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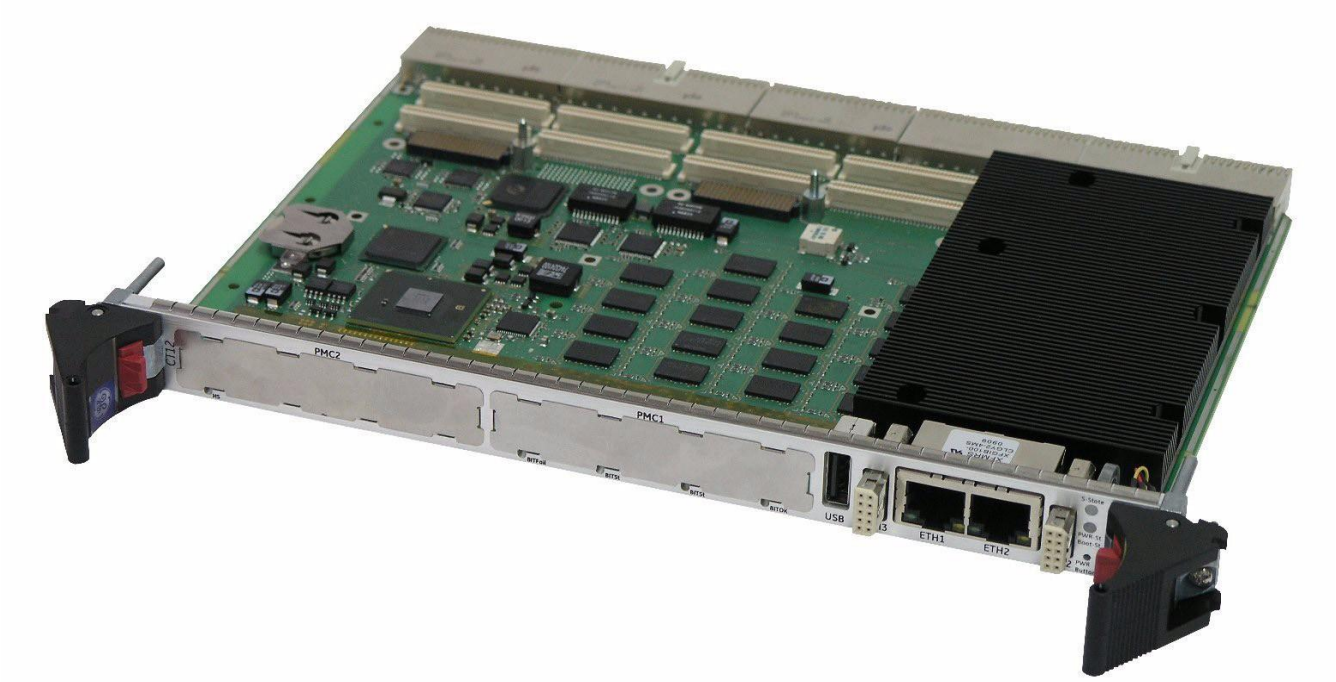
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User's Guide

CR12/CT12, VR12/VP12 UEFI Firmware

Publication No. UGCR12V051E Rev. A.0



abaco SYSTEMS

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Document History

Revision	Date	Description
Preliminary	January 2011	Start of FM edition
First-1	May 2011	First Edition for review only
First-2	July 2011	Insert changes from June 7
First-3	August 2011	Continue to insert changes
A.0	February 2017	Rebranding for Abaco Systems

Waste Electrical and Electronic Equipment (WEEE) Returns



Abaco Systems is registered with an approved Producer Compliance Scheme (PCS) and, subject to suitable contractual arrangements being in place, will ensure WEEE is processed in accordance with the requirements of the WEEE Directive.

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About This Manual

Conventions

Notices

This manual may use the following types of notice:



WARNING

Warnings alert you to the risk of severe personal injury.



CAUTION

Cautions alert you to system danger or loss of data.



NOTE

Notes call attention to important features or instructions.



TIP

Tips give guidance on procedures that may be tackled in a number of ways.



LINK

Links take you to other documents or websites.

Numbers

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. Where confusion may occur, decimal numbers have a “D” subscript and binary numbers have a “b” subscript. The prefix “0x” shows a hexadecimal number, following the ‘C’ programming language convention. Thus:

One dozen = 12_D = 0x0C = 1100_b

The multipliers “k”, “M” and “G” have their conventional scientific and engineering meanings of $x10^3$, $x10^6$ and $x10^9$, respectively, and can be used to define a transfer rate. The only exception to this is in the description of the size of memory areas, when “K”, “M” and “G” mean $x2^{10}$, $x2^{20}$ and $x2^{30}$ respectively.

In PowerPC terminology, multiple bit fields are numbered from 0 to n where 0 is the MSB and n is the LSB. PCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Text

Signal names ending with a tilde (“~”) denote active low signals; all other signals are active high. “N” and “P” denote the low and high components of a differential signal respectively.

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You can find information regarding Abaco products on the following website:



LINK

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Abaco Documents

This document is distributed via the Abaco website. You may register for access to manuals via the website.



LINK

https://www.abaco.com/products/vme-1160a

Third-party Documents

AMD Corp.	www.amd.com
American Megatrends	www.ami.com
Fedora	www.fedora.redhat.com
IBM Corp.	www.ibm.com
Intel Corp.	www.intel.com
Linear Technology	www.linear-tech.com
Microsoft Corp.	www.microsoft.com
Freescale Corp.	www.freescale.com
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PCI Industrial Computer Manufacturing Group	www.picmg.org
PLX Technology	www.plxtech.com
QNX Software Systems	www.qnx.com
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NOTE

Technical literature describing components used on the VMIVME-1160A is available from the manufacturers' websites.

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Technical Support Contact Information

You can find technical assistance contact details on the website Embedded Support page.



LINK
https://www.abaco.com/embedded-support

Abaco will log your query in the Technical Support database and allocate it a unique Case number for use in any future correspondence.

Alternatively, you may also contact Abaco's Technical Support via:



LINK
support@abaco.com

Returns

If you need to return a product, there is a Return Materials Authorization (RMA) form available via the website Embedded Support page.



LINK
https://www.abaco.com/embedded-support

Do not return products without first contacting the Abaco Repairs facility.

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1 • Introduction

This UEFI User's Guide describes the operation and functional properties of the Unified Extensible Firmware Interface (UEFI) firmware for CR12/CT12, VR12/ VP12 CPCI/VME Single Board Computers.

UEFI firmware is a replacement for the older BIOS firmware interface installed in previous generations of IBM PC/AT compatible systems.

UEFI firmware is implemented based on Aptio® solution. Aptio is American Megatrends Inc (AMI) next-generation firmware based on the UEFI specifications.

UEFI specification defines a new software interface between operating system (OS) and platform firmware. The interface contains data records with platform- related information and boot and runtime services that are available to the OS and its boot loader. To maintain compatibility to the older BIOS the UEFI firmware implements a Compatibility 16BIOS module (CSM16). Thus, several names and references in this documentation still use and refer to known BIOS acronyms.

NOTE

UEFI is sometimes referred herein to just as EFI, the original specification developed by Intel.

1.1 Safety Notices

The following general safety precautions represent warnings of certain dangers of which Abaco Systems is aware. Failure to comply with these or with specific Warnings and/or Cautions elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Abaco Systems assumes no liability for the user's failure to comply with these requirements.

Also follow all warning instructions contained in associated system equipment manuals.

WARNING

Use extreme caution when handling, testing, and adjusting this equipment. This device may operate in an environment containing potentially dangerous voltages.

Ensure that all power to the system is removed before installing any device.

To minimize shock hazard, connect the equipment chassis and rack/enclosure to an electrical ground. If AC power is supplied to the rack/enclosure, the power jack and mating plug of the power cable must meet IEC safety standards.

1.2 Flammability

The circuit board is made by a UL-recognized manufacturer and has a flammability rating of UL94V-1.

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1.3 EMI/EMC Regulatory Compliance



CAUTION

This equipment generates, uses, and can radiate electromagnetic energy. It may cause or be susceptible to EMI if not installed and used in a cabinet with adequate EMI protection.

The Abaco product is designed using good EMC practices and, when used in a suitably EMC-compliant chassis, should maintain the compliance of the total system.

1.4 Handling

Only handle the Abaco product by the edges, ejector handles, or front panel.

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2 • Starting Aptio® Setup Utility

This chapter describes the layout and the basic navigation of the Aptio Setup Utility.

NOTES

For convenience, Aptio® Setup Utility is further referred to just as Setup.

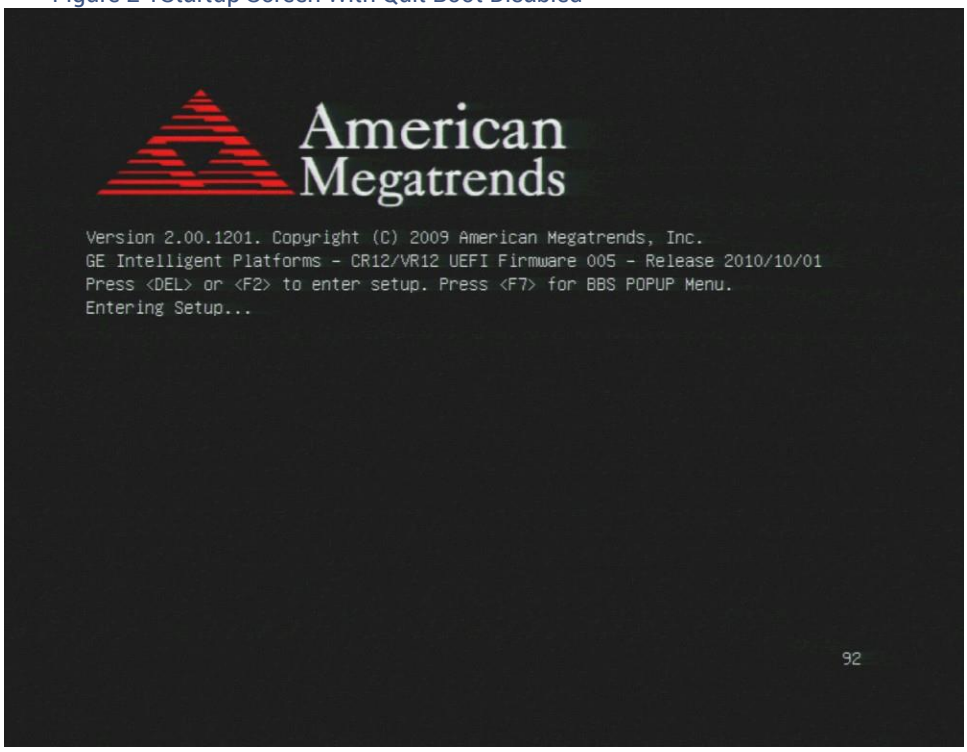
CR12/CT12 CPCI Single Board Computers and VR12/VP12 VME Single Board Computers are further referred to just as SBC.

2.1 Starting Setup

To enter the Setup, follow the next steps:

1. Power on the SBC.
2. Press the <Delete> key or <F2> key on your keyboard when you see the following text prompt on Startup screen.

Figure 2-1Startup Screen With Quit Boot Disabled



3. After you pressed the key, the top Setup screen (Figure 3) displays.

NOTE

This Startup screen slightly varies with different SBC and peripheral options. The BBS POPUP Menu entered with Key <F7> is described in Chapter 10.

The time the UEFI firmware is prompting for key input is configurable. The Startup screen might be replaced by OEM logo screen. Read Chapter 9 for modifying these features.

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2.2 Setup Screens Layout

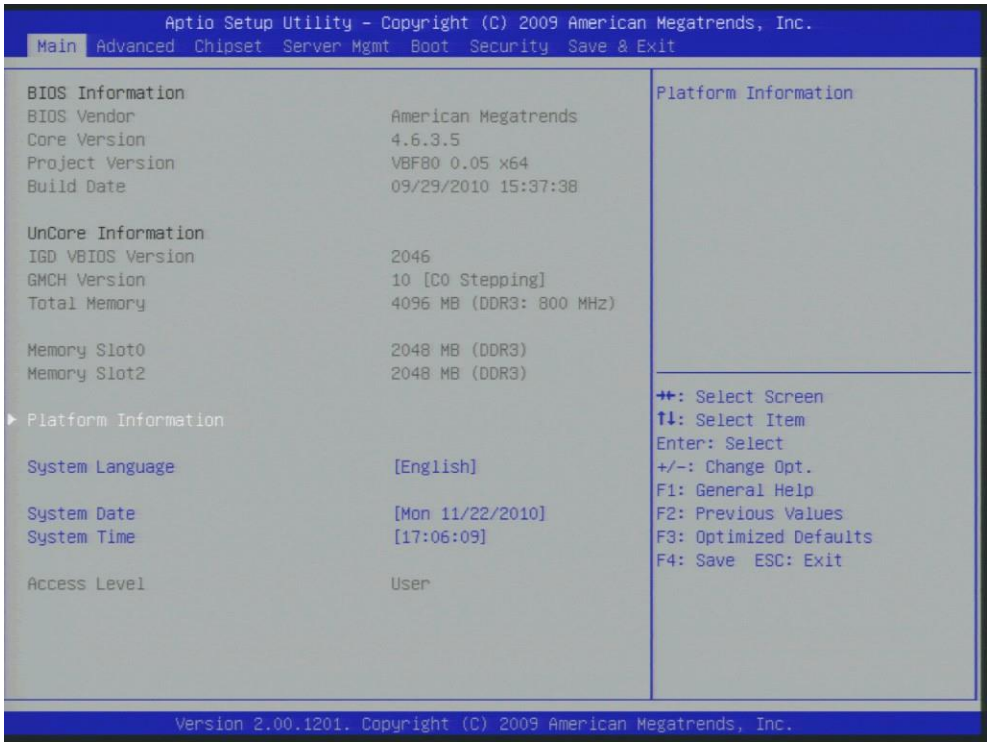
All Setup screens have the same layout divided into three main frames. The left frame displays all the options that can be configured. 'Grayed-out'

options cannot be configured. Options in blue can be configured. A highlighted white option is selected.

The upper right frame displays a text message. When an option is selected in the left frame, often a text message will accompany it.

The lower right frame displays the key legend

Figure 2-2 Setup Screens Layout



NOTE

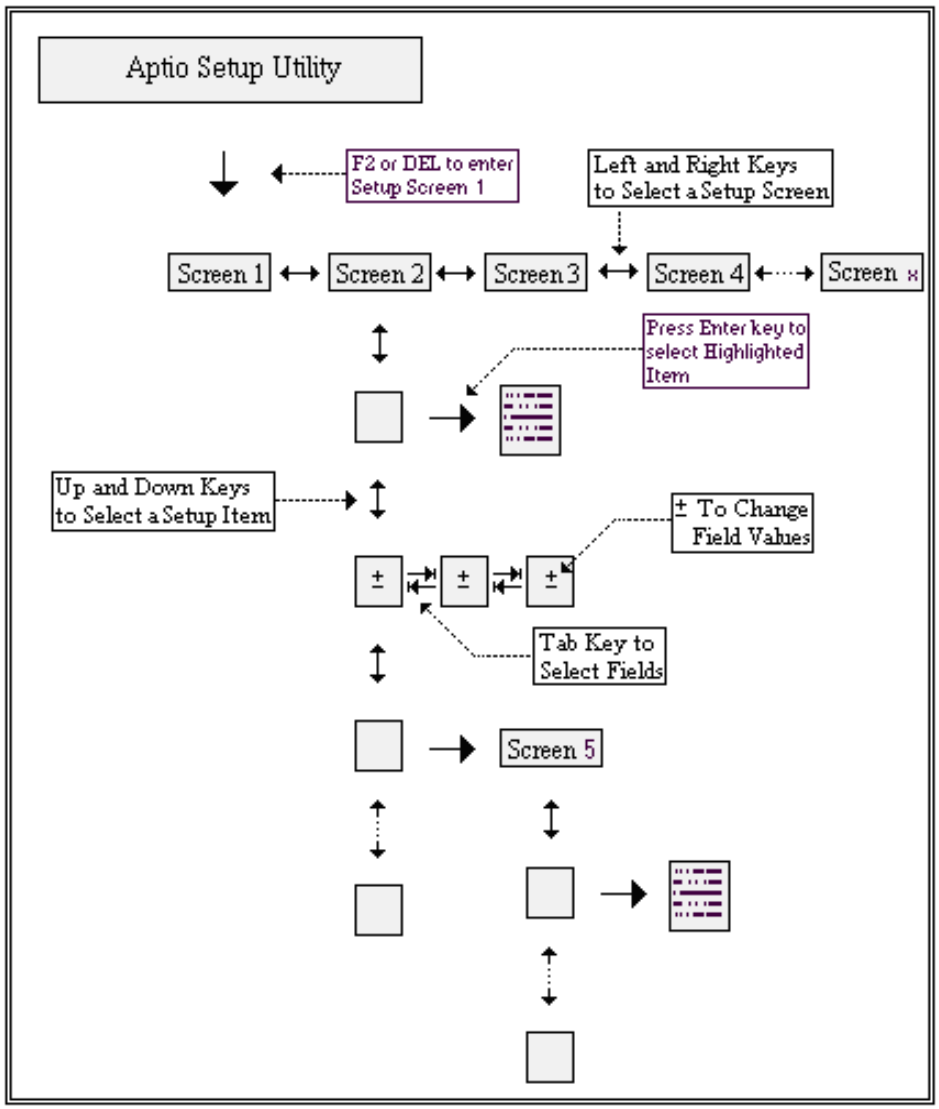
This manual describes the standard look of the Setup screens. The SBC you are using may has different features (product options) and thus the example screens and descriptions may not look exactly the same.

2.3 Setup Navigation

The Setup uses a key-based navigation system called hot keys. Most of the Setup hot keys can be used at any time during the setup navigation process.

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Figure 2-3 Setup Navigation Overview



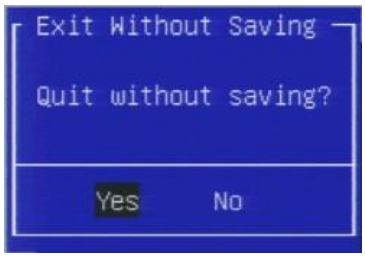
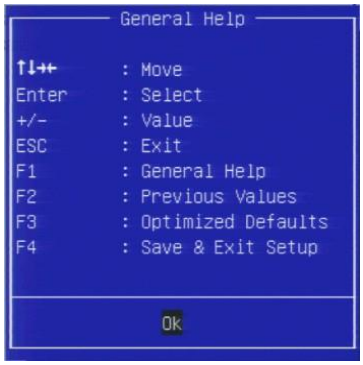
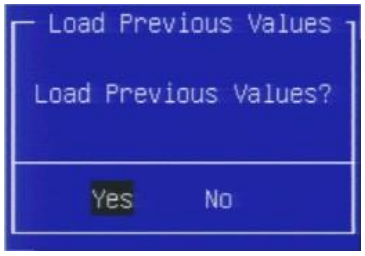
NOTE

There is a Hot Key legend located in the right lower frame on all Setup screens

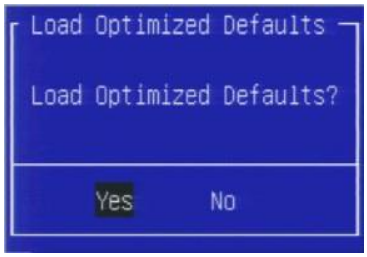
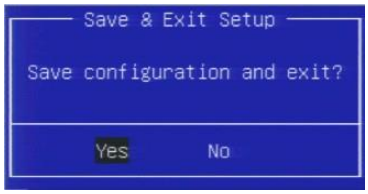
Table 2-1 Hot Keys Legend

Hot Key	Description
Enter	The <Enter> key allows the user to select an option to edit its value, access a Sub menu or go to another Setup screen.
↔ Left / Right	
The <Left Arrow> and <Right Arrow> keys allow you to move between the different Setup screens.	
For example:	Main screen, Advanced screen, Chipset screen, and so on.
↑↓ Up / Down	
The <Up Arrow> and <Down Arrow> keys allow you to	

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Hot Key	Description
jump to a Setup item or Sub-screen.	
+- Plus / Minus	
The <+> and <-> keys allow you to change the field value of a particular Setup item.	
For example:	Date and Time.
Tab	The <Tab> key allows you to jump between fields. For example: Date and Time.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup  Press the <Enter> key to discard changes and exit Setup. You can also use the <Left Arrow> and <Right Arrow> key to select No and then press the <Enter> key to abort this function and return to the previous screen.
F1	The <F1> key allows you to display the General Help screen.  Press the <Enter> key to exit and return to the previous screen
F2	The <F2> key allows you to discard your changes and return to the previous values.  Press the <Enter> key to load previous values and exit. You can also use the <Left Arrow> and <Right Arrow> key to select No and then press the <Enter> key to abort this function and return to the previous screen.

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Hot Key	Description
F3	The <F3> key allows you to load the optimized default values.  Press the <Enter> key to load optimized values and exit. The Optimized Defaults allow the SBC to boot up with the best performance and less conflicting settings known. However, some options cannot be determined and need to be changed by user afterwards. You can also use the <Left Arrow> and <Right Arrow> key to select No and then press the <Enter> key to abort this function and return to the previous screen.
F4	The <F4> key allows you to save any changes you have made and exit Setup.  Press the <Enter> key to save the configuration and exit. You can also use the <Arrow> key to select No and then press the <Enter> key to abort this function and return to the previous screen
Other keys	When other keys become available, they are displayed in the help screen along with their intended function.

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3 • Main Screen

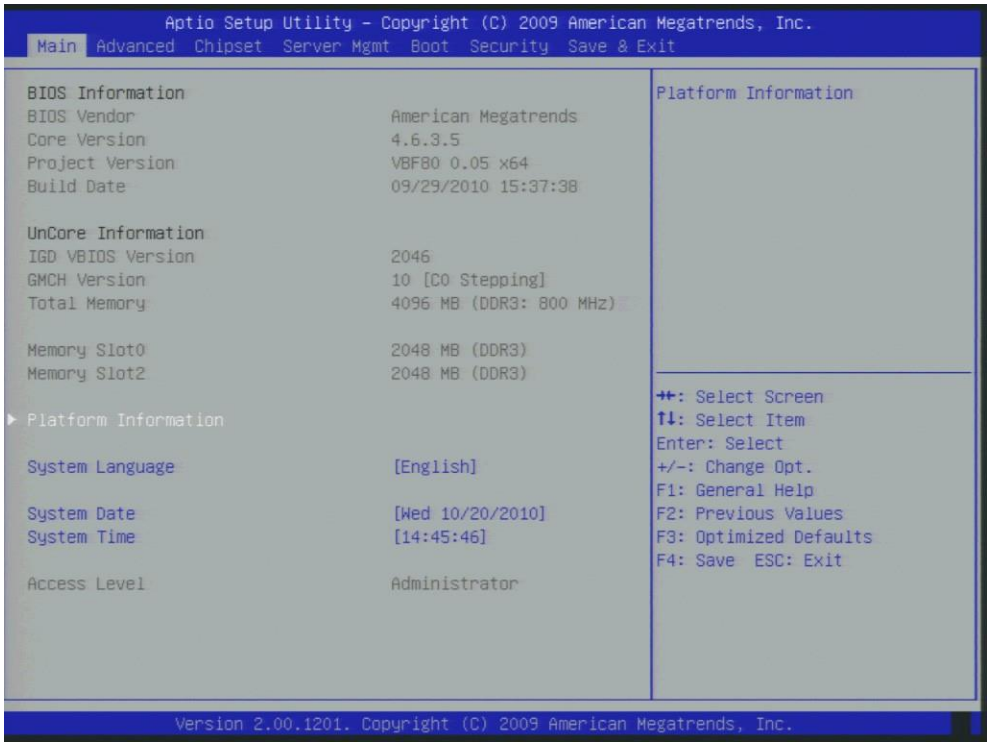
All Setup screens (Main, Advanced, Chipset …) and each menu options are described in this User's Guide. This chapter describes all Main options in consecutive order.

When you first enter the Setup, you will enter the Main screen.

Other Setup screens such as Advanced, Chipset, and so on can be selected by using the <Left Arrow> and <Right Arrow> keys. Those setup screens will be described in the next chapters.

You can always return to the Main screen by selecting the Main tab.

Figure 3-1 Main Setup Screen



3.1 BIOS Information

SBC UEFI firmware is based on Aptio® solution with additional Third Party code and Abaco-specific software modules. Aptio® is American Megatrends Inc (AMI) next-generation firmware based on the UEFI specifications.

The *BIOS Vendor* and *Core Version* displayed here refer to the AMI Aptio® solution.

The *Project Version* represents the SBC UEFI firmware version.

Different SBC UEFI firmware versions may all have the same *Core Version* in common.

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The *Build Date* refers to the date the SBC UEFI firmware was built. This may not be the same as the release date show on Startup screen.

Figure 3-2 Startup Screen Showing Release Information



The *Release Date* represents the date the SBC UEFI firmware release was made available to the customer. Different firmware releases may all show the same *Build Date* but have different *Release Dates*, as an example, changes to Default Setup Settings.

NOTE

For support questions refer to this Release Date shown on Startup screen!

3.2 Uncore Information

Shows information about Video BIOS version and Graphic Chipset (GMCH) version this board is running with and the total amount of Main Memory.

3.3 System Language



The optimal default is *English*.

NOTE

Currently, the only language available is English.

3.4 System Date / System Time



Use these options to change the system date and time.

Highlight *System Date* or *System Time* using the <Up Arrow> and <Down Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Left Arrow> and <Right Arrow> keys to move between fields.

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The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

NOTE

The time is in 24-hour format. For example, 5:30 A.M. appears as 05:30:00, and 5:30 P.M. as 17:30:00.

3.5 Access Level



This feature displays the level of access rights a user has for the current Setup session. For more details on how to change the *Access Level* see Chapter 7.

3.6 Platform Information

This screen shows information about processor and chipset this SBC is built on and the amount of System Memory. There is no selectable or changeable item here.

Select *Platform Information* option from the Main screen to jump to the Platform Information screen.

Figure 3-3 Platform Information Screen



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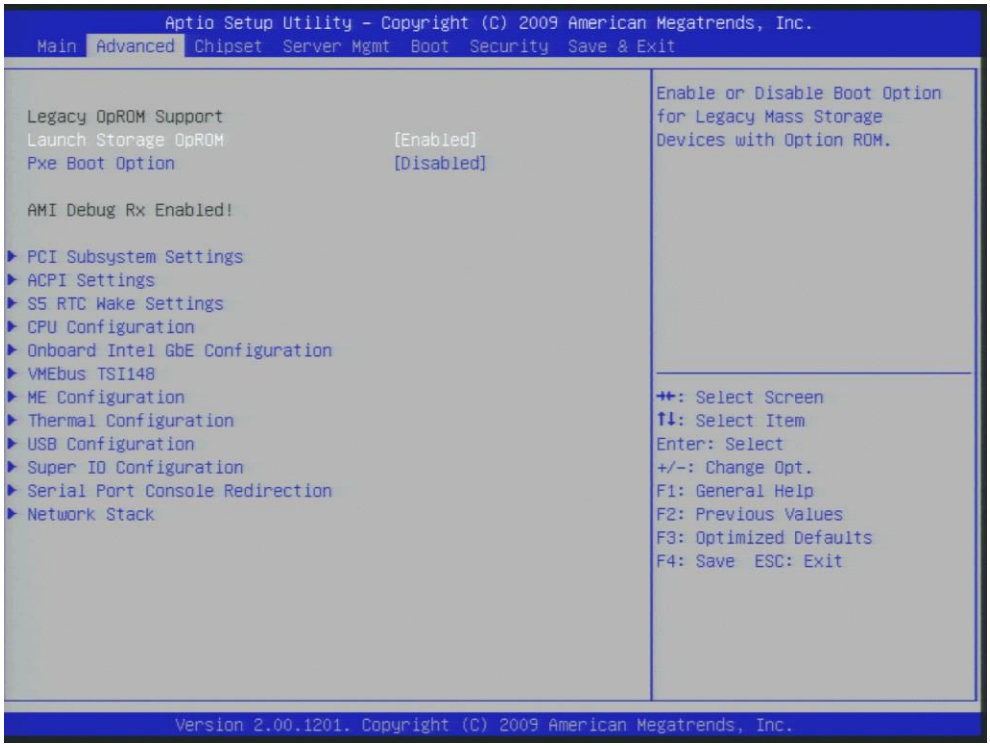
4 • Advanced Screen

The Advanced screen provides access to various features for device configuration and power management.

Select the Advanced tab from the Setup screen by using the <Left Arrow> and

<Right Arrow> keys. Press <Enter> to jump to the Advanced screen.

Figure 4-1 Advanced Setup Screen



4.1 Launch Storage OpROM



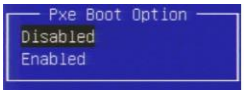
The optimal default is *Enabled*.

A mass storage adapter on an extension card (i.e. PMC / XMC or CPCI card) may come with an optional ROM (OpROM). Such an ROM often provides a pre-operating system user interface for configuring special features such as RAID, AHCI and other things.

The user can disable the launch when optional ROM is not needed and improve SBC start-up time.

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4.2 PXE Boot Option



The optimal default is *Disabled*.

The Preboot eXecution Environment (PXE) is a method to completely boot over a network, using no mass storage devices such as HDD or DVD. The firmware on SBC implements such a PXE client, which can be controlled by this option.

This feature controls in general the legacy PXE support. To individually enable PXE support for a specific Ethernet port see feature *Intel Boot Agent For Gigabit Ethernet* on page 47.

In addition to legacy PXE the modern variant UEFI PXE support can be controlled with feature *Network Stack* on page 67.

NOTE

The instruction to setup a PXE Boot Server is OS-dependant and out of scope of this manual. For more information please refer to the vendor you obtained your operating system.

4.2.1 PXE Boot Message



Once the PXE Boot Option is Enabled and a Boot Agent is enabled (see *Intel Boot Agent For Gigabit Ethernet* on page 47) a message like above will appear during boot.

NOTE

Quiet Boot needs to be disabled (see page 106) to see messages during boot.

4.3 AMI Debug RX Enabled

This feature show support for AMI low-cost debug tool *AMI Debug Rx* connected via USB. This tool is specifically designed for BIOS developers.

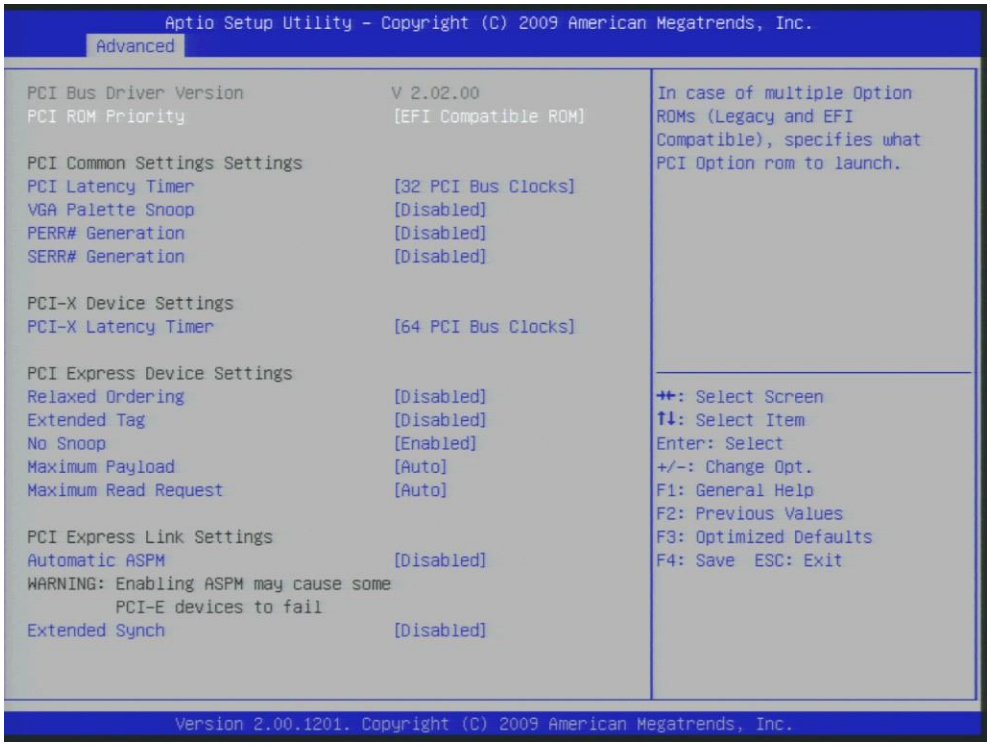
4.4 PCI Subsystem Settings

The PCI Subsystem Settings screen shows general PCI and PCI-E related options. Specific options are available under the Chipset tab.

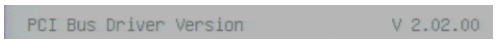
Select the *PCI Subsystem Settings* option from the Advanced screen to jump to the PCI Subsystem Settings screen.

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Figure 4-2 PCI Subsystem Settings

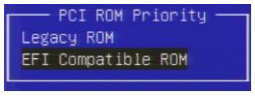


4.4.1 PCI Bus Driver Version



Displays the version of the PCI Bus Driver module built in UEFI firmware. This information is for reference only.

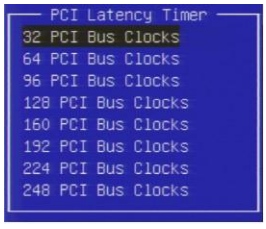
4.4.2 PCI ROM Priority



The optimal default is *EFI Compatible ROM*.

Specifies which type of option ROM is launched in cases of multiple option ROMs are available by your extension card.

4.4.3 PCI Latency Timer



The optimal default is *32 PCI Bus Clocks*.

This feature defines how long a PCI device can keep the PCI bus before another PCI device takes over. The timer starts when the device gains bus ownership, and counts

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down at the rate of the PCI clock. When the counter reaches zero, the PCI device releases the bus. If no other PCI device is waiting for bus ownership, it may take the bus again and transfer more data.

For better PCI throughput, a longer latency should be used. In addition, time critical applications may work better with shorter latencies. Customer should benchmark his system performance to determine the optimal PCI Latency Timer.

4.4.4 VGA Palette Snoop

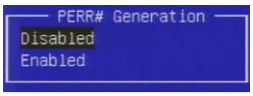


The optimal default is *Disabled*.

This setting is for old legacy reason. When enabled an appropriate device without its own VGA palette (i.e. MPEG decoder) will snoop VGA palette data from the graphics device to generate proper colors.

The user should not change setting unless your card manufacturer requires VGA Palette Snooping to be enabled. A wrong setting may result in inaccurate colors on the monitor.

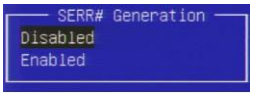
4.4.5 PERR# Generation



The optimal default is *Disabled*.

Parity Error (PERR#) pin is asserted active by PCI (-X,-E) device when a data parity error is detected. When this option is enabled, PERR is logged and a NMI is generated. Otherwise, when an error is detected, PERR is still logged but the PCI (-X,-E) device will continue operation as normal and no NMI is generated.

4.4.6 SERR# Generation

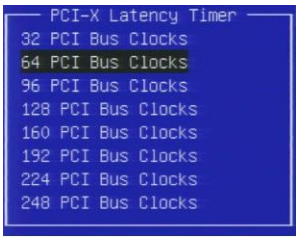


The optimal default is *Disabled*.

System Error (SERR#) pin is asserted active by PCI (-X,-E) device when a data error or a system error is detected. When this option is enabled, SERR is logged and a NMI is generated. Otherwise, when an error is detected, SERR is still logged but the PCI (-X,-E) device will continue operation as normal and no NMI is generated.

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4.4.7 PCI-X Latency Timer

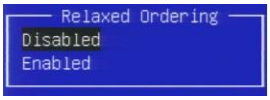


The optimal default is *64 PCI Bus Clocks*.

This feature defines how long a PCI-X device can keep the PCI-X bus before another PCI-X device takes over. The timer starts when the device gains bus ownership, and counts down at the rate of the PCI-X clock. When the counter reaches zero, the PCI-X device releases the bus. If no other PCI-X device is waiting for bus ownership, it may take the bus again and transfer more data.

For better PCI-X throughput, a longer latency should be used. In addition, time critical applications may work better with shorter latencies. Customer should benchmark his system performance to determine the optimal PCI-X Latency Timer.

4.4.8 Relaxed Ordering

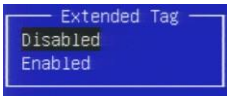


The optimal default is *Disabled*.

PCI bridges have no way of knowing which transactions are associated between multiple active devices (e.g. between local PCI bus and CPCI bus).

Enabling this option eliminates unnecessary transaction blocking by allowing Relaxed Ordering.

4.4.9 Extended Tag



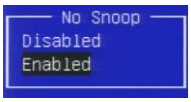
The optimal default is *Disabled*.

A tag is an 8-bit field generated by each requestor, and it must be unique for all outstanding requests. The tag field in the request is memorized by the completer and the same tag is used in the completion.

By default the number of request per device / function is limited to 32, and only requires 5 bits of the field. Once this bit is set, the entire field is used and the number of requests is increased to 256.

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4.4.10 No Snoop



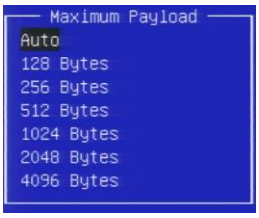
The optimal default is *Enabled*.

If the area of memory a PCI-E device accesses is not cached by the processor, enabling this option might result in improved latency by eliminating unnecessary snoop actions. An example of that might be large data structures (texture maps, Vertex arrays) written by CPU and read by GPU. However, in certain cases data may still be snooped.

NOTE

If user recognizes data coherence issues disabling this feature might help.

4.4.11 Maximum Payload



The optimal default is *Auto*.

This feature defines the size of actual data that can be transferred within a single transaction layer packet (TLP) along the PCI-Express bus.

During SBC initialization phase (power on, reset) the devices capabilities structure is queried and the highest supported Maximum Payload size for all devices is determined. However, this is subject to all PCI-Express devices connected support at minimum the selected Maximum Payload size.

If user set this feature to a lower value, all connected PCI-Express devices will be forced to use the selected Maximum Payload size, even if all devices would support a much larger payload size.

A larger size would increase the theoretical throughput as more data would be payload rather than protocol overhead. Adjusting this feature to lower size may improve latency especially for lower bandwidth devices e.g. (VME controller). Customer should benchmark his system performance to determine the optimal Maximum Payload.

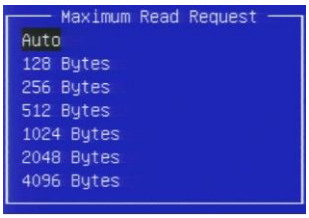
When set to Auto, a default value with maximum fairness and optimal performance is used.

NOTE

Customer should benchmark his system performance to determine the optimal Maximum Payload size.

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4.4.12 Maximum Read Request



The optimal default is *Auto*.

This feature determines the largest read request any PCI-Express device can generate.

Setting this feature to *4096* maximizes performance by allowing all PCI-Express devices to generate as large a read request as they require. However, this will impact devices that generate smaller read requests.

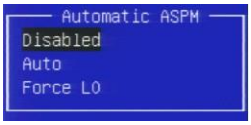
Manual size (*128 – 4096*) can be selected to ensure a fairer allocation of PCI- Express bandwidth when a certain degree of quality of service (QOS) is required. As an example, an audio output of a PCI Express sound device stutters when its reads are delayed by a bandwidth-eating graphics card. Reduce the Maximum Read Request for better audio quality.

When set to *Auto*, a manufacturer-preset value with maximum "fairness" and optimal “performance” is used.

NOTE

Customer should benchmark his system performance to determine the optimal Maximum Read Request.

4.4.13 Automatic ASPM



The optimal default is *Disabled*.

The Active State Power Management (ASPM) feature for PCI Express supports different Link power states: L0, L1, L2 and L3.

L0 (full-on) is a very low exit latency link state intended to reduce slightly power consumption during period of logical idle between link activities.

L1 and L2 allow more power saving opportunities including AUX power support (including sideband Wake signaling) with longest exit latency.

In L3 (full-off) state power and clock are removed and the SBC must go through a boot sequence to reapply power, clock and reset appropriate.

Setting Automatic ASPM to *Disabled* allows for best performance. Slightly power is reduced with *Force L0* setting.

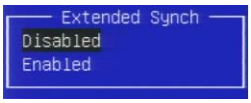
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In *Auto* mode the UEFI firmware decides the best setting

WARNING

Selecting Auto may cause some PCI-E devices to fail under certain circumstances!

4.4.14 Extended Synch



The optimal default is *Disabled*.

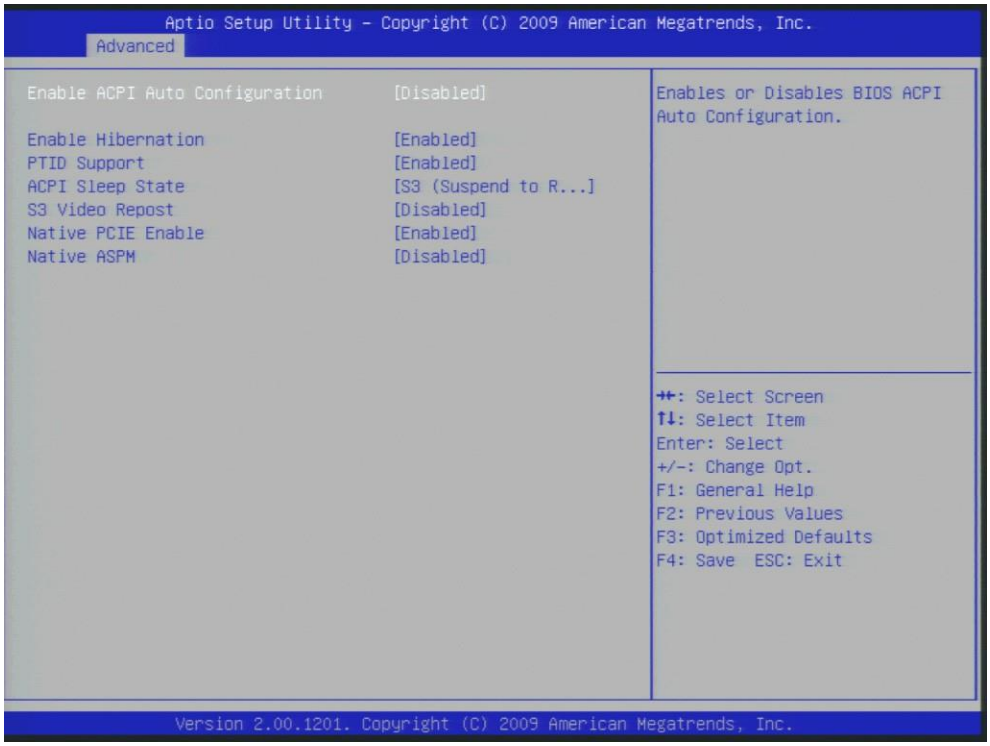
Extended Sync enabled provides external link monitoring device (i.e. PCI-E debug tool) enough time to sync properly (achieve bit and symbol lock). Under normal operation it is not necessary to enable this option.

4.5 ACPI Settings

The Advanced Configuration and Power Interface (ACPI) specification provides a standard method for device configuration and power management.

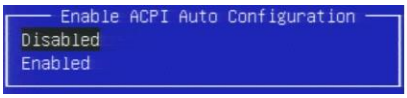
Select the *ACPI Settings* option from the Advanced screen to jump to the ACPI Settings screen.

Figure 4-3 ACPI Settings



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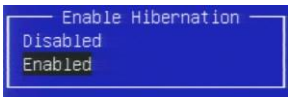
4.5.1 Enable ACPI Auto Configuration



The optimal default is *Disabled*.

The user should turn on *Enable ACPI Auto Configuration* to allow UEFI firmware to decide the best ACPI settings.

4.5.2 Enable Hibernation



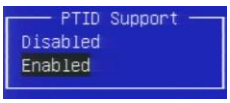
The optimal default is *Enabled*.

Enabled Hibernation (S4 Sleep State) allows the operating system to store the contents of RAM to non-volatile storage device such as a hard disk, before powering off the computer. Starting from a hibernated state is quicker than starting up the entire operation system and opening all applications.

NOTE

This option may not be effective with some OSs.

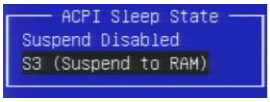
4.5.3 PTID Support



The optimal default is *Enabled*.

This setting controls the ACPI tables for the specific power and performance features coming along with this processor. For more information about the new features see *Thermal Configuration* option from the Advanced Setup screen.

4.5.4 ACPI Sleep State

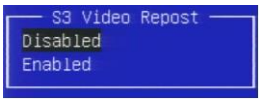


The optimal default is *S3 (Suspend to RAM)*.

Select the ACPI sleep state the system will enter when the SUSPEND button is pressed.

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4.5.5 S3 Video Repost

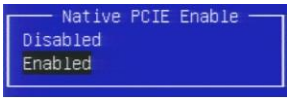


The optimal default is *Disabled*.

Some video cards do not allow the OS to save their entire state, so when the SBC goes into S3 (Suspend to RAM) mode, the card has to be reinitialized by the UEFI firmware when powering up.

For the internal video function this feature should be *Disabled*. For any extension card user should test what really works.

4.5.6 Native PCIE Enable

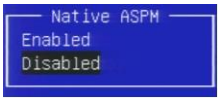


The optimal default is *Enabled*.

The native PCI Express handling can be controlled by operating system once this feature is enabled.

4.5.7 Native ASPM

NOTE
This feature is only supported in Vista and newer Windows versions.



The optimal default is *Disabled*.

The native Active State Power Management (ASPM) handling can be controlled by operating system once this feature is enabled.

NOTE
This feature is only supported in Vista and newer Windows versions.

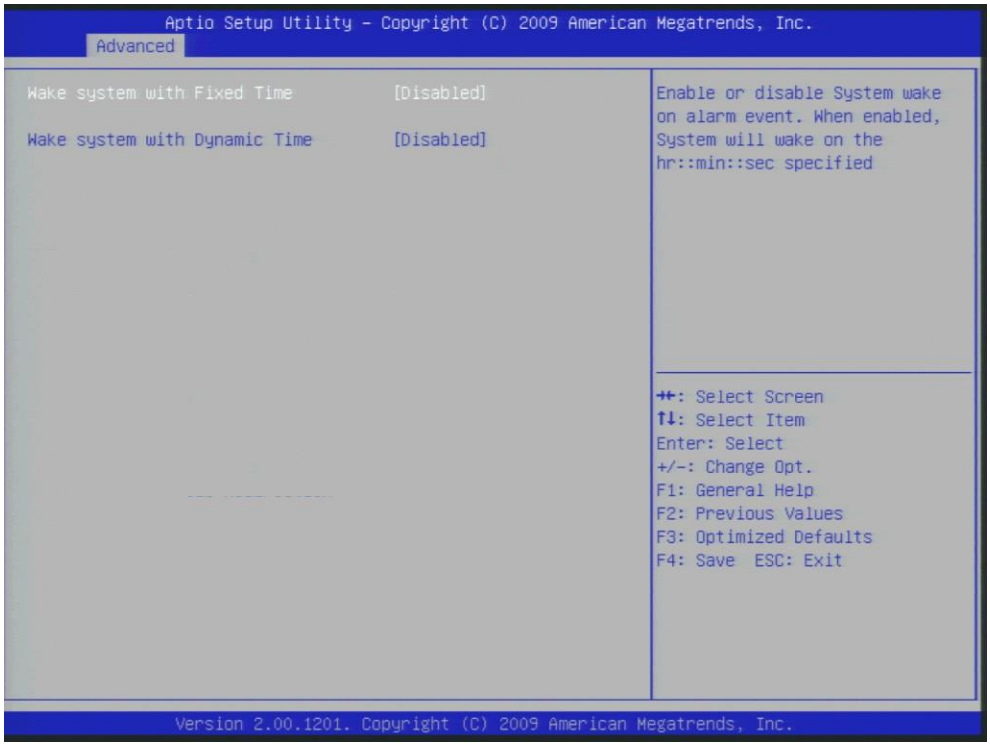
4.6 S5 RTC Wake Settings

The S5 RTC Wake Settings allows the SBC to wake up from Soft Off (S5).

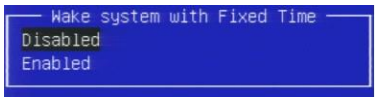
Select the *S5 RTC Wake Settings* option from the Advanced screen to jump to the S5 RTC Wake Settings screen.

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Figure 4-4 S5 RTC Wake Settings

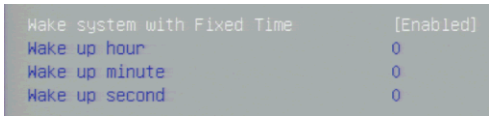


4.6.1 Wake System With Fixed Time



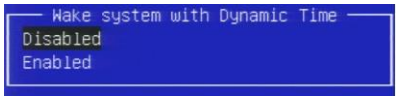
The optimal default is *Disabled*.

Enable or disable System wake on alarm event.



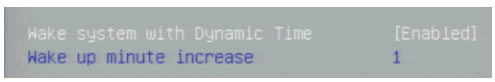
When enabled, System will wake from S5 state on the *hr:min:sec* specified.

4.6.2 Wake System With Dynamic Time



The optimal default is *Disabled*.

Enable or disable System wake on alarm event.



When enabled, System will wake from S5 state on the current time + Wake up minute increase.

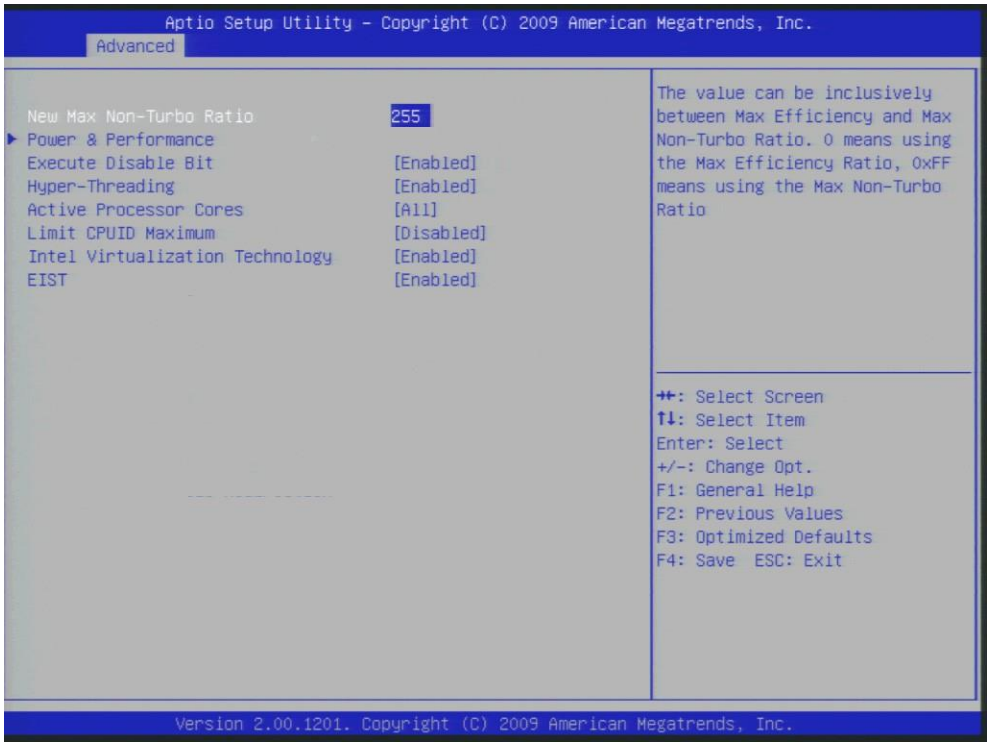
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4.7 CPU Configuration

The CPU Configuration screen provides access to processor specific power and performance options. Newer processor features sets such as Hyper Threading, Virtualization and EIST can be enabled to assist modern operating systems or disabled for legacy and compatibility reasons.

Select the *CPU Configuration* option from the Advanced screen to jump to the CPU Configuration screen.

Figure 4-5 CPU Configuration



4.7.1 New Max Non-Turbo Ratio



The optimal default is *255*.

This value actual modifies the multiplier for the Non-Turbo frequency. The formula works as

New Max Non-Turbo Ratio x 133 MHz = standard processor frequency 20 x 133 MHz = 2.66 GHz

In fact the multiplier will be dynamically adjusted from a low point of 12x (a 1.6 GHz) up to this maximum non-turbo ratio as the processor load demands.

NOTE

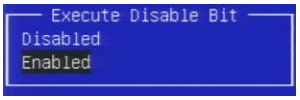
It is not possible to set the Non-Turbo frequency any higher than the base frequency of the processor, even so this field allows value up to 255.

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CAUTION

This feature might not be supported by the current SBC.

4.7.2 Execute Disable Bit



The optimal default is *Enabled*.

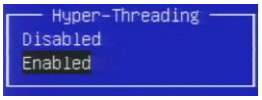
When enabled, the processor prevents the execution of code in data-only memory pages; otherwise the processor will not restrict code execution in any memory area.

It is highly recommended that user enables this feature for increased protection against buffer overflow attacks. Incidentally, some applications and device drivers attempt to execute code from the kernel stack for improved performance. This will cause a page-fault error if Execute Disable Bit is enabled. In such cases, user will need to disable this feature.

NOTE

This feature is subject to an operating system that supports the Execute Disable Bit.

4.7.3 Hyper-Threading



The optimal default is *Enabled*.

The Hyper-Threading Technology (HTT) allows a single core to perform like two separate threads concurrently. Multi-threaded applications may benefit in improving their performance.

NOTE

To have Hyper-Threading work an operating system which is HTT-aware and the APIC feature (see TBD) enabled is required.

4.7.4 Active Processor Cores



The optimal default is *All*.

This allows the user to limit its processor to a single core even so more cores are available.

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4.7.5 Limit CPUID Maximum



The optimal default is *Disabled*.

The CPUID instruction identifies the processor and its capabilities.

Before operating system can do so, it must first query the processor to find out the highest input value CPUID recognizes. This determines the kind of basic information CPUID can provide the operating system.

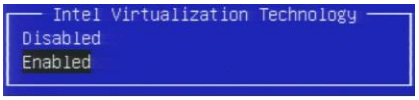
Older operating systems like Windows 95/98 and Windows Me were released before the processor on this SBC and are therefore not aware of such a processor.

They are not capable of handling the extra CPUID information provided by the processor with CPUID value greater than 03h.

When Limit CPUID Maximum feature is *Enabled*, the processor will limit the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value.

When *Disabled*, the processor will return the actual maximum CPUID input value of the processor when queried.

4.7.6 Intel Virtualization Technology



The optimal default is *Enabled*.

This feature is used to enable or disable the Intel Virtualization Technology (IVT) extensions that allow multiple operating systems to run simultaneously on the same system. It does this by creating virtual machines, each running its own x86 operating system.

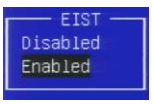
When *Enabled*, the IVT extensions will be enabled, allowing for hardware-assisted virtual machine management.

When *Disabled*, the IVT extensions will be disabled. However, software virtual machine managers can still be used if virtualization is required.

4.7.7 EIST

NOTE

It is recommended to enable this feature. It should only be disabled for troubleshooting purposes.



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This Setup feature is not intended to be used.

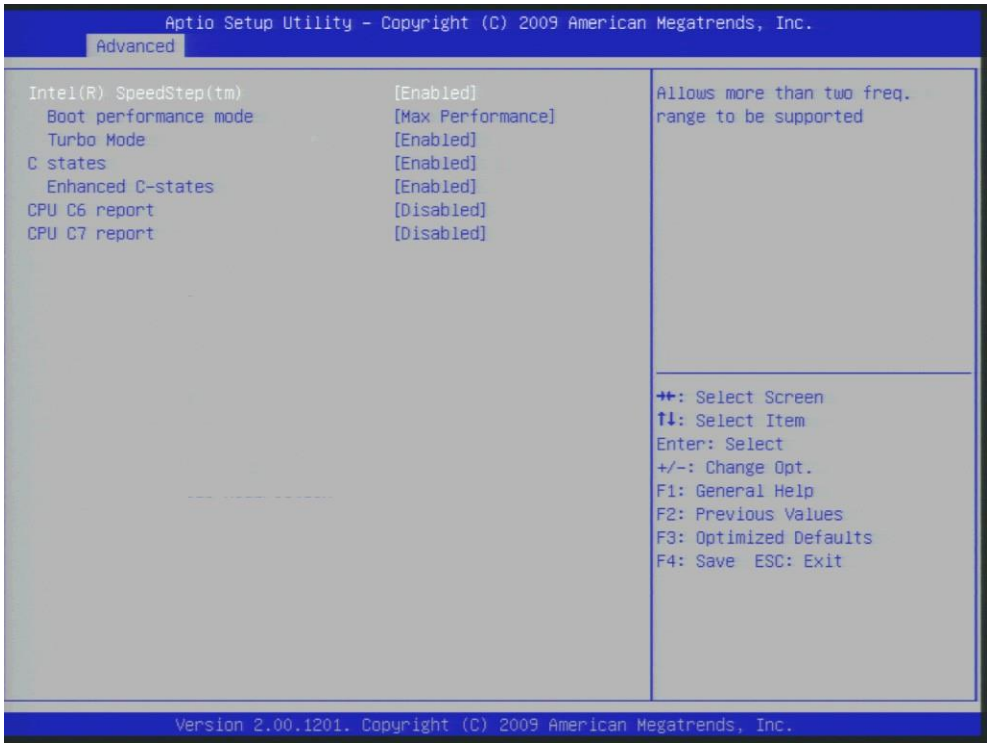
To control Enhanced Speed Step Technology (EIST) see *Intel(R) SpeedStep(tm)* at Power & Performance screen on next page.

4.7.8 Power & Performance

This screen allows the user to tune processor specific power savings and performance settings.

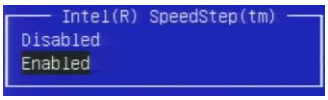
Select the *Power & Performance* option from the Advanced screen to jump to the Power & Performance screen.

Figure 4-6 Power & Performance



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4.7.9 Intel(R) SpeedStep(tm)



The optimal default is *Enabled*.

Intel® SpeedStep™ Technology allows the SBC to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

4.7.10 Boot Performance Mode

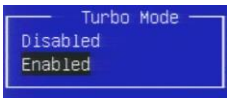


The optimal default is *Max Performance*.

When user selects *Max Performance* SBC will start with highest processer frequency enabling faster boot time.

Selecting *Max Battery* will result in lower processor frequency reducing average power consumption with slightly longer boot time.

4.7.11 Turbo Mode



The optimal default is *Enabled*.

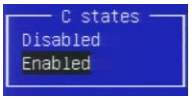
Turbo Mode allows dynamically changing processor clock-speed on demand.

When the processor has not reached its thermal and power limits and the user's workload demands additional performance, the processor frequency will dynamically increase until a thermal or power limit is reached or the maximum frequency for the number of active cores is reached. Conversely, when any of the limits are exceeded, the processor frequency will automatically decrease until the processor is again operating within its limits.

When this feature is *Enabled*, the processor can dynamically overclock one of its two processing cores to improve performance with applications that are not multi-threaded or optimized for dual-core processors.

When *Disabled*, the processor will not overclock any of its cores. All its processing cores will run at the same clock speed.

4.7.12 C-States



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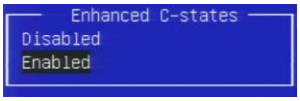
The optimal default is *Enabled*.

This feature allows the CPU to enter different power saving modes (C-States) when it's not 100 % utilized.

- C0 (Active) is the operating state.
- C1 (Halt) is a state where the processor is not executing instructions, but can return to an executing state essentially instantaneously.
- C1E (Enhanced Halt State) for lower power consumption than C1.
- C3 (Deep Sleep) is a state where the processor does not need to keep its cache coherent, but maintains other state.
- C6 (Deep Power Down) implements voltage reduction in addition to modifying internal clock signals.

Power consumption decreases from C0 to C6 but on the expense of wake up time which increases from nanoseconds to microseconds.

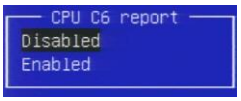
4.7.13 Enhanced C-States



The optimal default is *Enabled*.

This allows the user to enable or disable C1E-State as described before.

4.7.14 CPU C6 Report

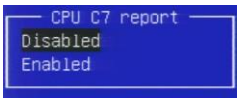


The optimal default is *Disabled*.

C6 has long latencies and has higher energy entry/exit costs. Therefore, incorrect or inefficient usage- entry/exit frequency is too high - has negative impact on power efficiency and performance.

Customer should benchmark his system performance and power consumption to determine the optimal C6 setting.

4.7.15 CPU C7 Report



The optimal default is *Disabled*.

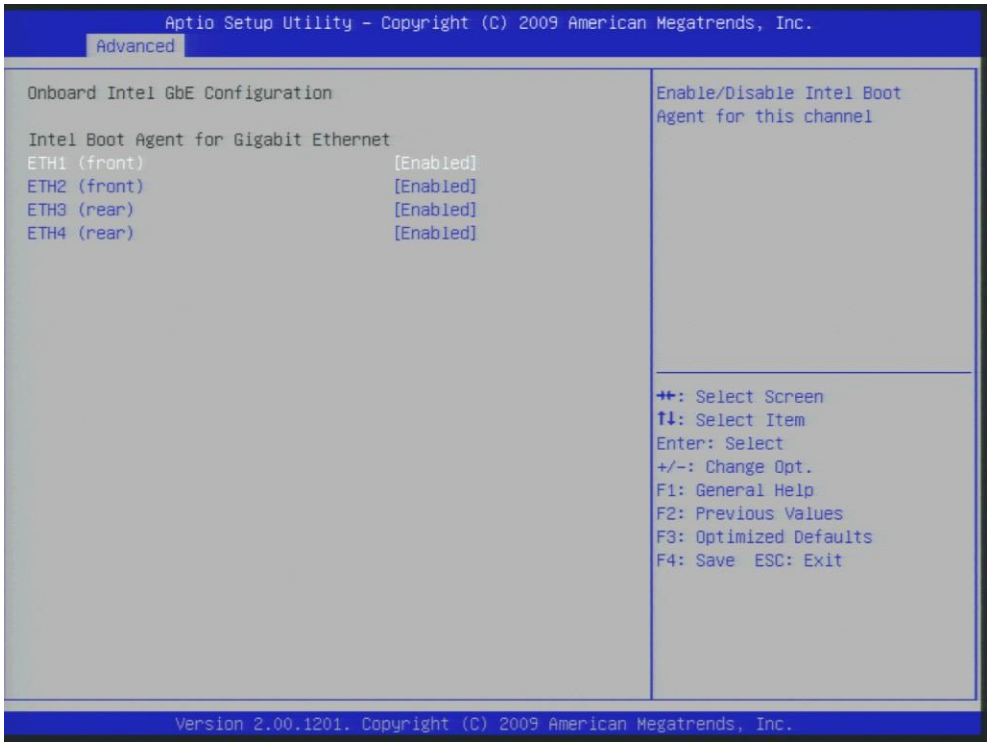
C7 state is not properly supported by the processor on this SBC. It is highly recommended leaving this setting on *Disabled*.

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4.8 Onboard Intel GbE Configuration

Select the *Onboard Intel GbE Configuration* option from the Advanced screen to jump to the Onboard Intel GbE Configuration screen.

Figure 4-7 Onboard Intel GbE Configuration



4.8.1 Intel Boot Agent For Gigabit Ethernet ETH1 / 2 / 3 / 4 (front / rear)





The optimal default is *Enabled*.

This feature controls legacy PXE support for the individually Ethernet ports. For more information see feature PXE Boot Option on page 29.

4.9 VMEbus TSI148

This screen lets the user configure specific VME features.

For more information please refer to the various TSI 148 documents available from website www.idt.com.

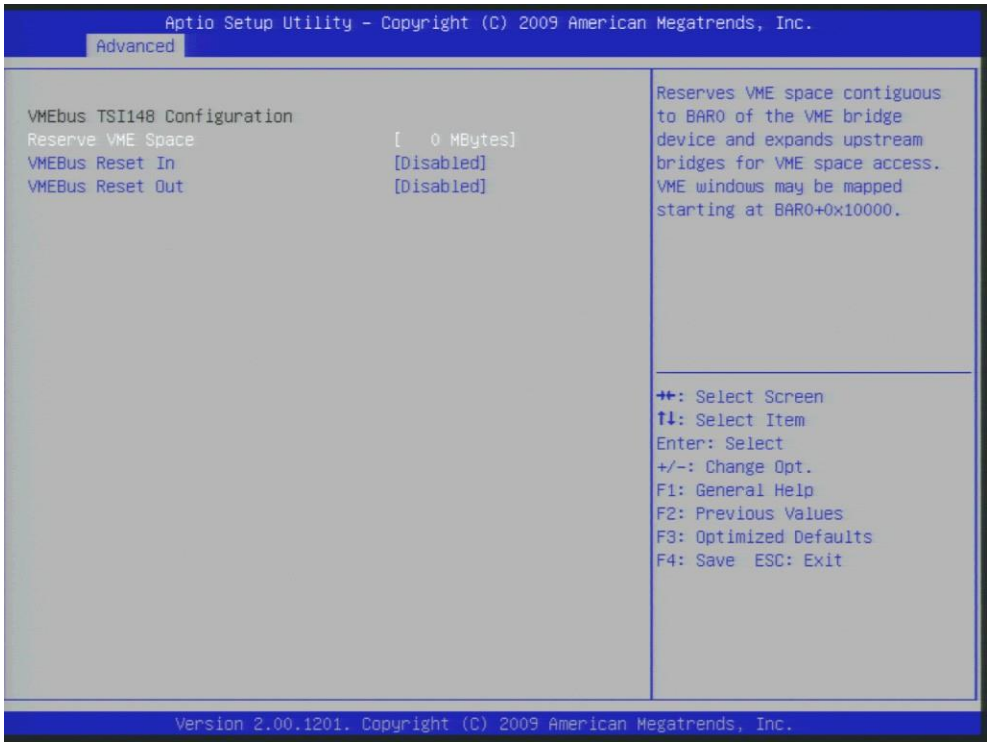
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Select the *VMEbus TSI148* option from the Advanced screen to jump to the VMEbus TSI148 screen.

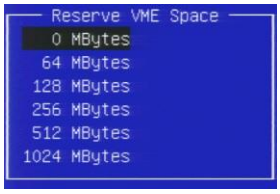
NOTE

Please note that this feature is not available with CR12/CT12 CPCI Single Board Computer.

Figure 4-8 VMEbus TSI148



4.9.1 Reserve VME Space

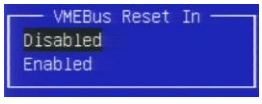


The optimal default is *0 MBytes*.

Reserves VME space contiguous to BAR0 of the VME bridge device and expands upstream bridges for VME space access. VME windows may be mapped starting at BAR0+0x10000.

0 MBytes, 64 MBytes, 128 MBytes, 256 MBytes, 512 MBytes, 1024 MBytes

4.9.2 VMEbus Reset In



The optimal default is *Disabled*.

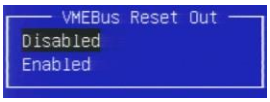
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Disabling this feature will prevent a VMEbus backplane reset from triggering a local system reset.

Please note that the initial reset sequence at power-up always triggers a VMEbus backplane reset to ensure proper system boot. Only subsequent resets can be masked using this feature.

Please use with caution. By specification, any VMEbus cards is expected to accept incoming VMEbus reset signal.

4.9.3 VMEbus Reset Out



The optimal default is *Disabled*.

Disabling this feature will prevent a local system reset from triggering a VMEbus backplane reset.

Please note that the initial reset sequence at power-up always triggers a VMEbus backplane reset to ensure proper system boot. Only subsequent resets can be masked using this feature.

Please use with caution. By specification, any VMEbus card is allowed to trigger VMEbus reset signal.

4.10 ME Configuration

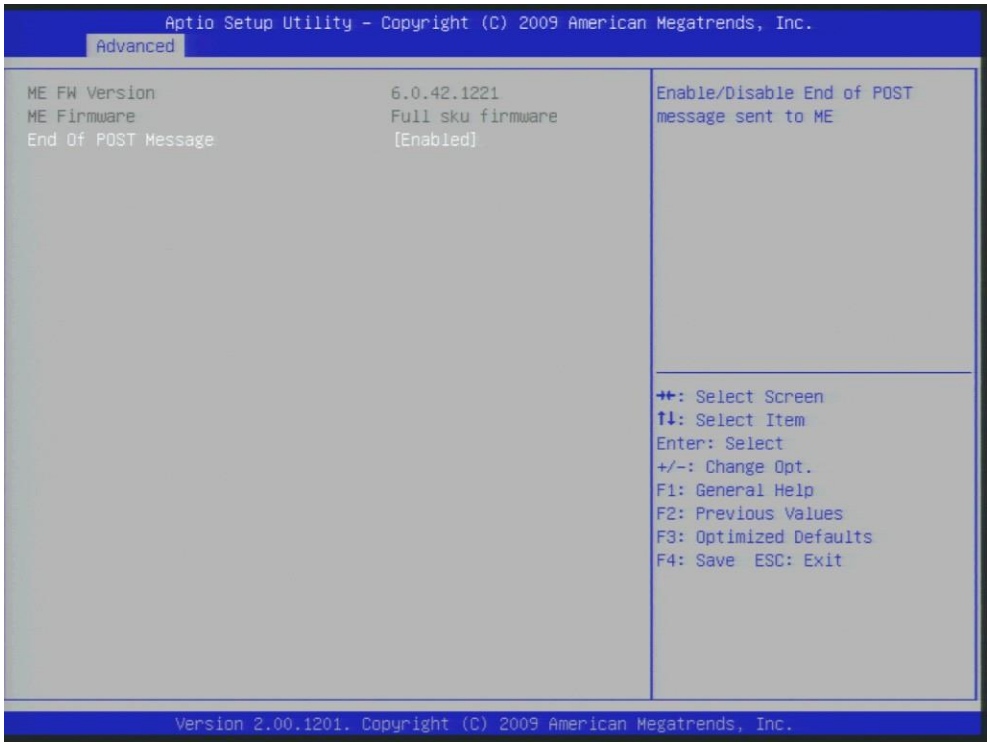
The Intel ® Management Engine (ME) is a hardware-based isolated and protected controller inside the chipset. The ME provides management features such as Intel® Active management Technology (AMT) and Alert Standard Format (ASF).

The optional IPMI controller (see SBC options) communicates with ME to access thermal data from sensors inside the processor and chipset.

Select the *ME Configuration* option from the Advanced screen to jump to the ME Configuration screen.

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Figure 4-9 ME Configuration



4.10.1 ME Firmware

Shows information about the version and type of ME Firmware integrated into this SBC firmware release.

4.10.2 End of POST Message



The optimal default is *Enabled*.

The user can disable notification of End Of Post status.

4.11 Thermal Configuration

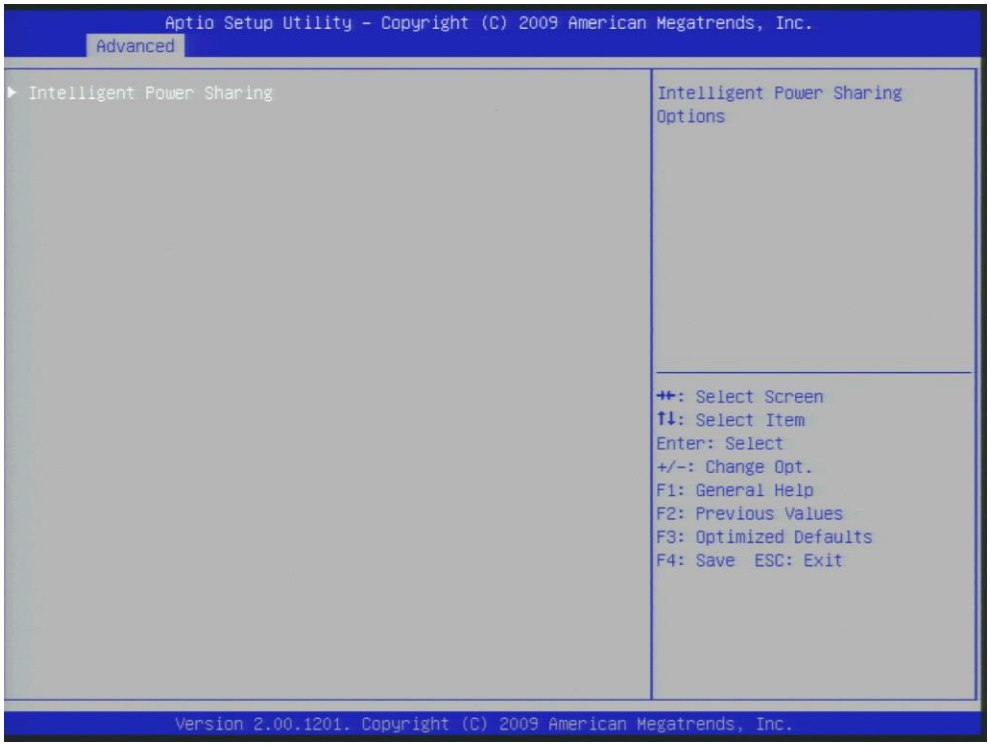
The next generations of 64-bit, multi-core processors coming with this SBC are based on the low-power/high-performance Nehalem micro-architecture with an integrated graphics and memory controller die known as a multi-chip package (MCP) processor.

The thermal solution to maintain temperatures of the processor core and graphics/memory core within operating limits can be controlled with the following features.

Select the *Thermal Configuration* option from the Advanced screen to jump to the Thermal Configuration screen.

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Figure 4-10 Thermal Configuration



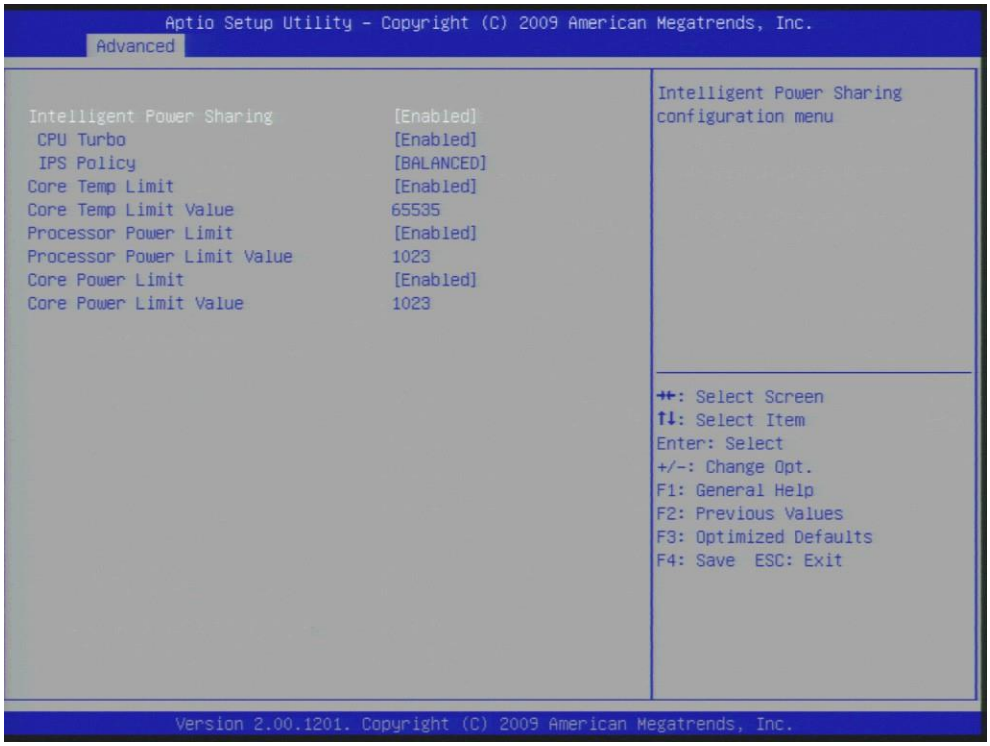
4.11.1 Intelligent Power Sharing

Typical workloads are not demanding enough to drive both the processor cores and the integrated graphics and memory controller towards their Thermal Design Power (TDP) limit simultaneously. As such, the opportunity exists to optimize both processor and integrated graphics performance through Intelligent Power Sharing (IPS).

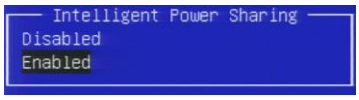
Select the *Intelligent Power Sharing* from the Thermal Configuration screen to jump to the Intelligent Power Sharing screen.

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Figure 4-11 Intelligent Power Sharing



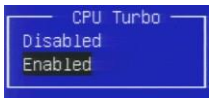
4.11.2 Intelligent Power Sharing



The optimal default is *Enabled*.

Enable this feature to utilize processor core and internal graphics controller dynamic frequency performance states to achieve their highest performance within the rated MCP TDP.

4.11.3 CPU Turbo



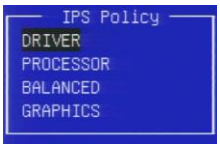
The optimal default is *Enabled*.

Typical applications (single threaded) are not able to drive both processor cores simultaneously thus consuming less than the TDP at the rated frequency.

Enabling *CPU Turbo* will take advantage of the available TDP headroom, increasing the active core operating frequency beyond the rated processor frequency.

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4.11.4 IPS Policy

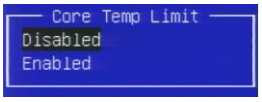


The optimal default is *DRIVER*.

The IPS Policy allows different operating points:

Driver	Allows a specific operating system driver to decide the power balance between both processor cores and the integrated graphics controller.
Processor	Both processor cores can operate at maximum thermal power level while the integrated graphics controller consumes the remaining thermal power budget.
Balanced	Power budget distribution between processor cores and graphics controller is equal.
Graphics	The integrated graphics operates at its maximum thermal power level, while the processor cores consume the remaining thermal power budget.

4.11.5 Core Temp Limit



The optimal default is *Disabled*.

When the temperature of one or both processor cores reaches the given limit the core frequency will be reduced.

The user can generally control setting with this feature.

4.11.6 Core Temp Limit Value



The optimal default is *65535*.

The user can set the *Core Temperature Limit* value in Grad Celsius.

NOTE

[°C] = ([°F] - 32) × 5/9

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4.11.7 Processor Power Limit



The optimal default is *Disabled*.

When the power consumption of the processor (cores and graphic) reaches the given limit the performance will be reduced.

The user can generally control setting with this feature.

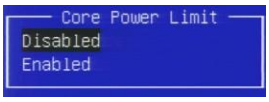
4.11.8 Processor Power Limit Value



The optimal default is *1023*.

The user can set power clamp value in tenths of watts.

4.11.9 Core Power Limit



The failsafe and optimal default is *Disabled*.

When the combined power consumption of both processor cores reaches the given limit the core frequency will be reduced.

The user can generally control setting with this feature.

4.11.10 Core Power Limit Value



The optimal default is *1023*.

The user can set power clamp value in tenths of watts.

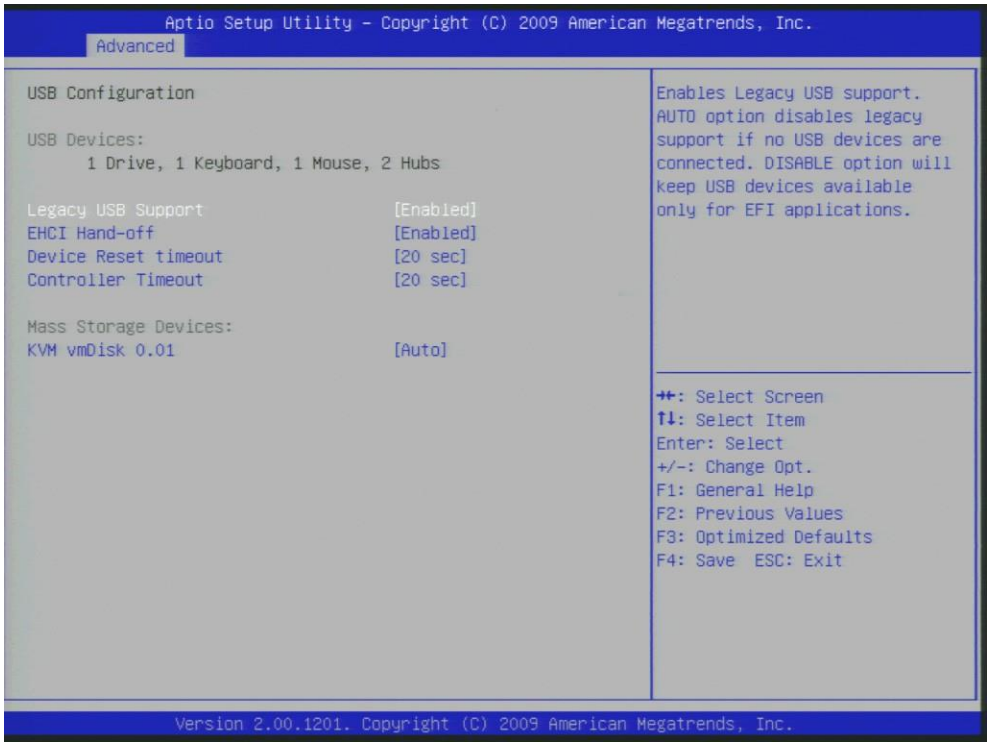
4.12 USB Configuration

You can use this screen to select options for the USB Configuration.

Select the *USB Configuration* option from the Advanced screen to jump to the USB Configuration screen.

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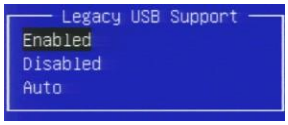
Figure 4-12 USB Configuration



4.12.1 USB Devices

Connected and identified USB devices are listed here.

4.12.2 Legacy USB Support

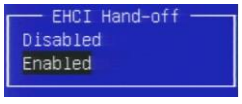


The optimal default is *Enabled*.

The user can enable support to allow legacy applications to access USB devices. Disabling this option will keep USB devices available only for EFI applications.

AUTO option disables legacy support if no USB devices are connected.

4.12.3 EHCI Hand-off

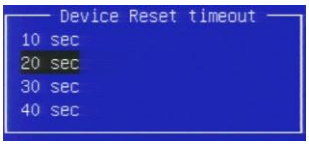


The optimal default is *Enabled*.

With this option user can specify if the UEFI firmware will stop the EHCI controller support when the operating system want the UFEI firmware to hand- over the EHCI host controllers to the operating system.

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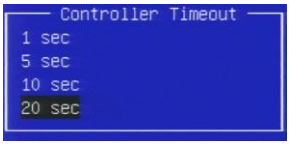
4.12.4 Device Reset Timeout



The optimal default is *20 sec*.

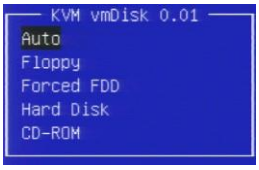
Some USB mass storage devices are slow to come online after the USB port has been initialized. The user can tune this control to a delay long enough to let your USB devices to be detected reliable by UEFI firmware.

4.12.5 Controller Timeout



The optimal default is *20 sec*.

4.12.6 Mass Storage Devices KVM vmDisk 0.01



The optimal default is *Auto*.

The user can set this control to determine the legacy device type under which the USB mass storage device shall appear to the boot sequence and legacy operating systems.

Auto enumerates devices according to their media format. Optical drives are emulated as CD-ROM, drives with no media will be emulated according to a drive type.

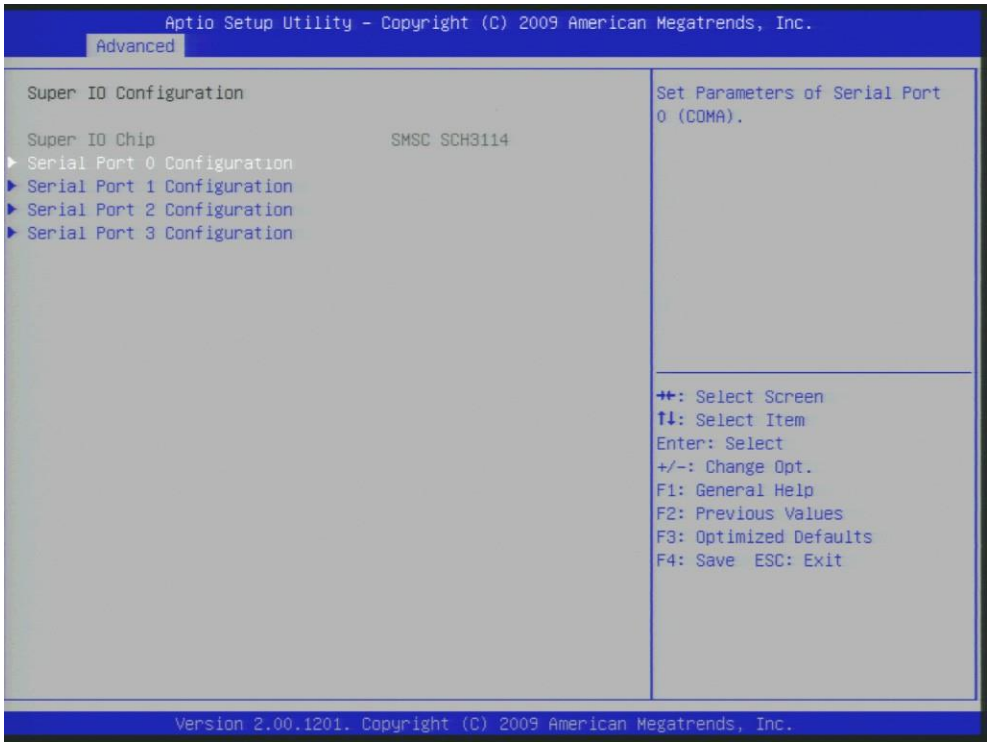
4.13 Super IO Configuration

With the next screen all four serial ports connected via Super IO chip can be individually selected.

Select the *Super IO Configuration* option from the Advanced Setup screen to jump to the Super IO Configuration.

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Figure 4-13 Super IO Configuration



4.13.1 Super IO Chip

Field shows the Super I/O chipset vendor and part number.

4.13.2 Serial Port 0 / 1 Configuration

COM 1 and COM2 have common functionality. Select one of either screen to control serial port configuration.

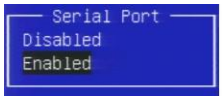
Select the *Serial Port 0 / 1 Configuration* option from the Super IO Configuration screen to jump to the Serial Port 0 / 1 Configuration screen.

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Figure 4-14 Serial Port 0/1 Configuration



Serial Port



The optimal default is *Enabled*.

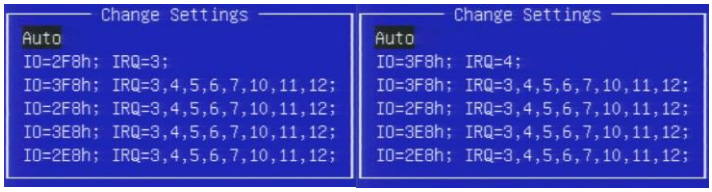
In general this option allows enabling or disabling the serial port.

Device Settings



Shows the serial port address (IO) and interrupt (IRQ) selected by user or UEFI firmware.

Change Settings

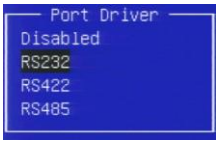


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The optimal default is *Auto*.

The user can individually select the serial port address (IO) and interrupt (IRQ) or select *Auto* to let the UEFI firmware decide the best setting. If more than one interrupt is listed the UEFI firmware automatically selects one from the list.

Port Driver



The optimal default is *RS232*.

COM1 and COM2 drivers support different electrical serial interface standards. The user can select which one matches with his environment.

RS232 Single-Ended, Single Driver, Single Receiver, up to 15 m (50 feet)

RS422 Differential, Single Driver, Multiple Receivers, up to 220 m (4,000 feet)

RS485 Differential, Multiple Drivers, Multiple Receivers, up to 220 m (4,000 feet)

NOTE

For more details on driver characteristic refer to SBC Hardware Reference Manual.

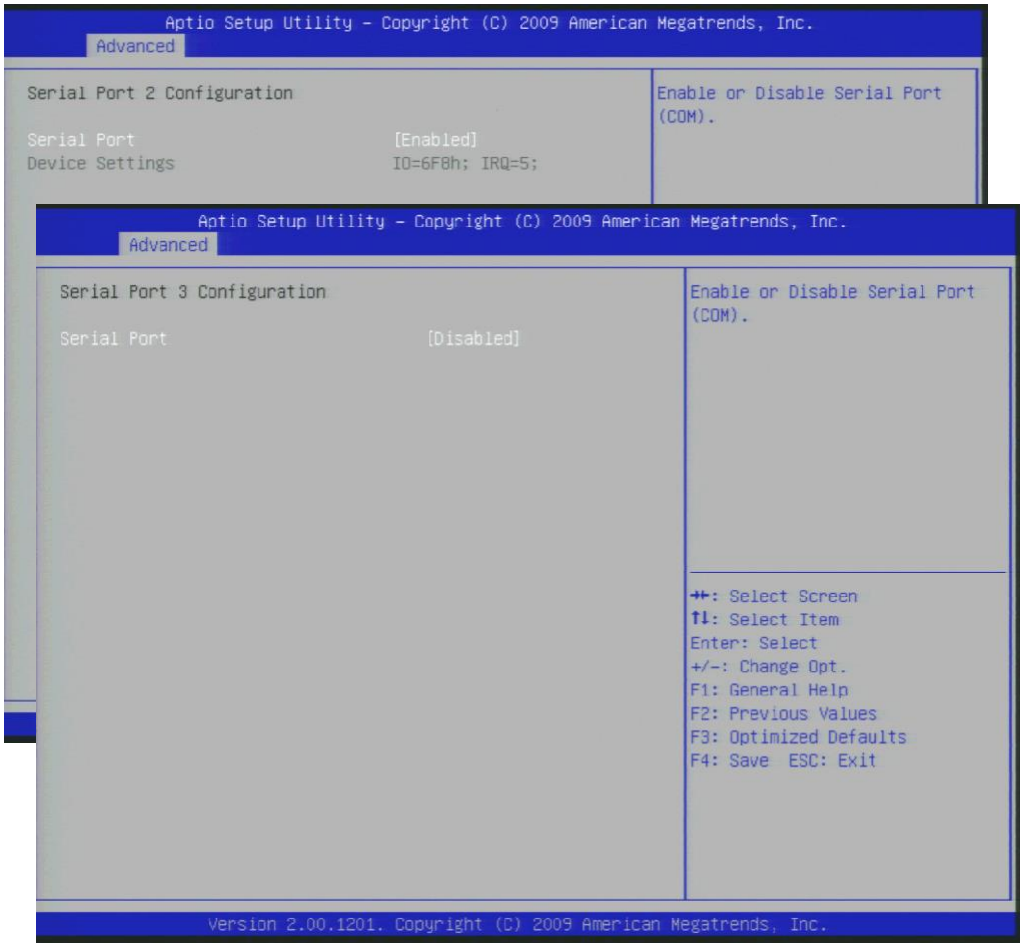
4.13.3 Serial Port 2 / 3 Configuration

COM 2 and COM3 have common functionality. Select one of either screen to control serial port configuration.

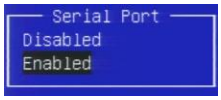
Select the *Serial Port 2 /3 Configuration* option from the Advanced screen to jump to the Serial Port 2 / 3 Configuration screen.

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Figure 4-15 Serial Port 2/3 Configuration



Serial Port



The optimal default is *Enabled*.

In general this option allows enabling or disabling the serial port

Device Settings



Shows the serial port address (IO) and interrupt (IRQ) automatically selected by UEFI firmware.

NOTE

The serial port driver is always RS232.

For more details on driver characteristic refer to SBC Hardware Reference Manual.

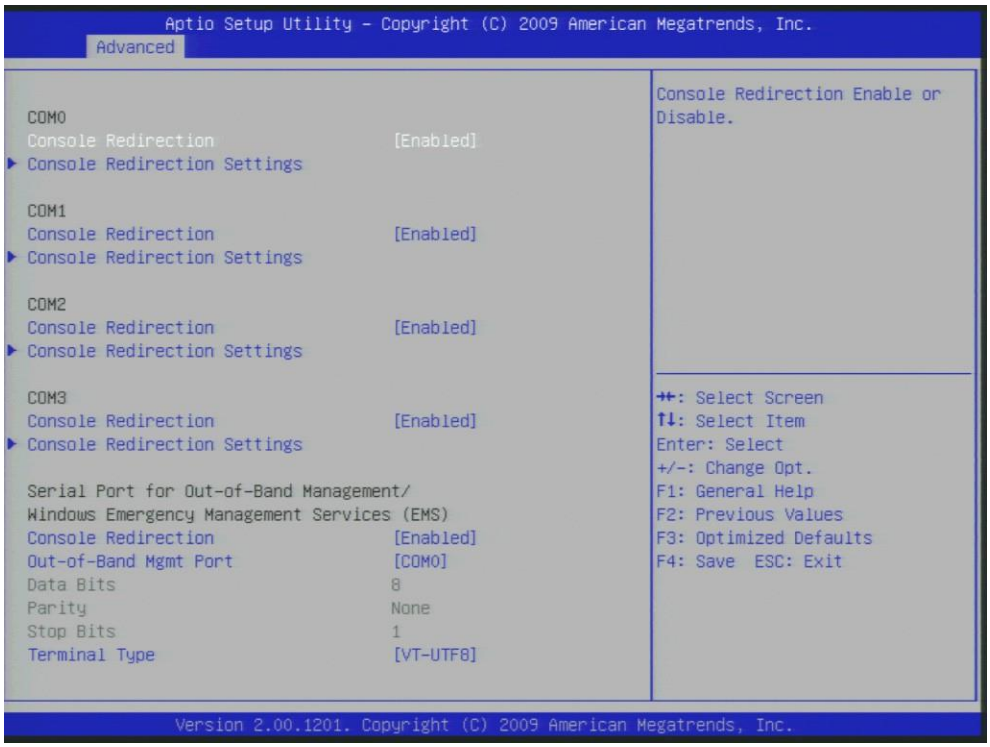
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4.14 Serial Port Console Redirection

This screen allows selecting options for the Remote Access Configuration. The remote access feature requires a dedicated serial port connection.

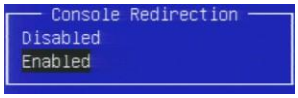
Select the *Serial Port Console Redirection* option from the Advanced screen to jump to the Serial Port Console Redirection Configuration screen.

Figure 4-16 Serial Port Console Redirection



4.14.1 COM 0 / 1 / 2 / 3

Console Redirection



The optimal default is *Disabled*.

The user can individually select one or more serial ports for console redirection.

4.14.2 Serial Port for Out-Of-band Management / Windows Emergency Management Services (EMS)

Console Redirection



The optimal default is *Disabled*.

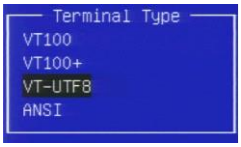
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Out-Of-Band Mgmt Port



The optimal default is *COM0*.

Terminal type



The optimal default is *VT-UTF8*.

The user can select the terminal protocol type.

COM 0 / 1 / 2 / 3 Console Redirection Settings

The user can select one or more serial ports for console redirection. The next screens allow individually settings for each of them.

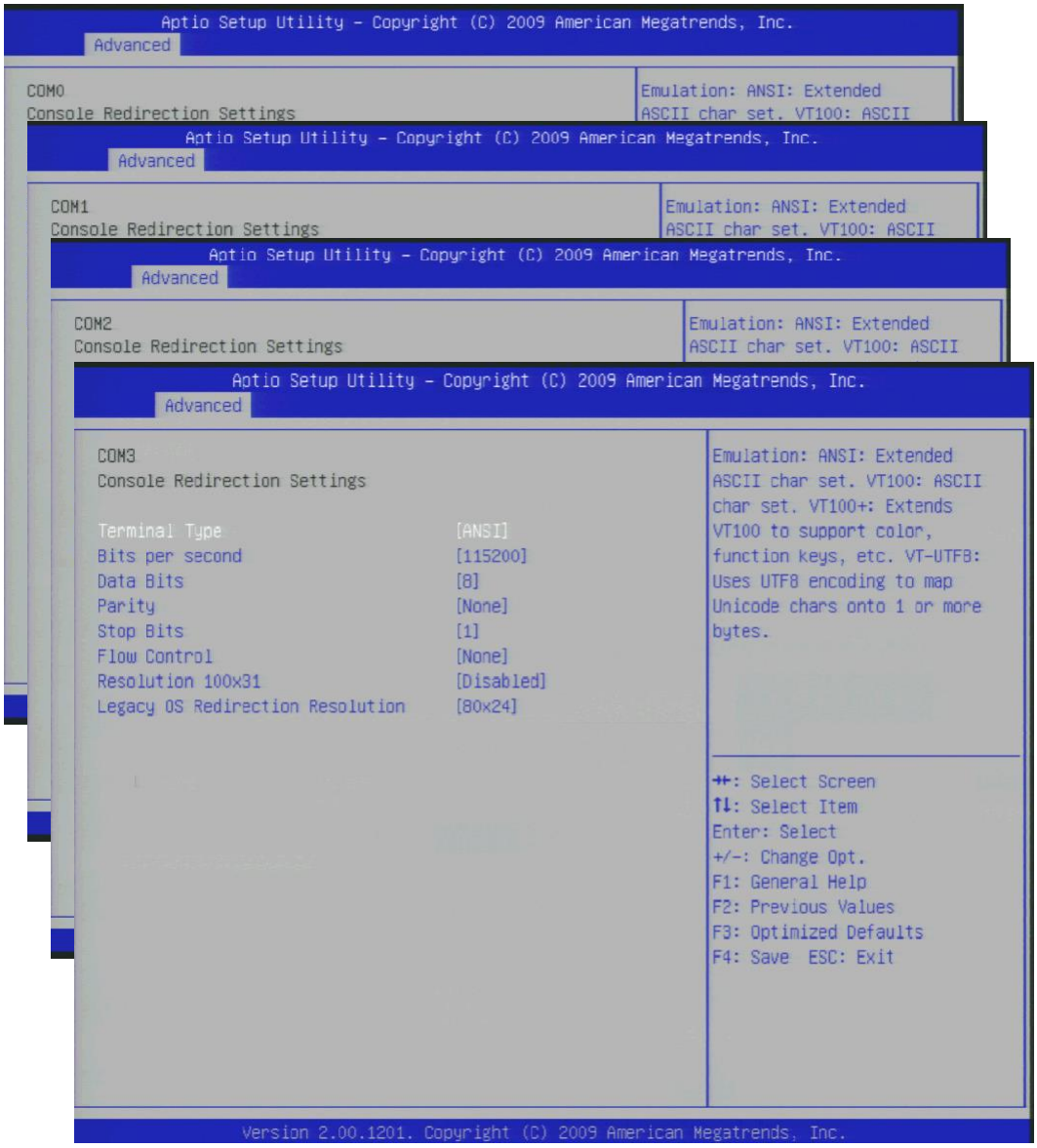
NOTE

The configuration screen only becomes available when the Serial Redirection for a serial port was enabled prior.

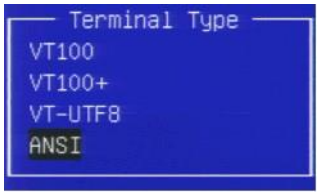
Select the COM 0 / 1 / 2 / 3Console Redirection Settings option from the Advanced screen to jump to the COM 0 / 1 / 2 / 3Console Redirection Settings screen.

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Figure 4-17 Serial Port Console Redirection



Terminal Type



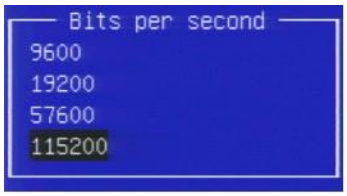
The optimal default is *ANSI*.

The user can select the Terminal Type for the proper control codes.

Terminal control codes are needed to give specific commands to your terminal such as switching colors or positioning the cursor.

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Bits Per Second



The optimal default is *115200*.

The user can select the baud rate (transmitted bits per second). This should be the same speed the terminal receiver is set to.

Data Bits



The optimal default is *8*.

The user can select the data bit in each character.

This should be the same data bit the terminal receiver is set to.

Parity

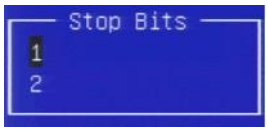


The optimal default is *None*.

The user can select the parity bit in each character.

This should be the parity bit the terminal receiver is set to.

Stop Bits

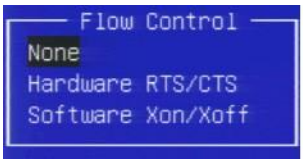


The optimal default is *1*.

The user can select the number of stop bits sent at the end of every character. This should be the same number the terminal receiver is set to.

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Flow Control



The optimal default is *None*.

The user can select the method of flow control.

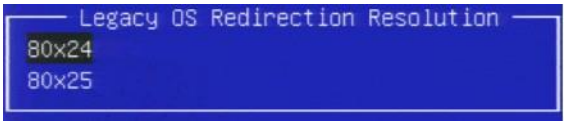
Hardware RTS/CTS	This requires RTS and CTS handshake signal lines to be connected and operational.
Software Xon/Xoff	Set this value for software flow control through Xon/Xoff character protocol.

Resolution 100x31

Picture TBD

The optimal default is *Disabled*.

Legacy OS Redirection Resolution



The optimal default is *80x24*.

4.15 Network Stack

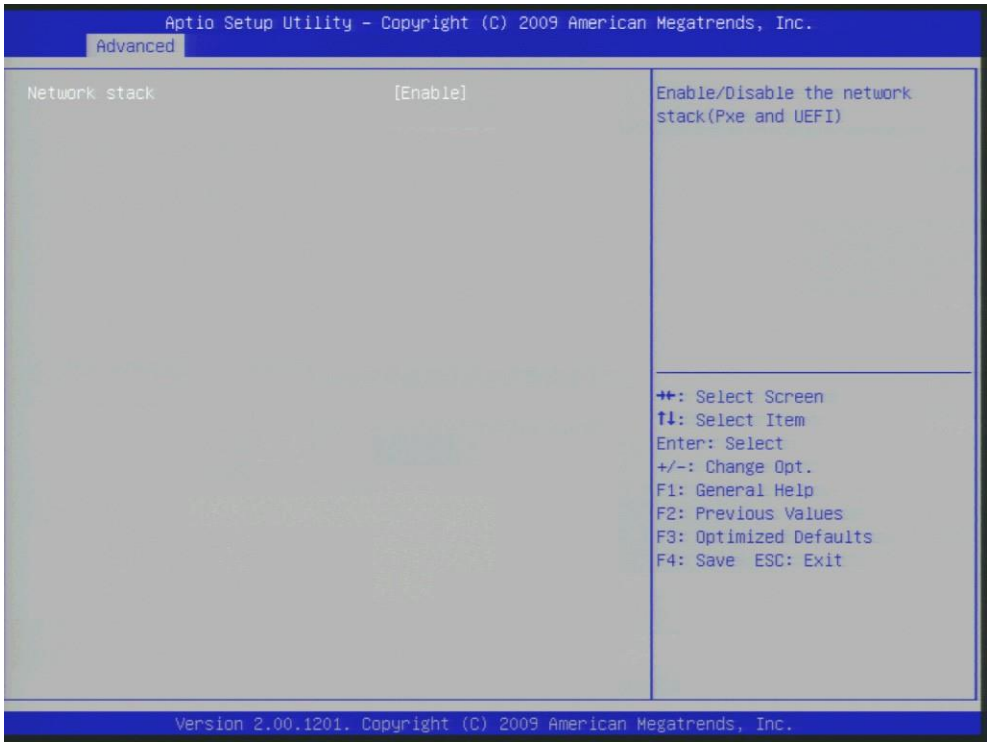
This screen controls the modern UEFI PXE support.

For more information on PXE see feature *PXE Boot Option* on page 29.

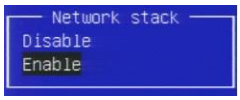
Select the *Network Stack* option from the Advanced screen to jump to the Network Stack screen.

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Figure 4-18 Network Stack



4.15.1 Network Stack



The optimal default is *Disabled*.

The user can control UEFI PXE support with this feature.

NOTE

UEFI PXE once enabled is valid for all existing SBC Ethernet ports.

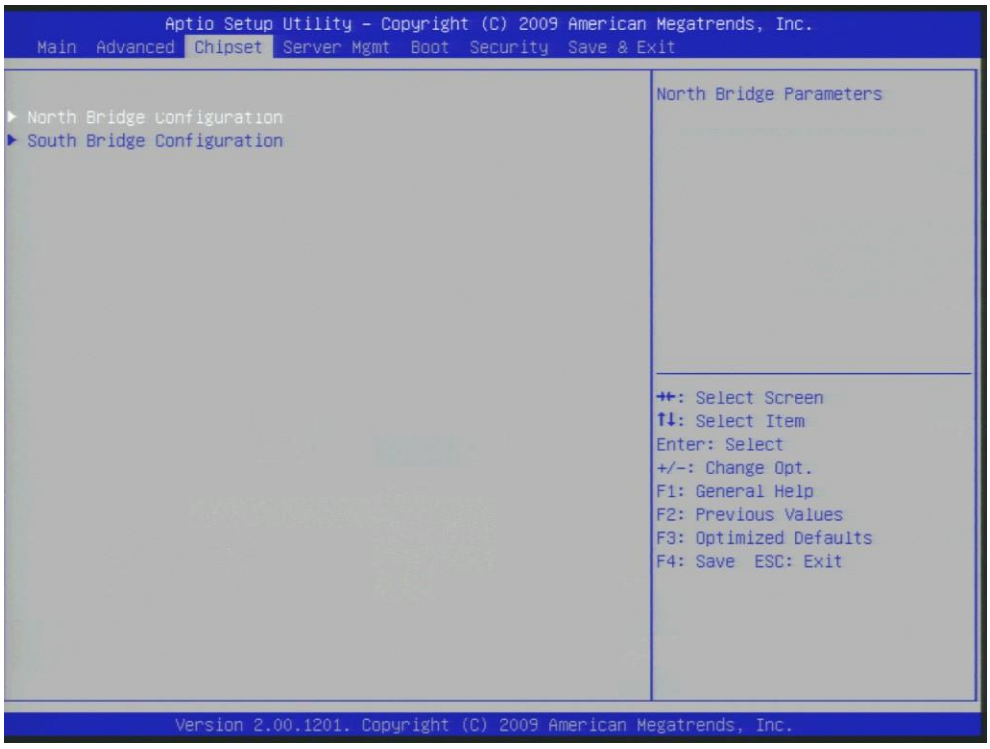
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5 • Chipset Setup Screen

Select the Chipset tab from the Setup screen to enter the Chipset Setup screen. The first options jumps to the North Bridge Configuration screen (page 71) with the second option showing the South Bridge Configuration (page 78).

With this modern SBC the North Bridge is integrated into the processor package.

Figure 5-1 Chipset Setup Screen



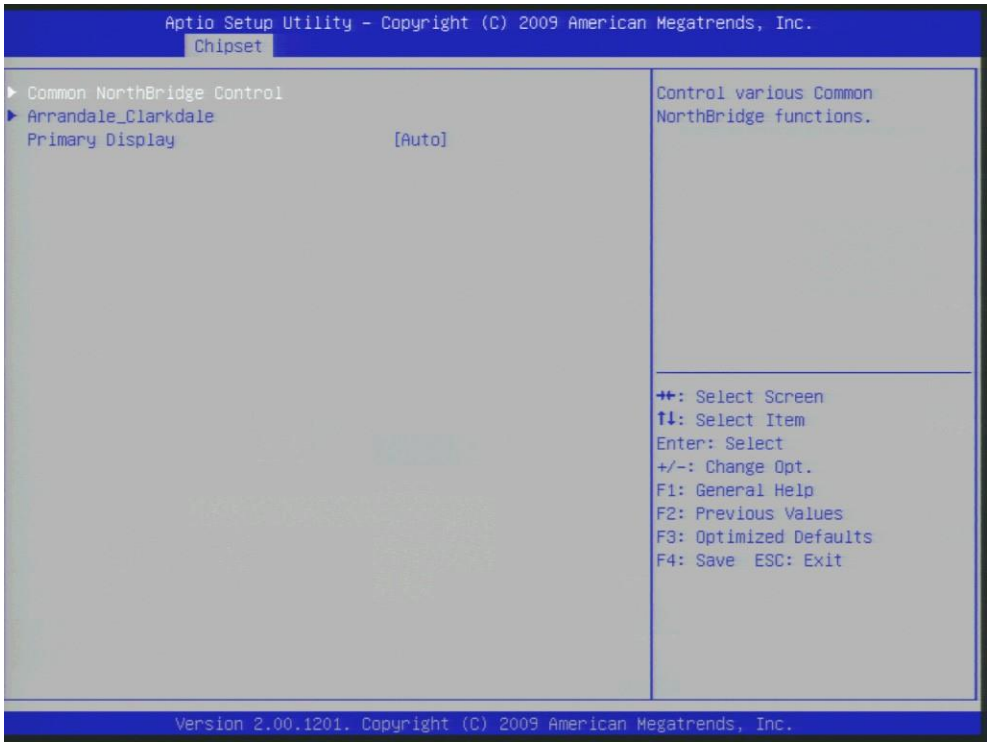
5.1.1 North Bridge Configuration

This section describes all options related to North Bridge chipset. Changeable options are described in the next level Setup screens Common NorthBridge Control and Arrandale_Clarkdale following on the next pages.

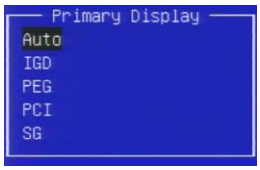
Select the *North Bridge* tab from the Chipset screen to enter the North Bridge screen.

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Figure 5-2 North Bridge Configuration



Primary Display



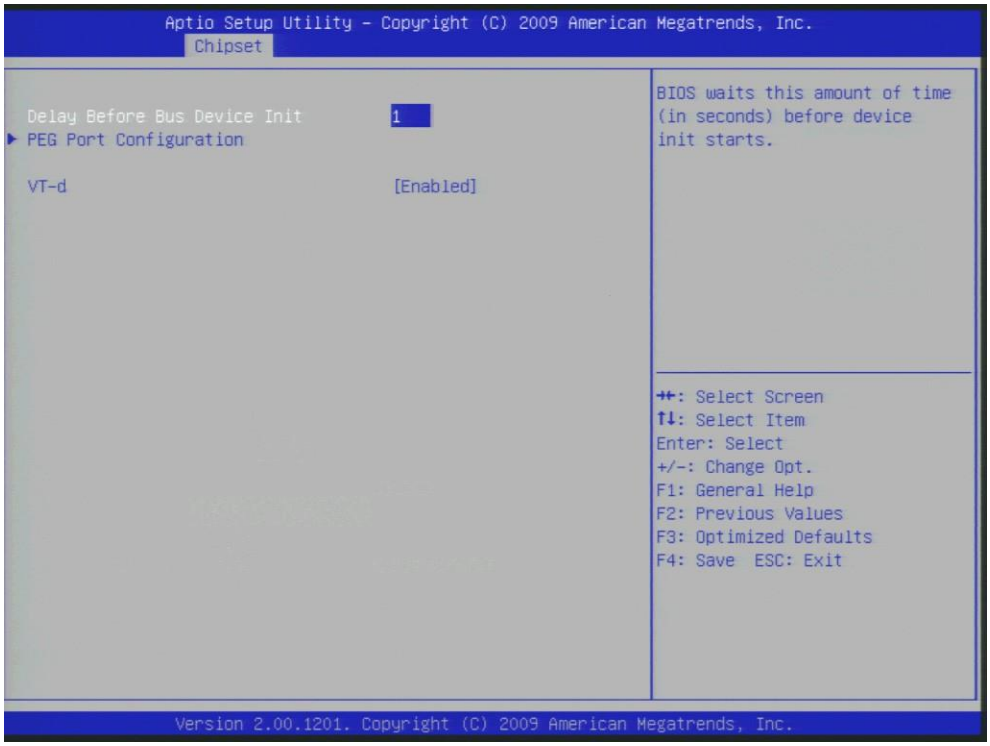
The optimal default is *Auto*.

Common North Bridge Control

Select the Common North Bridge Control tab from the North Bridge Configuration screen to enter the Common North Bridge Control screen.

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Figure 5-3 Common North Bridge Control

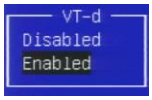


Delay Before Bus Device Init



The optimal default is *1*.

VT-d



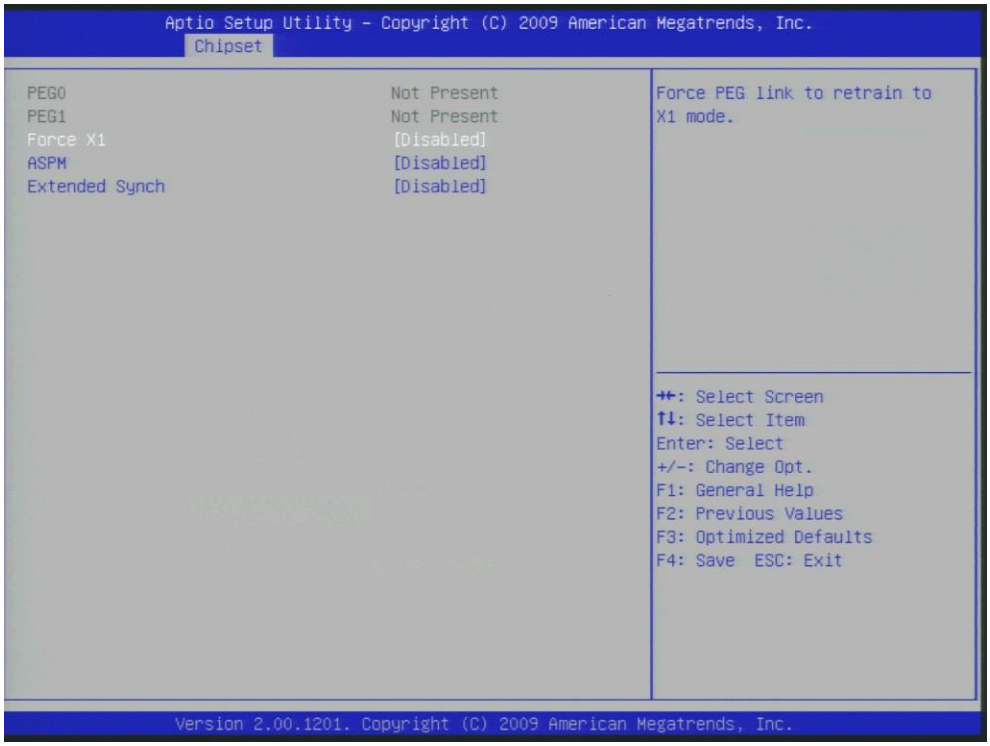
The optimal default is *Enabled*.

PEG Port Configuration

Select the *PEG Port Configuration* tab from the Common North Bridge Control screen to enter the PEG Port Configuration screen.

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Figure 5-4 North Bridge Configuration

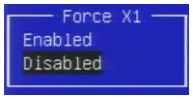


PEG0 / 1

The fields show the link width of the devices connected to PCI Express Graphics interface. Both PEG ports work as standard PCI Express links on this SBC.

Force X1

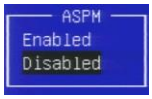
Dependent from the product the PEG1 interfaces connects to PMC2 / XMC2 (VR12) or CPCI-Bridge (CR12). PEG0 always connects to PMC1 / XMC1.



The optimal default is *Disabled*.

ASPM

This feature enabled forces both PEG ports to work with x1 link width regardless of the supported width from the connected devices.

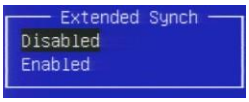


The optimal default is *Disabled*.

The user can enable Active State Power Management (ASPM) for power saving on both PEG ports.

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Extended Synch



The optimal default is *Disabled*.

The Extended Sync feature enabled provides external link monitoring device (i.e. PCI-E debug tool) enough time to sync properly (achieve bit and symbol lock).

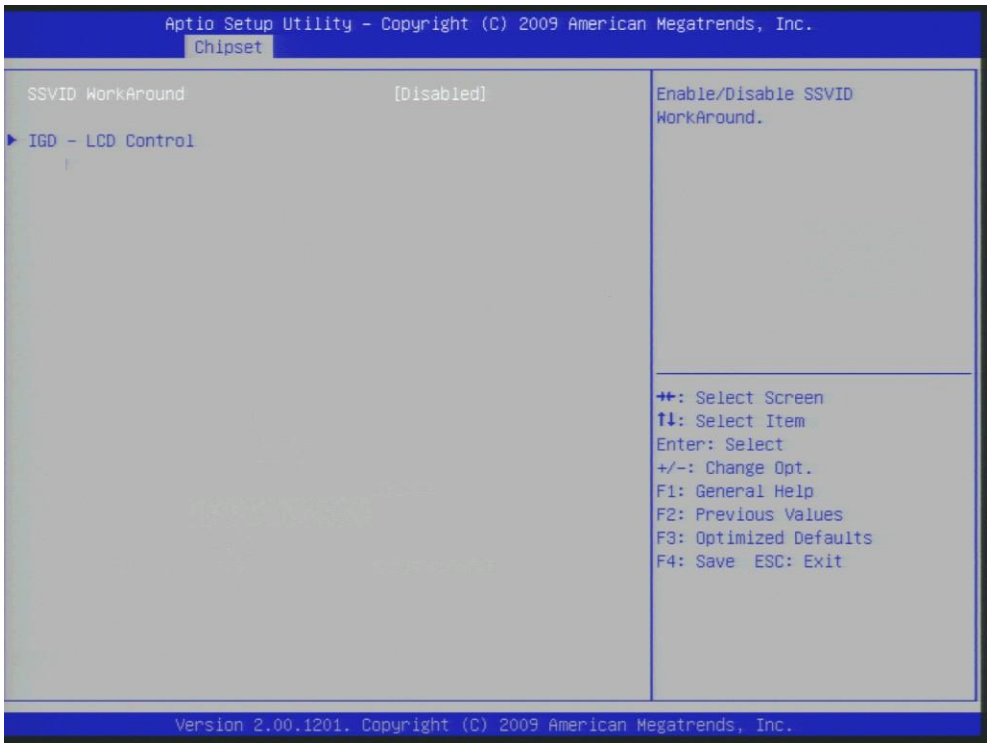
Under normal operation it is not necessary to enable this option.

5.2 Arrandale_Clarkdale

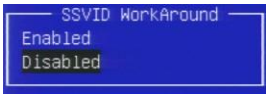
This section describes all options related to the integrated graphics controller.

Select the *Arrandale_Clarkdale* tab from the Chipset screen to enter the Arrandale_Clarkdale screen.

Figure 5-5 Arrandale_Clarkdale



5.2.1 SSVID Workaround



The optimal default is *Disabled*.

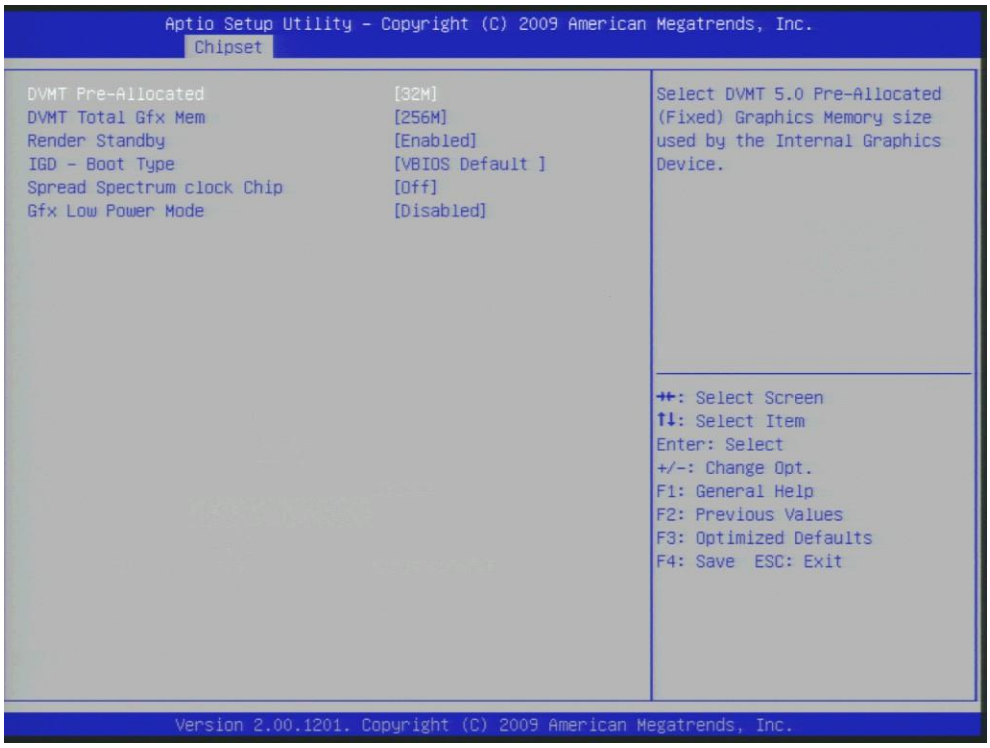
5.2.2 IGD – LCD Control

This section describes

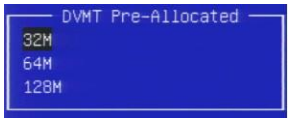
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Select the *IGD – LCD Control* tab from the Chipset screen to enter the IGD – LCD Control screen.

Figure 5-6 IGD – LCD Control

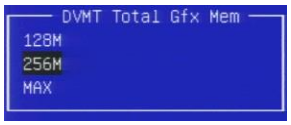


5.2.3 DVMT Pre-Allocated



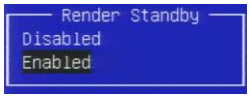
The optimal default is *32M*.

5.2.4 DVMT Total Gfx Mem



The optimal default is *256M*.

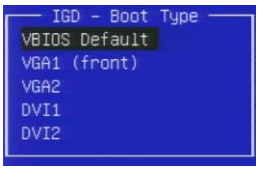
5.2.5 Render Standby



The optimal default is *Enabled*.

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5.2.6 IGD – Boot Type



The optimal default is VBIOS Default.

5.2.7 Spread Spectrum Clock Chip



The optimal default is *Off*.

5.2.8 Gfx Low Power Mode



The optimal default is *Disabled*.

5.3 South Bridge Configuration

The next fours sections describe the options supported by the South Bridge Ibex Peak in more details.

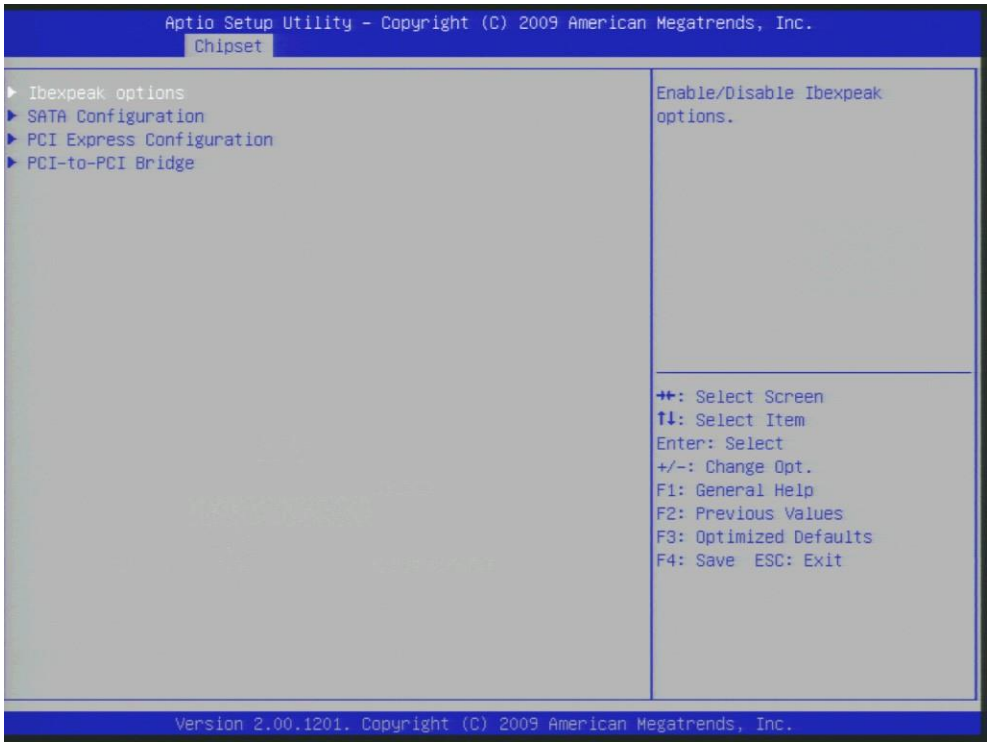
Select the *South Bridge Configuration* tab from the Chipset screen to enter the South Bridge Configuration screen.

NOTE

The feature PCI-to-PCI Bridge is not applicable for this SBC and will be deleted with the next firmware release.

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Figure 5-7 South Bridge Configuration

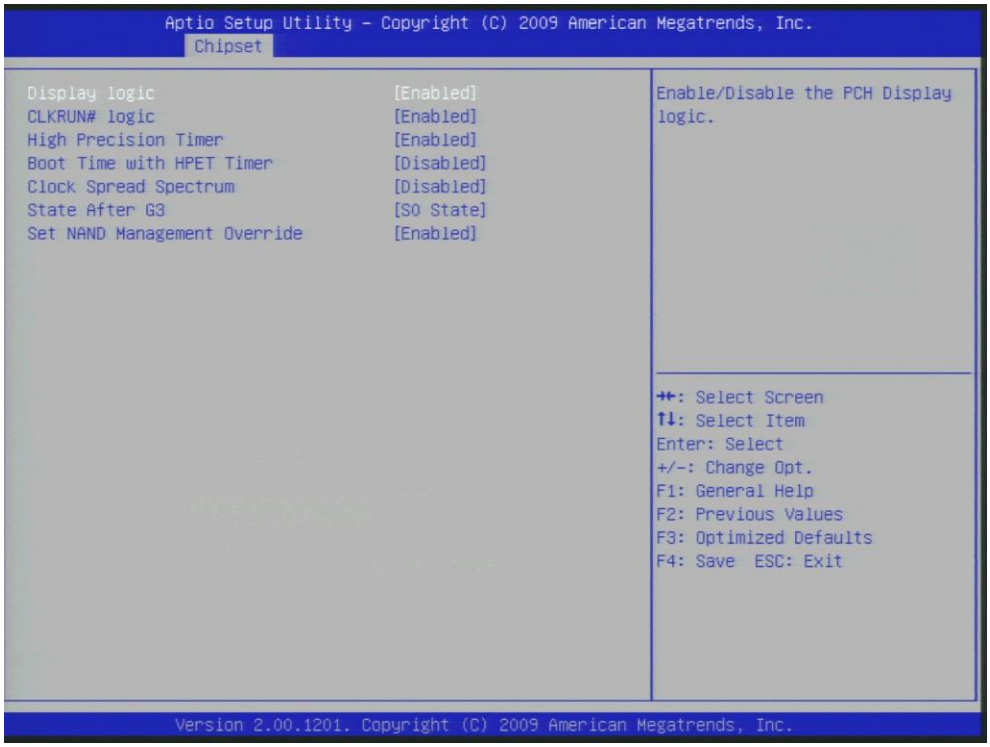


5.3.1 Ibexpeak Options

This screen controls general options of the South Bridge Ibex Peak.

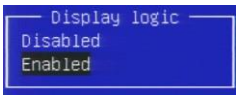
Select the *Ibexpeak Options* feature from the South Bridge Configuration screen to jump to the Ibexpeak Options screen.

Figure 5-8 Ibexpeak Options



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5.3.2 Display Logic

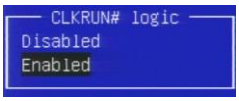


The optimal default is *Enabled*.

WARNING

This feature disables the video output circuitry of the GPU. Therefore it is highly recommended NOT to use this feature; otherwise no screen message will be visible after. If by coincidence the output is disabled the only way to overcome this is to erase the SBC configuration by removing the battery. CMOS RAM and NVRAM (Flash) will lose its content including the password when the battery is drained.

5.3.3 CLKRUN# Logic



The optimal default is *Enabled*.

This is a factory setting. Please do not change.

NOTE

Feature will set invisible with the next release of UEFI firmware.

5.3.4 High Precision Timer

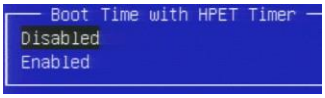


The optimal default is *Enabled*.

The High Precision Event Timer (HPET) is a hardware timer developed jointly by Intel and Microsoft since 2005. Previously only the older timing facilities such as the programmable interval timer (PIT) or the real-time clock could be used for timing purposes.

The user should turn this feature on for modern operating systems like Windows Vista, Windows 2008, Windows 7 and Linux operating systems 2.6 kernel and above can take advantage of this timer.

5.3.5 Boot Time With HPET Timer



The optimal default is *Disabled*.

Enabling this feature allow HPET get used during early boot and programmable interval timer PIT will be not used in early boot.

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5.3.6 Clock Spread Spectrum



The optimal default is *Disabled*.

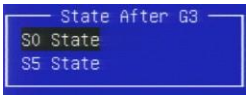
The user can enable spread-spectrum clock generation to additionally reduce the spectral density of the electromagnetic interference (EMI) that SBC generates.

NOTE

This feature is not required to pass EMI compliance this SBC is specified for until otherwise noted.

This feature should not be enabled with VR12 since malfunction of the VME interface might be the result.

5.3.7 State After G3



The optimal default is *S0 state*.

In the unpredictable event of losing power, user can decide with this feature the behavior of SBC once power returns.

S0 Turn on

S5 Stay off

This can be very helpful if user remotely connects to the system, as it will be unavailable until user is able to power the system back up.

5.3.8 Set NAND Management Override



The optimal default is *Enabled*.

This feature is not supported by the current SBC hardware.

NOTES

The Onboard Flash functionality is connected to SATA port TBD and not controlled by this feature.

Feature will set invisible with the next release of UEFI firmware.

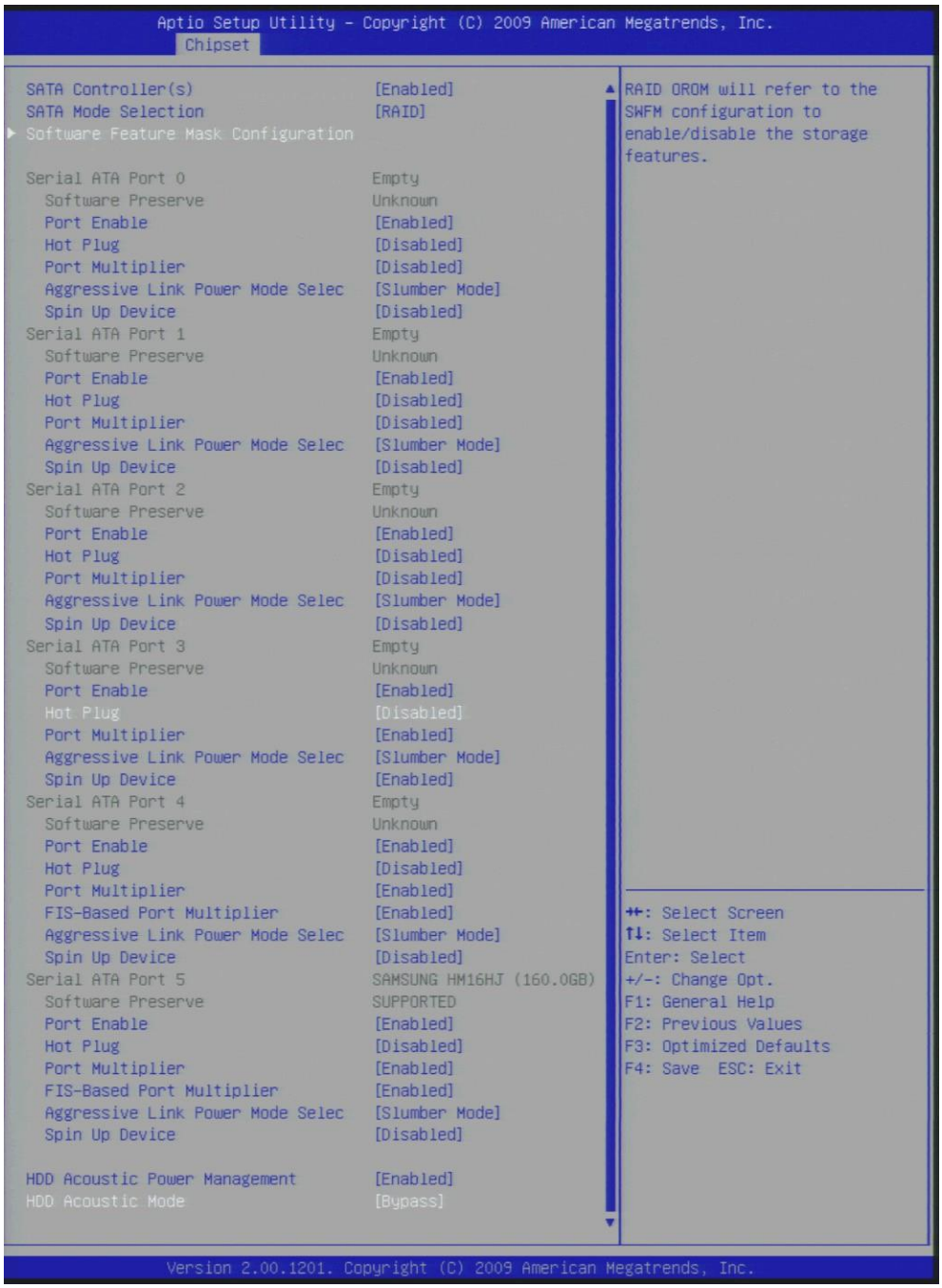
5.3.9 SATA Configuration

This screen controls SATA related options such as Hot Plugging, Port Multiplying, Power Management and Start-Up time.

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Select the *SATA Configuration* option from the South Bridge Configuration screen to jump to the SATA Configuration screen.

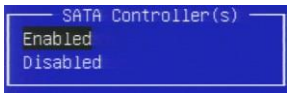
Figure 5-9 SATA Configuration



NOTE

Screen shot was tweaked to show all options in one page. Actual Setup screen offers scroll bar to show all options.

SATA Controller(s)

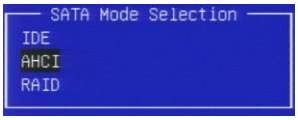


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The optimal default is *Enabled*.

User can disable all SATA ports if not used.

SATA Mode Selection



The optimal default is *AHCI*.

This option defines the operating mode for SATA controller.

IDE Legacy mode for older operating systems like DOS and Windows 98.

AHCI Recommended mode for modern operating systems. RAID SBC supports different RAID modes. Further settings see *Software Feature Mask Configuration*.

NOTES

AHCI and RAID mode require operating systems supporting it.

Selecting must be made carefully since mode switching once an operating system has already been installed might not be easily possible.

Some features in this section like Hot Plug, Port Multiplier, Aggressive Link Power Mode Select, Spin Up Device are dependent on SATA mode selection.

Serial ATA Port 0 / 1 / 2 / 3 / 4 / 5 Software Preserve



The first line informs about the connected SATA device or shows Empty if not available.

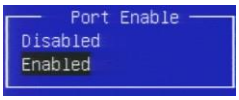
The second line shows the devices *Software Preserve* capability once a SATA device is connected.

The reset handling between the old legacy PATA and the new SATA interface has significantly changed. In order to avoid losing important software settings in SATA device without legacy driver knowledge, the Software Preserve feature ensures that the value of important software settings is maintained across a reset or an asynchronous loss of signal.

NOTE

UEFI firmware will turn this feature on by default if supported by SATA device.

Port Enable

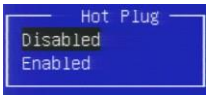


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The optimal default is *Enabled*.

Hot Plug

User can individually disable SATA port if it is not used.



The optimal default is *Disabled*.

The user can individually enable option when a Hot Plug capable device is connected.

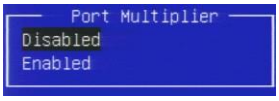
NOTES

Feature is only available in AHCI or RAID mode.

Proper function requires operating system and device driver supporting it.

Hot Plug feature is not available when Aggressive Link Power Mode is set to Partial or Slumber mode.

Port Multiplier



The optimal default is *Disabled*.

A SATA port multiplier is a device that allows up to 15 SATA devices to be connected to a single SATA host port (similar to a USB hub).

The user should enable this feature when such a device is connected.

NOTE

Feature is not available in IDE mode.

FIS-based Port Multiplier



The optimal default is *Enabled*.

NOTE

Only SATA Port 4 and 5 support Feature is not available in IDE mode.

Aggressive Link Power Mode Select



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The optimal default is *Slumber Mode*.

Aggressive Link Power Mode (ALPM) moves a SATA link to a very low power state when during idle time (no I/O request). The SATA link is automatically set to active power state once I/O requests are queued to that link.

Power savings come at the expense of disk latency. As such, ALPM should be used only if the system experiences long periods of idle I/O time.

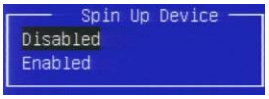
Disabled	Maximum performance but no power saving entered
Partial Mode	Allow transition to low power states with as small impact on performance
Slumber Mode	Lowest power state, useful when an extended period of idle time is expected

NOTES

Feature is not available in IDE mode.

Hot Plug feature is not available in Partial or Slumber mode.

Spin Up Device



The optimal default is *Disabled*.

When enabled, the SATA device will not spin up until the UEFI firmware issues a specific command to do so. This limits the power consumption upon power on but increases boot time.

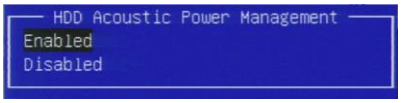
When *Spin Up* feature is enabled for multiple SATA devices, the UEFI firmware tries to set up Staggered Spin Up sequence further removing power demand on power on.

NOTES

Feature is not available in IDE mode.

Operation is subject to SATA device supporting it.

HDD Acoustic Power Management



The optimal default is *Disabled*.

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HDD Acoustic Mode



The optimal default is *Bypass*.

5.3.10 Software Feature Mask Configuration

This section describes the specific RAID features.

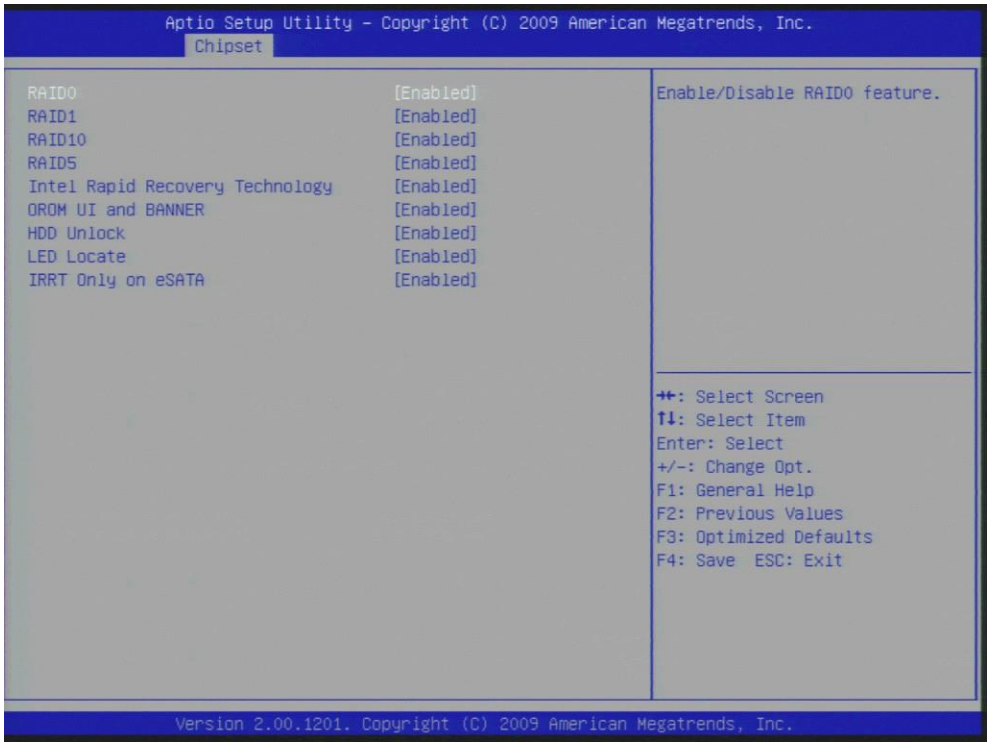
NOTE

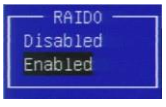
The screen is only available when RAID was enabled in SATA Mode Selection feature.

Select the *Software Feature Mask Configuration* option from the SATA Configuration screen to jump to the Software Feature Mask Configuration screen.

RAID0

Figure 5-10 Software Feature Mask Configuration





The optimal default is *Enabled*.

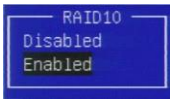
RAID1



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The optimal default is *Enabled*.

RAID10

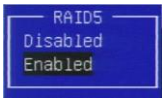


The optimal default is *Enabled*.

Support depends on SBC SATA port availability.

RAID5

SATA port Matrix vs. RAID capability must be defined by HW engineer.



The optimal default is *Enabled*.

Support depends on SBC SATA port availability.

SATA port Matrix vs. RAID capability must be defined by HW engineer.

Intel Rapid Recovery Technology



The optimal default is *Enabled*.

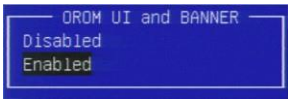
Intel® Rapid Recover Technology uses RAID 1 (mirroring) functionality to copy data from a designated master drive to a designated recovery drive. The master drive data can be copied to the recovery drive either continuously or on request.

When using the continuous update policy, changes made to the data on the master drive while the recovery drive is not connected are automatically copied to the recovery drive when it is reconnected. When using the on request update policy, the master drive data can be restored to a previous state by copying the data on the recovery drive back to the master drive.

NOTE

The recovery volume can be the only volume on a system. Recovery volume capacity will equal the size of the smaller of the two hard drives.

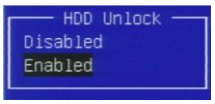
OROM UI and BANNER



The optimal default is *Enabled*.

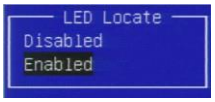
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HDD Unlock



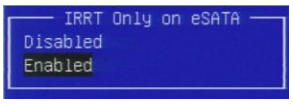
The optimal default is *Enabled*.

LED Locate



The optimal default is *Enabled*.

IRRT Only on eSATA



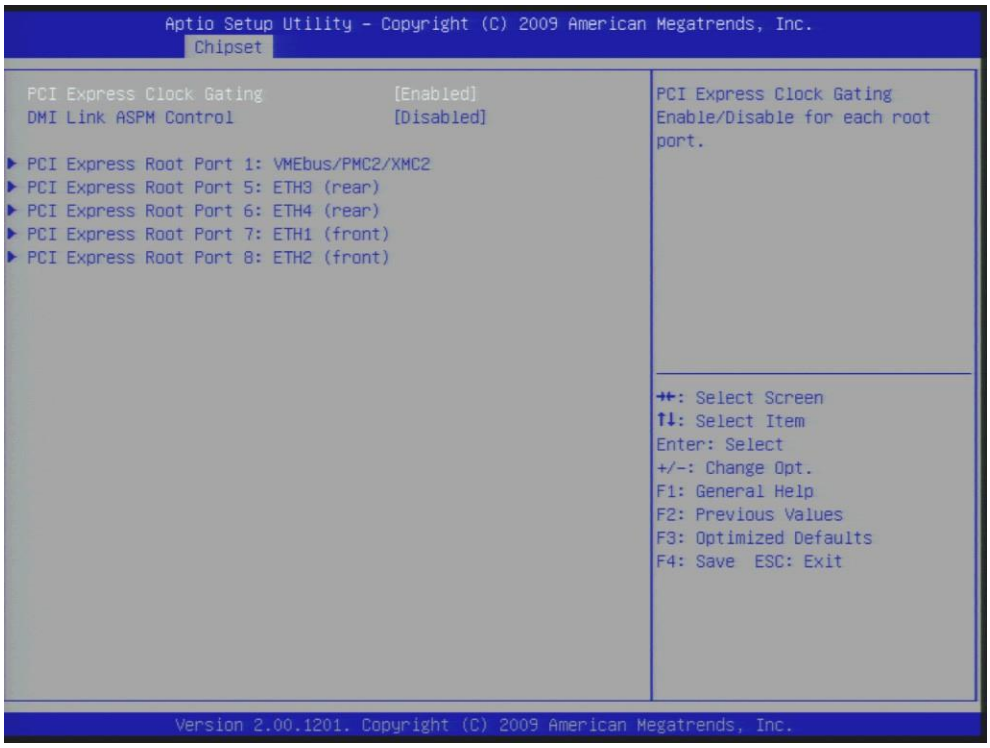
The optimal default is *Enabled*.

5.3.11 PCI Express Configuration

This and the next sections describe PCI Express root complex related options such as power saving, error behavior and resource distribution.

Select the *PCI Express Configuration* option from the South Bridge Configuration screen to jump to the PCI Express Configuration screen.

Figure 5-11 PCI Express Configuration



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PCI Express Clock Gating



The optimal default is *Enabled*.

The user can achieve power savings through enabling Clock-gating by turning off the clock to portions of each PCI Express root port at times.

DMI Link ASPM Control



The optimal default is *Disabled*.

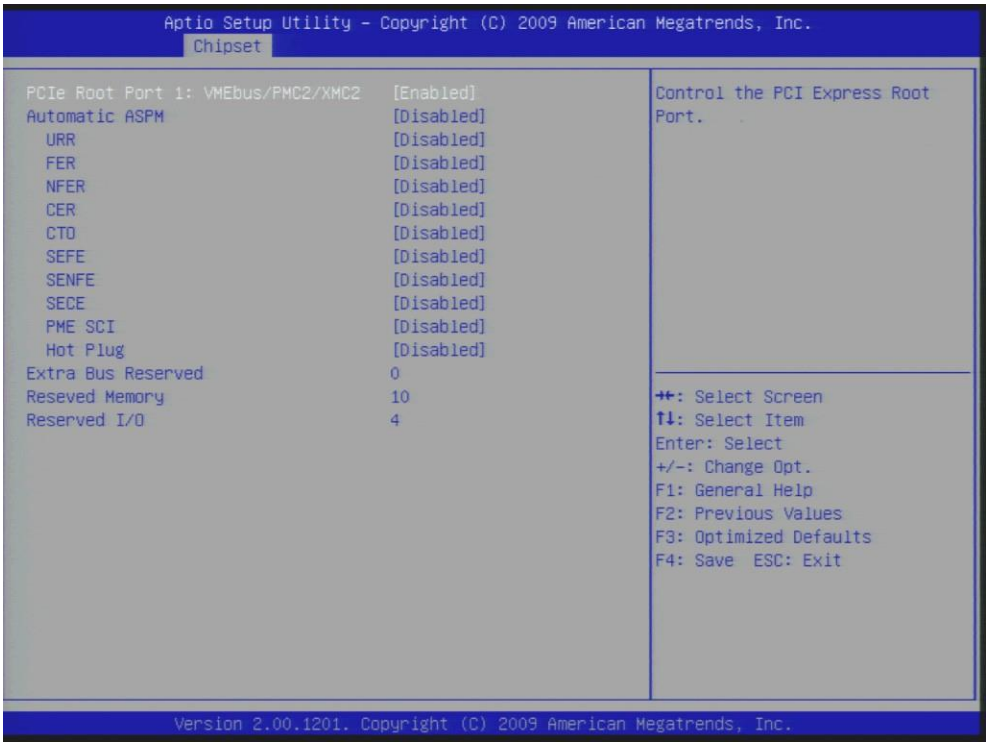
The DMI Link connects the processor and the PCH chipset similar to a four-lane PCI Express. User can enable power saving for different link states. Either, when interface is idle in L0s (full-on, low latency) state or for L0s and L1 (smart power saving, longer latency) states.

PCI Express Root Port 1

This Setup screen allows individual settings for PCI Express port 1.

Select the *PCI Express Root Port 1* option from the PCI Express Configuration screen to jump to the PCI Express Root Port 1 screen.

Figure 5-12 PCI Express Root Port 1 : VMEbus / PMC2 / XMC2



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PCIe Root Port 1: VMEbus / PMC2 / XMC2



The optimal default is *Enabled*.

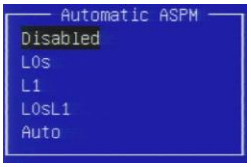
User can disable the PCI Express port 1 if not in use by VMEbus controller and PMC2 / XMC2 extension slots.

NOTES

VMEbus controller is connecte to PCIe Root Port 1 at VR12.

PMC2 / XMC2 extension slot is connected to PCIe Root Port 1 at CR12 / CT12.

Automatic ASPM



The optimal default is *Disabled*.

The user can enable automatic Active State Power Management (ASPM) for power saving in different link states. Either, when PCI Express interface is idle in *L0*s (full-on, low latency) state, *L1* (smart power saving, longer latency) state or both. In *Auto* mode the EFI firmware selects the best choice.

URR / FER / NFER / CER / CTO / SEFE / SENFE / SECE



The optimal default is *Disabled*.

The PCI Express interface supports extensive error reporting available to operating systems that do have the knowledge. The individual error causes can be controlled by these options.

URR Unsupported Request Reporting

FER Fatal Error Reporting

NFER Non-Fatal Error Reporting

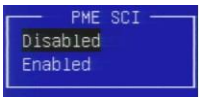
CER Correctable Error

CTO Completion Timer TO

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SEFE System Error on Fatal Error SENFE System Error on Non-Fatal Error
SECE System Error on Correctable Error

PME SCI

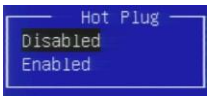


The optimal default is *Disabled*.

PCI Express sends in-band messages over the same Links it uses to transfer data to signal Power Management Events (PME) such as sleep and wake. Appropriate operating systems will then invoke the proper ACPI method to service the event.

Hot Plug

Enabling this option allows signaling a System Control Interrupt (SCI) to the OS in case of an event.



The optimal default is *Disabled*.

This option controls Hot Plug capabilities for PCI Express Port 1.

WARNINGS

It is not recommended to enable this feature with VR12.

On CR12 this feature should not enabled unless the extension card in PMC2 / XMC2 extension slot explicitly supports Hot Plug feature. Please consult documentation from your extension card vendor.

Reserved Memory



The optimal default is *10*.

In the case of an extension card supporting Hot Plug the UEFI firmware might not be able to determine the extra amount of memory space to be reserved for the device.

The user can predefine the memory space from 0 to 20 Megabytes. Please consult documentation from your extension card vendor for the right value.

Reserved I/O



The optimal default is *4*.

In the case of an extension card supporting Hot Plug the UEFI firmware might not be able to determine the extra amount of I/O space to be reserved for the device.

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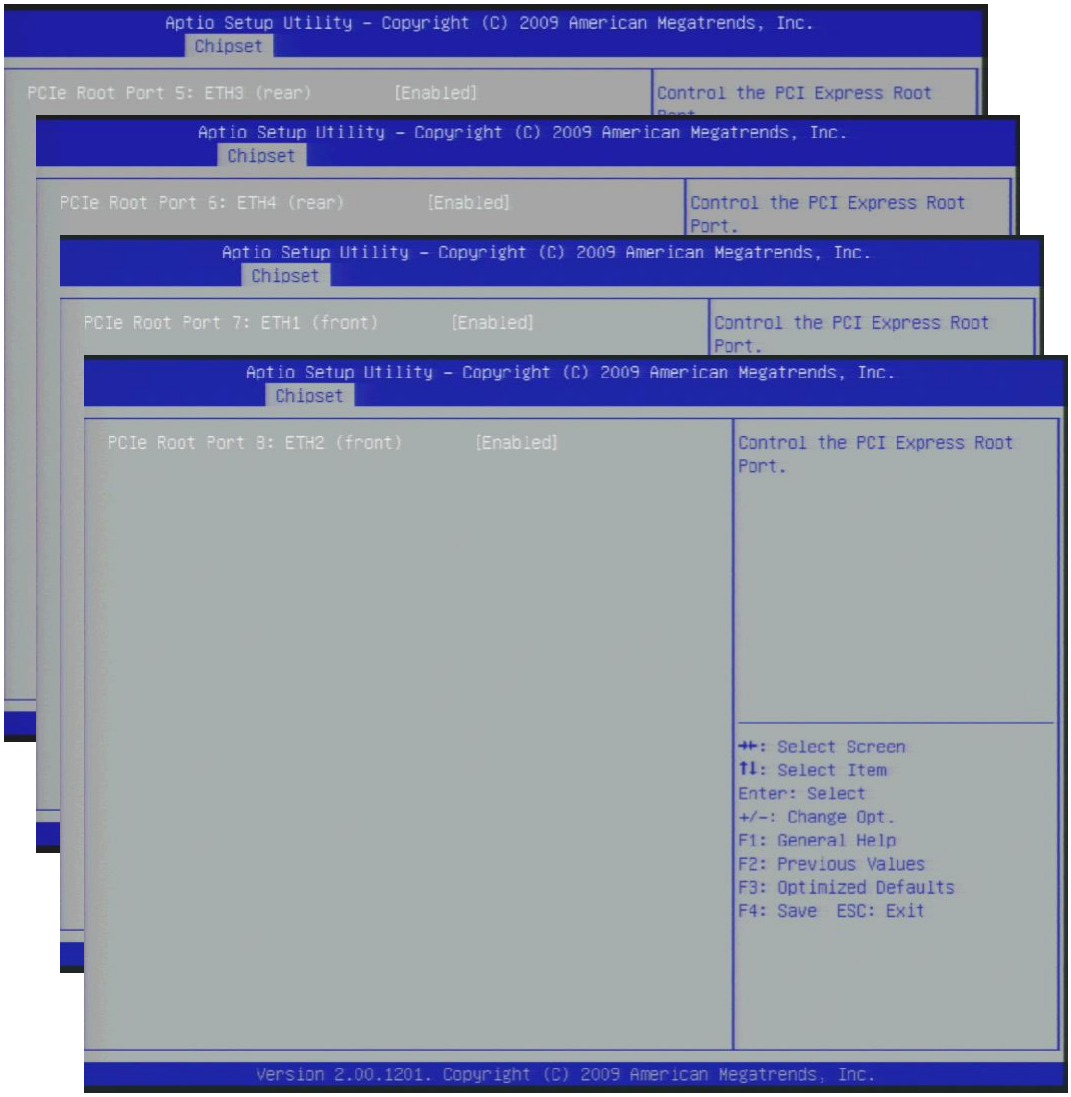
The user can predefine the I/O space of 4K / 8K / 12K / 16K / 20K. Please consult documentation from your extension card vendor for the right value.

PCI Express Root Port 5 / 6 / 7 / 8: ETH 3 / 4 / 1 / 2 (rear / front)

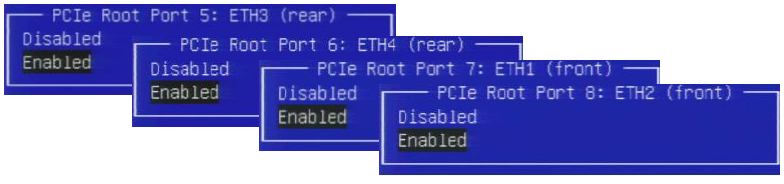
The next Setup screens allow individual control over PCI Express port 5 / 6 / 7 / 8.

Select the *PCI Express Root Port x* option from the PCI Express Configuration screen to jump to the PCI Express Root Port x screen.

Figure 5-13 PCI Express Root Port 5 / 6 / 7 / 8: ETH 3 / 4 / 1 / 2 (rear / front)



PCI Express Root Port 5 / 6 / 7 / 8: ETH 3 / 4 / 1 / 2 (rear / front)



The optimal default is *Enabled*.

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The user can individually control PCI Express port if the port is not in use by Ethernet controller.

5.3.12 PCI-to-PCI Bridge

NOTE

This feature is not applicable for this SBC and will be deleted with the next firmware release.

Select the PCI-to-PCI Bridge option from the PCI Express Configuration screen to jump to the PCI-to-PCI Bridge screen.

Figure 5-14 PCI-To-PCI Bridge



Extra Bus Reserved



The optimal default is 0.

NOTE

This feature is not applicable for this SBC and will be deleted with the next firmware release.

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6 • Server Mgmt Screen

The SBC provides optional extended manageability through the implementation of Intelligent Platform Management Interface (IPMI).

The IPMI sub-systems consists of an out-of-band controller called the Baseboard Management Controller (BMC) that monitors the health of the system. Health monitoring is accomplished by distributed sensors throughout the SBC feeding back collected data to the BMC. If the BMC detects a fault condition, it can log an error to the System Event Log (SEL). The event log can be monitored by a number of IPMI software packages.

The IPMI sub-system operates independently of the operating system and allows administrators to manage the system remotely even if the SBC is powered down (IPMI power provided).

Some Management features can be adjusted or monitored via Setup and described in this chapter.

The System Event Log can be queried by IPMI-compliant Open-Source Utilities such as ipmitool and ipmievd.

See the Generation 12 SBC IPMI Cross Platform Specification for further IPMI information.



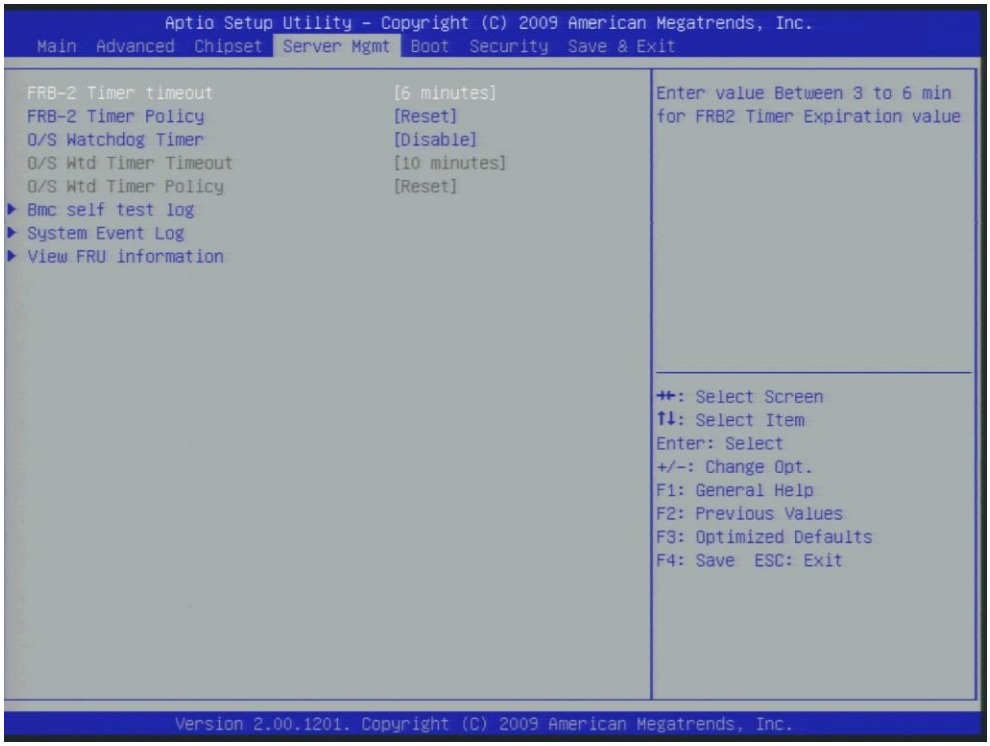
NOTE

All values changed on the Server Mgmt Setup screen do not take effect until SBC is restarted.

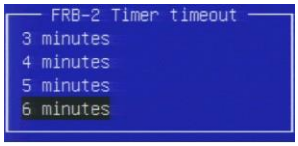
Select the Server Mgmt tab from the Setup screen to enter Server Mgmt screen.

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Figure 6-1 Server Mgmt



6.1 FRB-2 Timer Timeout

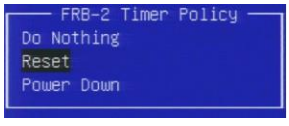


The optimal default is *6 minutes*.

The Fault Resilient Booting (FRB) timer 2 is designed to guarantee that the system completes POST. Near the end of POST, before the Option ROMs are initialized, the UEFI firmware disables the FRB-2 timer in the BMC.

The FRB-2 timer can be set from 3 minutes to approximately 6 minutes

6.2 FRB-2 Timer Policy



The optimal default is *Reset*.

If the system hangs during POST, the UEFI firmware will not disable FRB-2 timer in the BMC, which generates a *Reset*, *Power Down* or *Do Nothing*.

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6.3 O/S Watchdog Timer

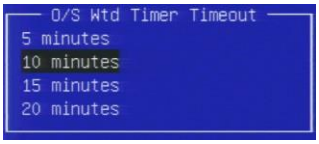


The optimal default is *Disabled*.

The O/S Watchdog Timer is designed to determine the successful operating system boot and initialization.

Feature can be enabled in Setup; hence special Management Software is required to shut off timer after the OS loads.

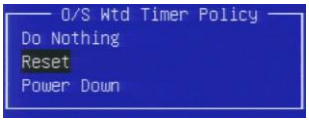
6.4 O/S Wtd Timer Timeout



The optimal default is *10 minutes*.

The timer can be set from 5 minutes to approximately 20 minutes

6.5 O/S Wtd Timer Policy



The optimal default is *Reset*.

If the O/S Watchdog timer is not disabled by special Management Software after OS load, the system generates a *Reset, Power Down* or *Do Nothing*.

6.6 BMC Self Test Log

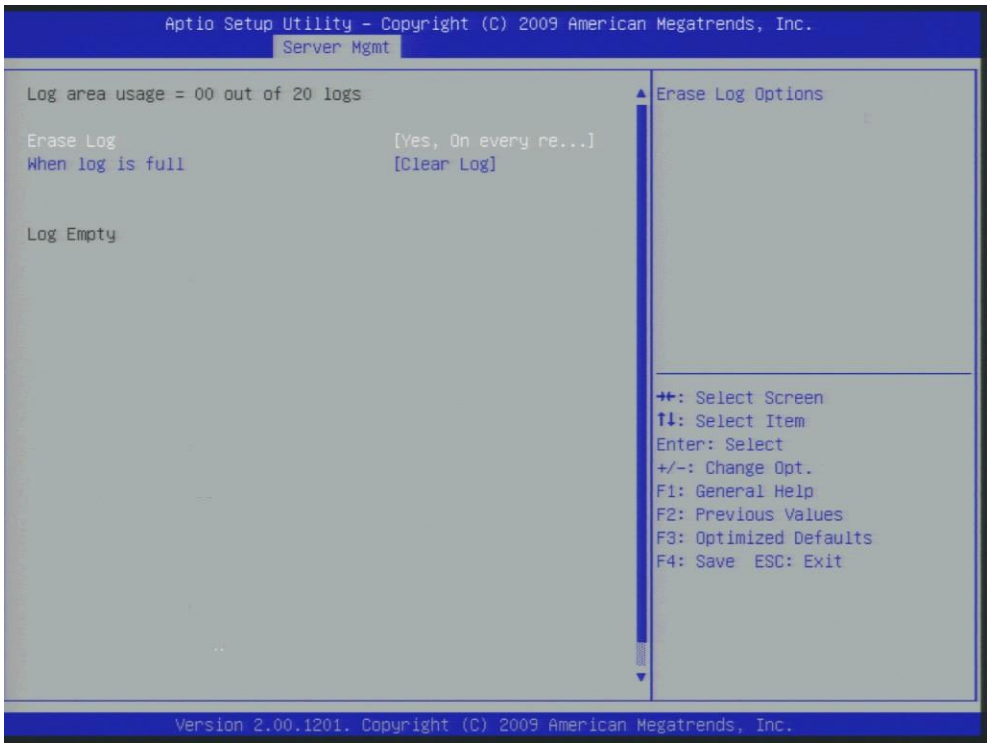
The BMC self test reporting into UEFI firmware can be managed here.

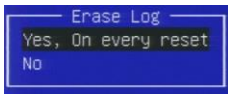
Select the BMC self test log tab from the Server Mgmt screen to enter BMC self test log screen.

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6.6.1 Erase Log

Figure 6-2 BMC Self Test Log

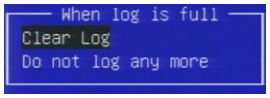




The optimal default is *Yes, on every reset*.

The user can decide if the logging buffer is cleared on every reset or continued.

6.6.2 When Log Is Full



The optimal default is *Clear Log*.

The user can decide what happens if the logging buffer is full. This option is very useful if the logging buffer is not cleared on every reset.

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6.6.3 Log Empty



This is the standard log status when BMC Self test performs successfully without any error. Otherwise the error condition gets listed here.

6.7 System Event Log

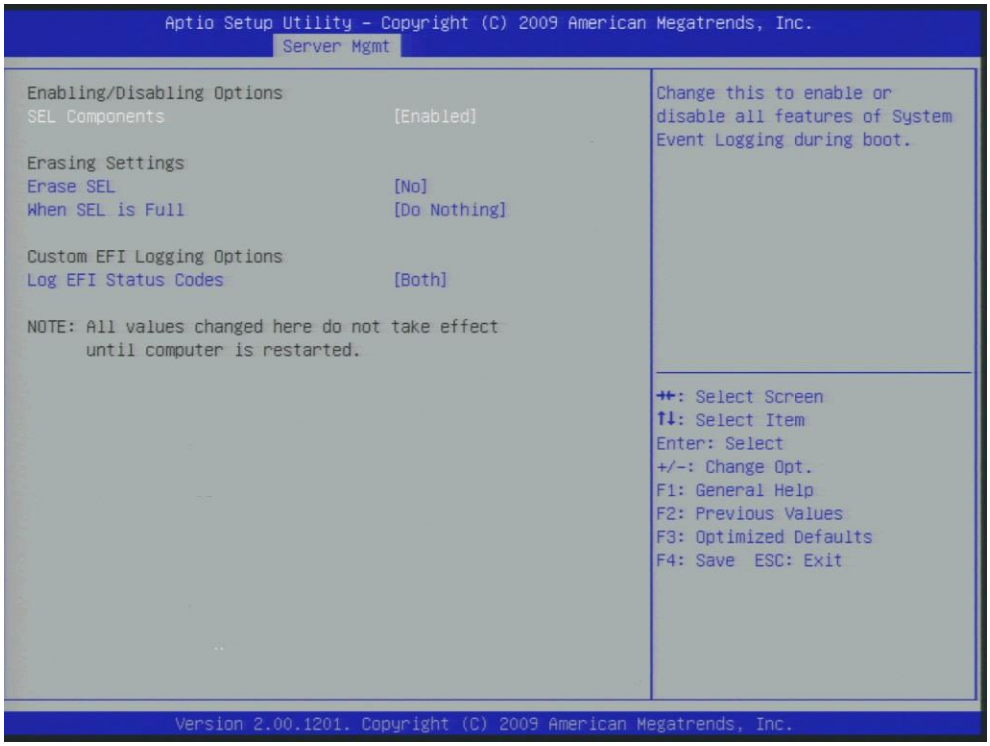
Several types of information are logged to the System Event Log (SEL), from administrative messages to indications of important events, such as sensor-threshold crossings.

The behavior of logging during POST can be managed on this screen.

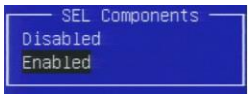
Select the *System Event Log* tab from the Server Mgmt screen to enter System Event Log screen.

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Figure 6-3 System Event Log



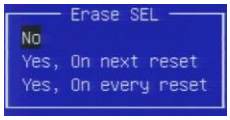
6.7.1 Enabling / Disabling Options SEL Components



The optimal default is *Disabled*.

Enable this feature to allow information collected during POST to be sent to SEL.

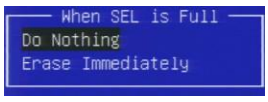
6.7.2 Erasing Settings Erase SEL



The optimal default is *No*.

User can decide if the SEL buffer is always cleared on every reset, one time on next reset or never.

6.7.3 Erasing Settings When SEL Is Full



The optimal default is *Do Nothing*.

User can decide what happens if the SEL buffer is full. This option is very useful if the logging buffer is not cleared on every reset.

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6.7.4 Custom EFI Logging Options Log EFI Status Codes



The optimal default is *Both*.

This feature determines the types of information send to SEL. Errors are saved in

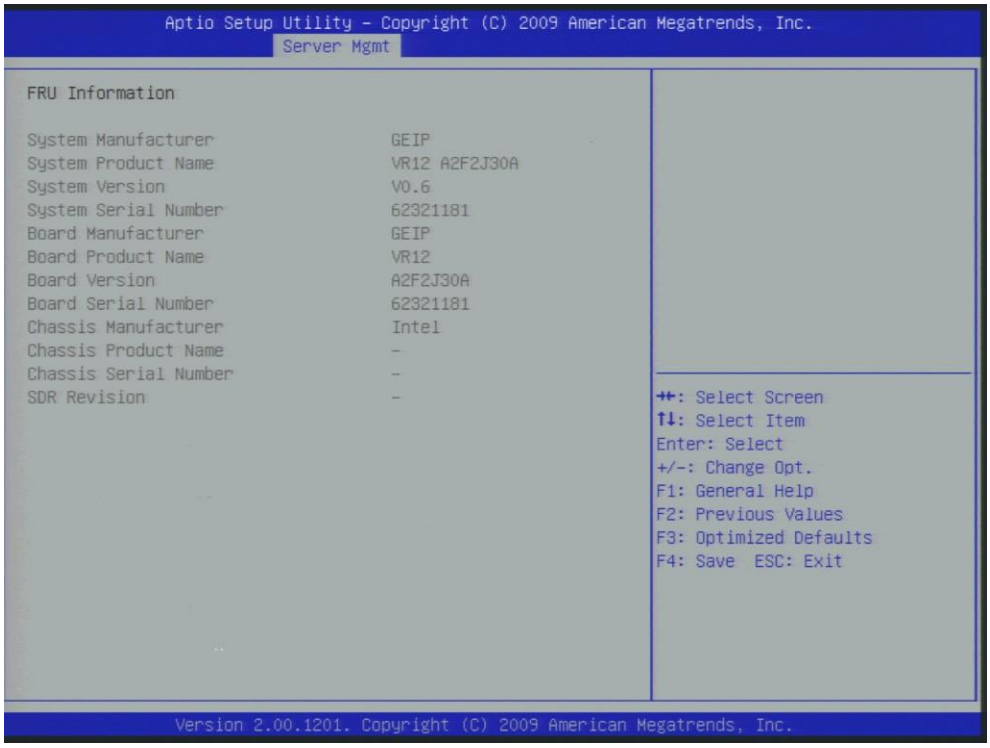
Error Codes, POST codes mapped into *Progress Codes*.

6.8 View FRU Information

The Field Replaceable Unit (FRU) information of the SBC such as *System Product Name, System Version and System Serial Number* are accessible using the IPMI protocol via the BMC or at this Setup screen.

Select the *View FRU Information* tab from the Server Mgmt screen to enter View FRU Information screen.

Figure 6-4 View FRU Information



NOTE

System product Name is identical with the order code of the SBC. System Serial Number represents the serial number of the SBC. The same information can be found on labels attached to the PCB.

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7 • Boot Screen

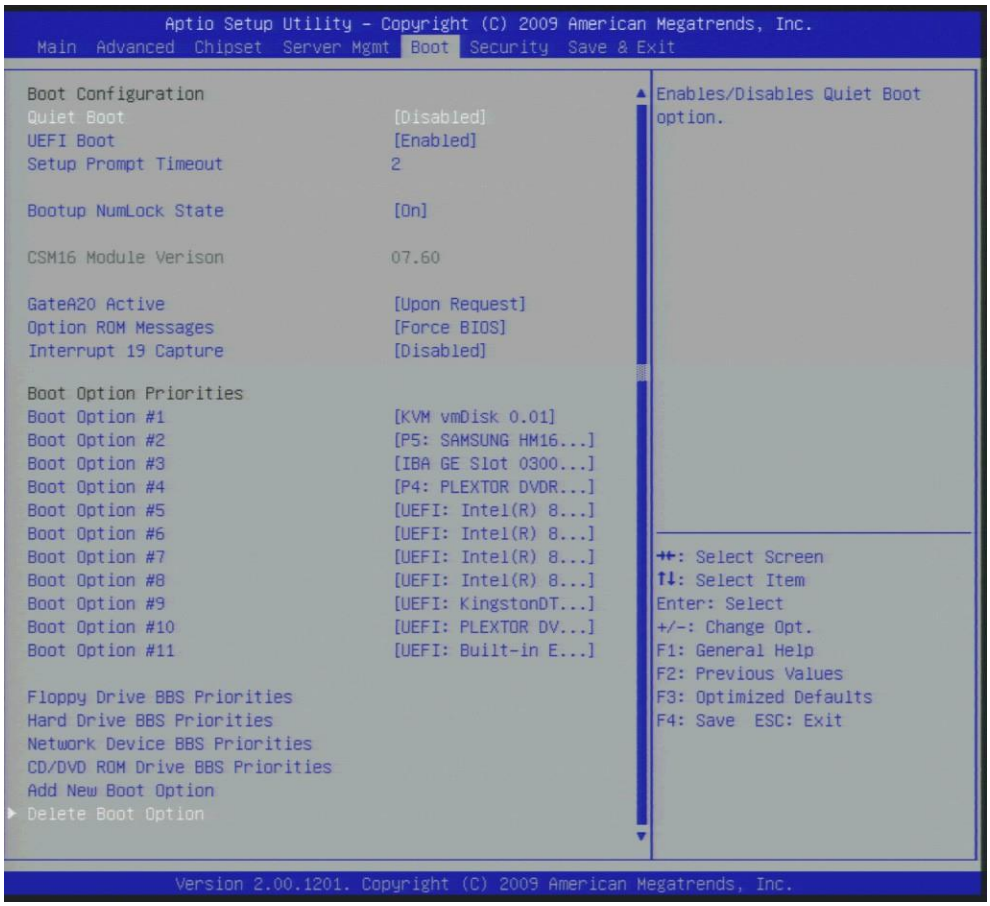
This section describes how to enable boot devices, define boot priority and tune the behavior during POST.

NOTE

Available features and device names shown in the screenshots in this chapter are for reference only and will differ remarkable from User System configuration.

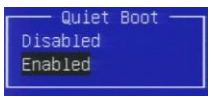
Select the *Boot* tab from the Setup screen to enter the Boot screen.

Figure 7-1 Boot Setup Screen



7.1 Boot Configuration

7.1.1 Quiet Boot



The optimal default is *Disabled*.

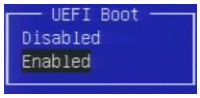
Enable this value to allow the SBC to display the POST messages. Once disabled, the SBC shows the OEM logo during POST. See also Chapter 1.

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NOTE

Messages from extension cards might become visible depending on the Option ROM Messages feature.

7.1.2 UEFI Boot



The optimal default is *Enabled*.

UEFI implements a new interface between operating systems and platform firmware at boot time. This feature allows to Enable/Disable UEFI boot from drives.

For more details read Chapter 9 or look at the official UEFI homepage www.uefi.org.

7.1.3 Boot Configuration Setup Prompt Timeout



The failsafe and optimal default is 2.

After you turn on power or reset your SBC the UEFI firmware is prompting for key input (see Chapter 1). This value defines the number of tenth of seconds to wait additionally for Setup activation key.

65535 mean indefinite waiting. 0 means no wait (not recommended).

NOTE

In newer firmware release than 005 this value defines the number of seconds instead of tenth of seconds.

7.1.4 Boot Configuration Bootup NumLock State



The optimal default is *On*.

This feature allows the user to select the keyboard NumLock state.

7.2 CSM16 Module Information

The *CSM16 Module Information* represents the version of the Compatibility16BIOS module implemented in this SBC UEFI firmware release.

The Compatibility16BIOS can be seen as the runtime image of a previous legacy BIOS without the POST and Setup. The module provides runtime services and software and hardware routines required to maintain compatibility. It may also control the legacy hardware through traditional hardware interfaces like serial ports, parallel ports, keyboard, and PS2 mouse.

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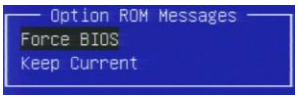
7.2.1 Gate A20 Active



The optimal default is *Upon Request*.

Selecting *Upon Request* allows A20 gate to be disabled by BIOS services. This is useful for legacy support on older operating systems like MS-DOS and Microsoft Windows 98 and has no negative effect on modern operating systems such as Vista or Linux. Set this feature to *Always* turns A20 gate on forever but does only work with modern operating systems.

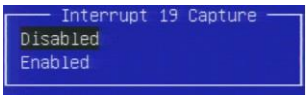
7.2.2 Option ROM Messages



The optimal default is *Force BIOS*.

Set this feature to *Force BIOS* to display Option ROM messages even if *Quiet Boot* is enabled. *Keep Current* keeps displaying the OEM logo during Option ROM initialization.

7.2.3 Interrupt 19 Capture



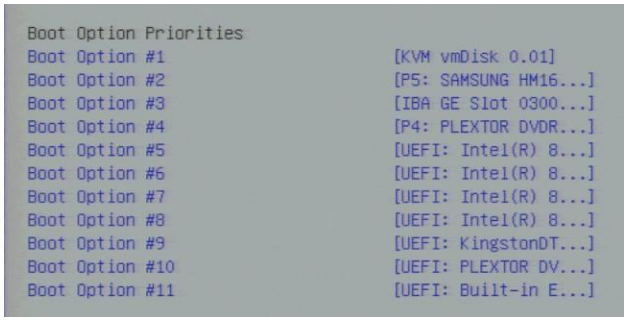
The optimal default is *Disabled*.

Enable this value to allow Option ROMs such as network controllers to trap interrupt 19.

NOTE

Enabling this is required only for legacy Option ROMs that do not register their boot devices or services through the BIOS Boot Services (BBS) mechanism. Using such an Option ROM will compromise the UEFI firmware control over Boot Option Priorities.

7.3 Boot Option Priorities Boot Option #1 / #2 / …



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These features let the User define the boot sequence represented by the top device from a legacy BBS class or a native EFI boot entry. During POST, Boot Option #1 will be checked followed next by Boot Option #2 and so on.

NOTE

The ordering will remain valid as long as no physical changes are made to the system. When the attached devices have changed, the list will be dynamically generated.



Selecting *Boot Option #* allows picking the top device from each legacy BBS class or an EFI boot entry

To change the device order within a legacy BBS class use the Setup features called *HDD BBS Priorities, FDD BBS Priorities, DVD/CD BBS Priorities* and *Networking Device*.

An EFI boot option can be added manually with feature *Add New Boot Option*.

7.4 Floppy Drive BBS Priorities Hard Drive BBS Priorities CD/DVD Drive BBS Priorities Network Device BBS Priorities

These features let the user organize devices within the legacy BBS class. A device class will become visible when at least one device of this category is present.

Select one of either *BBS Priorities* tab from the Boots screen to enter the BBS Priorities screen.

NOTE

Some devices like USB sticks can emulate different classes depending on the formatting, e.g. as HDD or FDD.

CD/DVD and Network BBS screens TBD

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Figure 7-2 Floppy Drive and Hard Drive BBS Priorities



7.4.1 Boot Option #1



CD/DVD and Network BBS sub menus TBD

This feature let the user organize all devices within a legacy BBS class.

NOTE

The ordering of devices within a device class will remain valid as long as no physical changes are made to the system. When the attached devices have changed, the list will revert to its default order.

Add New Boot Option

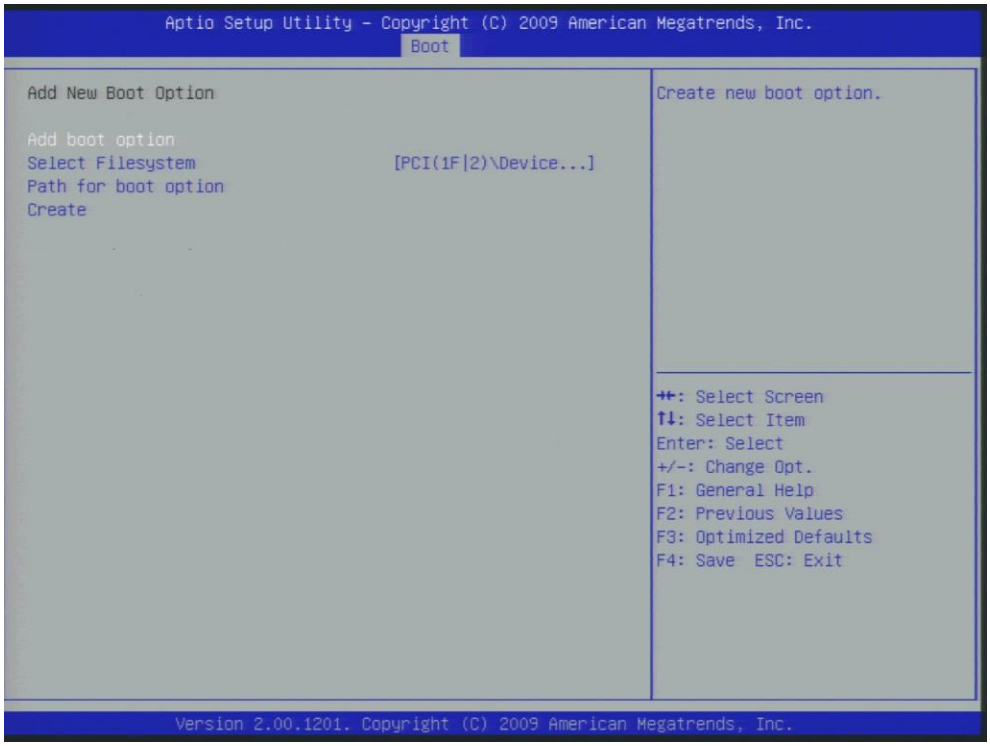
UEFI implements a new interface between operating systems and platform firmware at boot time. In EFI mode, Operating System installation automatically adds a boot option that points to the Operating System Boot loader. A new Boot option can also be added manually as described in this section.

For more details on EFI Boot mode have a look at the official UEFI homepage www.uefi.org.

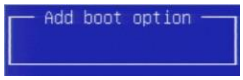
Select *Add New Boot Option* tab from the Boot screen to enter the Add New Boot Option screen.

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Figure 7-3 Add New Boot Option

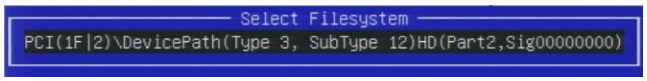


Add Boot Option



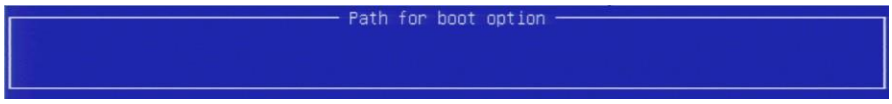
Add a name to describe your new boot option.

Select Filesystem



Select a filesystem from the option menu.

Path For Boot Option



Define the path to EFI boot application (*.efi).

Usually this path points to a Boot Manager (EFI application) which selects and loads the operating system, removing the need for a dedicated boot loader

Create

To make a removable device bootable, the EFI application simply needs to be renamed to BOOTx64.EFI (case insensitive) and placed in the \EFI\BOOT directory. When a removable device, such as a USB key, is detected in EFI Boot Mode, a boot option is automatically added to point to the following location:

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\EFI\BOOT\BOOTx64.EFI.

Selecting this feature creates a new native EFI Boot item according to the parameters defined before.

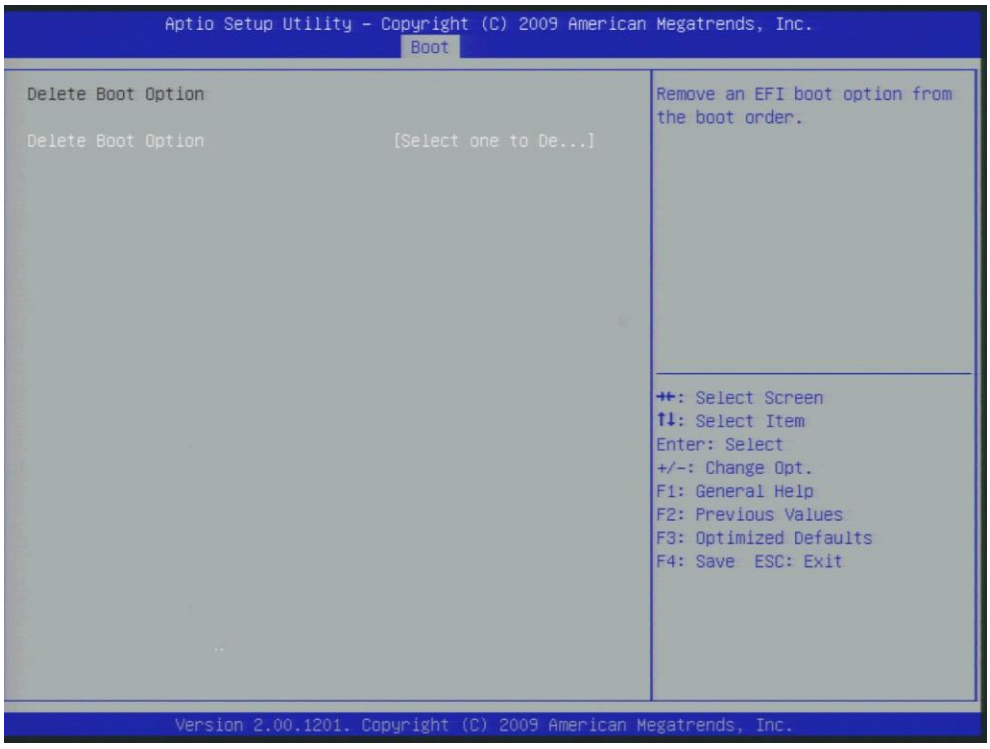


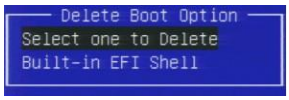
Delete Boot Option

All manually added EFI boot options can be deleted on this screen.

Select *Delete Boot Option* tab from the Boot screen to enter the Delete Boot Option screen.

Figure 7-4 Delete Boot Option





Select the EFI boot option you want to delete from your boot menu.

NOTE

The Built-in EFI Shell can be deleted but will automatically return after reset or power on.

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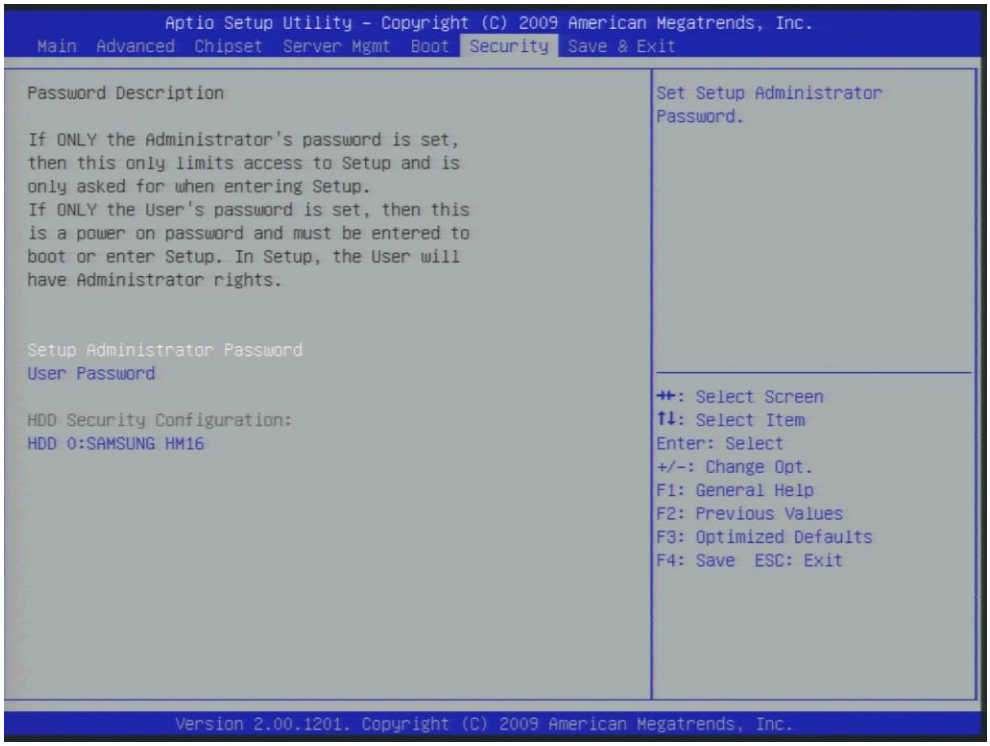
8 • Security Screen

The SBC firmware comes with the ability to set passwords against unauthorized Power On Self Test (POST) and to protect Setup changes. In addition to that Hard Disk Drives (HDD) supporting the “Security Mode Feature Set” can be locked.

If the customer at the keyboard does not know the password, then execution halts or media access is protected.

Select the Security tab from the Setup screen to enter the Security screen.

Figure 8-1 Security Setup Screen



8.1 Access Level

NOTE

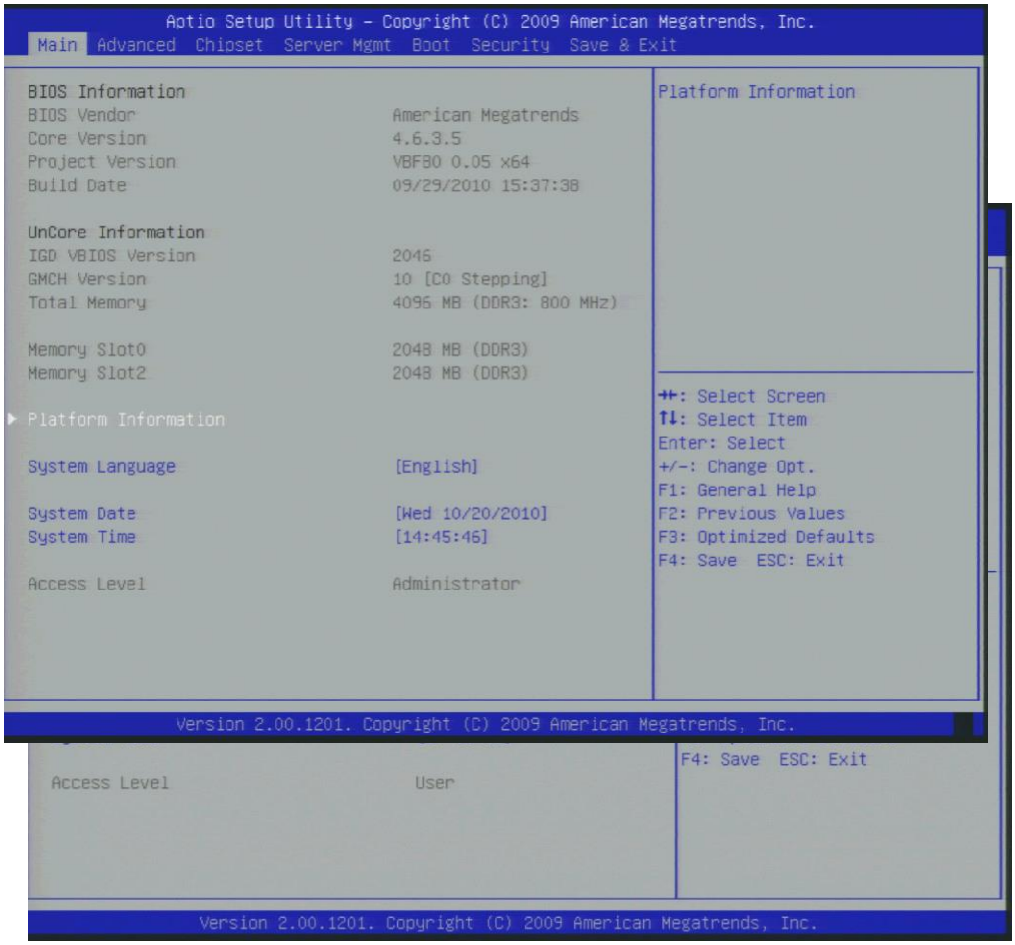
Even so the Setup references HDD (Hard Disk Drive) this feature is available to all drives supporting the security mechanism, e.g. SSD (Solid State Drive) with an individual HDD Security Configuration item visible for each. The item becomes invisible when no capable device is available.

The user can access Setup features on two different levels of accessibility, User and Administrator. The current active *Access Level* is shown at the bottom of the Main screen.

Select the *Main* tab from the Setup screen to enter Main screen.

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Figure 8-2 Access Level

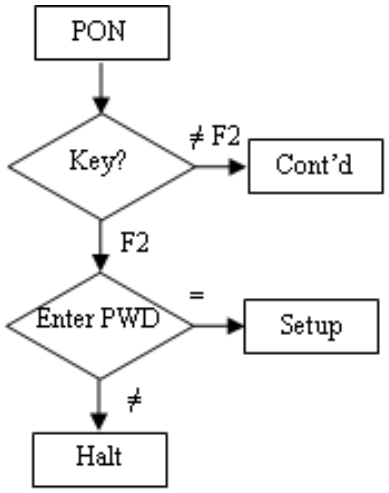
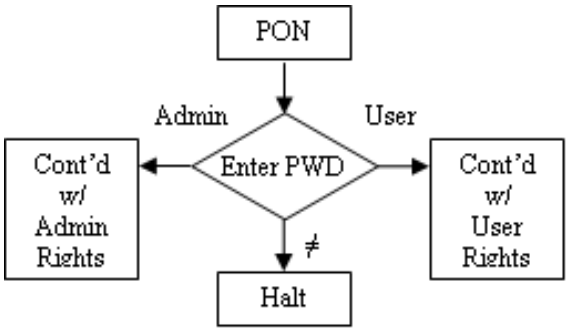


The level of POST protection is controlled by two passwords, User and Administrator. The table below details the protection coverage after power on (PON).

Table 8-1 Access Level Coverage

User PWD	Admin PWD	Flow after Poweron (PON) during POST	Setup Access Level
No	No	PON → Cont'd	Normal Operation Admin
Yes	No	PON → Enter PWD ≠ Halt; Enter PWD = Cont'd	General Protection Admin

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User PWD	Admin PWD	Flow after Poweron (PON) during POST	Setup Access Level
No	Yes		Setup Protection Only Admin
Yes	Yes		User or Admin, depending on PWD

With Access Level being *Administrator* a user is allowed to change both passwords, User and Administrator. Full access to any Setup feature is gained.

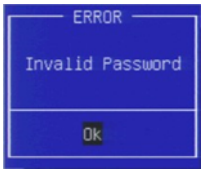
With Access Level being *User* a user is allowed to change User password only.

The accessibility to each Setup feature is predefined by factory. **Accesses to Setup screens are restricted to Main, Boot and Save & Exit**. This can be changed on request. Please contact factory to discuss.

8.2 Setup Administrator Password User Password







The optimal default is *Blank*.

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User can define *User Password* and *Administrator Password*. A restricted access to Setup features is only given with Administrator Password set; otherwise user gains Administrator access to all Setup features with User password only.

The password must be entered twice for verification. When a password is already set it can only be modified with the existing password known.

The password must be up to 20 characters in length. All alphanumeric characters and special characters can be used, and distinction is made between upper-case and lower-case characters.



WARNING

Care must be taken when SBC is used with different keyboard schemes. It is not recommended to use any special character in such a case since the character printed on the key might not be the same recognized.

8.2.1 Password Request During POST

When security feature is enabled, whenever the system is powered on the SBC will behave as defined in Table 3.

The following screen shot shows the interaction to unlock the POST when the SBC is powered on.

8.2.2 POST Password Lost

After three bad password attempts during POST the execution halts. Another try requires a prior power on cycle.

8.2.3 Reset POST Password

If the user forgot the POST password defined, the only way to reset it is to erase the SBC configuration by removing the battery. CMOS RAM and NVRAM (Flash) will lose its content including the password when the battery is drained.



WARNING

Please check with the appropriate Hardware Reference Manual for your SBC for proper handling of battery.



NOTE

It might be necessary to wait up to several minutes after removal of the battery to allow onboard capacitors assisting the backup battery to get drained too.

8.3 HDD Security Configuration

The “ATA Security Feature Set” is supported by almost all modern drives and allows two passwords to be set, a User Password and a Master Password.

For each capable drive an individual *HDD Security Configuration* item will become visible. Up to six drives with independent User password and Master password are supported. The item is unavailable when no capable drive is available.

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NOTE

User will be asked entering User password individually for each drive secured.

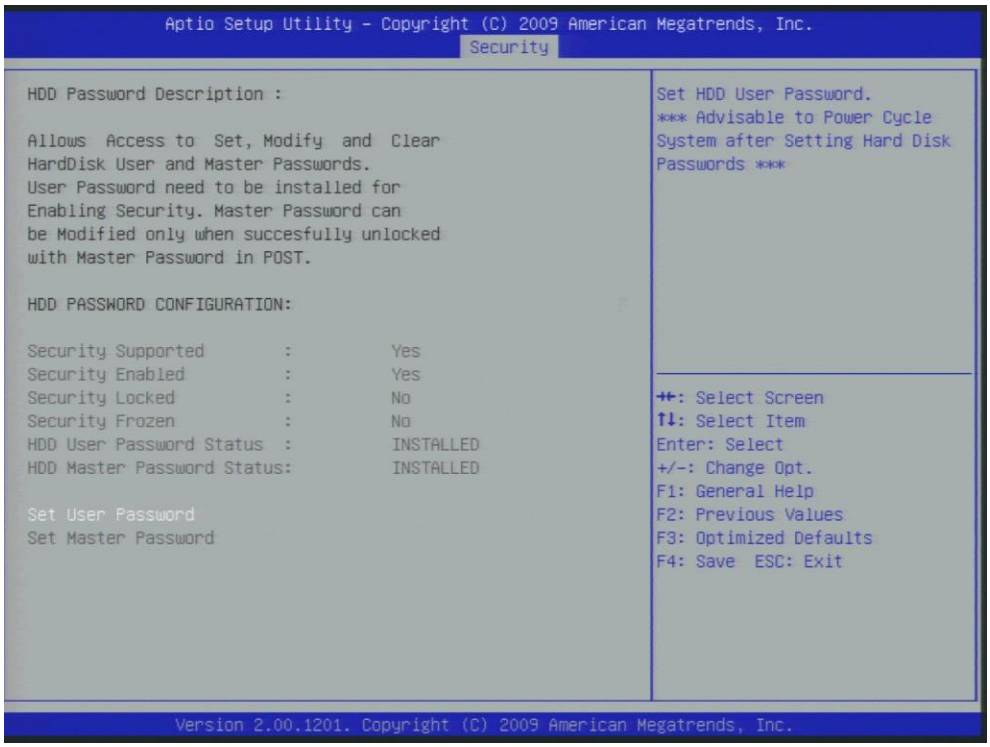
For convenience those drives are further referred to just as HDD.

WARNING

The password function is a powerful security feature designed to prevent unauthorized access to the HDD. Failing to enter the correct password might result in total loss of valuable information. Read the whole section carefully before activating this feature!

Select the *HDD Security Protection* feature from the *Security* tab to enter the HDD Security Protection screen with an overview of the drive configuration.

Figure 8-3 HDD Security Protection



8.3.1 Security Supported

HDD Security Configuration screen is available when at least one drive supports "ATA Security Feature Set".

8.3.2 Security Enabled

Booting requires successful password verification.

8.3.3 Security Locked

The device media access is denied. Booting is not possible.

8.3.4 Security Frozen

All device commands are allowed except those which can set/change password.

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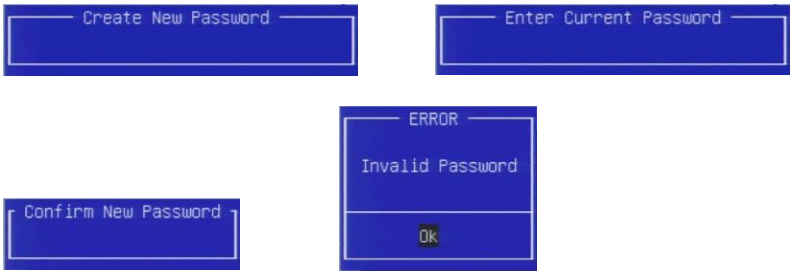
8.3.5 HDD User Password Status

The security protection is enabled when password is installed.

8.3.6 HDD Master Password Status

An installed password can unlock the HDD and override the User password.

8.3.7 Set User Password Set Master Password



The locking is activated immediately by setting the User Password. An empty password (no character) disables the Security feature. A current password has to be entered prior.

The purpose of the Master Password is to allow an administrator to establish a password that is kept secret from the user, and which may be used to unlock the device if the User Password is lost. Setting of the Master Password does not lock the device. A Master Password must be entered prior to the User Password.

Any password must be up to 32 characters in length. All alphanumeric characters and special characters can be used, and distinction is made between upper-case and lower-case characters.

WARNING

If a password protected HDD is supposed to be used on different SBC it is highly recommended to test the interoperability prior storing critical information. Different SBC might not behave the same even so the protection mechanism is defined by ATA specification.

8.3.8 Security Level

The ATA specification for drives distinguishes between two different security levels, High and Maximum.

8.3.9 High Level Security

The device can be unlocked via User Password and via Master Password when the User Password is forgotten. The information stored on the drive is not touched.

8.3.10 Maximum Level Security

The device can be unlocked via User Password and via Master Password when the User Password is forgotten. The information on the drive will be erased by writing zeros onto all sectors before again allowing access to it.

This SBC firmware release selects level High per default. A user cannot change it.

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Please contact factory if you want to modify this behavior for higher security reason.

8.3.11 Password Request For HDD

When security feature is enabled, whenever the system is powered on the HDD will be locked and the SBC will ask for a password. The User password can be used to unlock the HDD and continue booting. The HDD will remain unlocked until the drive is powered off or reset.

NOTE

User will be asked entering User password individually for each drive secured.

The following screen shot shows the interaction to unlock the HDD when the SBC is powered on.

Figure 8-4 Password Request For HDD



8.3.12 User Password Lost

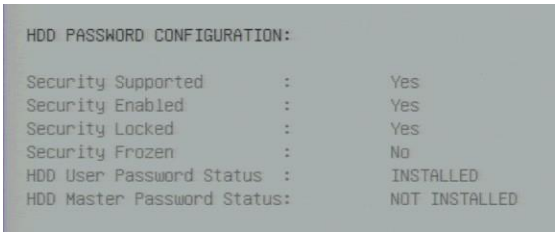
The HDD will remain locked when the password verification with User Password fails.



After three bad attempts a user can either power cycle the SBC and tries again or enter the Setup (press <F2>) to override User password via Master password verification.

In Locked mode the drive will appear in the Setup normally displaying all the information such as the drive model and serial numbers but will refuse to boot. The *Security Locked* status shown at Security screen is set to *Yes*.

Figure 8-5 Security Locked HDD



Using the correct Master Password unlocks the HDD, clears the User Password and disables the Security Feature.

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The user can also try to enter User Password again. If the current User Password is correctly verified, setting a new empty User Password will unlock the HDD and disables the Security feature also.

NOTE

Once a HDD is locked, entering a User or Master Password is only valid one time at Setup screen. When it fails another try needs a prior power cycle. There is no warning sign if tried a second or third time without power cycling, but any password will be rejected invalid even if it would be correct.

8.3.13 Erase HDD Password(s)

The password function is a powerful security feature designed to prevent unauthorized access to the HDD. If the user does no longer know the password, user will be unable to access the media information. Brute forcing the User password is annoying slow as the HDD has to be power cycled every 3 tries.

The password is stored in the electronic of the HDD and in the service area of the platter itself; not to be confused with the POST password, which is stored in the CMOS RAM of the SBC. Removing the drive from SBC and installing in a different SBC will not help.

While the device lock is intended to be impossible to defeat without a valid password, there are workarounds to unlock a HDD. A few data recovery companies offer such unlocking services. This doesn't mean that Abaco is able to offer the same service.

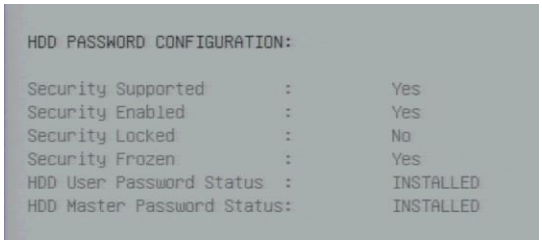
NOTE

In the case a user has entered a User Password but NO Master Password and the User password is lost please contact factory for help before accessing any recovery company.

8.3.14 Security Frozen

To prevent the Security Feature from being abused the SBC firmware freezes all security settings prior to loading the operating system. This prevents any application and also malware to change the user hard disk password after booting.

Figure 8-6 Security Frozen HDD



The device in this state allows no change to passwords but is able to boot. A Frozen status can be left only by next power cycle. A cold or warm reset does not change the status. The *Set User Password* and *Set Master Password* features in Setup are not available at this stage.

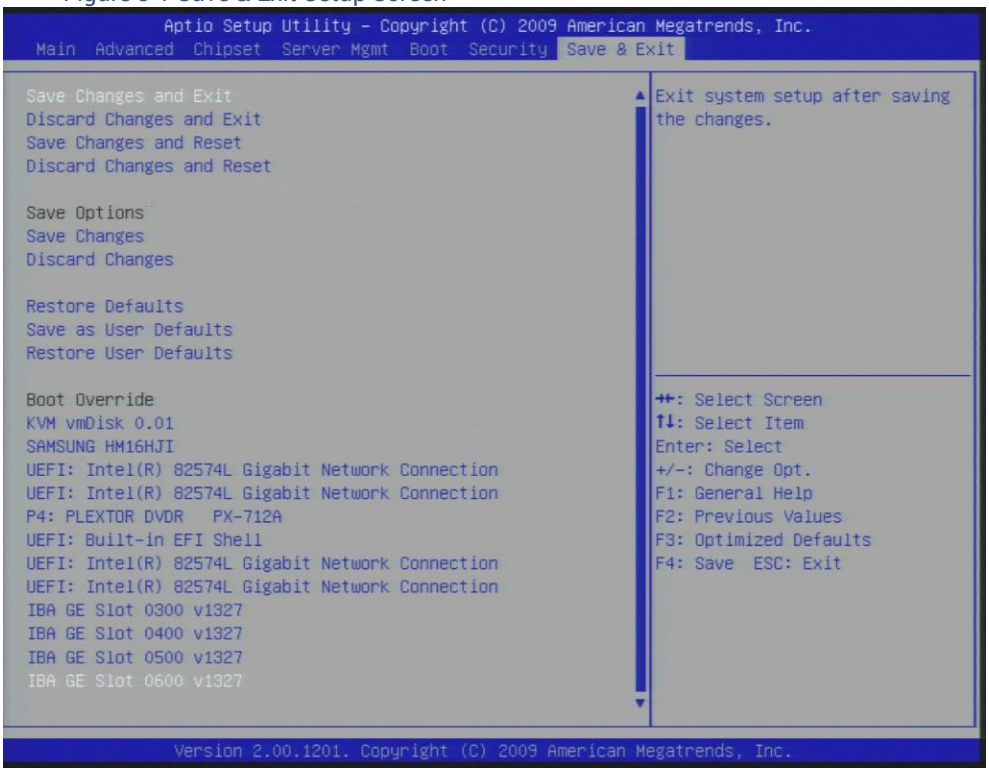
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9 • Save & Exit

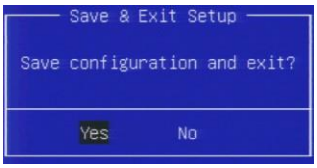
This section describes the various methods to leave the Setup with or without saving the changes followed by a reset or continued with the POST process.

Select the *Save & Exit* tab from the Setup screen to enter the Save & Exit screen.

Figure 9-1 Save & Exit Setup Screen



9.1 Save Changes and Exit



The default selection is *Yes*.

Press the <Enter> key to save the configuration, exit Setup and continue POST.

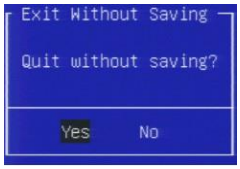
You can also use the <Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

NOTE

Some Setup features require a Reset after changing. When such a configuration item has been modified a reset instead of POST will be performed.

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9.2 Discard Changes and Exit

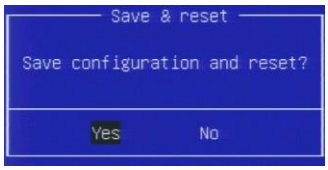


The default selection is *Yes*.

Press the <Enter> key to discard changes, exit Setup and continue POST.

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.3 Save Changes and Reset

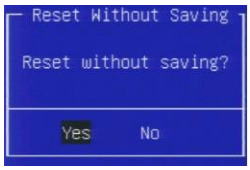


The default selection is *Yes*.

Press the <Enter> key to save the configuration and reset the SBC.

You can also use the <Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.4 Discard Changes and Reset



The default selection is *Yes*.

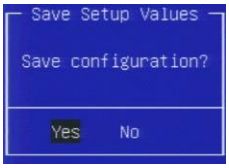
Press the <Enter> key to discard changes and reset the SBC.

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

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9.5 Save Options

9.5.1 Save Changes

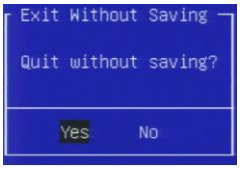


The default selection is *Yes*.

Press the <Enter> key to save the configuration and return to the previous screen.

You can also use the <Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.5.2 Discard Changes

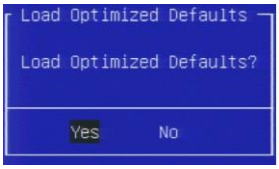


The default selection is *Yes*.

Press the <Enter> key to discard changes and return to the previous screen.

You can also use the <Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.5.3 Save Options Restore Defaults



The default selection is *Yes*.

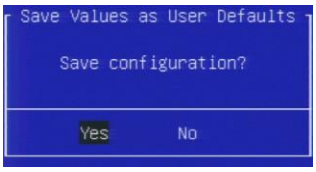
Press the <Enter> key to load optimized values and return to the previous screen.

The Optimized Defaults allow the SBC to boot up with the best performance and less conflicting settings known. However, some options cannot be determined and need to be changed by user afterwards.

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

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9.5.4 Save As User Defaults

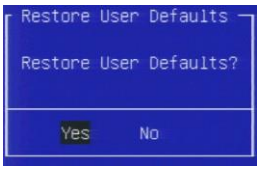


The default selection is *Yes*.

Press the <Enter> key to save current values as User Defaults and return to the previous screen.

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.5.5 Restore User Defaults



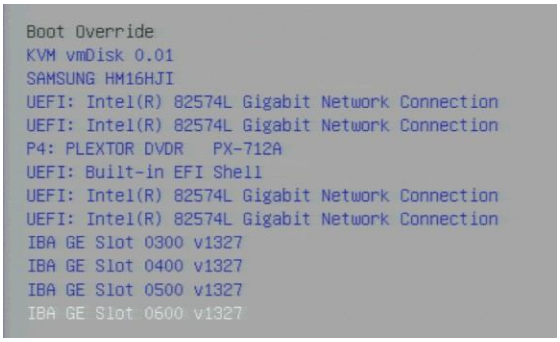
The default selection is *Yes*.

Press the <Enter> key to restore User Defaults and return to the previous screen.

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

9.6 Boot Override

With this feature user can leave the Setup and boot directly into the selected device. Depending on the prior actions within Setup an additional menu will appear and ask to save changes.

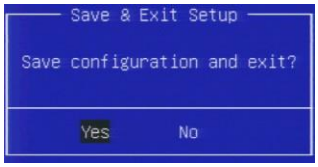


Select the boot device and press the <Enter> key.

The list of selectable devices is dependent on your system environment.

Depending on the prior actions within Setup none or one of the next menus will appear.

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Press the <Enter> key and accept to save any changes done in Setup and exit (direct boot).

You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

Some Setup items require a Reset after changing. In this case a direct boot into the selected device is not possible!



Press the <Enter> key and accept to save any changes done in Setup and reset (no direct boot).

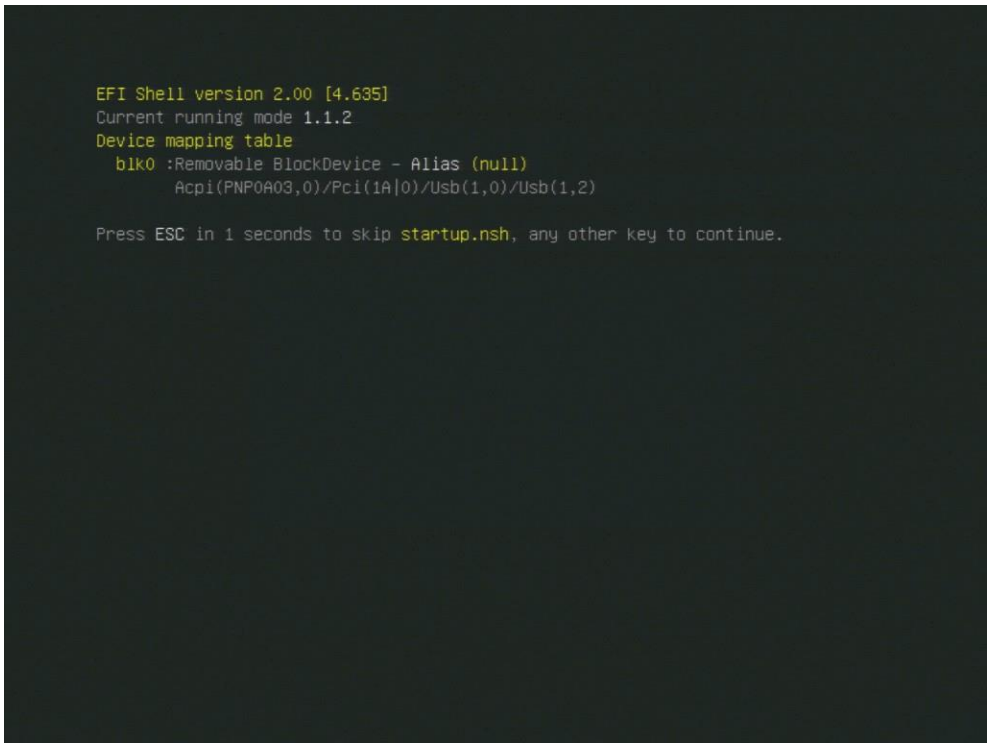
You can also use the <Left Arrow> and <Right Arrow> key to select *No* and then press the <Enter> key to abort this function and return to the previous screen.

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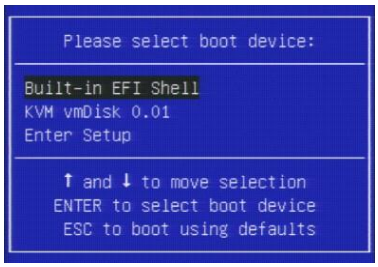
10 • EFI Shell

The EFI shell allows you to explore the EFI environment, load EFI device drivers and execute other EFI applications. A command-line interface with text commands is used to manage files and system environment variables.

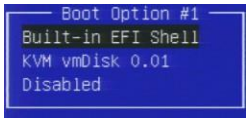
Figure 10-1 EFI Shell



10.1 Start EFI Shell



The EFI shell is part of the boot process. You can start the EFI shell manually by pressing <F7> for BBS POPUP and select *Built-in EFI Shell* for the next boot cycle.



Or you select *Built-in EFI Shell* as Boot Option #1 so it starts every time you boot your computer.

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When the EFI Shell is invoked, it first looks for commands in the file startup.nsh. The execution path is defined by the environment. There is no requirement for a startup file to exist. Once the startup file commands are completed, the shell looks for commands from console input device.

10.2 EFI Shell Commands & Script

It is beyond the scope of this document to describe the full capabilities of the EFI Shell and the EFI Shell commands in detail. Basic information and a list of EFI commands are provided within the EFI shell by entering *help*.

Extensive details on commands and scripting can be found on the official UEFI homepage www.uefi.org

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11 • BBS Popup

A Boot Selection Popup Menu (*BBS POPUP*) can be displayed by pressing <F7>.

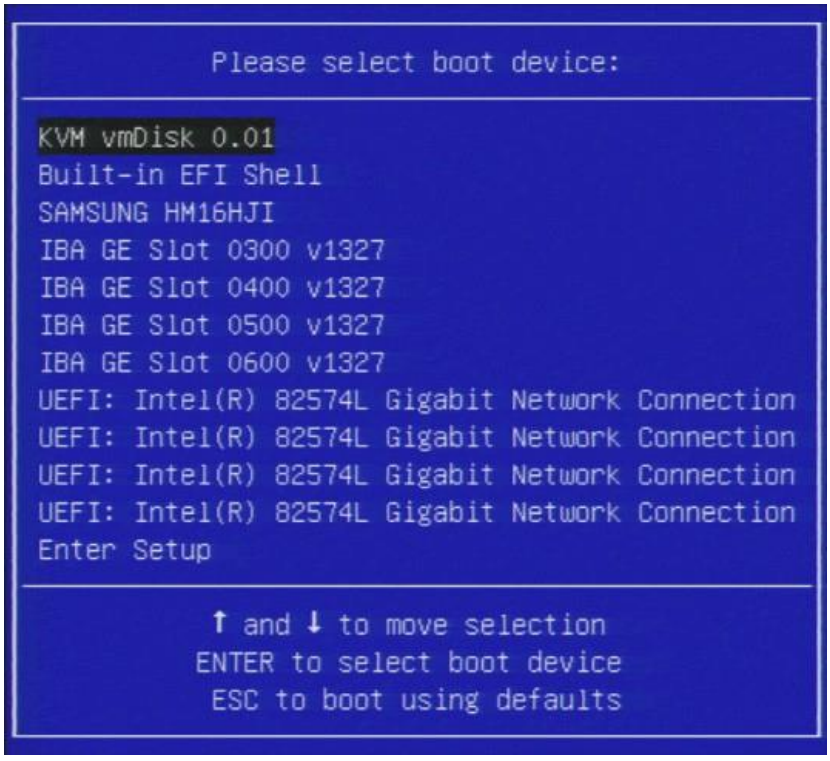
This key can be pressed at the same time the <Delete> or <F2> key for entering Setup can be pressed.

Figure 11-1 Startup Screen with BBS POPUP option



The BBS POPUP menu allows you to select a boot device for one single start. On the next boot, the boot device priority selected in the Setup Boot screen will be used again.

Figure 11-2 BBS Popup Screen



Use the <Up Arrow> and <Down Arrow> key to select a boot device and then press the <Enter> key to start booting. Press <ESC> to abort this function and continue with boot device priority selected in Setup. Or select *Enter Setup* to start Setup.

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12 • UEFI Firmware Update

UEFI firmware update images are typically available from Abaco homepage TBD or provided by Abaco Support members. Follow the instructions for updating the UEFI firmware supplied with the image.

12.1 UEFI Firmware Redundancy Strategy

The SBC has two sets of EFI Flash chips to form an EFI redundancy strategy. Basic idea behind that is to always have at least one working EFI available regardless if there have been any flashing errors or not.

12.2 UEFI Firmware Updating Procedure

To always maintain at least one EFI Flash correct, the **TBD software** uses the following update procedure:

1. Switch to the second Flash.

Description TBD

2. Update the second Flash.

Description TBD

12.3 Fallback Mechanism

In case of one UEFI firmware being corrupted and therefore the SBC not starting up, the IPMI controller automatically switches to the other Flash and resets the board. **Description TBD**

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13 • UEFI Powerup Checkpoints and Status Codes

A status code is a data value used to indicate progress during the boot phase. A subset of these status codes, known commonly as checkpoints, indicate common phases of the UEFI firmware boot process.

The UEFI firmware displays the progress of the boot process at the bottom of the system's video screen, once the firmware has progressed far enough to initialize the video part.

An alternate method of viewing Checkpoint codes is to redirect the output of the console to a serial port (see Chapter 4, Serial Port Console Redirection).

A document with a list of checkpoints and status codes and a detailed description can be found on American Megatrends Inc (AMI) homepage

http://www.ami.com/support/doc/AMI_Aptio_4.x_Status_Codes_PUB.pdf

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14 • Default Values

The Optimized Defaults allow the SBC to boot up with the best performance and less conflicting settings known. See page 22 (F3 key).

The table below shows all settings at a glance.

Table 14-1 Default Values

Top Menu	Next SubMenu	Setup Item	Optimal Default
Advanced		Launch Storage OpROM	Disabled
		Pxe Boot Option	Enabled
	PCI Subsystem Settings	PCI ROM Priority	EFI Compatible ROM
		PCI Latency Timer	32 PCI Bus Clocks
		VGA Palette Snoop	Disabled
		PERR# Generation	Disabled
		SERR# Generation	Disabled
		PCI-X Latency Timer	64 PCI Bus Clocks
		Relaxed Ordering	Disabled
		Extended Tag	Disabled
		No Snoop	Enabled
		Maximum Payload	Auto
		Maximum Read Request	Auto
		Automatic ASPM	Disabled
		Extended Synch	Disabled
	ACPI Settings	Enable ACPI Auto Configuration	Disabled
		Enable Hibernation	Enabled
		PTID Support	Enabled
		ACPI Sleep State	S3 (Suspend to RAM)
		S3 Video Repost	Disabled
		Native PCIE Enable	Enabled
		Native ASPM	Disabled
	S5 RTC Wake Settings	Wake system with Fixed Time	Disabled
		Wake system with Dynamic Time	Disabled
	CPU Configuration	New Max Non-Turbo Ratio	55
		Execute Disable Bit	Enabled
		Hyper-Threading	Enabled
		Active Processor Cores	All

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		Limit CPUID Maximum	Disabled
		Intel Virtualization Technology	Enabled
		EIST	Enabled
	Power & Performance	Intel(R) SpeedStep(tm)	Enabled
		Boot performance mode	Max Performance
		Turbo Mode	Enabled
		C states	Enabled
		Enhanced C-states	Enabled
		CPU C6 report	Disabled
		CPU C7 report	Disabled
	Onboard Intel GbE Configuration	ETH1	Enabled
		ETH2	Enabled
		ETH3	Enabled
		ETH4	Enabled
	VMEbus TSI148	Reserve VME Space	0 MBytes
		VMEBus Reset In	Disabled
		VMEBus Reset Out	Disabled
	ME Configuration	End Of POST Message	Enabled
	Intelligent Power Sharing	Intelligent Power Sharing	Enabled
		CPU Turbo	Enabled
		IPS Policy	DRIVER
		Core Temp Limit	Disabled
		Core Temp Limit Value	65535
		Processor Power Limit	Disabled
		Processor Power Limit Value	1023
		Core Power Limit	Disabled
		Core Power Limit Value	1023
	USB Configuration	Legacy USB Support	Enabled
		EHCI Hand-off	Enabled
		Device Reset timeout	20 sec
		Controller Timeout	20 sec
	Serial Port 0 Configuration		
		Serial Port	Enabled

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		Change Settings	Auto
		Port Driver	RS232
	Serial Port 1 Configuration	Serial Port	Enabled
		Change Settings	Auto
		Port Driver	RS232
	Serial Port 2 Configuration	Serial Port	Enabled
	Serial Port 3 Configuration	Serial Port	Disabled
	Serial Port Console Redirection	COM0 Console Redirection	 Disabled
		COM1 Console Redirection	 Disabled
		COM2 Console Redirection	 Enabled
		COM3 Console Redirection	 Disabled
		Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS) Console Redirection	 Disabled
		Out-of-Band Mgmt Port	COM0
		Terminal Type	VT-UTF8
	COM0	Terminal Type	ANSI
		Bits per second	115200
		Data Bits	8
		Parity	None
		Stop Bits	1
		Flow Control	None
		Resolution 100x31	Disabled
		Legacy OS Redirection Resolution	80x24
	COM1	Terminal Type	ANSI
		Bits per second	115200
		Data Bits	8

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		Parity	None
		Stop Bits	1
		Flow Control	None
		Resolution 100x31	Disabled
		Legacy OS Redirection Resolution	80x24
	COM2	Terminal Type	VT-UTF8
		Bits per second	115200
		Data Bits	8
		Parity	None
		Stop Bits	1
		Flow Control	None
		Resolution 100x31	Enabled
		Legacy OS Redirection Resolution	80x25
	COM3	Terminal Type	ANSI
		Bits per second	115200
		Data Bits	8
		Parity	None
		Stop Bits	1
		Flow Control	None
		Resolution 100x31	Disabled
		Legacy OS Redirection Resolution	80x24
	Network Stack	Network stack	Disabled
Chipset	**Common NorthBridge Control**	Delay Before Bus Device Init	1
		VT-d	Enabled
	PEG Port Configuration	Force X1	Disabled
		ASPM	Disabled
		Extended Synch	Disabled
	Arrandale_Clarkdale	SSVID WorkAround	Disabled
	IGD - LCD Control	DVMT Pre-Allocated	32M
		DVMT Total Gfx Mem	256M
		Render Standby	Enabled

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		IGD - Boot Type	VBIOS Default Spread Spectrum clock Chip Off
		Gfx Low Power Mode	Disabled
	South Bridge Configuration		
	Ibexpeak options	Display logic	Enabled
		CLKRUN# logic	Enabled
		High Precision Timer	Enabled
		Boot Time with HPET Timer	Disabled
		Clock Spread Spectrum	Disabled
		State After G3	S0 State
		Set NAND Management Override	Enabled
	SATA Configuration	SATA Controller(s)	Enabled
		SATA Mode Selection	AHCI Serial ATA Port 0
		Port Enable	Enabled
		Hot Plug	Disabled
		Port Multiplier	Disabled
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled Serial ATA Port 1
		Port Enable	Enabled
		Hot Plug	Disabled
		Port Multiplier	Disabled
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled
		Serial ATA Port 2	
		Port Enable	Enabled
		Hot Plug	Disabled
		Port Multiplier	Disabled
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled Serial ATA Port 3
		Port Enable	Enabled

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		Hot Plug	Disabled
		Port Multiplier	Disabled
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled Serial ATA Port 4
		Port Enable	Enabled
		Hot Plug	Disabled
		Port Multiplier	Disabled FIS-Based Port Multiplier
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled Serial ATA Port 5
		Port Enable	Enabled
		Hot Plug	Disabled
		Port Multiplier	Disabled FIS-Based Port Multiplier
		Aggressive Link Power Mode Select	Slumber Mode
		Spin Up Device	Disabled
		HDD Acoustic Power Management	Disabled
		HDD Acoustic Mode	Bypass
	Software Feature Mask Configuration	RAID0	Enabled
		RAID1	Enabled
		RAID10	Enabled
		RAID5	Enabled
		Intel Rapid Recovery Technology	Enabled
		OROM UI and BANNER	Enabled
		HDD Unlock	Enabled
		LED Locate	Enabled
		IRRT Only on eSATA	Enabled
	PCI Express Configuration	PCI Express Clock Gating	Enabled
		DMI Link ASPM Control	Disabled

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Top Menu	Next SubMenu	Setup Item	Optimal Default
	PCI Express Root Port 1: VMEbus/PMC2/ XMC2	PCIe Root Port 1: VMEbus/ PMC2/XMC2	Enabled
		Automatic ASPM	Disabled
		URR	Disabled
		FER	Disabled
		NFER	Disabled
		CER	Disabled
		CTO	Disabled
		SEFE	Disabled
		SENFE	Disabled
		SECE	Disabled
		PME SCI	Disabled
		Hot Plug	Disabled
		Extra Bus Reserved	0
		Reserved Memory	10
		Reserved I/O	4
	PCI Express Root Port 5: ETH3 (rear)	PCIe Root Port 5: ETH3 (rear)	Enabled
	PCI Express Root Port 6: ETH4 (rear)	PCIe Root Port 6: ETH4 (rear)	Enabled
	PCI Express Root Port 7: ETH1 (front)	PCIe Root Port 7: ETH1 (front)	Enabled
	PCI Express Root Port 8: ETH2 (front)	PCIe Root Port 8: ETH2 (front)	Enabled
	PCI-to-PCI Bridge	Extra Bus Reserved	0
Server Mgmt		FRB-2 Timer timeout	6 minutes
		FRB-2 Timer Policy	Reset
		O/S Watchdog Timer	Disable
		O/S Wtd Timer Timeout	10 minutes
		O/S Wtd Timer Policy	Reset
	Bmc self test log	Erase Log	Yes, On every reset
		When log is full	Clear Log
	System Event Log	SEL Components	Disabled

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Top Menu	Next SubMenu	Setup Item	Optimal Default
		Erase SEL	No
		When SEL is Full	Do Nothing
		Log EFI Status Codes	Both
Boot		Quiet Boot	Disabled
		UEFI Boot	Enabled
		Setup Prompt Timeout	2
		Bootup NumLock State	On
		GateA20 Active	Upon Request
		Option ROM Messages	Force BIOS
		Interrupt 19 Capture	Disabled

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