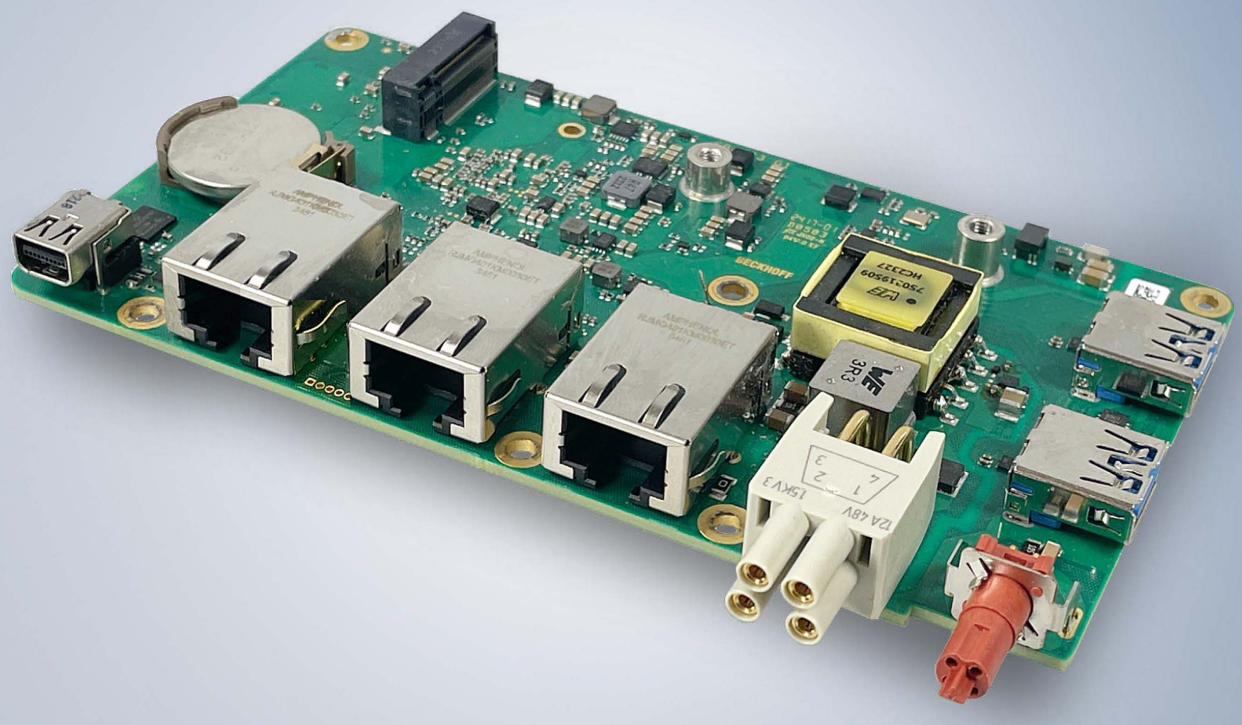
BECKHOFF New Automation Technology

Operating Manual | EN

CB8283

Computerboard



27.02.2025 | Version: 1.0

1 Documentation issue status

Version	Modifications
0.1	First preliminary version G1
1.0	First release, version G1

2 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
For installation and commissioning of the components, it is absolutely necessary to observe the documentation and the following notes and explanations.
It is the duty of the responsible staff to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Origin of the document

This documentation was originally written in German. All other languages are derived from the German original.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation.

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EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
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3 Safety instructions

Safety regulations

Please observe the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the mounting, wiring, commissioning areas, etc.

Exclusion of liability

All of the components are supplied in specific hardware and software configurations depending on the application requirements. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

⚠ DANGER

Serious risk of injury!

Failure to follow the safety instructions associated with this symbol directly endangers human life and health!

⚠ WARNING

Risk of injury!

Failure to follow the safety instructions associated with this symbol endangers human life and health!

⚠ CAUTION

Personal injuries!

Failure to follow the safety instructions associated with this symbol can lead to physical injuries!

NOTICE

Damage to the environment or devices

Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.

Tip or pointer

This symbol indicates information that contributes to better understanding.

UL note

This symbol indicates important information regarding UL approval.

Intended use

The CB8283 Computer Board was designed and developed exclusively for configuration in automation processes. To that end the board is equipped with external interfaces in order to acquire or output digital or analog signals or forward them to higher-level components.

The computer board has been developed for an IP65 working environment. It offers full protection against contact (dust-tight) and against water jets (nozzle) from any angle.

The specified limits for electrical and technical data must be adhered to.

Any other use is regarded as inappropriate.

4 Notes on information security

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To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

5 Overview

5.1 Properties

The CB8283 is designed as a compact, high-performance IP65/67 motherboard. On account of its wide variety of interfaces (3 x LAN 2.5 GB, 2 x USB3.2, mini DisplayPort, EtherCAT P), 40 GB M.2 SSD with 3D flash and integrated Intel Atom® CPU (quad-core at most) with universal multi-core support for TwinCAT 3, this motherboard can be used in robust industrial PCs for simultaneous, high-performance automation, visualization and communication under hard real-time conditions: from the classic machine controller to modern Industry 4.0 concepts as an edge device.

The integrated EtherCAT P connection enables you to connect actuators/sensors directly via IP67-protected EtherCAT P Box modules.

The compact format of the CB8283 offers the full functionality of a motherboard for space-saving and freely mountable industrial PC hardware and advanced Industry 4.0 concepts.

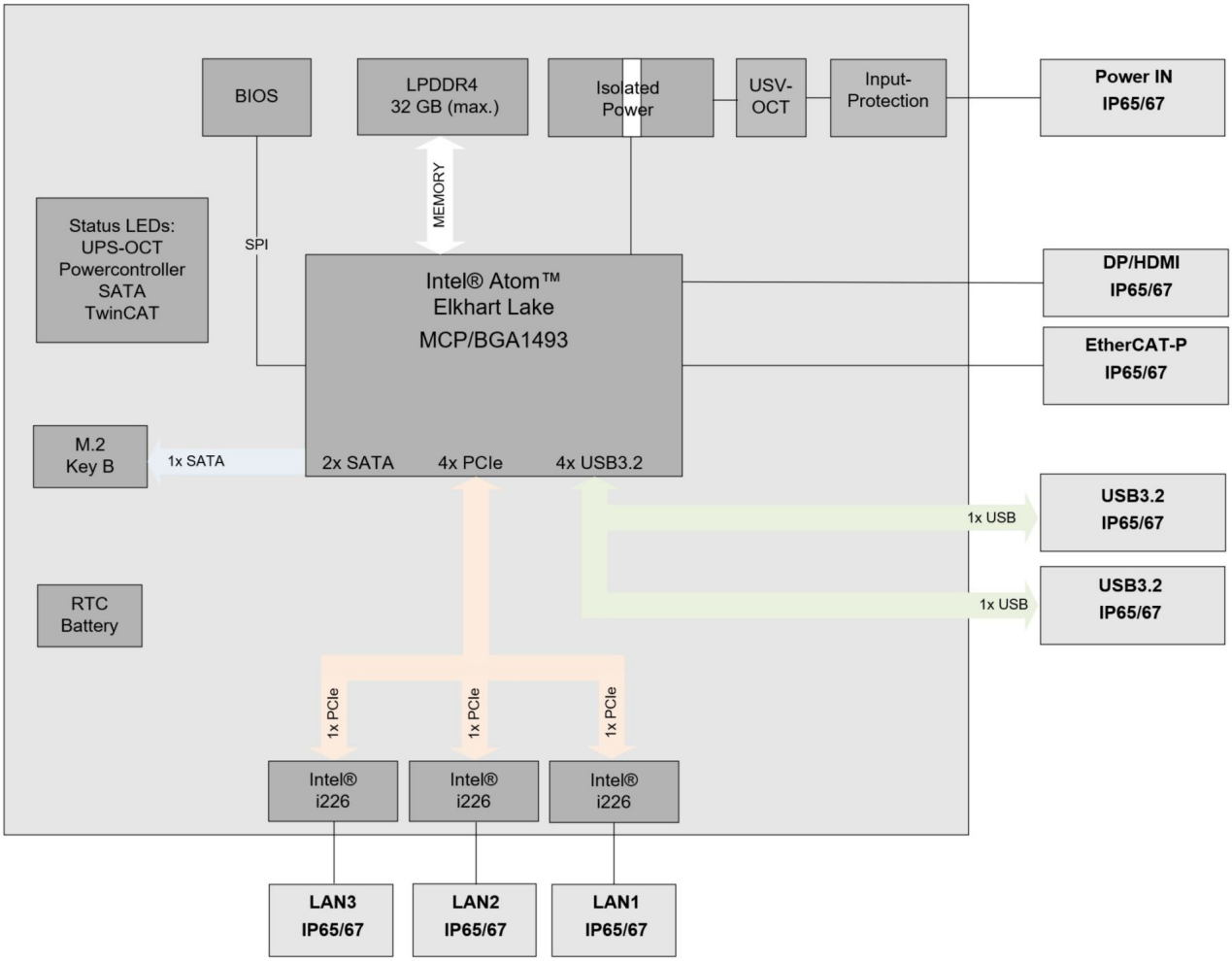


Fig. 1: CB8283 block diagram

5.2 List of features

Availability of the processors

The list of features lists all the processors that can be ordered. Their actual availability depends on the manufacturer.

List of features	
CB8283	
CPU	Intel® Atom™ x6212RE (DC/1.5M/1.2GHz/TDP6W) Intel® Atom™ X6414RE (QC/1.5M/1.5GHZ/TDP9W) Intel® Atom™ X6425RE (QC/1.5M/1.9GHz/TDP12W)
Socket	Elkhart Lake, BGA1493, Multi-Chip Package (MCP)
Memory	OnBoard SDRAM-1.1V / LPDDR4, Dual channel (depending on CPU up to 3200 MT/s, max. 32 GB)
I/O front panel	1x EtherCAT P connection, IP65/67 1x power, IP65/67 1x DisplayPort (connection of an HDMI adapter for one HDMI signal possible), IP65/67 3x LAN 10/100/1000/2500, IP65/67 2x USB 3.2, IP65/67
I/O internal	1x M.2 (B) socket, signals dependent on chipset (see M.2 2242/2280k Key B (P1000) [▶ 21]
Graphic resolution	HDMI 1.4b: 3840x2160 @ 30 Hz DisplayPort 1.2a/eDP 1.3: 4096x2160 @ 60 Hz MIPI-DSI: 2560x1600 @ 60 Hz
RTC	CR2032 battery
BIOS	AMI® Aptio V
Power supply	20 V - 30 V input voltage overvoltage and undervoltage protection reverse polarity protection, UPS-OCT possible,electrically isolated
Format	135 x 75 mm

5.3 Specifications and documents

The following documents, specifications or webpages were used for the preparation of this manual or as further technical documentation respectively.

- **PCI specification**
- Version 2.3 or 3.0
- www.pcisig.com
- **PCI Express® Base Specification**
- Version 5.0
- www.pcisig.com
- **ACPI specification**
- Version 5.0
- www.acpi.info
- **ATA/ATAPI specification**
- Version 7 Rev. 1
- www.t13.org
- **USB specifications**
- www.usb.org
- **SMBus specification**
- Version 2.0
- www.smbus.org
- **Intel® chip descriptions**
- Intel® Core™ Processor Product Family datasheet
- www.intel.com
- **Intel® chip description**
- i226 Datasheet
- www.intel.com
- **SMSC® chip description**
- SCH3114 Datasheet (NDA required)
- www.smsc.com
- **American Megatrends®**
- Aptio™ Text Setup Environment (TSE) User Manual
- www.ami.com
- **American Megatrends®**
- Aptio™ 5.x Status Codes
- www.ami.com

6 Detailed description

6.1 Power supply

The power supply conforms to IP65/67. The board is supplied with an isolated input voltage of nominally 24 V, which in reality may lie between 20 V and 30 V. In normal operation the DC/DC power rail is supplied with this voltage.

A UPS can also be implemented via an UOS-OCT signal (OCT = One Cable Technology).

UPS-OCT

The UPS OCT can only be implemented with the Beckhoff CU81XX-xxxx UPS.

6.2 CPU

The processors are multi-chip packages from Intel®. These MCPs are based on processors from the x6000E series (Elkhart Lake Gen11). Advanced energy-saving LPDDR4 technology enables memory extension of up to 32 GB, depending on the product variant.

Intel® processors of the x6000E series (Elkhart Lake Gen11) have an extended ambient temperature range and are therefore particularly suitable for use in industrial systems.

6.3 Memory

Four SDRAM memory modules up to a maximum of 32 GB are permanently installed on the CB8283 board.

Depending on the component variant, these are 4 GB or 8 GB DDR4 or LPDDR4 memory variants. Depending on the CPU used, a maximum clock frequency of 3200 MHz is supported.

6.4 M.2 socket

M.2 cards can easily and simply be inserted by plugging them into the slot and fixing them with a screw. Cards of different types have different recesses (keys). Depending on which types are supported, ports can accept expansion cards of one or more types. The M.2 socket of the CB8283 supports M.2 modules with Key B. SATA signals that allow an SSD to be connected are output via the interface.

7 Interfaces

7.1 Note on the use of cables

Requirement for the cabling!

The cables used must meet certain requirements for most interfaces. For example, twisted and shielded cables are necessary for a reliable USB 2.0 connection. Limitations in the maximum cable length are also no rarity. All of these interface-specific requirements can be found in the respective specifications and must be observed accordingly.

NOTICE

IP65/67 cable type

The cables used must comply with IP65/67!

7.2 Interface overview

The interfaces of the CB8283 board are summarized in the figure below. The table below shows the function of the respective interface, as well as the manual page where you can find further information on this connection.

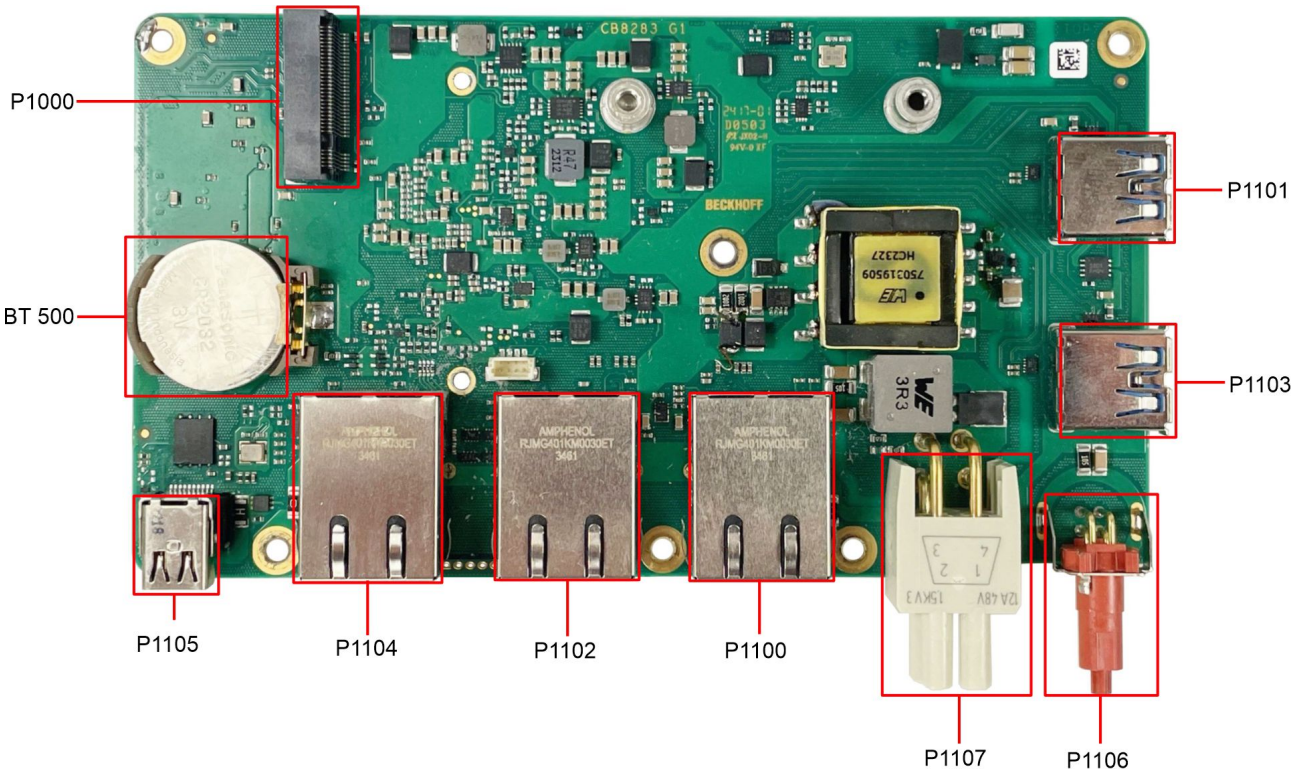


Fig. 2: CB8283 interface overview

Interface designation

The designation of the interfaces corresponds to the designation in the circuit diagram.

7.3 List of interfaces

Number	Function (designation)	Page
P1101	USB 3.2	USB 3.2 IP65/67 (P1103, P1101) [▶ 16]
P1103	USB 3.2	USB 3.2 IP65/67 (P1103, P1101) [▶ 16]
P1106	EtherCAT P	EtherCAT P IP65/67 (P1106) [▶ 17]
P1107	Vin / S UPS	Power connection IP65/67 (P1107) [▶ 18]
P1100	LAN 1	LAN IP65/67 (P1100, P1102, P1104) [▶ 19]
P1102	LAN 2	LAN IP65/67 (P1100, P1102, P1104) [▶ 19]
P1104	LAN 3	LAN IP65/67 (P1100, P1102, P1104) [▶ 19]
P1105	DP	Mini DisplayPort IP65/67 (P1005) [▶ 20]
BT500	Battery holder	Battery (BT500) [▶ 23]
P1000	M.2 socket Key B	M.2 2242/2280k Key B (P1000) [▶ 21]

Sequence of the interfaces

The list is in clockwise order, starting with the interface P1101 (USB3.2).

7.4 External interfaces

7.4.1 USB 3.2 IP65/67 (P1103, P1101)

USB channels 1 and 2 are each made available via a USB connector (P1103, P1101) in accordance with IP65/67.

The USB channels support the USB specification 3.2. Low-power and high-power modes are also specified. The maximum currents here are limited to 150 mA and 900 mA. Devices with their own current supply must be used for higher power demands. The USB interfaces are electronically protected.

All necessary settings for USB can be made in the BIOS. This applies to both USB interfaces. Note that the "USB Mouse and Keyboard" functionality of the BIOS setup is only required if the operating system does not provide USB support. Do not select this function for settings in the setup and for booting Windows with a connected USB mouse and keyboard, because this would result in significant performance limitations.

Fig. 3: P1103 and P1101-USB

Pin assignment USB3.2 connector		
Pin	**Signal**	**Description**
1	VCC	Supply voltage 5 V
2	D-	Data - (USB 2.0)
3	D+	Data + (USB 2.0)
4	GND	Ground
5	SSRX-	Receive line - (USB 3.2)
6	SSRX+	Receive line + (USB 3.2)
7	GND	Ground
8	SSTX-	Transmit line - (USB 3.2)
9	SSTX+	Transmit line + (USB 3.2)

7.4.2 EtherCAT P IP65/67 (P1106)

EtherCAT P (EtherCAT + Power) is an extension of the EtherCAT technology in the area of cabling. This IP65/67 connector allows you to use the four-core Ethernet cable (IP65/67) for data and for two electrically isolated, individually switchable 24 V/3 A power supplies. This allows you to cascade several EtherCAT devices. You only need one cable for the connection and power supply of I/O and field devices.

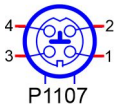


Fig. 4: P1106 EtherCAT P connection

Pin assignment EtherCAT P connection IP65/67		
Pin	**Signal**	**Description**
1	LAN41+	LAN signal + and ground
2	LAN40 +	LAN signal + and ground
3	LAN40 -	LAN signal - and supply voltage 24 V
4	LAN41 -	LAN signal - and supply voltage 24 V

7.4.3 Power connection IP65/67 (P1107)

The connection for the power supply is implemented as a 2x2-pin housing plug in accordance with IP65/67. The main power supply (24 V) for the module is on pin 2.

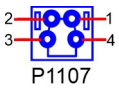


Fig. 5: P1107 Power connection

Pin assignment of the power plug:					
Description	**Signal**	**Pin**		**Signal**	**Description**
Supply voltage 24V	Vin	2	1	GND	Ground
PC Start: Input for starting and shutting down the PC. Low (0 V or open contact): PC starts. High (>3V): PC shuts down.	PC_START	3	4	PC_ACTIVE	PC status: Output of the PC status. The voltage corresponds to the positive supply voltage and can be loaded with 1A. Low (0 V): PC is off. High (Vin): PC is on.

Function restrictions PC_Start switch

Please note that there are system states in which the activation of a connected PC_Start switch is ignored by the system, e.g. during booting of a Windows operating system. In this case, repeat the operation of the switch after a few seconds. The same applies to connected PC_Start push buttons.

7.4.4 LAN IP65/67 (P1100, P1102, P1104)

The board has three 2.5 Gbit LAN connections in accordance with IP65/67. 10/100/1000/2500BaseT-compatible network components can be connected to all of them. The required speed is selected automatically. TSN, Auto-Cross and Auto-Negotiate are available as well as PXE and RPL functionality. Controller is Intel®'s i226-IT.

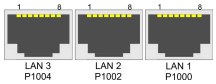


Fig. 6: P1000 P1002 P1004 LAN 2.5 IP65

Pin assignment of LAN connector		
Pin	**Name**	**Description**
1	LAN-0	LAN line 0 +
2	LAN-0#	LAN line 0 -
3	LAN-1	LAN line 1 +
4	LAN-2	LAN line 2 +
5	LAN-2#	LAN line 2 -
6	LAN-1	LAN line 1 -
7	LAN-3	LAN line 3 +
8	LAN-3#	LAN line 3 -

7.4.5 Mini DisplayPort IP65/67 (P1005)

The board has a Mini DisplayPort in accordance with IP65/67.

The interface additionally provides HDMI/DVI signals that can be used with aid of an adapter. Please consult your distributor with regard to a suitable adapter.

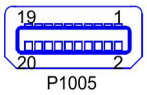


Fig. 7: P1005 Display Port IP65

Pin assignment Mini DisplayPort					
Description	**Signal**	**Pin**		**Signal**	**Description**
Ground	GND	1	2	HPD	Hot Plug Detect
Display Port Lane 0 +	L0	3	4	DP / HDMI	HDMI#
Display Port Lane 0 -	L#0	5	6	GND	Ground
Ground	GND	7	8	GND	Ground
Display Port Lane 1 +	L1	9	10	L3	Display Port Lane 3 +
Display Port Lane 1 -	L#1	11	12	L#3	Display Port Lane 3 -
Ground	GND	13	14	GND	Ground
Display Port Lane 2 +	L2	15	16	AUX	Auxiliary plus
Display Port Lane 2 -	L#2	17	18	AUX#	Auxiliary minus
Ground	GND	19	20	3.3 V	Supply voltage 3.3 V

Switching to HDMI

DisplayPort signals are led out via the interface by default. With the use of a level shifter cable the board switches the DisplayPort specification 1.1 automatically to HDMI signals.

7.5 Internal interfaces

7.5.1 M.2 2242/2280k Key B (P1000)

The CB8283 is equipped with an M.2 socket, into which an M.2-2242/2280 card (Key B) can be inserted. SATA signals (up to 3 Gb/s), which enable the connection of an M.2-SSD card, are fed out via this socket.

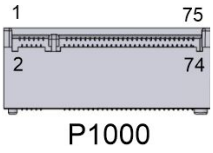


Fig. 8: P1000 M.2KeyB

Pin assignment M.2 2242/2280 connector					
Description	**Signal**	**Pin**		**Signal**	**Description**
Configuration pin	CFG3	1	2	3.3 V1	Standby supply voltage S3.3 V
Ground	GND1	3	4	3.3 V2	Standby supply voltage S3.3 V
Ground	GND2	5	6	FCPWROFF#	Full Card Power OFF active low
USB Channel 2 Data +	USB_D+	7	8	WDISABLE#	(not led out)
USB Channel 2 Data -	USB_D-	9	10	GPIO9 DAS DDS LED1	(not led out)
Ground	GND3	11	12	Connector Key	
Connector Key		13	14		
		15	16		
		17	18		
		19	20	GPIO5	(not led out)
Configuration pin	CFG 0	21	22	GPIO6	(not led out)
(not led out)	GPIO11	23	24	GPIO7	(not led out)
(not led out)	DPR	25	26	GPIO10	(not led out)
Ground	GND4	27	28	GPIO8	(not led out)
(not led out)	PER1# USB3 SSRX# SSICRX#	29	30	UIM_RST	(not led out)
(not led out)	PER1 USB3 SSRX SSICRX	31	32	UIM_CLK	(not led out)
Ground	GND5	33	34	UIM_DATA	(not led out)
(not led out)	PET1# USB3TX# SSICTX#	35	36	UIM_PWR	(not led out)
(not led out)	PET1 USB3TX SSICTX	37	38	DEVSLP	(not led out)
Ground	GND6	39	40	GPIO0	(not led out)
SATA Lane 1 Receive plus	PER0 SATAB	41	42	GPIO1	(not led out)
SATA Lane 1 Receive minus	PER0# SATAB#	43	44	GPIO2	(not led out)
Ground	GND7	45	46	GPIO3	(not led out)
SATA Lane 1 Transmit minus	PET0# SATAA#	47	48	GPIO4	(not led out)
SATA Lane 1 Transmit plus	PET0 SATAA	49	50	PRST#	PCIe Reset active low
Ground	GND8	51	52	CLKREQ#	(not led out)
(not led out)	REFCLK#	53	54	PEWAKE#	(not led out)
(not led out)	REFCLK	55	56	NC1	(not led out)
Ground	GND9	57	58	NC2	(not led out)
(not led out)	ANTCTL0	59	60	COEX3	(not led out)
(not led out)	ANTCTL1	61	62	COEX2	(not led out)
(not led out)	ANTCTL2	63	64	COEX1	(not led out)

Pin assignment M.2 2242/2280 connector					
Description	**Signal**	**Pin**		**Signal**	**Description**
(not led out)	ANTCTL3	65	66	SIM_ DETECT	(not led out)
Powergood	RESET#	67	68	SUSCLK	Suspendclock
Configuration pin	CFG1	69	70	3.3V3	Standby supply voltage S3.3 V
Ground	GND10	71	72	3.3V4	Standby supply voltage S3.3 V
Ground	GND11	73	74	3.3V5	Standby supply voltage S3.3 V
Configuration pin	CFG2	75			

7.5.2 Battery (BT500)

The board is delivered with a CR2032 battery holder together with a 3 V battery.

Fig. 9: BT500 battery

UL conformity

All technical measures for UL conformity are already integrated on the board.

Accordingly, no additional actions are necessary for the connection of an RTC battery. The battery must be connected directly.

8 BIOS

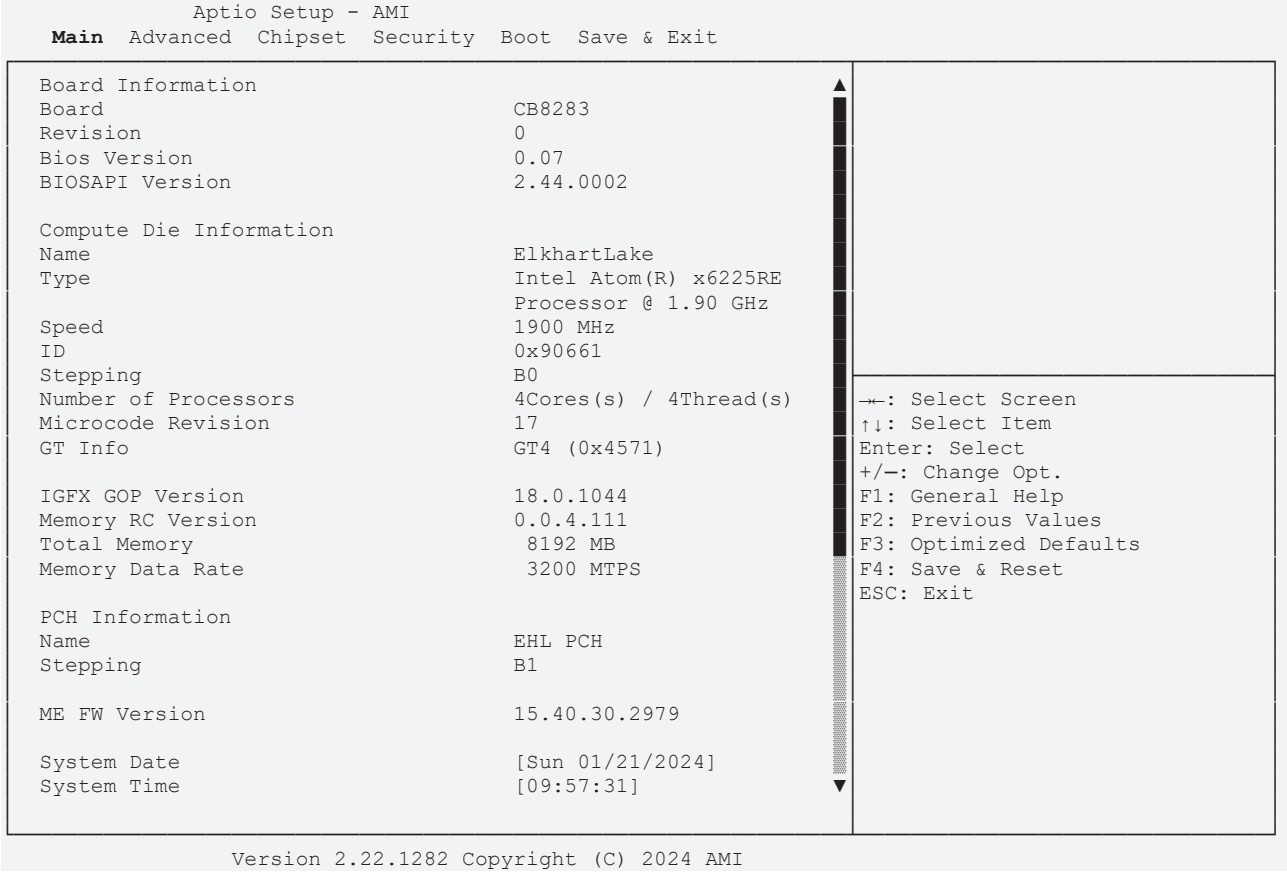
8.1 Using the setup

Within the individual setup pages the last saved settings can be restored can at any time with F2 ("Previous Values"). Use F3 ("Optimized Defaults") to load the factory defaults. Use F2/F3 to load the complete set of settings and F4 to save them (“Save & Reset”).

A "►" sign in front of the menu item indicates that a submenu is available. Use the arrow keys to navigate between menu items. Use the Enter key to select menu items and call submenus or selection dialogs.

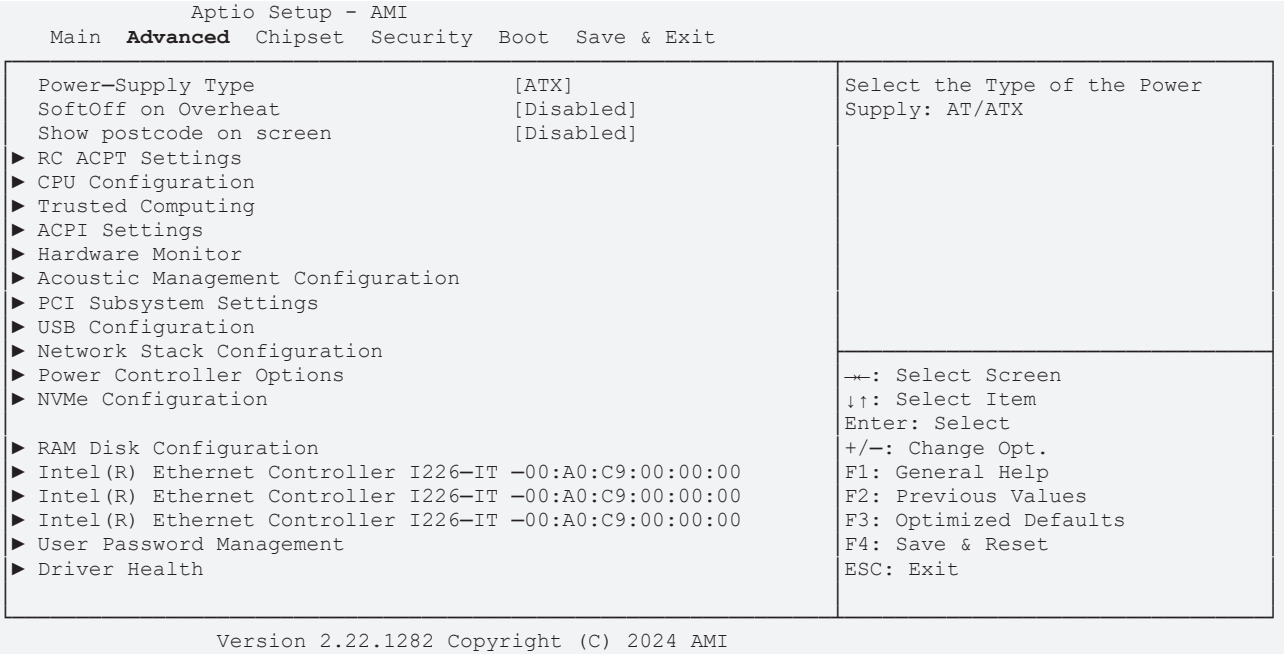
For each setup option a help text is displayed at the top right, which in many cases contains useful information about the option and permitted values, etc.

8.2 Main CB8283



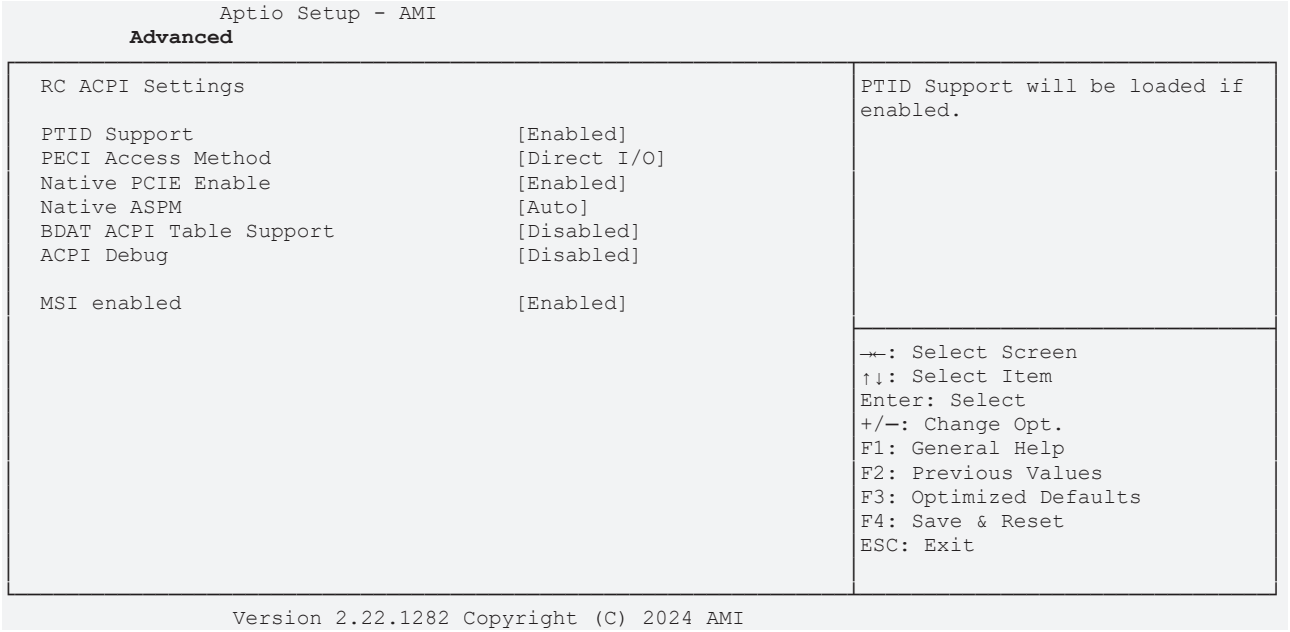
BIOS entry	Options
Board	None
Revision	None
Bios Version	None
BIOSAPI Version	None
Compute Die Information	None
Name	None
Type	None
Speed	None
ID	None
Stepping	None
Number of Processors	None
Microcode Revision	None
GT Info	None
IGFX GOP Version	None
Memory RC version	None
Total Memory	None
Memory Data Rate	None
PCH Information	None
Name	None
Stepping	None
ME FW Version	None
Memory Information	
System Date	Set the system date here.
System Time	Set the system time here.

8.3 Advanced



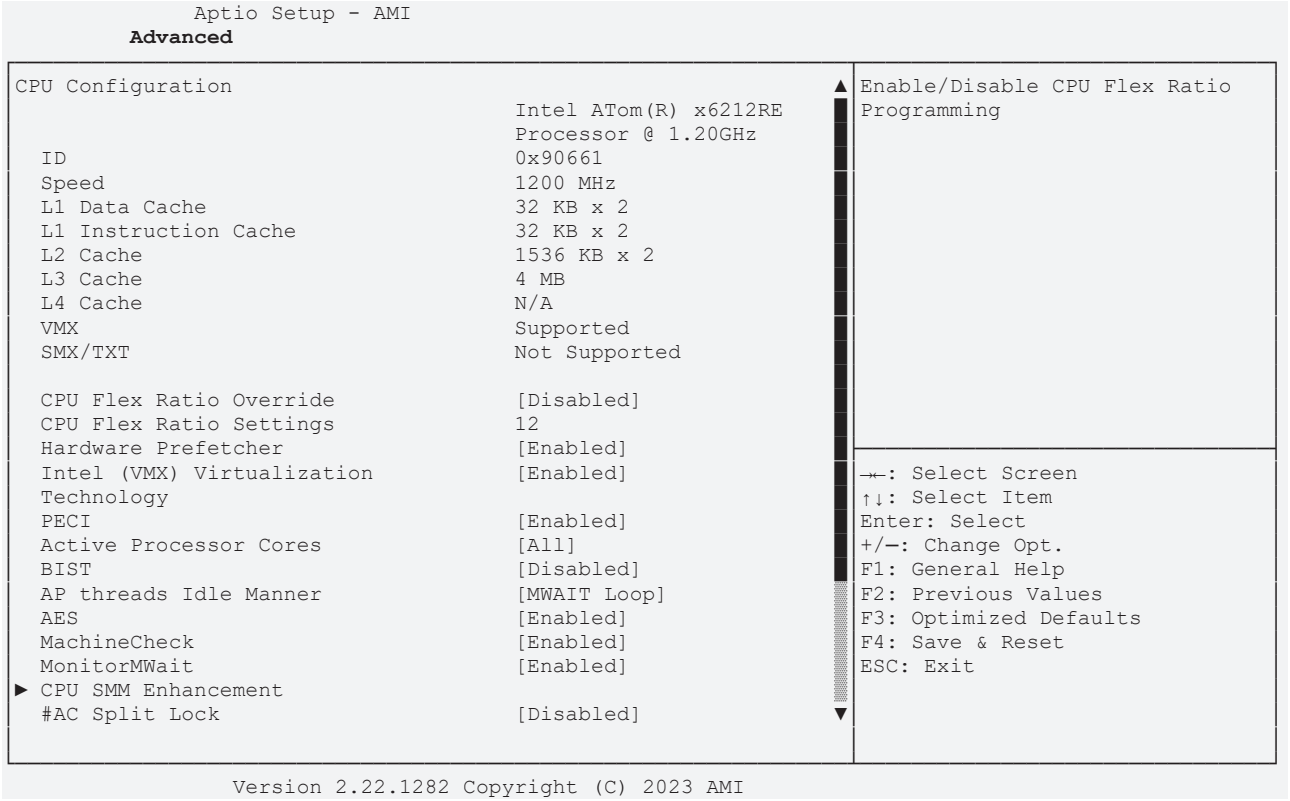
BIOS entry	Options
Power-Supply Type	ATX / AT
SoftOff on Overheat	Disabled / Enabled
Show postcode on screen	Disabled / Enabled
▶ RC ACPI Settings	Submenu: RC ACPI settings [▶ 27]
▶ CPU Configuration	Submenu: CPU Configuration [▶ 28]
▶ Trusted Computing	Submenu: Trusted Computing [▶ 30]
▶ ACPI Settings	Submenu: ACPI Settings [▶ 31]
▶ Hardware Monitor	Submenu: Hardware Monitor [▶ 31]
▶ Acoustic Management Configuration	Submenu: Acoustic Management Configuration [▶ 32]
▶ PCI Subsystem Settings	Submenu: PCI Subsystem Settings [▶ 33]
▶ USB Configuration	Submenu: USB Configuration [▶ 34]
▶ Network Stack Configuration	Submenu: Network Stack Configuration Disabled [▶ 35]
▶ Power Controller Options	Submenu: Power Controller Options [▶ 36]
▶ NVME Configuration	Submenu: NVMe Configuration [▶ 37]
▶ RAM Disk Configuration	Submenu: RAM Disk Configuration [▶ 37]
▶ Intel® Ethernet Controller I226-IT - 00:A0:C9:00:00:00	Submenu: Intel Ethernet Controller I226-IT [▶ 39]
▶ Intel® Ethernet Controller I226-IT - 00:A0:C9:00:00:00	Submenu: Intel Ethernet Controller I226-IT [▶ 40]
▶ Intel® Ethernet Controller I226-IT - 00:A0:C9:00:00:00	Submenu: Intel Ethernet Controller I226-IT [▶ 41]
▶ User Password Management	Submenu: User Password Management [▶ 42]
▶ Driver Health	Submenu: Driver Health [▶ 42]

8.3.1 RC ACPI settings



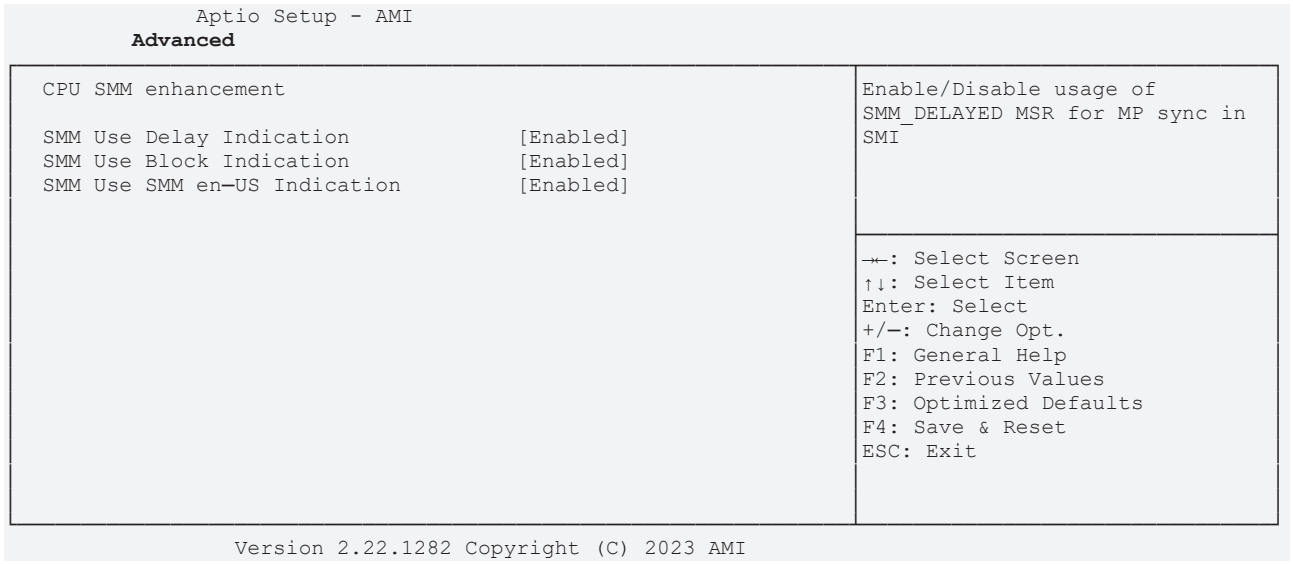
BIOS entry	Options
RC ACPI Settings	
PTID Support	Enabled / Disabled
PECI Access Method	Direct I/O / ACPI
Native PCIE Enable	Enabled / Disabled
Native ASPM	Auto / Enabled / Disabled
BDAT ACPI Table Support	Disabled / Enabled
ACPI Debug	Disabled / Enabled
MSI enabled	Enabled / Disabled

8.3.2 CPU Configuration



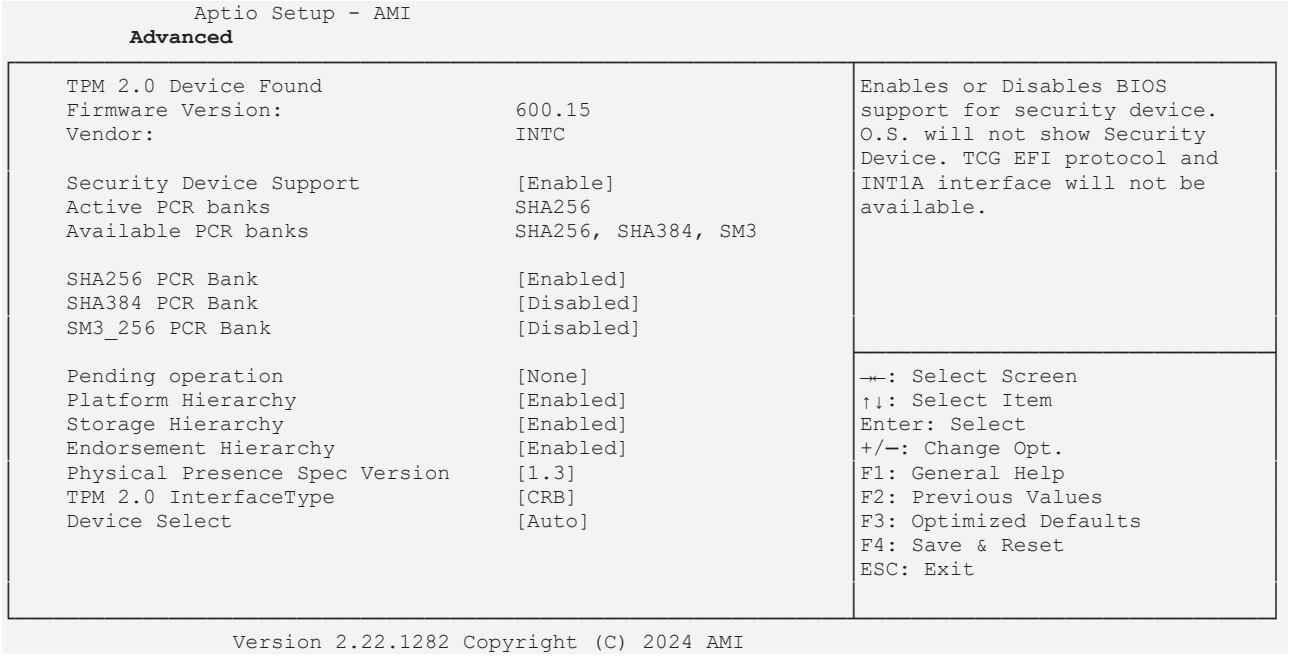
BIOS entry	Options
CPU Configuration	
Type	None
ID	None
Speed	None
L1 Data Cache	None
L1 Instruction Cache	None
L2 Cache	None
L3 Cache	None
L4 Cache	None
VMX	None
SMX/TXT	None
CPU Flex Ratio Override	Disabled / Enabled
CPU Flex Ratio Settings	None
Hardware Prefetcher	Enabled / Disabled
Adjacent Cache Line Prefetch	Enabled / Disabled
Intel (VMX) Virtualization Technology	Enabled / Disabled
PECI	Enabled / Disabled
Active Processor Cores	All / 1 / 2 / 3
BIST	Disabled / Enabled
AP threads Idle Manner	MWait Loop / Halt Loop / Run Loop
AES	Enabled / Disabled
MachineCheck	Enabled / Disabled
Monitor MWait	Enabled / Disabled
►CPU SMM Enhancement	Submenu: CPU SMM Enhancement [▶ 29]
#AC Split Lock	Disabled / Enabled

8.3.2.1 CPU SMM Enhancement



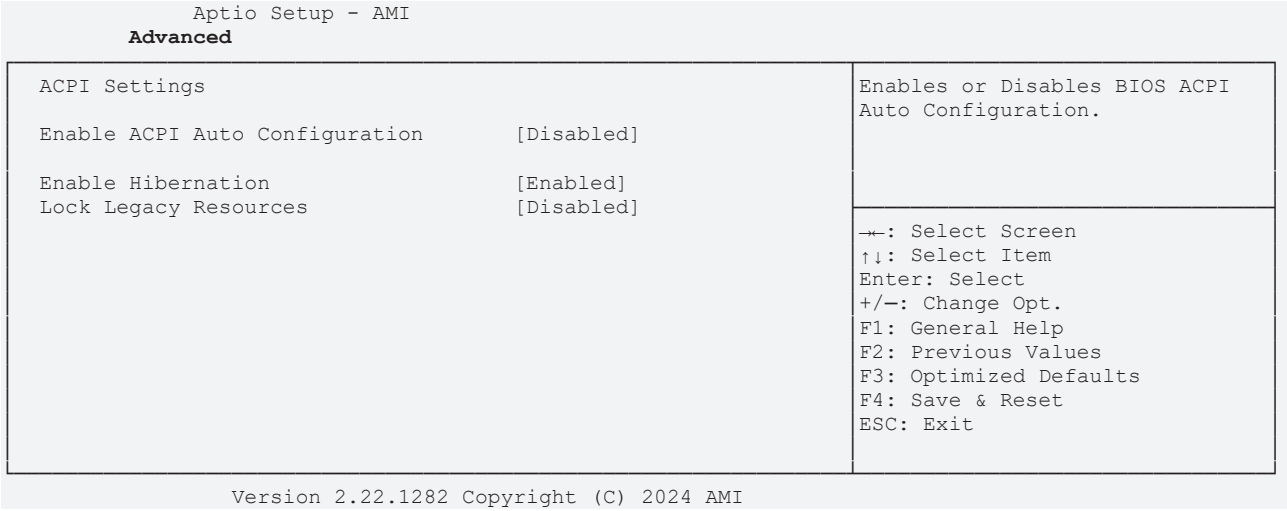
BIOS entry	Options
CPU SMM Enhancement Information	
SMM Use Delay Indication	Enabled / Disabled
SMM Use Block Indication	Enabled / Disabled
SMM Use SMM en - US Indication	Enabled / Disabled

8.3.3 Trusted Computing



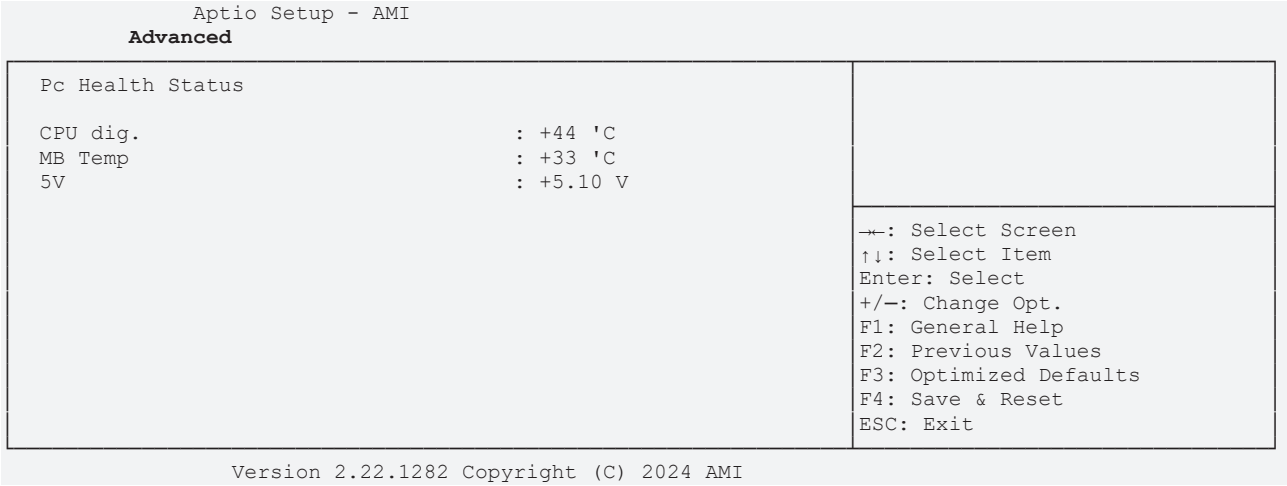
BIOS entry	Options
Configuration	
Security Device Support	Enable / Disable
SHA256 PCR Bank	Enabled / Disabled
SHA384 PCR Bank	Disabled / Enabled
SM_3256PCR Bank	Disabled/ Enabled
Pending Operation	None / TPM Clear
Platform Hierarchy	Enabled / Disabled
Storage Hierarchy	Enabled / Disabled
Endorsement Hierarchy	Enabled / Disabled
Physical Presence Spec Version	1.3 / 1.2
TPM 2.0 InterfaceType	None
Device Select	Auto / TPM 1.2 / TPM 2.0

8.3.4 ACPI Settings



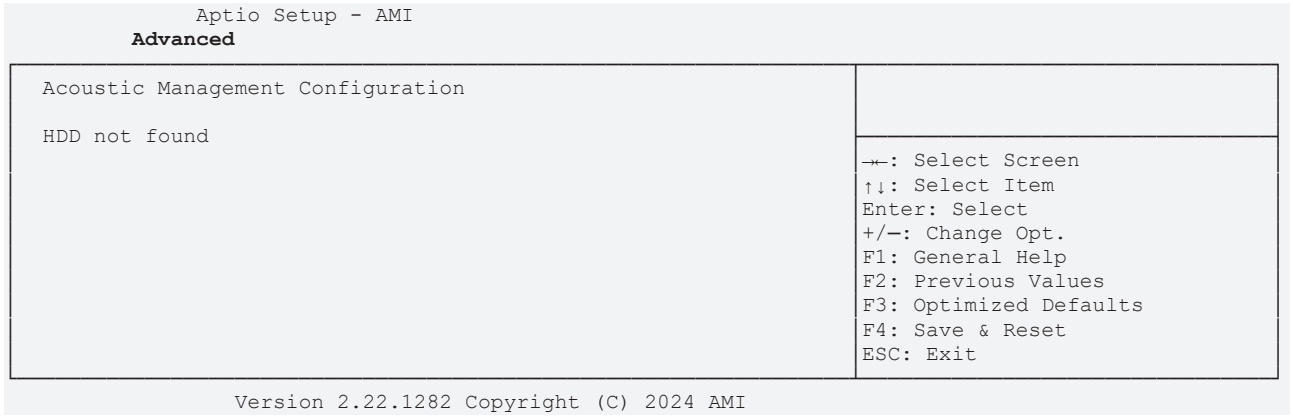
BIOS entry	Options
ACPI Settings	
Enable ACPI Auto Configuration	Disabled / Enabled
Enable Hibernation	Enabled / Disabled
Lock Legacy Resources	Disabled / Enabled

8.3.5 Hardware Monitor



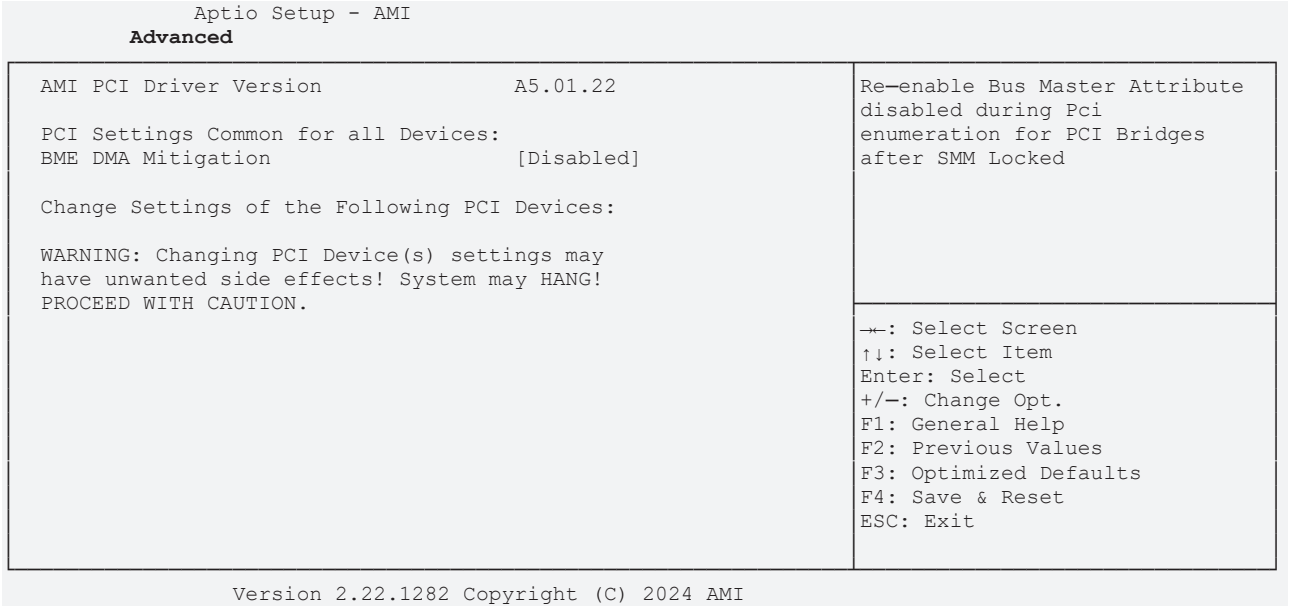
BIOS entry	Options
PC Health Status	None

8.3.6 Acoustic Management Configuration



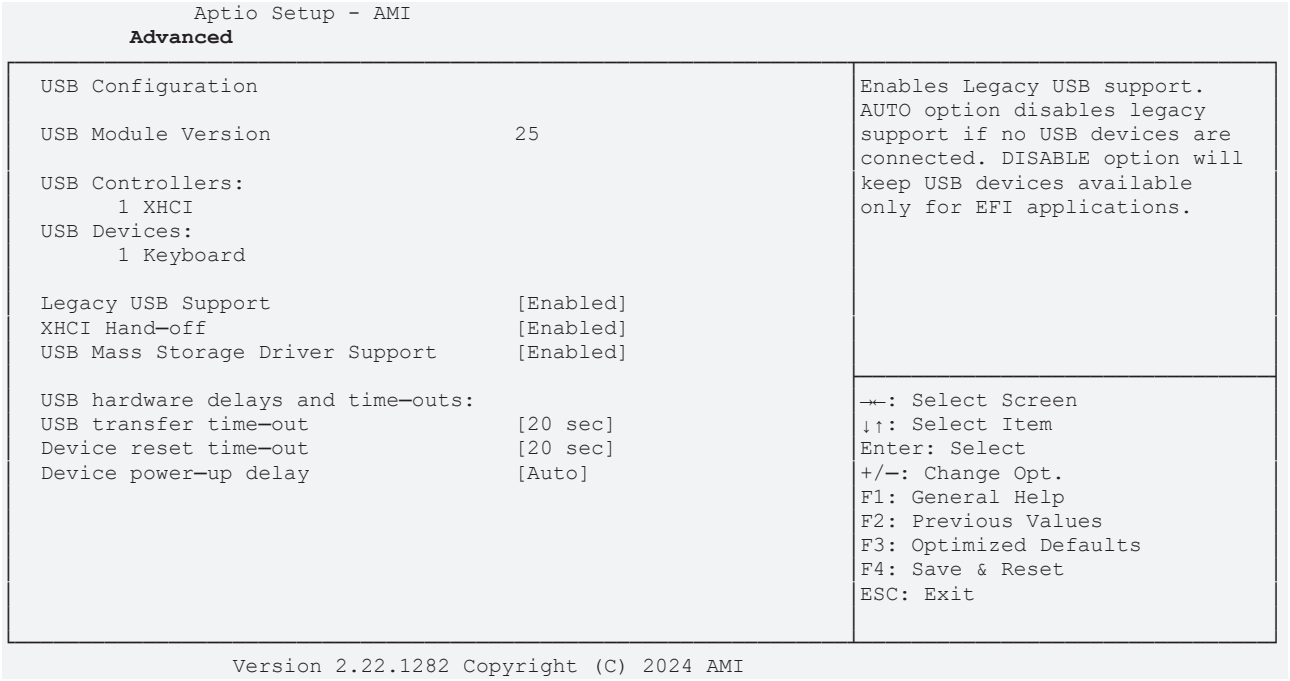
BIOS entry	Options
Acoustic Management Configuration	
HDD not found	None

8.3.7 PCI Subsystem Settings



BIOS entry	Options
AMI PCI Driver Version:	None
PCI Settings Common for all Devices:	
BME DMA Mitigation	Disabled / Enabled

8.3.8 USB Configuration

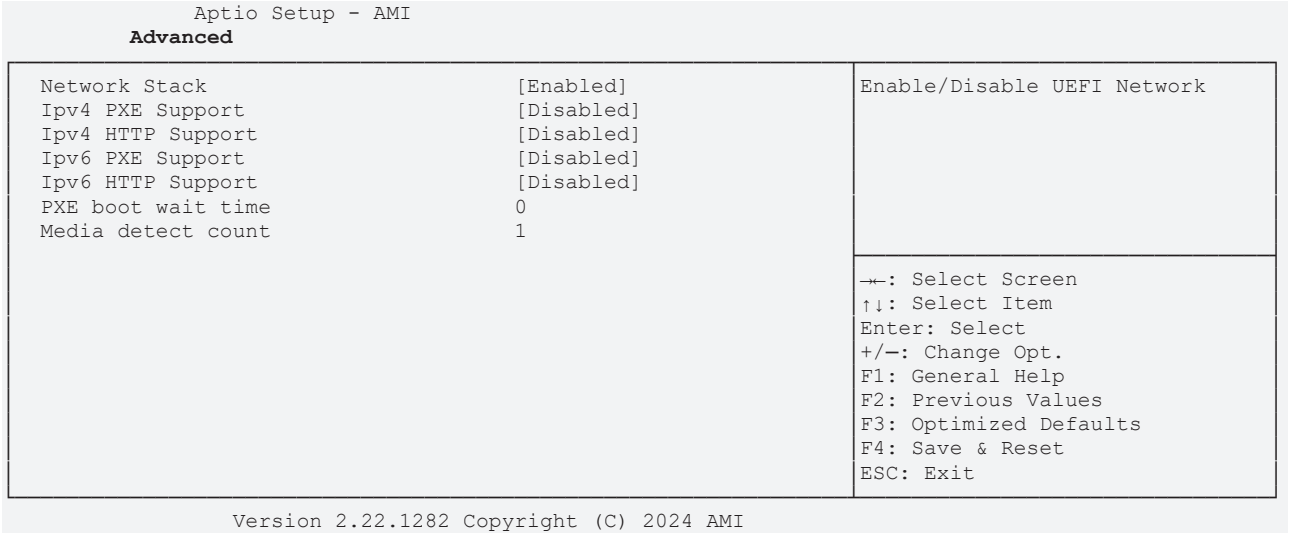


BIOS entry	Options
USB Configuration	
USB Module Version	None
USB Devices	None
Legacy USB support	Enabled / Disabled / Auto
XHCI Hand-off	Enabled / Disabled
USB Mass Storage Driver Support	Enabled / Disabled
USB hardware delays and time-outs:	
USB transfer time-out	1 / 5 / 10 / 20 sec
Device reset time-out	10 / 20 / 30 / 40 sec
Device power-up delay	Auto / Manual

8.3.9 Network Stack Configuration Disabled

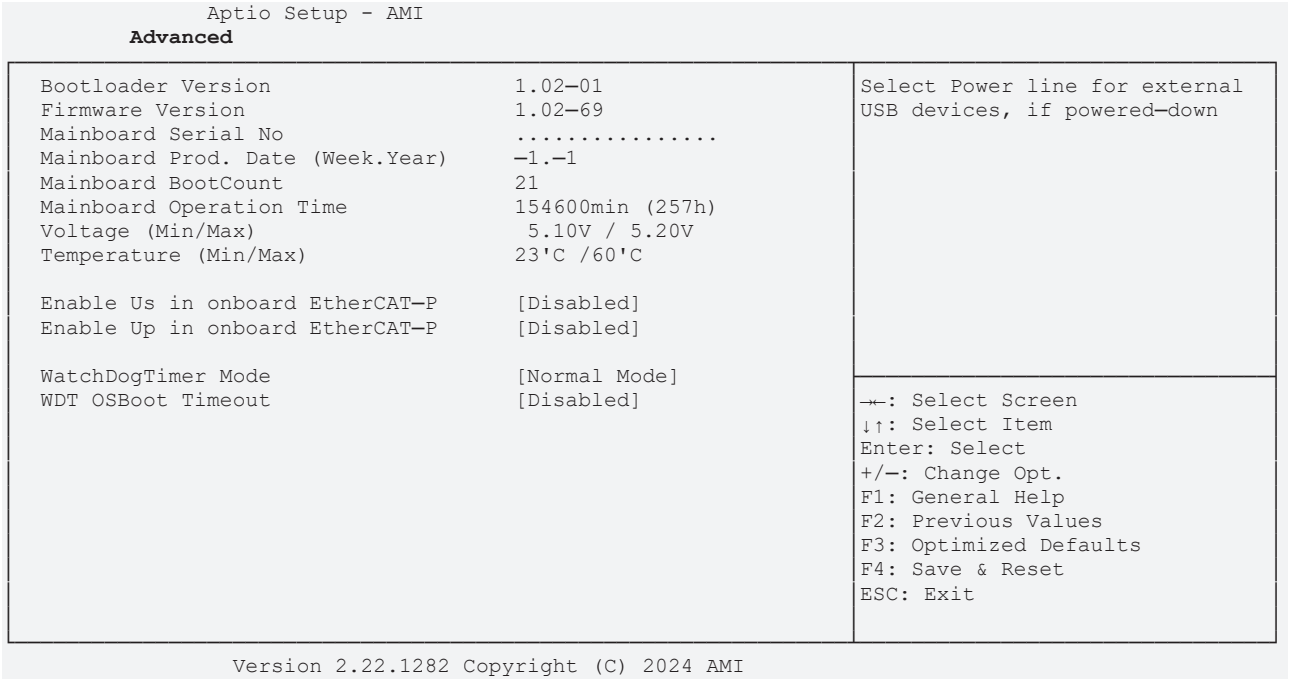
BIOS entry	Options
Network Stack	Disabled / Enabled

8.3.10 Network Stack Configuration Enabled



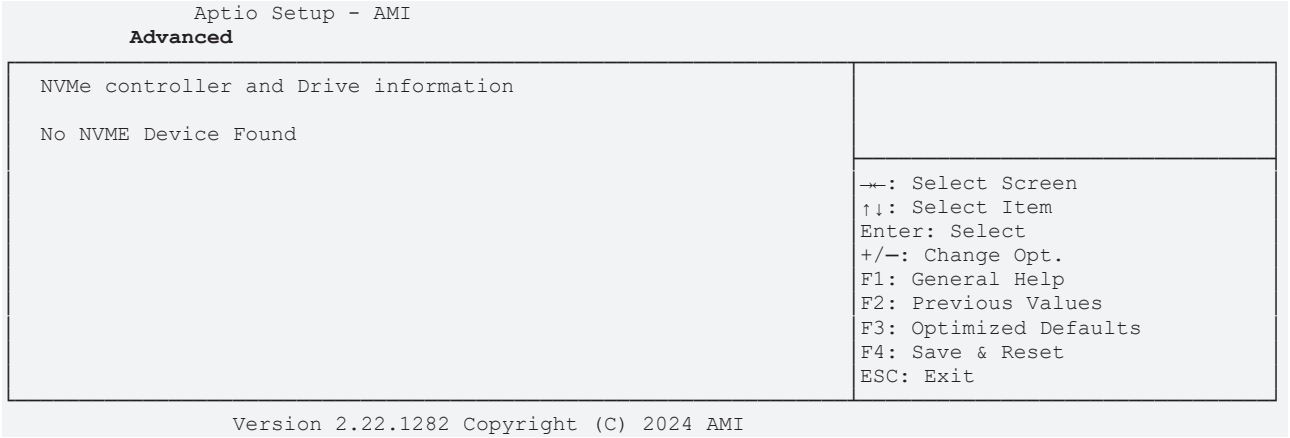
BIOS entry	Options
Network Stack	Enabled / Disabled
Ipv4 PXE Support	Enabled / Disabled
Ipv4 HTTP Support	Enabled / Disabled
Ipv6 PXE Support	Enabled / Disabled
Ipv6 HTTP Support	Enabled / Disabled
PXE boot wait time	None
Media detect count	None

8.3.11 Power Controller Options



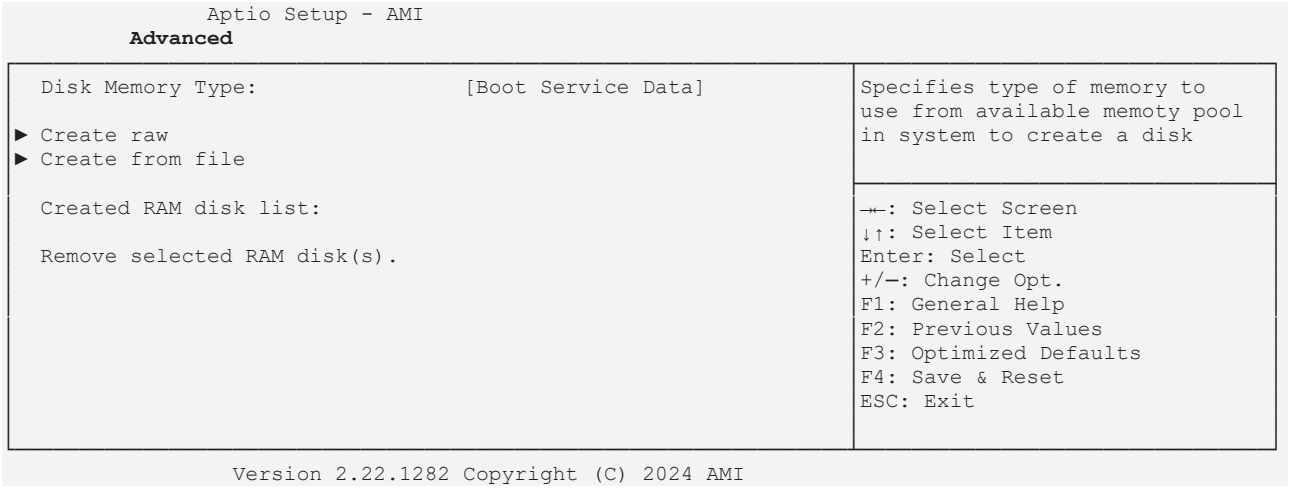
BIOS entry	Options
Bootloader version	None
Firmware version	None
Mainboard Serial No	None
Mainboard Prod. Date (Week.Year)	None
Mainboard BootCount	None
Mainboard Operation Time	None
Voltage (Min/Max)	None
Temperature (Min/Max)	None
Enable Us in onboard EtherCAT-P	Disabled / Enabled
Enable Up in onboard EtherCAT-P	Disabled / Enabled
WatchDogTimer Mode	Normal Mode / Compatibility Mode
WDT OSBoot Timeout	Disabled / 45/60/75…225/240/255 Seconds

8.3.12 NVMe Configuration



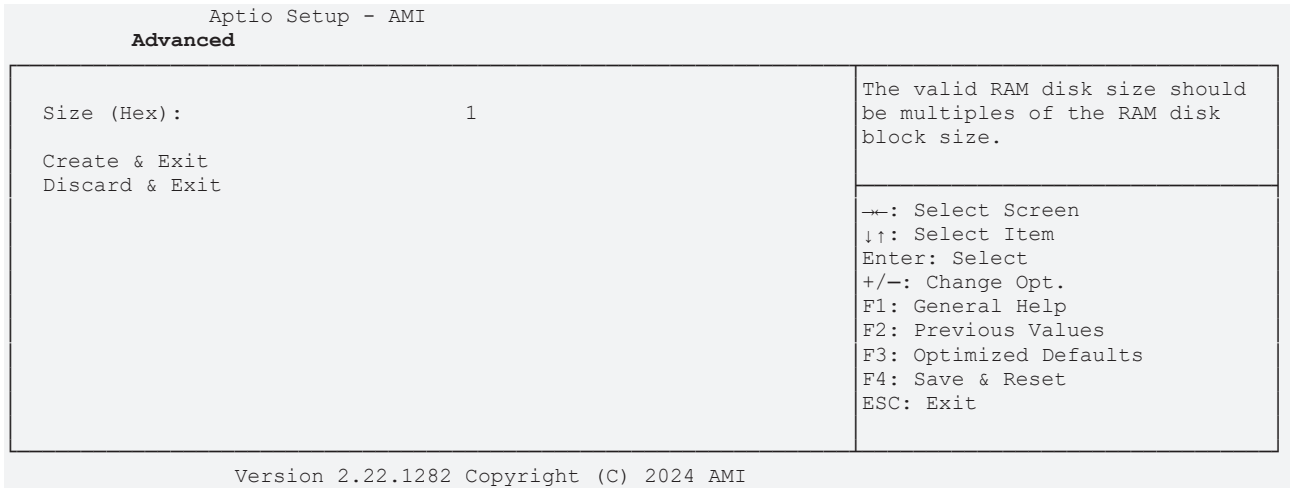
BIOS entry	Options
NVMe Configuration	
No NVME Device Found	None

8.3.13 RAM Disk Configuration



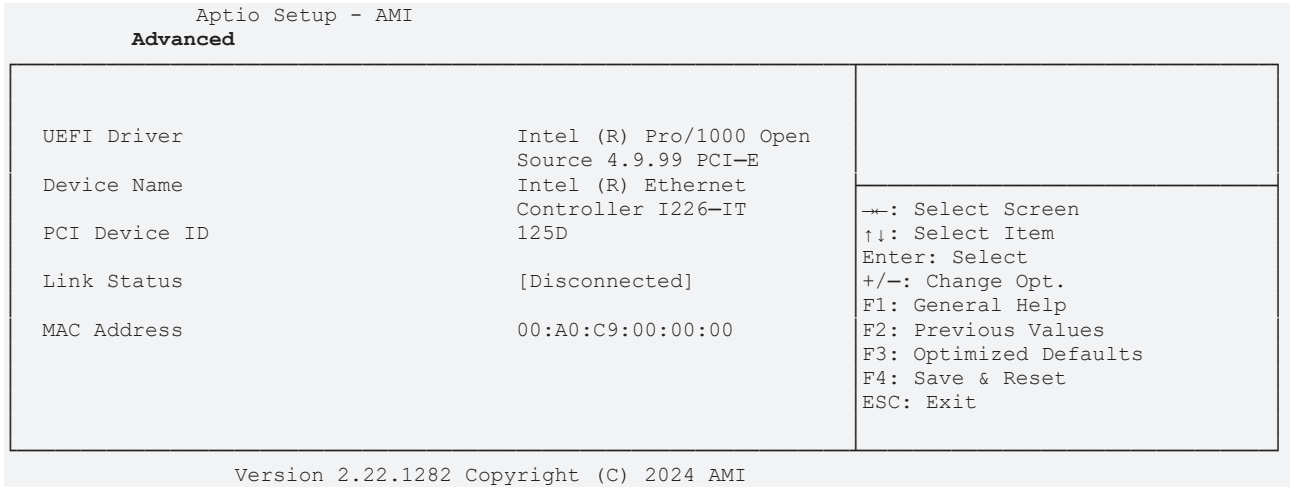
BIOS entry	Options
Disk Memory Type:	Boot Service Data / Reserved
► Create raw	Submenu: Create raw [▶ 38]
► Create from file	None
Created RAM disk list:	
Remove selected RAM disk(s).	None

8.3.13.1 Create raw



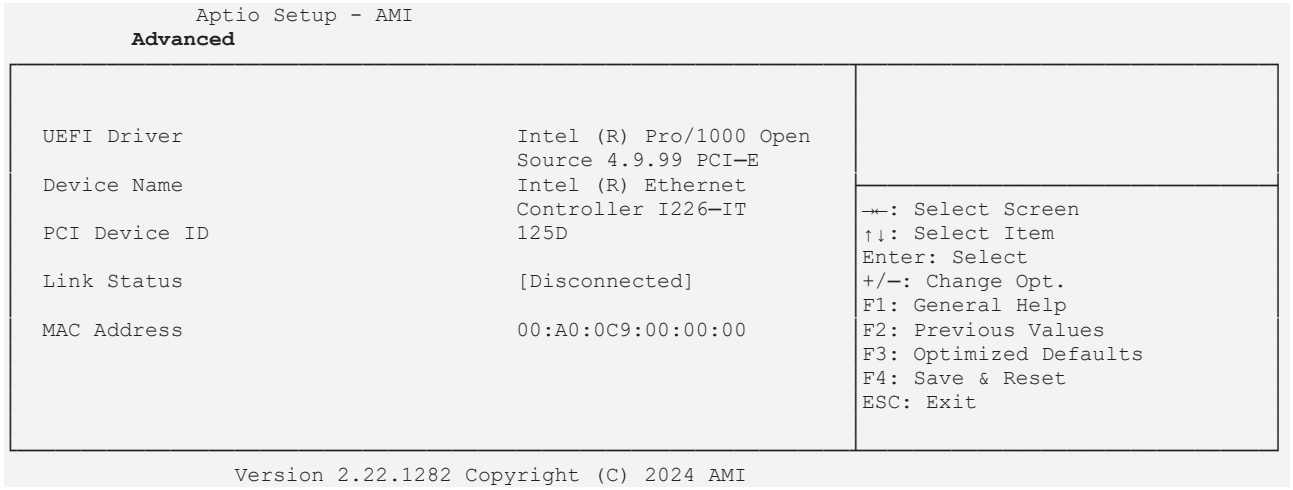
BIOS entry	Options
Size (Hex):	None
Create & Exit	None
Discard & Exit	None

8.3.14 Intel Ethernet Controller I226-IT



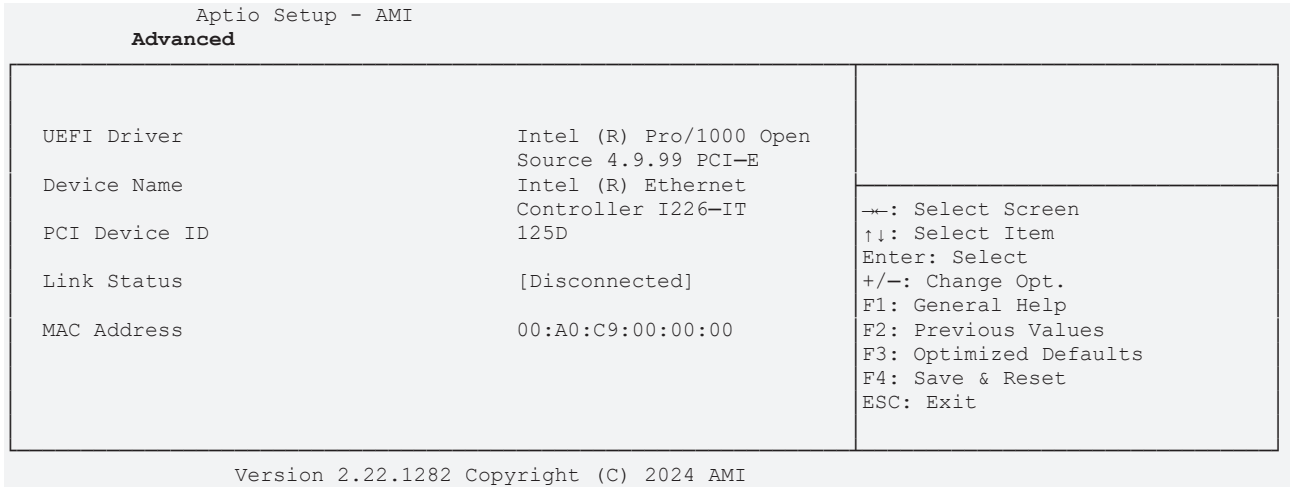
BIOS entry	Options
UEFI Driver	None
Device Name	None
PCI Device ID	None
Link Status	None
MAC Address	None

8.3.15 Intel Ethernet Controller I226-IT



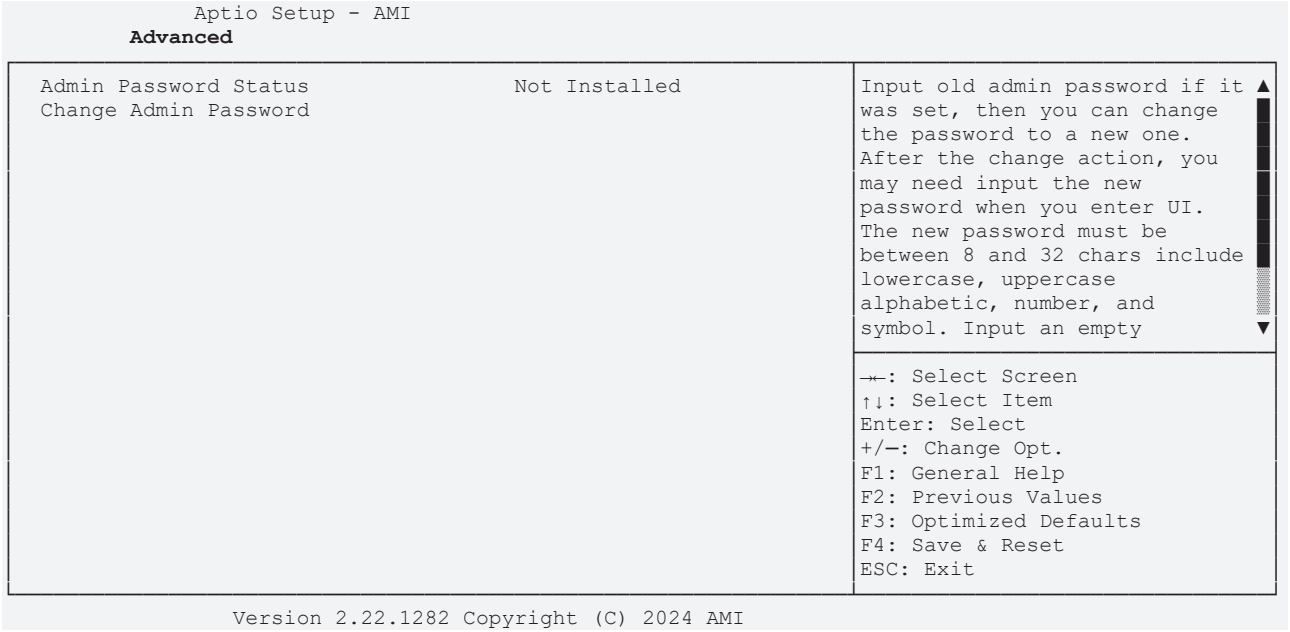
BIOS entry	Options
UEFI Driver	None
Device Name	None
PCI Device ID	None
Link Status	None
MAC Address	None

8.3.16 Intel Ethernet Controller I226-IT



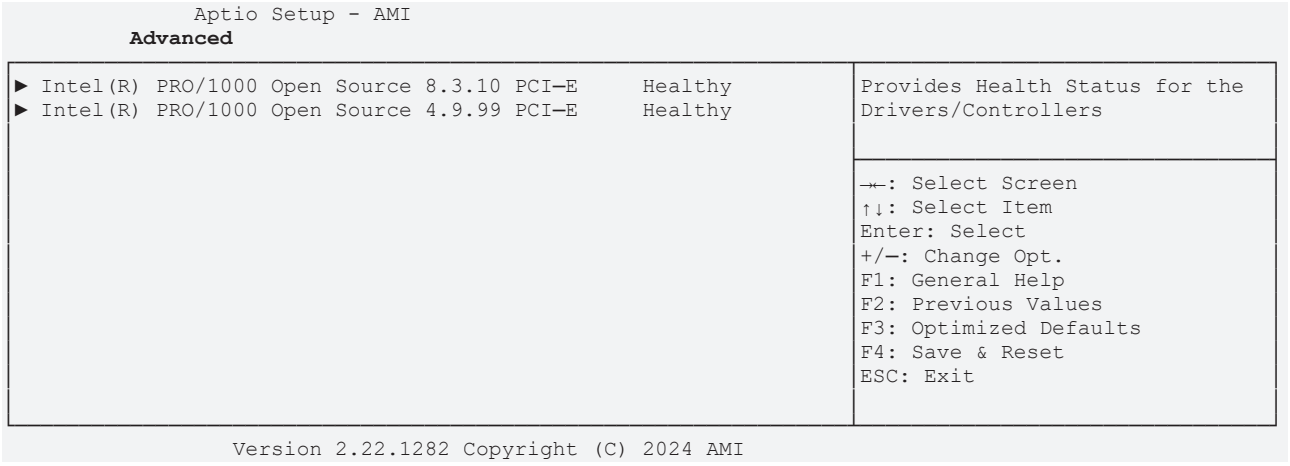
BIOS entry	Options
UEFI Driver	None
Device Name	None
PCI Device ID	None
Link Status	None
MAC Address	None

8.3.17 User Password Management



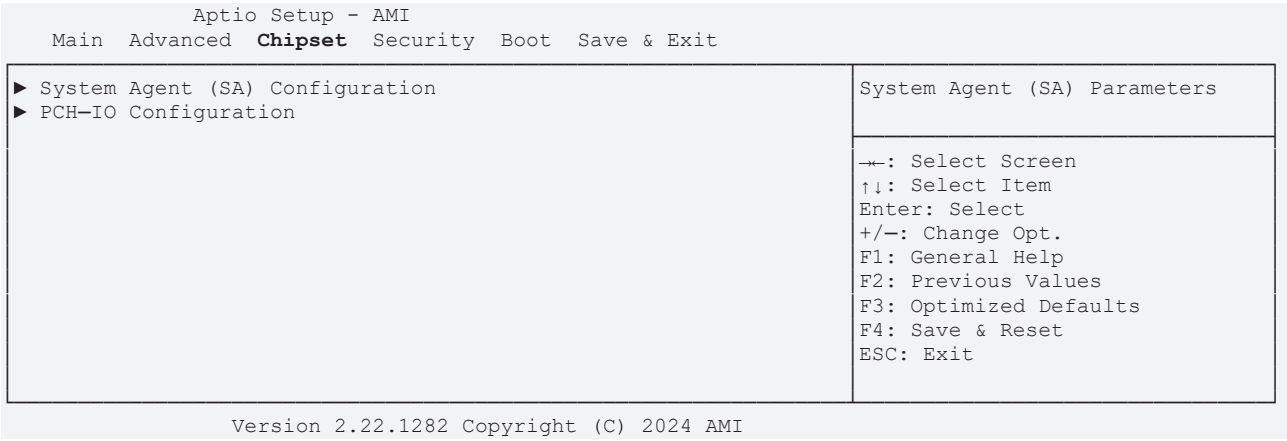
BIOS entry	Options
Admin Password Status	None
Change Admin Password	None

8.3.18 Driver Health



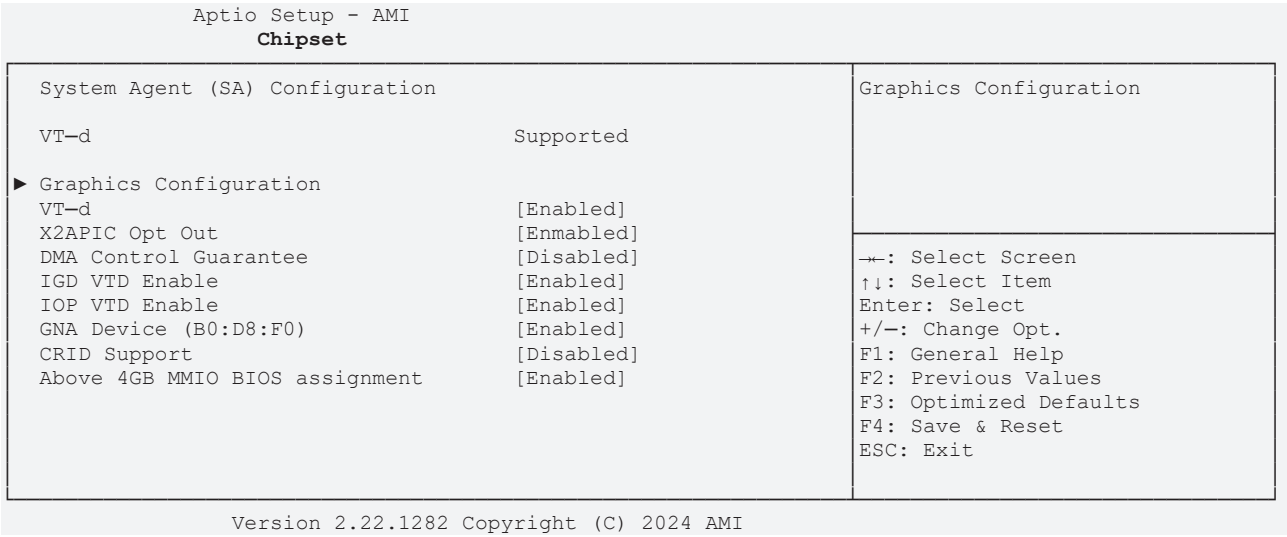
BIOS entry	Options
► Intel(R) PRO/1000 Open Source 8.3.10 PCI-E	None
► Intel(R) PRO/1000 Open Source 4.9.99 PCI-E	None

8.4 Chipset



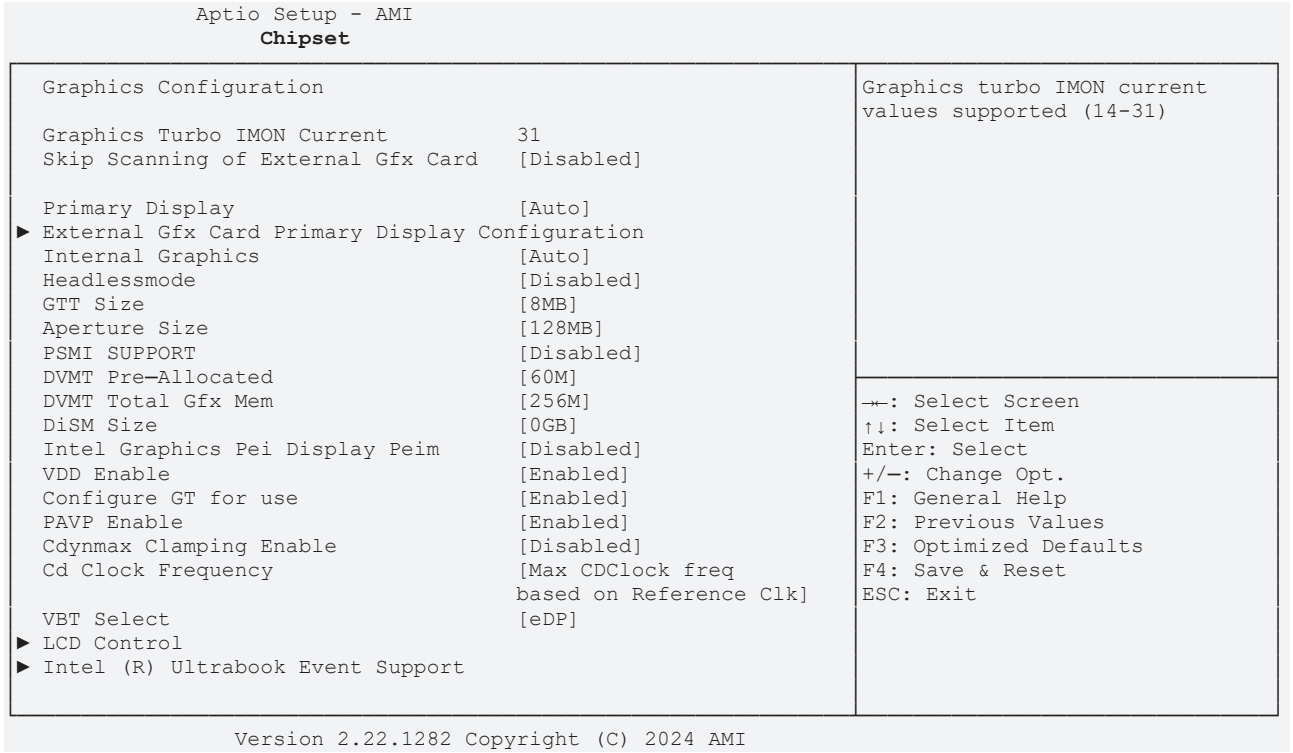
BIOS entry	Options
▶System Agent (SA) Configuration	Submenu: System Agent (SA) Configuration [▶ 43]
▶PCH-IO Configuration	Submenu: PCH-IO Configuration [▶ 48]

8.4.1 System Agent (SA) Configuration



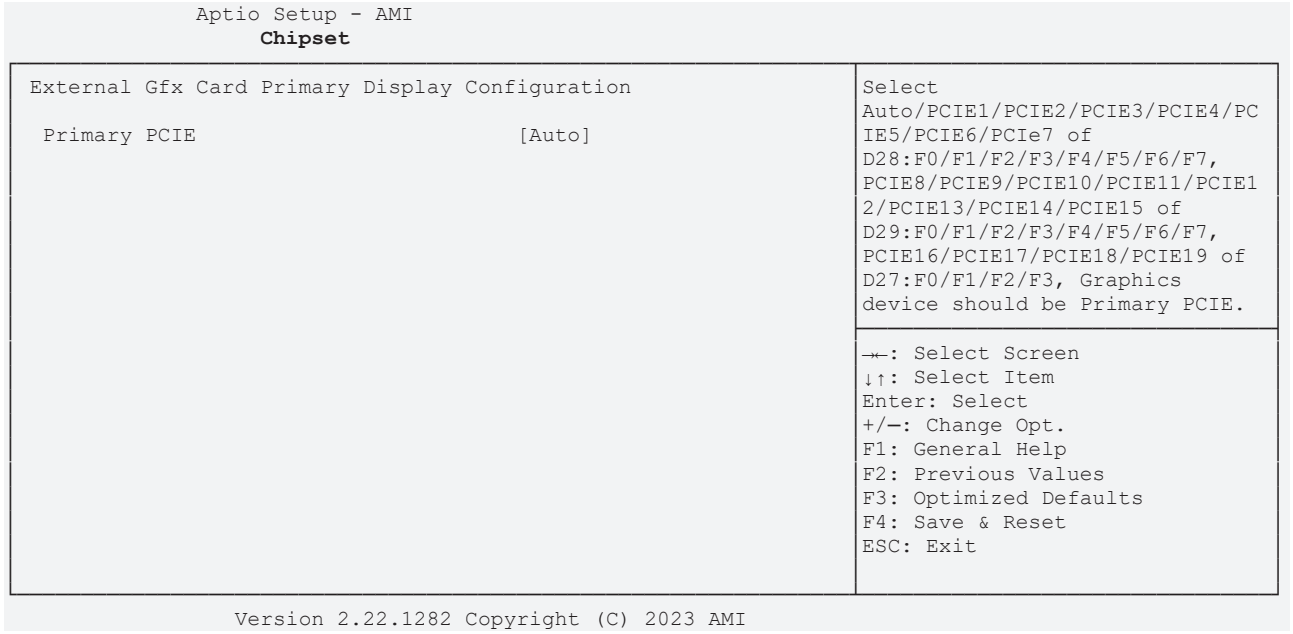
BIOS entry	Options
System Agent (SA) Configuration	
VT-d	None
▶ Graphics Configuration	Submenu: Graphics Configuration [▶ 44]
VT-d	Enabled / Disabled
X2APIC Opt Out	Disabled / Enabled
DMA Control Guarantee	Disabled / Enabled
IGD VTD Enable	Enabled / Disabled
IOP VTD Enable	Enabled / Disabled
GNA Device (B0:D8:F0)	Enabled / Disabled
CRID Support	Disabled / Enabled
Above 4GB MMIO BIOS assignment	Enabled / Disabled

8.4.1.1 Graphics Configuration



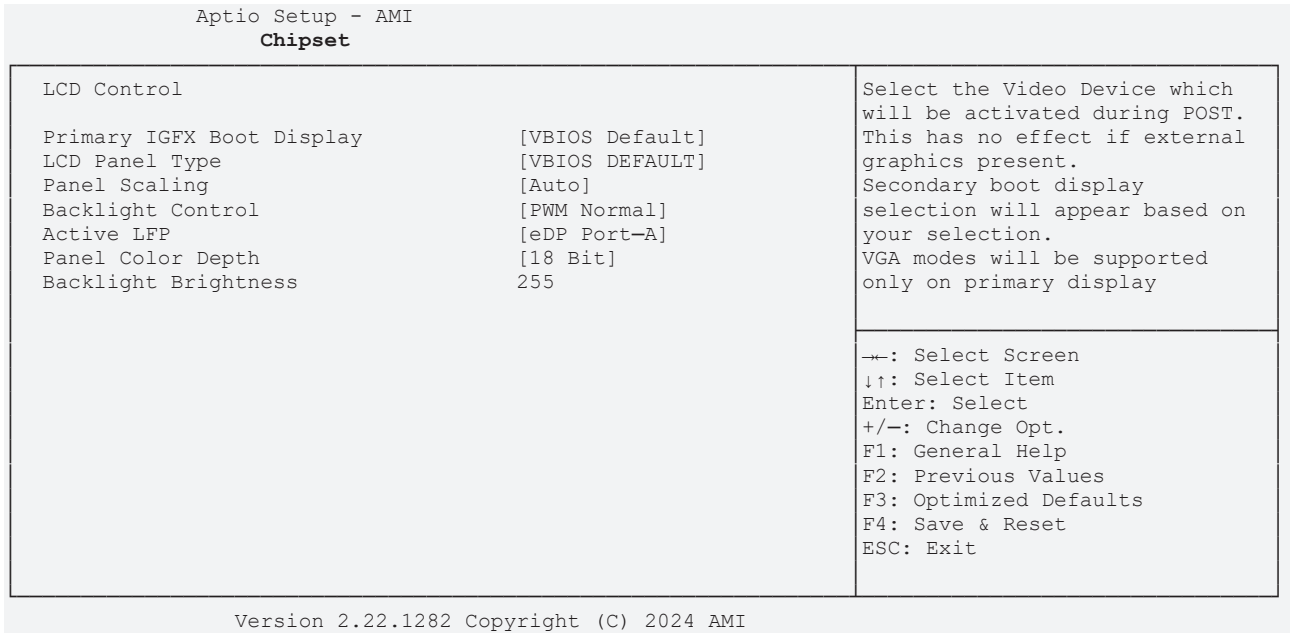
BIOS entry	Options
Graphics Configuration	
Graphics Turbo IMON Current	None
Skip Scanning of External Gfx Card	Disabled / Enabled
Primary Display	Auto / IGFX / PEG Slot / PCH PCI / HG
► External Gfx Card Primary Display Configuration	Submenu: External Gfx Card Primary Display Configuration [▶ 45]
Internal Graphics	Auto / Disabled / Enabled
GTT Size	2 / 4 / 8 MB
Aperture Size	128 / 256 / 512 / 1024 MB
PSMI SUPPORT	Disabled / Enabled
DVMT Pre-Allocated	0M, 32M…64M, 96M, 128M, 160M
DVMT Total Gfx Mem	128M / 256M / MAX
DiSM Size	0 – 7 GB
Intel Graphics Pei Display Peim	Disabled / Enabled
VDD Enable	Enabled / Disabled
Configure GT for use	Disabled / Enabled
PAVP Enable	Enabled / Disabled
Cdynmax Clamping Enable	Disabled / Enabled
Cd Clock Frequency	172.8 / 307.2 / 556.8 / 652.8 Mhz Max CdClock freq based on Reference Clk
VBT Select	eDP / MIPI
► LCD Control	Submenu: LCD Control [▶ 46]
► Intel® Ultrabook Event Support	Submenu: Intel Ultrabook Event Support [▶ 47]

8.4.1.1.1 External Gfx Card Primary Display Configuration



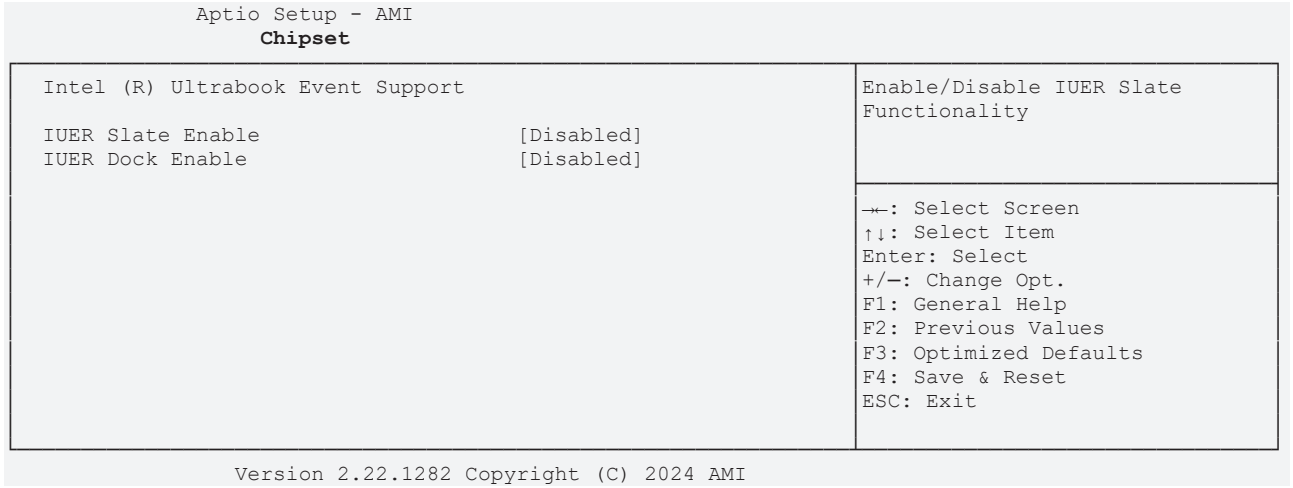
BIOS entry	Options
External Gfx Card Primary Display Configuration	
Primary PCIE	Auto / PCI1 - PCIE19

8.4.1.1.2 LCD Control



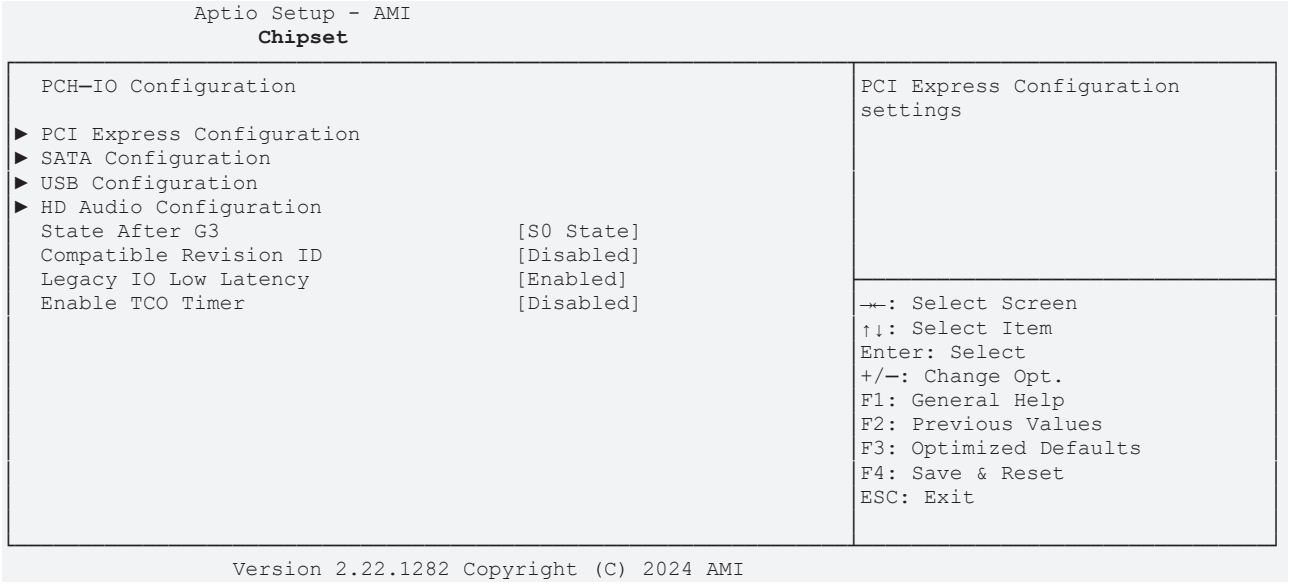
BIOS entry	Options
LCD Control	
Primary IGFX Boot Display	VBIOS Default / EFP / LFP / EFP3 / EFP2 / EFP3
LCD Panel Type	VBIOS Default / Various LVDS Resolutions
Panel Scaling	Auto / Off / Force Scaling
Backlight Control	PWM Normal / PWM Inverted
Active LFP	eDP Port / No eDP
Panel Color Depth	18 Bit / 24 Bit
Backlight Brightness	None

8.4.1.1.3 Intel Ultrabook Event Support



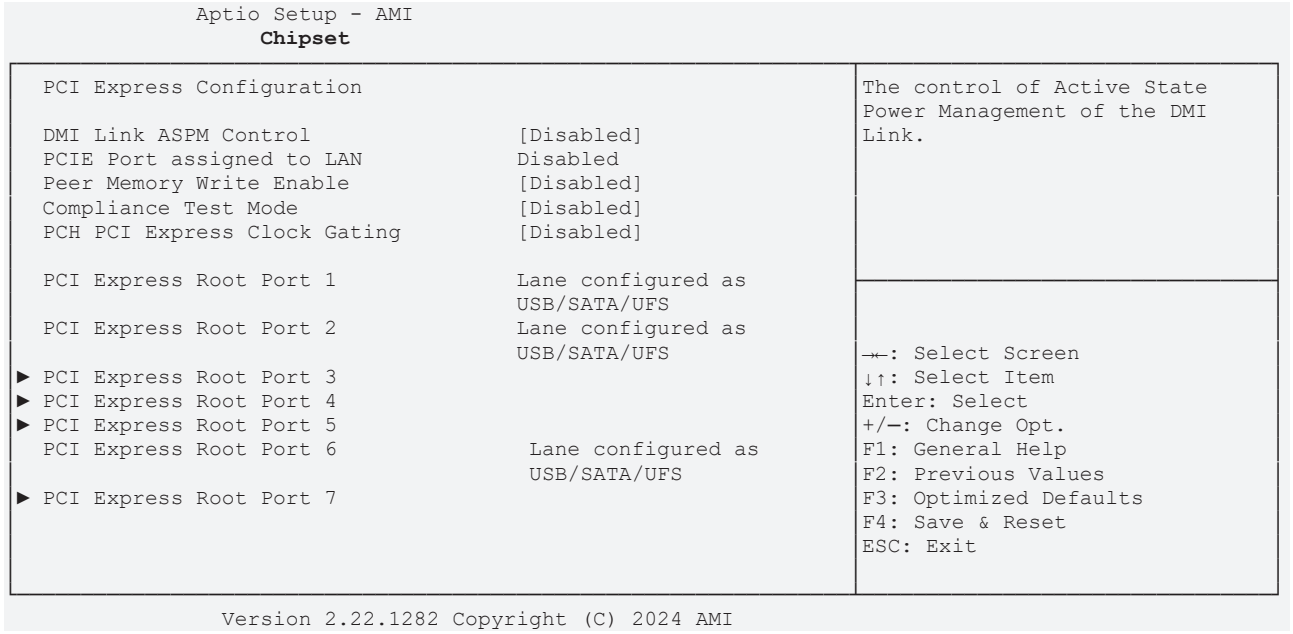
BIOS entry	Options
Intel® Ultrabook Event Support	
IUER Slate Enable	Disabled / Enabled
IUER Dock Enable	Disabled / Enabled

8.4.2 PCH-IO Configuration



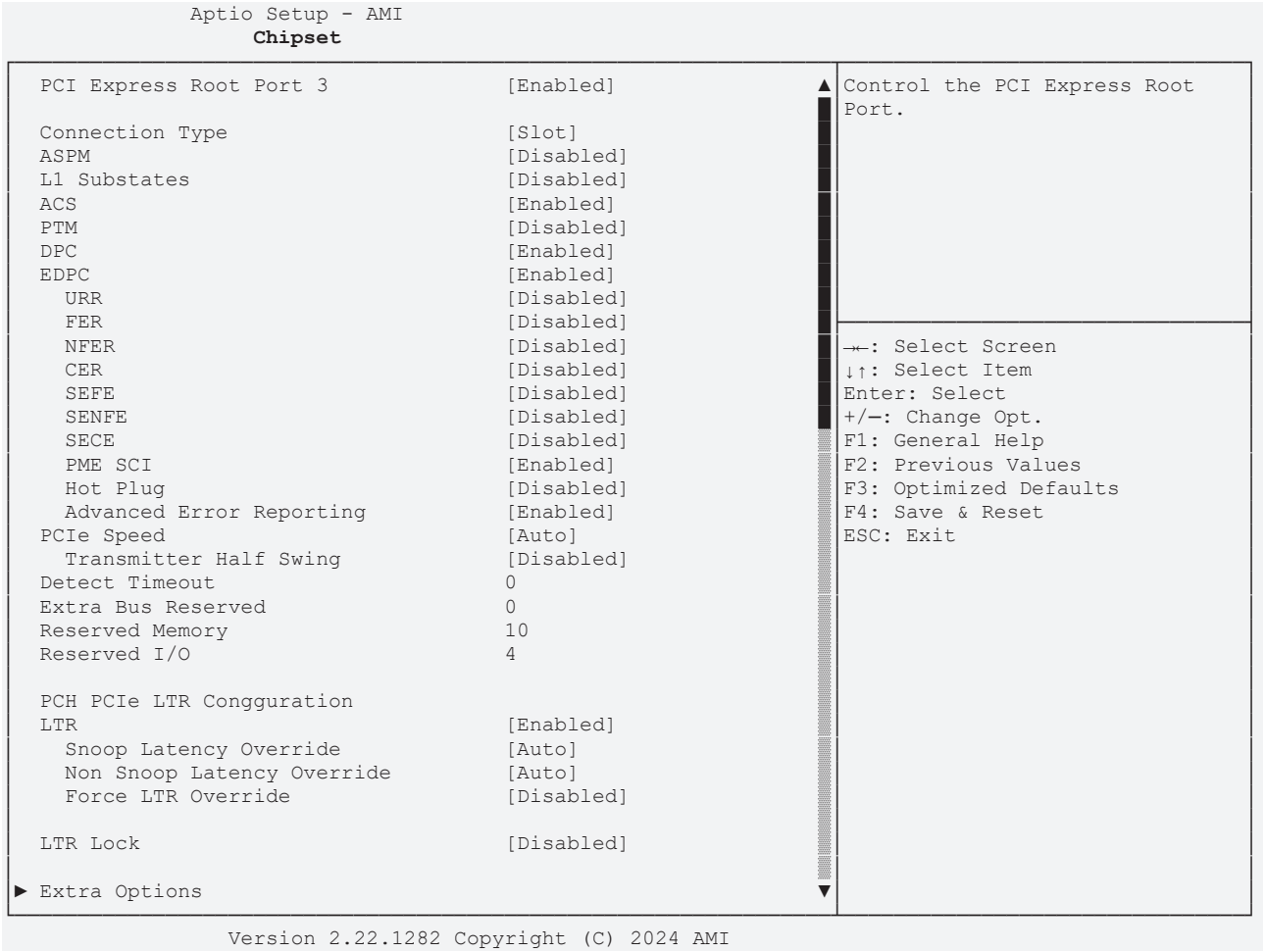
BIOS entry	Options
PCH-IO Configuration	
► PCI Express Configuration	Submenu: PCI Express Configuration [▶ 49]
► SATA Configuration	Submenu: SATA Configuration [▶ 64]
► USB Configuration	Submenu: USB Configuration [▶ 67]
► HD Audio Configuration	Submenu: HD Audio Configuration [▶ 68]
State After G3	S0 State / S5 State
Compatible Revision ID	None
Legacy IO Low Latency	Disabled / Enabled
Enable TCO Timer	Enabled / Disabled

8.4.2.1 PCI Express Configuration



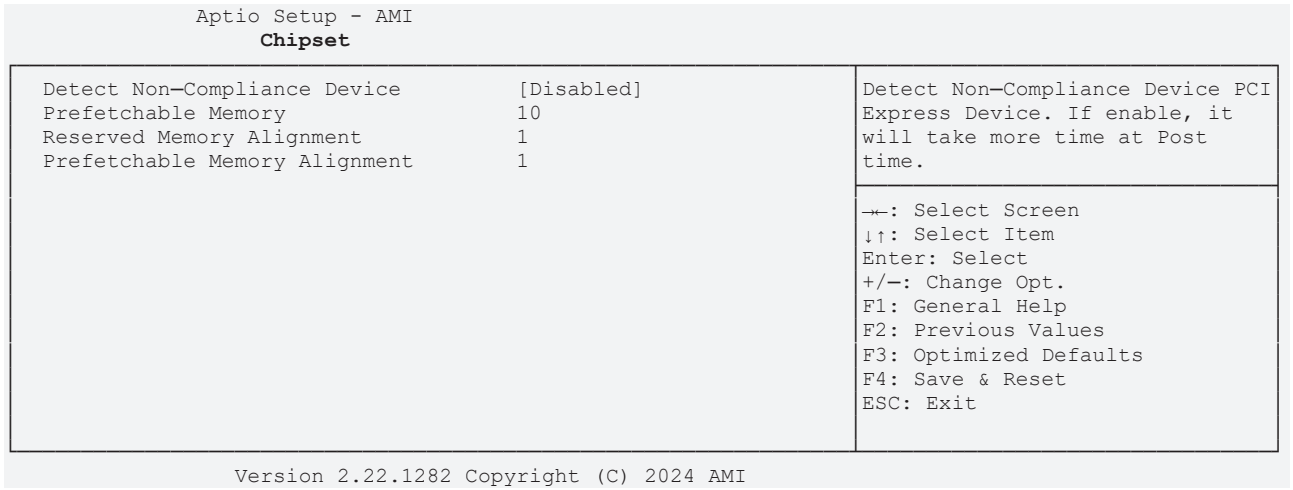
BIOS entry	Options
PCI Express Configuration	
DMI Link ASPM Control	Disabled / L0s / L1 / L0sL1 / Auto
PCIE Port assigned to LAN	Disabled
Peer Memory Write Enable	Disabled / Enabled
Compliance Test Mode	Disabled / Enabled
PCH PCI Express Clock Gating	Disabled / Enabled
PCI Express Root Port 1	None
PCI Express Root Port 2	None
► PCI Express Root Port 3	Submenu: PCI Express Root Port 3 [▶ 50]
► PCI Express Root Port 4	Submenu: PCI Express Root Port 4 [▶ 53]
► PCI Express Root Port 5	Submenu: PCI Express Root Port 5 [▶ 56]
PCI Express Root Port 6	None
► PCI Express Root Port 7	Submenu: PCI Express Root Port 7 [▶ 60]

8.4.2.1.1 PCI Express Root Port 3



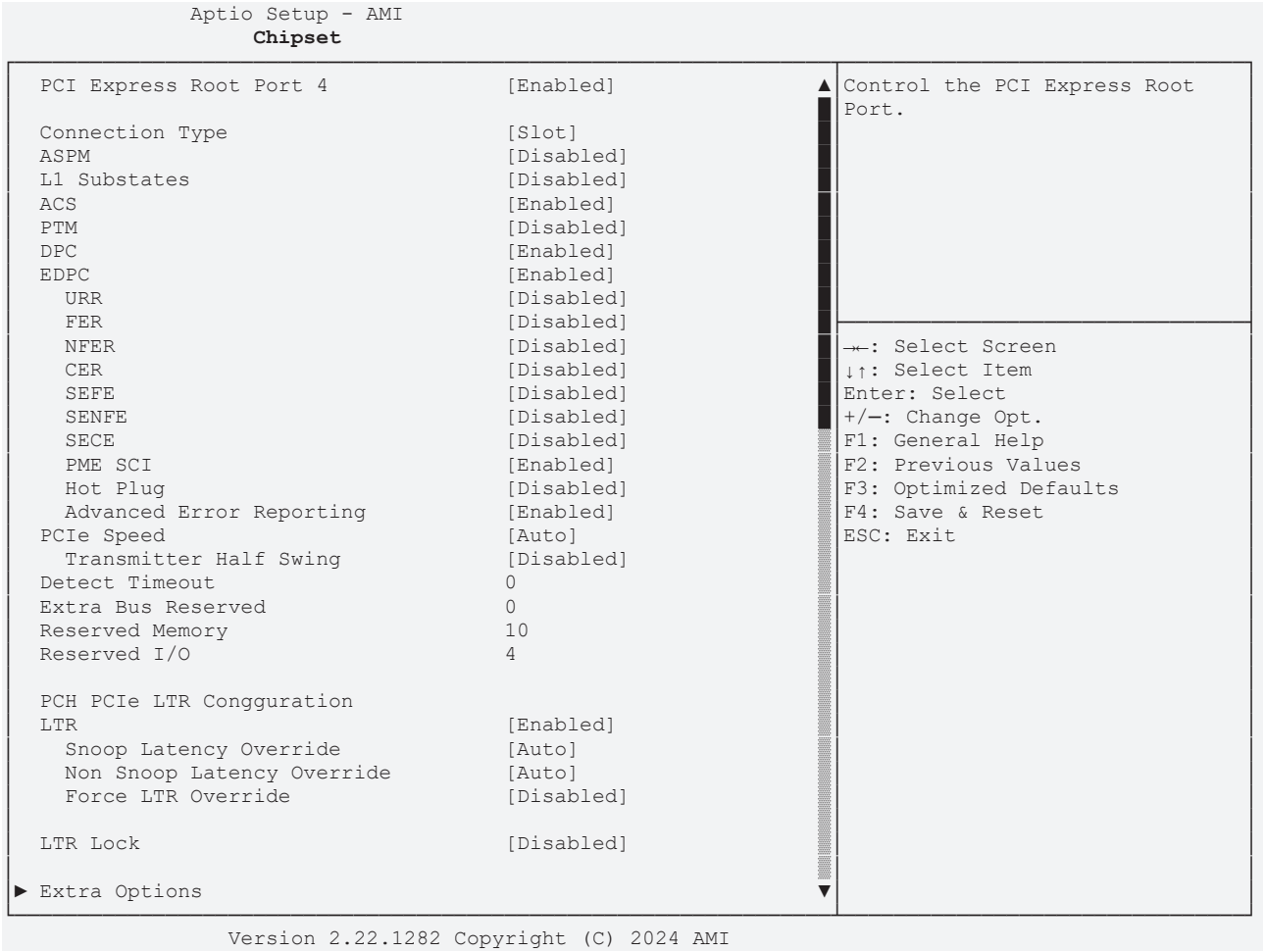
BIOS entry	Options
PCI Express Root Port 5	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	Disabled / L1.1 & L1.2 / L1.1
ACS	Enabled / Disabled
PTM	Enabled / Disabled
DPC	Enabled / Disabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Disabled / Enabled
Hot Plug	Enabled / Disabled
Advanced Error Reporting	Enabled / Disabled
PCIe Speed	Auto / Gen1 / Gen2 / Gen3
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved I/O	None
PCH PCIe LTR Configuration	
LTR	Enabled / Disabled
Snoop Latency Override	Auto / Manual / Disabled
Non Snoop Latency Override	Auto / Manual / Disabled
Force LTR Override	Disabled / Enabled
LTR Lock	Disabled / Enabled
► Extra Options	Submenu: Extra Options [▶ 52]

8.4.2.1.1.1 Extra Options



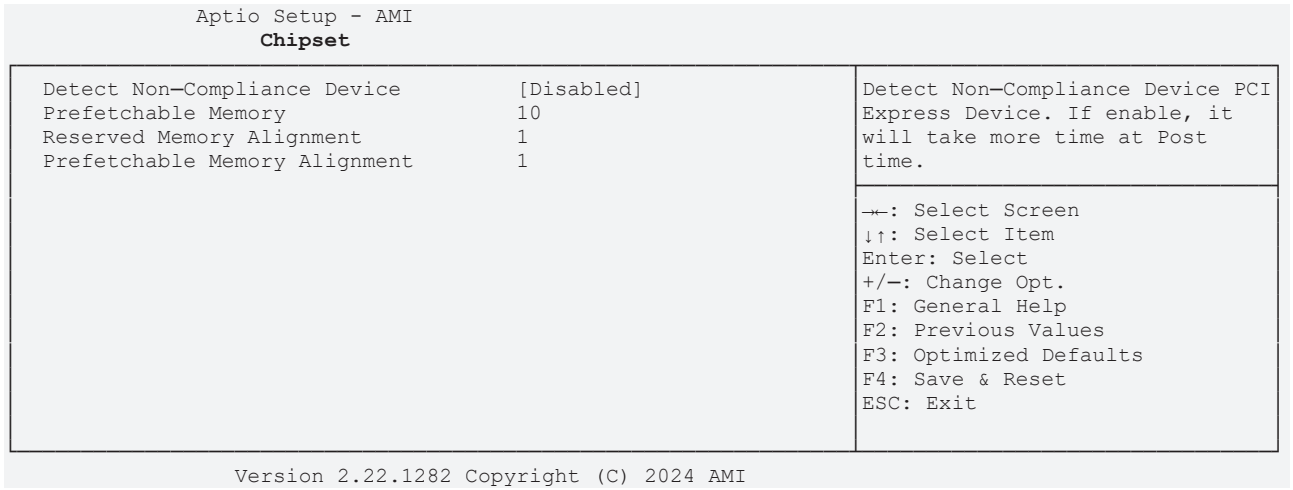
BIOS entry	Options
Detect Non-Compliance Device	Disabled / Enabled
Prefetchable Memory	None
Reserved Memory Alignment	None
Prefetchable Memory Alignment	None

8.4.2.1.2 PCI Express Root Port 4



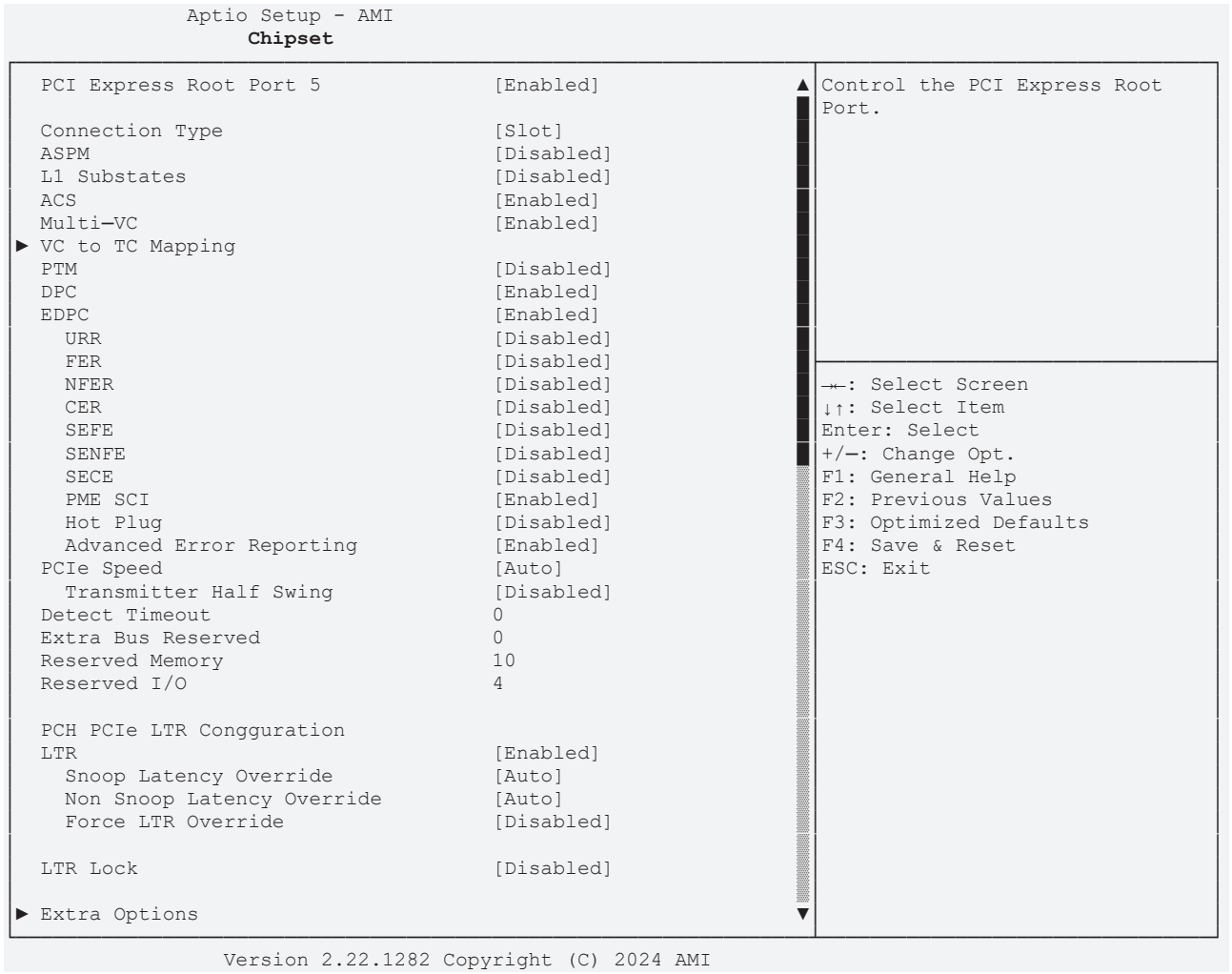
BIOS entry	Options
PCI Express Root Port 5	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	Disabled / L1.1 & L1.2 / L1.1
ACS	Enabled / Disabled
PTM	Enabled / Disabled
DPC	Enabled / Disabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Disabled / Enabled
Hot Plug	Enabled / Disabled
Advanced Error Reporting	Enabled / Disabled
PCIe Speed	Auto / Gen1 / Gen2 / Gen3
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved I/O	None
PCH PCIe LTR Configuration	
LTR	Enabled / Disabled
Snoop Latency Override	Auto / Manual / Disabled
Non Snoop Latency Override	Auto / Manual / Disabled
Force LTR Override	Disabled / Enabled
LTR Lock	Disabled / Enabled
► Extra Options	Submenu: Extra Options [▶ 55]

8.4.2.1.2.1 Extra Options



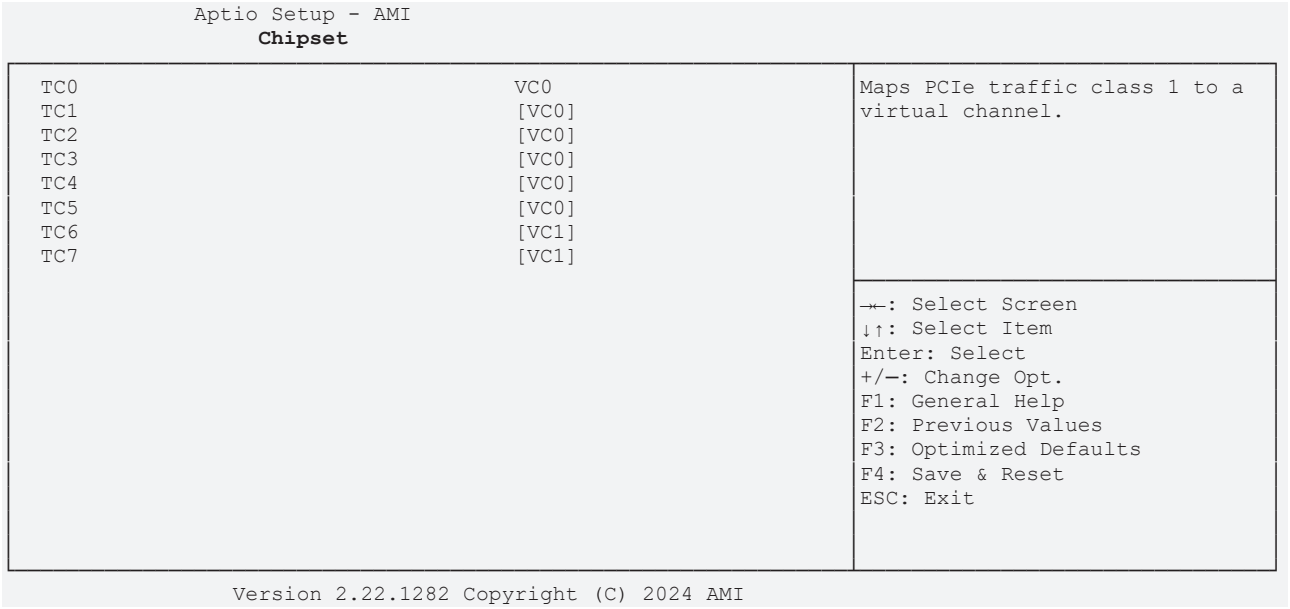
BIOS entry	Options
Detect Non-Compliance Device	Disabled / Enabled
Prefetchable Memory	None
Reserved Memory Alignment	None
Prefetchable Memory Alignment	None

8.4.2.1.3 PCI Express Root Port 5



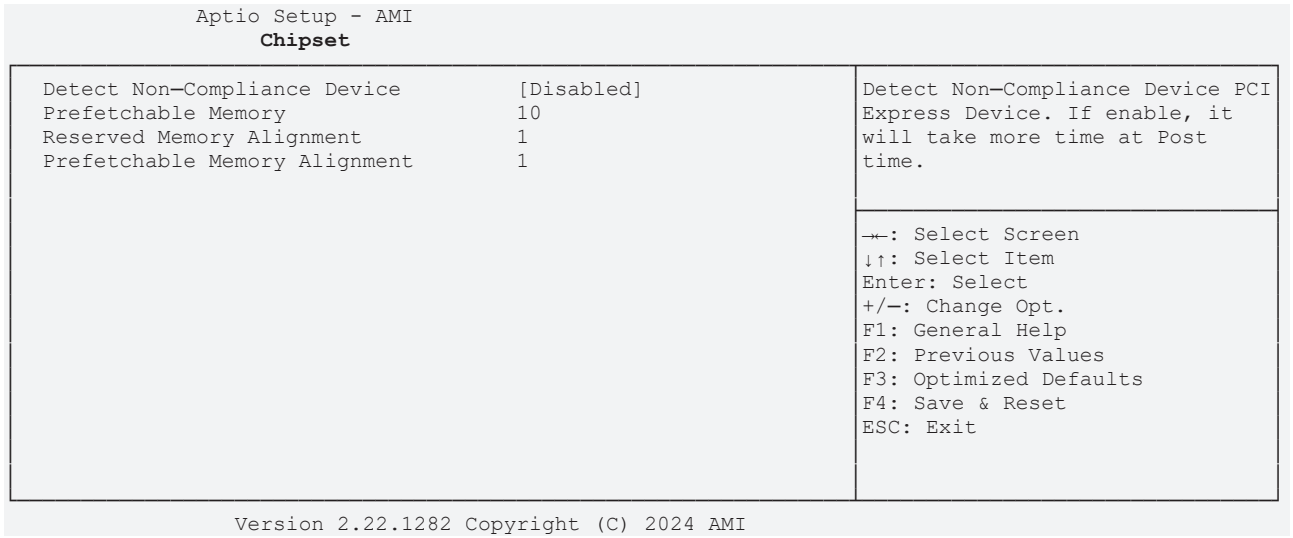
BIOS entry	Options
PCI Express Root Port 5	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	Disabled / L1.1 & L1.2 / L1.1
ACS	Enabled / Disabled
Multi-VC	Enabled / Disabled
► VC to TC Mapping	Submenu: VC to TC Mapping [▶ 58]
PTM	Enabled / Disabled
DPC	Enabled / Disabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Disabled / Enabled
Hot Plug	Enabled / Disabled
Advanced Error Reporting	Enabled / Disabled
PCIe Speed	Auto / Gen1 / Gen2 / Gen3
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved I/O	None
PCH PCIe LTR Configuration	
LTR	Enabled / Disabled
Snoop Latency Override	Auto / Manual / Disabled
Non Snoop Latency Override	Auto / Manual / Disabled
Force LTR Override	Disabled / Enabled
LTR Lock	Disabled / Enabled
► Extra Options	Submenu: Extra Options [▶ 59]

8.4.2.1.3.1 VC to TC Mapping



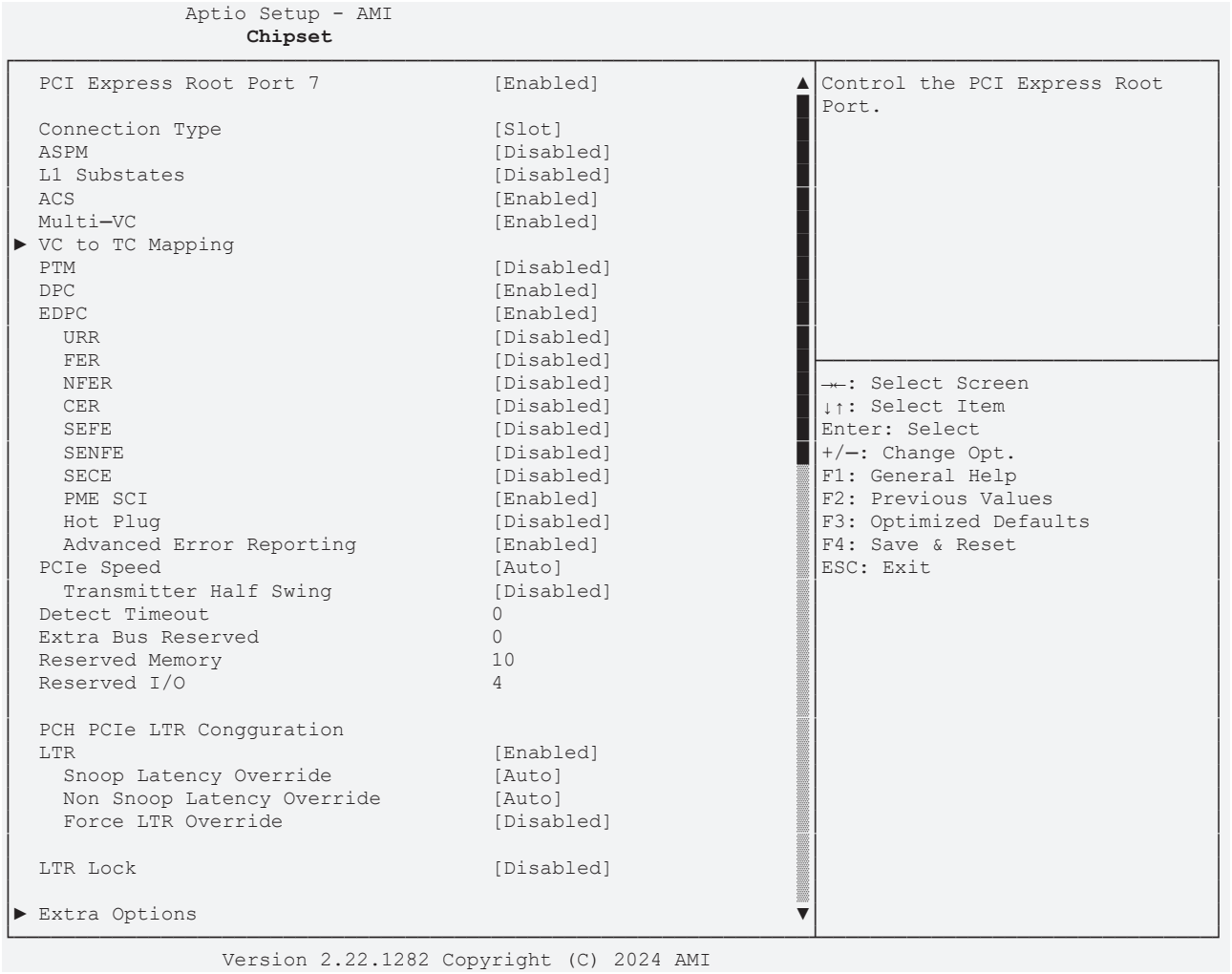
BIOS entry	Options
TC0	None
TC1	VC0 / VC1
TC2	VC0 / VC1
TC3	VC0 / VC1
TC4	VC0 / VC1
TC5	VC0 / VC1
TC6	VC1 / VC0
TC7	VC1 / VC0

8.4.2.1.3.2 Extra Options



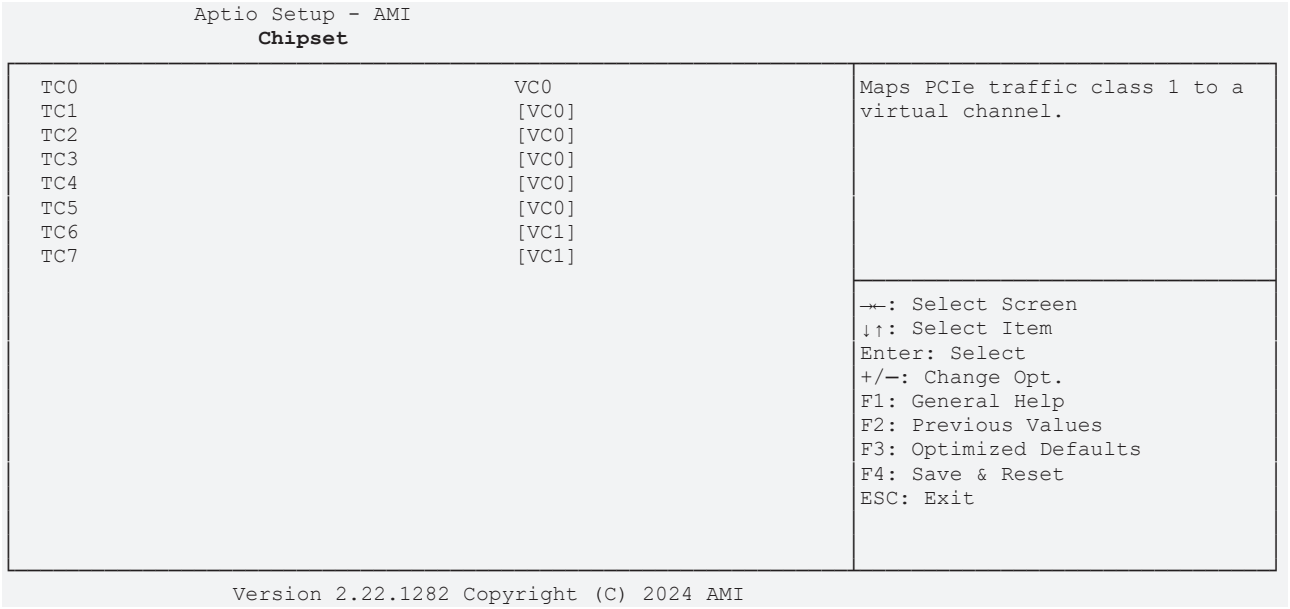
BIOS entry	Options
Detect Non-Compliance Device	Disabled / Enabled
Prefetchable Memory	None
Reserved Memory Alignment	None
Prefetchable Memory Alignment	None

8.4.2.1.4 PCI Express Root Port 7



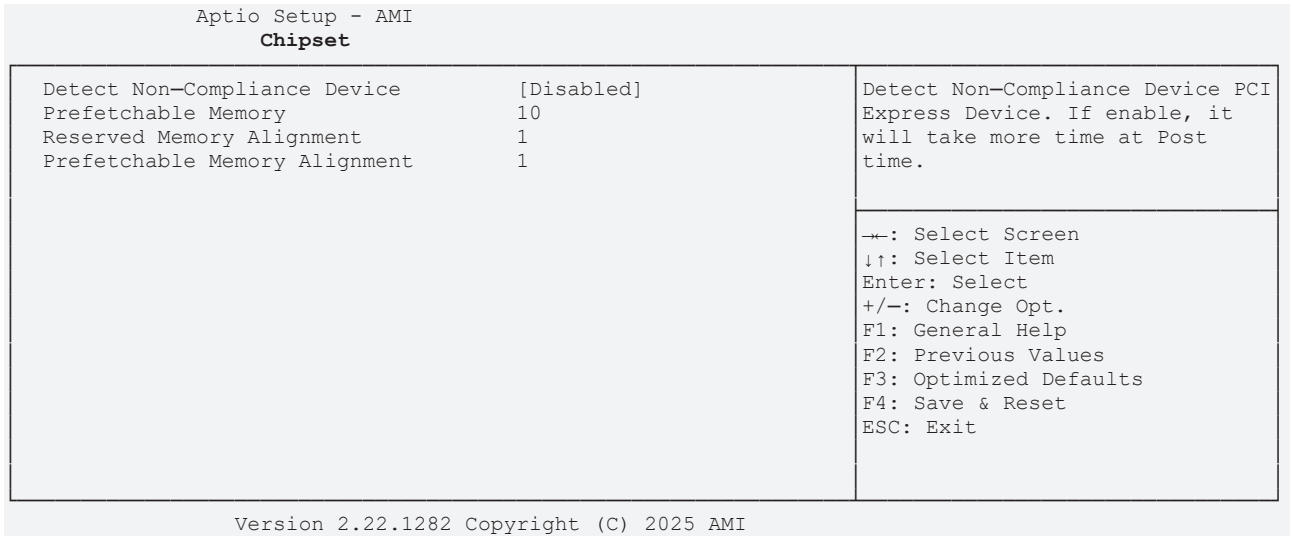
BIOS entry	Options
PCI Express Root Port 7	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	Disabled /L1.1 & L1.2 / L1.1
ACS	Enabled / Disabled
Multi-VC	Enabled / Disabled
► VC to TC Mapping	Submenu: VC to TC Mapping [▶ 62]
PTM	Enabled / Disabled
DPC	Enabled / Disabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Disabled / Enabled
Hot Plug	Enabled / Disabled
Advanced Error Reporting	Enabled / Disabled
PCIe Speed	Auto / Gen1 / Gen2 / Gen3
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved I/O	None
PCH PCIe LTR Configuration	
LTR	Enabled / Disabled
Snoop Latency Override	Auto / Manual / Disabled
Non Snoop Latency Override	Auto / Manual / Disabled
Force LTR Override	Disabled / Enabled
LTR Lock	Disabled / Enabled
► Extra Options	Submenu: Extra Options [▶ 63]

8.4.2.1.4.1 VC to TC Mapping



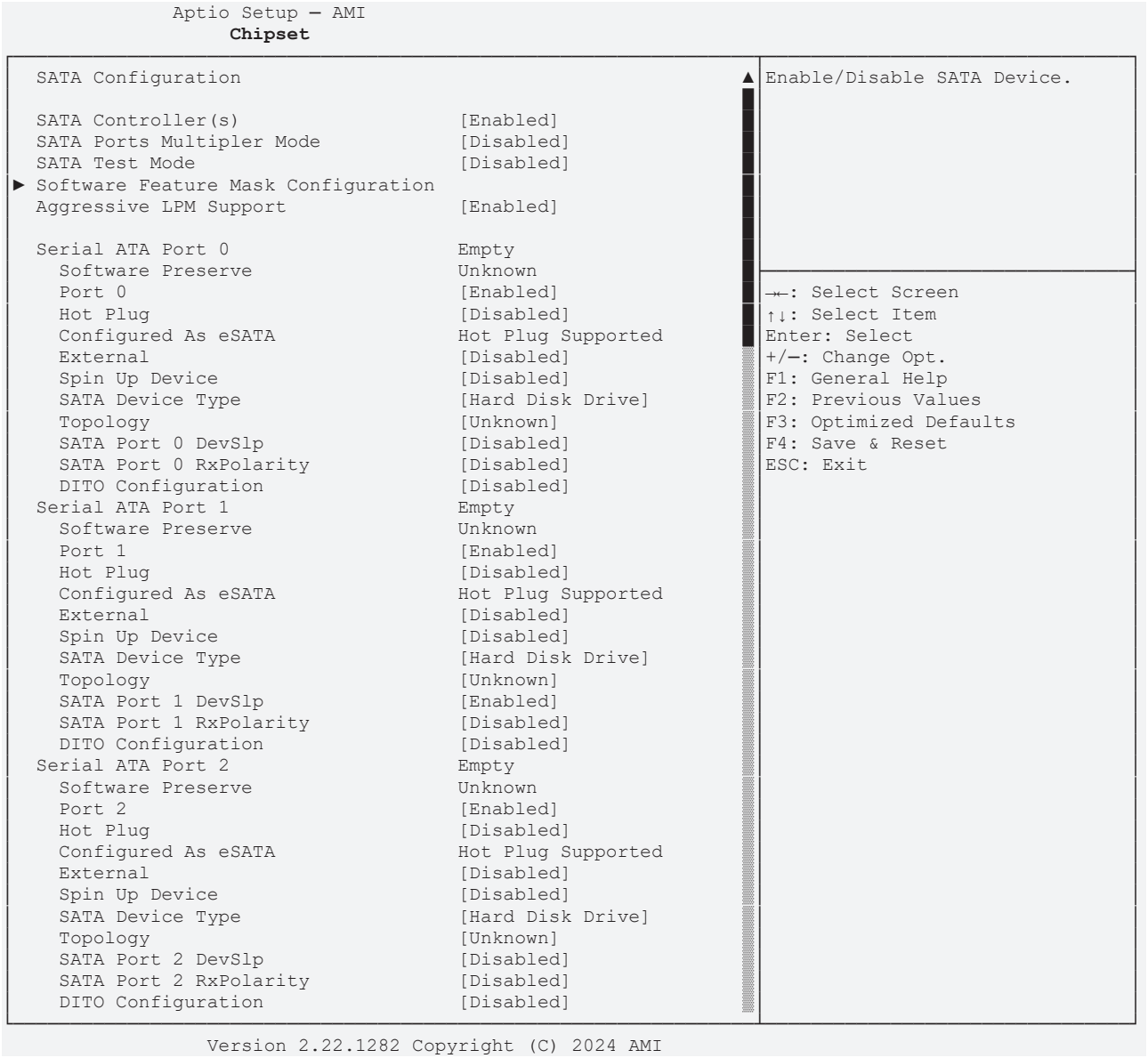
BIOS entry	Options
TC0	None
TC1	VC0 / VC1
TC2	VC0 / VC1
TC3	VC0 / VC1
TC4	VC0 / VC1
TC5	VC0 / VC1
TC6	VC1 / VC0
TC7	VC1 / VC0

8.4.2.1.4.2 Extra Options



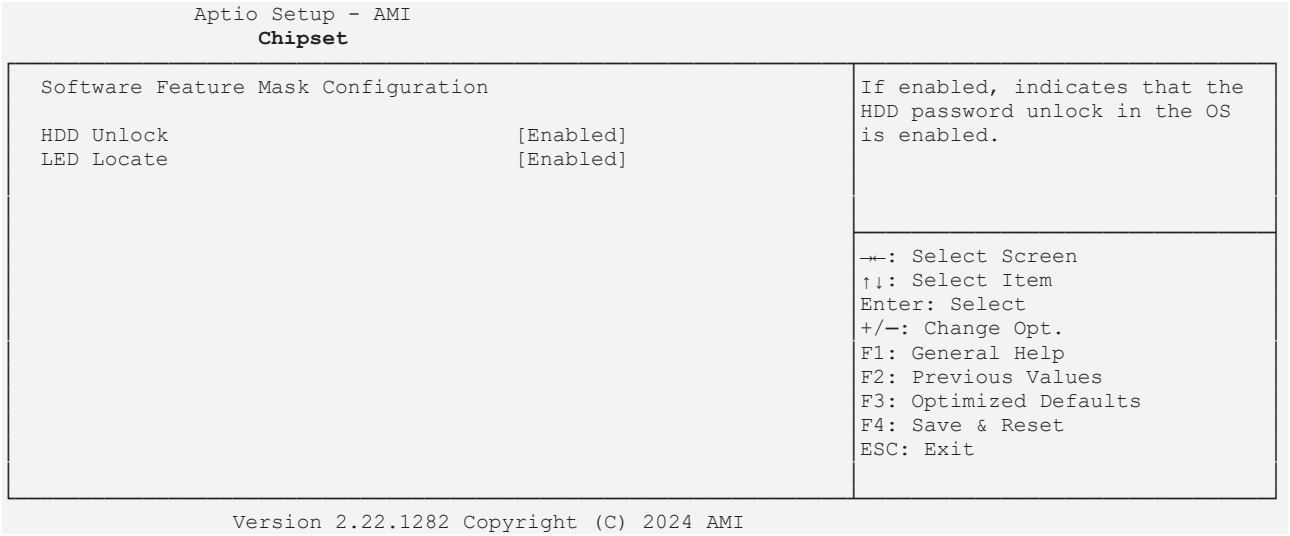
BIOS entry	Options
Detect Non-Compliance Device	Disabled / Enabled
Prefetchable Memory	None
Reserved Memory Alignment	None
Prefetchable Memory Alignment	None

8.4.2.2 SATA Configuration



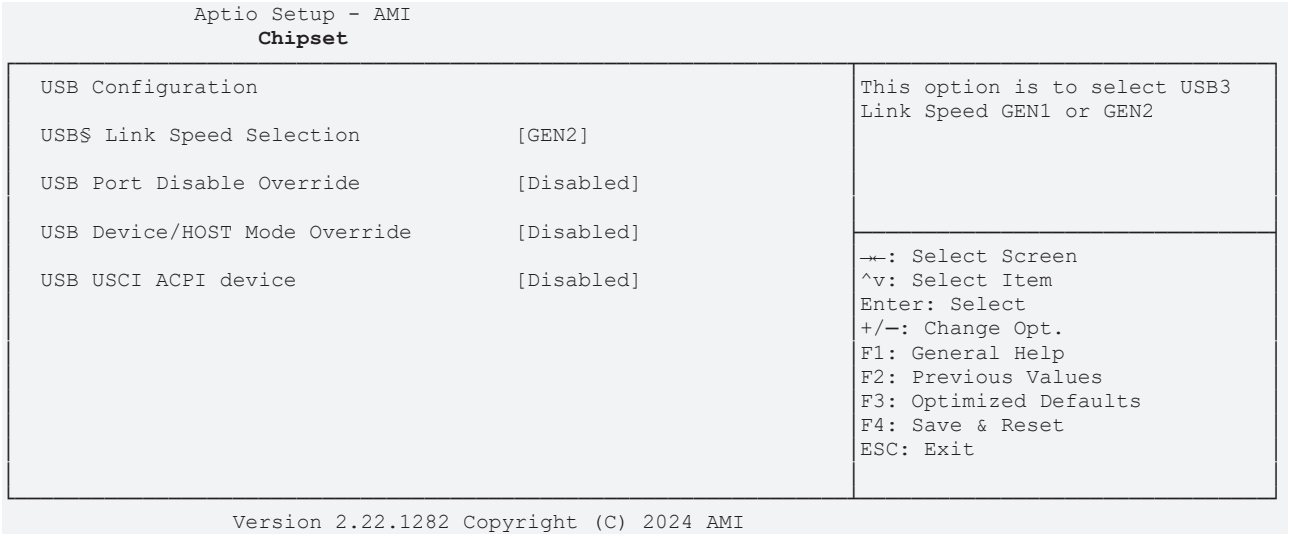
BIOS entry	Options
SATA Configuration	
SATA Controller(s)	Enabled / Disabled
SATA Mode Selection	None
SATA Test Mode	Disabled / Enabled
► Software Feature Mask Configuration	Submenu: Software Feature Mask Configuration [▶ 66]
Aggressive LPM Support	Enabled / Disabled
Serial ATA Port 0	None
Software Preserve	None
Port 0	Enabled / Disabled
Hot Plug	Disabled / Enabled
Configured As eSATA	None
External	Disabled / Enabled
Spin Up Device	Disabled / Enabled
SATA Device Type	Hard Disk Drive / Solid State Drive
Topology	Unknown / ISATA / Direct Connect / Flex / M2
SATA Port 0 DevSlp	Enabled / Disabled
SATA Port 0 RxPolarity	Enabled / Disabled
DITO Configuration	Disabled / Enabled
Serial ATA Port 1	None
Software Preserve	None
Port 1	Enabled / Disabled
Hot Plug	Disabled / Enabled
Configured As eSATA	None
External	Disabled / Enabled
Spin Up Device	Disabled / Enabled
SATA Device Type	Hard Disk Drive / Solid State Drive
Topology	Unknown / ISATA / Direct Connect / Flex / M2
SATA Port 1 DevSlp	Enabled / Disabled
DITO Configuration	Disabled / Enabled
Serial ATA Port 2	None
Software Preserve	None
Port 2	Enabled / Disabled
Hot Plug	Disabled / Enabled
Configured As eSATA	None
External	Disabled / Enabled
Spin Up Device	Disabled / Enabled
SATA Device Type	Hard Disk Drive / Solid State Drive
Topology	Unknown / ISATA / Direct Connect / Flex / M2
SATA Port 2 DevSlp	Enabled / Disabled
DITO Configuration	Disabled / Enabled

8.4.2.2.1 Software Feature Mask Configuration



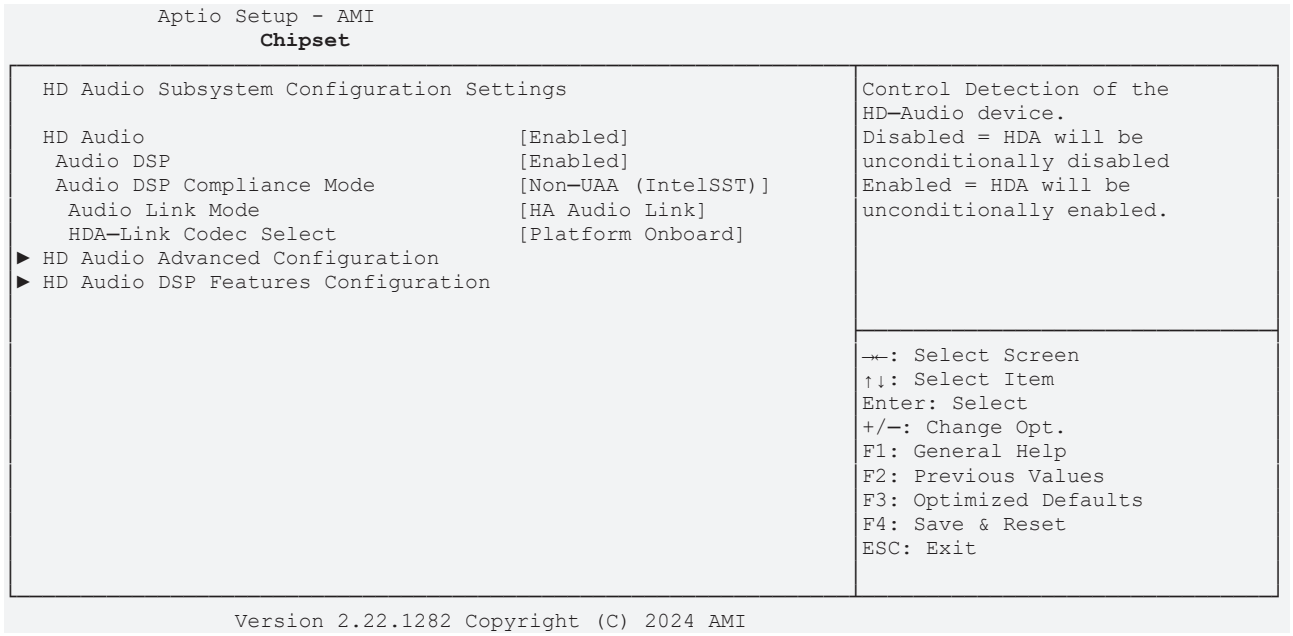
BIOS entry	Options
Software Feature Mask Configuration	
HDD Unlock	Enabled / Disabled
LED Locate	Enabled / Disabled

8.4.2.3 USB Configuration



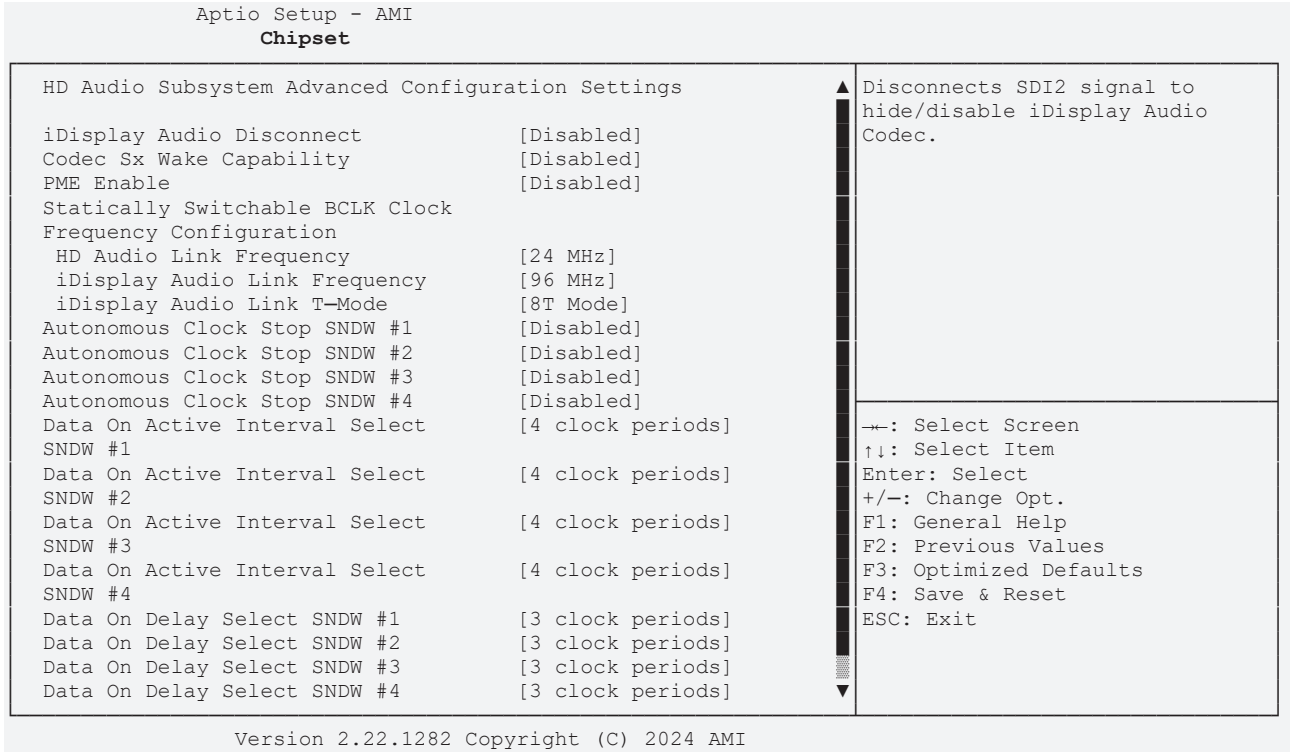
BIOS entry	Options
USB Configuration	
USB3 Link Speed Selection	Gen2 / Gen1
USB Port Disable Override	Disabled / Select Per-Pin
USB Device/HOST Mode Override	Disabled / Select Per-Pin
USB USCI ACPI device	Disabled / Enabled

8.4.2.4 HD Audio Configuration



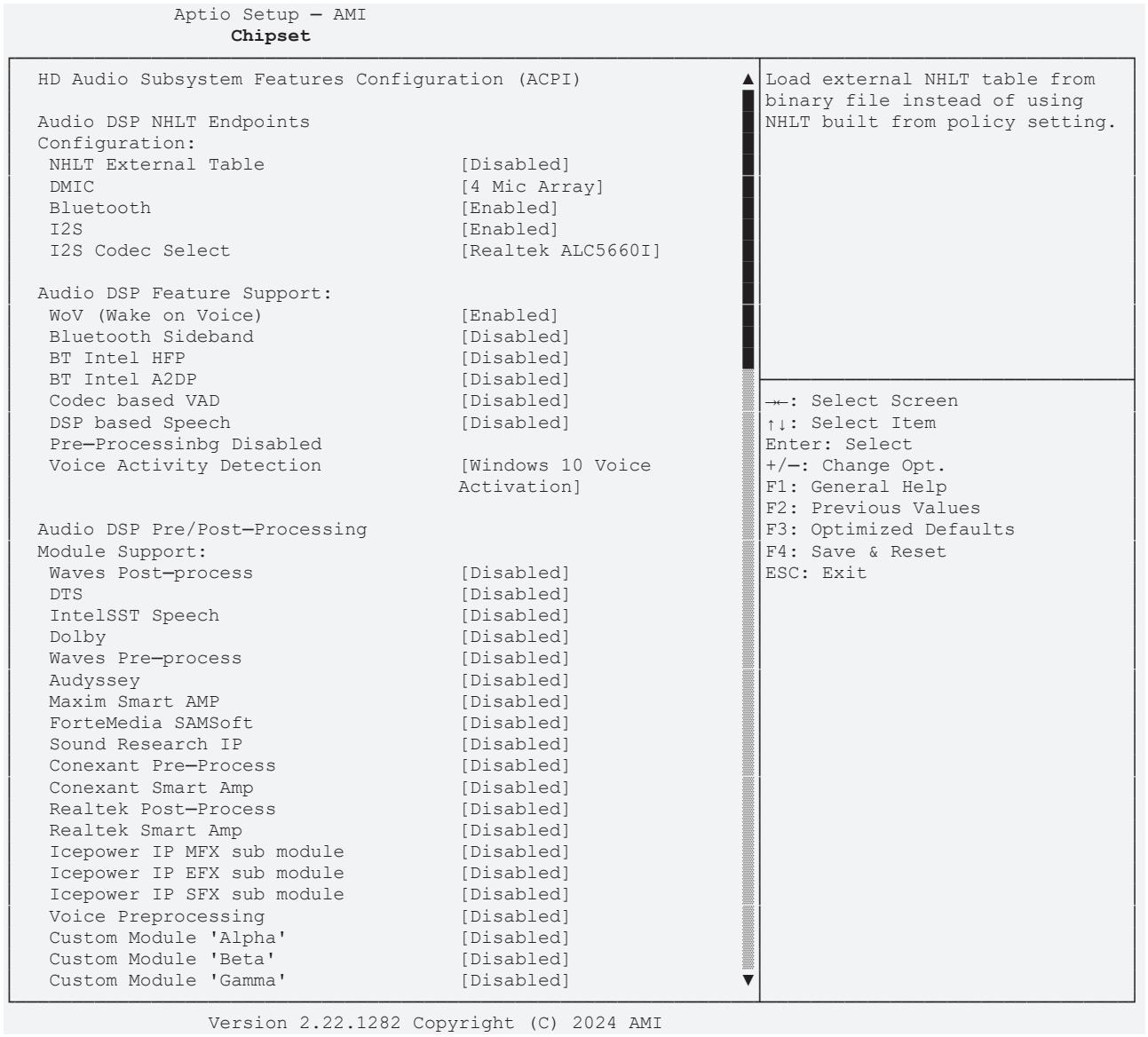
BIOS entry	Options
HD Audio Subsystem Configuration Settings	
HD Audio	Enabled / Disabled
Audio DSP	Enabled / Disabled
Audio DSP Compliance Mode	Non-UAA (IntelSST) / UAA (HDA Inbox/IntelSST)
Audio Link Mode	SSP (I2S) / HD Audio Link / SoundWire / Advanced Link Config
HDA-Link Codec Select	Platform Onboard / External Kit
► HD Audio Advanced Configuration	Submenu: HD Audio Advanced Configuration [▶ 69]
► HD Audio DSP Features Configuration	Submenu: HD Audio Subsystem Features Configuration (ACPI) [▶ 70]

8.4.2.4.1 HD Audio Advanced Configuration



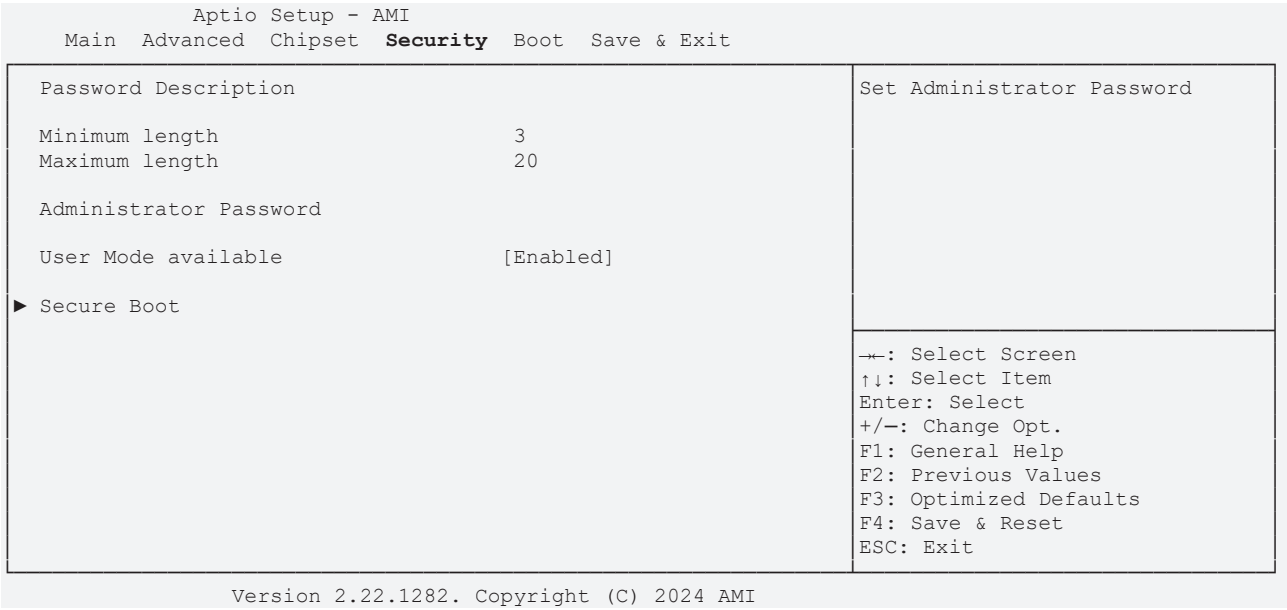
BIOS entry	Options
HD Audio Subsystem Advanced Configuration Settings	
iDisplay Audio Disconnect	Disabled / Enabled
Codec Sx Wake Capability	Disabled / Enabled
PME Enable	Disabled / Enabled
Statically Switchable BCLK Clock DPC Frequency Configuration:	
HD Audio Link Frequency	6 MHz / 12 MHz / 24 MHz
iDisplay Audio Link Frequency	48 MHz / 96 MHz
iDisplay Audio Link T–Mode FER	2T Mode / 4T Mode / 8T Mode / 16T Mode
Autonomous Clock Stop SNDW #1	Disabled / Enabled
Autonomous Clock Stop SNDW #2	Disabled / Enabled
Autonomous Clock Stop SNDW #3	Disabled / Enabled
Autonomous Clock Stop SNDW #4	Disabled / Enabled
Data On Active Interval Select SNDW #1	3 / 4 / 5 / 6 clock periods
Data On Active Interval Select SNDW #2	3 / 4 / 5 / 6 clock periods
Data On Active Interval Select SNDW #3	3 / 4 / 5 / 6 clock periods
Data On Active Interval Select SNDW #4	3 / 4 / 5 / 6 clock periods
Data On Delay Select SNDW #1	2 / 3 clock periods
Data On Delay Select SNDW #2	2 / 3 clock periods
Data On Delay Select SNDW #3	2 / 3 clock periods
Data On Delay Select SNDW #4	2 / 3 clock periods

8.4.2.4.2 HD Audio Subsystem Features Configuration (ACPI)



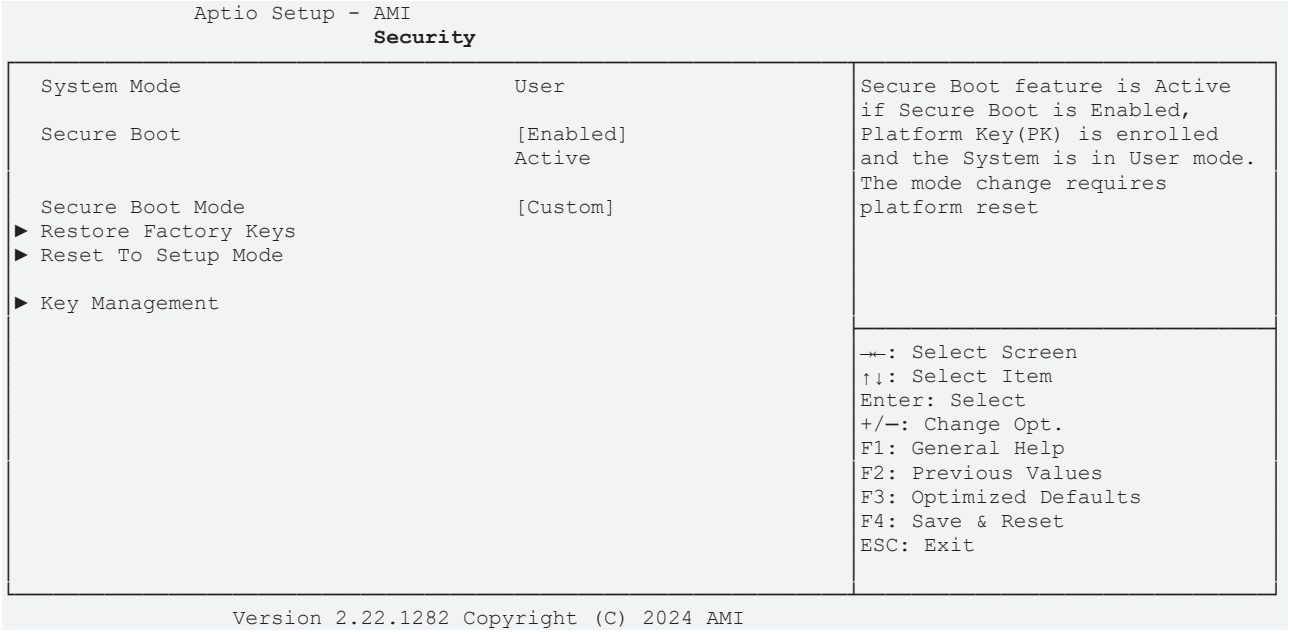
BIOS entry	Options
HD Audio Subsystem Features Configuration (ACPI)	
Audio DSP NHLT Endpoints Configuration:	
NHLT External Table	Disabled / Enabled
DMIC	Disabled / 1 / 2 / 4 Mic Array
Bluetooth	Enabled / Disabled
I2S	Enabled / Disabled
I2S Codec Select	Realtek ALC274 / Realtek ALC5660I / Disabled
Audio DSP Feature Support:	
WoV (Wake on Voice)	Enabled Disabled
Bluetooth Sideband	Disabled / Enabled
BT Intel HFP	None
BT Intel A2DP	None
Codec based VAD	Disabled / Enabled
DSP based Speech	None
Pre-Processing disabled	
Voice Activity Detection	Intel Wake on Voice / Windows 10 Voice Activation
Audio DSP Pre/Post-Processing Module Support:	
Waves Post-process	Disabled / Enabled
DTS	Disabled / Enabled
IntelSST Speech	Disabled / Enabled
Dolby	Disabled / Enabled
Waves Pre-process	Disabled / Enabled
Audyssey	Disabled / Enabled
Maxim Smart AMP	Disabled / Enabled
ForteMedia SAMSoft	Disabled / Enabled
Sound Research IP	Disabled / Enabled
Conexant Pre-Process	Disabled / Enabled
Conexant Smart Amp	Disabled / Enabled
Realtek Post-Process	Disabled / Enabled
Realtek Smart Amp	Disabled / Enabled
Icepower IP MFX sub module	Disabled / Enabled
Icepower IP EFX sub module	Disabled / Enabled
Icepower IP SFX sub module	Disabled / Enabled
Voice Preprocessing	Disabled / Enabled
Custom Module 'Alpha'	Disabled / Enabled
Custom Module 'Beta'	Disabled / Enabled
Custom Module 'Gamma'	Disabled / Enabled

8.5 Security



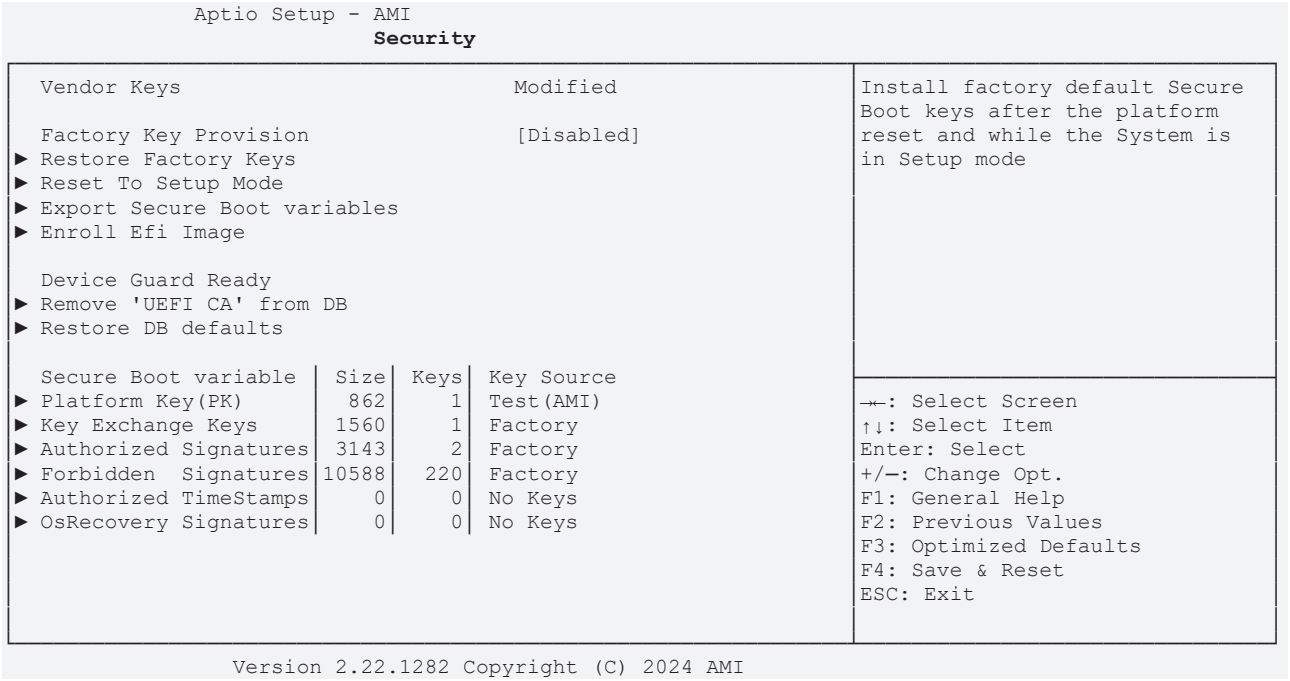
BIOS entry	Options
Password Description	
Minimum Length	None
Maximum Length	None
Administrator Password	Set an administrator password here.
User Mode available	Enabled / Disabled
Secure Boot menu	Submenu: Secure Boot [▶ 73]

8.5.1 Secure Boot



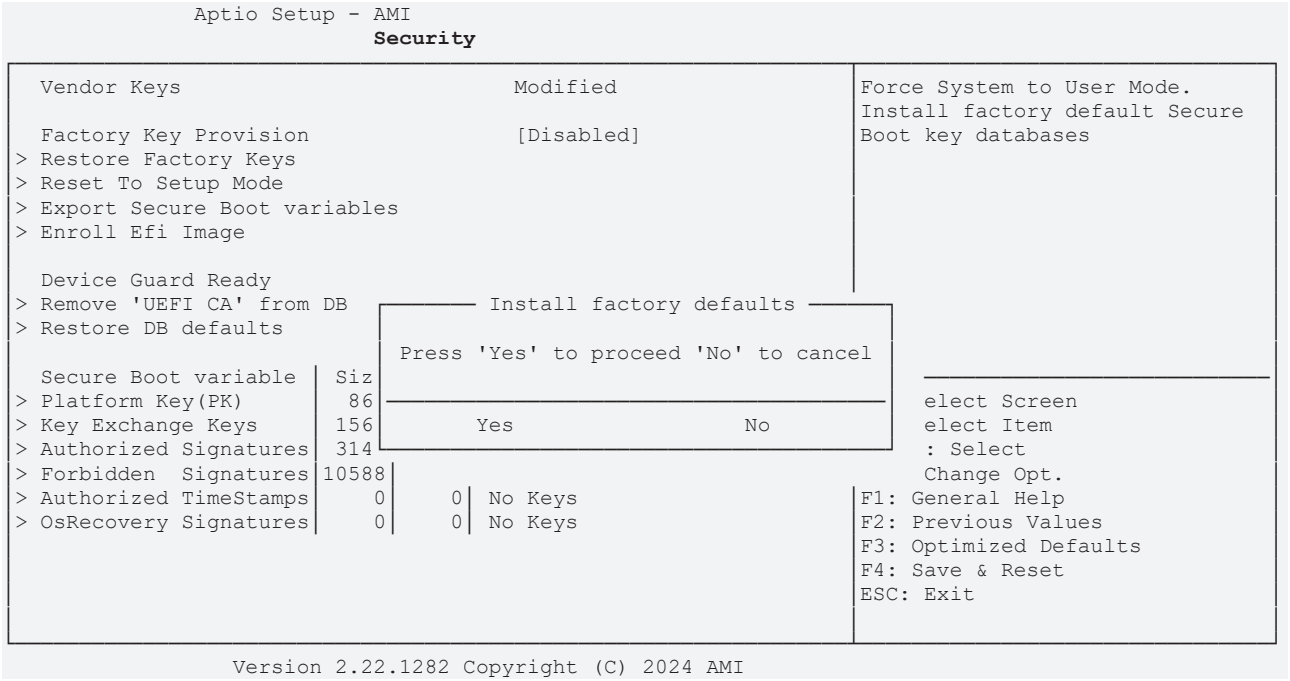
BIOS entry	Options
System Mode	None
Secure Boot	Enabled / Disabled
Secure Boot Mode	Standard / Custom
► Restore Factory Keys	Press enter key
► Reset To Setup Mode	Press enter key
► Key Management	Submenu: Key Management [▶ 74]

8.5.1.1 Key Management



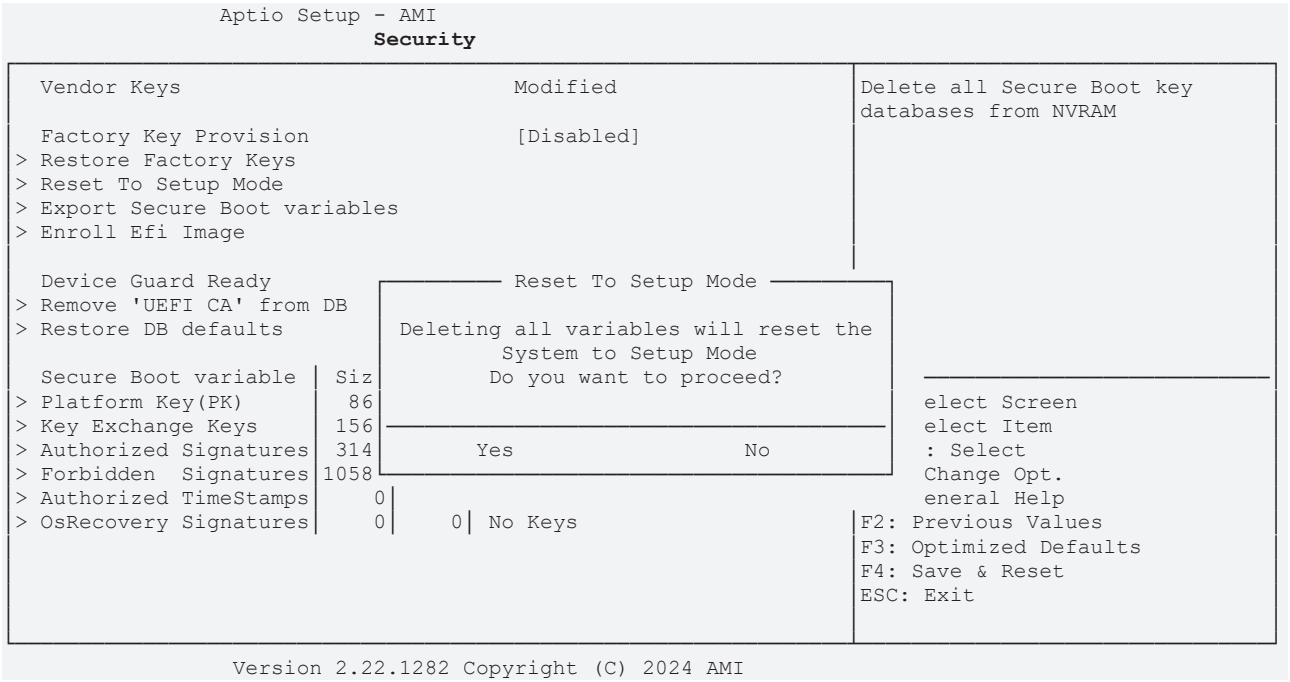
BIOS entry	Options
Vendor Keys	None
Factory Key Provision	Disabled / Enabled
▶ Restore Factory Keys	Press enter key
▶ Reset To Setup Mode	Press enter key
▶ Export Secure Boot variables	Press enter key
▶ Enroll Efi Image	Press enter key
Device Guard Ready	
▶ Remove 'UEFI CA' from DB	Press enter key
▶ Restore DB defaults	Press enter key
Secure Boot variables	
▶ Platform Key(PK)	Press enter key
▶ Key Exchange Keys	Press enter key
▶ Authorized Signatures	Press enter key
▶ Forbidden Signatures	Press enter key
▶ Authorized TimeStamps	Press enter key
▶ OS Recovery Signatures	Press enter key

8.5.1.1.1 Restore factory keys



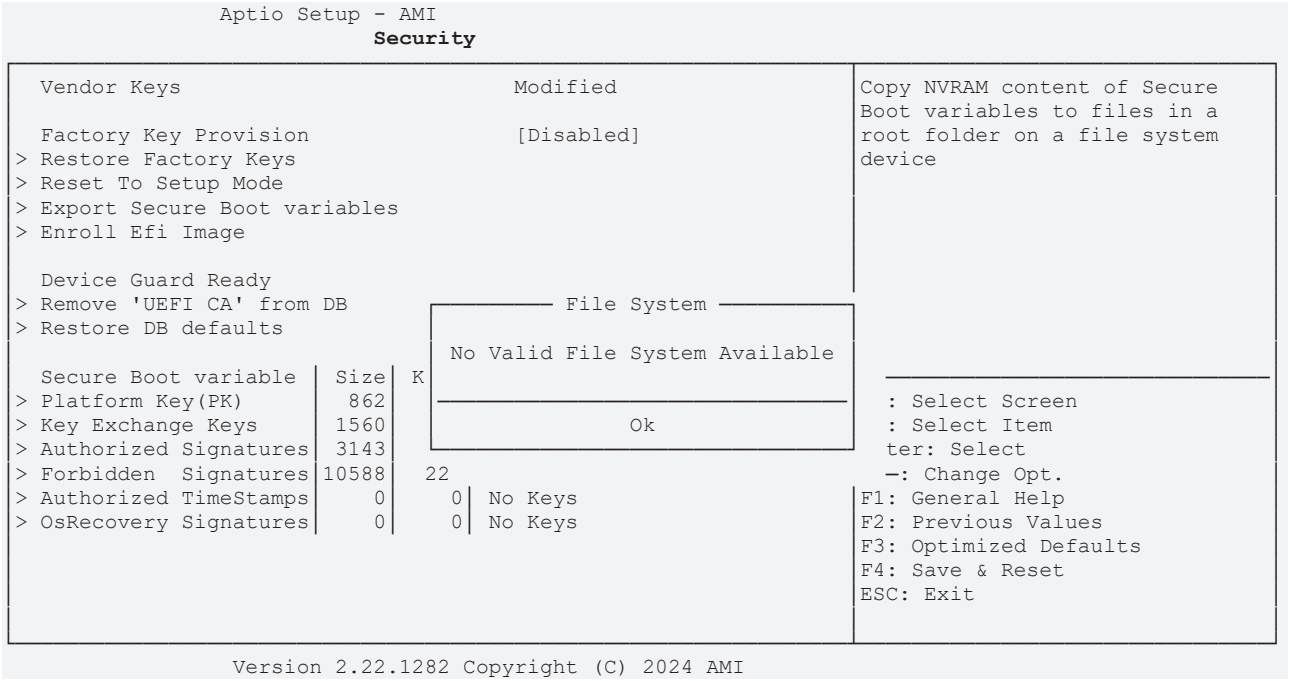
BIOS entry	Options
Vendor Keys	None
► Restore Factory Keys	see box

8.5.1.1.2 Reset To Setup Mode



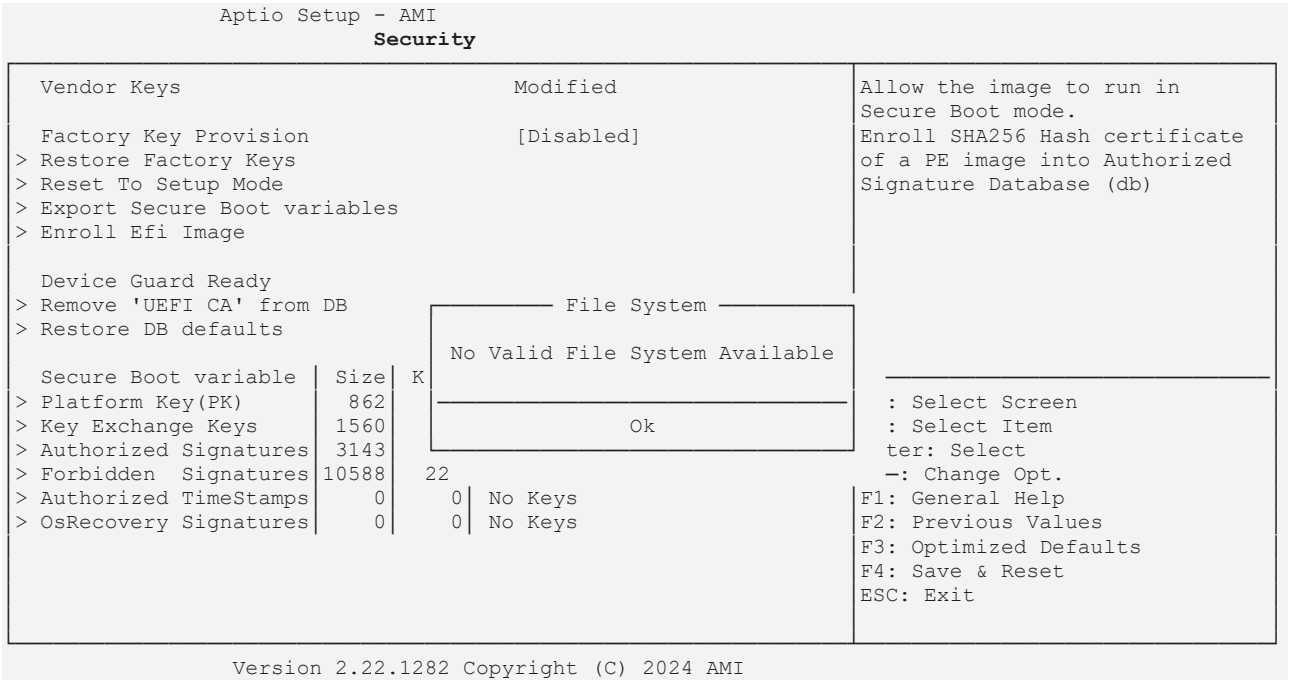
BIOS entry	Options
Vendor Keys	None
Restore To Setup Mode	see box

8.5.1.1.3 Export Secure Boot Variables



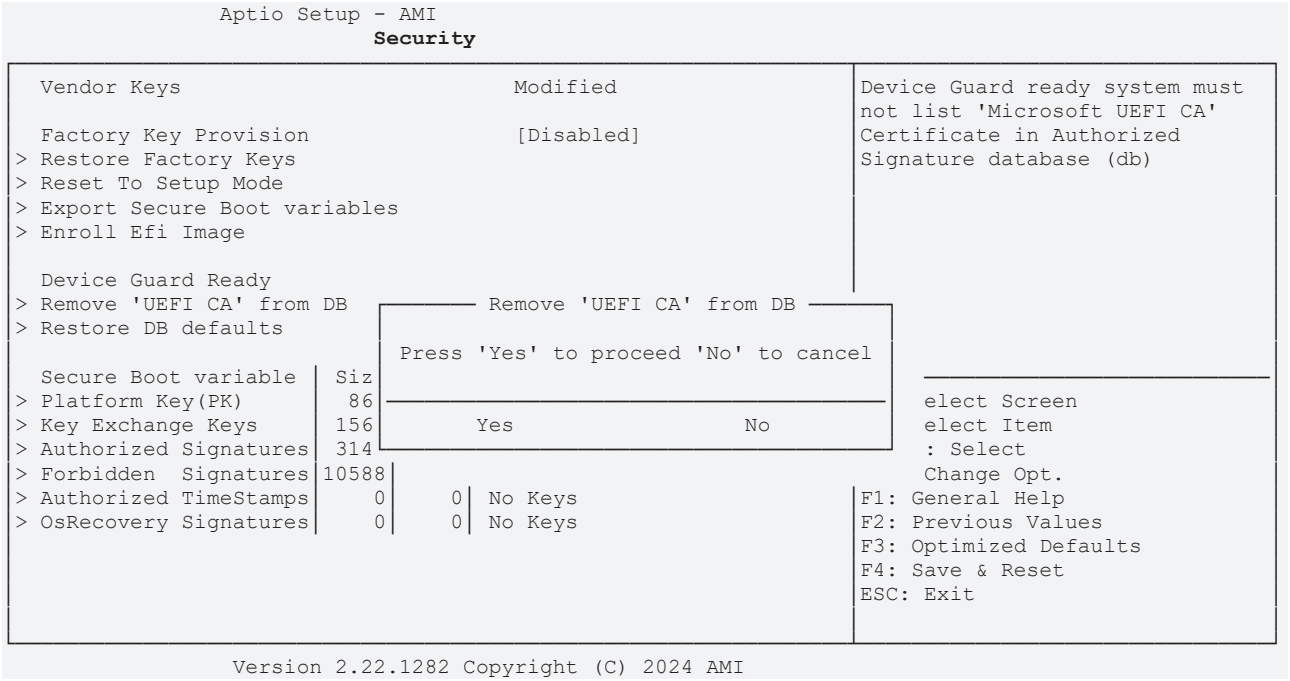
BIOS entry	Options
Vendor Keys	None
Export Secure Boot Variables	File System, see box

8.5.1.1.4 Enroll Efi Image



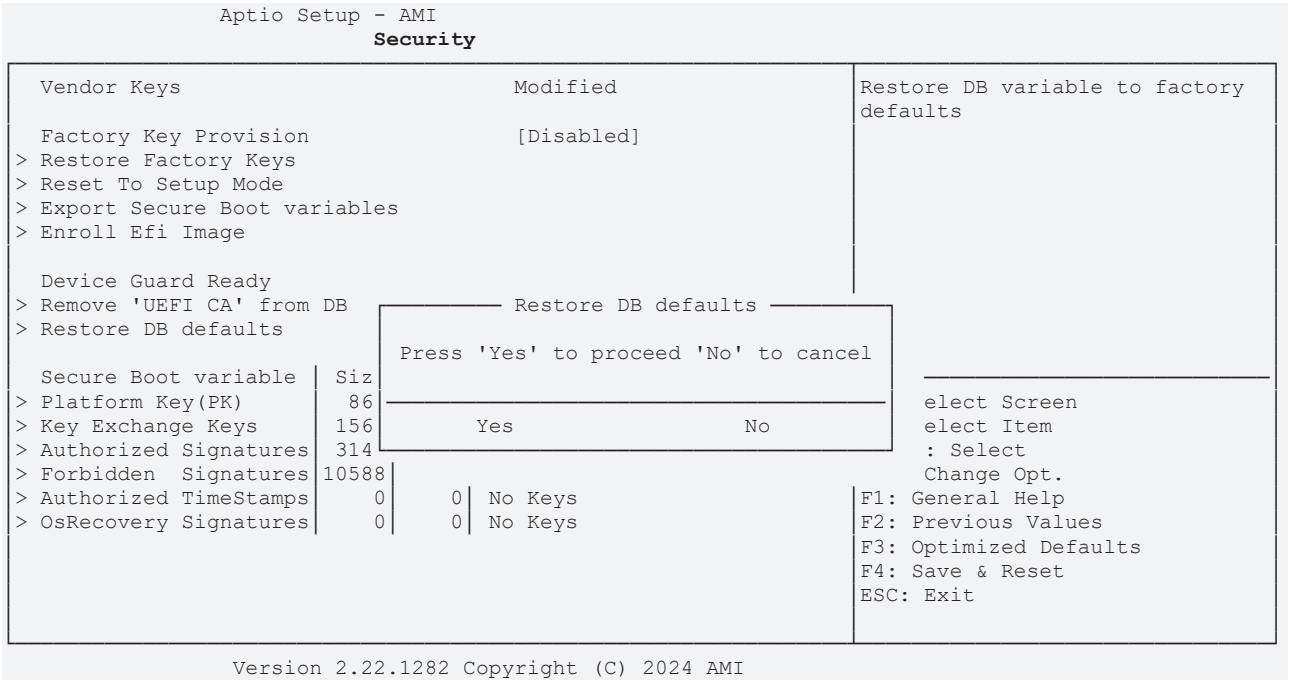
BIOS entry	Options
Vendor Keys	None
Enroll Efi Image	see box

8.5.1.1.5 Remove UEFI CA from DB



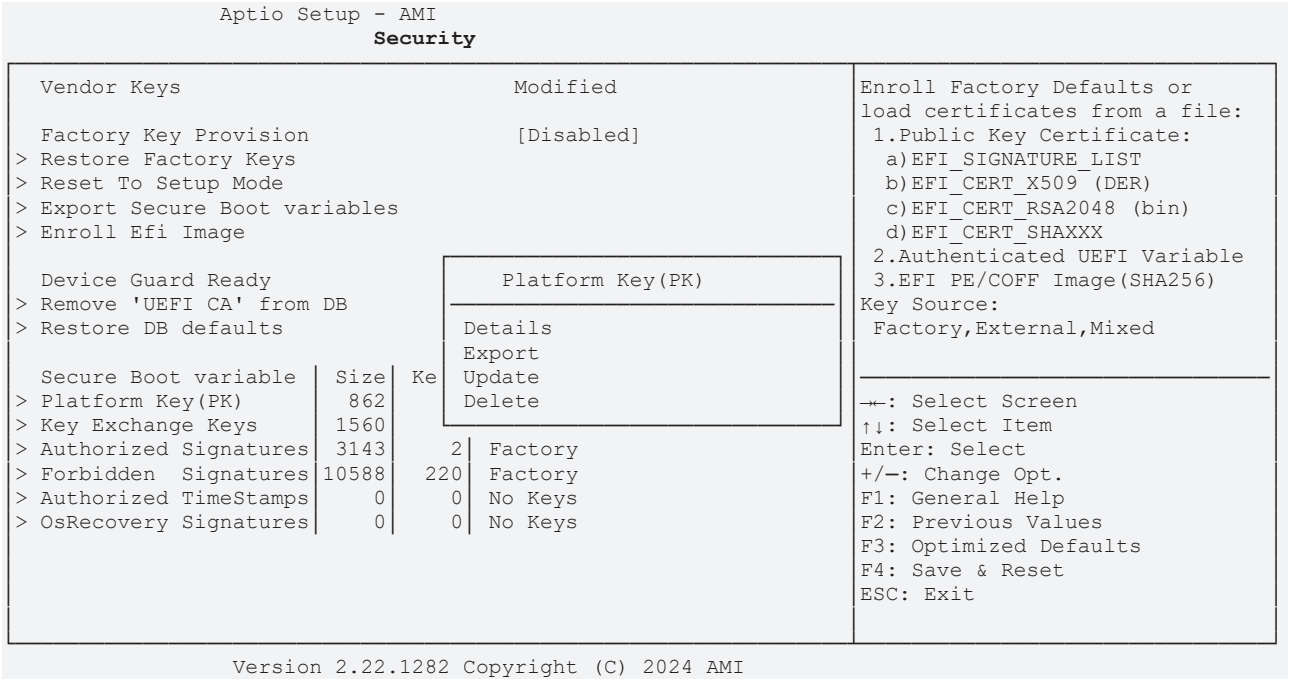
BIOS entry	Options
Vendor Keys	None
Remove ‘UEFI CA‘ from DB	see box

8.5.1.1.6 Restore DB defaults



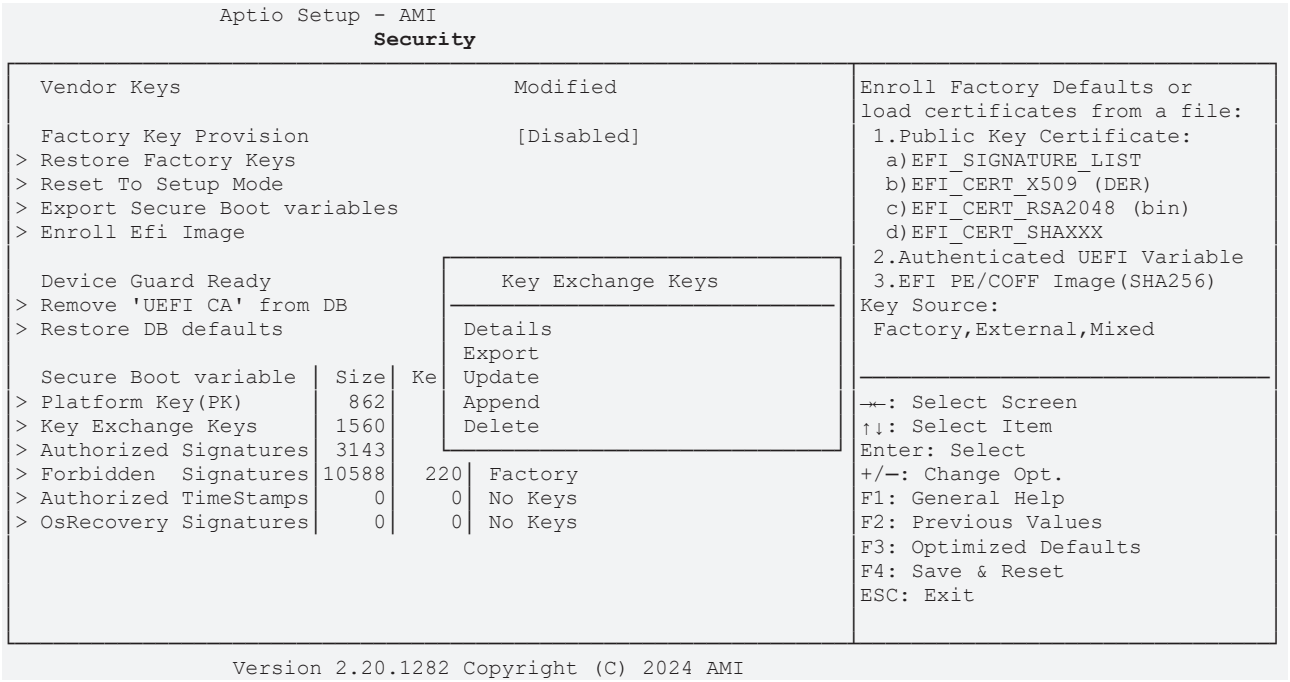
BIOS entry	Options
Vendor Keys	None
Restore DB Faults	see box

8.5.1.1.7 Platform Key (PK)



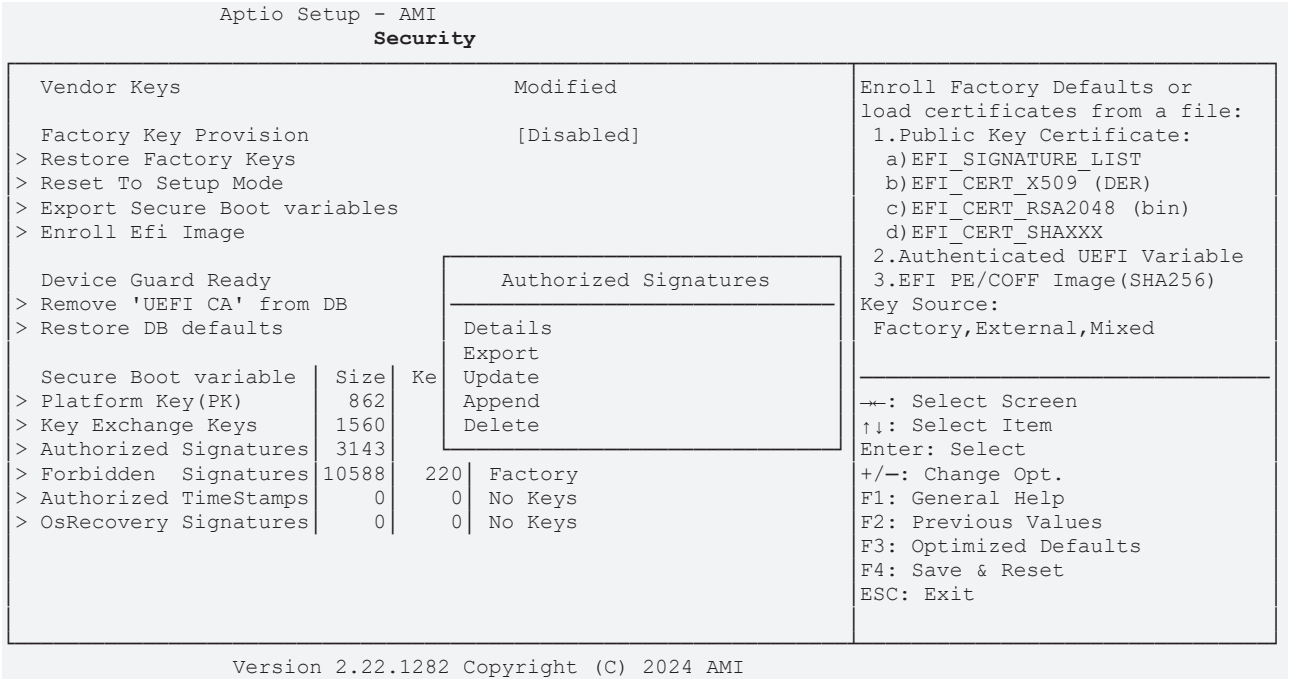
BIOS entry	Options
Vendor Keys	None
Platform Key (PK)	see box

8.5.1.1.8 Key Exchange Keys



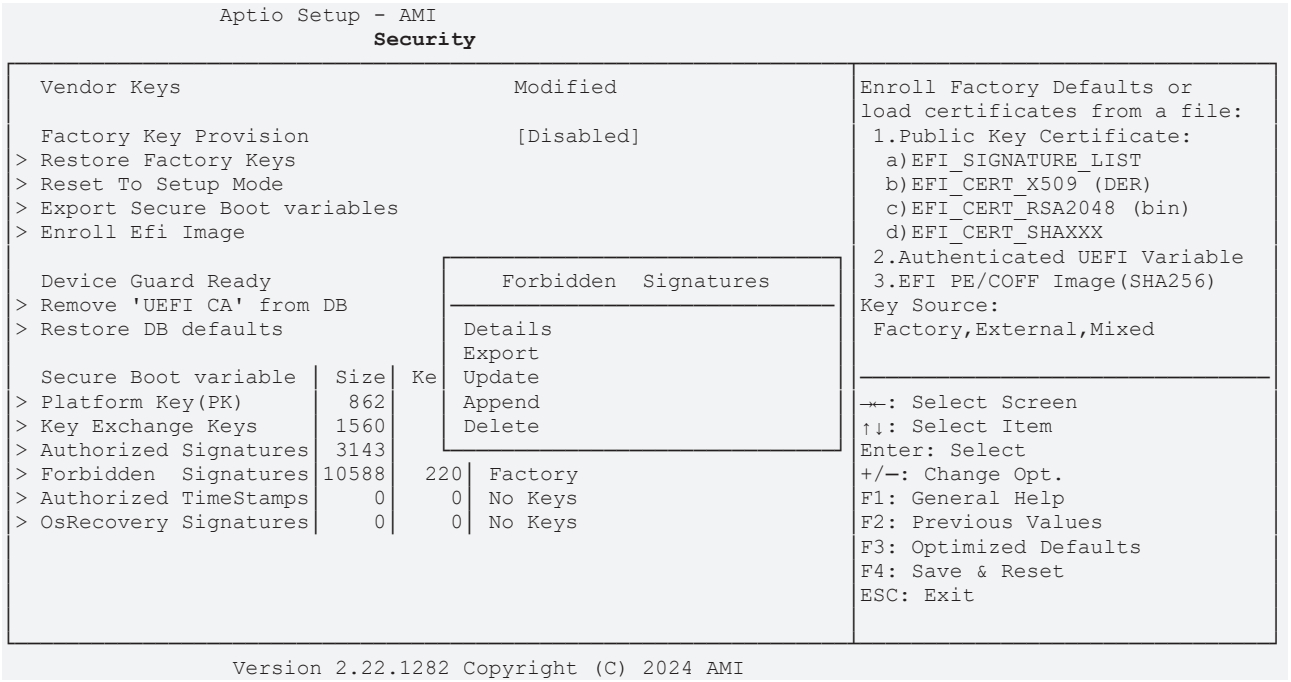
BIOS entry	Options
Vendor Keys	None
Key Exchange Keys	see box

8.5.1.1.9 Authorized Signatures



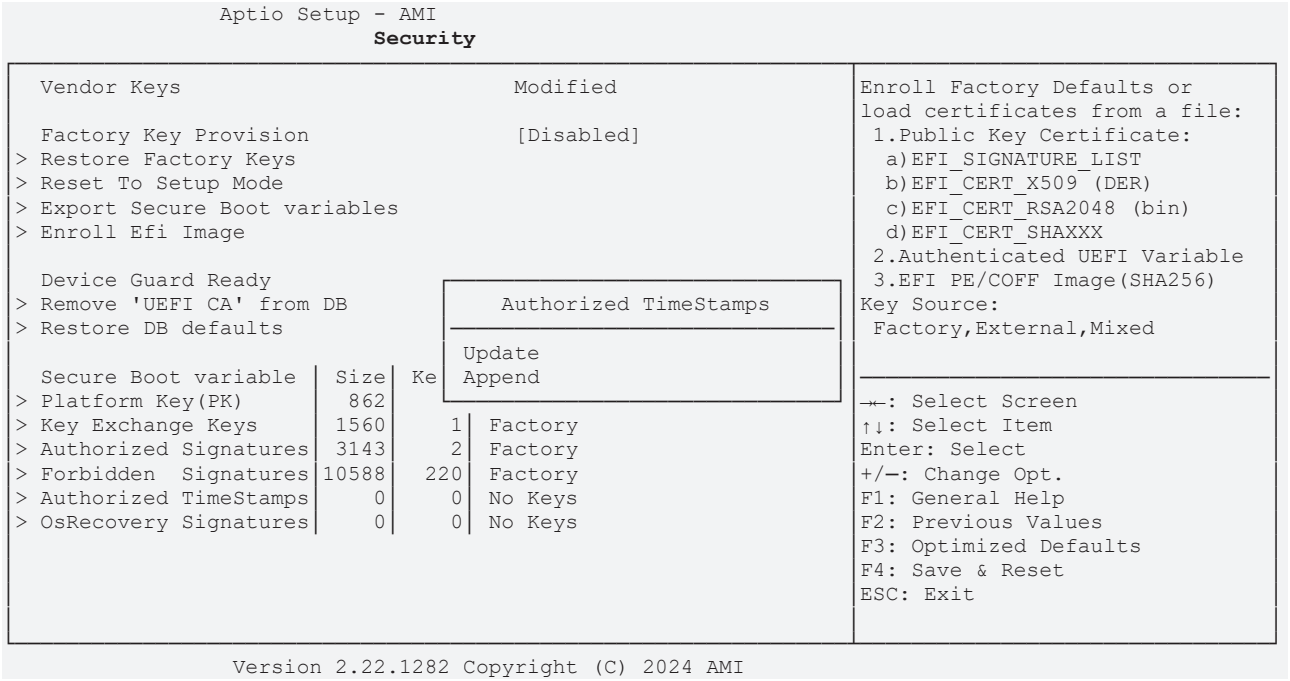
BIOS entry	Options
Vendor Keys	None
Authorized Signatures	see box

8.5.1.1.10 Forbidden Signatures



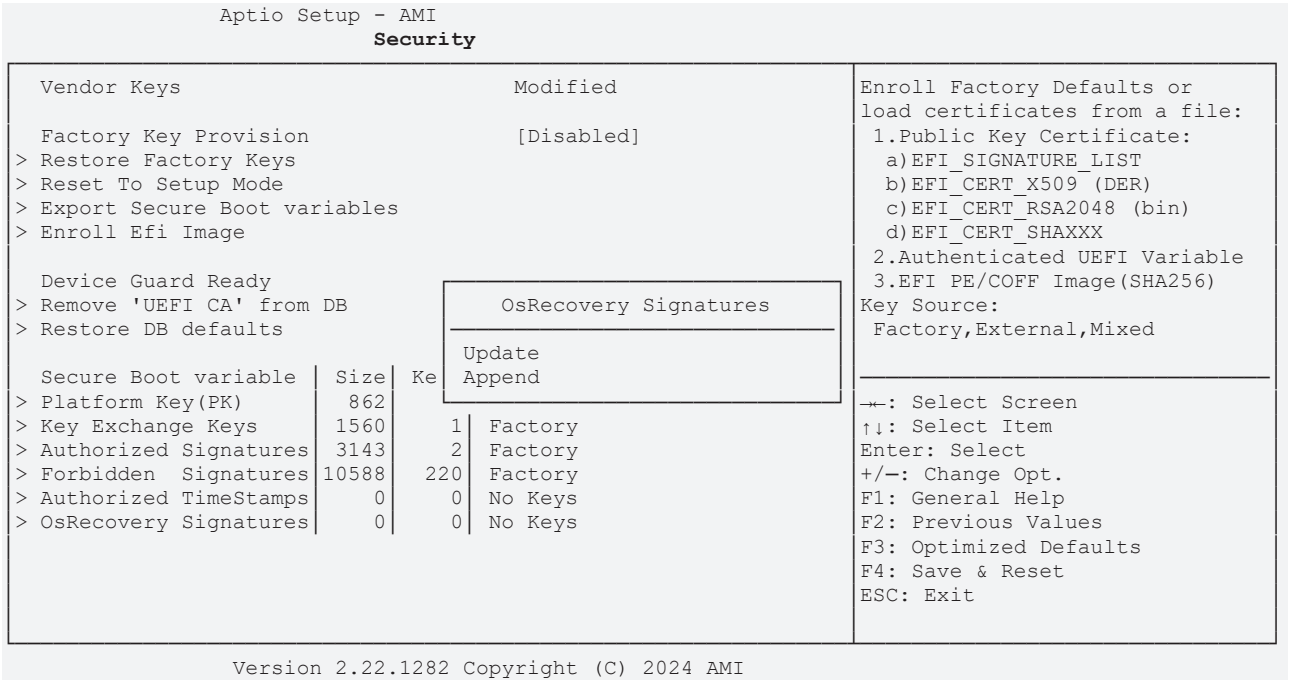
BIOS entry	Options
Vendor Keys	None
Forbidden Signatures	see box

8.5.1.1.11 Authorized TimeStamps



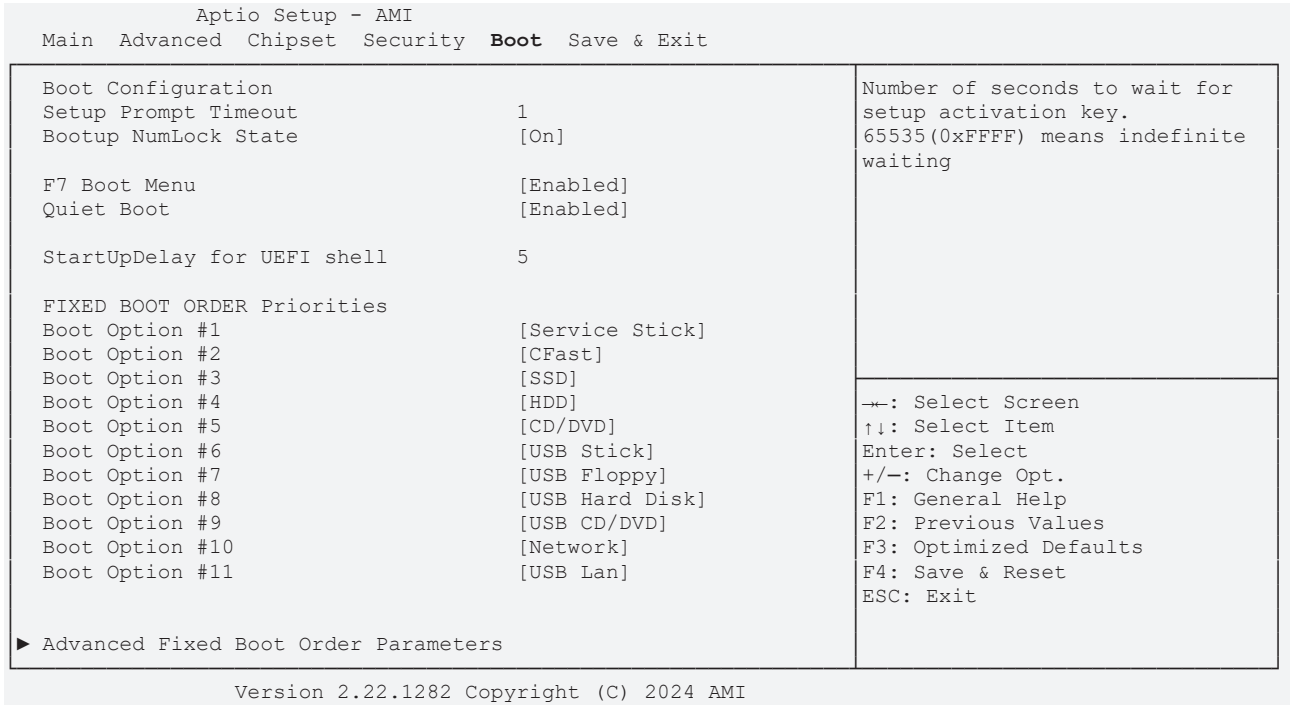
BIOS entry	Options
Vendor Keys	None
Authorized TimeStamps	see box

8.5.1.1.12 OsRecovery Signatures



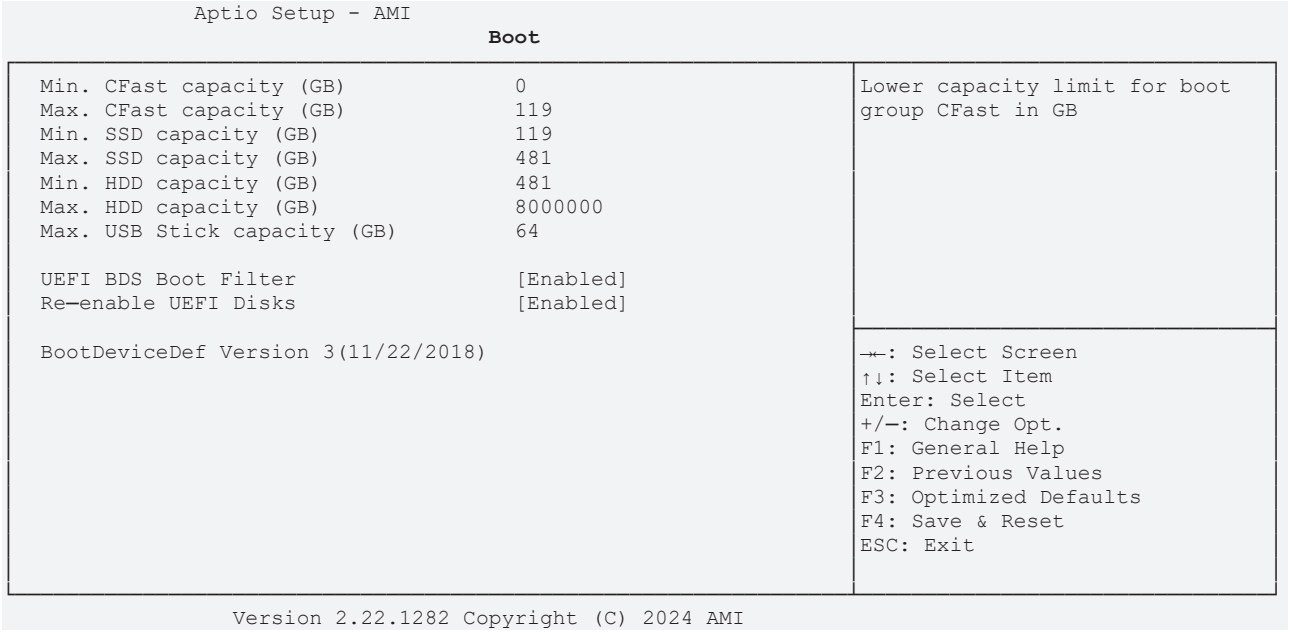
BIOS entry	Options
Vendor Keys	None
OsRecovery Signatures	See box

8.6 Boot



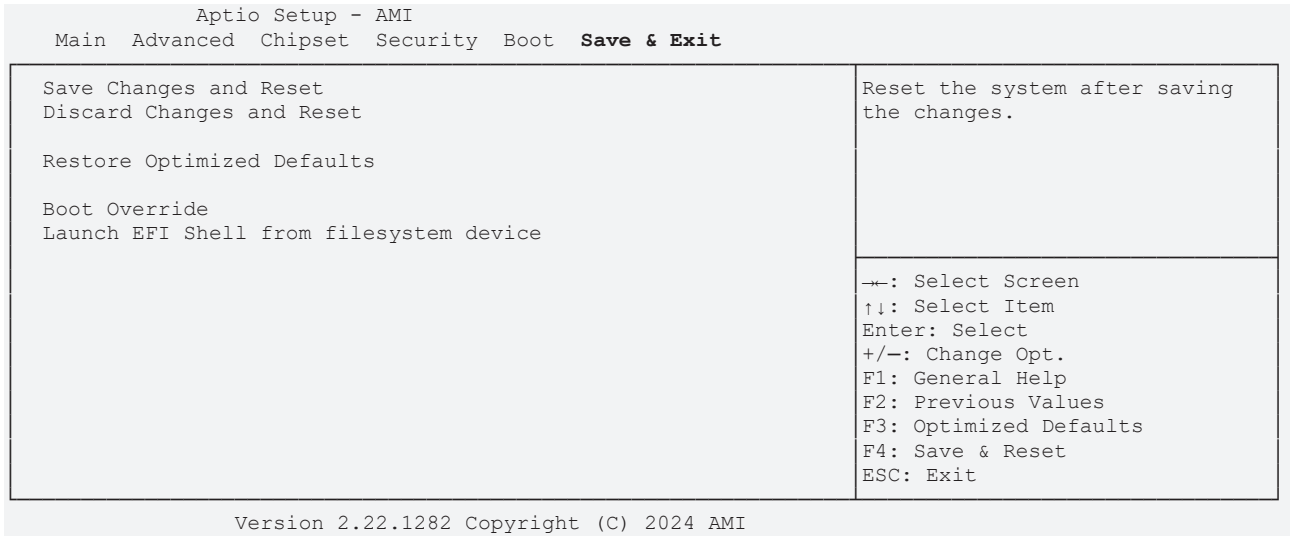
BIOS entry	Options
Boot Configuration	
Setup Prompt Timeout	None
Bootup NumLock State	On / Off
F7 Boot Menu	Disabled / Enabled
Quiet Boot	Enabled / Disabled
Fixed Boot Order Priorities	
Boot Option #1-11	Specify the order of the boot media to be used.
Advanced Fixed Boot Order Parameters	Submenu: Advanced Fixed Boot Order Parameters [▶ 82]

8.6.1 Advanced Fixed Boot Order Parameters



BIOS entry	Options
Min. CFast capacity	None
Max. CFast capacity	None
Min. SSD capacity (GB)	None
Max. SSD capacity (GB)	None
Min. HDD capacity (GB)	None
Max. HDD capacity (GB)	None
Max. USB Stick capacity (GB)	None
UEFI BDS Boot Filter	Enabled / Disabled
Re-enable UEFI Disks	Enabled / Disabled
BootDeviceDef Version 3(11/22/2018)	None

8.7 Save & Exit



BIOS entry	Options
Save Changes and Reset	Press enter key
Disacrd Changes and Reset	Press enter key
Restore Optimized Defaults	Press enter key
Boot Override	None
Launch EFI Shell from filesystem device	Press enter key

8.8 BIOS update

The "DecdFlsh" program and a bootable medium with the latest BIOS version are used if the BIOS needs to be updated. When doing this it is important to start the program from a DOS environment without a virtual memory manager such as "EMM386.EXE". If such a memory manager is loaded, the program will abort with an error message or cause a crash.

DecdFlsh is a program for the automatic updating of the BIOS on all boards with AMI-BIOS. All files contained in the zip file must be unpacked into a directory, from where

```
DecdFlsh Bios-Dateiname
```

calling takes place. The name of the BIOS file and its length are checked. The BIOS will now be programmed.

The system must not be interrupted during the flashing process, as otherwise the update will abort and the BIOS on the board will be destroyed. The Flash procedure takes about 75 seconds. The necessary firmware update takes place automatically.

NOTICE

Risk of damage due to incorrect update procedure!

If the BIOS update is performed incorrectly, the board may become unusable. Therefore a BIOS update should only be done if the corrections / additions that the new BIOS version brings with it are really needed.

Before a planned BIOS update, it is essential to ensure that the BIOS file to be reloaded is really released for exactly this board and for exactly this board version. If an inappropriate file is used, the board will inevitably not boot afterwards.

9 LEDs

The LEDs for the status messages of the CB8283 motherboard are provided on the C9900-A083 LED board. This is screwed onto the housing cover. The connection to the board is made with a cable via the 4-pin connector (P100). The power supply of the board is (3.3 V). The LEDs are described from left to right.

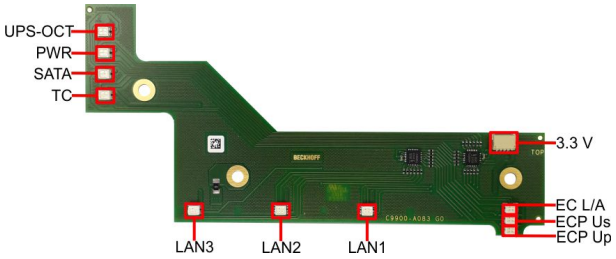


Fig. 10: LED board

9.1 LED: UPS-OCT

The RGB LED indicates the transmission quality of the UPS-OCT signals by means of colors and flashing intervals.

Color	Interval	Meaning
None	Steadily lit	No UPS-OCT connected
Blue	Flashing	Bootloader active
Yellow	Steadily lit	Moderate signal quality
Green	Steadily lit	Good signal quality
Red	Steadily lit	Poor signal quality

If the LED is not lit, no UPS-OCT is connected.

Adaptation of the status codes

It is possible to adapt the status codes (e.g. as UPS-OCT-LED). To do this, the system colors can be changed with the aid of an SMB command. This change remains in force until the next restart or reset.

9.2 LED: PWR

The RGB LED indicates status messages of the power controller by means of colors and flashing intervals.

Color	Interval	Meaning
None	Steadily lit	PC is off / system in error state
White	Steadily lit	Powerfail
Cyan	Steadily lit	Reserved
Magenta	Steadily lit	S UPS active (if present)
Blue	Steadily lit	Reserved
Yellow	Steadily lit	S5 state, Windows shut down, supply voltage still present
Green	Steadily lit	S0 state, normal operation
Red	Steadily lit	Reset/Start
Green/yellow	Flashing	Bootloader running without error
Red/yellow	Flashing	Bootloader is starting (start sequence is being run through)
Yellow	Flashing (6 s)	S4 state
Yellow	Flashing (3 s)	S3 state
Magenta	Flashing (0.5 s)	S UPS capacitance test (if S UPS present)
Red/magenta	Flashing	Checksum error during I^2C transmission in the bootloader

A steadily lit red LED can indicate a hardware error.

9.3 LED: SATA

The RGB LED indicates the hard disk activity.

Color	Interval	Meaning
Red	Flashing	Activity (access to storage medium)

9.4 LED: TwinCAT

The RGB LED indicates status messages for TwinCAT by means of colors and flashing intervals.

Color	Interval	Meaning
Green	Steadily lit	TwinCAT Run Mode
Blue	Steadily lit	TwinCAT Config Mode
Red	Steadily lit	TwinCAT Stop
-	-	TwinCAT not started

Adaptation of the status codes

It is possible to adapt the status codes (e.g. as TwinCAT LED). To do this, the system colors can be changed with the aid of an SMB command. This change remains in force until the next restart or reset. A change of the default colors is indicated by the additional flashing of the white LED.

9.5 LED: LAN 1 - LAN 3

The LEDs of the LAN interfaces indicate the activity and speed of the data transmission (Mbit/s). The LEDs light up during connection and flash during data transmission:

LED Permanently on when connected	LED Flashing during data transmission	Mbit/s
White	White	2500
Green	Green	1000
Orange	Orange	100/10

The LEDs directly on the interface are not visible with existing wiring. Their signals are forwarded to the display on the housing via an additional LED board.

9.6 EtherCAT LEDs

These LEDs indicate the various statuses of the EtherCAT P connection.

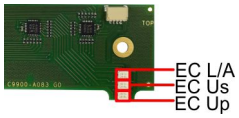


Fig. 11: EtherCAT P LEDs

LED	Color/flashing interval	Meaning
EC L/A	green on	Connection to the network (1000 Mbit/s)
	green flashing	Data transmission running (1000 Mbit/s)
	orange on	Connection to the network (100 Mbit/s)
	orange flashing	Data transmission running (100 Mbit/s)
ECP U_S	green on	System voltage in normal range (24 V)
	red on	Voltage outside the normal range
ECP U_P	green on	Peripheral voltage in normal range (24 V)
	red on	Voltage outside the normal range

9.7 Power supply LED board

The LED board is supplied with a voltage of 3.3 V via a 4-pin plug.

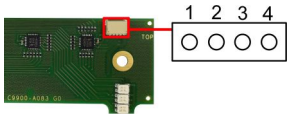


Fig. 12: Power supply LED board

Pin assignment power supply plug		
Pin	**Name**	**Description**
1	3.3 V	Voltage 3.3 V +
2	SCLK	Serial Clock Signal
3	SDAT	Serial DATA Signal
4	GND	Ground

10 Mechanical drawing

Dimensions

Dimensions in mil, millimeters are in square brackets [mm].

10.1 Printed circuit board: dimensions and holes

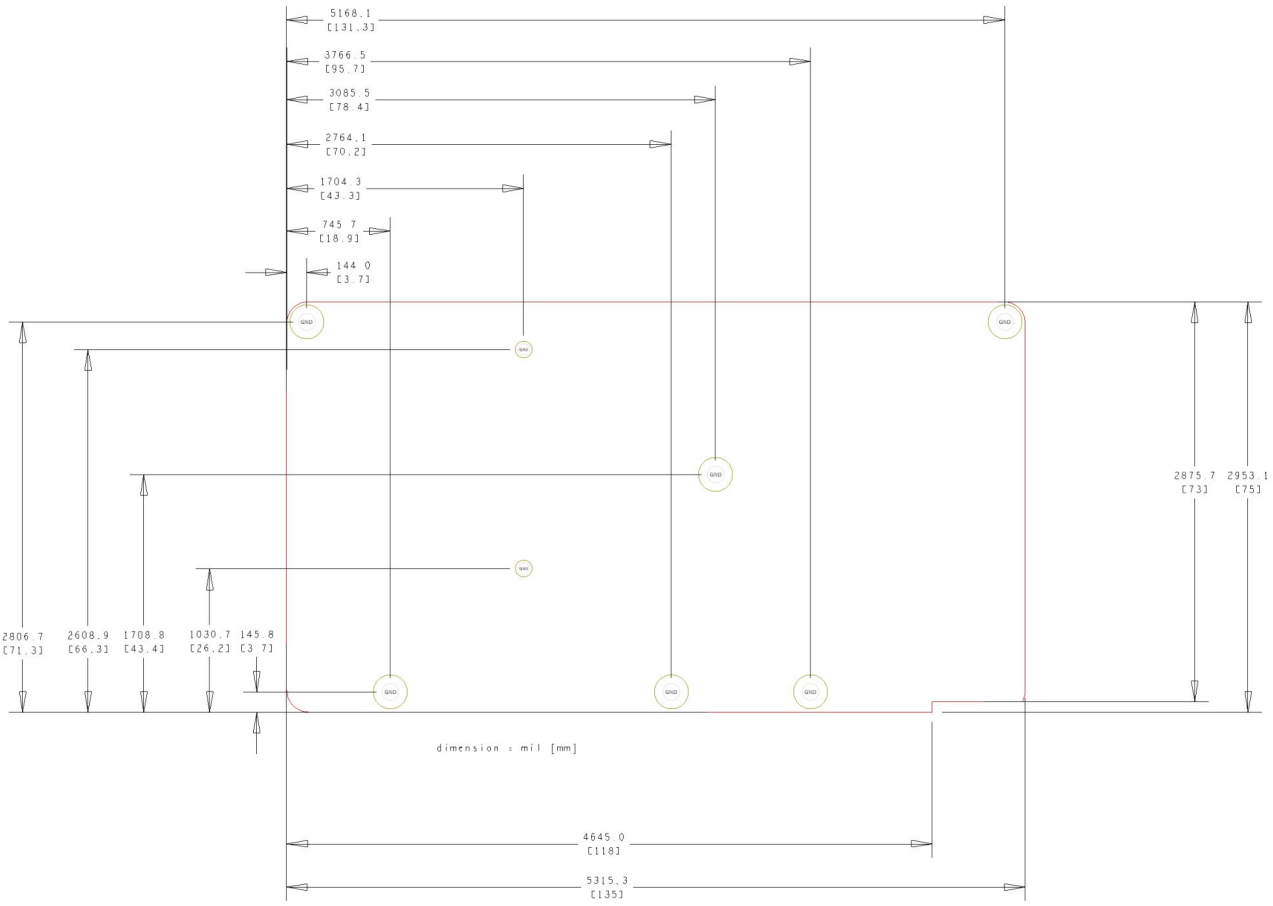


Fig. 13: CB8283 MZ

11 Technical data

11.1 Electrical data

Power supply	
Board	24 V_{DC} (+20 % / –15 %)
RTC	≥3 A

Power	
Transformer	30 W continuous load 60 W peak load

Current consumption	
RTC	≤10 µA

11.2 Environmental conditions

Temperature range	
Operating	0 °C ... +50 °C (extended temperature range on request)
Storage	-25 °C ... +85 °C
Shipping	-25 °C ... +85 °C, for packed boards

Temperature changes	
Operating	0.5 °C per minute, 7.5 °C in 30 minutes
Storage	1.0 °C per minute
Shipping	1.0 °C per minute, for packed boards

Relative humidity	
Operating	5 % ... 85 % (non-condensing)
Storage	5 % ... 95 % (non-condensing)
Shipping	5% ... 100% (non-condensing), for packed boards

Impact	
Operating	150 m/s², 6 ms
Storage	400 m/s², 6 ms
Shipping	400 m/s², 6 ms, for packed boards

Vibrations	
Operating	10 ... 58 Hz, amplitude 0.075 mm 58 to 500 Hz, 10 m/s²
Storage	5 ... 9 Hz, amplitude 3.5 mm 9 to 500 Hz, 10 m/s²
Shipping	5 ... 9 Hz, amplitude 3.5 mm 9 to 500 Hz, 10 m/s², for packed boards

Note on impact and vibration resistance

The specifications for impact and vibration resistance refer only to the motherboard itself without heat sink, memory module, cabling, etc.

11.3 Thermal specifications

The board is specified for an ambient temperature range of 0 °C to +50 °C (extended temperature range on request). In addition, care must be taken that the temperature of the processor die does not exceed 110 °C. To ensure this a suitable cooling concept must be implemented that is oriented to the maximum power consumption of the processor/chipset. It must also be ensured that any existing controllers are included in the cooling concept. The power consumption of these function blocks may be of the same order of magnitude as the power consumption of the processor.

The board is prepared with suitable holes for the use of modern cooling solutions. We have a series of compatible cooling components in our range. Your distributor will be pleased to assist you in selecting suitable solutions.

NOTICE

Prevent the maximum die temperature being exceeded!

It is the end customer's responsibility to ensure that the die temperature of the processor does not exceed 110 °C! Continuous overheating can destroy the board!

If the temperature exceeds 110 °C, the ambient temperature needs to be reduced. Ensure sufficient air circulation if necessary.

12 Appendix I: Post Codes

During the boot phase, the BIOS generates a series of status messages (so-called "POST Codes"), which can be output with the help of a suitable reading device (POST Code card). The meanings of the POST Codes are explained in the document "Aptio™ 5.x Status Codes" from American Megatrends®, which is available from the website http://www.ami.com. In addition, the following OEM POST Codes are output:

Code	Description
87h	BIOS-API started
88h	PCA9535 started
89h	PWRCTRL firmware started

13 Appendix II: Resources

13.1 Interrupt

The resources used depend on the setup setting. The listed interrupts and their use are given by the AT compatibility. If interrupts are to be available only on the ISA side, they must be reserved by the BIOS setup. Exclusivity on the PCI side is neither given nor possible.

13.2 PCI-Devices

The PCI devices listed here all exist on the board, including those that are detected and configured by the BIOS. Due to the BIOS setup settings it may be the case that various PCI devices or functions of devices are not activated. If devices are disabled, the bus numbers of other devices may change as a result.

Bus	Dev.	Fct.	Controller / Slot
00	00	00	Host Bridge ID 3E30
00	01	00	PCI-to- PCI Bridge ID1901
00	01	01	PCI-to- PCI Bridge ID1905
00	01	02	PCI-to- PCI Bridge ID1909
00	02	00	VGA Controller ID3E98
00	08	00	System Device ID1911
00	12	00	Data Acquisition/Signal Processing Controller ID A379
00	14	00	XHCI USB Controller ID A36D
00	14	02	RAM Controller ID A36F
00	16	00	Communication Device ID A360
00	16	03	Serial Device ID A363
00	17	00	RAID Controller ID 2822
00	1D	00	PCI-to-PCI Bridge ID A330
00	1D	04	PCI-to-PCI Bridge ID A334
00	1F	02	ISA Bridge ID A306
00	1F	03	HD Audio Device ID A348
00	1F	04	SMBus Controller ID A323
00	1F	05	Controller ID A324
00	1F	06	Ethernet Controller ID 15BB
01	00	00	Ethernet Controller (PCIE) ID 1533
02	00	00	Ethernet Controller (PCIE) ID 1533
03	00	00	Ethernet Controller (PCIE) ID 1533

13.3 SMB-Devices

The following table lists the reserved SM-Bus device addresses in 8-bit notation.

NOTICE

These address ranges may not be used by external devices even if the component assigned in the table doesn't exist on the motherboard.

Address	Function
34-35	API access to power supply
36-39	Reserved
5C-5D	NCT7491
60-6F	Reserved for DDR4
70-73	POST-Code Output
88-89	Slave address defined by BIOS
A0-A7	Reserved for DDR4
B0-B3	Power controller (access via BIOS-API)
B8-BB	Power controller (access via BIOS-API)

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Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20
33415 Verl
Germany

Phone:	+49 5246 963-0
e-mail:	info@beckhoff.com
web:	www.beckhoff.com

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Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com