VPX3-TL BIOS

User's Manual

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LEADING EDGE COMPUTING

Preface

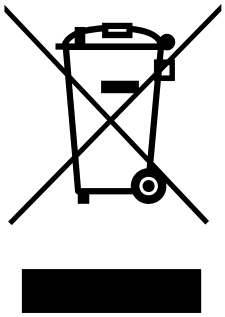
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Revision History

Revision	Release Date	Description of Change(s)
1.0	2023-07-05	Initial release, based on BIOS Eng. Spec. 0.4

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1 BIOS Setup Menu

1.1 Introduction

The BIOS setup utility is invoked by pressing <ESC> or <DEL> keys. User can change BIOS settings during setup utility runs. A reset of system is required in order to make new settings take effect.

In BIOS setup utility, there are several hot keys are designed for specific purpose. Hot keys are listed as below.

- <F1>: General help in setup menu
- <F8>: Load previous BIOS values
- <F9>: Load BIOS default in setup utility
- <F10>: Save & Exit setup utility

1.2 Menu Selection Bar

The Menu Selection Bar is located at the top of the screen. It displays the top level available menus to the user:

- Main Menu
- Advanced Menu
- Chipset Menu
- Server Mgmt Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

1.3 Menu Conventions

The appearance of setup menu listed in this chapter is a sample to describe the item list. It is shown on VT100 terminal via serial console. Followings are the menu conventions.

- **Using color**

  The mandatory BIOS setup fields are in black. The BIOS setup fields currently not used are in grey. The display only strings are in black.

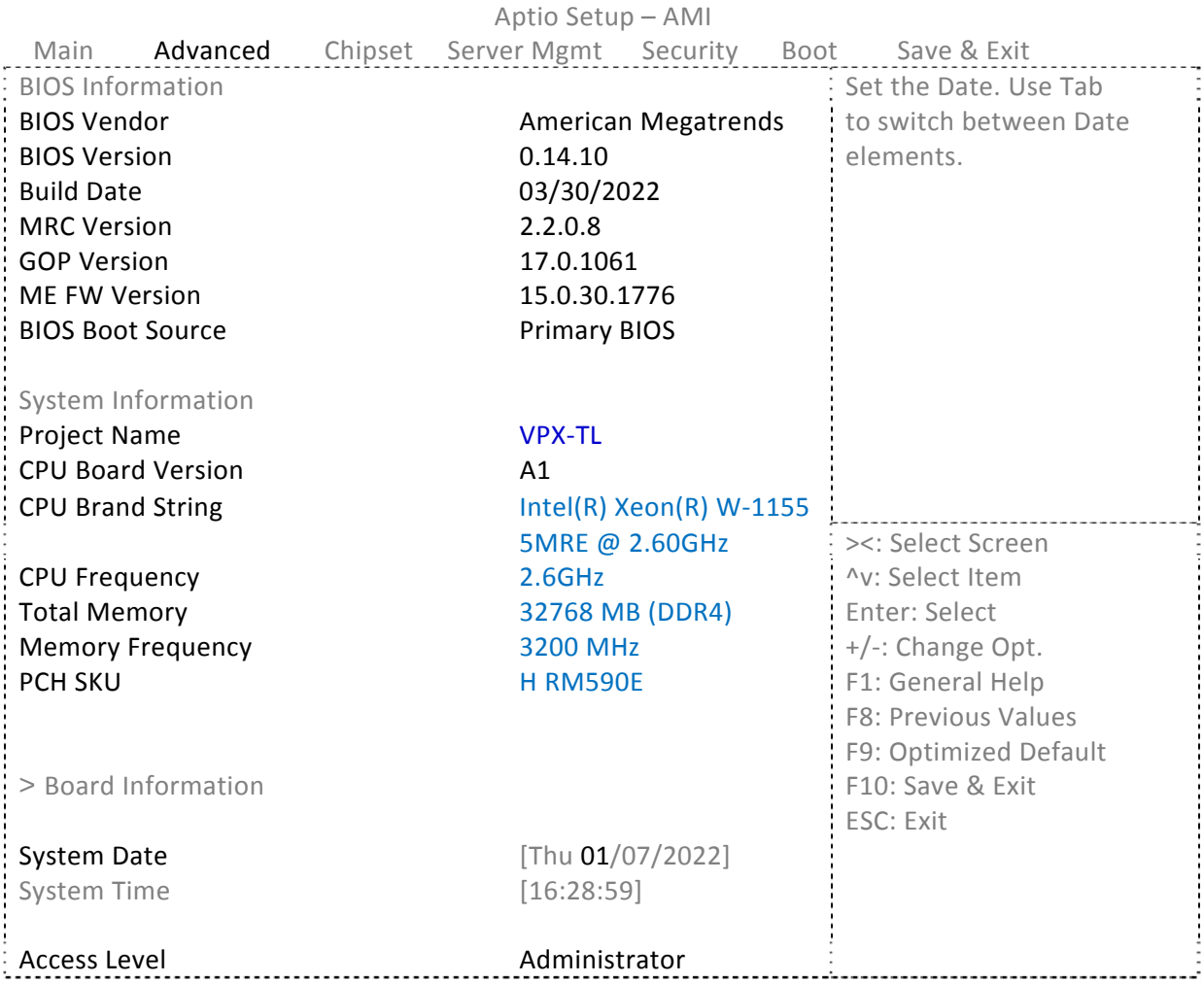
- **Using brackets**

  Editable menu options are marketed with squares '[' and ']' to distinguish them from display only fields that can't be modified.

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2 Getting Started

The Main Menu provides read-only information about system and also allows to set system's date and time. Refer to the tables below, it shows the screen shot of Main menu for detail, and submenus and settings as well.



2.1 BIOS Information

BIOS Item	Options	Description
BIOS Vendor	**Info-only.** American Megatrends	Display vendor name of system BIOS.
BIOS Version	**Info-only.** x.yy.zz	Display version of booting BIOS.
Build Date	**Info-only.** MM/DD/YYYY	It shows the date that BIOS was built.
MRC Version	**Info-only.** w.x.y.z	Display the revision of MRC code which is implemented in BIOS.

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BIOS Item	Options	Description
VBIOS Version / GOP Version	**Info-only.** yyyy/x.y.zzzz	*VBIOS Version:* When video option ROM is set to "Legacy Only", it will show up. *GOP Version:* When video option ROM is set to "UEFI Only", it will show up.
ME FW Version	**Info-only.** ww.x.yy.zzzz	Display the version of Intel manageability firmware which is implemented in BIOS.
BIOS Boot Source	**Info-only.** Primary BIOS/Backup BIOS	It shows which BIOS flash boots the system. *Primary BIOS:* usually means that boots from SPI0 *Backup BIOS:* usually means that boots from SPI1

2.2 System Information

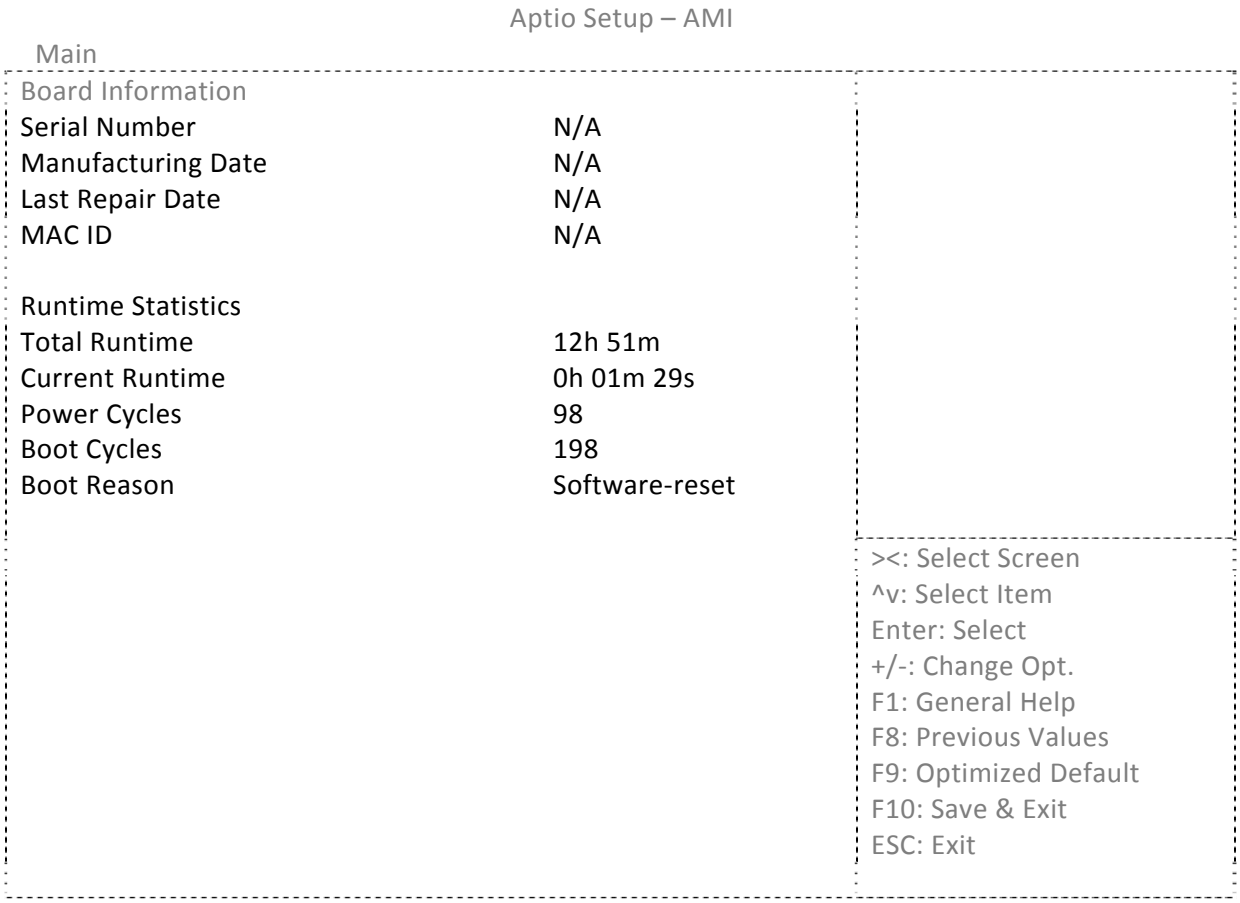
BIOS Item	Options	Description
Project Name	**Info-only.** VPX-TL	It shows the project name.
CPU Board Version	**Info-only.** A1/A2/A3/…	It shows the CPU board HW version.
CPU Brand String	**Info-only.** Intel(R) Core, …	It shows what CPU is booting the system.
CPU Frequency	**Info-only.** XXXX GHz	It shows CPU's frequency.
Total Memory	**Info-only.** XXXX MB (DDRx)	It shows total memory size used on the motherboard and memory type.
Memory Frequency	**Info-only.** XXXX MHz	It shows memory's frequency.
PCH SKU	**Info-only.** xxxx	It shows what PCH SKU is designed on motherboard.

2.3 System Date/Time

BIOS Item	Options	Description
System Date	MM/DD/YYYY	For configuring/showing system date. When setting the Date, use <Tab> key to switch between Date elements.
System Time	HH:MM:SS	For configuring/showing system time. When setting the Time, use <Tab> key to switch between Time elements.
Access Level	**Info-only.** Administrator/User	It shows what access level is used to enter BIOS setup menu.

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2.4 Board Information

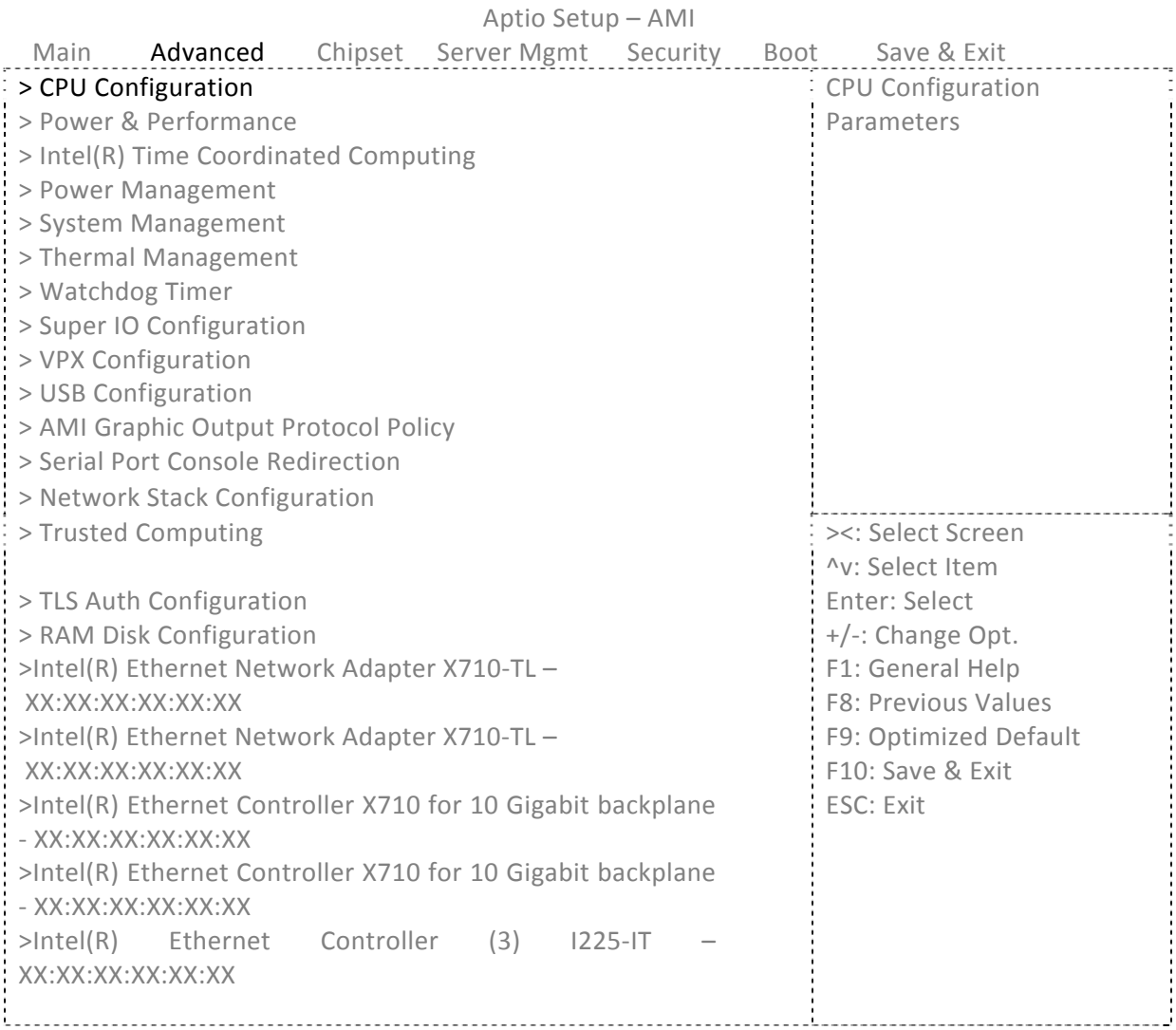


BIOS Item	Options	Description
Serial Number	**Info-only.**	Display board's serial number.
Manufacturing Date	**Info-only.**	Display manufacturing date.
Last Repair Date	**Info-only.**	Display Last Repair Date.
MAC ID	**Info-only.**	Shows onboard Ethernet's MAC ID.
Total Runtime	**Info-only.**	The returned value specifies the total time in minutes the system is running in S0 state.
Current Runtime	**Info-only.**	The returned value specifies the time in seconds the system is running in S0 state. This counter is cleared when the system is removed from the external power supply.
Power Cycle	**Info-only.**	The returned value specifies the number of times the external power supply has been shut down.
Boot Cycles	**Info-only.**	The boot cycle is increased after a HW or SW reset or after a successful power-up.
Boot Reason	**Info-only.**	The boot reason is the event which causes the reboot of the system.

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3 Advanced Menu

This menu contains the settings for most of the user interfaces in the system.

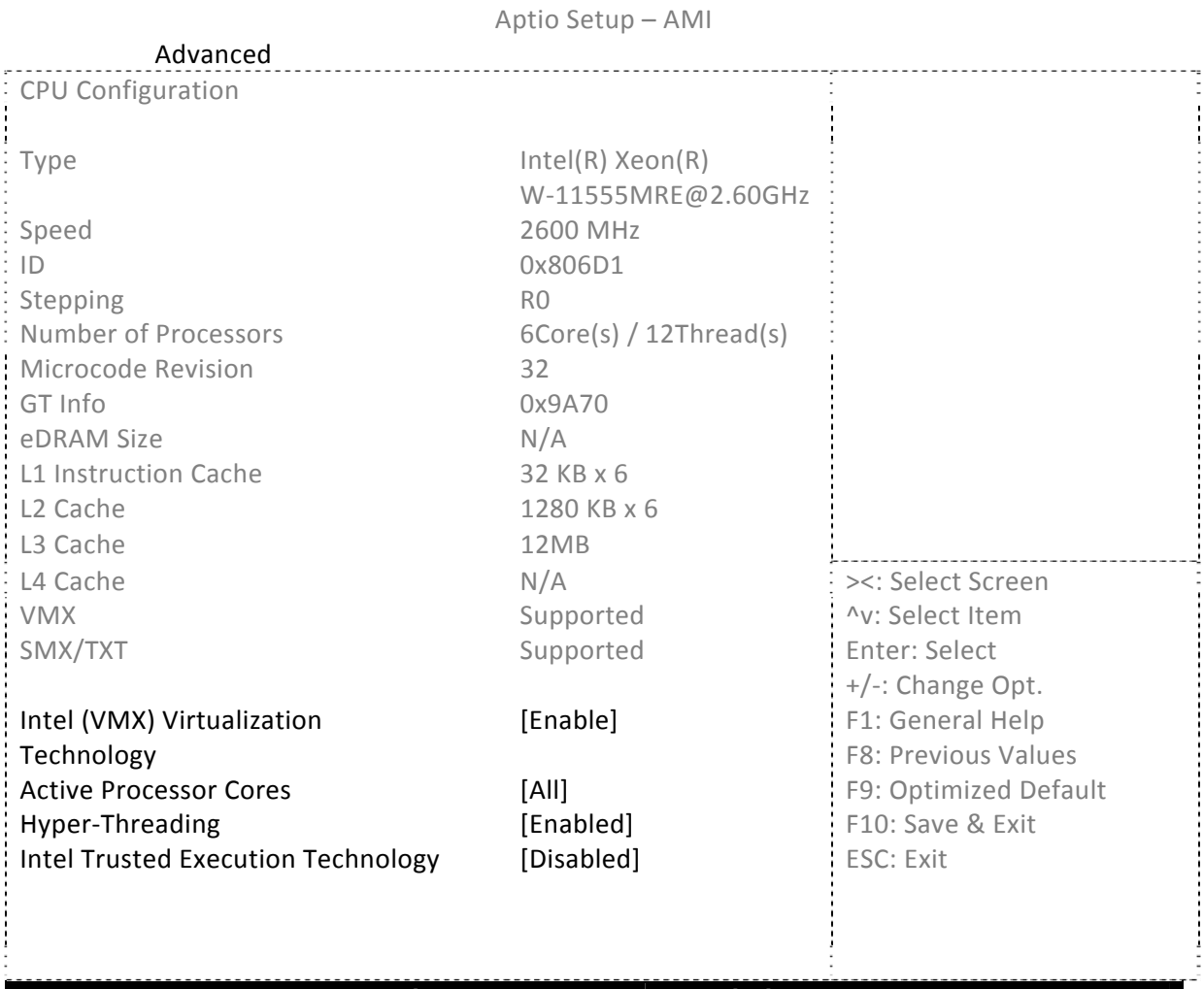


BIOS Item	Options	Description
CPU Configuration	**Submenu**	For configuring CPU features/functions.
Power & Performance	**Submenu**	For configuring Power & Performance Options
Intel(R) Time Coordinated Computing	**Submenu**	Intel(R) Time Coordinated Computing (Intel(R) TCC) options
Power Management	**Submenu**	
System Management	**Submenu**	
Thermal Management	**Submenu**	
Watchdog Timer	**Submenu**	
Super IO Configuration	**Submenu**	
VPX Configuration	**Submenu**	
USB Configuration	**Submenu**	

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AMI Graphic Output Protocol Policy	**Submenu**	User Select Monitor Output by Graphic Output Protocol
Serial Port Console Redirection	**Submenu**	
Network Stack Configuration	**Submenu**	
Trusted Computing	**Submenu**	
TLS Auth Configuration	**Submenu**	
RAM Disk Configuration	**Submenu**	
Intel(R) Ethernet Network Adapter X710-TL	**Submenu**	Configure Gigabit Ethernet device parameters.
Intel(R) Ethernet Controller X710 for 10 Gigabit backplane	**Submenu**	Configure Gigabit Ethernet device parameters.
Intel(R) Ethernet Controller (3) I225-IT	**Submenu**	Configure Gigabit Ethernet device parameters.

3.1 CPU Configuration

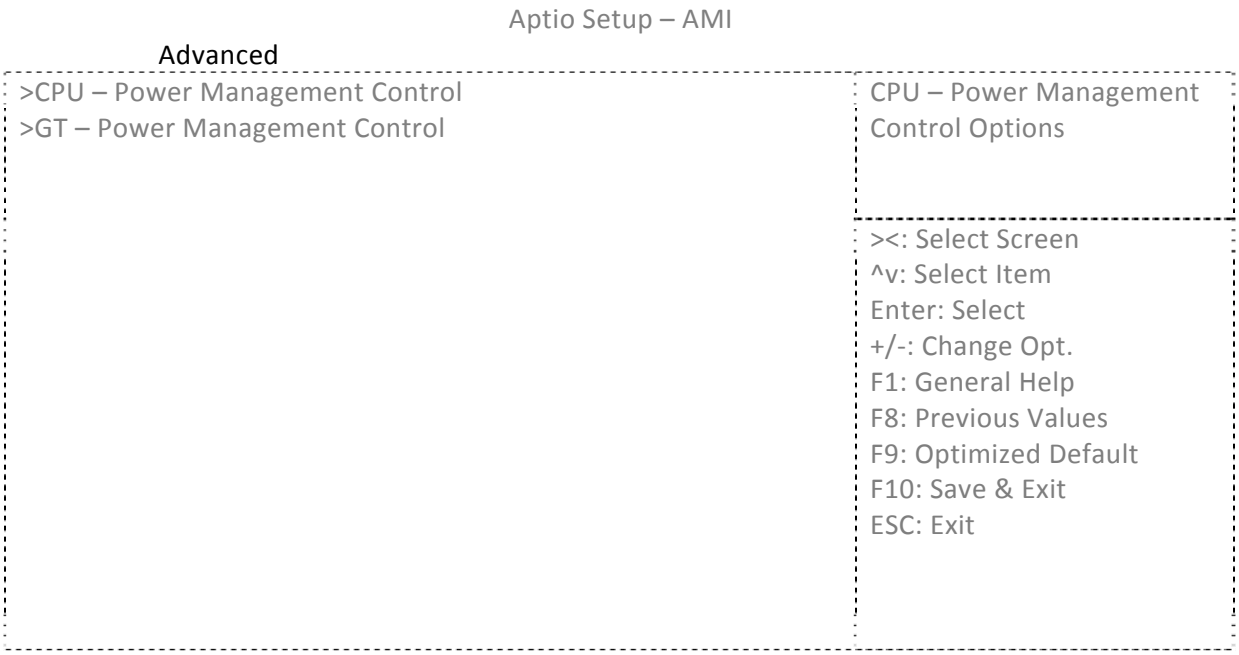


BIOS Item	Options	Description
Type	**Info-only.**	It shows what detail CPU information
Speed	**Info-only.**	It shows what detail CPU information
ID	**Info-only.**	It shows what detail CPU information
Stepping	**Info-only.**	It shows what detail CPU information

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Number of Processors	**Info-only.**	It shows what detail CPU information
Microcode Revision	**Info-only.**	It shows what detail CPU information
GT Info	**Info-only.**	It shows what detail CPU information
eDRAM Size	**Info-only.**	It shows what detail CPU information
L1 Instruction Cache	**Info-only.**	It shows what detail CPU information
L2 Cache	**Info-only.**	It shows what detail CPU information
L3 Cache	**Info-only.**	It shows what detail CPU information
L4 Cache	**Info-only.**	It shows what detail CPU information
VMX	**Info-only.**	It shows what CPU support feature.
SMX/TXT	**Info-only.**	It shows what CPU support feature.
Intel (VMX) Virtualization Technology	**Enabled** Disabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	**All** / 1 / 2 / 3 / 4 / 5	Number of cores to enable in each processor package.
Hyper-Threading	**Enabled** Disabled	Enable or Disable Hyper-Threading Technology.
Intel Trusted Execution Technology	Enabled **Disabled**	Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology. Changes require a full power cycle to take effect.

3.2 Power & Performance



BIOS Item	Options	Description
CPU – Power Management Control	**Submenu**	CPU – Power Management Control Options
GT – Power Management Control	**Submenu**	GT – Power Management Control Options

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3.2.1 CPU – Power Management Control

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CPU – Power Management Control		CPU – Power Management Control Options
Boot performance mode	[Turbo Performance]	
Intel(R) SpeedStep(tm)	[Enabled]	
Race To Halt (RTH)	[Enabled]	
Intel(R) Speed Shift Technology	[Enabled]	
Per Core P State OS control mode	[Enabled]	
HwP Autonomous Per Core P State	[Enabled]	
HwP Autonomous EPP Grouping	[Enabled]	
EPB override over PECI	[Disabled]	
HwP Fast MSR Support	[Enabled]	
HDC Control	[Enabled]	
Turbo Mode	[Disabled]	
> View/Configure Turbo Options		
> Config TDP Configurations		
> CPU VR Settings		
Platform PL1 Enable	[Enabled]	
Platform PL1 Power	50000	
Platform PL1 Time Window	[0]	
Platform PL2 Enable	[Enabled]	
Platform PL2 Power	55000	><: Select Screen
Power Limit 4 Override	[Disabled]	^v: Select Item
C states	[Disabled]	Enter: Select
Thermal Monitor	[Enabled]	+/-: Change Opt.
Interrupt Redirection Mode Selection	[Fixed Priority]	F1: General Help
Timed MWAIT	[Disabled]	F8: Previous Values
> Custom P-state Table		F9: Optimized Default
Energy Performance Gain	[Disabled]	F10: Save & Exit
EPG DIMM Idd3N		ESC: Exit
EPG DIMM Idd3P		
> Power Limit 3 Settings		
> CPU Lock Configuration		

BIOS Item	Options	Description
Boot performance mode	Max Battery Max Non-Turbo Performance **Turbo Performance**	Select the performance state that the BIOS will set starting from reset vector.
Intel(R) SpeedStep(tm)	**Enabled** Disabled	Allows more than two frequency ranges to be supported.
Race To Halt (RTH)	**Enabled** Disabled	Enable/Disable Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power. (RTH is controlled through

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BIOS Item	Options	Description
		MSR 1FC bit 20)
Intel(R) Speed Shift Technology	**Enabled** Disabled	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Per Core P State OS control mode	**Enabled** Disabled	Enable/Disable Per Core P state OS control mode. Disabling will set Bit 31 = 1 command 0x06. When set, the highest core request is used for all other core requests.
HwP Autonomous Per Core P State	**Enabled** Disabled	Disable Autonomous PCPS (Bit 30 = 1, command 0x11) Autonomous will request the same value for all cores all the time. Enable PCPS (default Bit 30 = 0, command 0x11)
HwP Autonomous EPP Grouping	**Enabled** Disabled	Enable EPP grouping (default Bit 29 =0, command 0x11) Autonomous will request the same values for all cores with same EPP. Disable EPP grouping (Bit 29 =1 , command 0x11) autonomous will not necessarily request same values for all cores with same EPP.
EPB override over PECI	Enabled **Disabled**	Enable/Disable EPB override over PECI. Enable by sending pcode command 0x2b , subcommand 0x3 to 1. This will allow OOB EPB PECI override control
HwP Fast MSR Support	**Enabled** Disabled	Enable/Disable HwP Fast MSR Support for IA32_HWP_REQUEST MSR.
HDC Control	**Enabled** Disabled	This option allows HDC configuration.
Turbo Mode	Enabled **Disabled**	Enable/Disable Per Core P state OS control mode. Disabling will set Bit 31 = 1 command 0x06. When set, the highest core request is used for all other core requests.
View/Configure Turbo Options	**Submenu**	
Config TDP Configurations	**Submenu**	
CPU VR Settings	**Submenu**	
Platform PL1 Enable	**Enabled** Disabled	Enable/Disable Platform Power Limit 1 programming. If this option is enabled, it activates the PL1 value to be used by the processor to limit the average power of given time window.

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BIOS Item	Options	Description
Platform PL1 Power	**50000**	Platform Power Limit 1 Power in Milli Watts. BIOS will round to the nearest 1/8W when programming. Any value can be programmed between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). For 12.50W, enter 12500. This setting will act as the new PL1 value for the Package RAPL algorithm.
Platform PL1 Time Window	**0**	Platform Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default values. Indicates the time window over which Platform TDP value should be maintained.
Platform PL2 Enable	**Enabled** Disabled	Enable/Disable Platform Power Limit 2 programming. If this option is disabled, BIOS will program the default values for Platform Power Limit 2.
Platform PL2 Power	**55000**	Platform Power Limit 2 Power in Milli Watts. BIOS will round to the nearest 1/8W when programming. Any value can be programmed between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). For 12.50W, enter 12500. This setting will act as the new PL2 value for the Package RAPL algorithm.
Power Limit 4 Override	Enabled **Disabled**	Enable/Disable Power Limit 4 override. If this option is disabled, BIOS will leave the default values for Power Limit 4.
C states	Enabled **Disabled**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Thermal Monitor	**Enabled** Disabled	Enable/Disable Thermal Monitor
Interrupt Redirection Mode Selection	**Fixed Priority** Round robin Hash Vector No Change	Interrupt Redirection Mode Select for Logical Interrupts
Timed MWAIT	Enabled **Disabled**	Enable/Disable Timed MWAIT Support
Custom P-state Table	**Submenu**	
Energy Performance Gain	Enabled **Disabled**	Enable/disable Energy Performance Gain.
EPG DIMM Idd3N	**26**	Active standby current (Idd3N) in milliamps from datasheet. Must be calculated on a per DIMM basis.
EPG DIMM Idd3P	**11**	Active power-down current (Idd3P) in milliamps from datasheet. Must be calculated on a per DIMM basis.

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BIOS Item	Options	Description
Power Limit 3 Settings	**Submenu**	
CPU Lock Configuration	**Submenu**	

CPU – Power Management Control → View / Configure Turbo Options

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Current Turbo Settings		
Max Turbo Power Limit	4095.875	
Min Turbo Power Limit	0.0	
Package TDP Limit	45.0	
Power Limit 1	45.0	
Power Limit 2	83.0	
1-core Turbo Ratio Limit Ratio (TRLR)	45	
2-core Turbo Ratio Limit Ratio (TRLR)	45	
3-core Turbo Ratio Limit Ratio (TRLR)	44	
4-core Turbo Ratio Limit Ratio (TRLR)	43	><: Select Screen
5-core Turbo Ratio Limit Ratio (TRLR)	42	^v: Select Item Enter: Select +/-: Change Opt.
6-core Turbo Ratio Limit Ratio	41	F1: General Help F8: Previous Values
Energy Efficient P-state	[Enabled]	F9: Optimized Default
Package Power Limit MSR Lock	[Disabled]	F10: Save & Exit
Energy Efficient Turbo	[Disabled]	ESC: Exit

BIOS Item	Options	Description
Max Turbo Power Limit	**Info-only.**	
Min Turbo Power Limit	**Info-only.**	
Package TDP Limit	**Info-only.**	
Power Limit 1	**Info-only.**	
Power Limit 2	**Info-only.**	
1-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	
2-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	
3-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	
4-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	

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5-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	
6-core Turbo Ratio Limit Ratio (TRLR)	**Info-only.**	
Energy Efficient P-state	**Enabled** Disabled	
Package Power Limit MSR Lock	Enabled **Disabled**	
Energy Efficient Turbo	Enabled **Disabled**	

CPU – Power Management Control →Config TDP Configurations

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Config TDP Configurations

Enable Configurable TDP	Applies to cTDP
Configurable TDP Boot Mode	Nominal
Configurable TDP Lock	Disabled
CTDP BIOS control	Disabled
ConfigTDP Levels	2
ConfigTDP Turbo Activation Ratio	25 (Unlocked)
Power Limit 1	45.0W (MSR:45.0)
Power Limit 2	83.0W (MSR:83.0)
Custom Settings Nominal	
ConfigTDP Nominal	Ratio:26 TAR:25 PL1:13.0W
Power Limit 1	0
Power Limit 2	0
Power Limit 1 Time Window*	[0]
ConfigTDP Turbo Activation Ratio	0
Custom Settings Down	
ConfigTDP Level1	Ratio:21 TAR:20 PL1:3.0W
Power Limit 1	0
Power Limit 2	0
Power Limit 1 Time Window*	[0]
ConfigTDP Turbo Activation Ratio	0

><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit

ESC: Exit

BIOS Item	Options	Description
Enable Configurable TDP	Applies to non-cTDP **Applies to cTDP**	Applies TDP initialization settings based on non-cTDP or cTDP. Default is 1: Applies to cTDP; if 0 then applies non-cTDP and BIOS will bypass cTDP initialzation flow
Configurable TDP Boot Mode	**Nominal** Down Up Deactivate	Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero.

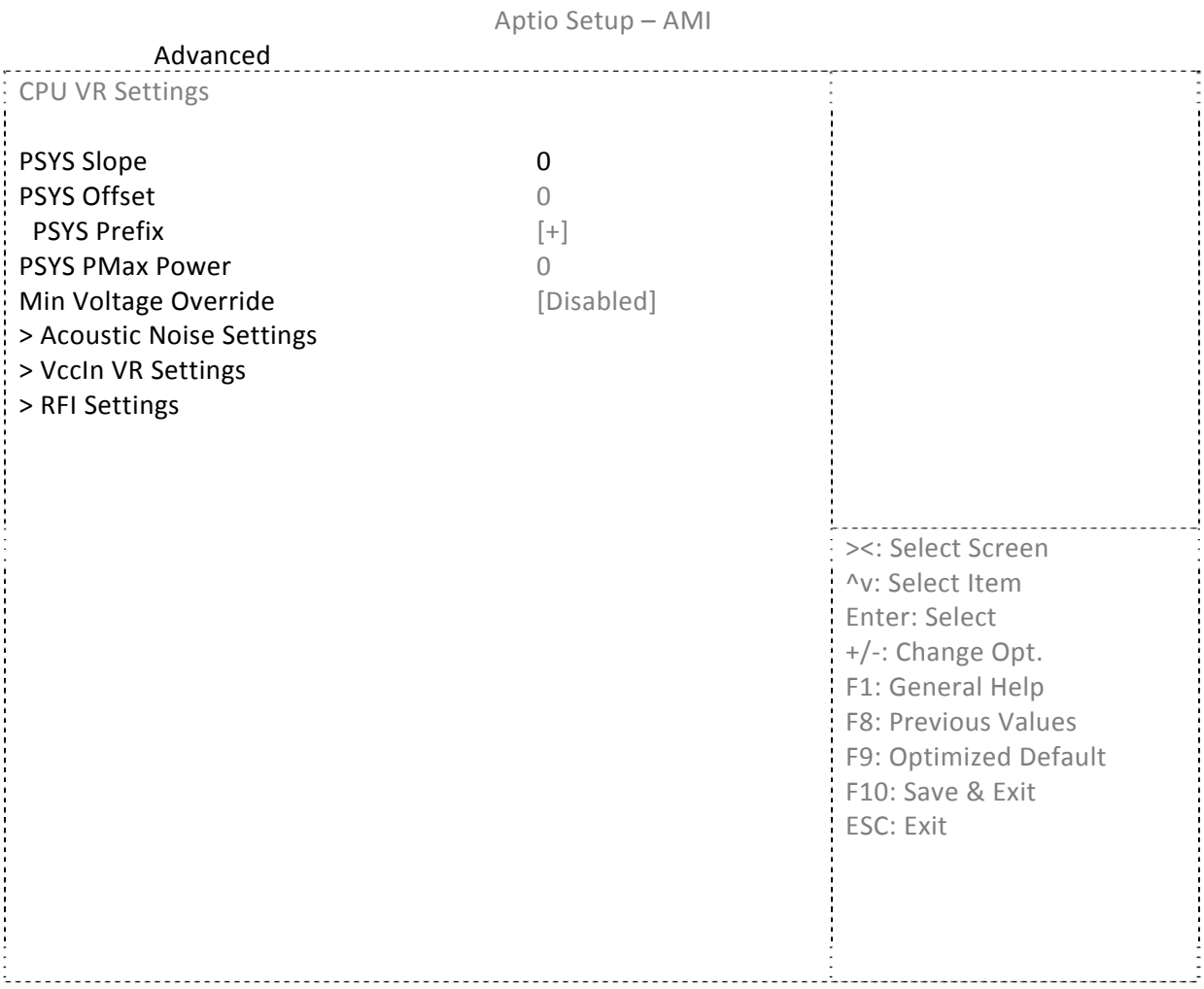
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BIOS Item	Options	Description
Configurable TDP Lock	Enabled **Disabled**	Configurable TDP Mode Lock sets the Lock bits on TURBO_ACTIVATION_RATIO and CONFIG_TDP_CONTROL. Note: When CTDP Lock is enabled Custom ConfigTDP Count will be forced to 1 and Custom ConfigTDP Boot Index will be forced to 0.
CTDP BIOS control	Enabled **Disabled**	Enables CTDP control via runtime ACPI BIOS methods. This "BIOS only" feature does not require EC or driver support.
ConfigTDP Levels	**Info-only.**	
ConfigTDP Turbo Activation Ratio	**Info-only.**	
Power Limit 1	**Info-only.**	
Power Limit 2	**Info-only.**	
ConfigTDP Nominal	**Info-only.**	
Power Limit 1	**0**	Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and TDP
Power Limit 2	**0**	Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.
Power Limit 1 Time Window*	**[0]**	Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default value (28 sec for Mobile and 8 sec for Desktop). Defines time window which TDP value should be maintained.
ConfigTDP Turbo Activation Ratio	0	Custom value for Turbo Activation Ratio. Needs to be configured with valid values from LFM to Max Turbo. 0 means don't use custom value.
ConfigTDP Level1	**Info-only.**	
Power Limit 1	**0**	Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and TDP

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BIOS Item	Options	Description
Power Limit 2	**0**	Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.
Power Limit 1 Time Window*	**[0]**	Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default value (28 sec for Mobile and 8 sec for Desktop). Defines time window which TDP value should be maintained.
ConfigTDP Turbo Activation Ratio	**0**	Custom value for Turbo Activation Ratio. Needs to be configured with valid values from LFM to Max Turbo. 0 means don't use custom value.

CPU – Power Management Control → CPU VR Settings



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BIOS Item	Options	Description
PSYS Slope	**0**	PSYS Slope defined in 1/100 increments. Range is 0-200. For a 1.25 slope, enter 125. 0 = AUTO. Uses BIOS VR mailbox command 0x9."
PSYS Offset	**0**	PSYS Offset defined in 1/1000 increments. Range is 0-63999. For an offset of 25.348, enter 25348. PSYS Uses BIOS VR mailbox command 0x4.
PSYS Prefix	**+**	Sets the offset value as positive or negative.
PSYS PMax Power	**0**	PSYS PMax power, defined in 1/8 Watt increments. Range 0-8192. For a PMax of 125W, enter 1000. 0 = AUTO. Uses BIOS VR mailbox command 0xB.
Min Voltage Override	Enabled **Disabled**	Min Voltage Override. Enable to override minimum voltage for runtime and for C8.
Acoustic Noise Settings	**Submenu**	
VccIn VR Settings	**Submenu**	
RFI Settings	**Submenu**	

CPU – Power Management Control → CPU VR Settings→ Acoustic Noise Settings

Aptio Setup – AMI

Advanced

Acoustic Noise Settings

Acoustic Noise Mitigation	[Disabled]
Pre Wake Time	0
Ramp Up Time	0
Ramp Down Time	0
VccIn VR Domain	
Disable Fast PKG C State Ramp for VccIn Domain	[FALSE]
Slow Slew Rate for VccIn Domain	[Fast/2]

><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit
ESC: Exit

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BIOS Item	Options	Description
Acoustic Noise Mitigation	Enabled **Disabled**	Enabling this option will help mitigate acoustic noise on certain SKUs when the CPU is in deeper C state
Pre Wake Time	**0**	Set the maximum Pre Wake randomization time in micro ticks. Range is 0-255. This is for acoustic noise mitigation Dynamic Perodicity Alteration (DPA) tuning.
Ramp Up Time	**0**	Set the maximum Ramp Up randomization time in micro ticks. Range is 0-255. This is for acoustic noise mitigation Dynamic Perodicity Alteration (DPA) tuning.
Ramp Down Time	**0**	Set the maximum Ramp Down randomization time in micro ticks. Range is 0-255. This is for acoustic noise mitigation Dynamic Perodicity Alteration (DPA) tuning.
Disable Fast PKG C State Ramp for VccIn Domain	TRUE **FALSE**	This option needs to be configured to reduce acoustic noise during deeper C states. False: Don't disable Fast ramp during deeper C states; True: Disable Fast ramp during deeper C state
Slow Slew Rate for VccIn Domain	**Fast/2** Fast/4 Fast/8 Fast/16	Set VR VccIn Slow Slew Rate for Deep Package C State ramp time; Slow slew rate equals to Fast devided by number, the number is 2, 4, 8, 16 to slow down the slew rate to help minimize acoustic noise

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CPU – Power Management Control →CPU VR Settings→ VccIn VR Settings

Aptio Setup – AMI

Advanced

VccIn VR Domain	
VR Config Enable	[Enabled]
Current AC Loadline	200
Current DC Loadline	150
Current Psi1 Threshold	80
Current Psi2 Threshold	20
Current Psi3 Threshold	4
Current Imon Slope	100
Current Imon Offset	1
Current VR Current Limit	292
Current Tdc Current Limit	360
AC Loadline	0
DC Loadline	0
PS Current Threshold1	80
PS Current Threshold2	20
PS Current Threshold3	4
PS3 Enable	[Enabled]
PS4 Enable	[Enabled]
IMON Slope	0
IMON Offset	0
IMON Prefix	[+]
VR Current Limit	0
TDC Enable	[Enabled]
TDC Current Limit	0
TDC Time Window	[1 ms]
TDC Lock	[Disabled]
VccIn Demotion Override Enable	[Disabled]

><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit
ESC: Exit

BIOS Item	Options	Description
VR Config Enable	**Enabled** Disabled	VR Config Enable
Current AC Loadline	**200**	
Current DC Loadline	**150**	
Current Psi1 Threshold	**80**	
Current Psi2 Threshold	**20**	
Current Psi3 Threshold	**4**	
Current Imon Slope	**100**	
Current Imon Offset	**1**	
Current VR Current Limit	**292**	
Current Tdc Current Limit	**360**	
AC Loadline	0	AC Loadline defined in 1/100 mOhms. A value of 100 = 1.00 mOhm, and 1255 = 12.55 mOhm. Range is 0-6249 (0-62.49 mOhms). 0 = AUTO/HW default. Uses BIOS mailbox command 0x2.

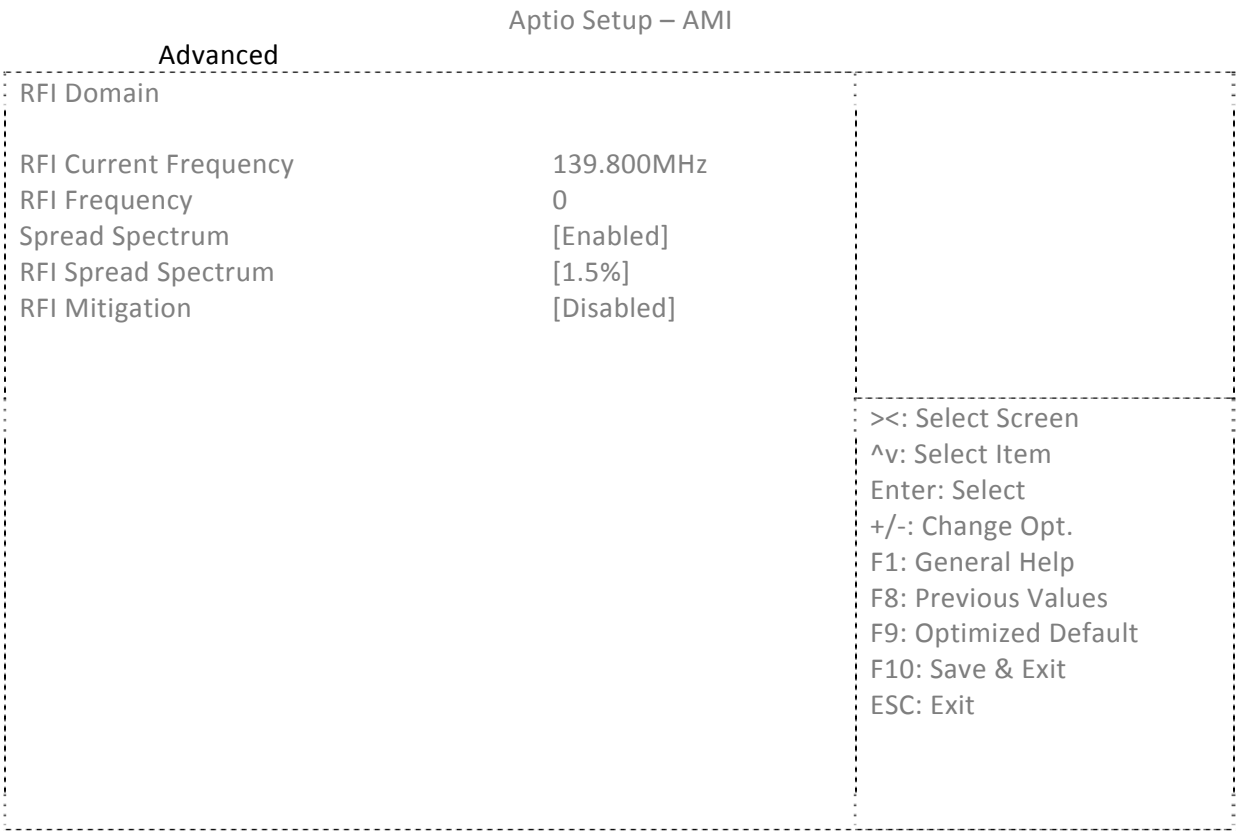
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BIOS Item	Options	Description
DC Loadline	0	DC Loadline defined in 1/100 mOhms. A value of 100 = 1.00 mOhm, and 1255 = 12.55 mOhm. Range is 0-6249 (0-62.49 mOhms). 0 = AUTO/HW default. Uses BIOS mailbox command 0x2.
PS Current Threshold1	80	PS Current Threshold1, defined in 1/4 A increments. A value of 400 = 100A. Range 0-512, which translates to 0-128A. 0 = AUTO. Uses BIOS VR mailbox command 0x3.
PS Current Threshold2	20	PS Current Threshold2, defined in 1/4 A increments. A value of 400 = 100A. Range 0-512, which translates to 0-128A. 0 = AUTO. Uses BIOS VR mailbox command 0x3.
PS Current Threshold3	4	PS Current Threshold3, defined in 1/4 A increments. A value of 400 = 100A. Range 0-512, which translates to 0-128A. 0 = AUTO. Uses BIOS VR mailbox command 0x3.
PS3 Enable	**Enabled** Disabled	PS3 Enable/Disable. 0 - Disabled, 1 - Enabled.Uses BIOS VR mailbox command 0x3.
PS4 Enable	**Enabled** Disabled	PS4 Enable/Disable. 0 - Disabled, 1 - Enabled. Uses BIOS VR mailbox command 0x3
IMON Slope	0	IMON Slope defined in 1/100 increments. Range is 0-200. For a 1.25 slope, enter 125. 0 = AUTO. Uses BIOS VR mailbox command 0x4.
IMON Offset	0	IMON Offset defined in 1/1000 increments. Range is 0-63999. For an offset of 25.348, enter 25348. IMON Uses BIOS VR mailbox command 0x4.
IMON Prefix	[+]	Sets the offset value as positive or negative.
VR Current Limit	0	Voltage Regulator Current Limit (Icc Max). This value represents the Maximum instantaneous current allowed at any given time. The value is represented in 1/4 A increments. A value of 400 = 100A. 0 means AUTO. Uses BIOS VR mailbox command 0x6.
TDC Enable	**Enabled** Disabled	TDC Enable. 0- Disable, 1 - Enable
TDC Current Limit	0	TDC Current Limit, defined in 1/8A increments. Range 0-32767. For a TDC Current Limit of 125A, enter 1000. 0 = 0 Amps. Uses BIOS VR mailbox command 0x1A.
TDC Time Window	**1 ms**, 2 ms, 3 ms, 4	TDC Time Window, value in milliseconds.

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BIOS Item	Options	Description
	ms, 5 ms, 6 ms, 7 ms, 8 ms, 10 ms	1ms is default. Range from 1ms to 10ms, except for 9ms. 9ms has no valid encoding in the MSR definition.
TDC Lock	Enabled **Disabled**	TDC Lock
VccIn Demotion Override Enable	Enabled **Disabled**	Enable VccIn Demotion Override Configuration.

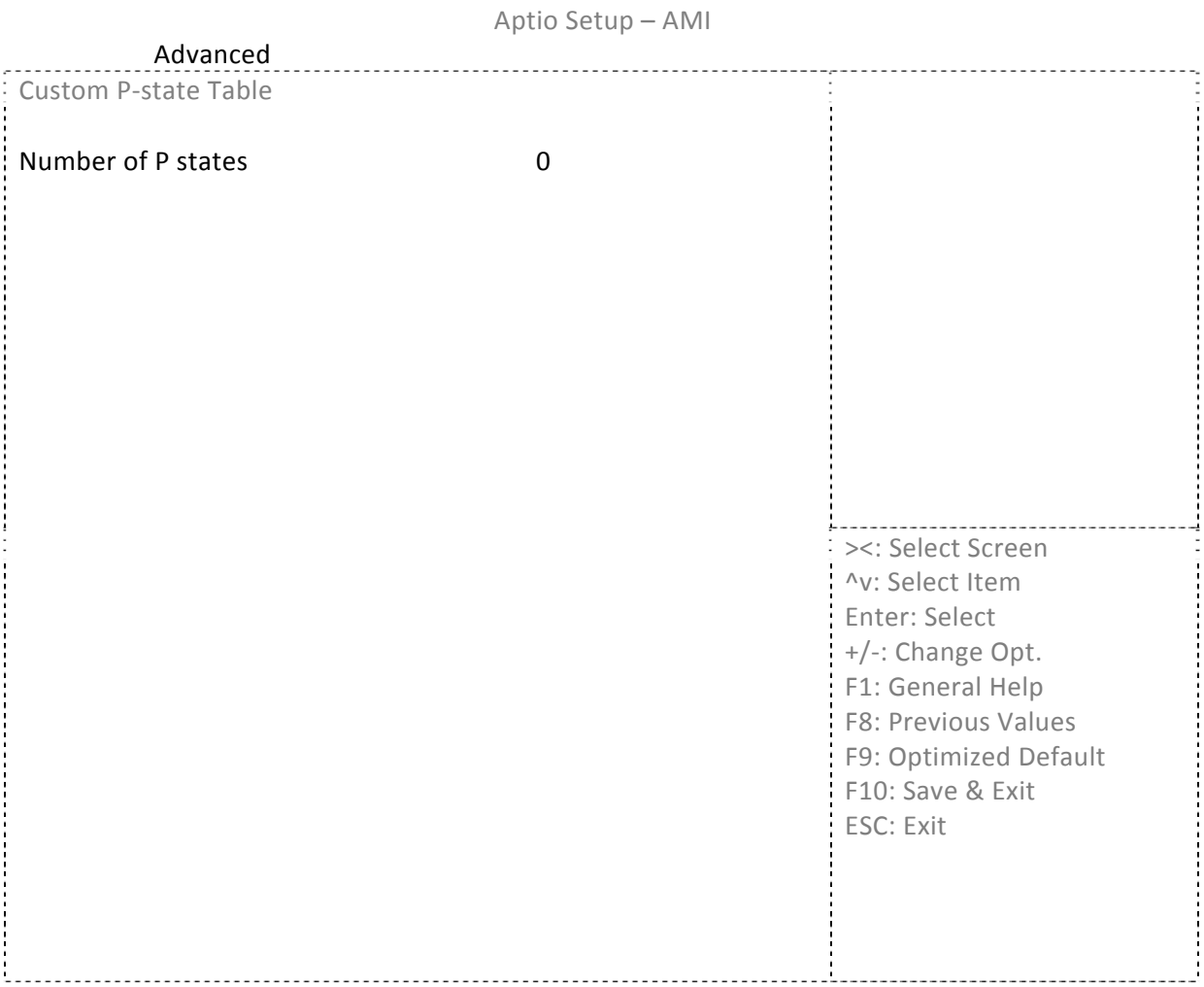
CPU – Power Management Control → CPU VR Settings→ RFI Settings



BIOS Item	Options	Description
RFI Current Frequency	139.800MHz	
RFI Frequency	**0**	Set desired RFI frequency, in increments of 100KHz. (For a frequency of 100.6MHz, enter 1006.)
Spread Spectrum	**Enabled** Disabled	Enable or Disable the Spread Spectrum
RFI Spread Spectrum	0.5%, 1%, **1.5%**, 2%, 3%, 4%, 5%, 6%	Set the Spread Spectrum
RFI Mitigation	Enabled **Disabled**	Disable - DCM is the IO_N default; Enable - Enable IO_N DCM/CCM switching as RFI mitigation.

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CPU – Power Management Control → Custom P-state Table



BIOS Item	Options	Description
Number of P states	**0**	Sets the number of custom P-states. At least 2 states must be present.

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CPU – Power Management Control → Power Limit 3 Settings

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Advanced

Power Limit 3 Override	[Disabled]	
		><: Select Screen ^v: Select Item Enter: Select +/-: Change Opt. F1: General Help F8: Previous Values F9: Optimized Default F10: Save & Exit ESC: Exit

BIOS Item	Options	Description
Power Limit 3 Override	Enabled **Disabled**	Enable/DisablePower Limit 3 override. If this option is disabled, BIOS will leave the hardware default values for Power Limit 3 and Power Limit 3 Time Window.

CPU – Power Management Control → CPU Lock Configuration

Aptio Setup – AMI

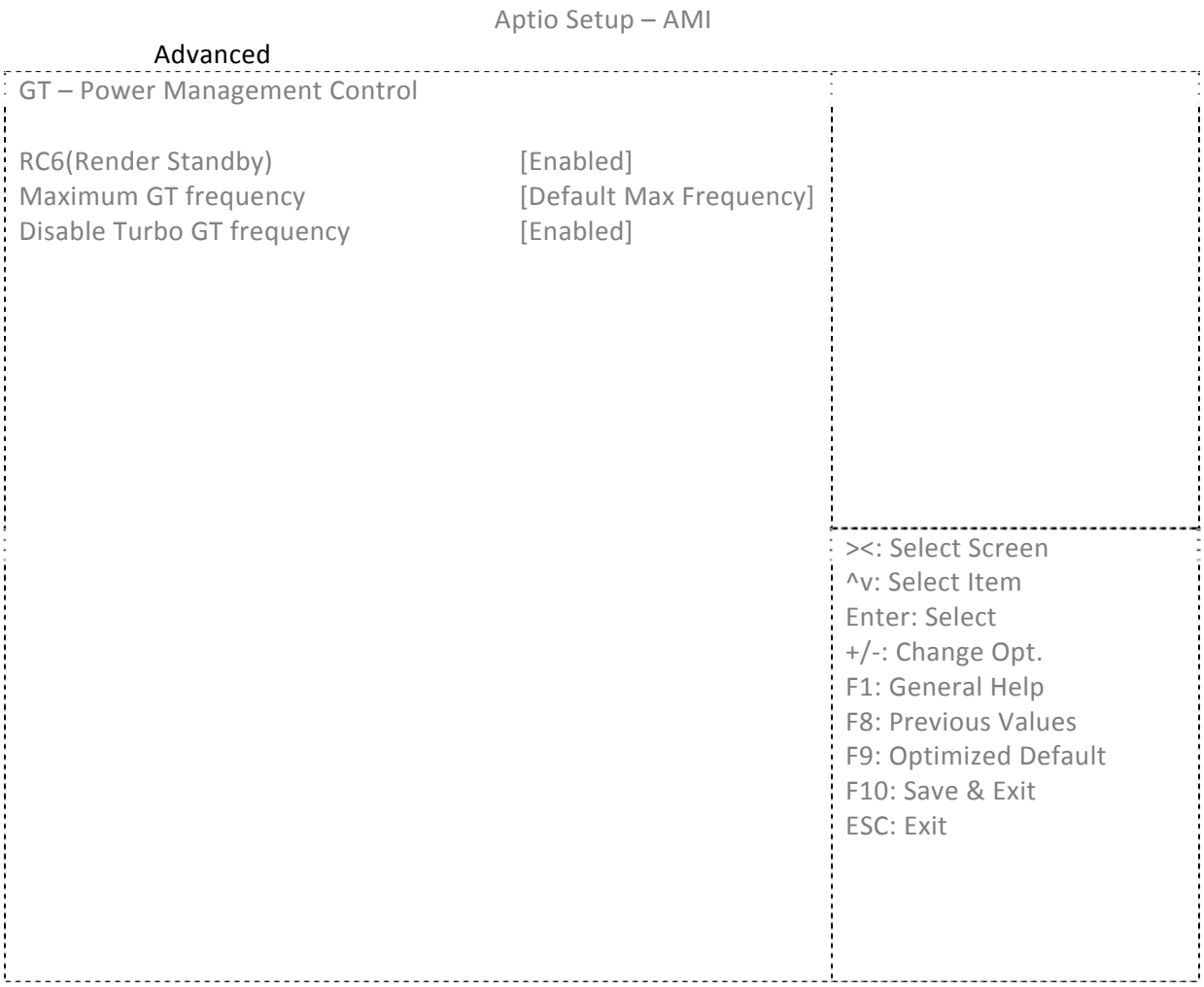
Advanced

CFG Lock	[Enabled]	
Overclocking Lock	[Enabled]	
		><: Select Screen ^v: Select Item Enter: Select +/-: Change Opt. F1: General Help F8: Previous Values F9: Optimized Default F10: Save & Exit ESC: Exit

BIOS Item	Options	Description
CFG Lock	**Enabled** Disabled	Configure MSR 0xE2[15], CFG Lock bit
Overclocking Lock	**Enabled** Disabled	Enable/Disable Overclocking Lock (BIT 20) in FLEX_RATIO(194) MSR

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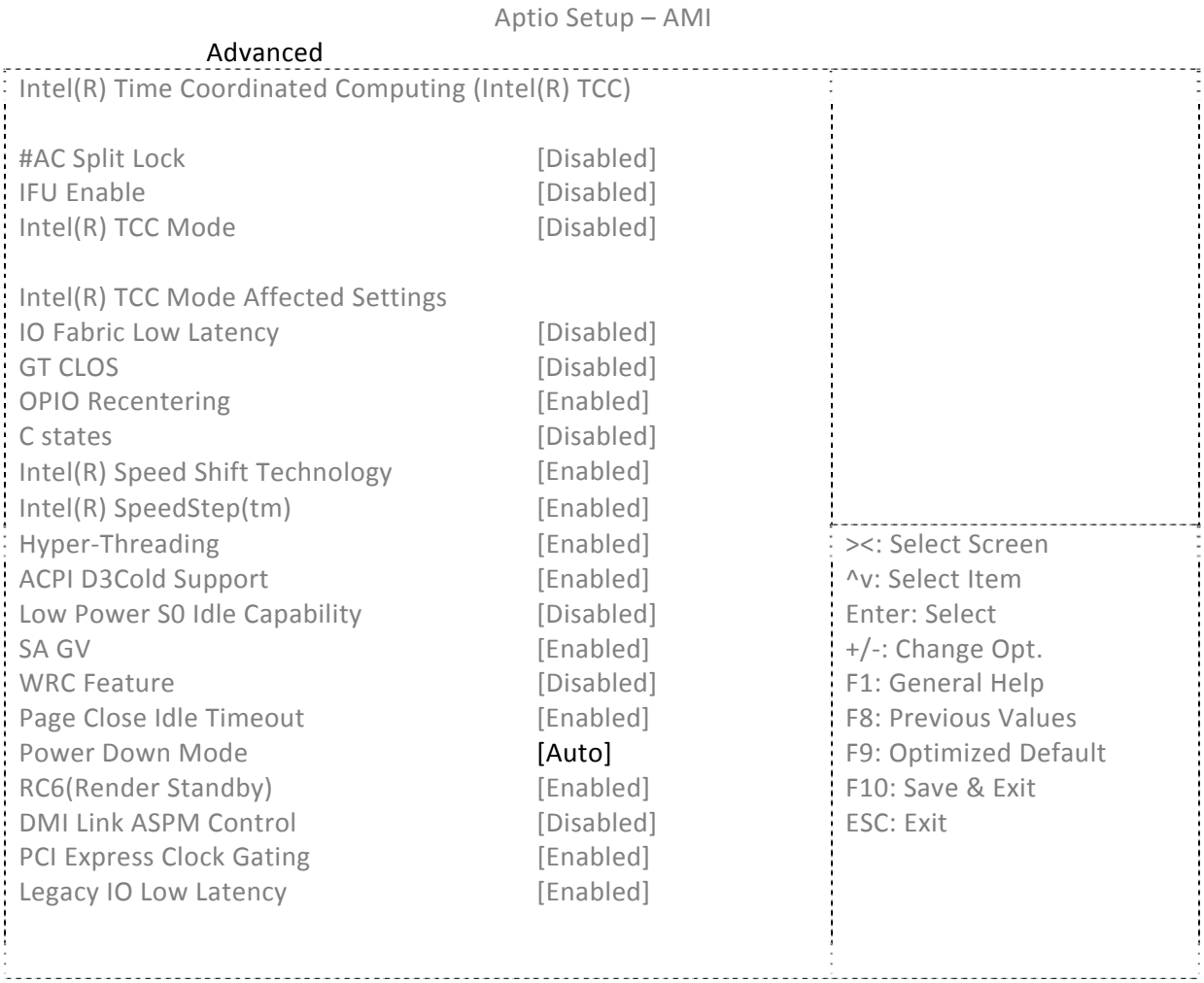
3.2.2 GT – Power Management Control



BIOS Item	Options	Description
RC6(Render Standby)	**Enabled** Disabled	Check to enable render standby support.
Maximum GT frequency	**Default Max Frequency**, 100Mhz, 150Mhz, 200Mhz, 250Mhz, 300Mhz, 350Mhz, 400Mhz, 450Mhz, 500Mhz, 550Mhz, 600Mhz, 650Mhz, 700Mhz, 750Mhz, 800Mhz, 850Mhz, 900Mhz, 950Mhz, 1000Mhz, 1050Mhz, 1100Mhz, 1150Mhz, 1200Mhz	Maximum GT frequency limited by the user. Choose between 350MHz (RPN) and 1350MHz (RP0). Value beyond the range will be clipped to min/max supported by SKU
Disable Turbo GT frequency	**Enabled** Disabled	Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited

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3.3 Intel(R) Time Coordinated Computing



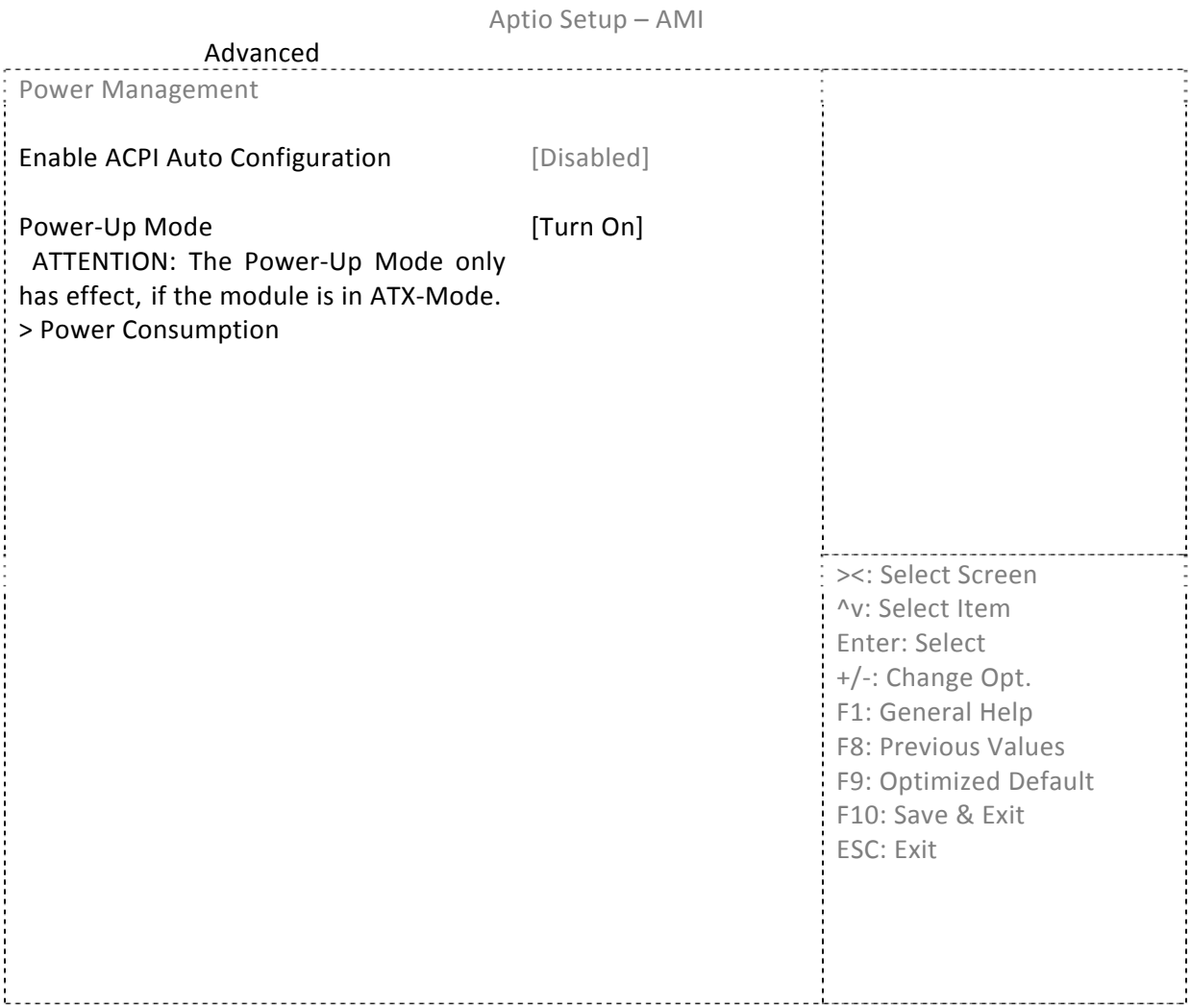
BIOS Item	Options	Description
#AC Split Lock	Enabled **Disabled**	Enable or Disable Alignment Check Exception (#AC). When enabled, this will assert an #AC when any atomic operation has an operand that crosses two cache lines.
IFU Enable	Enabled **Disabled**	Enable or Disable Instruction Fetch Unit(IFU). When enabled, Instructions will be prefetch to the cache.
Intel(R) TCC Mode	Enabled **Disabled**	Enable or Disable Intel(R) TCC Mode. When enabled, this will modify system settings to improve real-time performance. The full list of settings and their current state are displayed below when Intel(R) TCC mode is enabled.
IO Fabric Low Latency	Enabled **Disabled**	Enable or Disable IO Fabric Low Latency. This will turn off some power management in the PCH IO fabrics. This option provides the most aggressive IO Fabric performance setting. S3 state is NOT supported.

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BIOS Item	Options	Description
GT CLOS	Enabled **Disabled**	Enable or Disable Graphics Technology(GT) Class of Service. Enable will reduce Gfx LLC allocation to minimize impact of Gfx workload on LLC
OPIO Recentering	**Enabled** Disabled	Enable or Disable Opio Recentering to improve Pcie latency.
C states	Enabled **Disabled**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Intel(R) Speed Shift Technology	**Enabled** Disabled	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Intel(R) SpeedStep(tm)	**Enabled** Disabled	Allows more than two frequency ranges to be supported.
Hyper-Threading	**Enabled** Disabled	Enable or Disable Hyper-Threading Technology.
ACPI D3Cold Support	**Enabled** Disabled	Enable/Disable ACPI D3Cold support to be executed on D3 entry and exit
Low Power S0 Idle Capability	Enabled **Disabled**	This variable determines if we enable ACPI Lower Power S0 Idle Capability (Mutually exclusive with Smart connect). While this is enabled, it also disable 8254 timer for SLP_S0 support.
SA GV	**Enabled** Disabled	System Agent Geyserville. Can disable, fix to a specific point, or enable frequency switching.
WRC Feature	Enabled **Disabled**	Enable/Disable SA WRC(Write Cache) Feature of IOP. When enabled, supports IO devices allocating onto the ring and into LLC.
Page Close Idle Timeout	**Enabled** Disabled	Page Close Idle Timeout Control
Power Down Mode	**Auto** No Power Down APD PPD-DLLoff	CKE Power Down Mode Control
RC6(Render Standby)	**Enabled** Disabled	Check to enable render standby support.
DMI Link ASPM Control	Enabled **Disabled**	The control of Active State Power Management of the DMI Link.
PCI Express Clock Gating	**Enabled** Disabled	PCI Express Clock Gating Enable/Disable for each root port.
Legacy IO Low Latency	**Enabled** Disabled	Set to enable low latency of legacy IO. Some systems require lower IO latency irrespective of power. This is a tradeoff between power and IO latency.

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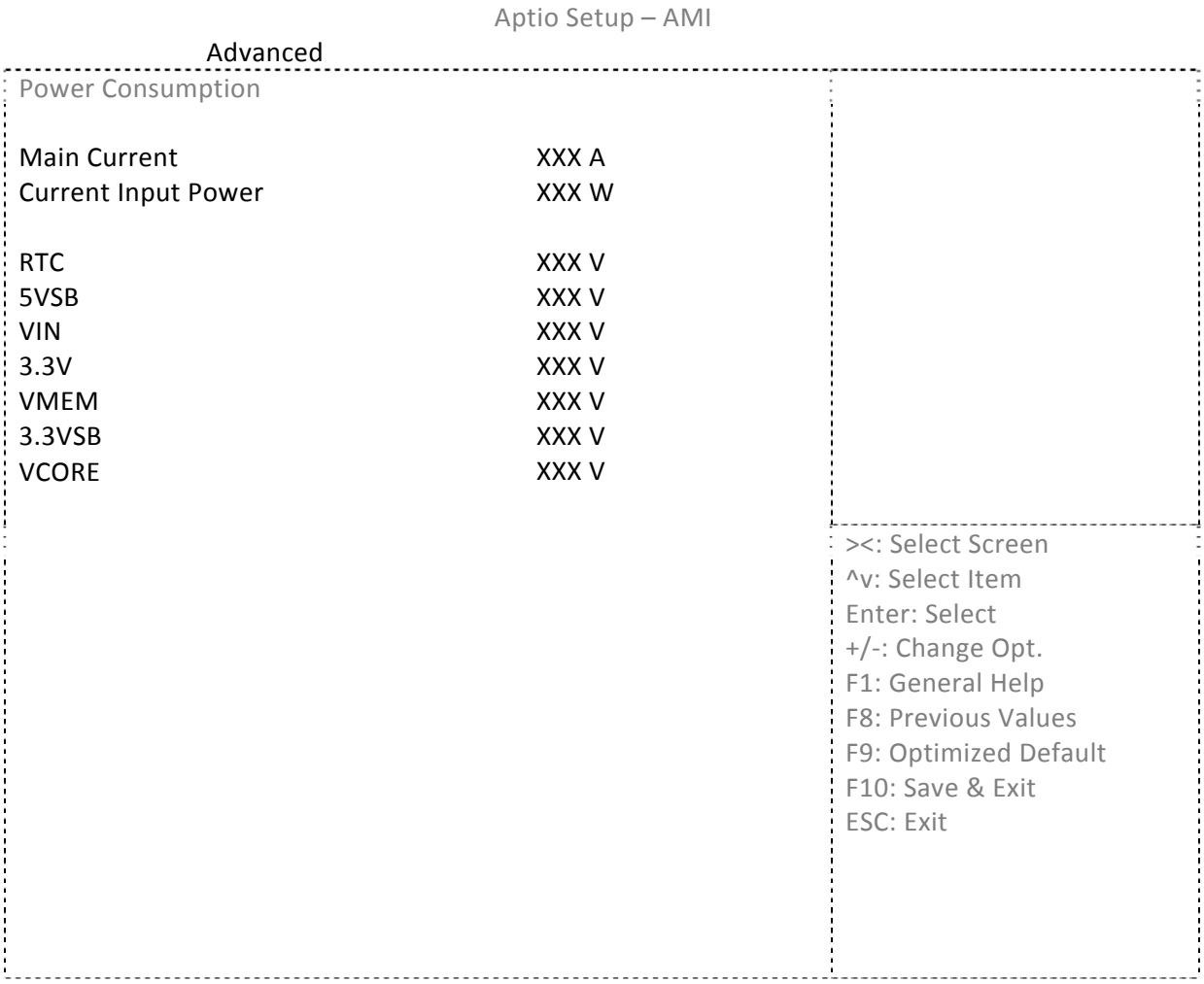
3.4 Power Management



BIOS Item	Options	Description
Enable ACPI Auto Configuration	Enabled **Disabled**	Enables or Disables BIOS ACPI Auto Configuration.
Power-Up Mode	**Turn On** Remain Off	Turn On: The machine starts automatically when the power supply is turned on. Remain Off: To start the machine the power button has to be pressed.
Power Consumption	**Submenu**	

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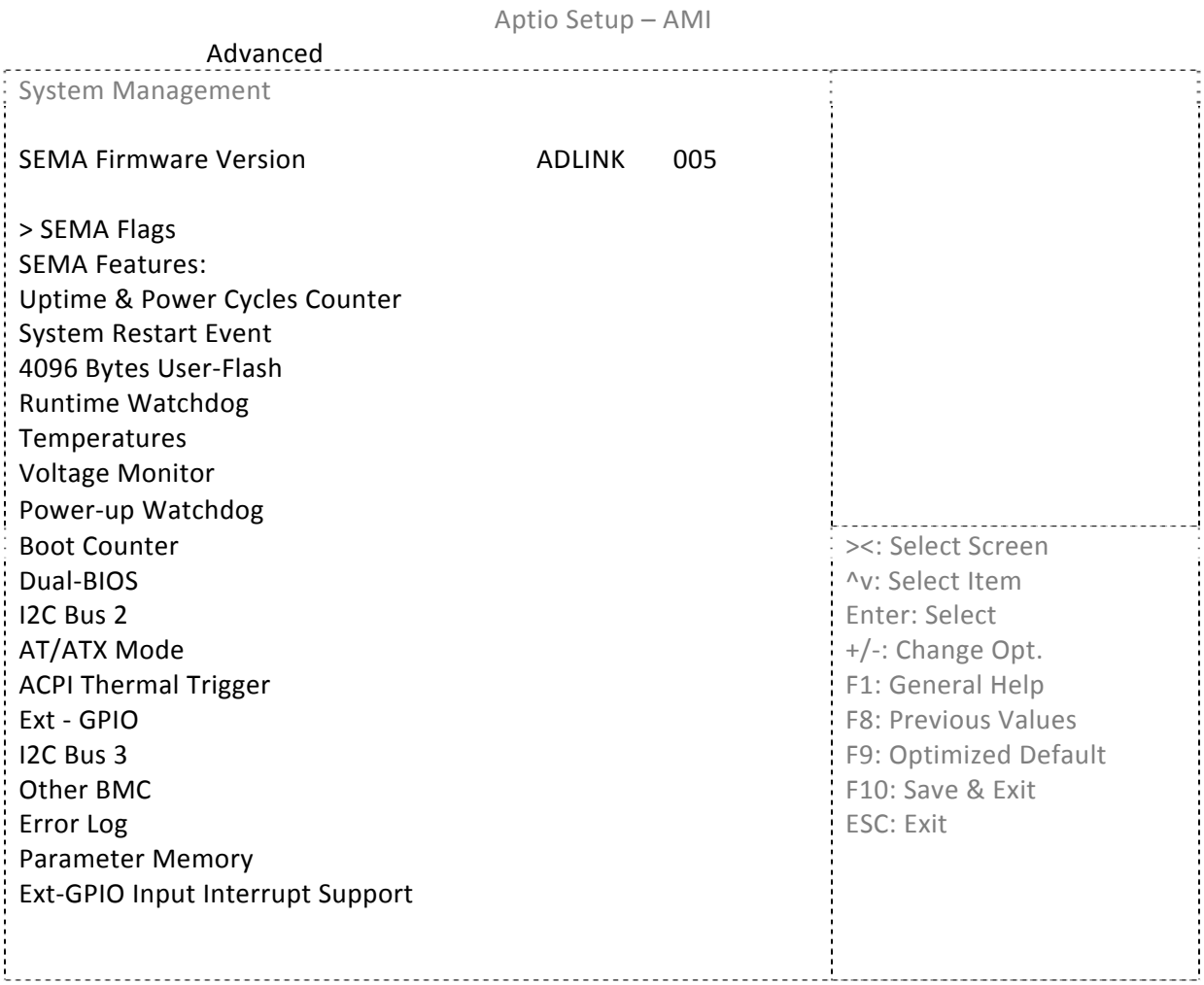
3.4.1 Power Consumption



BIOS Item	Options	Description
Main Current	**Info-only**	
Current Input Power	**Info-only**	
RTC	**Info-only**	
5VSB	**Info-only**	
VIN	**Info-only**	
3.3V	**Info-only**	
VMEM	**Info-only**	
3.3VSB	**Info-only**	
VCORE	**Info-only**	

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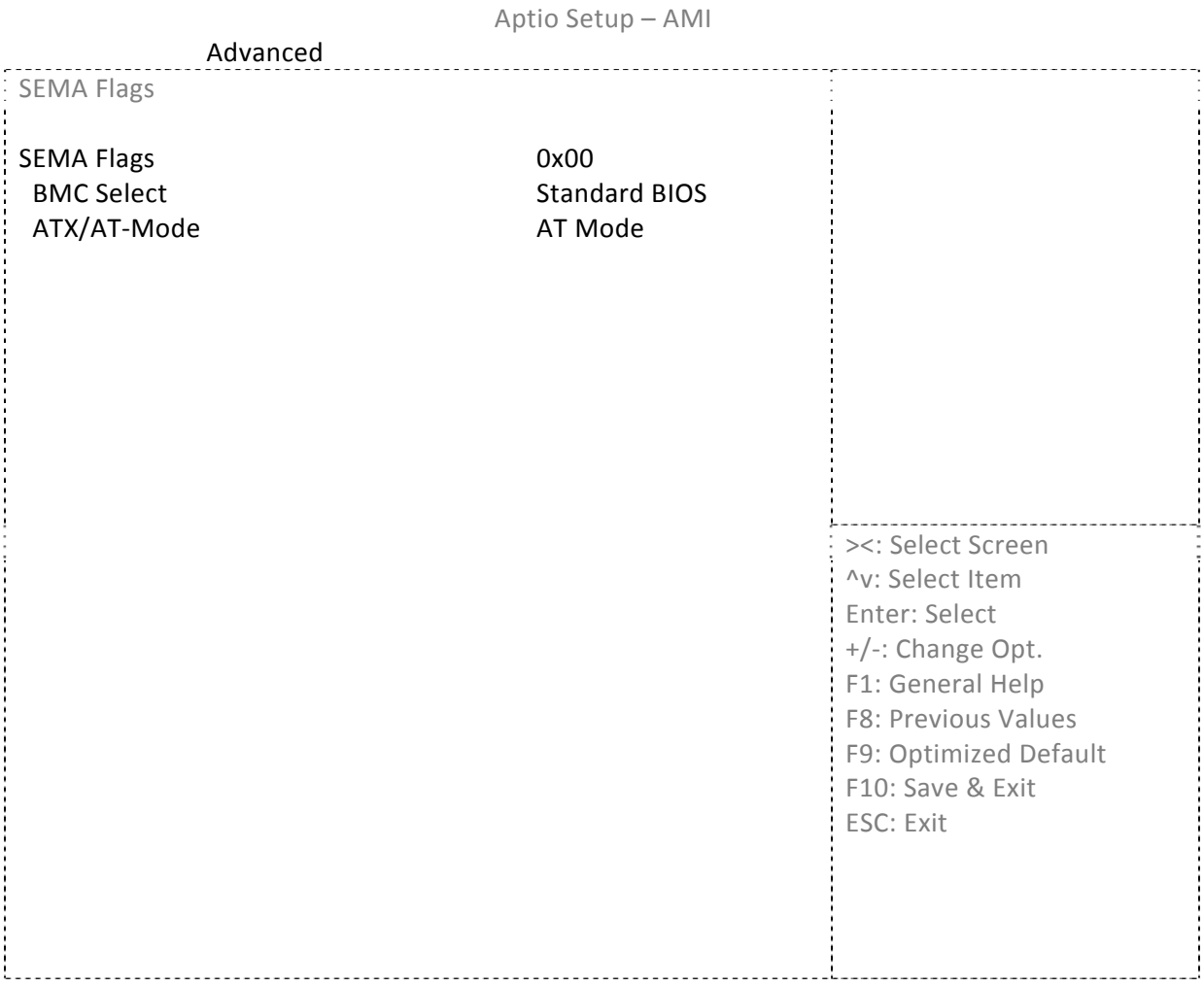
3.5 System Management



BIOS Item	Options	Description
SEMA Firmware Version	**Info-only**	
SEMA Flags	**Submenu**	
SEMA Features	**Info-only**	If this item is shown in below, it means SEMA supports it.

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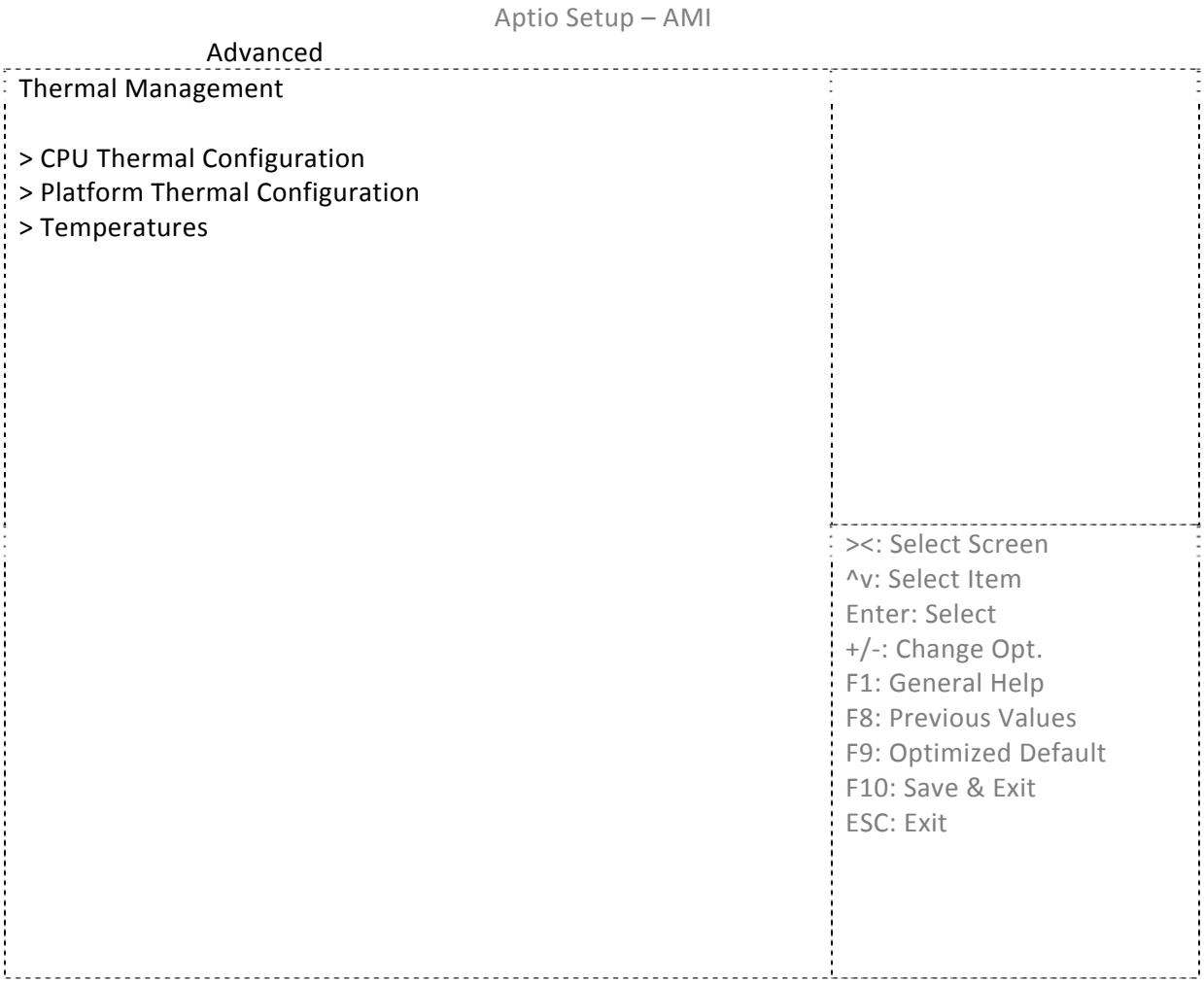
3.5.1 SEMA Flags



BIOS Item	Options	Description
Flags	**Info-only**	
SEMA Flags	**Read only**	Show current SEMA settings.
BMC Select	**Read only**	Display current boot BIOS ROM chip.
ATX/AT-Mode	**Read only**	Display current power mode setting, AT or ATX mode.

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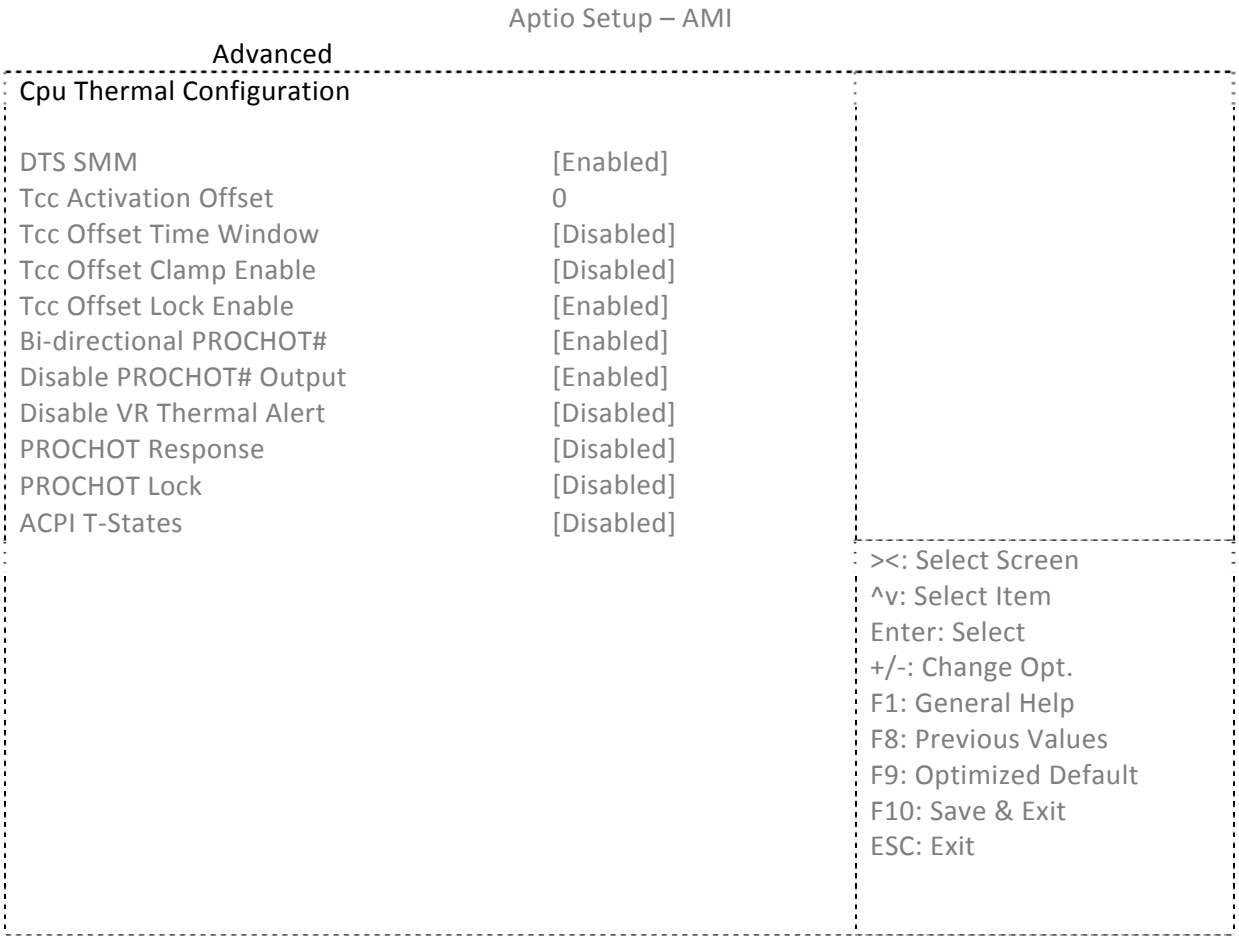
3.6 Thermal Management



BIOS Item	Options	Description
CPU Thermal Configuration	**Submenu**	
Platform Thermal Configuration	**Submenu**	
Temperatures	**Submenu**	

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3.6.1 CPU Thermal Configuration



BIOS Item	Options	Description
DTS SMM	**Enabled** Disabled	Disabled: ACPI thermal management uses EC reported temperature values.
Tcc Activation Offset	**0**	Offset from factory set Tcc activation temprature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc Activation Temp - Tcc Activation Offset. Tcc Activation Offset range is 0 to 63.
Tcc Offset Time Window	**Disabled**, 5 ms, 10 ms, 55 ms, 156 ms, 375 ms, 500 ms, 750 ms, 1 sec, 2 sec, 3 sec, 4 sec, 5 sec, 6 sec, 7 sec, 8 sec, 10 sec, 12 sec, 14 sec, 16 sec, 20 sec, 24 sec, 28 sec, 32 sec, 40 sec, 48 sec, 56 sec, 64 sec, 80 sec, 96 sec, 112 sec, 128 sec, 160 sec, 192 sec, 224 sec, 256 sec, 320 sec, 384 sec, 448 sec	Tcc Offset Time Window for Running Average Temperature Limit(RATL) feature. The Tcc offset time window can range from 5ms to 448s.

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Tcc Offset Clamp Enable	Enabled **Disabled**	Tcc Offset Clamp bit Enable for Running Average Temperature Limit(RATL) feature to allow CPU to throttle below P1.
Tcc Offset Lock Enable	**Enabled** Disabled	Lock Enable for Running Average Temperature Limit(RATL) feature to lock Temperature Target MSR.
Bi-directional PROCHOT#	**Enabled** Disabled	When a processor thermal sensor trips (either core), the PROCHOT# will be driven.
Disable PROCHOT# Output	**Enabled** Disabled	Enable/Disable PROCHOT# Output
Disable VR Thermal Alert	Enabled **Disabled**	Enable/Disable VR Thermal Alert
PROCHOT Response	Enabled **Disabled**	Enable/Disable PROCHOT Response
PROCHOT Lock	Enabled **Disabled**	Enable/Disable PROCHOT Lock
ACPI T-States	Enabled **Disabled**	Enable/Disable ACPI T-States.

3.6.2 Platform Thermal Configuration

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Advanced

Platform Thermal Configuration

Critical Trip Point	[Disabled]
Active Trip Point 0	[87 C]
Active Trip Point 1	[55 C]
Passive Trip Point	[95 C]
Passive TC1 Value	1
Passive TC2 Value	5
Passive TSP Value	10
Active Trip Points	[Disabled]
Passive Trip Points	[Enabled]
Critical Trip Points	[Disabled]
PCH Temp Read	[Enabled]
CPU Energy Read	[Enabled]
CPU Temp Read	[Enabled]
Alert Enable Lock	[Disabled]
CPU Temp	72
Boot DTS Read	[Disabled]

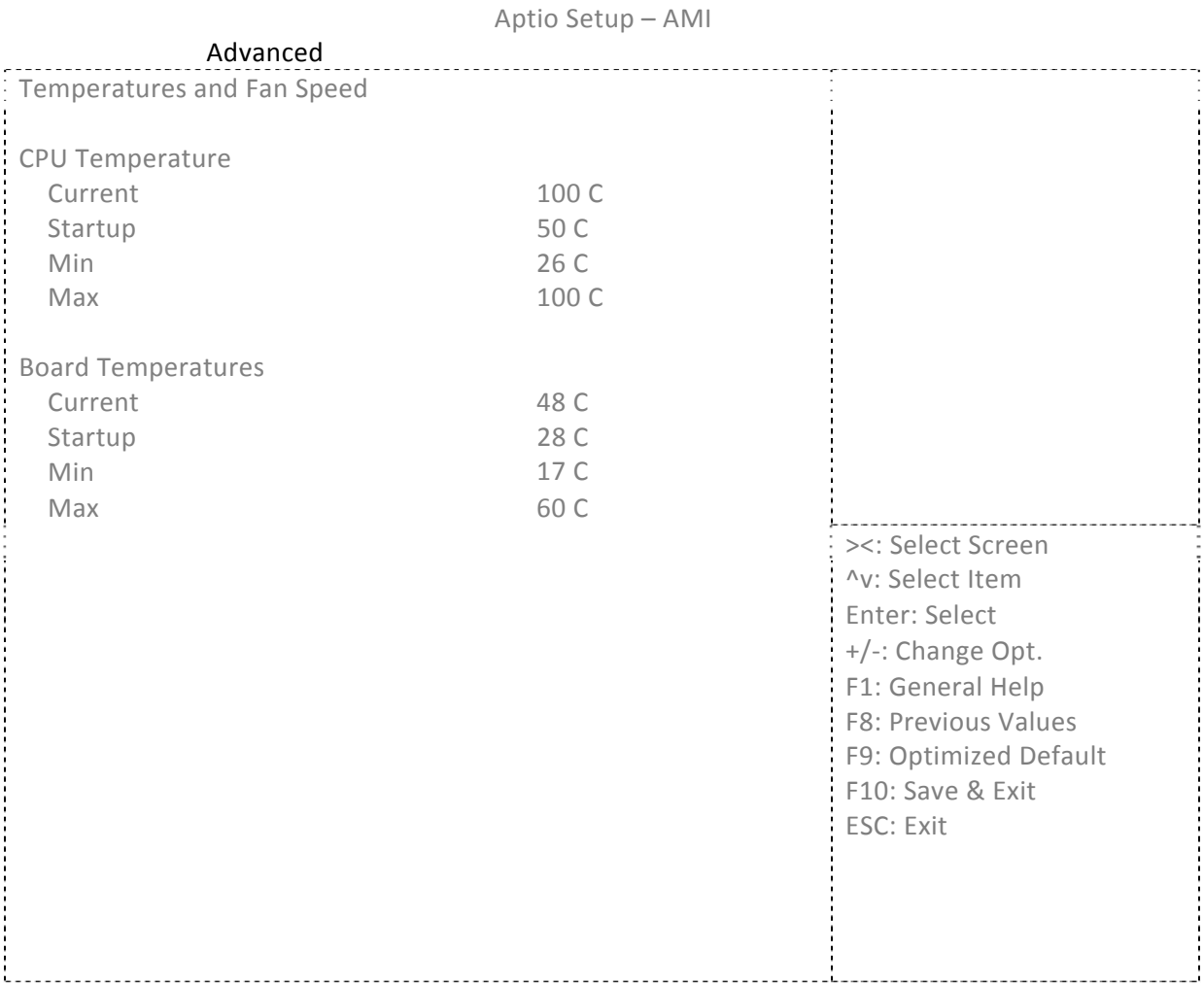
><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit
ESC: Exit

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BIOS Item	Options	Description
Critical Trip Point	**Disabled**, 80 C, 90 C, 95 C, 100 C	This value controls the temperature of the ACPI Critical Trip Point - the point in which the OS will shut the system off.
Active Trip Point 0	Disabled, 15 C, 23 C, 31 C, 39 C, 47 C, 55 C, 63 C, 71 C, 79 C, **87 C**, 95 C, 103 C, 111 C, 119 C (POR)	This value controls the temperature of the ACPI Active Trip Point 0 - the point in which the OS will turn the processor fan on Active Trip Point 0 Fan Speed.
Active Trip Point 1	Disabled, 15 C, 23 C, 31 C, 39 C, 47 C, **55 C**, 63 C, 71 C, 79 C, 87 C, 95 C, 103 C, 111 C, 119 C (POR)	This value controls the temperature of the ACPI Active Trip Point 1 - the point in which the OS will turn the processor fan on Active Trip Point 1 Fan Speed.
Passive Trip Point	Disabled, 15 C, 23 C, 31 C, 39 C, 47 C, 55 C, 63 C, 71 C, 79 C, 87 C, **95 C**, 103 C, 111 C, 119 C (POR)	This value controls the temperature of the ACPI Passive Trip Point - the point in which the OS will begin throttling the processor.
Passive TC1 Value	**1**	This value sets the TC1 value for the ACPI Passive Cooling Formula. Range 1 - 16
Passive TC2 Value	**5**	This value sets the TC2 value for the ACPI Passive Cooling Formula. Range 1 - 16
Passive TSP Value	**10**	This item sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenths of a second how often the OS will read the temperature when passive cooling is enabled. Range 2 - 32
Active Trip Points	Enabled **Disabled**	Disable Active Trip Points
Passive Trip Points	**Enabled** Disabled	Disable Passive Trip Points
Critical Trip Points	Enabled **Disabled**	Disable Critical Trip Points
PCH Temp Read	**Enabled** Disabled	PCH Temperature Read Enable
CPU Energy Read	**Enabled** Disabled	CPU Energy Read Enable
CPU Temp Read	**Enabled** Disabled	CPU Temperature Read Enable
Alert Enable Lock	Enabled **Disabled**	Lock all Alert Enable settings
CPU Temp	**72**	Fail Safe temp that EC will use if OS is hung
Boot DTS Read	Enabled **Disabled**	Read PCH, CPU DTS Temperature and publish via SMBIOS table

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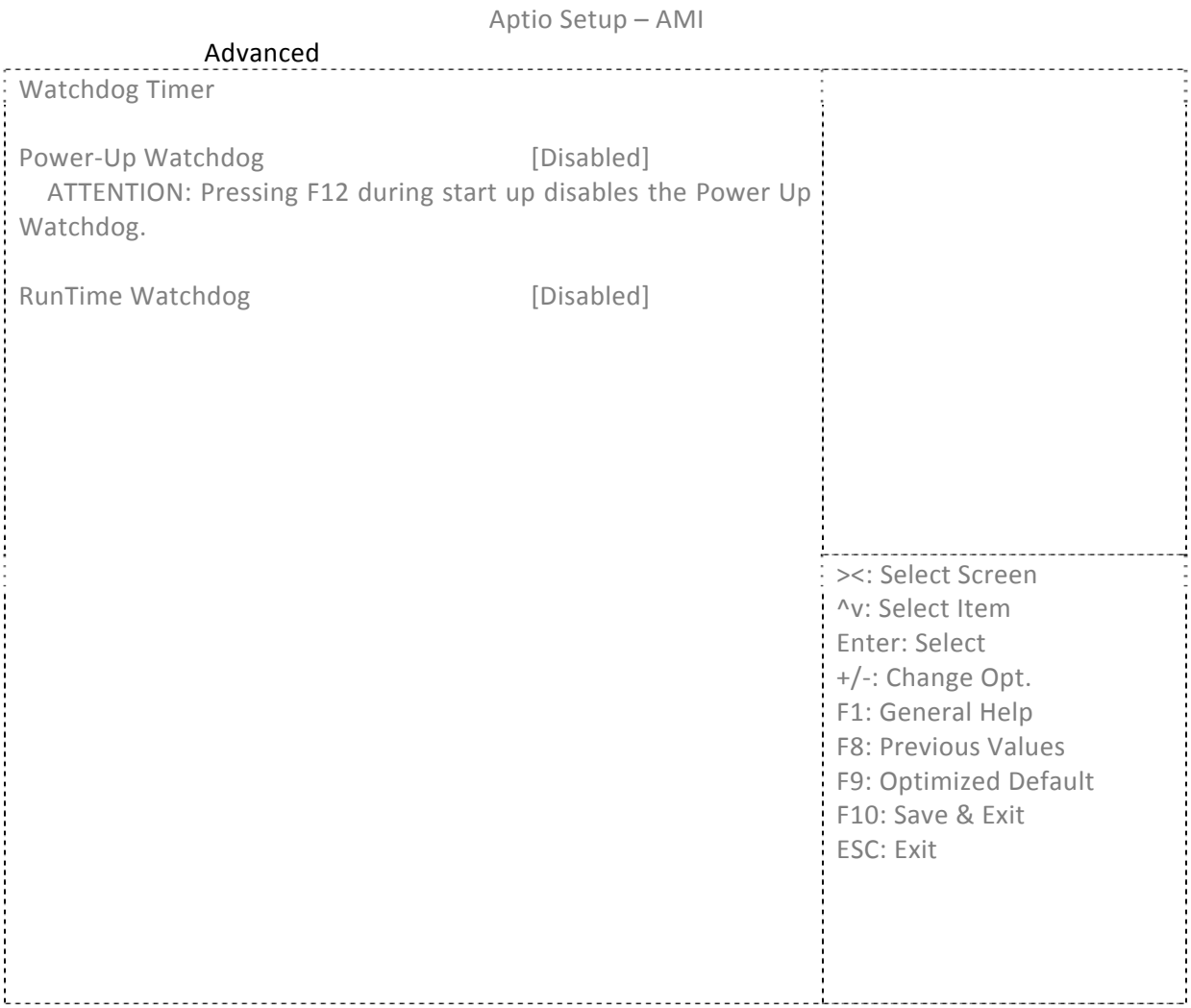
3.6.3 Temperatures



BIOS Item	Options	Description
CPU Temperature Current/Startup/Min/Max	**Info-only**	
Board Temperatures Current/Startup/Min/Max	**Info-only**	.

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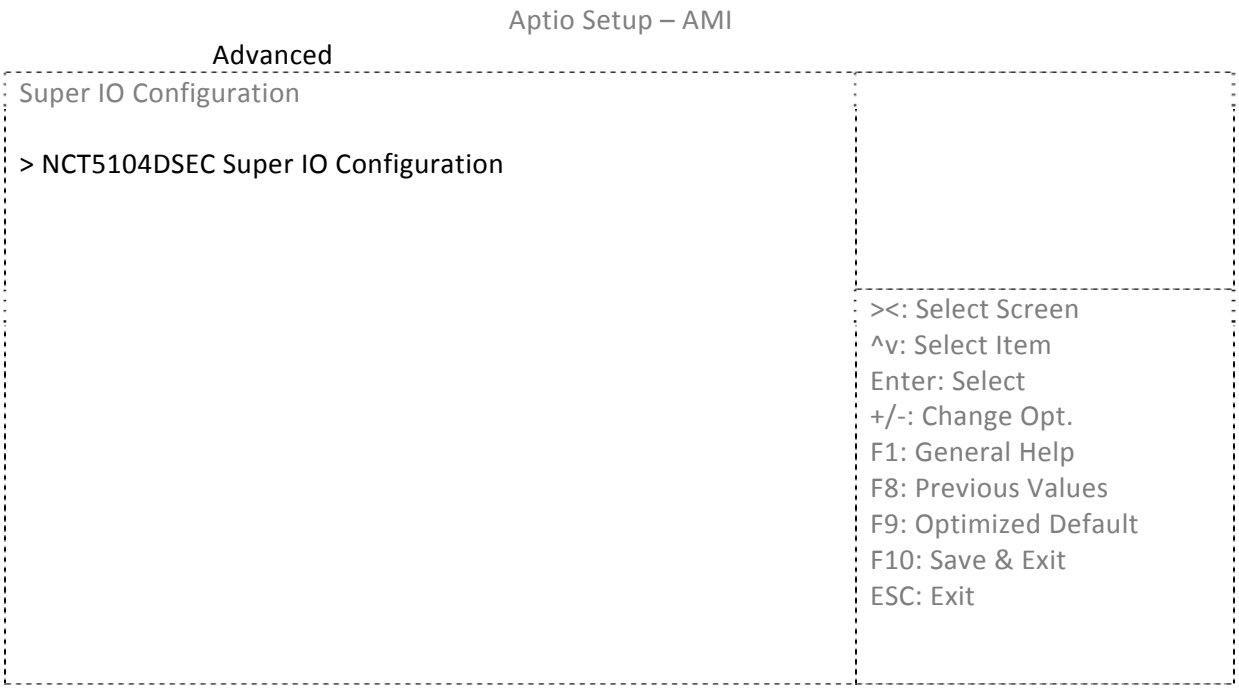
3.7 Watchdog Timer



BIOS Item	Options	Description
Power-Up Watchdog	Enabled **Disabled**	The Power Up Watchdog resets the system after a certain amount of time after power up.
RunTime Watchdog	Enabled **Disabled**	The RunTime Watchdog resets the system after a certain amount of time after power up.

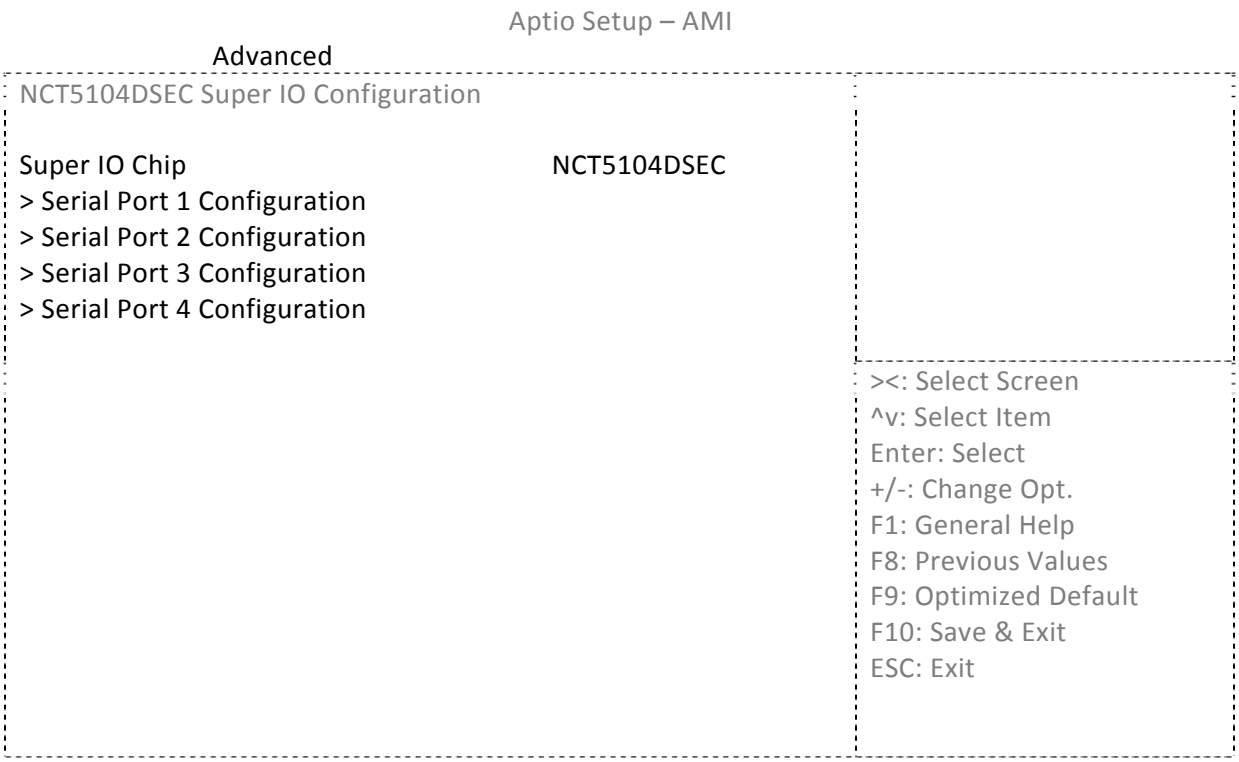
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3.8 Super IO Configuration



BIOS Item	Options	Description
NCT5104DSEC Super IO Configuration	**Submenu**	

3.8.1 NCT5104DSEC Super IO Configuration



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BIOS Item	Options	Description
Super IO Chip	**Info-only**	
Serial Port x Configuration	**Submenu**	

NCT5104DSEC Super IO Configuration → Serial Port x Configuration

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Advanced

Serial Port x Configuration

Serial Port [Enabled]
Device Settings IO=3F8h; IRQ=4;

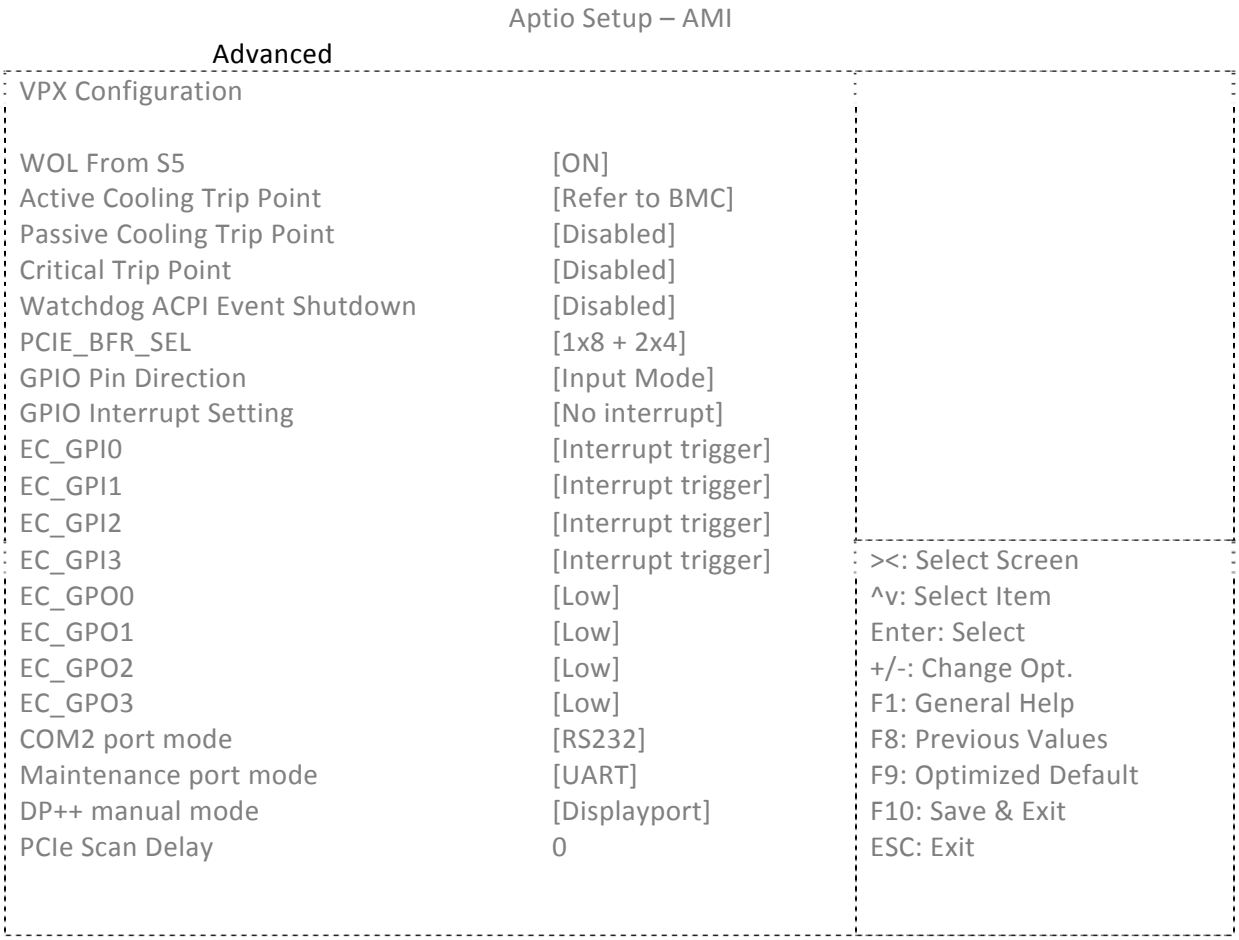
Change Settings [Auto]

><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit
ESC: Exit

BIOS Item	Options	Description
Serial Port	Disabled **Enabled**	Enable or disable serial port (COMx).
Device Setting	**Info-only**	It will show current resource assignment of serial port (COMx).
Change Settings	**Auto** IO=3F8;IRQ=4; IO=3F8;IRQ=3,4,5,7,9,10,11,12 IO=2F8;IRQ=3,4,5,7,9,10,11,12 IO=3E8;IRQ=3,4,5,7,9,10,11,12 IO=2E8;IRQ=3,4,5,7,9,10,11,12	Select an optimal setting for Super IO device.

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3.9 VPX Configuration



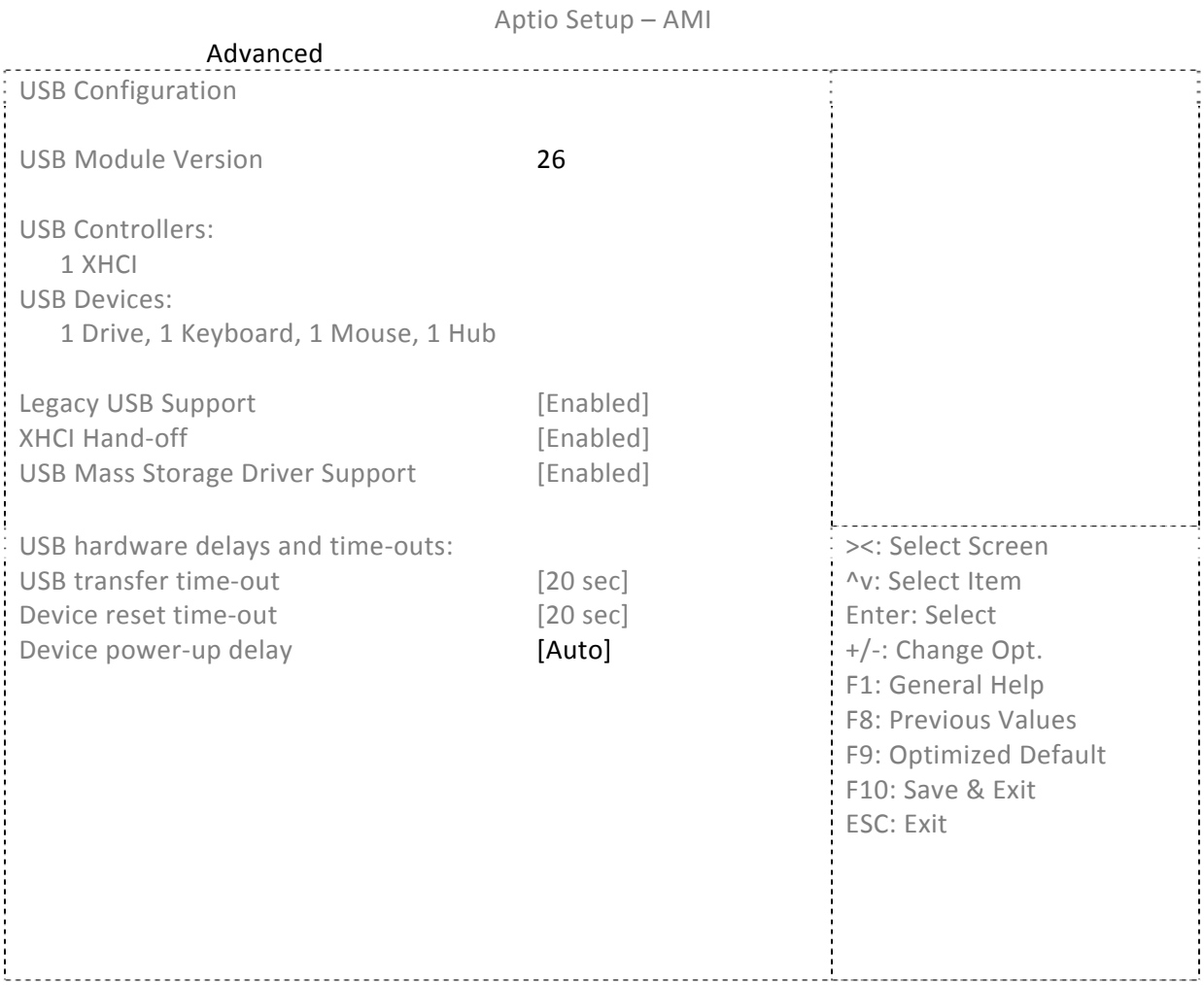
BIOS Item	Options	Description
WOL From S5	OFF **ON**	This Config to control power on/off LAN in S5 State by SEMA(EC).
Active Cooling Trip Point	40 C, 50 C, 60 C, 70 C, **Refer to BMC**	This value is the temperature threshold of the active cooling trip point.
Passive Cooling Trip Point	**Disabled**, 70 C, 80 C, 90 C	This value is the temperature threshold of the passive cooling trip point.
Critical Trip Point	**Disabled**, 80 C, 90 C, 95 C	This value is the temperature threshold of the critical trip point.
Watchdog ACPI Event Shutdown	**Disabled** Enabled	Watchdog ACPI Event Shutdown Enabled/Disabled
PCIE_BFR_SEL	**1x8 + 2x4**, 2x8	Refer to the following information for customized functions
GPIO Pin Direction	**Input Mode** Output Mode	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
GPIO Interrupt Setting	**No interrupt,** Interrupt for both edge trigger, Low level trigger, High level trigger	When GPIO Pin is input mode, it supports edge trigger and level trigger

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BIOS Item	Options	Description
EC_GPI0	**Interrupt trigger** No Interrupt	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPI1	**Interrupt trigger** No Interrupt	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPI2	**Interrupt trigger** No Interrupt	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPI3	**Interrupt trigger** No Interrupt	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPO0	**Low** High	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPO1	**Low** High	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPO2	**Low** High	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
EC_GPO3	**Low** High	Indicates whether the GPIO Pin is interrupted. Write 0x00 to clear the interrupt and EC_GPIO_INT will be changed to high level
COM2 port mode	**RS232**, RS485, RS422	COM2 port mode
Maintenance port mode	RS232**, UART**	Maintenance port mode
DP++ manual mode	HDMI with Passive Dongle, **Displayport**	DP++ manual mode
PCIe Scan Delay	**0**	System delay before PCIe scan. Unit is second and maximum value is 60 seconds

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3.10 USB Configuration

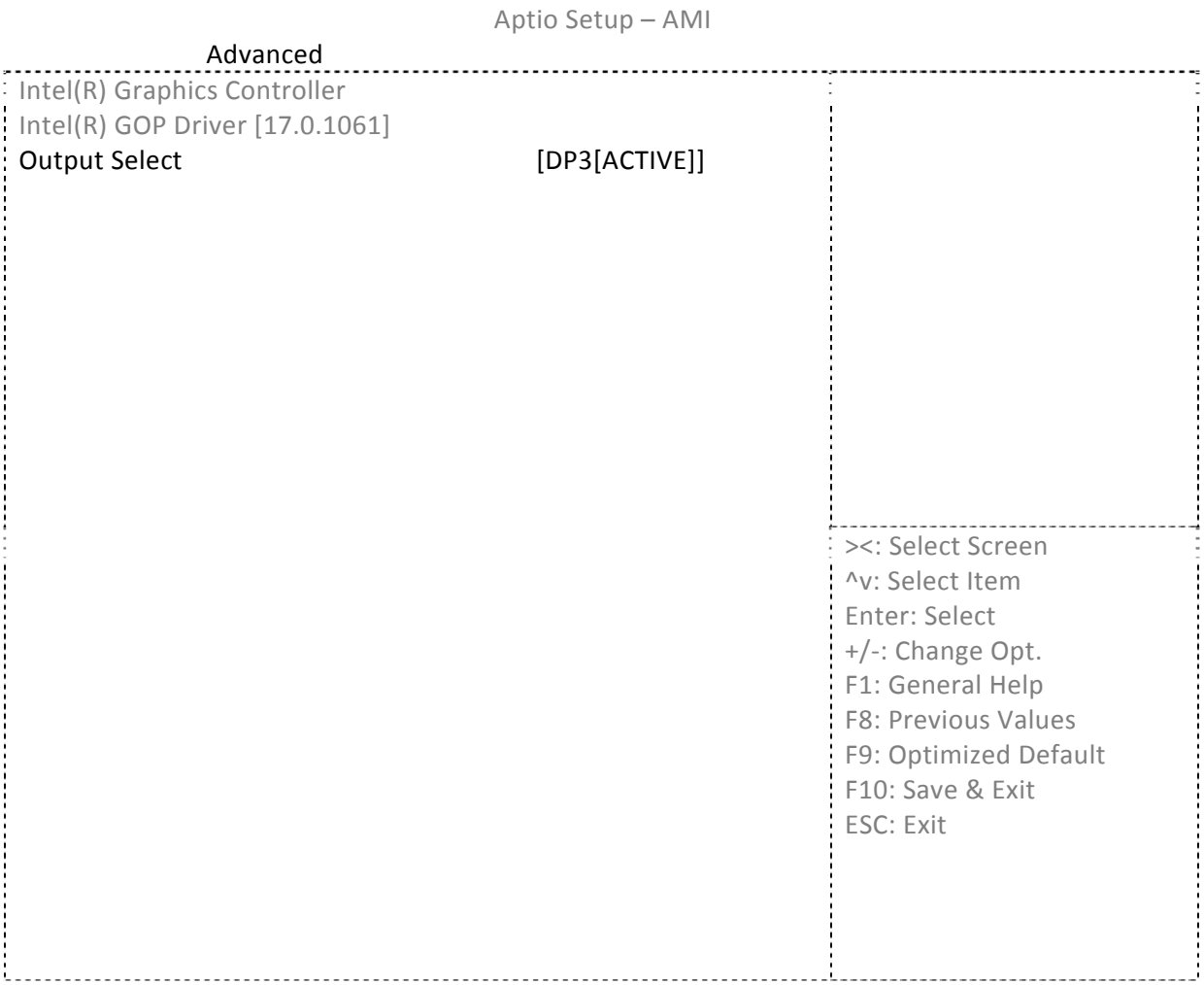


BIOS Item	Options	Description
USB Module Version	**Info-only**	
USB Controllers	**Info-only**	
USB Devices	**Info-only**	
Legacy USB Support	**Enabled** Disabled	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
XHCI Hand-off	**Enabled** Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	**Enabled** Disabled	Enable/Disable USB Mass Storage Driver Support.
USB transfer time-out	1 sec, 5 sec, 10 sec, **20 sec**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec, **20 sec**, 30 sec, 40 sec	USB mass storage device Start Unit command time-out.

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BIOS Item	Options	Description
Device power-up delay	**Auto,** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

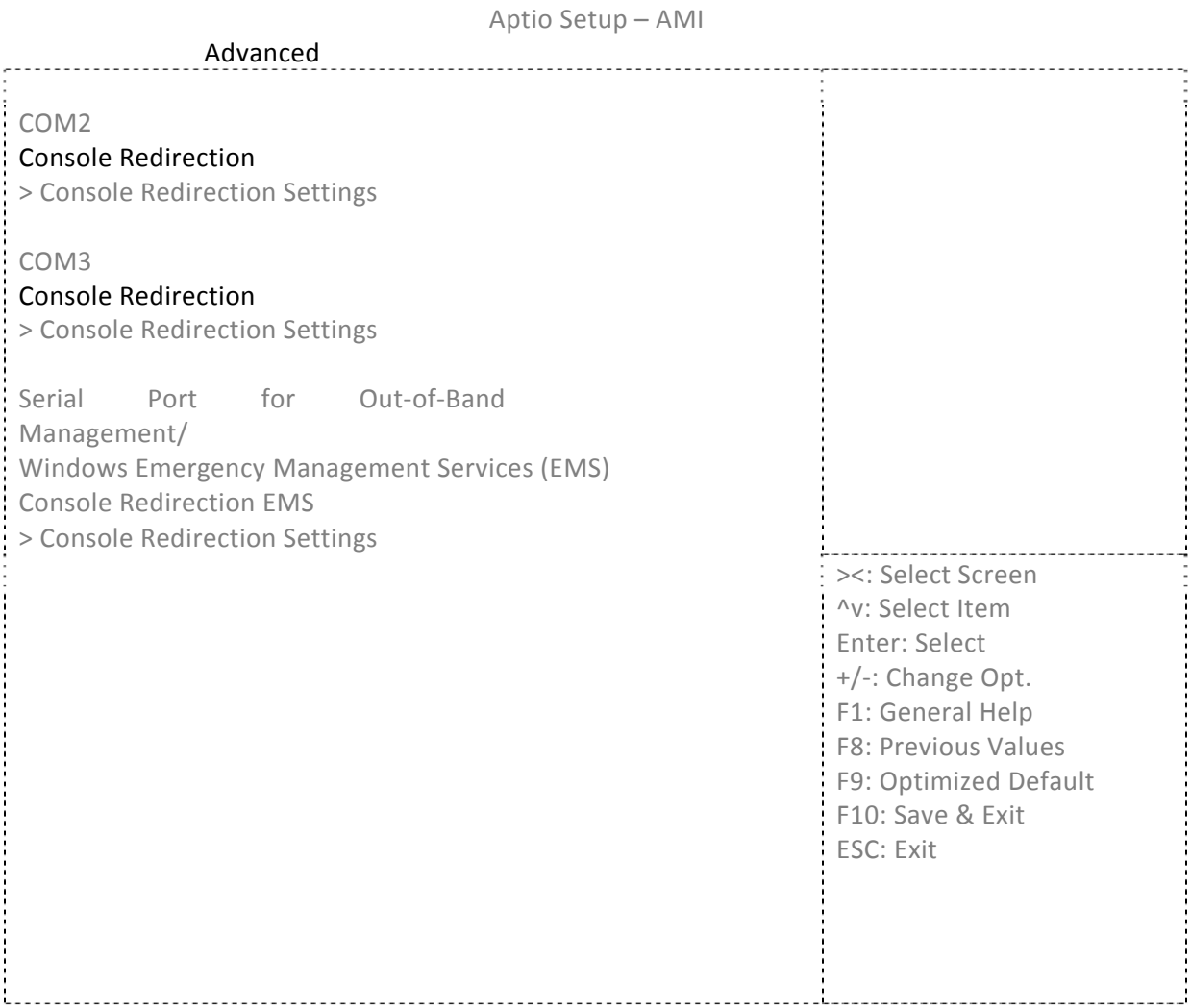
3.11 AMI Graphic Output Protocol Policy



BIOS Item	Options	Description
Intel(R) GOP Driver	**Info-only**	
Output Select	DP3[ACTIVE]	Output Interface

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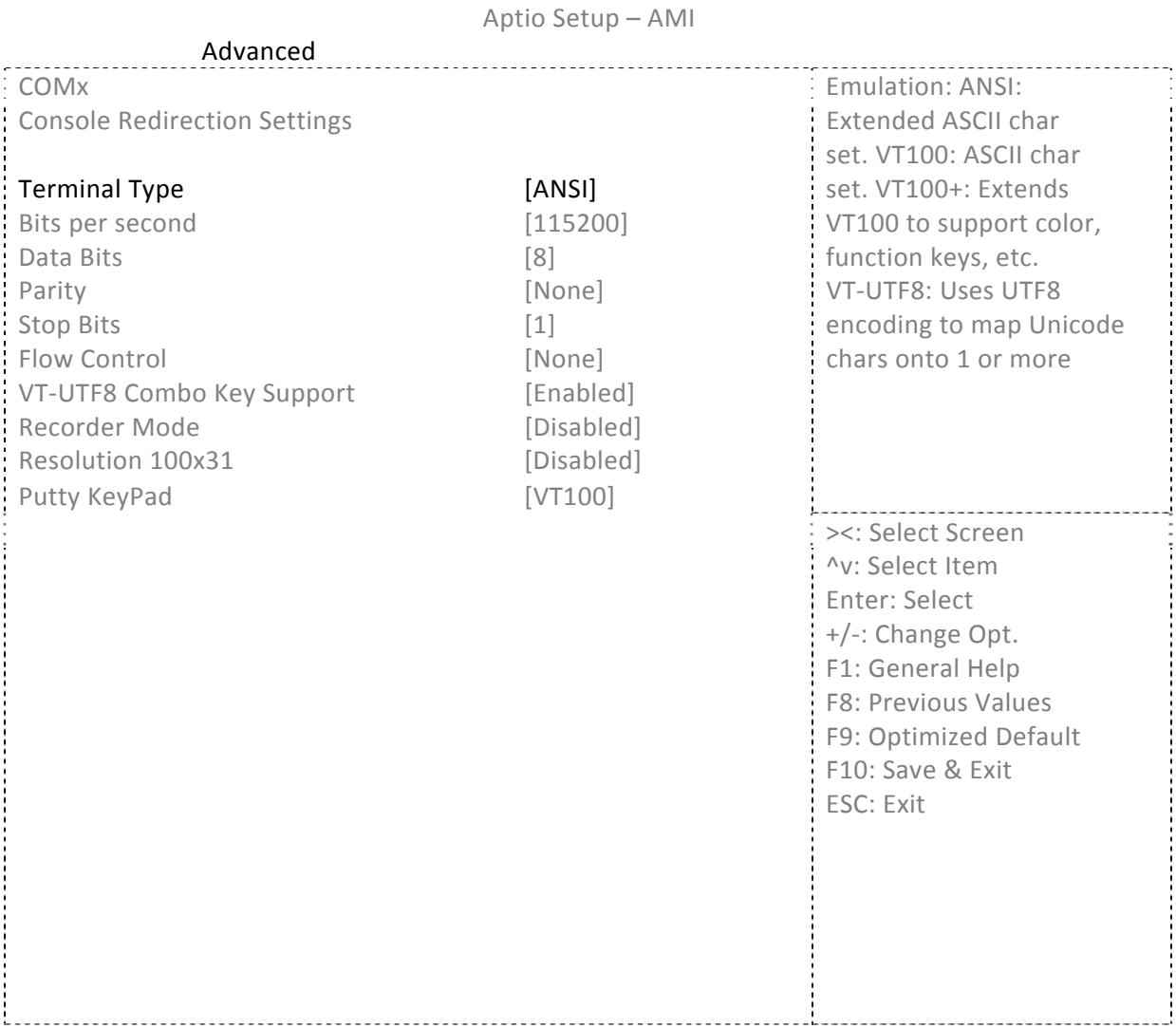
3.12 Serial Port Console Redirection



BIOS Item	Options	Description
Console Redirection	**Disabled** Enabled	To enable or disable console redirection of COMx.
Console Redirection Settings	**Submenu**	The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

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3.12.1 Console Redirection Settings



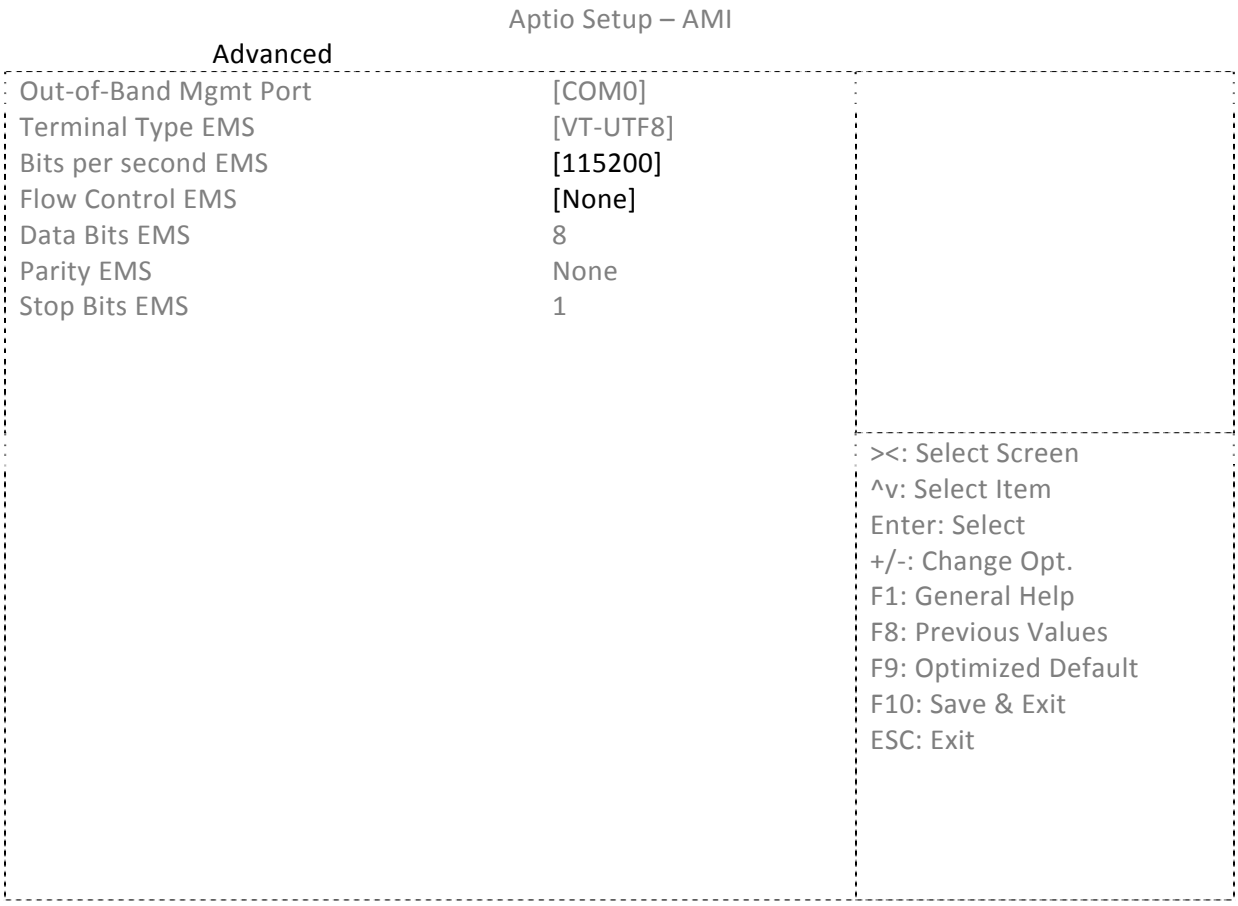
BIOS Item	Options	Description
Terminal Type	VT100, VT100Plus, VT-UTF8, **ANSI**	Configure the type of console emulation. Emulation: **ANSI:** Extended ASCII char set. **VT100:** ASCII char set. **VT100+:** Extends VT100 to support color, function keys, etc. **VT-UTF8:** Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 **115200**	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speed.
Data Bits	7 **8**	Configure the number of data bits in each transmitted or received serial character for both serial ports.

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Parity	**None**, Even, Odd, Mark, Space	Configures if parity bit is generated (transmit data) or checked. A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	**1** 2	Configures the number of stop bits transmitted and received in each serial character for both serial ports. Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	**None**, Hardware RTS/CTS	Configures flow control for console redirection. Hardware flow control uses RTC/CTS. Software flow control uses XON/XOFF.
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable VT-UTF8 combination key support for ANSI/VT100 terminals.
Recorder Mode	**Disabled** Enabled	With this mode enabled only text will be sent. This is to capture terminal data.
Resolution 100x31	**Disabled** Enabled	Enables or disables extended terminal resolution.
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select Function Keys and Key Pad on Putty.

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3.12.2 Console Redirection Settings (EMS)

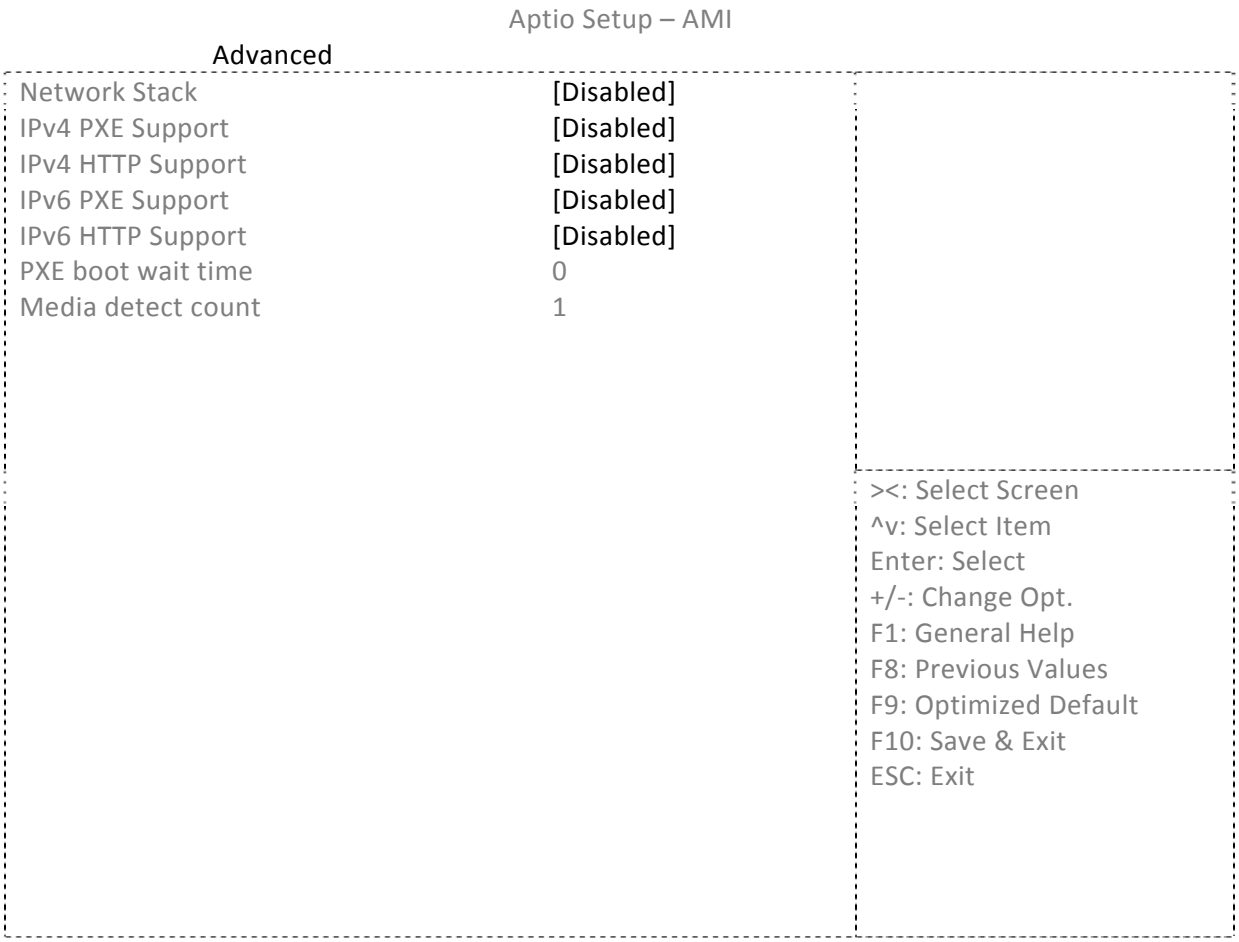


BIOS Item	Options	Description
Out-of-Band Mgmt Port	**COM0** COM1 COM2 COM3	Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.
Terminal Type EMS	VT100 VT100Plus **VT-UTF8** ANSI	VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.
Bits per second EMS	9600 19200 57600 **115200**	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Flow Control EMS	**None** Hardware RTS/CTS Software Xon/Xoff	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop

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BIOS Item	Options	Description
Data Bits EMS	**Info-only**	
Parity EMS	**Info-only**	
Stop Bits EMS	**Info-only**	

3.13 Network Stack Configuration

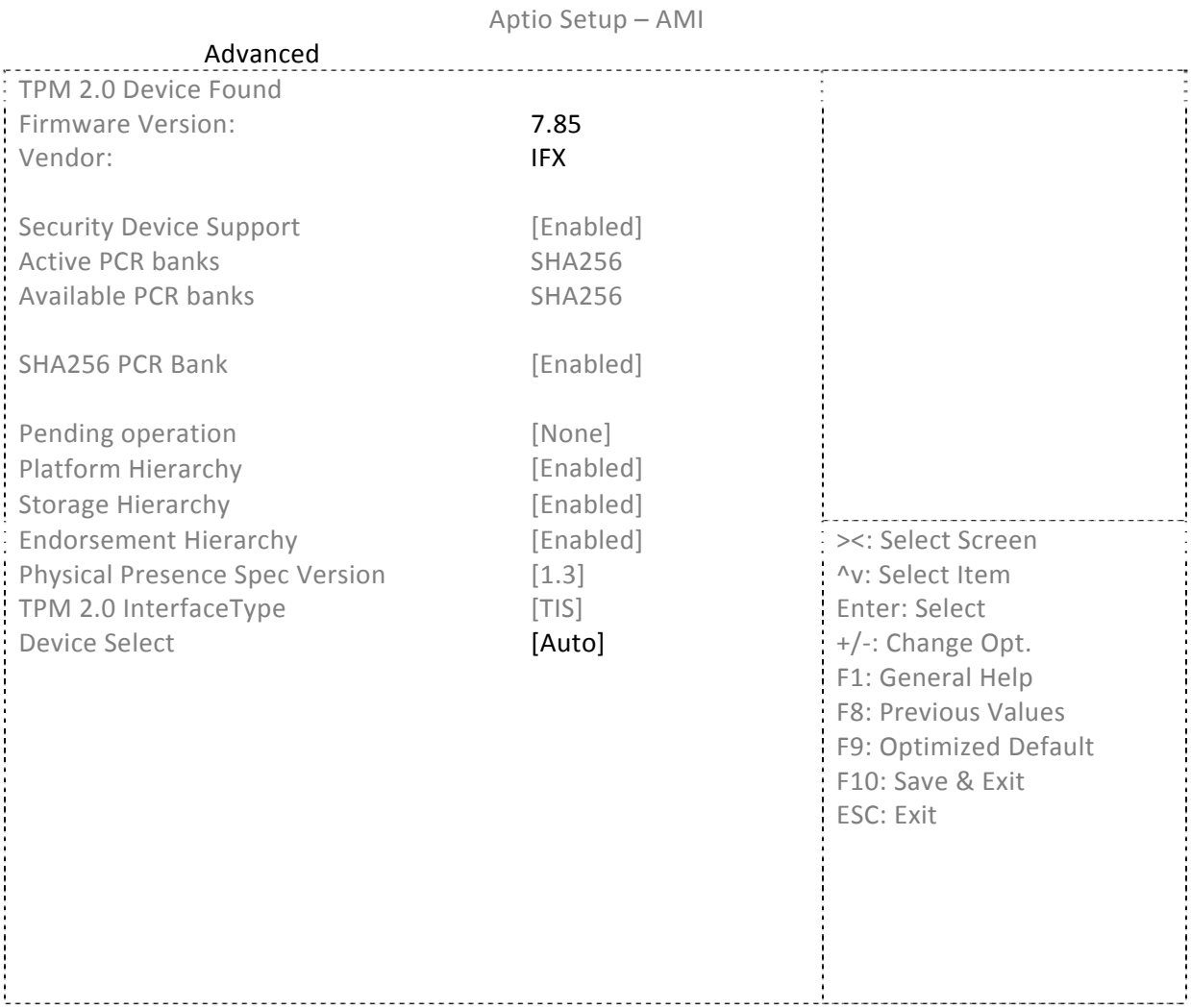


BIOS Item	Options	Description
Network Stack	**Disabled** Enabled	Enable/Disable UEFI Network Stack
IPv4 PXE Support	**Disabled** Enabled	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	**Disabled** Enabled	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	**Disabled** Enabled	Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	**Disabled** Enabled	Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.

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BIOS Item	Options	Description
PXE boot wait time	0	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	1	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

3.14 Trusted Computing



BIOS Item	Options	Description
Firmware Version	**Info-only**	
Vendor	**Info-only**	
Security Device Support	Disable **Enable**	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Active PCR banks	**Info-only**	
Available PCR banks	**Info-only**	

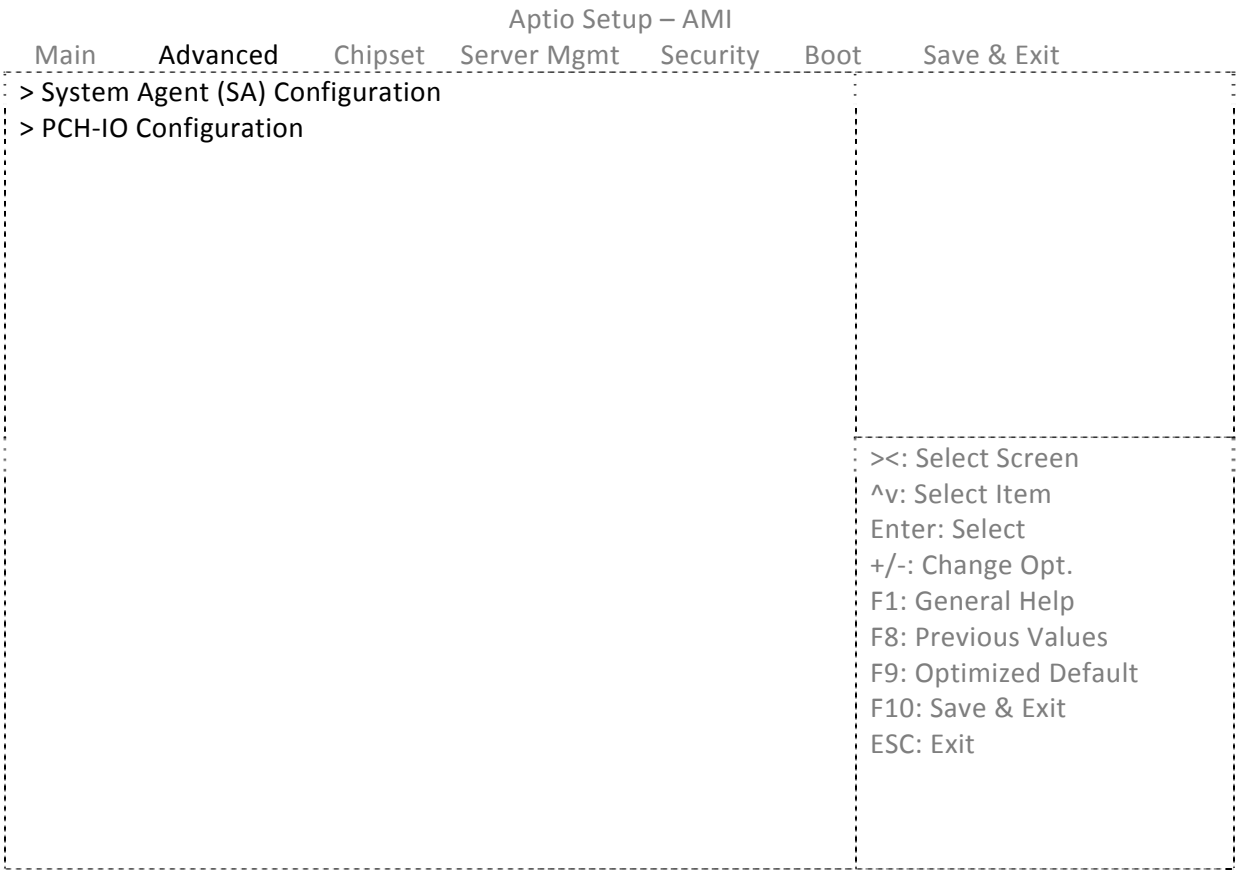
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BIOS Item	Options	Description
SHA256 PCR Bank	Disable **Enable**	Enable or Disable SHA256 PCR Bank
Pending operation	**None** TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Disable **Enable**	Enable or Disable Platform Hierarchy
Storage Hierarchy	Disable **Enable**	Enable or Disable Storage Hierarchy
Endorsement Hierarchy	Disable **Enable**	Enable or Disable Endorsement Hierarchy
Physical Presence Spec Version	1.2 **1.3**	Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
TPM 2.0 InterfaceType	CRB **TIS**	Select the Communication Interface to TPM 20 Device.
Device Select	TPM 1.2 TPM 2.0 **Auto**	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated

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4 Chipset Menu

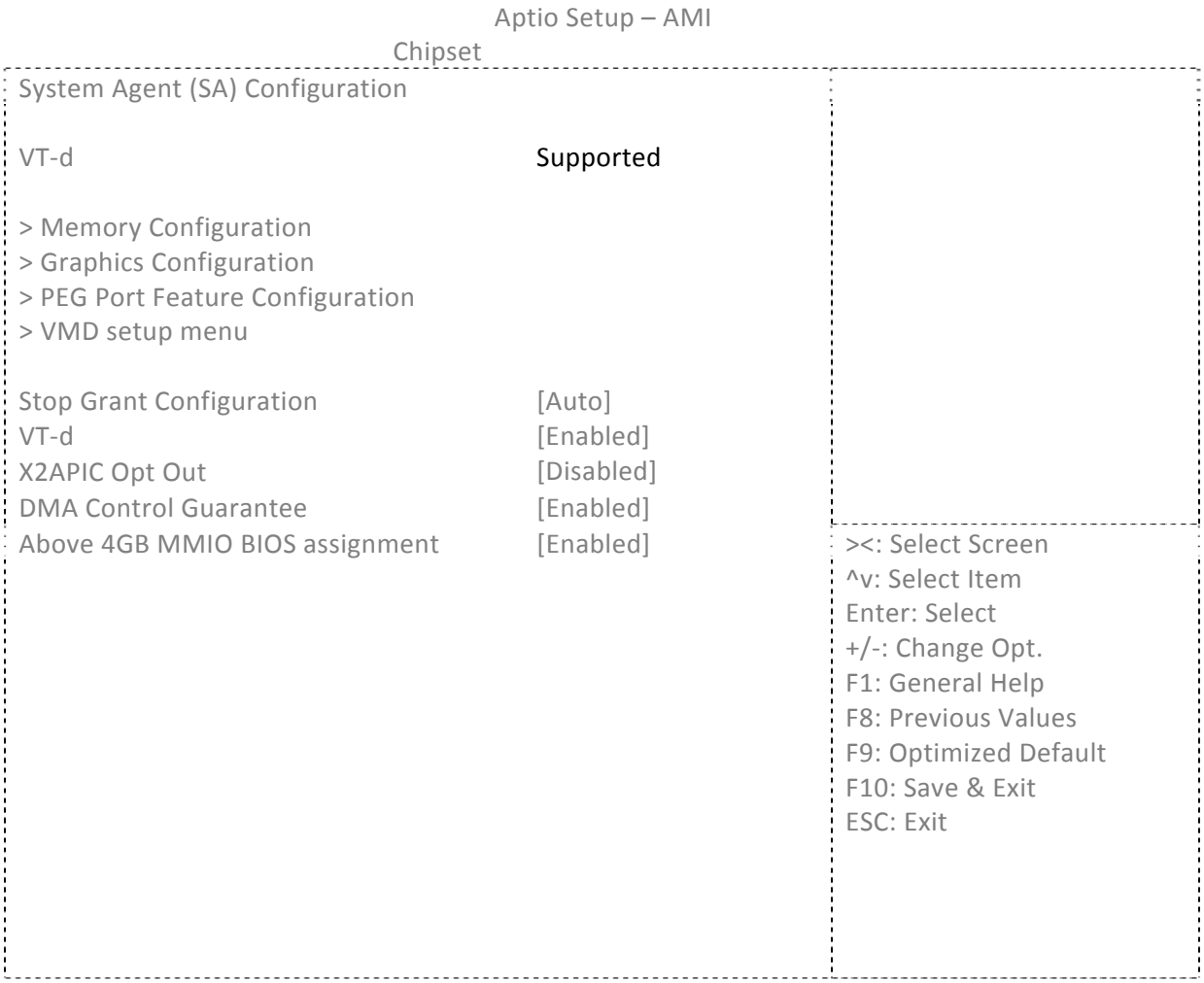
This menu contains the settings for most of the chipset I/O in the system.



BIOS Item	Options	Description
System Agent (SA) Configuration	**Submenu**	System Agent (SA) Parameters
PCH-IO Configuration	**Submenu**	PCH Parameters

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4.1 System Agent (SA) Configuration



BIOS Item	Options	Description
VT-d	**Info-only**	
> Memory Configuration	**Submenu**	
> Graphics Configuration	**Submenu**	
> PEG Port Feature Configuration	**Submenu**	
> VMD setup menu	**Submenu**	
Stop Grant Configuration	**Auto** Manual	Automatic/Manual stop grant configuration
VT-d	Disabled **Enabled**	VT-d capability
X2APIC Opt Out	**Disabled** Enabled	Enable/Disable X2APIC_OPT_OUT bit
DMA Control Guarantee	Disabled **Enabled**	Enable/Disable DMA_CONTROL_GUARANTEE bit
Above 4GB MMIO BIOS assignment	Disabled **Enabled**	Enable/Disable above 4GB MemoryMappedIO BIOS assignment

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4.1.1 Memory Configuration

Aptio Setup – AMI

Chipset

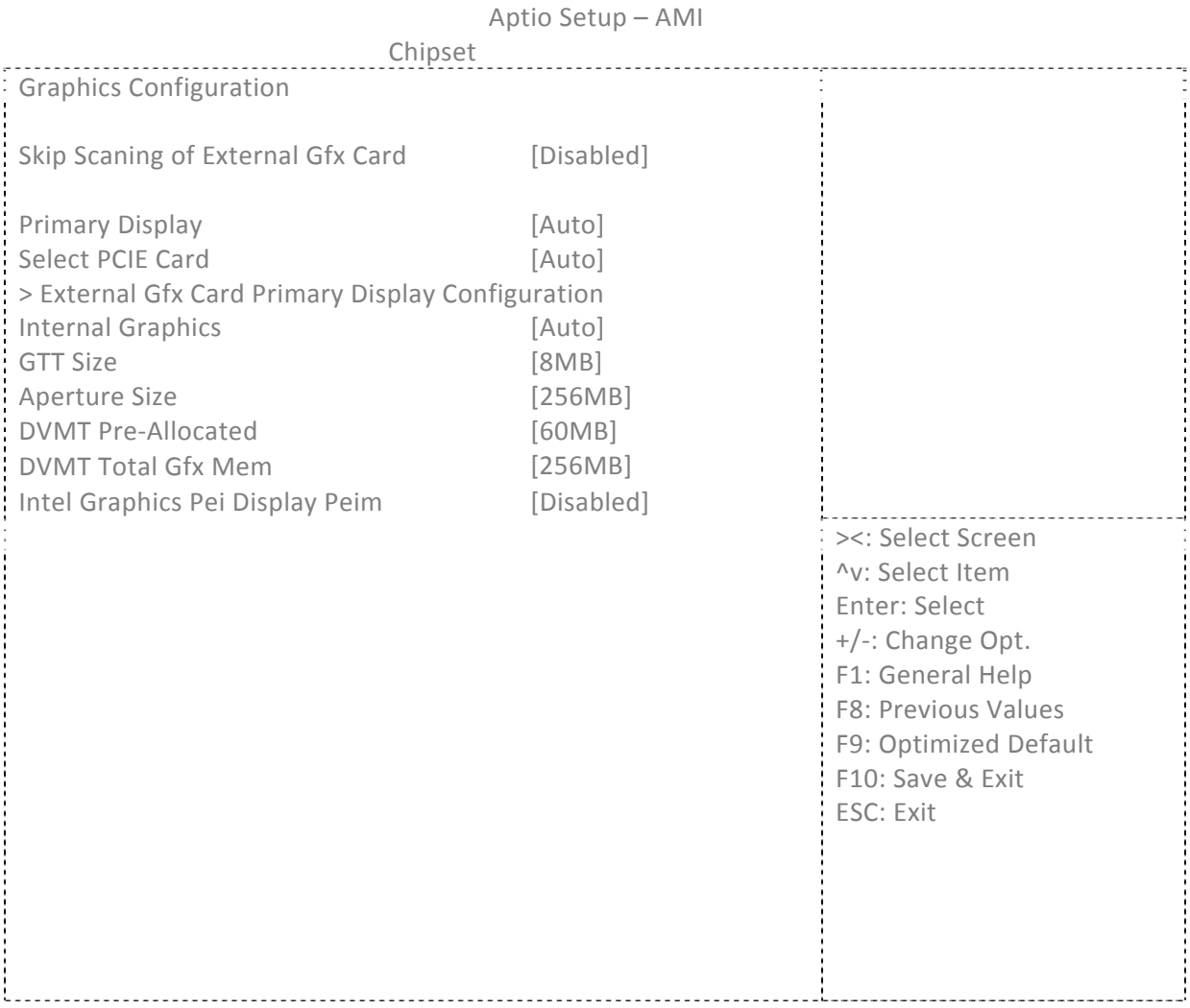
Memory Configuration		
Memory RC Version	2.0.2.8	
Memory Speed	3200 MT/s	
Memory Timings (tCL-tRCD-tRP-tRAS)	22-22-22-52	
Controller 0 Channel 0 Slot 0	Populated & Enabled	
Size	16384 MB (DDR4)	
Number of Ranks	1	
Manufacturer	Micron	
Controller 0 Channel 0 Slot 1	Not Populated / Disabled	
Controller 0 Channel 1 Slot 0	Populated & Enabled	
Size	16384 MB (DDR4)	
Number of Ranks	1	
Manufacturer	Micron	>: Select Screen
Controller 0 Channel 1 Slot 1	Not Populated / Disabled	^v: Select Item
		Enter: Select
Memory Test on Warm Boot	[Enabled]	+/-: Change Opt.
Maximum Memory Frequency	[Auto]	F1: General Help
ECC Support	[Enabled]	F8: Previous Values
Max TOLUD	[Dynamic]	F9: Optimized Default
Controller 0, Channel 0 DIMM Control	[Disable DIMM1]	F10: Save & Exit
Controller 1, Channel 0 DIMM Control	[Disable DIMM1]	ESC: Exit
In-Band ECC Support	[Disabled]	

BIOS Item	Options	Description
Memory RC Version	**Info-only**	
Memory Speed	**Info-only**	
Memory Timings (tCL-tRCD-tRP-tRAS)	**Info-only**	
Controller X Channel X Slot X	**Info-only**	
Size	**Info-only**	
Number of Ranks	**Info-only**	
Manufacturer	**Info-only**	
Memory Test on Warm Boot	Disabled **Enabled**	Enable Or Disable Base Memory Test Run on Warm Boot
Maximum Memory Frequency	**Auto**	Maximum Memory Frequency Selections in Mhz.
ECC Support	Disabled **Enabled**	Enable/disable DDR Ecc Support
Max TOLUD	**Dynamic**, 1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB, 3.5 GB	Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller

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BIOS Item	Options	Description
Controller 0, Channel 0 DIMM Control	Enable both DIMMs, Disable DIMM0, **Disable DIMM1,** Disable both DIMMs	Controller 0, Channel 0 DIMM Control Support - Enable or Disable Dimms on Controller 0, Channel 0.
Controller 1, Channel 0 DIMM Control	Enable both DIMMs, Disable DIMM0, **Disable DIMM1,** Disable both DIMMs	Controller 1, Channel 0 DIMM Control Support - Enable or Disable Dimms on Controller 1, Channel 0.
In-Band ECC Support	**Disabled**, Enabled	Enable/Disable In-Band ECC. Either the IBECC or the TME can be enabled.

4.1.2 Graphics Configuration

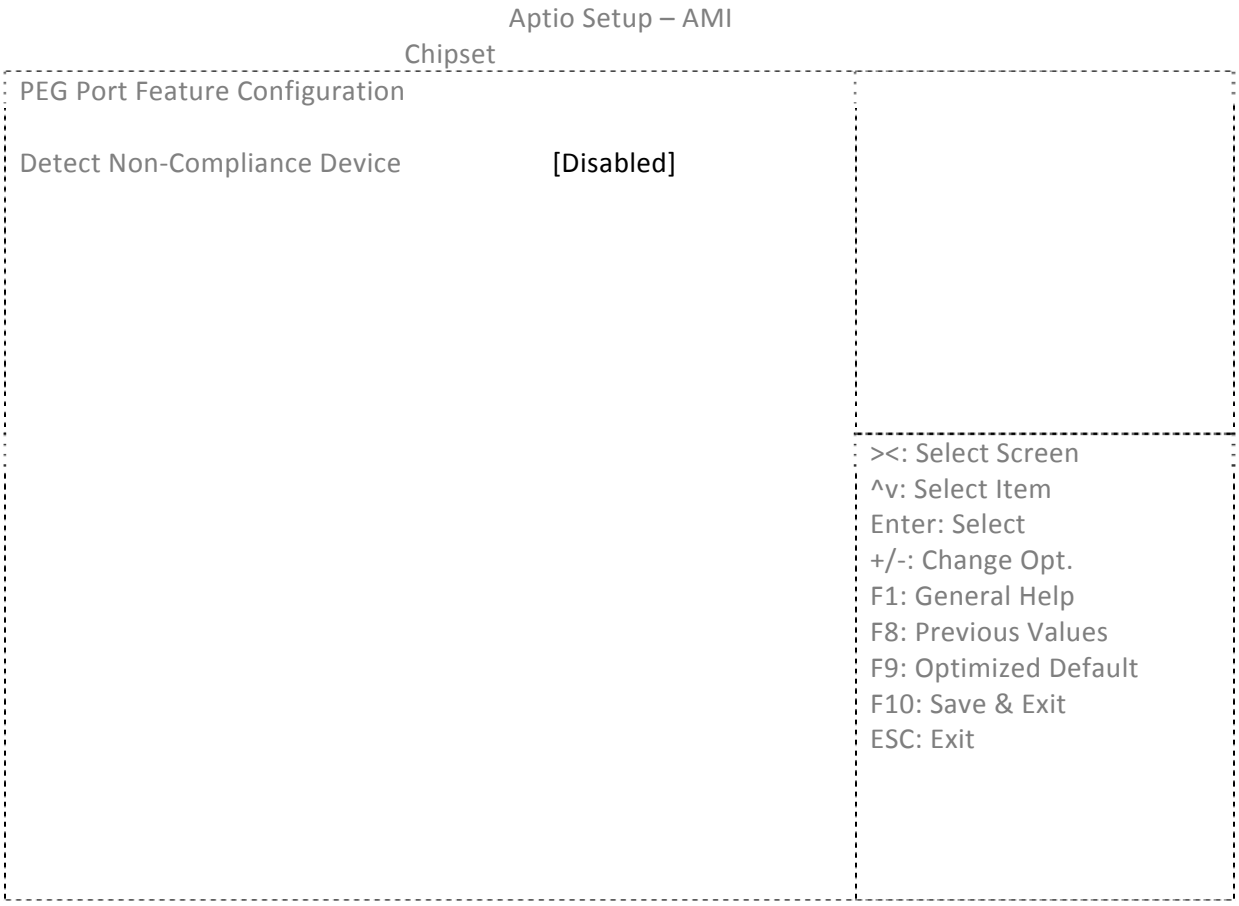


BIOS Item	Options	Description
Skip Scaning of External Gfx Card	**Disabled** Enabled	If Enable, it will not scan for External Gfx Card on PEG and PCH PCIE Ports
Primary Display	**Auto**, IGFX, PEG Slot, PCH PCI, HG	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx.

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Select PCIE Card	**Auto**, Elk Creek 4, PEG Eval	Select the card used on the platform
> External Gfx Card Primary Display Configuration	**Submenu**	N/A
Internal Graphics	**Auto**, Disabled, Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2MB, 4MB, **8MB**	Select the GTT Size
Aperture Size	128MB,**256MB**, 512MB, 1024MB	Select the Aperture Size
DVMT Pre-Allocated	0M, 32M, 64M, 96M, 128M, 160M, 4M, 8M, 12M, 16M, 20M, 24M, 28M, 32M/F7, 36M, 40M, 44M, 48M, 52M, 56M, **60M**	Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	128M, **256M**, MAX	Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.
Intel Graphics Pei Display Peim	**Disabled** Enabled	Enable/Disable Pei (Early) Display

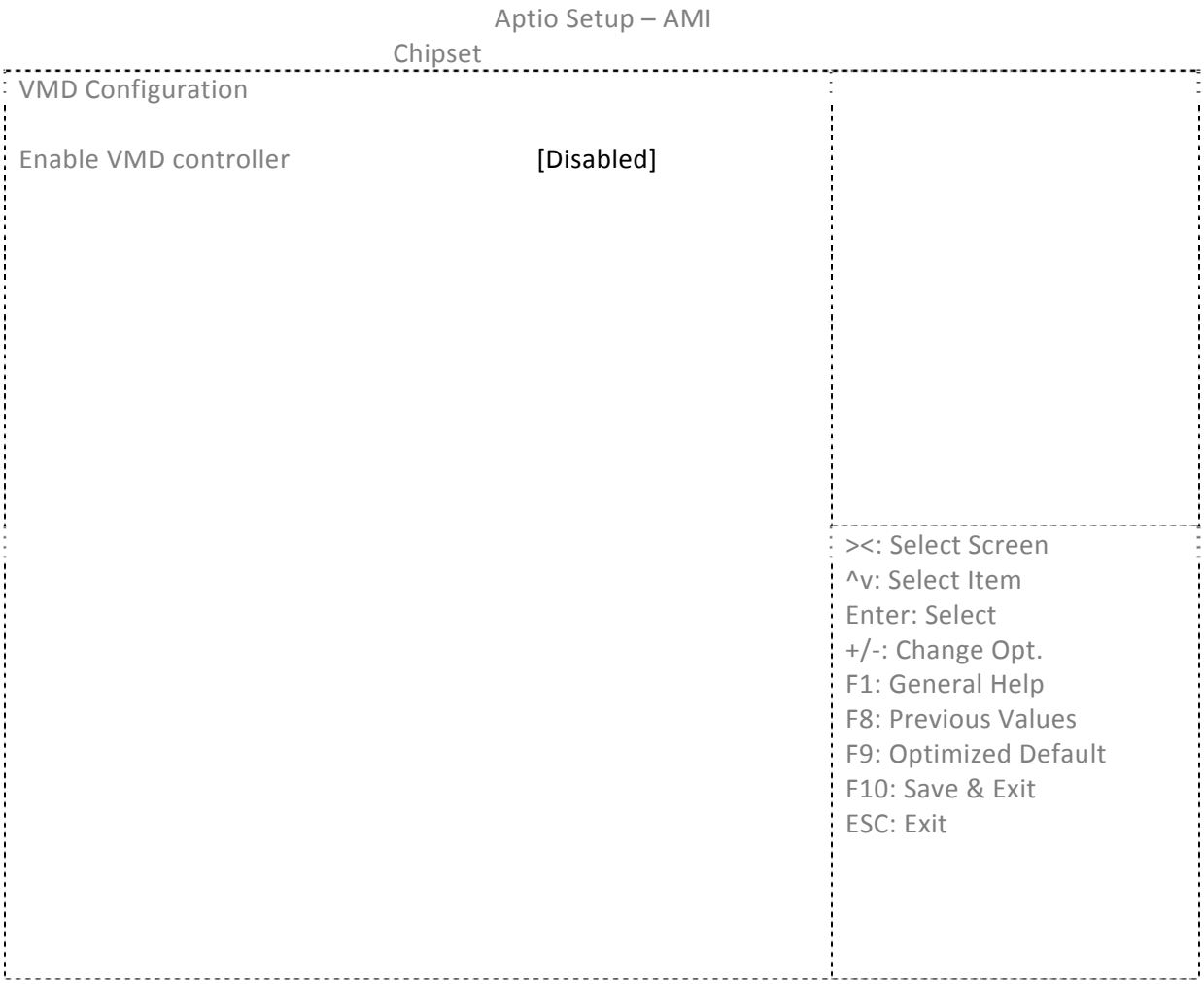
4.1.3 PEG Port Feature Configuration



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BIOS Item	Options	Description
Detect Non-Compliance Device	**Disabled** Enabled	Detect Non-Compliance PCI Express Device in PEG

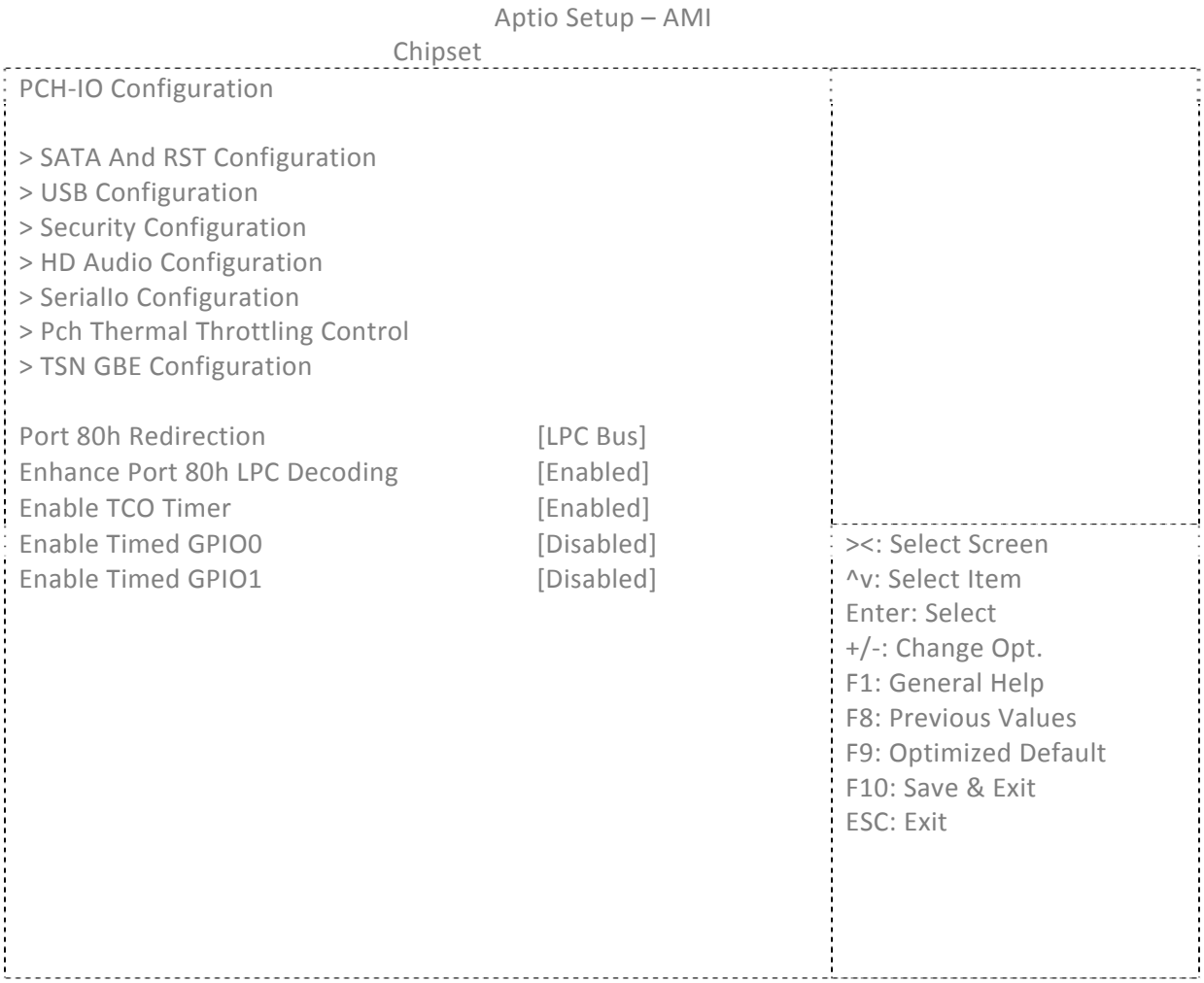
4.1.4 VMD setup menu



BIOS Item	Options	Description
Enable VMD controller	**Disabled** Enabled	

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4.2 PCH-IO Configuration



BIOS Item	Options	Description
> SATA And RST Configuration	**Submenu**	
> USB Configuration	**Submenu**	
> Security Configuration	**Submenu**	
> HD Audio Configuration	**Submenu**	
> Seriallo Configuration	**Submenu**	
> Pch Thermal Throttling Control	**Submenu**	
> TSN GBE Configuration	**Submenu**	
Port 80h Redirection	**LPC Bus** PCIE Bus	Control where the Port 80h cycles are sent.
Enhance Port 80h LPC Decoding	Disabled **Enabled**	Support the word/dword decoding of port 80h behind LPC
Enable TCO Timer	Disabled **Enabled**	Enable/Disable TCO timer. When disabled, it disables PCH ACPI timer, stops TCO timer, and ACPI WDAT table will not be published.

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Enable Timed GPIO0	**Disabled** Enabled	Enable/Disable Timed GPIO0. When disabled, it disables cross time stamp time-synchronization as extension of Hammock Harbor time synchronization.
Enable Timed GPIO1	**Disabled** Enabled	Enable/Disable Timed GPIO1. When disabled, it disables cross time stamp time-synchronization as extension of Hammock Harbor time synchronization.

4.2.1 SATA And RST Configuration

Aptio Setup – AMI

Chipset

SATA And RST Configuration

SATA Controller(s)	[Enabled]
SATA Mode Selection	[AHCI]
SATA Test Mode	[Disabled]
> Software Feature Mask Configuration	
Aggressive LPM Support	[Enabled]
SATA Controller Speed	[Gen3]
Serial ATA Port 0	TS256GSSD420I (256.0GB)
Software Preserve	SUPPORTED
Port 0	[Enabled]
Hot Plug	[Disabled]
Configured as eSATA	Hot Plug supported
External	[Disabled]
Spin Up Device	[Disabled]
SATA Device Type	[Hard Disk Drive]
Topology	[Unknow]
SATA Port 0 DevSlp	[Enabled]
DITO Configuration	[Disabled]
DITO Value	625
DM Value	15

><: Select Screen
^v: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F8: Previous Values
F9: Optimized Default
F10: Save & Exit
ESC: Exit

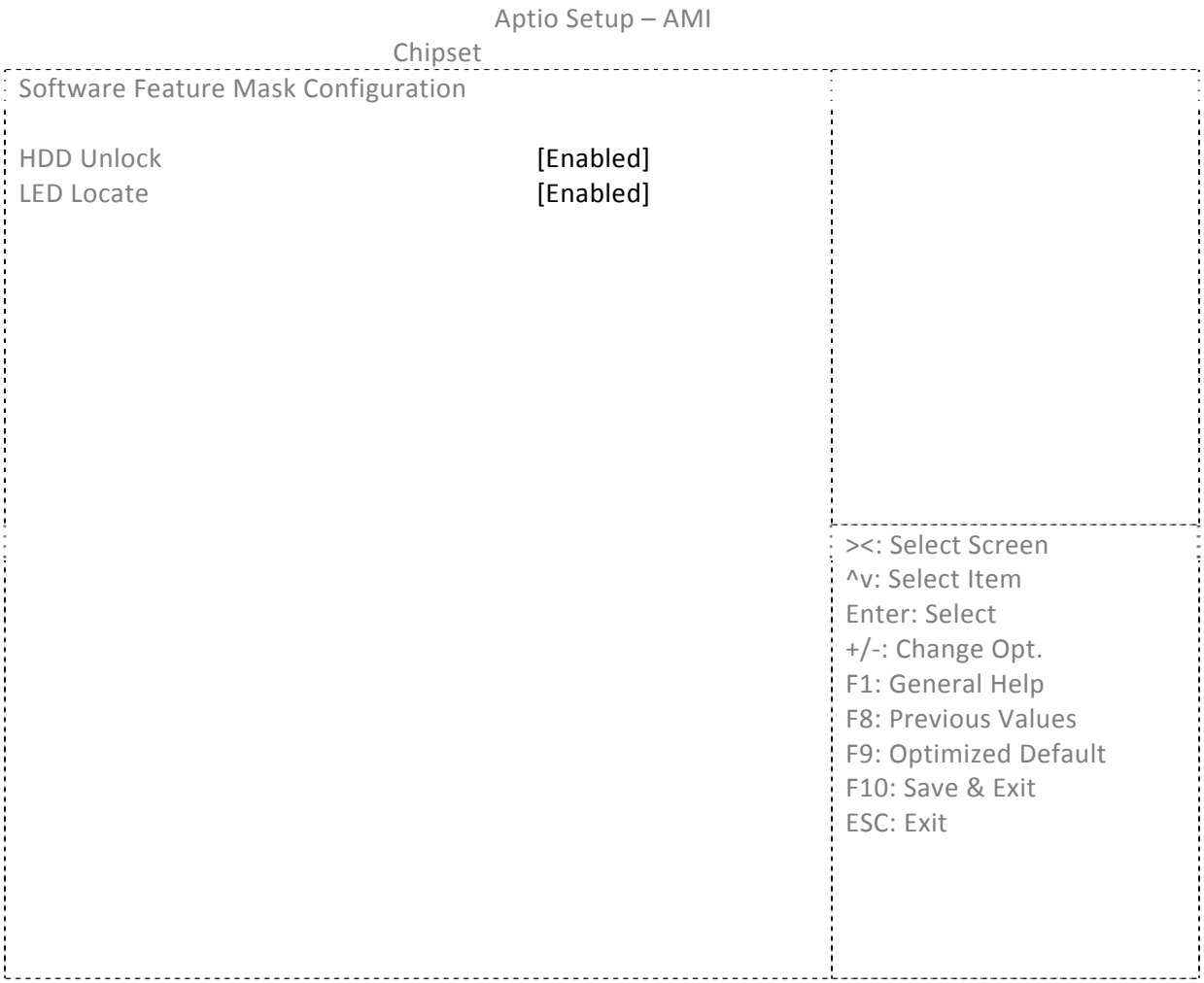
BIOS Item	Options	Description
SATA Controller(s)	Disabled **Enabled**	Enable/Disable SATA Device.
SATA Mode Selection	**AHCI** Intel RST Premium With Intel Optane System Acceleration	Determines how SATA controller(s) operate.
SATA Test Mode	Disabled **Enabled**	Test Mode Enable/Disable (Loop Back).

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> Software Feature Mask Configuration	**Submenu**	
Aggressive LPM Support	Disabled **Enabled**	Enable PCH to aggressively enter link power state.
SATA Controller Speed	Default, Gen1, Gen2, **Gen3**	Indicates the maximum speed the SATA controller can support.
Serial ATA Port 0	**Info-only**	
Software Preserve	**Info-only**	
Port 0	Disabled **Enabled**	Enable or Disable SATA Port
Hot Plug	**Disabled** Enabled	Designates this port as Hot Pluggable.
Configured as eSATA	**Info-only**	
External	**Disabled** Enabled	Marks this port as external.
Spin Up Device	**Disabled** Enabled	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	**Hard Disk Drive** Solid State Drive	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive
Topology	**Unknown** ISATA Direct Connect Flex M2	Identify the SATA Topology if it is Default or ISATA or Flex or DirectConnect or M2
SATA Port 0 DevSlp	Disabled **Enabled**	Enable/Disable SATA Port 0 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it.
DITO Configuration	**Disabled** Enabled	Enable/Disable DITO Configuration
DITO Value	**625**	DITO Value
DM Value	**15**	DM Value

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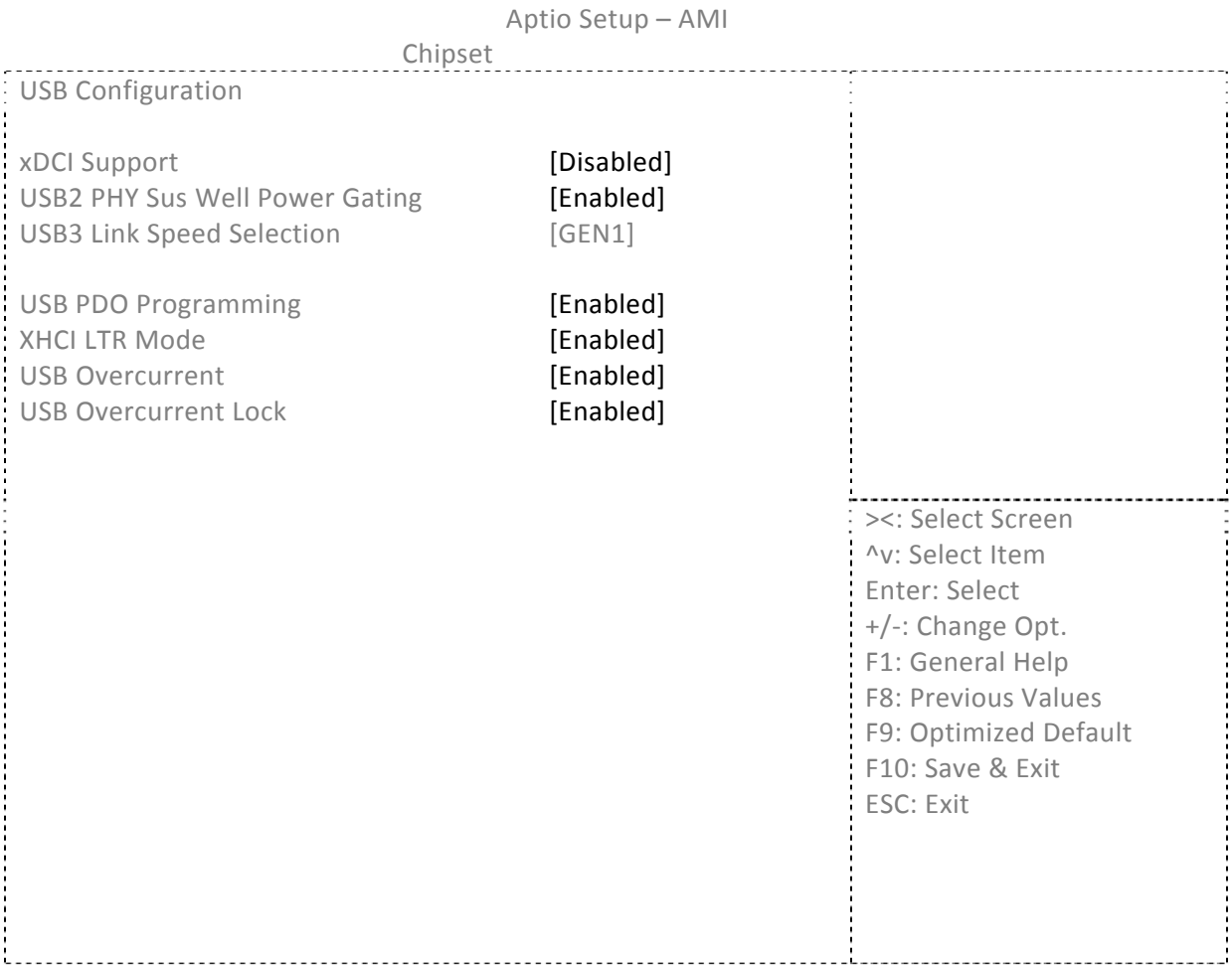
4.2.2 Software Feature Mask Configuration



BIOS Item	Options	Description
HDD Unlock	Disabled **Enabled**	If enabled, indicates that the HDD password unlock in the OS is enabled.
LED Locate	Disabled **Enabled**	If enabled, indicates that the LED/SGPIO hardware is attached and ping to locate feature is enabled on the OS.

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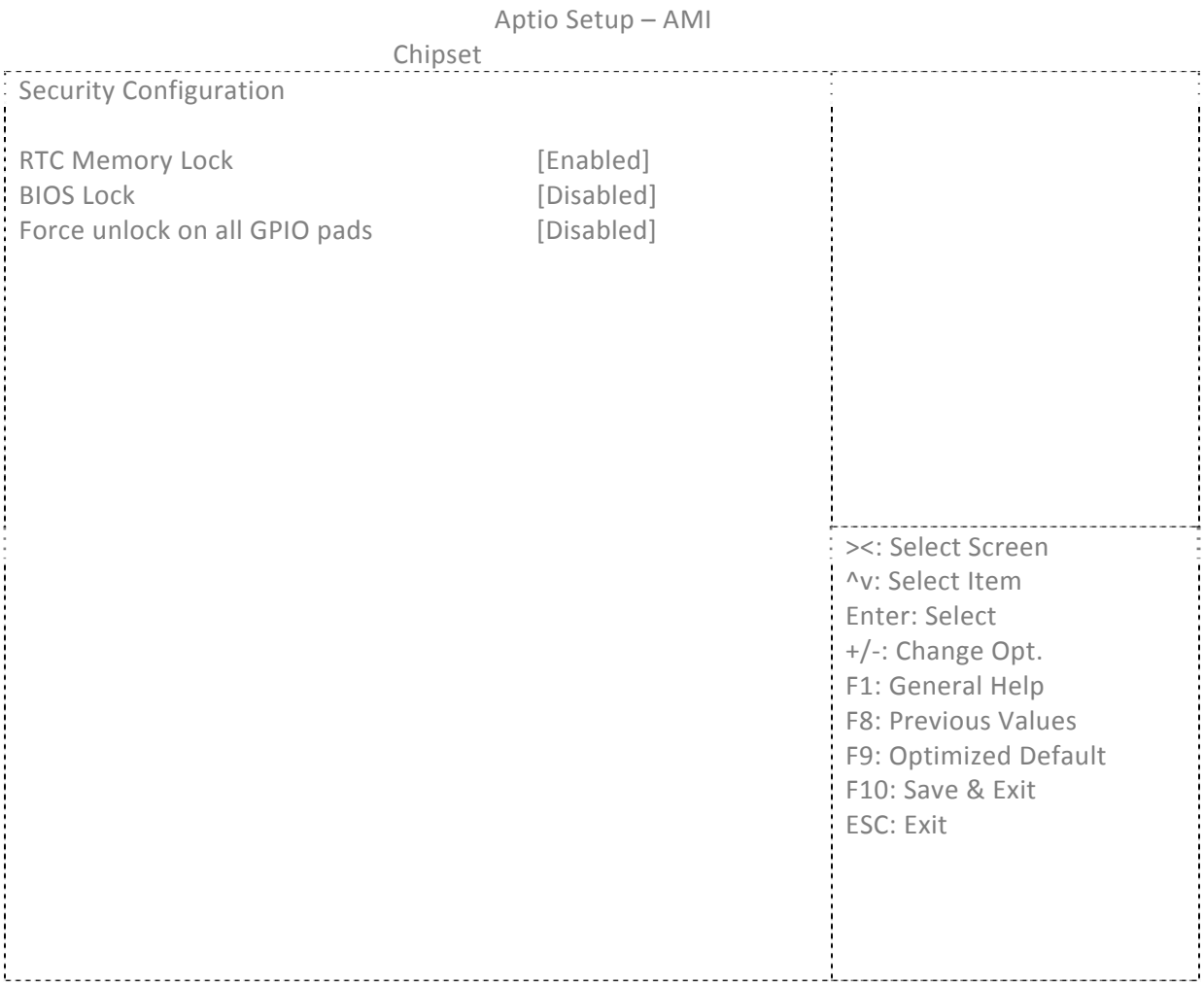
4.2.3 USB Configuration



BIOS Item	Options	Description
xDCI Support	**Disabled** Enabled	Enable/Disable xDCI (USB OTG Device).
USB2 PHY Sus Well Power Gating	Disabled **Enabled**	Select 'Enabled' to enable SUS Well PG for USB2 PHY. This option has no effect on PCH-H
USB3 Link Speed Selection	**GEN1** GEN2	This option is to select USB3 Link Speed GEN1 or GEN2
USB PDO Programming	Disabled **Enabled**	Select 'Enabled' if Port Disable Override functionality is used.
XHCI LTR Mode	Disabled **Enabled**	Enable/Disable XHCI LTR Mode
USB Overcurrent	Disabled **Enabled**	Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC does not work.
USB Overcurrent Lock	Disabled **Enabled**	Select 'Enabled' if Overcurrent functionality is used. Enabling this will make xHCI controller consume the Overcurrent mapping data

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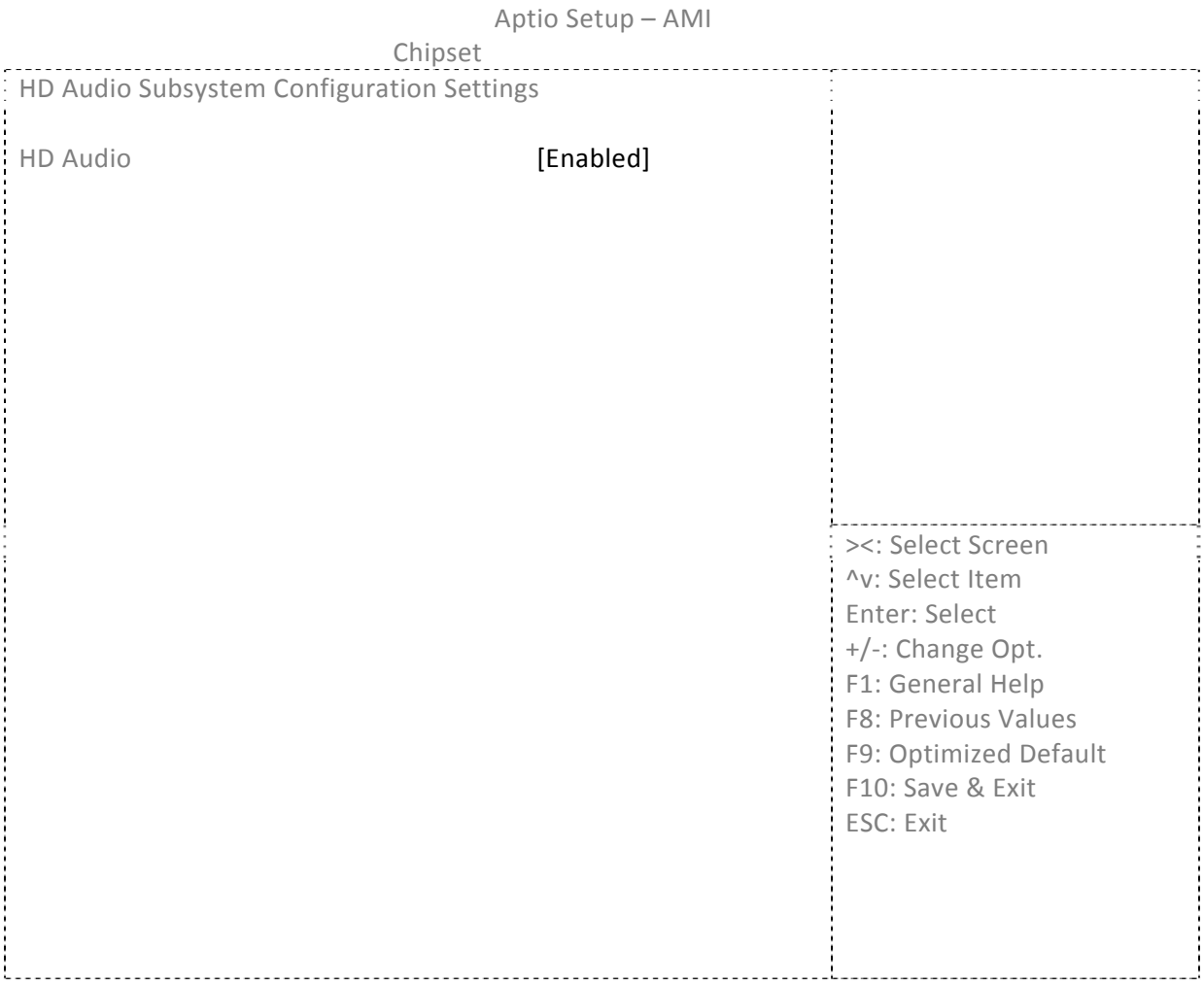
4.2.4 Security Configuration



BIOS Item	Options	Description
RTC Memory Lock	Disabled **Enabled**	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM
BIOS Lock	**Disabled** Enabled	Enable/Disable the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.
Force unlock on all GPIO pads	**Disabled** Enabled	If Enabled BIOS will force all GPIO pads to be in unlocked state

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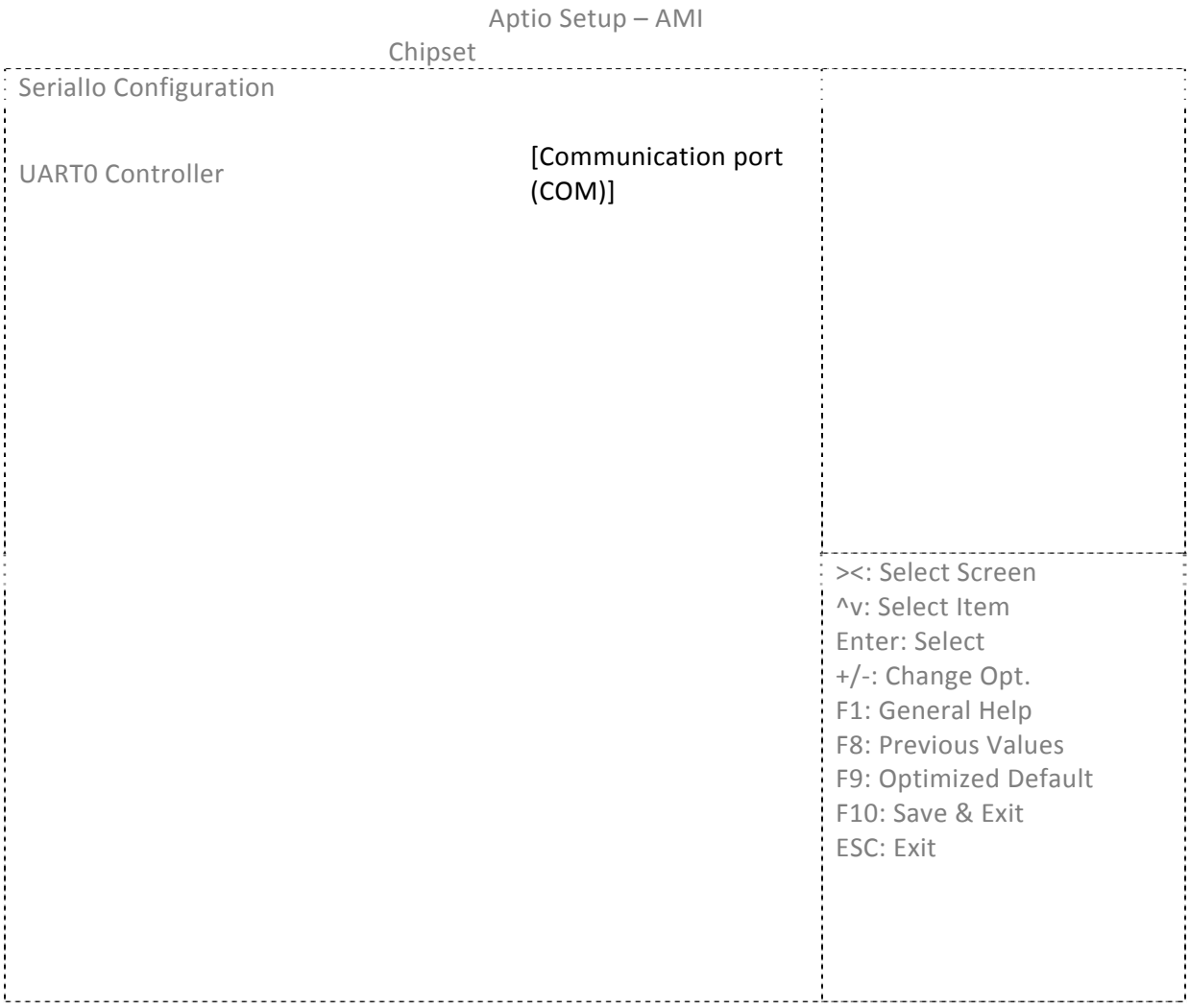
4.2.5 HD Audio Configuration



BIOS Item	Options	Description
HD Audio	Disabled **Enabled**	Control Detection of the HD-Audio device.

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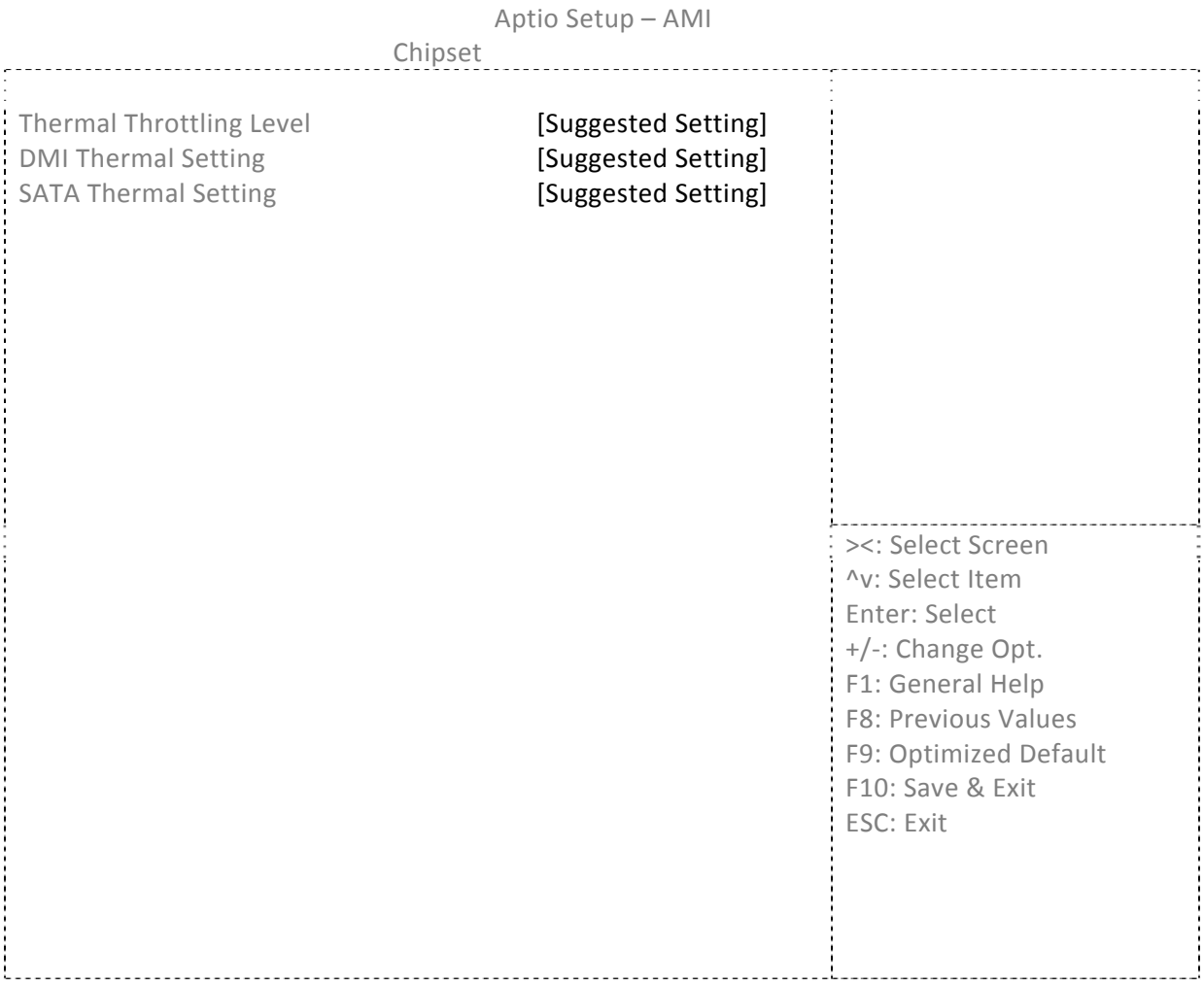
4.2.6 Serial IO Configuration



BIOS Item	Options	Description
UART0 Controller	Disabled Enabled **Communication port (COM)**	Enables/Disables Seriallo Controller

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4.2.7 PCH Thermal Throttling Control

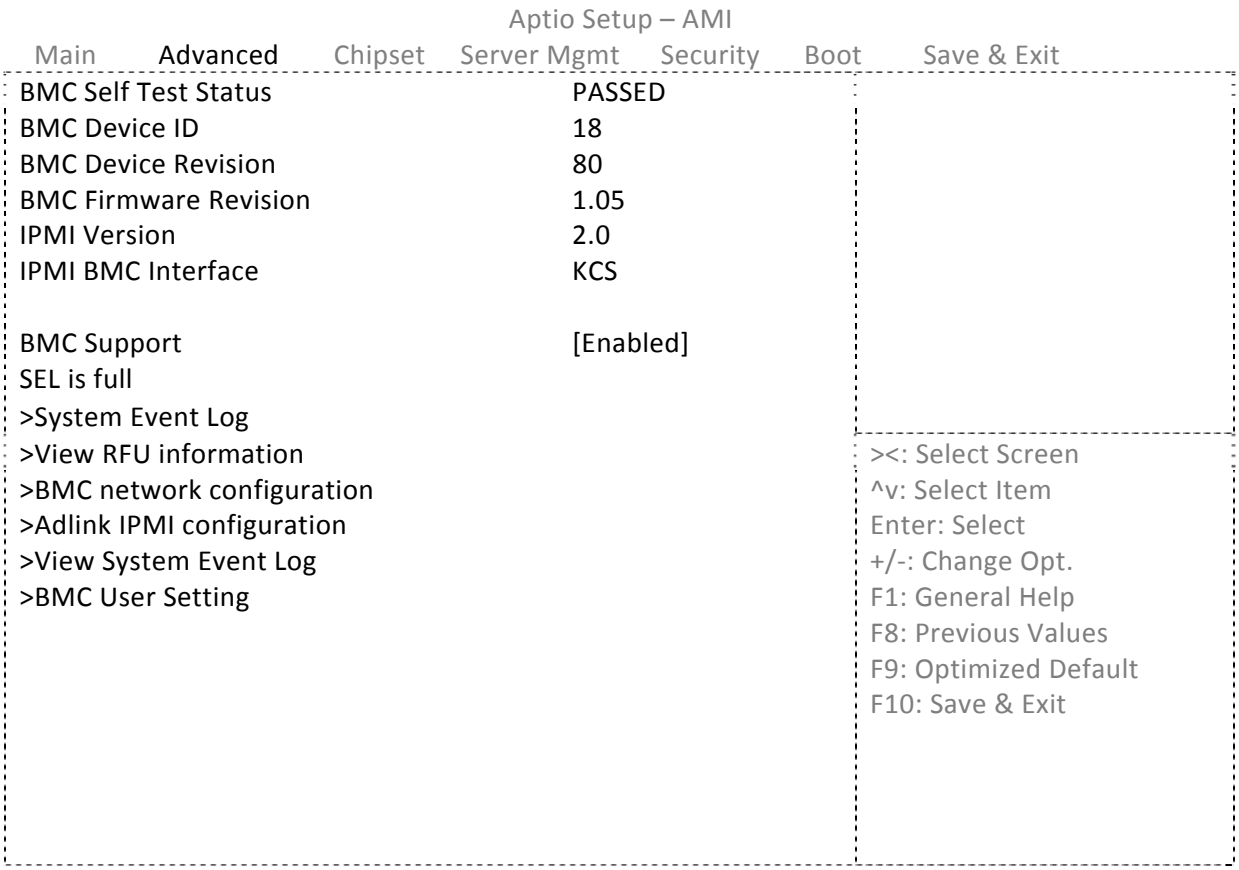


BIOS Item	Options	Description
Thermal Throttling Level	**Suggested Setting** Manual	Determine if use Intel suggested setting
DMI Thermal Setting	**Suggested Setting** Manual	Determine if use Intel suggested setting
SATA Thermal Setting	**Suggested Setting** Manual	Determine if use Intel suggested setting

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5 Server Mgmt Menu

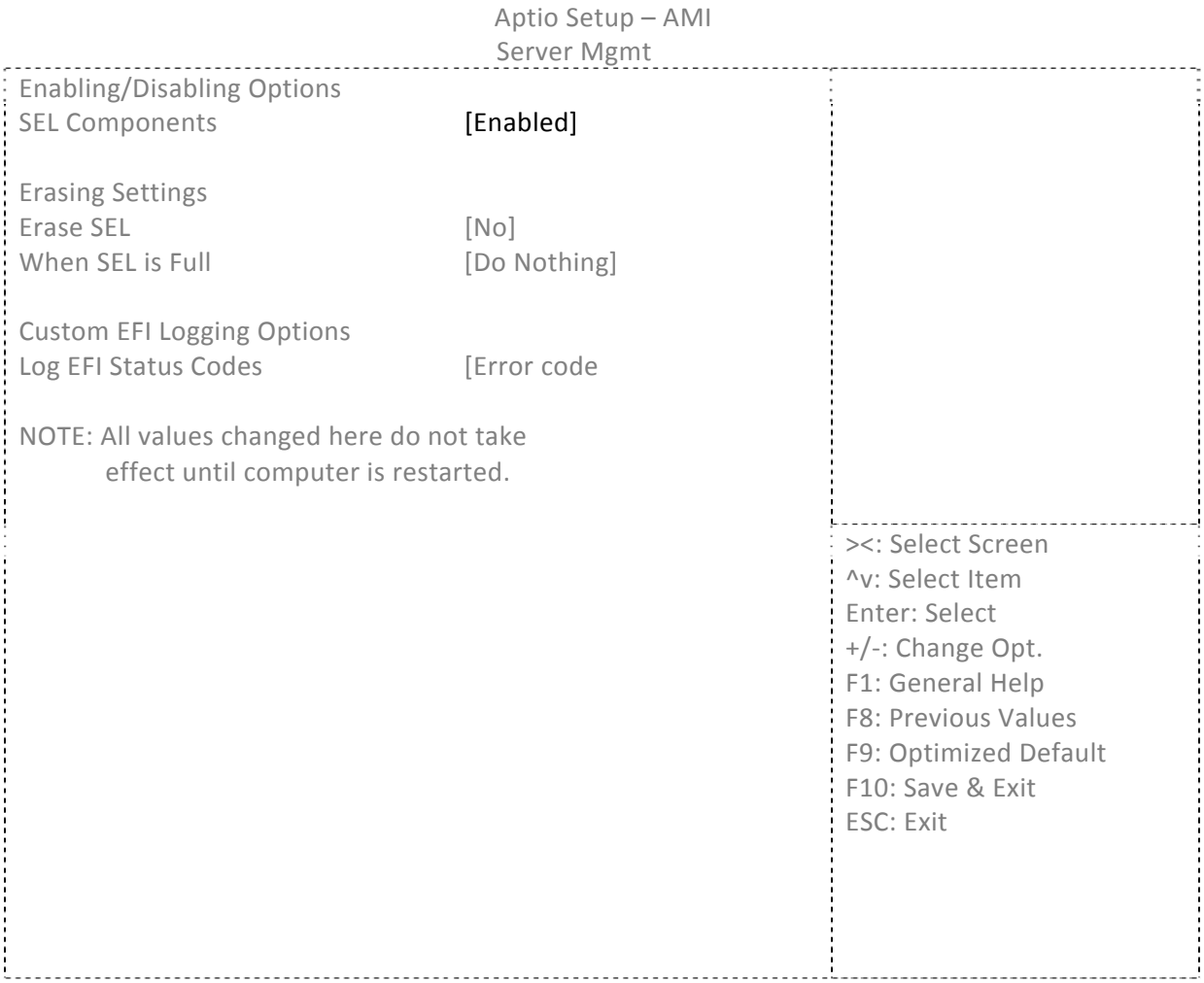
This menu contains the settings for IPMI BMC in the system.



BIOS Item	Options	Description
BMC Self Test Status	**Info-only**	
BMC Device ID	**Info-only**	
BMC Device Revision	**Info-only**	
BMC Firmware Revision	**Info-only**	
IPMI Version	**Info-only**	
IPMI BMC Interface	**Info-only**	
BMC Support	Disabled **Enabled**	Enable/Disable interfaces to communicate with BMC
SEL is full	**Info-only**	
>System Event Log	**Submenu**	
>View RFU information	**Submenu**	
>BMC network configuration	**Submenu**	
>Adlink IPMI configuration	**Submenu**	
>View System Event Log	**Submenu**	Enter to check SEL.
>BMC User Setting	**Submenu**	Enter to modify BMC user setting.

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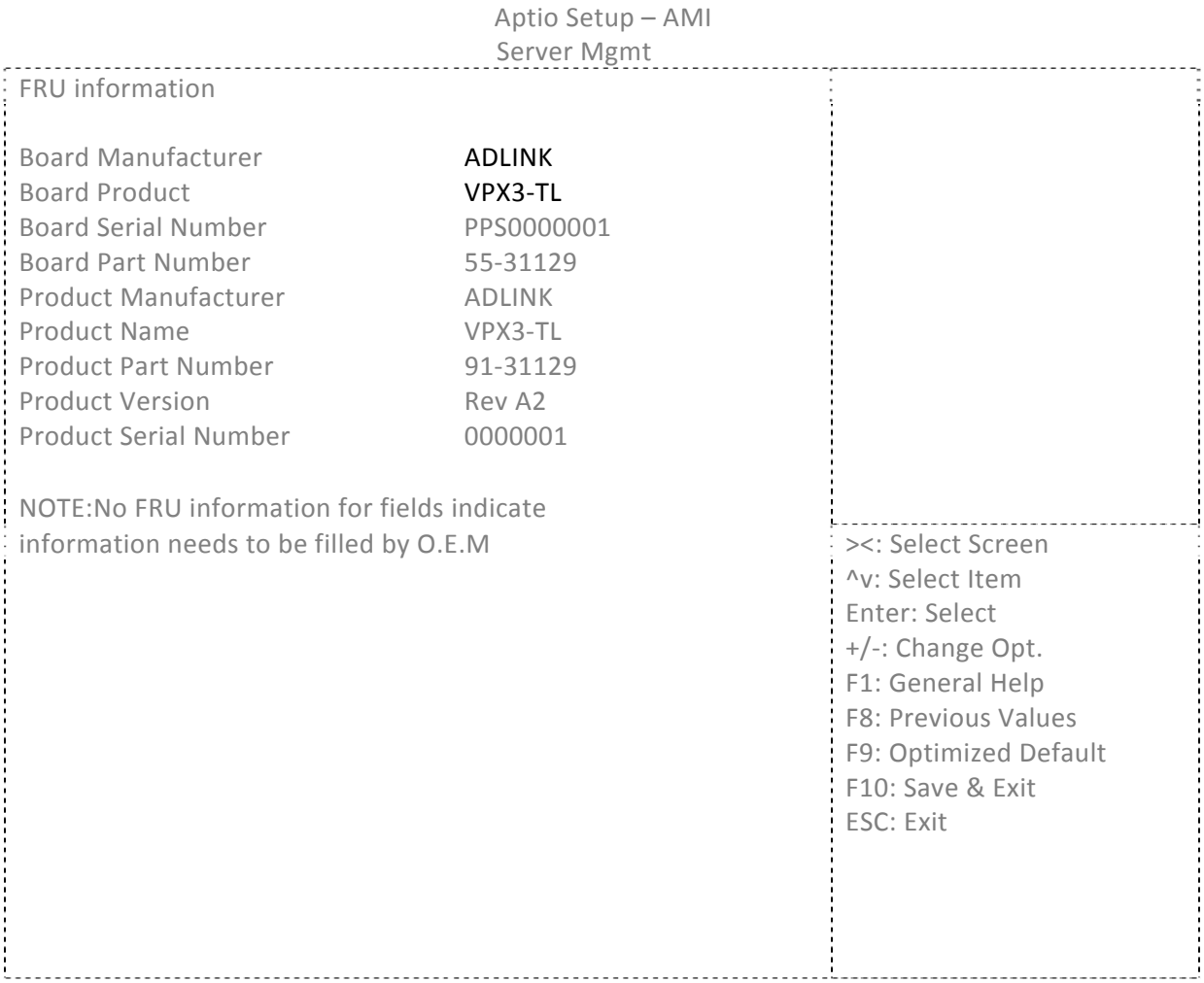
5.1 System Event Log



BIOS Item	Options	Description
SEL Components	Disabled **Enabled**	Change this to enable or disable event logging for error/progress codes during boot.
Erase SEL	**No** Yes, On next reset Yes, On every reset	Choose options for erasing SEL.
When SEL is Full	Do Nothing Erase Immediately	Choose options for reactions to a full SEL.
Log EFI Status Codes	Disabled Both Error code Progress code	Disable the logging of EFI Status Codes or log only error code or only progress code or both.

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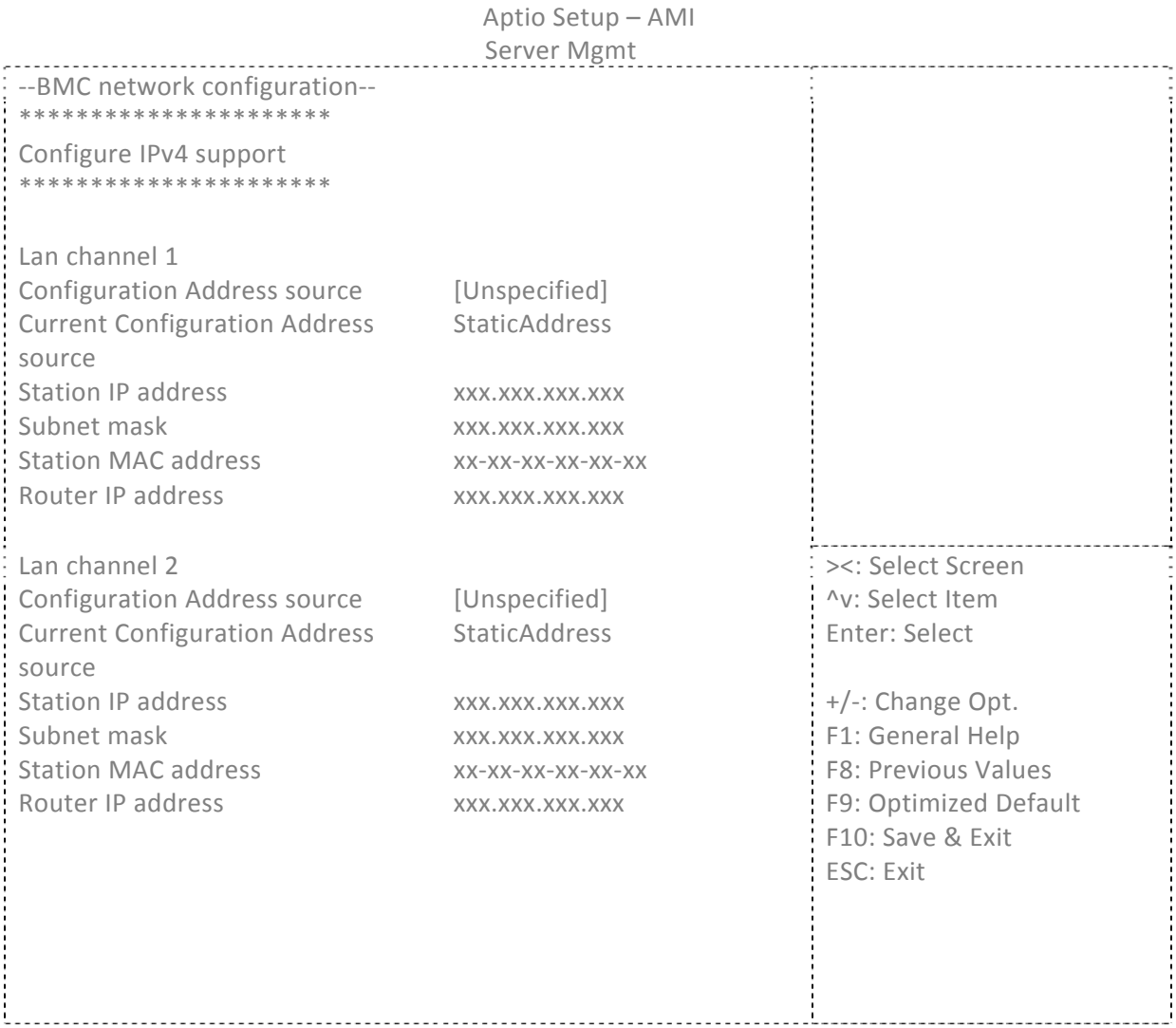
5.2 View FRU information



BIOS Item	Options	Description
Board Manufacturer	**Info-only**	
Board Product	**Info-only**	
Board Serial Number	**Info-only**	
Board Part Number	**Info-only**	
Product Manufacturer	**Info-only**	
Product Name	**Info-only**	
Product Part Number	**Info-only**	
Product Version	**Info-only**	
Product Serial Number	**Info-only**	

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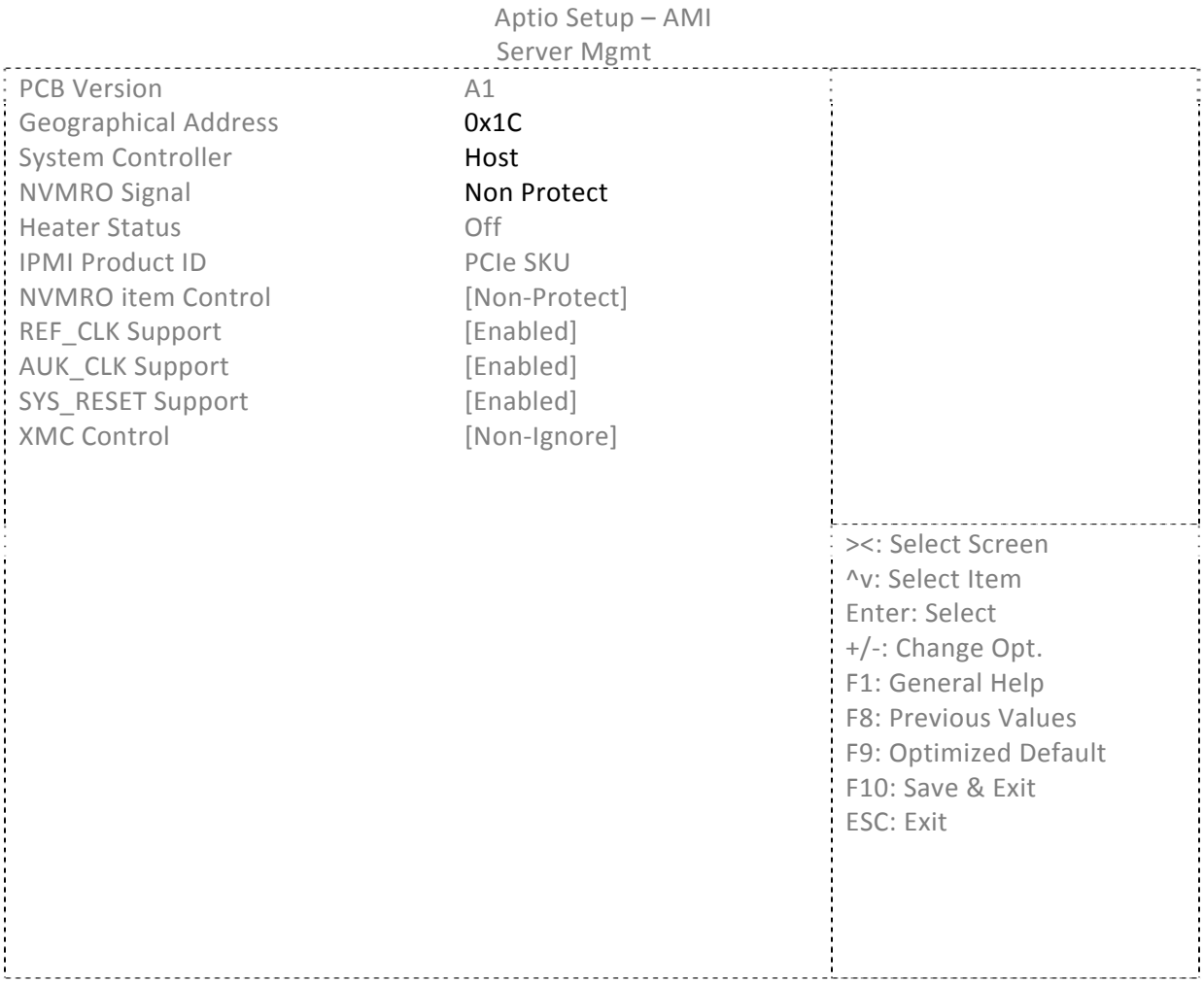
5.3 BMC network configuration



BIOS Item	Options	Description
Configuration Address source	**Unspecified** Static DynamicBmcDhcp	Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase
Current Configuration Address source	**Info-only**	
Station IP address	**Info-only**	
Subnet mask	**Info-only**	
Station MAC address	**Info-only**	
Router IP address	**Info-only**	

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5.4 ADLINK IPMI Configuration

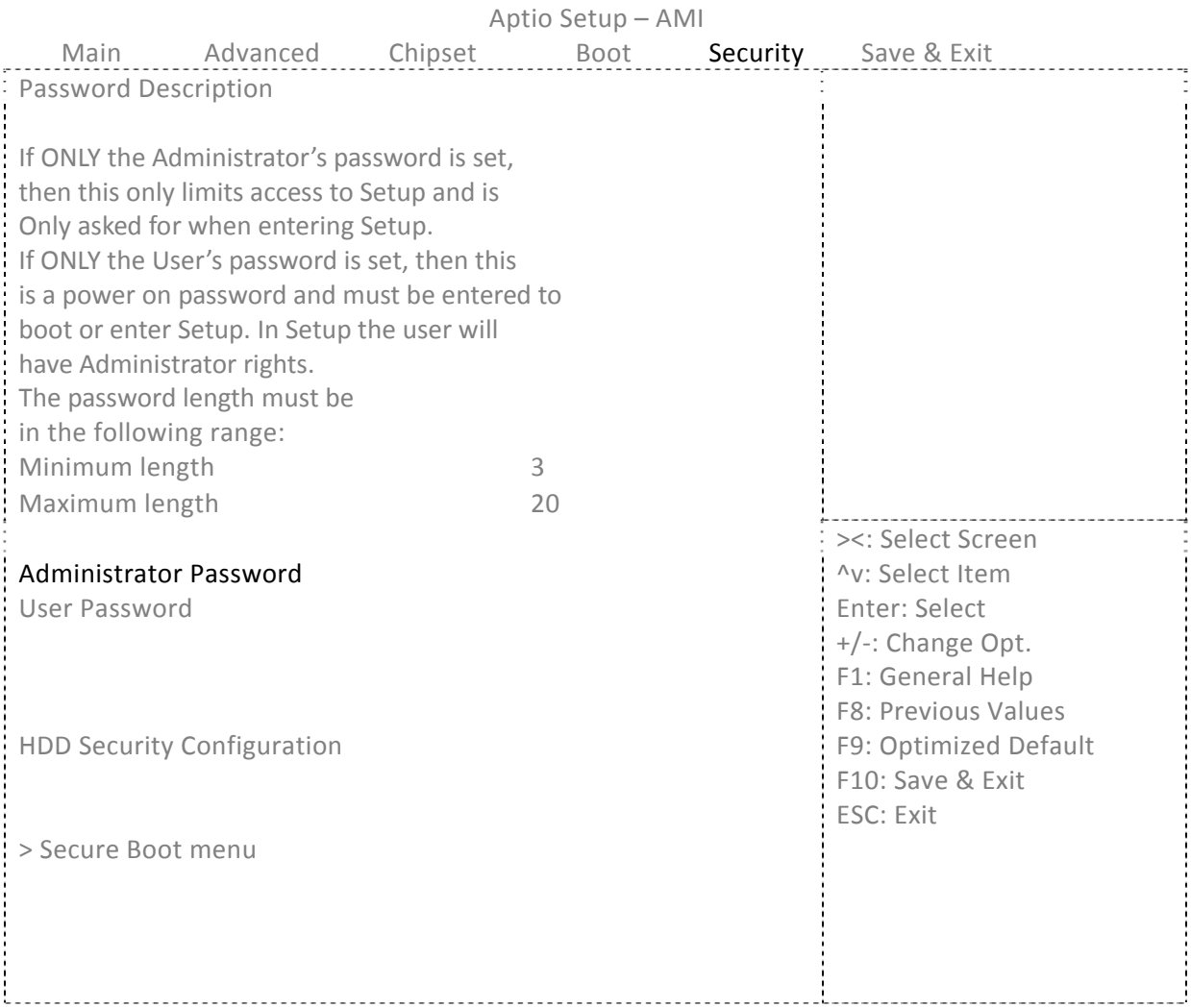


BIOS Item	Options	Description
PCB Version	**Info-only**	
Geographical Address	**Info-only**	
System Controller	**Info-only**	
NVMRO Signal	**Info-only**	
Heater Status	**Info-only**	
IPMI Product ID	**Info-only**	
NVMRO item Control	Protect Non-Protect	Enable or disable NVMRO Control support.
REF_CLK Support	Disabled Enabled	Enable or disable REF_CLK support.
AUK_CLK Support	Disabled Enabled	Enable or disable AUK_CLK support.
SYS_RESET Support	Disabled Enabled	Enable or disable SYS_RESET support.
XMC Control	Ignore Non-Ignore	Ignore or non-ignore XMC

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6 Security Menu

This menu contains the settings for security in the system.

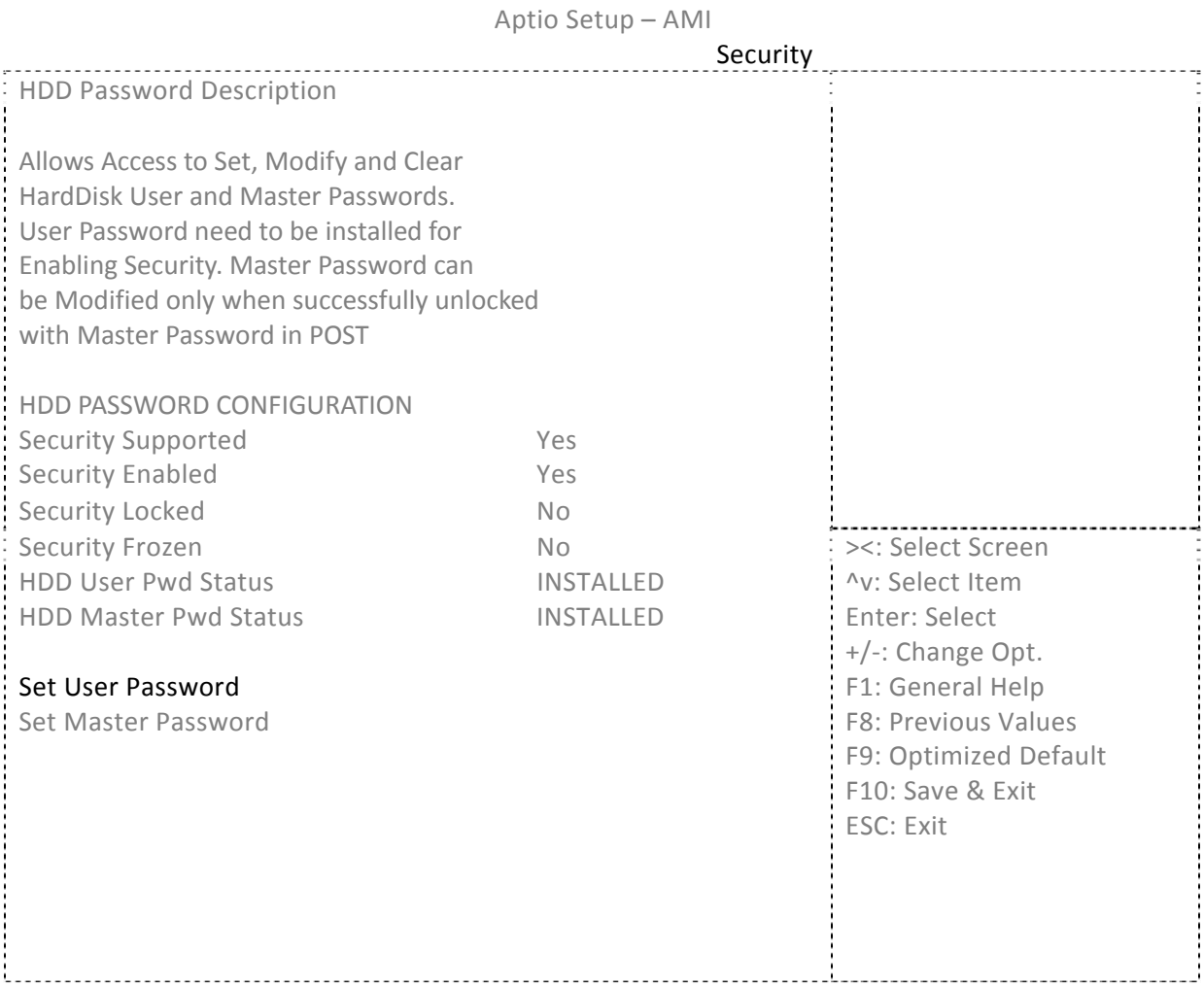


BIOS Item	Options	Description
Administrator Password	**Enter to set password**	Configure/Clear Administrator Password. When pressing enter, a menu will be popped up for creating new password. When password installed, press enter without inputting password, it will clear password.
User Password	**Enter to set password**	Configure/Clear User Password. When pressing enter, a menu will be popped up for creating new password. When password installed, press enter without inputting password, it will clear password.

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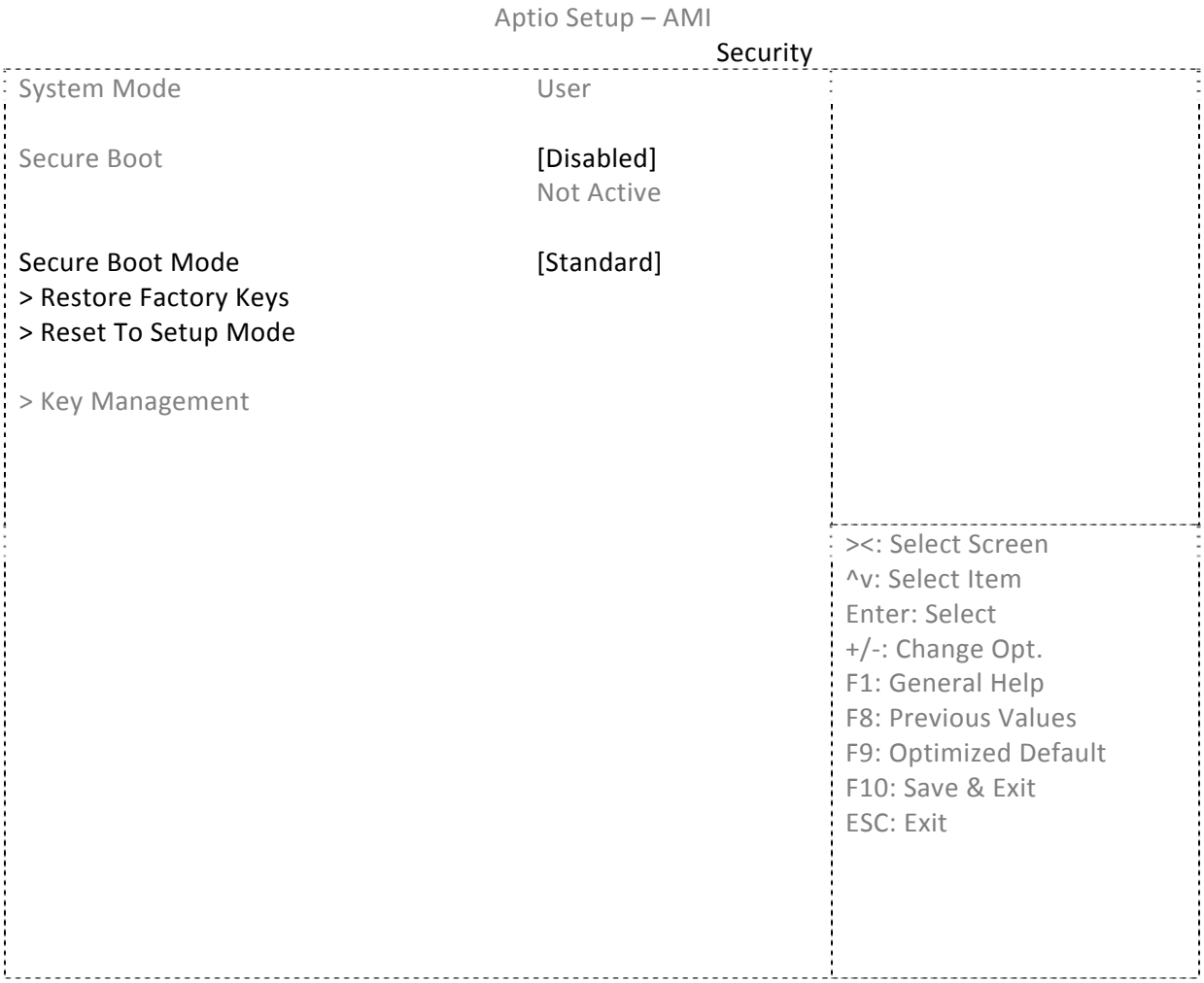
BIOS Item	Options	Description
HDD Security Configuration	**Submenu**	For HDD security, it will list all HDD detected on motherboard. Select the HDD and then press enter can figure/clear HDD password.
Secure Boot menu	**Submenu**	

When selecting a HDD to configure passwords, BIOS will enter another new BIOS setup page like below. The method of configuring HDD password is the same as BIOS passwords. Once password is set, it will reflect the status on the screen, like 'INSTALLED' change on 'HDD User Pwd Status'. When there is no HDD user password installed, you can always change master password without confirming the latest installed password. Once HDD user password is installed, HDD master password is not allowed changing.



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6.1 Secure Boot

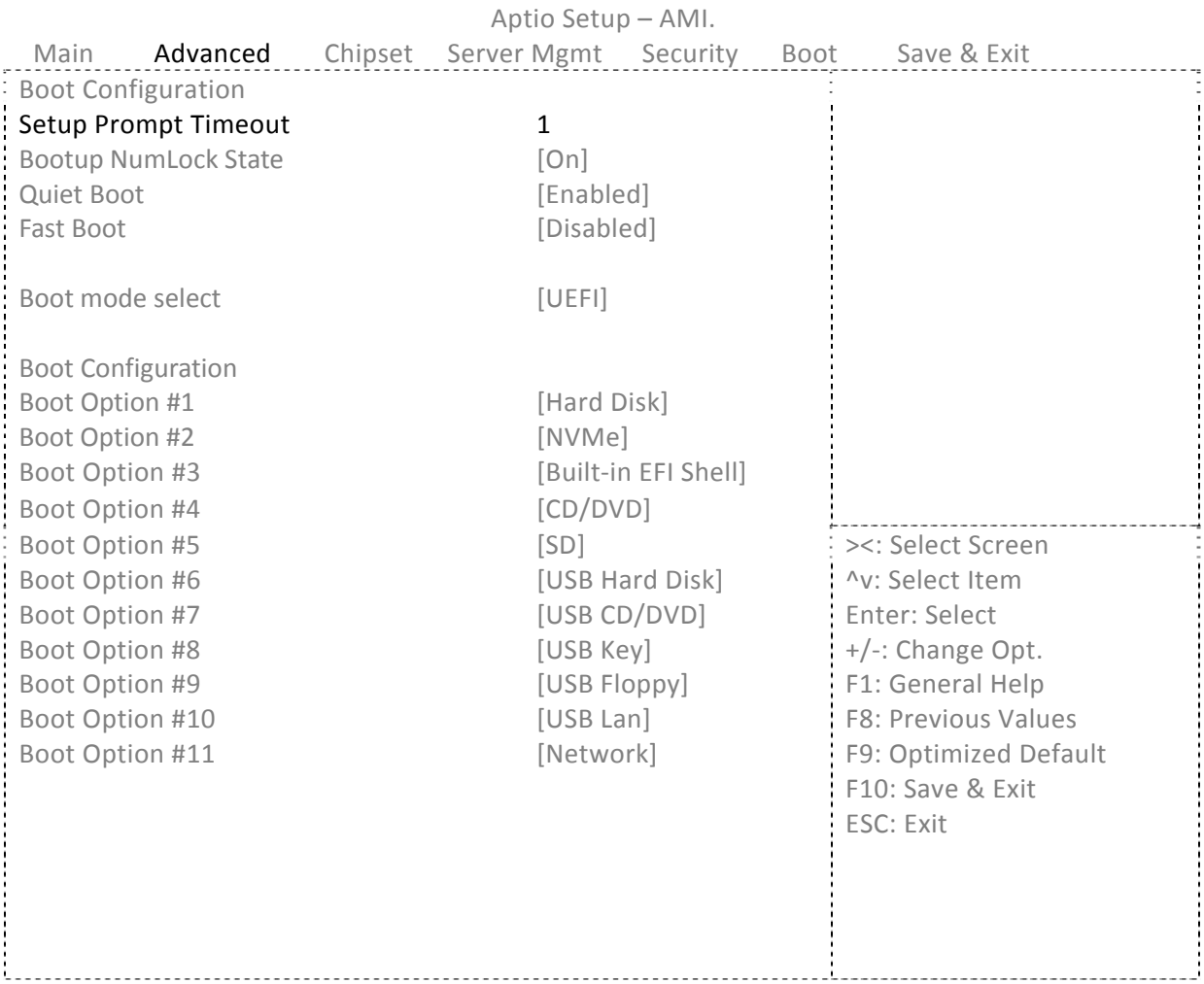


BIOS Item	Options	Description
System Mode	**Info-only**	
Secure Boot	**Disabled** Enabled	Secure Boot feature is Active if Secure Boot is Enabled,
Secure Boot Mode	**Standard** Custom	Secure Boot mode options

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7 Boot Menu

This menu contains the settings for bootable devices in the system.



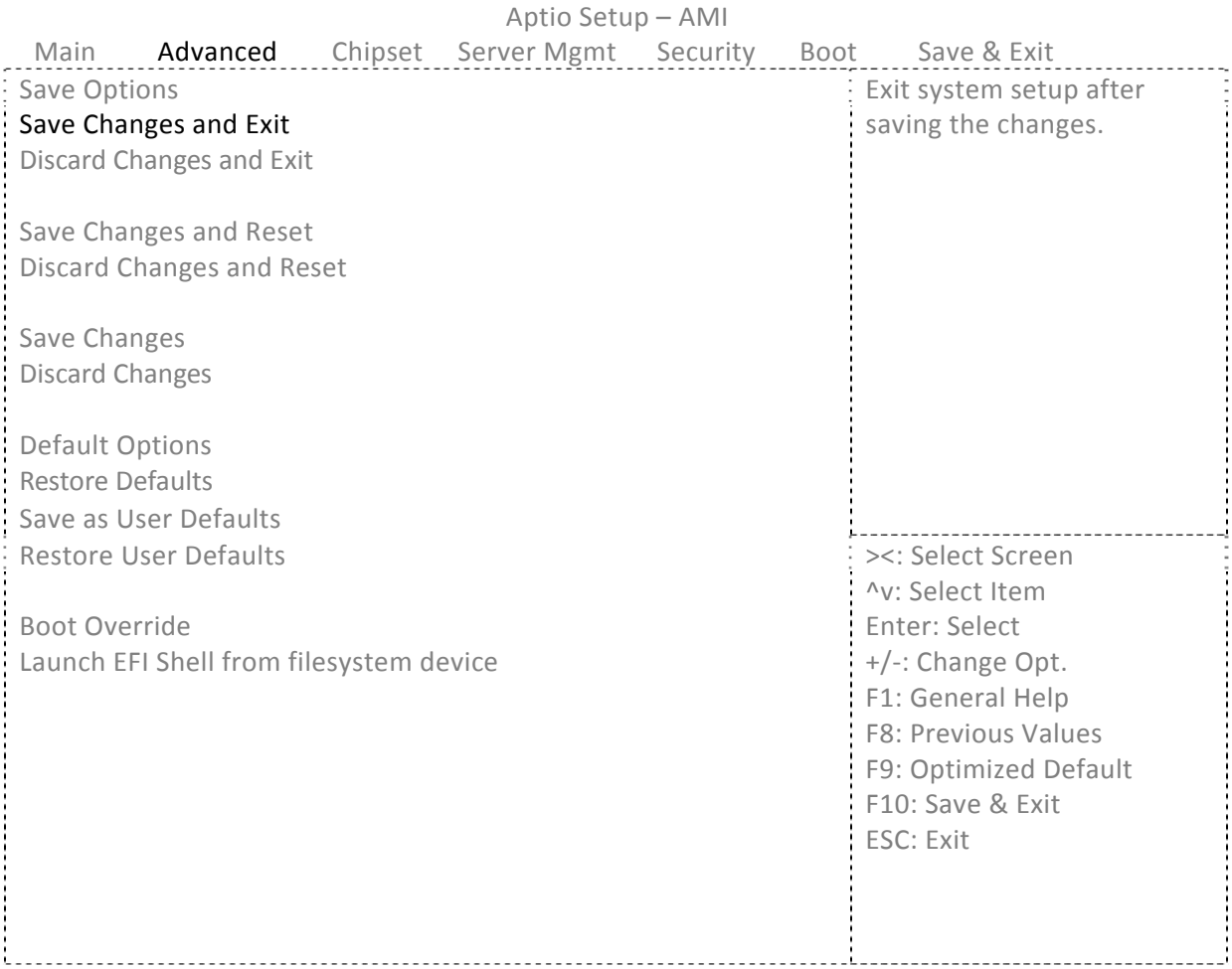
BIOS Item	Options	Description
Setup Prompt Timeout	**1**	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	On **Off**	Select the keyboard NumLock state after system boot.
Quiet Boot	Disabled **Enabled**	**Enabled:** will show splash screen during POST. **Disabled:** will show boot message during POST.
Fast Boot	**Disabled** Enabled	Enable or disabled Fast boot feature. Most probes are skipped to reduce time cost during boot.
Boot mode select	LEGADY **UEFI**	Select boot mode, LEGACY/UEFI.

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Boot Option #1~#11	Hard Disk NVME CD/DVD SD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	Set system boot order.

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8 Save & Exit



BIOS Item	Options	Description
Save Changes and Exit	**Enter**	Save changed settings and exit BIOS setup utility.
Discard Changes and Exit	**Enter**	Skip changed setting and exit BIOS setup utility.
Save Changes and Reset	**Enter**	Save all changed settings and let system do reset to boot system.
Discard Changes and Reset	**Enter**	Discard all changed settings and let system do reset to boot system.
Save Changes	**Enter**	Save all changed settings.
Discard Changes	**Enter**	Discard changes done so far to any of the setup options.
Restore Default	**Enter**	Load the default made when BIOS was built.
Save as User Default	**Enter**	Save all changed done so far as User Defaults.
Restore User Default	**Enter**	Load the default that user save as user defaults.
Boot Override	**Info-only**	

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Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

1. Read these safety instructions carefully.
2. Keep this user's manual for future reference.
3. Read the specifications section of this manual for detailed information on the operating environment of this equipment.
4. The equipment can be operated at an ambient temperature of 40°C.
5. When installing/mounting or uninstalling/removing equipment; or when removal of the chassis lid required for user servicing (Section 3.1-3.5):
   - Turn off power and unplug any power cords/cables, and
6. To avoid electrical shock and/or damage to equipment:
   - Keep equipment away from water or liquid sources;
   - Keep equipment away from high heat or high humidity;
   - Keep equipment properly ventilated (do not block or cover ventilation openings);
   - Make sure to use recommended voltage and power source settings;
   - Always install and operate equipment near an easily accessible electrical socket-outlet;
   - Secure the power cord (do not place any object on/over the power cord);
   - Only install/attach and operate equipment on stable surfaces and/or recommended mountings;
   - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
   - The power cord must be connected to a socket or outlet with a ground connection.
7. Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.

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8. This equipment is not suitable for use in locations where children are likely to be present.
9. Equipment must be serviced by authorized technicians when:
   - The power cord or plug is damaged;
   - Liquid has penetrated the equipment;
   - It has been exposed to high humidity/moisture;
   - It is not functioning or does not function according to the user's manual;
   - It has been dropped and/or damaged; and/or,
   - It has an obvious sign of breakage.
10. Please pay strict attention to all warnings and advisories appearing on the device, to avoid injury or damage.
11. It is recommended that equipment be installed only in a server room or computer room where access is:
    - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required;
    - Only afforded by the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.
12. Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

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Getting Service

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