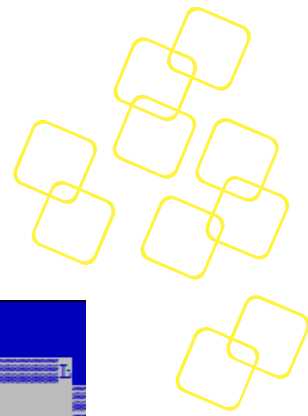
This sub-menu contains settings for the QPI configuration.



**Figure 33: Hardware Setup: QPI configuration**

Group	Setup item	Access / Options	Description
None	Isoc	Enabled Disable	Enable/disable ISOC
	Link Speed Mode	Fast Slow	Select QPI link speed as either the POR speed (Fast) or default speed (slow)
	Link Frequency Select	Auto 6.4 GB/s 8.0 GB/s 9.6 GB/s Auto Limited	Allows for Selecting the QPI link frequency
	Link0p Enable	Enabled Disabled	Enable/disable Link0
	Link1p Enable	Enabled Disabled	Enable/disable Link1

**Table 32: Hardware Setup: QPI configuration Menu Items**



### 3.2.3.5 PCI Subsystem Settings

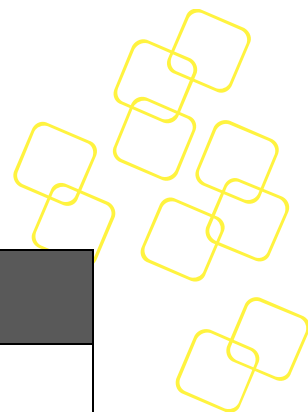
```
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Hardware
-----
Above 4G Decoding      [Disabled]      Enables or Disables
SR-IOV Support        [Disabled]      64bit capable Devices
                                                              to be Decoded in Above
PCI Common Settings Settings
PCI Latency Timer     [32 PCI Bus Clocks]
VGA Palette Snoop    [Enabled]
PERR# Generation     [Enabled]
SERR# Generation     [Enabled]
PCI Express Device Settings
-----
><: Select Screen
: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
-----
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

### 3.2.3.6 Hardware Setup: South Bridge Configuration

This menu contains settings for the South Bridge for related SATA and USB and ACPI setting etc.

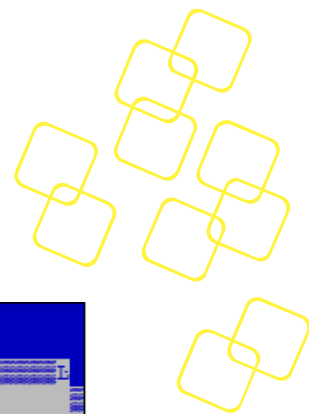
```
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Hardware
-----
SATA Configuration
USB Configuration
ACPI Settings
Runtime Error Logging
Serial Mux           [Disabled]
PCH Compatibility RID [Disabled]
SMBus Controller    [Enabled]
GbE Controller      [Enabled]
Wake on LAN         [Disabled]
Restore AC Power Lose [Power Off]
-----
><: Select Screen
: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
-----
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

**Figure 34: Hardware Setup: South Bridge configuration**

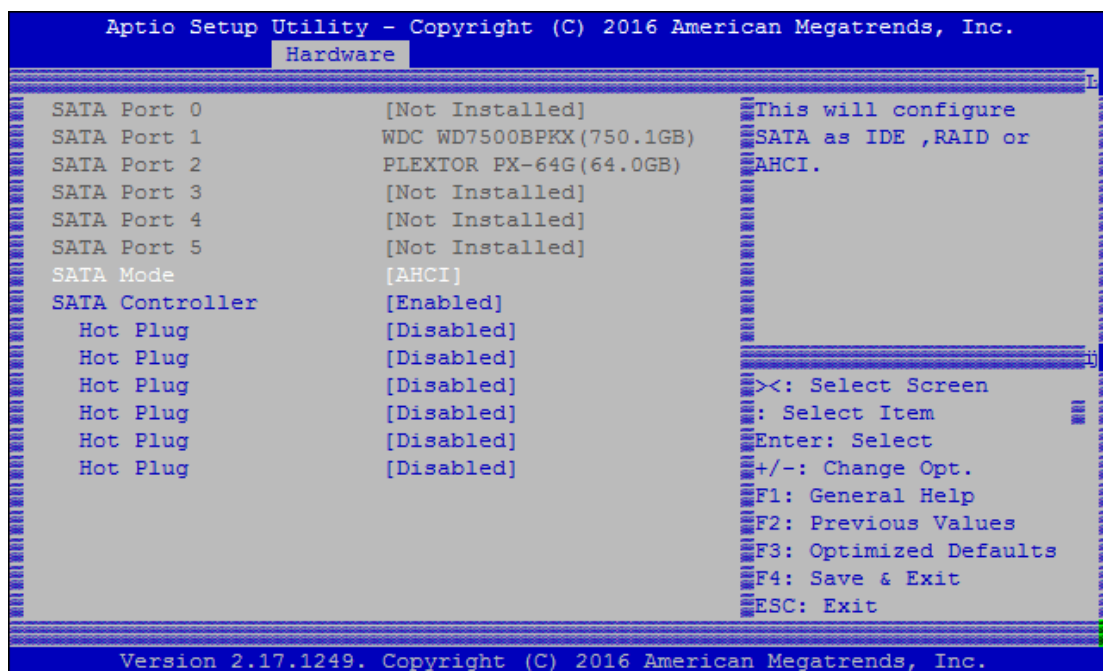


Group	Setup item	Access / Options	Description
	SATA Configuration	N/A	Select sub-menu.
	USB Configuration	N/A	Select sub-menu.
	ACPI Settings	N/A	Select sub-menu.
	Runtime Error Logging	N/A	Select sub-menu.
	Serial Mux	Enable/Disable	
	PCH Compatibility RID	Enable/Disable	Enable or Disable PCH's CCRID
	SMBus Controller	Enable/Disable	Enable or Disable SMBus CDevice
	GbE Controller	Enable/Disable	
	Wake on LAN	Enable/Disable	
	Restore AC Power Lose	Power On/Power Off/ Last State	Select S0/S5 for ACPI state after a G3

**Table 33: Hardware Setup: South Bridge configuration Menu Items**



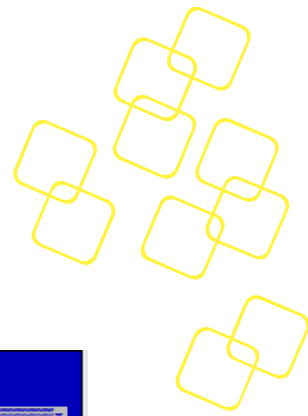
### 3.2.3.6.1 South Bridge Configuration: SATA Configuration



**Figure 35: Hardware Setup: SATA configuration**

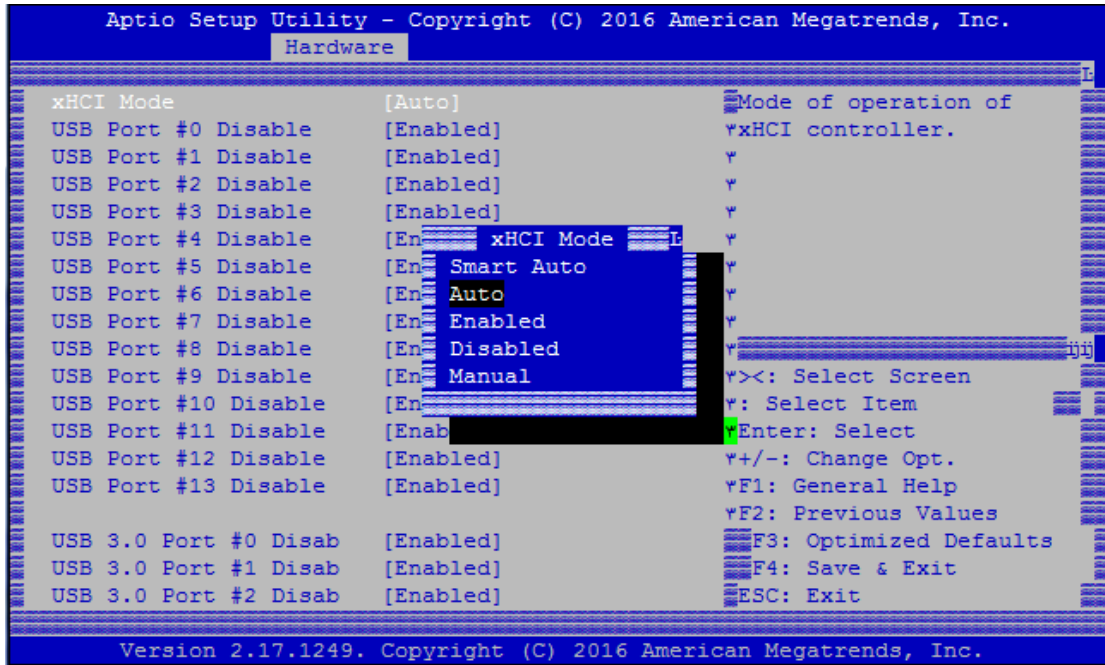
Feature	Default	Description
SATA Port0	Display only	Show current SATA devices in use on the FWA-5020
SATA Port1	Display only	
SATA Port2	Display only	
SATA Port3	Display only	
SATA Port4	Display only	
SATA Port5	Display only	
SATA Mode	AHCI Mode	(1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.
SATA Controller	Enabled	To enable the SATA controller

**Table 34: Hardware Setup: SATA configuration Menu Items**



### 3.2.3.7 USB Configuration

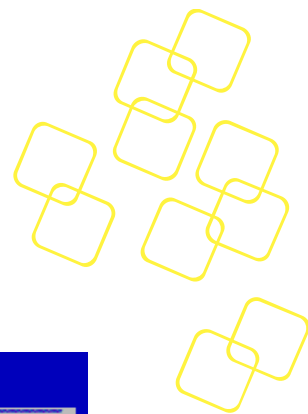
This menu contains settings for the USB configuration.



**Figure 36: Hardware Setup: USB configuration**

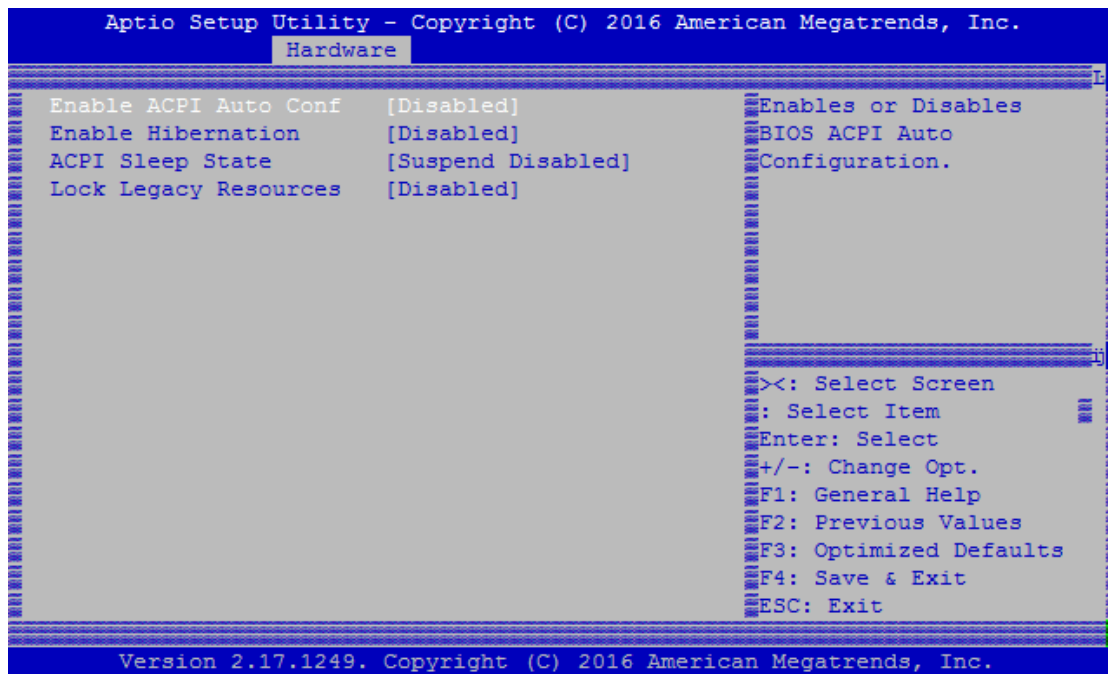
Group	Setup item	Access / Options	Description
None	xHCI Mode	Smart Auto Auto Enabled Disabled Manual	To set up the mode of operation of xHCI controller

**Table 35: Hardware Setup: USB configuration Menu Items**



### 3.2.3.8 ACPI Setting

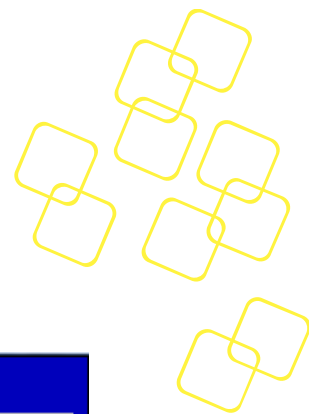
This menu contains settings for the ACPI configuration.



**Figure 37: Hardware Setup: ACPI configuration**

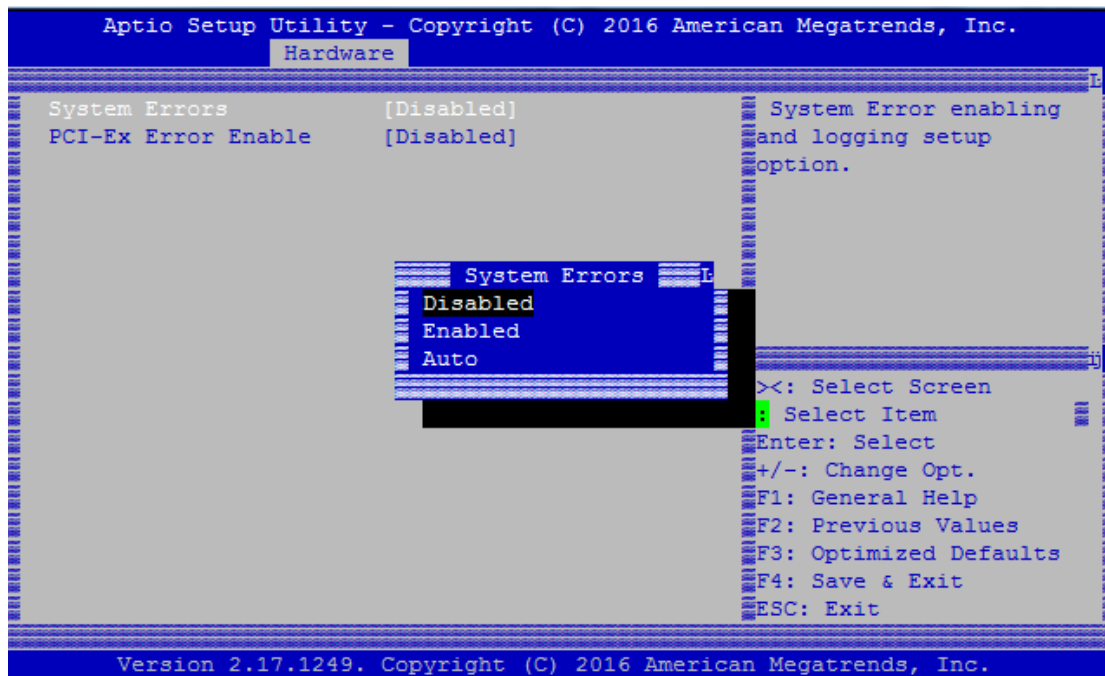
Group	Setup item	Access / Options	Description
None	Enable ACPI Auto Configuration	Enabled Disabled	Enable or disable BIOS ACPI auto configuration
	Enable Hibernation	Enabled Disabled	Enable the system ability to hibernate (OS/S4 sleep state), this option may be not effective with some O.S
	ACPI Sleep State	Suspend Disabled S1 (CPU Stop Clock)	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
	Lock Legacy Resources	Enabled Disabled	Enable lock of legacy resources

**Table 36: Hardware Setup: ACPI configuration Menu Items**



### 3.2.3.9 Runtime Error logging

This sub-menu contains settings for the Runtime error logging configuration.



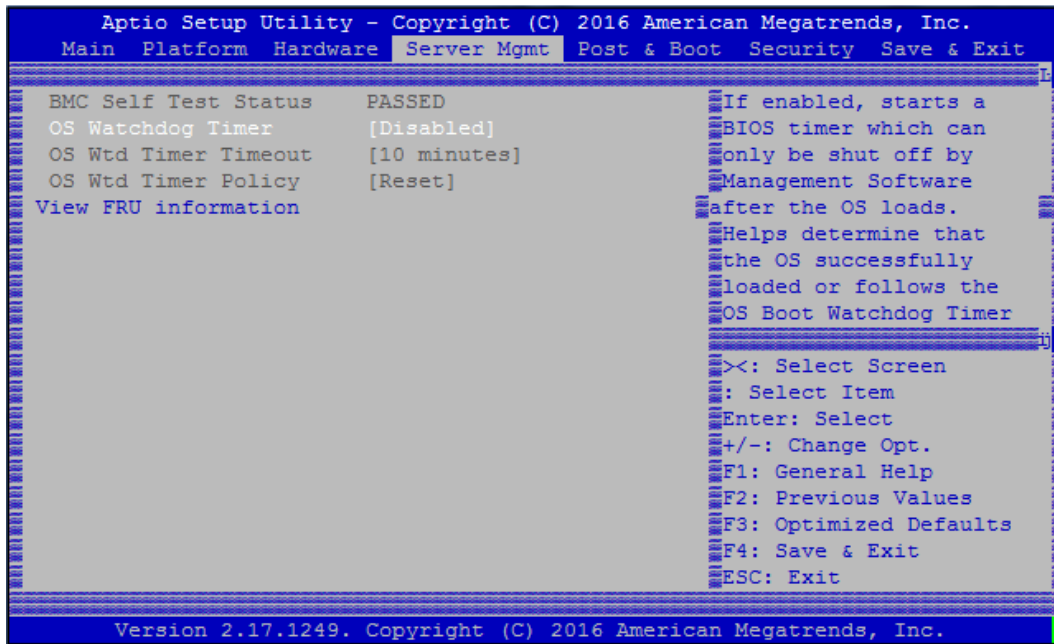
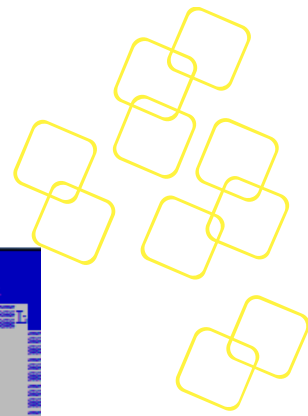
**Figure 38: Hardware Setup: Runtime Error logging configuration**

Group	Setup item	Access / Options	Description
None	System Errors	Enabled Disabled Auto	System error enabling and logging setup option
	PCI-Ex Error Enable	Enabled Disabled	Enable or Disable PCI-Ex Error

**Table 37: Hardware Setup: Runtime Error logging Menu Items**

### 3.2.4 Server Mgmt

The Server Mgmt menu supports configuring BMC related features such as OS Watchdog Timer, etc.



**Figure 39: Server Mgmt configuration**

Group	Setup item	Access / Options	Description
None	BMC Self Test Status	Display only (Passed)	BMC self test status indication during power on process
	OS Watchdog Timer	Enable Disable	If enabled, starts a BIOS timer which can only be shut off by Management Software after the OS loads. Helps determine that the OS successfully loaded or follows the OS Boot Watchdog Timer
	OS Wtd Timer Timeout	5 minutes 10 minutes 15 minutes 20 minutes	Configure the length of the OS Boot Watchdog Timer. Not available if OS Boot Watchdog Timer is disabled.
	OS Wtd Timer Policy	Do Nothing Reset Power Down	Configure how the system should respond if the OS Boot Watchdog Timer expires. Not available if OS Boot Watchdog Timer is disabled.
	View FRU information	N/A	sub-menu.

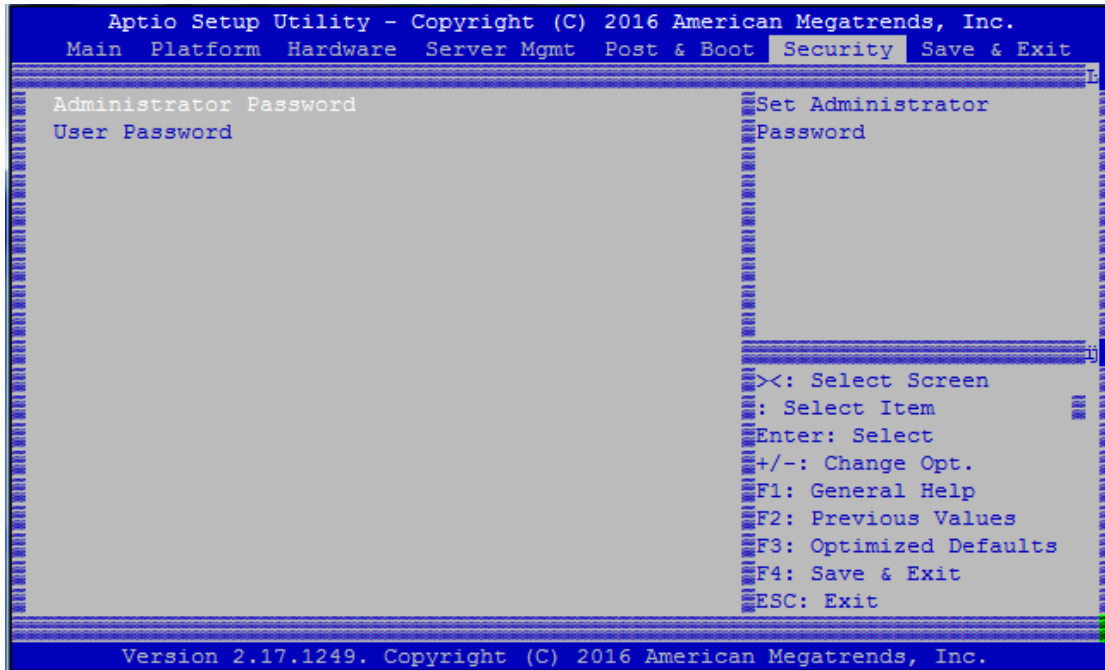
**Table 38: Server Mgmt configuration Menu Items**

### 3.2.5 Security Setup





“**Administrator Password**” allows users to configure the system so that a password after being installed is required each time the system boots, and/or an attempt is made to enter the Setup program.

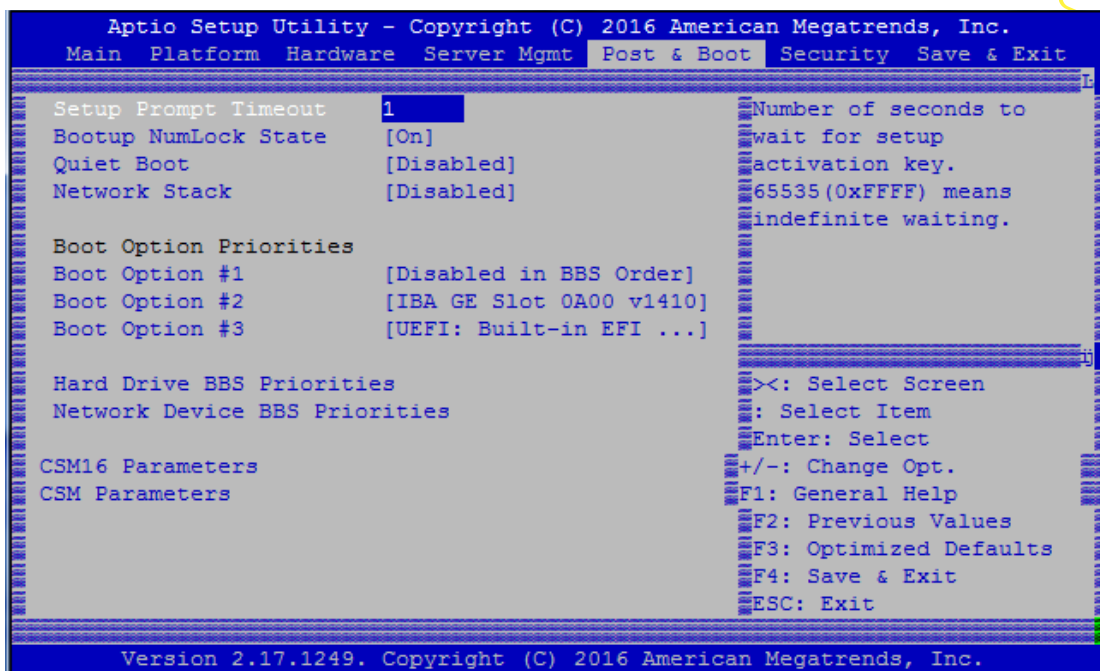
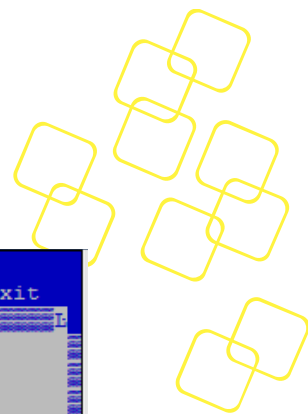


**Note:**

- ◆ If set the “Password Check” is [Setup], then this only limits access to Setup and is only asked for when entering Setup.
- ◆ If set the “Password Check” is [Always], then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights.
- ◆ The password length must be in the following range:
  - Minimum length: 3
  - Maximum length: 20

**3.2.6 POST & Boot Menu**

Users can configure the system boot priority settings via the boot page. The default setting of boot priority of boot option #1 is “UEFI: Built-in EFI Shell”; Users can define the boot priorities based on the application.



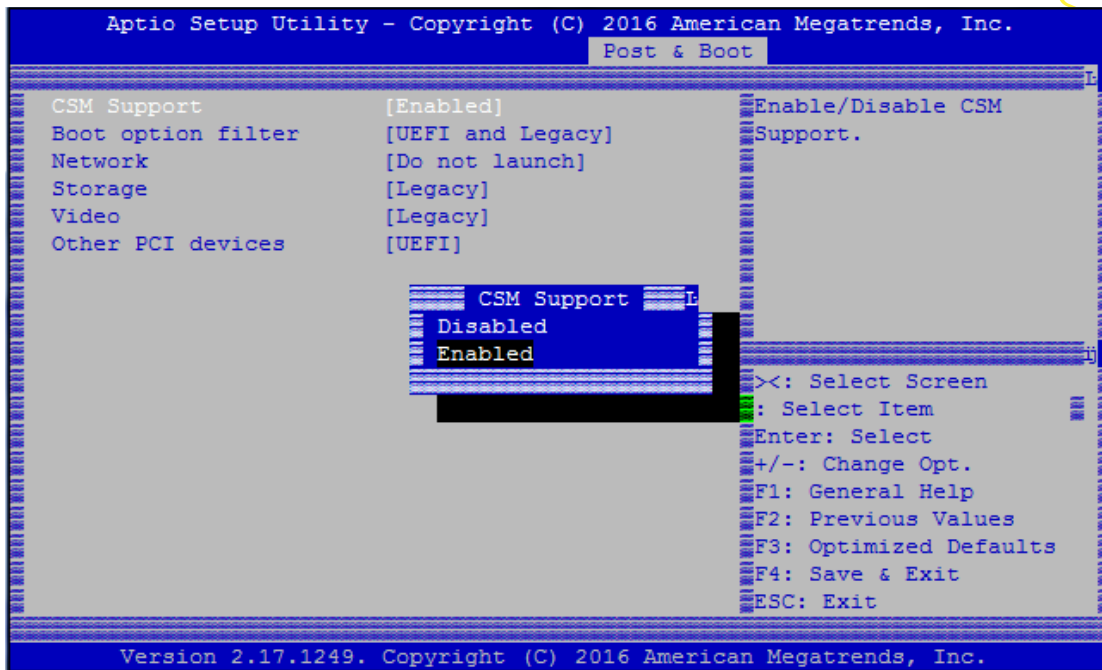
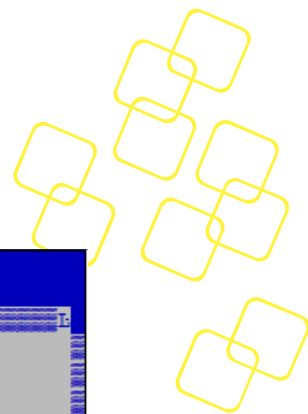
**Figure 40 Boot Configuration**

Feature	Default	Description
Setup Prompt Timeout	1	Number of seconds to wait for setup activation key.
Bootup NumLock State	On	Select the keyboard NumLock state.
Quiet Boot	Disabled	Enables or disables Quiet Boot option.
Network Stack	Disabled	Enables or disables boot via Network (PXE)
Boot Option Priority	User Defined	Sets the system boot order.
CSM16 Parameters	Option ROM Messages	Force BIOS Keep Current
CSM Parameters	CSM Support	Enable the CSM support

**Table 39 Boot Configuration**

### 3.2.6.1 Compatibility Support Module (CSM) Configuration

This submenu allows users to configure the support for legacy BIOS mechanisms and option ROMs.



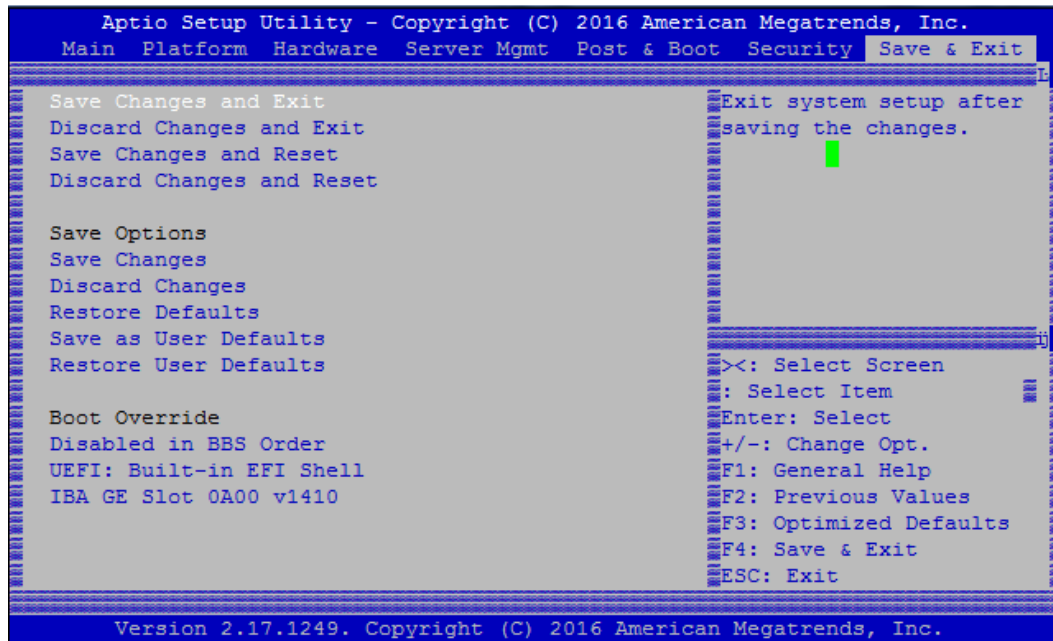
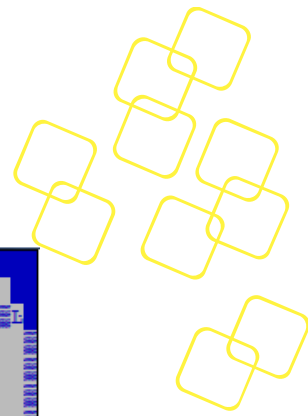
**Figure 41: Post & Boot Setup: CSM Configuration Menu**

Group	Setup item	Access / Options	Description
None	CSM Support	Enabled Disabled	Enables or disables the Compatibility Support Module.
	Boot option filter	UEFI and Legacy Legacy Only UEFI Only	This item allows to control the execution of legacy and UEFI compliant Option ROMs
	Network	Do not launch UEFI Legacy	This item allows a more granular control of OptionROM execution depending of the type of extension device.
	Storage		
	Video		
	Other PCI device ROM		

**Table 40: CSM Configuration Menu**

### 3.2.7 Save & Exit Menu

The FWA-5020 BIOS allows users to store BIOS configuration results as “User Defaults.” Users can select “Save as User Defaults” to record all changes which had been made in previous pages as the default setting for further use.



**Figure 42: Save & Exit Menu**

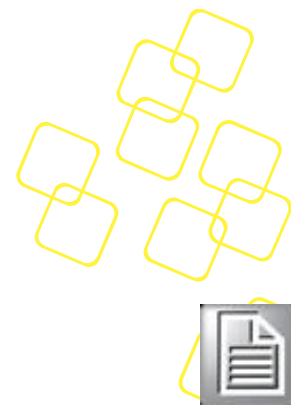
Group	Setup item	Description
None	Save Changes and Exit	Exit setup after saving the changes. Does not update User defaults.
	Discard Changes and Exit	Exit setup without saving any changes.
	Save Changes and Reset	Reset system after saving the changes. Does not update User Defaults.
	Discard Changes and Reset	Reset system without saving the changes.
Save Options	Save Changes	Save Changes made so far to any of the setup options.
	Discard Changes	Discard Changes made so far to any of the setup options.
	Restore Defaults	Restores the BIOS factory defaults to all the setup options.
	Save as User Defaults	Saves the Current BIOS Settings as User Defaults.
	Restore User Defaults	Restores the User defaults to all the setup options.
Boot Override	UEFI: < boot device>	This option allows you to override the specified boot order and use a different boot device for the next boot.

**Table 41: Save & Exit Menu Options**

### 3.3 Installing Components

Please make sure you follow the safety guidelines presented in section 1.1 when making changes to the hardware.



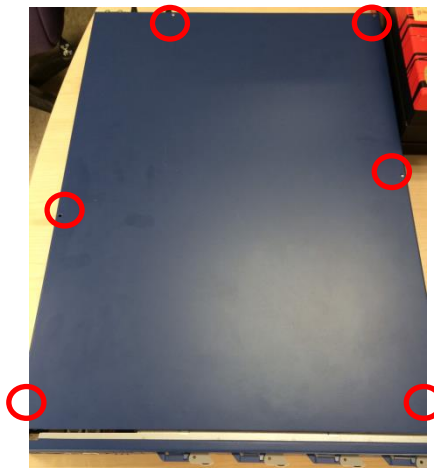


### 3.3.1 Removing the top cover

**You need:**

- a PH2/PH3 screw driver

The top cover is secured by a total of 7 screws, 1 on the left, and 6 on the top cover.



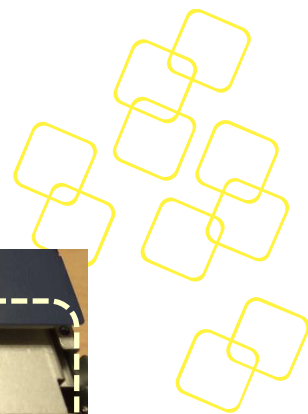
**Figure 43: Top cover screw (Top cover/ FWA-5020U-D0A1R)**

To remove the top cover, remove these screws using a PH1 screw driver. Be sure to keep the screws in a safe place for top cover re-installation.

After that, slide the top cover backwards until the front flange of the top cover disengages with the unit's face plate:



**Figure 44: Slide Top Cover back**



**Figure 45: Top Cover Flange Disengagement(FWA-5020U-D0A1R)**

Now lift off and remove the top cover.

### 3.3.2 Reinstalling the top cover

**You need:**

- a PH1/PH2 screw driver

To re-install the top cover slide it onto the unit from the top with the top cover flange facing the unit's face plate. Keep a gap of about an inch between the front plate and the flange.

After that, slide the top cover forward until the flange is fully seated underneath the face plate.

Now insert the screws in the 7 locations shown above. Tighten each screw only lightly then move on to the next screw. After all screws have been inserted, tighten them.



### 3.3.3 Disk Installation

#### 3.3.3.1 2.5" HDD drive

**You need:**

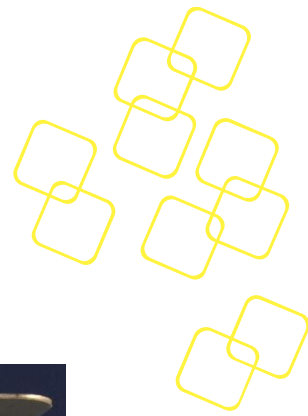
- a PH2 screw driver
- a standard 2.5" SATA HDD
- the HDD carrier module (included in the unit)
- the SATA cable (included in the unit)



**Figure 46: Screws for HDD mounting**

After removing the top cover, follow the instructions below for 2.5" disk installation:

- 1) Remove the HDD module from machine
- 2) The HDD carrier plate has two holes on each side to accommodate different HDD vendor's mounting hole locations.



Insert the HDD module back to machine after the HDD is ready.

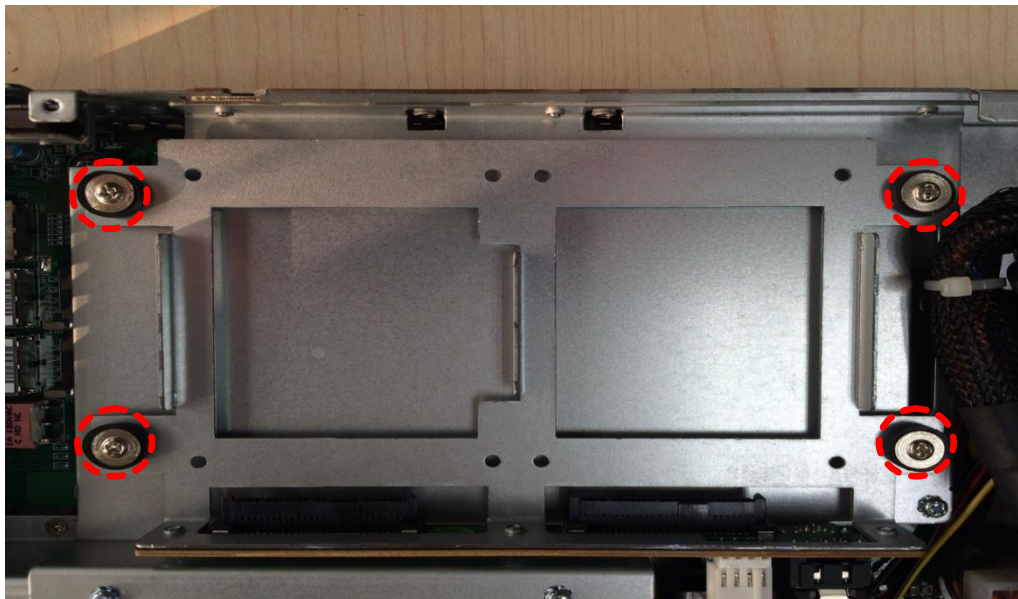
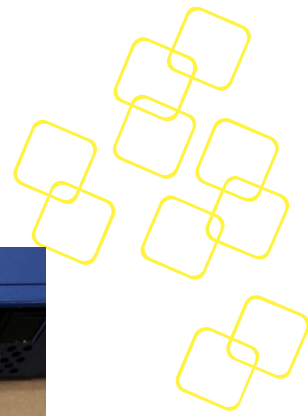


Figure 47: HDD Carrier module install (FWA-5020L/U-00A1R for top one, FWA-5020U-D0A1R for bottom one)

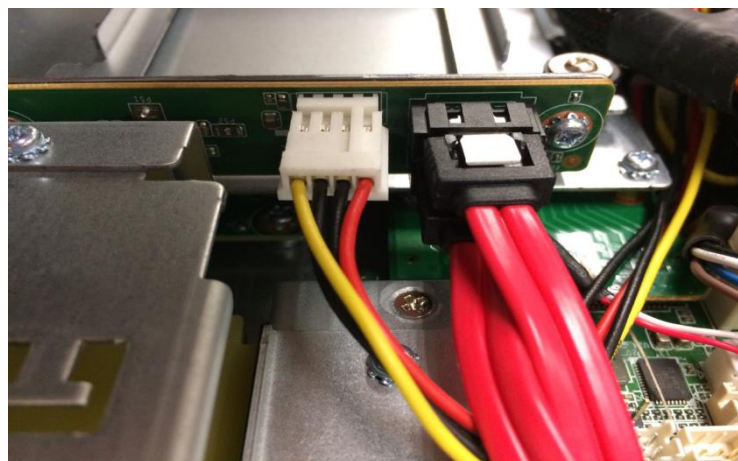


FWA-5020L/U-00A1R: After locking the 4 pcs screw on the side of HDD tray, close the latch and then put it into machine.

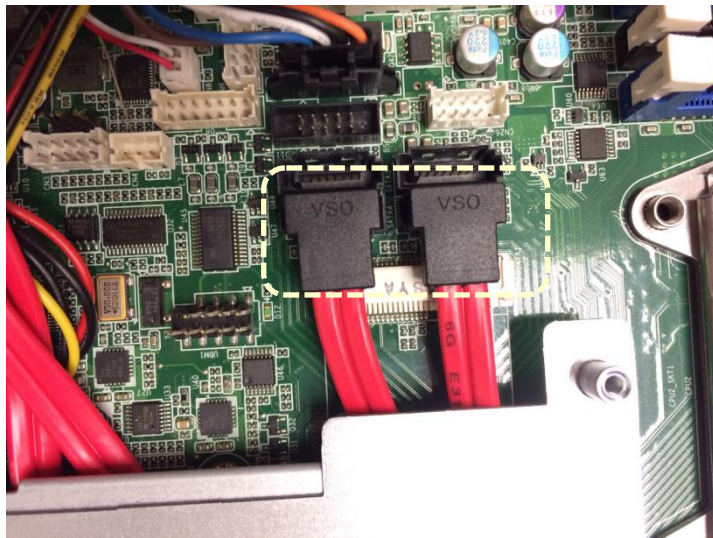
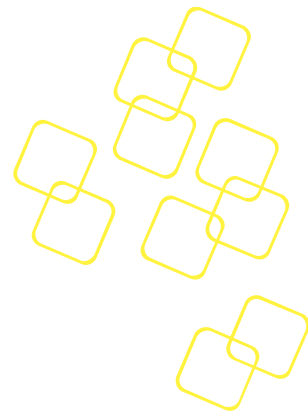
FWA-5020U-D0A1R: Please turn the HDD plate back and lock 8pcs screws into HDD.

**Figure 48: Carrier plate and HDD alignment (Top: FWA-5020L/U-00A1R; Bottom: FWA-5020U-D0A1R)**

Connect the SATA cable delivered with the unit to the disk as well as the mother board connector. Please make yourself be aware of the keying mechanism in the SATA connector before inserting the cable.





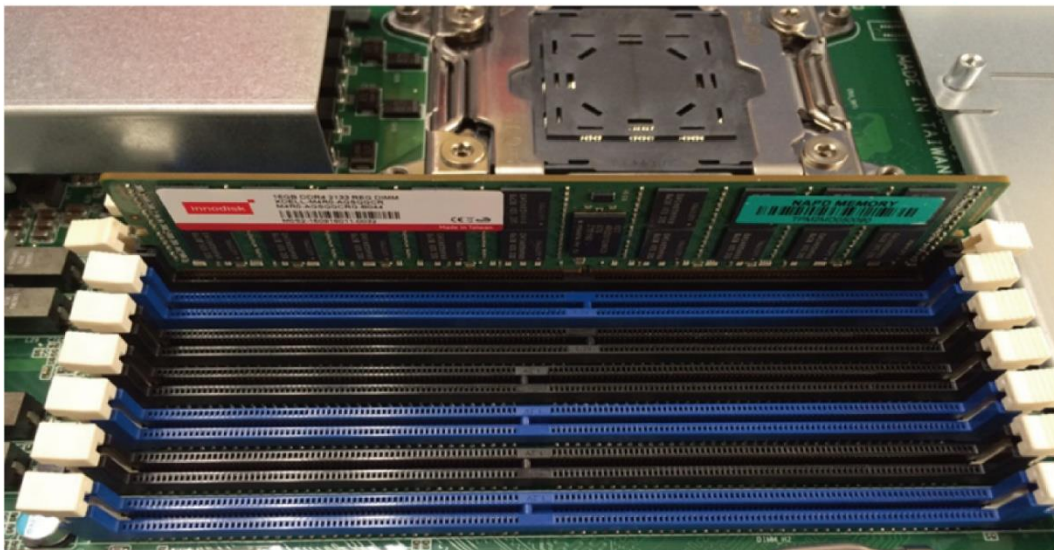


**Figure 49: SATA cabling**

### 3.3.4 Memory Installation

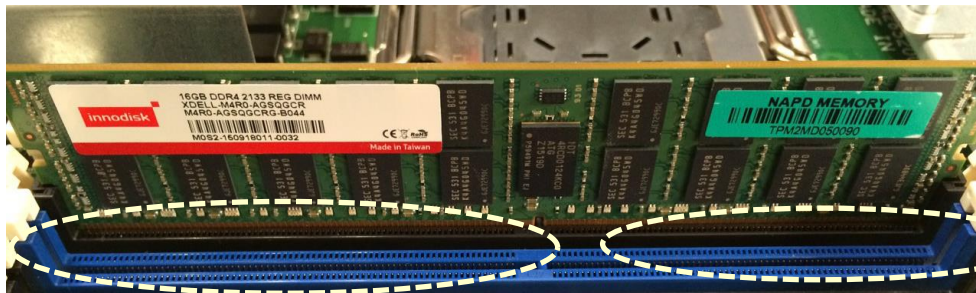
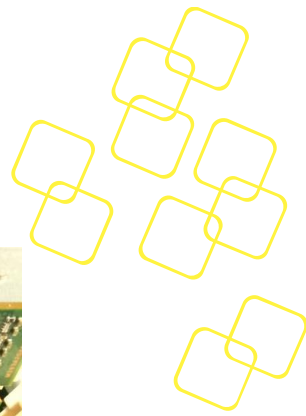
After removing the top cover, follow the instructions below for DIMM installation:

- 1) Double check that the DIMMs to be installed match the requirements of section 2.4.5.
- 2) Open the white latches on the left and right sides of the DIMMs by turning it outwards as indicated by the arrows below.



**Figure 50: Opening DIMM latches**

- 3) Select DIMM orientation so that the keys in the DIMM module and socket match.



**Figure 51: DIMM key alignment**

- 4) Insert the DIMM from the top using the guide rails on the left and right of the DIMM sockets.



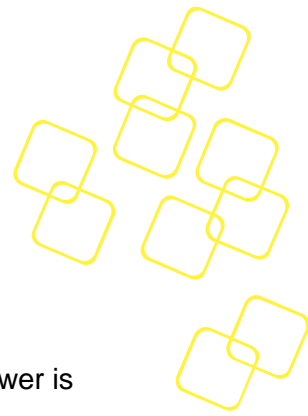
**Figure 52: DIMM insertion into slide rails**

- 5) Put your thumbs near the right and left end of the DIMM and press down the DIMM evenly until the white latches fully close with a click.



**Figure 53: Seating the DIMM in the socket**

- 6) In case you want to install another DIMM, repeat steps 1) to 5) accordingly.



### 3.4 Firmware Upgrades

#### 3.4.1 BIOS

The BIOS can be upgraded using “ipmitool” under Linux. ipmitool-1.8.15 or newer is required. Or go for IPMI command with HPM.1 to upgrade the BIOS .s

“ipmitool” is available via <https://sourceforge.net/projects/ipmitool/> or as part of all major Linux distributions. Documentation on ipmitool can also be found there.

Start ipmitool with the following parameters to update the BIOS on the FWA-5020:

A. ipmitool hpm upgrade (**BIOS Name**) -z 255 force

```
[root@localhost home]# ipmitool hpm upgrade FWA5020_bios_standard_01_12.img -z 255 force
Setting large buffer to 255

PICMG HPM.1 Upgrade Agent 1.0.9:

Validating firmware image integrity...OK
Performing preparation stage...
Services may be affected during upgrade. Do you wish to continue? (y/n): y
OK

Performing upgrade stage:

-----
|ID | Name           | Active           | Versions           | File           | % |
|---|-----|-----|-----|-----|-----|
|* 2|BIOS           | 1.12 00000000   | 1.12 00000000     | 1.12 00000000 |100%|
|   |Upload Time: 05:54 | Image Size: 16777216 bytes
-----

(*) Component requires Payload Cold Reset

Firmware upgrade procedure successful
```

B. ipmitool hpm activate

```
[root@localhost home]# ipmitool hpm activate

PICMG HPM.1 Upgrade Agent 1.0.9:

Waiting firmware activation...OK
```

C. reboot system and follow step A to flash second BIOS chip.

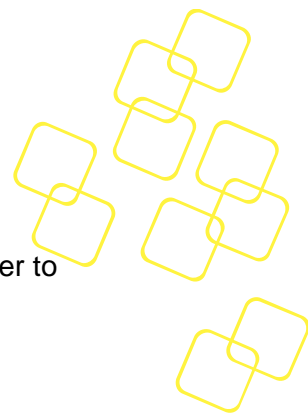
#### 3.4.2 LAN Bypass

LAN Bypass Firmware can be upgraded via the LAN Bypass Software. Please refer to the Advanced LAN Bypass User’s Manual for details.

### 3.5 Replacing FRUs

Please make sure you follow the safety guidelines presented in section 1.1 when making changes to the hardware.





For instruction on how to remove and install the top cover of the unit please refer to section 3.3.

### 3.5.1 Disk drives

#### 3.5.1.1 2.5" HDD

**You need:**

- a PH2 screw driver

a standard 2.5" SATA HDD To remove the HDD, proceed in the reverse of the installation procedure in section 3.3.3.1:

- 5) Detach the HDD power and SATA cables
- 6) Remove the four screws on the corners of the HDD carrier plate and remove the HDD carrier plate from the system
- 7) Remove the HDD mounting screws and extract the HDD from the carrier plate.
- 8) Install a new HDD by following the instructions in section 3.3.3.1.



### 3.5.2 CMOS Battery

**You need:**

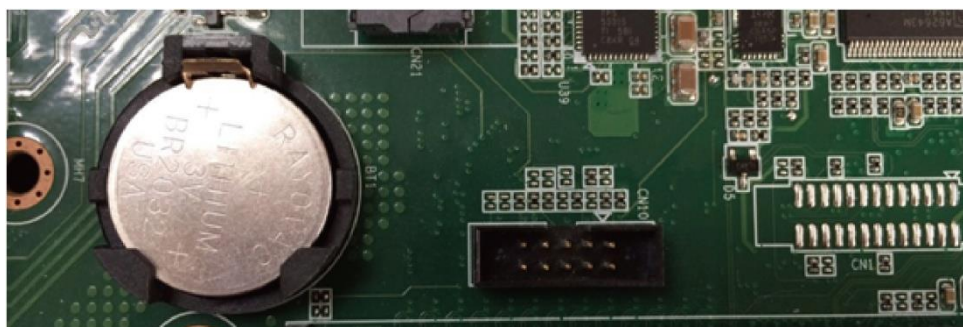
- A BR2032 battery

**Warning!**

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type specified above. Dispose of used batteries according to the manufacturer's instructions.



To replace the RTC's battery located at B1, pull the spring clip securing the battery forward with your finger tip. Please handle with care and do not bend the spring clip. Then extract the battery vertically.



**Figure 54: Pulling up the battery**

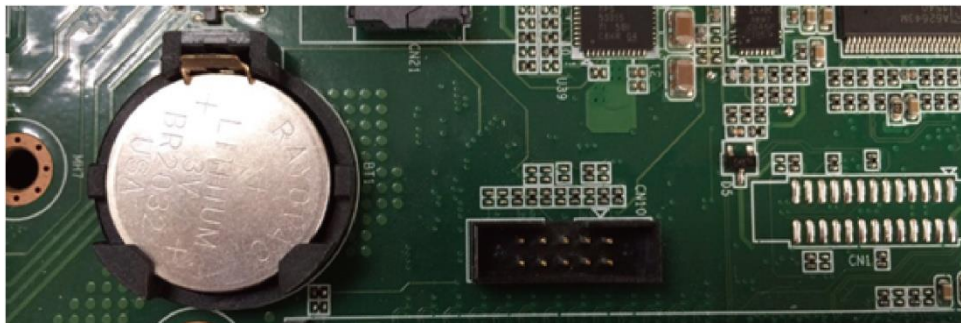
Keeping the spring clip pulled towards you, insert the replacement battery.

Please make sure you insert the battery in correct polarity with the positive pole facing on top and the negative pole facing the bottom. Trying to insert the battery with





incorrect orientation/polarity will damage the battery holder. Additional security risks apply as stated above.

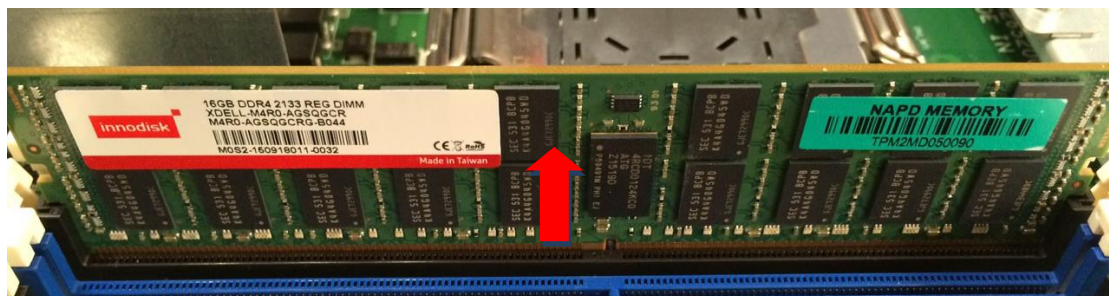


**Figure 55 Battery Polarity**

When the coin cell is seated release the spring clip and control that it moves back into its original position and that it secures the battery correctly.

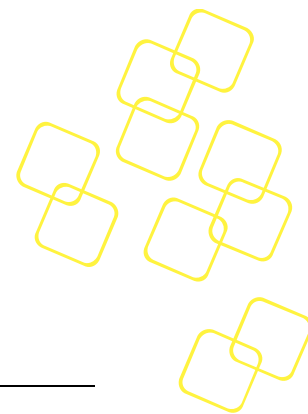
### 3.5.3 DIMMs

To replace a DIMM module, basically extract the DIMM module by pushing the DIMM socket latches outward. As the latches flip completely open, the DIMM module will be automatically extracted from the socket. Pull the DIMM module out vertically.



**Figure 56: Unlocking and removing a DIMM**

To insert a new DIMM please follow the process described in section 3.3.4.



## A. APPENDIX: CONNECTOR PINOUT AND LED INFORMATION

### A.1) Console Port (RS232)

This connector can be found at position F5.

Please note that this RJ45 connector for the console, in contrast to RJ45 connectors for network ports, does not feature any integrated LEDs.



**Figure 57: RJ45 Console connector**

Pin No.	Signal Name	Description
1	n.c.	Not connected
2	n.c.	Not connected
3	TX	Transmit Data (Output from FWA-5020)
4	GND	Digital Circuit Ground
5	GND	Digital Circuit Ground
6	RX	Receive Data (input to FWA-5020)
7	n.c.	Not connected
8	n.c.	Not connected

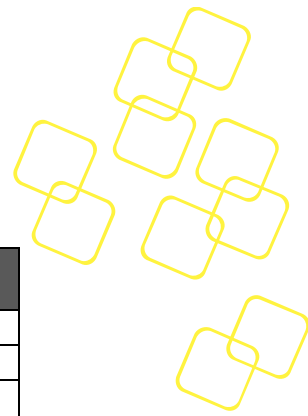
**Table 42: Console connector pin assignment**

### A.2) USB 3.0 Type A connectors

These connectors can be found at position



**Figure 58: Stacked USB Type A connector**

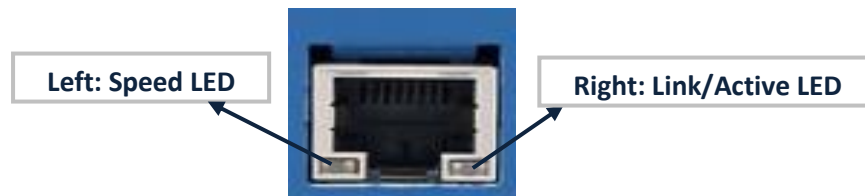


Pin No.	Signal Name	Description
1	VBUS	VCC5_USB3_P34
2	D-	USB2_N2
3	D+	USB2_P2
4	GND	GND
5	StdA_SSRX-	USB3_RX_DN3
6	StdA_SSRX+	USB3_RX_DP3
7	GND_DRAIN	GND
8	StdA_SSTX-	USB3_TX_DN3
9	StdA_SSTX+	USB3_TX_DP3
10	VBUS	VCC5_USB3_P34
11	D-	USB2_N3
12	D+	USB2_P3
13	GND	GND
14	StdA_SSRX-	USB3_RX_DN4
15	StdA_SSRX+	USB3_RX_DP4
16	GND_DRAIN	GND
17	StdA_SSTX-	USB3_TX_DN4
18	StdA_SSTX+	USB3_TX_DP4

**Table 43: Stacked USB Type A connector pin assignment**

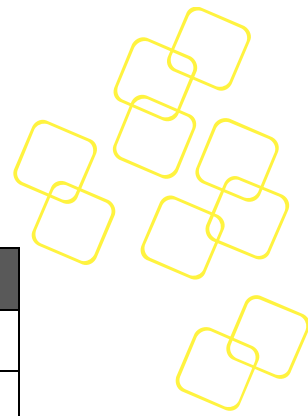
**A.3) RJ45 10/100/1000 BASE-T ports**

These connectors can be found at positions F6 through F7



**Figure 59: RJ45 10/100/1000 Base-T connector**

**A.3.1) Connector Pinout**



Pin No.	Signal Name	Description
1	MDI[0]+	Media Dependent Interface[0]+
2	MDI[0]-	Media Dependent Interface[0]-
3	MDI[1]+	Media Dependent Interface[1]+
4	MDI[2]+	Media Dependent Interface[2]+
5	MDI[2]-	Media Dependent Interface[2]-
6	MDI[1]-	Media Dependent Interface[1]-
7	MDI[3]+	Media Dependent Interface[3]+
8	MDI[3]-	Media Dependent Interface[3]-

**Table 44: RJ45 10/100/1000 Base-T connector pin assignment**

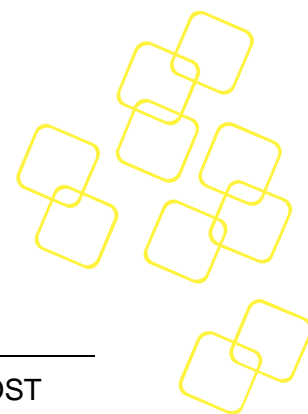
A.3.2) LED Definition

Speed LED	Left (Green / Amber Color)	Link/Active LED	Right (Green / Amber Color)
<b>10 Mbps</b>	Off	<b>Link</b>	Turn on Green
<b>100 Mbps</b>	Static Amber	<b>Active</b>	Blinking Green
<b>1000 Mbps</b>	Static Green	<b>Bypass Status: Disconnect</b>	Blinking Amber
		<b>Bypass Status: Bypass</b>	Static Amber

**Table 45: RJ45 connector LED indication**

Note: Bypass States are only signalled on the traffic LAN ports. Management LAN ports do not have this extra LED colour & signalling.

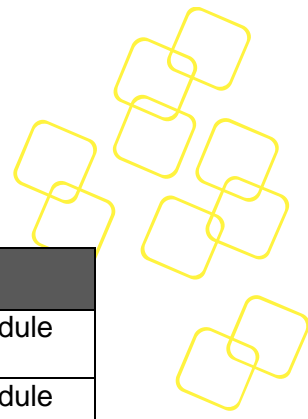




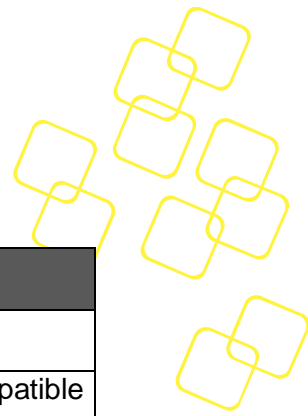
## B. BIOS POST CODES

POST Codes are diagnostic codes sent by the BIOS to IO address 0x80. A POST adapter needs to be installed in the system to view these POST Codes. Codes not listed are reserved by AMI.

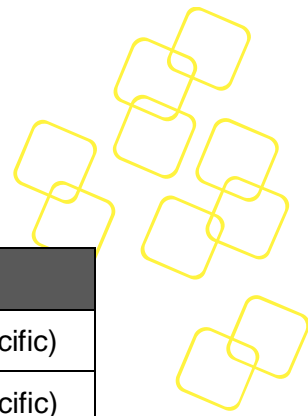
POST Code	Description
0x01	Power on. Reset type detection (soft/hard).
0x02	AP initialization before microcode loading
0x03	North Bridge initialization before microcode loading
0x04	South Bridge initialization before microcode loading
0x05	unused
0x06	Microcode loading
0x07	AP initialization after microcode loading
0x08	North Bridge initialization after microcode loading
0x09	South Bridge initialization after microcode loading
0x0A	unused
0x0B	Cache initialization
0x0E	Microcode not found
0x0F	Microcode not loaded
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started



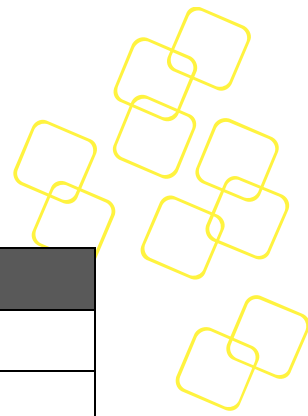
POST Code	Description
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	unused
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL
0x31	Memory Installed
0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F -0x4E	unused



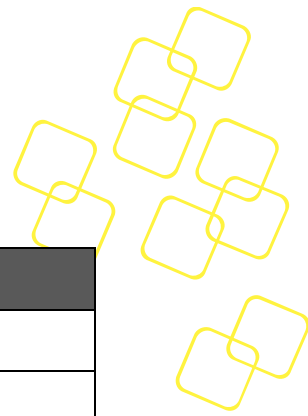
POST Code	Description
0x4F	DXE IPL is started
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)



POST Code	Description
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x72	South Bridge DXE Initialization (South Bridge module specific)
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x80 – 0x8F	unused
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect



POST Code	Description
0x9D	USB Enable
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL
0xAB	Setup Input Wait
0xAC	Reserved for ASL
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0XB2	Legacy Option ROM Initialization
0xB3	System Reset
0XB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xC0 – 0xCF	unused
0xD0	CPU initialization error



POST Code	Description
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available
0xE0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE8	S3 Resume Failed
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xF0 – 0xF4	unused
0xf8 – 0xFA	unused

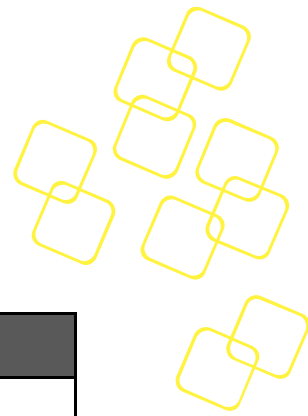
**Table 46: BIOS POST Codes**



## C. APPENDIX: POWER SUPPLY SPECIFICATION

The FWA-5020 is available with a 650W redundant AC PSU. The specifications for this power supply are listed below. Please consult your Advantech representative reg. other power supply options.

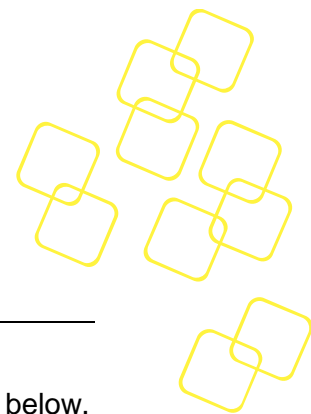
Item	Specification	Comment / Conditions
Rating	650W	0..50°C ambient
AC input voltage	90-264V, 47-63Hz	Auto ranging
Input Current	35A peak@115VAC 70A peak@240VAC	
Hold up time	16ms min.	@ 70% Load
Efficiency	80PLUSR Gold Level Power Efficiency (Module)	@50%
MTBF	100,000h @25°C and full load	MIL217F
Safety	UL, CB, CE,CCC,TUV,	IEC 60950 E176239 / EN 60950/ GB4943,GB9254,GB 17625
EMI Compliance	<ul style="list-style-type: none"> <li>• <b>EN55022 CLASS B:2006+A1:2007</b></li> <li>• <b>EN61000-3-2:2006+A2:2009</b></li> <li>• <b>EN61000-3-3:2008</b></li> <li>• <b>AS/NZS CISPR 22: 2006</b></li> </ul>	
Environment	RoHS	"5 of 6" compliant
Protection	Short Circuit Protection Over Current Protection Over Voltage Protection Over Temperature Protection No load Operation	



Item	Specification	Comment / Conditions
Rating	650W	0..50°C ambient
AC input voltage	-40~-72VDC	
Input Current	24-12A @ -48VDC	
Hold up time	1ms min.	at 70% of maximum load at 48VDC
Efficiency	≥ 80%	@-48Vdc
MTBF	100,000h @25°C and full load	MIL217F
Safety	UL, CB, CE,CCC,TUV,FCC	IEC 60950 E176239 EN 60950 GB4943,GB9254,GB 17625
EMI Compliance	EN 55022: 2010 / AC: 2011, Class A EN 55024: 2010 IEC 61000-4-2: 2008 IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 IEC 61000-4-4: 2012 IEC 61000-4-5: 2014 IEC 61000-4-6: 2013 IEC 61000-4-8: 2009	
Environment	RoHS	"5 of 6" compliant
Protection	Short Circuit Protection Over Current Protection Over Voltage Protection Over Temperature Protection No load Operation	

**Table 47: Redundant AC/DC Power Supply Specification**





## **D. APPENDIX: DECLARATION OF CONFORMITY**

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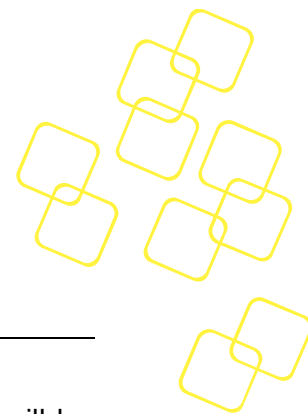
The FWA-5020 has been successfully tested for compliance to the regulations below. Should you need a signed copy of the declaration of conformity or the related test reports, please contact your Advantech representative.

### **CE**

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring.

### **FCC Class A**

Note: 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 or her own expense.



## **E. APPENDIX: WARRANTY AND RMA**

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Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered, for example, Advantech products used, other hardware and software used, etc. Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.