Manual for Computerboard

CB6263

Version: 0.3
Date: 20.04.2020

BECKHOFF

Index

1 Documentation issue status

Version	Comment
0.3	Adaptations in the BIOS layout and update
0.2	Adaptations in the block diagram, corrected feature list, adaptation of the interface designation, adaptations in the BIOS
0.1	First preliminary version (draft)

2 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The qualified personnel must ensure that the application of the described products meets all safety requirements, including all applicable laws, specifications, regulations and standards.

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 prior announcement.
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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3 Safety instructions

Safety regulations

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

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. 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 the life and health of persons!

⚠ WARNING

Risk of injury!

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

⚠ CAUTION

Personal injuries!

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

NOTE

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 certification.

Intended use

The CB6263 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.

Any other use is regarded as inappropriate.

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

4 Overview

4.1 Properties

The CB6263 is conceived as a compact PC. It offers basic functions, on-board RAM and a powerful CPU of the Intel® Bay trail generation in the smallest space.

The CB6263 provides 1x DisplayPort/HDMI, 1x USB2.0, 1x USB3.0 and 2x Gigabit-LAN as I/O interfaces on its front panel.

The BAseCon140 plug enables the flexible extension of the I/O functions of the CB6263. It provides 8 PCIe lanes, of which 4 can be multiplexed with SATA signals and 4 with USB 3.0 signals. The configuration of the I/O functions is taken care of by the PIC on the expansion card. The PIC contains the configuration data, which are communicated to the board upon connection and thus enable an uncomplicated and self-configuring extension of the I/O options.

Further, a Status LED shows the status of the power controller.

Despite its extremely small format, therefore, the CB6263 offers the full functionality of a motherboard.

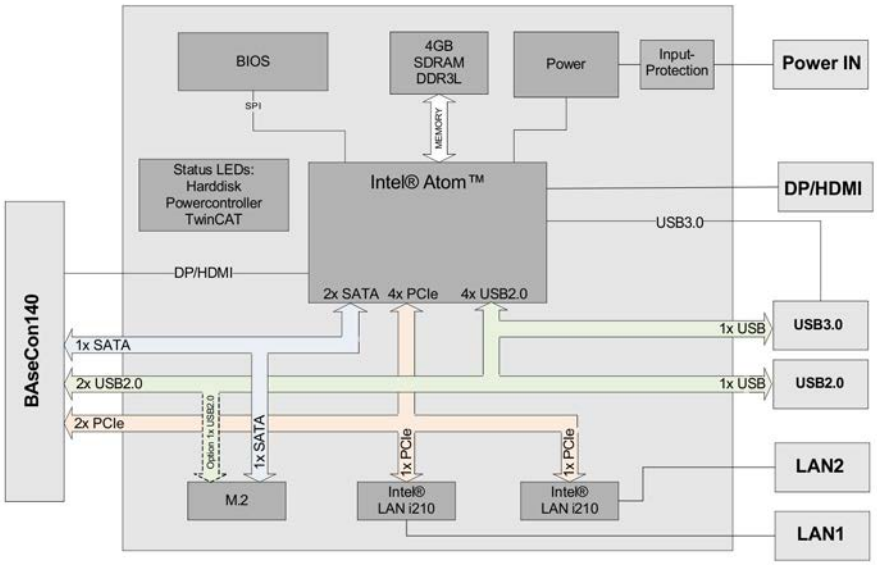


Fig. 1: Block diagram - CB6263

4.1.1 List of features

CB6263	75 x 75 Board
CPU	Intel® Atom™ E3845 (QC, 2M, 1.91 GHz), TDP 10W Intel® Atom™ E3827 (DC, 1M, 1.75 GHz), TDP 8W Intel® Atom™ E3815 (SC, 1M, 1.46 GHz), TDP 5W
Socket	DDR3L
Memory	Onboard DRAM-1.35V / DDR3 (depending on CPU up to 1333 MHz, up to 4 GB)
I/O on front panel	1x DisplayPort 2x LAN 10/100/1000 1 x USB 2.0 1 x USB 3.0
Internal I/O	1x M.2 (B) sockets, signals dependent on chipset see Internal: M.2 1x BAseCon140, for signals see Internal: BAseCon140 (Q170 only)
Graphic resolution	DisplayPort1.1a: 2560 x 1600 (at 16:10), 2560 x 1440 (at 16:9) HDMI1.4/DVI: 1920x1200 (at 16:10), 1920x1080 (at 16:9)
RTC	With external CMOS battery (via 2-pin contact strip or expansion card)
BIOS	AMI ® Aptio V
Power supply	20V - 30V Input voltage Overvoltage and undervoltage protection Reverse polarity protection Not galvanically isolated
Format	75 x 75 mm

Availability of the processors

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

4.1.2 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 2.0

www.pcisig.com

ACPI specification

Version 3.0

www.acpi.info

ATA/ATAPI specification

Version 7 Rev. 1

www.t13.org

USB specifications

www.usb.org

SM-Bus specification

Version 2.0

www.smbus.org

Intel® chip descriptions

Intel® Atom™ Processor E3800 Product Family datasheet

www.intel.com

Intel® chip description

i210 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™ 4.x Status Codes

www.ami.com

5 Detailed description

5.1 CPU

The processors employed are System-on-a-Chip models from Intel®. These SoCs are based on processors from the Atom™ E38xx family, which are characterized by very low power consumption, but nevertheless offer a contemporary performance with clock rates of currently up to 2 GHz. Despite its extremely small size and low power consumption, the processor offers a second-level cache of 256 kB per core and familiar standard features such as SSE4.1/4.2, loadable microcode, etc.

Intel® processors from the Atom™ E38xx family feature an extended ambient temperature range and are therefore particularly suitable for use in industrial systems.

5.2 Memory

Four permanently installed DRAM memory modules are used on the CB6263 board.

Depending on the component variant, these are 2GByte or 4GByte DDR3 memory variants. Depending on the CPU used, a maximum clock frequency of 1333MHz is supported.

5.3 M.2

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 CB6263 supports M.2 modules with Key B. SATA signals that allow an SSD to be connected are output via the interface.

6 Connections

6.1 Plug connector overview

The plug connections of the CB6263 board are summarized in the illustration below. The function of the respective plug connection can be taken from the table below the illustration, as can the page of the manual on which further information about this connection can be read.

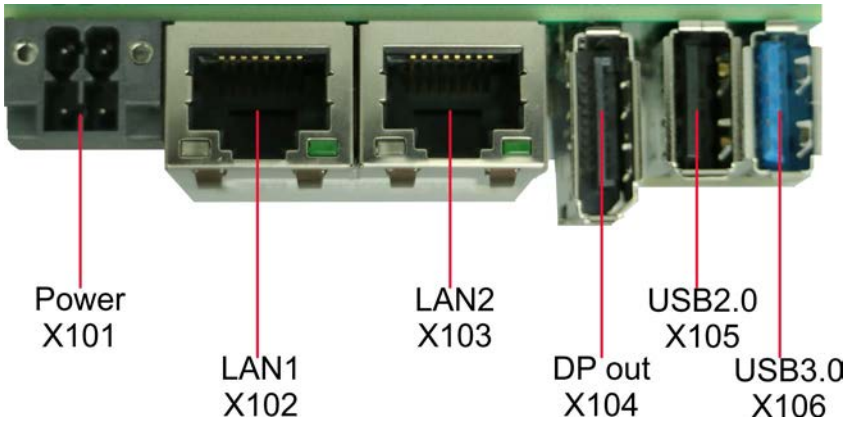


Fig. 2: Front panel

Front panel

The illustration corresponds to the installation situation in the PC housing.

6.2 List of interfaces

Number	Function (designation)	Page
P904	Vin (X101)	Front panel: Power supply (X101) [▶ 15]
P903	LAN 1 (X102)	Front panel: LAN (X102, X103) [▶ 16]
P900	LAN 2 (X103)	Front panel: LAN (X102, X103) [▶ 16]
P905	DisplayPort (X104)	Front panel: DisplayPort / HDMI / DVI (X104) [▶ 17]
P902	USB2.0 (X105)	Front panel: USB 2.0 (X105) [▶ 18]
P902	USB3.0 (X106)	Front panel: USB 3.0 (X106) [▶ 19]
P803	BAseCon140	Internal: BAseCon140 [▶ 22]
P800	M.2 socket	Internal: M.2 (Key B) [▶ 20]
P802	Fan connection housing plug (three-pole)	Internal: FAN [▶ 26]
P801	RealTimeClock RTC housing plug (two-pin)	Internal: RTC [▶ 27]

The numbers in brackets correspond to the labeling of the external interfaces on the housing on the front panel of the Industrial PC.

6.3 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 are to be taken from the respective specifications and observed accordingly.

6.4 External connections

6.4.1 Front panel: Power supply (X101)

The connection for the power supply is implemented as a 2x2-pin housing plug. The main power supply (24 V) for the module is on pin 3.

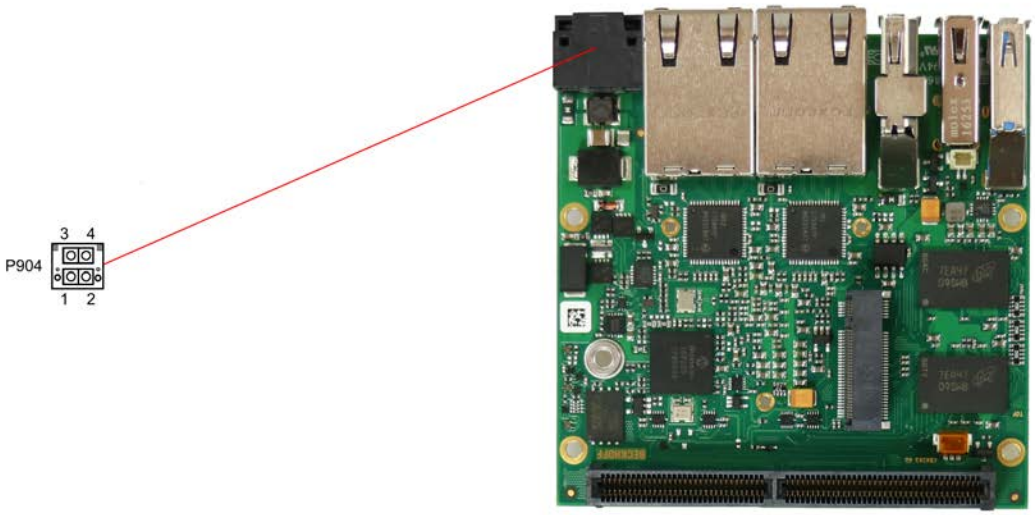


Fig. 3: CB6263 Vin

90° plug

As the plug is a 90° plug, the plug symbol in the illustration is oriented to what you see when you look at the board from the side (instead of from above).

Pin assignment of the power plug:

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

Function restrictions PC_On switch

Please note that there are system states in which the activation of a connected PC_On 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_On buttons.

6.4.2 Front panel: LAN (X102, X103)

The board has two Gigabit-LAN connections. Network components compatible with 10BaseT, 100BaseT and 1000BaseT can be connected to all of them. The required speed is selected automatically. Auto-Cross and Auto-Negotiate are available as well as PXE and RPL functionality. Controller is Intel®'s i210.

90° plug

As the plug is a 90° plug, the plug symbol in the illustration is oriented to what you see when you look at the board from the side (instead of from above).

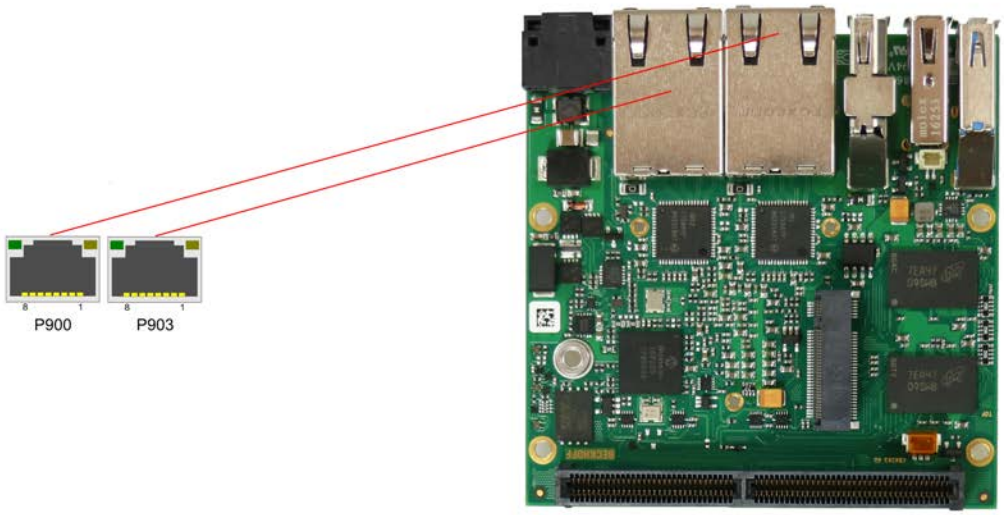


Fig. 4: CB6263 LAN

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 -

The LEDs of the LAN interfaces indicate the activity and speed of the data transmission (Mbit/s). The right-hand LED lights up when there is a connection and activity, and the left-hand LED during data transmission:

Right LED Permanent with connection, Flashing during data transmission	Left LED Permanent during data transmission	Mbit/s
Green	Green	1000
Green	Orange	100
Green	None	10

6.4.3 Front panel: DisplayPort / HDMI / DVI (X104)

An appropriate standard plug is available for devices with a DisplayPort connection.

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.

90° plug

As the plug is a 90° plug, the plug symbol in the illustration is oriented to what you see when you look at the board from the side (instead of from above).

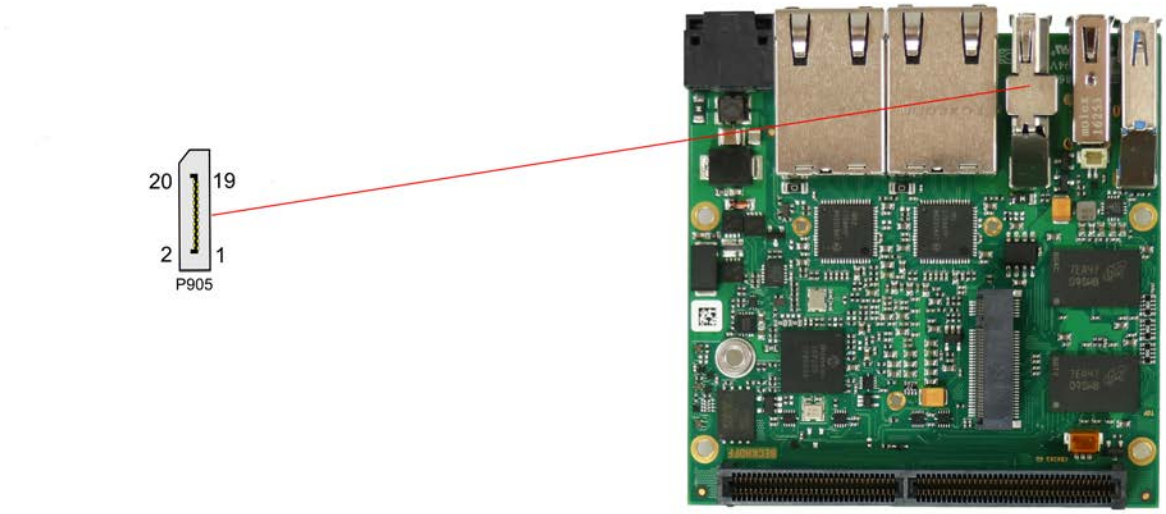


Fig. 5:

Pin assignment of DisplayPort plug:

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

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.

6.4.4 Front panel: USB 2.0 (X105)

The USB channel 1 is provided via a standard USB connector and supports USB specification 2.0. This USB interface can supply up to 500mA current and is electronically fused.

All necessary settings for USB are done by the BIOS. Note that the "USB mouse and keyboard" function in the BIOS setup is only required if the operating system does not offer USB support. This function should not be selected for settings in the setup and for booting Windows with a USB mouse and keyboard connected, because this would lead to considerable performance limitations.

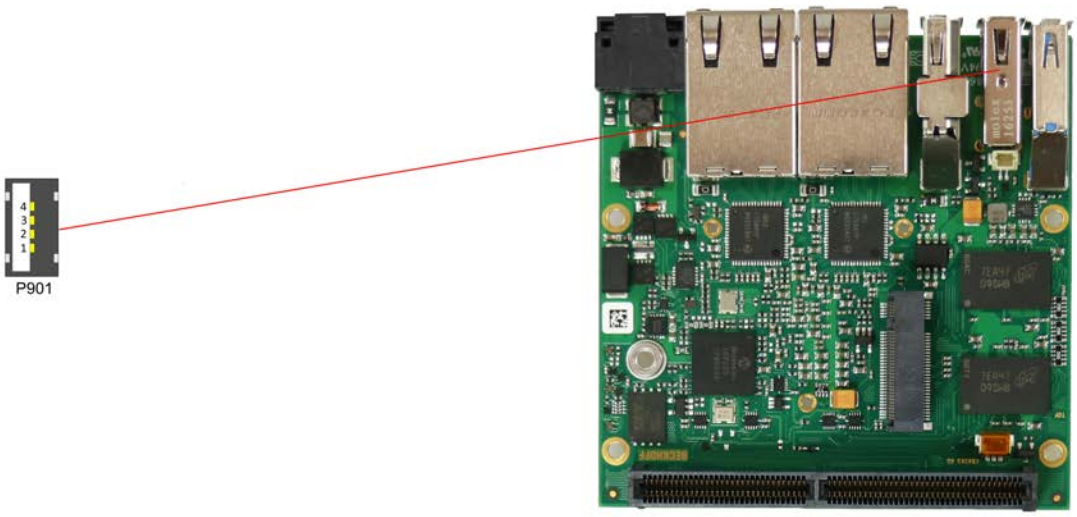


Fig. 6: CB6263 USB 2.0

Pin assignment of USB 2.0 connector:

Pin	Name	Description
1	VCC	5 V for USB
2	USB D#	Data channel USB -
3	USB D	Data channel USB +
4	GND	Ground

6.4.5 Front panel: USB 3.0 (X106)

USB channel 2 is made available via a standard USB plug connector.

This USB channel supports the USB 3.0 specification. Contrary to the specification, the USB 3.0 channel only supplies current up to 500 mA. Devices with their own current supply must be used for higher power demands. The USB interface is electronically fused.

All necessary settings for USB can be made in the BIOS. This applies to both USB interfaces. Note that the "USB mouse and keyboard" function in the BIOS setup is only required if the operating system does not offer USB support. This function should not be selected for settings in the setup and for booting Windows with a USB mouse and keyboard connected, because this would lead to considerable performance limitations.

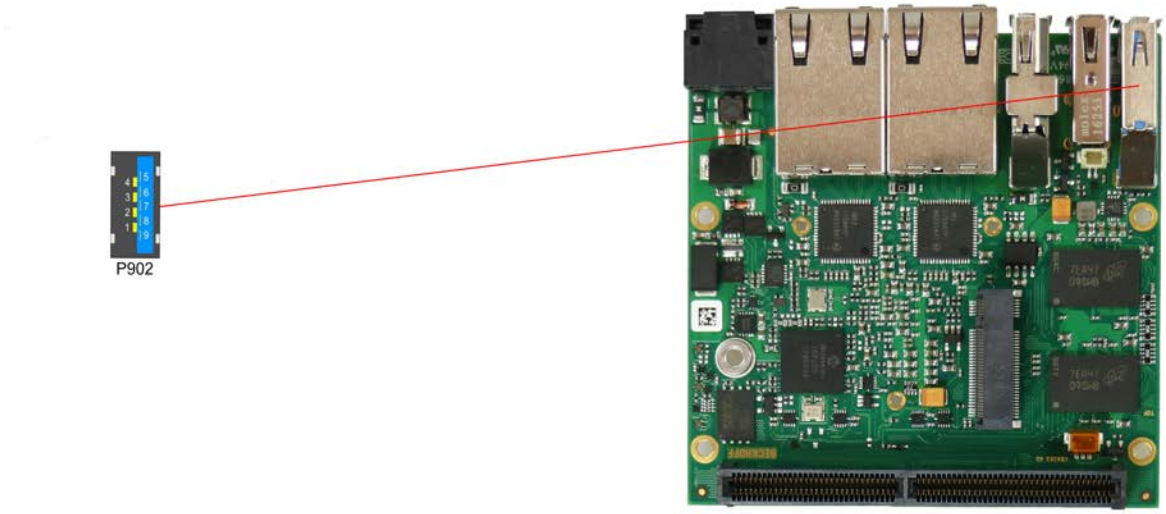


Fig. 7: CB6263 USB 3.0

Pin assignment of USB 3.0 connector:

Pin	Signal	Description
1	VCC	5 V supply voltage
2	D-	Data - (USB 2.0)
3	D+	Data + (USB 2.0)
4	GND	Ground
5	RX-	Receive line - (USB 3.0)
6	RX+	Receive line + (USB 3.0)
7	GND	Ground
8	TX-	Transmit line - (USB 3.0)
9	TX+	Transmit line + (USB 3.0)

6.5 Internal connections

6.5.1 Internal: M.2 (Key B)

The CB6263 is equipped with an M.2 socket, into which an M.2-2242 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.

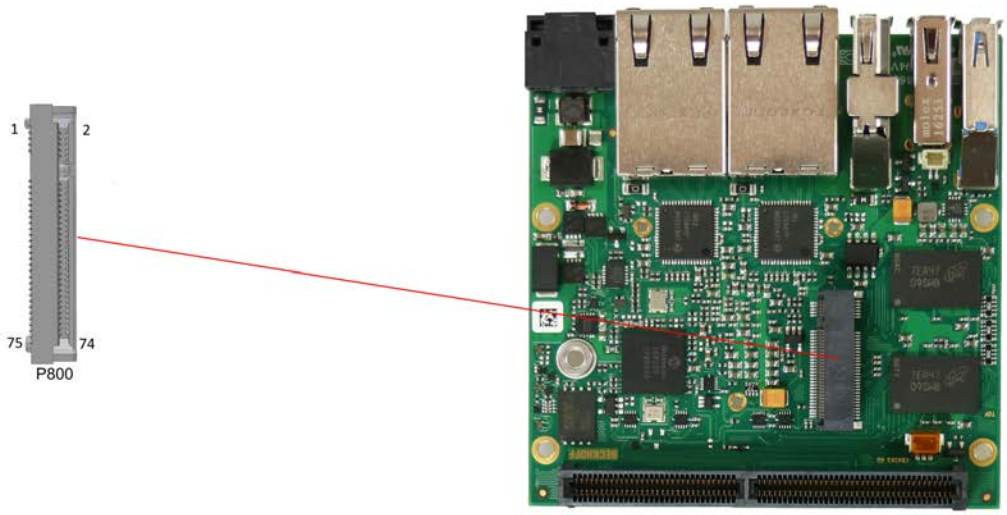


Fig. 8: CB6263 M.2

Pin assignment of M.2 connector:

Description	Signal	Pin		Signal	Description
Configuration pin	CONFIG_3	1	2	3.3V1	Standby supply voltage S3.3V
Ground	GND	3	4	3.3V2	Standby supply voltage S3.3V
Ground	GND	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	GND	11	12	Connector Key	
Connector Key		13	14		
		15	16		
		17	18		
		19	20	GPIO5	(not led out)
Configuration pin	Config 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	GND	27	28	GPIO8	(not led out)
(not led out)	PER1# USB3-5 SSRX# SSICRX#	29	30	UIM RST	(not led out)

Description	Signal	Pin		Signal	Description
(not led out)	PER1 USB3-5 SSRX SSICRX	31	32	UIM CLK	(not led out)
Ground	GND	33	34	UIM DATA	(not led out)
(not led out)	PET1# USB3-5 SSTX# SSICTX#	35	36	UIM PWR	(not led out)
(not led out)	PET1 USB3-5 SSTX SSICTX	37	38	DEVSLP	(not led out)
Ground	GND	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	GND	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	GND	51	52	CLKREQ#	(not led out)
(not led out)	REFCLK#	53	54	PEWAKE#	(not led out)
(not led out)	REFCLK	55	56	N/C	(not led out)
Ground	GND	57	58	N/C	(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)
(not led out)	ANTCTL3	65	66	SIM DETECT	(not led out)
Power good	RESET#	67	68	SUSCLK	Suspend clock
Configuration pin	CFG1	69	70	3.3 V	Standby supply voltage S3.3V
Ground	GND	71	72	3.3 V	Standby supply voltage S3.3V
Ground	GND	73	74	3.3 V	Standby supply voltage S3.3V
Configuration pin	CFG2	75			

6.5.2 Internal: BAseCon140

The BAseCon140 plug connector (Samtec HSEC-170-01-L-DV-A-K-TR) enables the flexible extension of the IO functions of the CB6263. It provides up to 8 PCIe lanes, of which 4 can be multiplexed with SATA2.0 (3G) signals and 4 with USB 3.0 signals. In addition, DisplayPort, HSIC, SMBus and 1Wire signals are fed out via the BAseCon plug. The extension board takes care of the configuration of the IO functions. A PIC on the expansion card contains the configuration data, which are communicated to the board upon connection and thus enable an uncomplicated and self-configuring extension of the I/O options.

Observe the current limits!

In order to avoid damaging the device, it is essential to observe the following current limits:

A maximum load of 2.8 A per pin must not be exceeded. On account of the different current consumptions of the usable processors the actual current consumption may be lower. The respective maximum values can be obtained from your distributor on inquiry.

Irrespective of the CPU in use, a maximum total load of 100 W must not be exceeded.

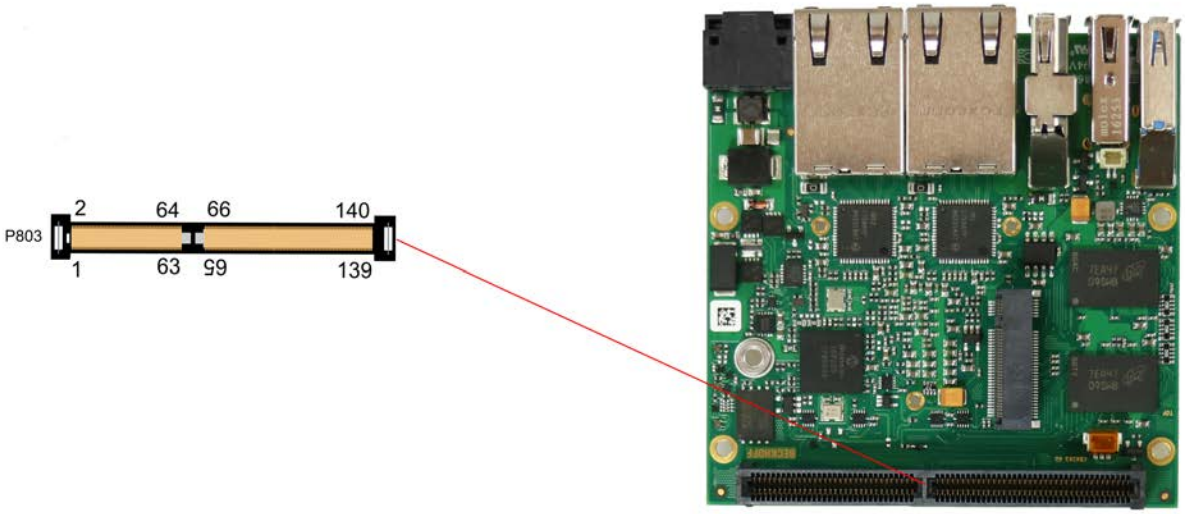


Fig. 9: CB6263 BAseCon140

Pin assignment of BAseCon140 connector:

Description	Signal	Pin		Signal	Description
S UPS output	S UPS OUT1	1	2	S UPS IN1	S UPS input
S UPS output	S UPS OUT2	3	4	S UPS IN2	S UPS input
VCC	5V1	5	6	GND	Ground
VCC	5V2	7	8	GND	Ground
Ground	GND	9	10	3.3V1	3.3 V supply voltage
Ground	GND	11	12	3.3V2	3.3 V supply voltage
S VCC	S5V	13	14	S3.3V	Standby supply voltage 3.3 V
Ground	GND	15	16	GND	Ground
PCIe Lane 1 Transmit +	PE1 TX/ SATA4 TX	17	18	SATA4 RX/ PE1 RX	PCIe Lane 1 Receive +
PCIe Lane 1 Transmit -	PE1 TX#/ SATA4 TX#	19	20	SATA4 RX #/ PE1 RX#	PCIe Lane 1 Receive -
Ground	GND	21	22	GND	Ground
PCIe Clock Lane 1 +	PECLK1	23	24	PECLK2	PCIe Clock Lane 2 +
PCIe Clock Lane 1 -	PECLK1#	25	26	PECLK2#	PCIe Clock Lane 2 -
Ground	GND	27	28	GND	Ground

Description	Signal	Pin		Signal	Description
PCI Lane 2 Transmit +	PE2 TX/ SATA3 TX	29	30	SATA3 RX/ PE2 RX	PCIe Lane 2 Receive
PCI Lane 2 Transmit -	PE2 TX#/ SATA3 TX#	31	32	SATA3 RX #/ PE2 RX#	PCIe Lane 2 Receive -
Ground	GND	33	34	GND	Ground
(not led out)	PE3-TX/ SATA2-TX	35	36	SATA2 RX/ PE3 RX	(not led out)
(not led out)	PE3-TX#/ SATA2-TX#	37	38	SATA2 RX#/ PE3 RX#	(not led out)
Ground	GND	39	40	GND	Ground
(not led out)	PECLK3	41	42	PECLK4	(not led out)
(not led out)	PECLK3#	43	44	PECLK4#	(not led out)
Ground	GND	45	46	GND	Ground
SATA Lane 2 Transmit +	PE4-TX/ SATA1-TX	47	48	SATA1 RX/ PE4 RX	SATA Lane 2 Receive +
SATA Lane 2 Transmit -	PE4-TX#/ SATA1-TX#	49	50	SATA1 RX #/ PE4 RX #	SATA Lane 2 Receive -
Ground	GND	51	52	GND	Ground
PCIe Clock Enable Lane 1 active low	PCKE1#	53	54	PCKE2#	PCIe Lane 2 Clock Enable active low
(not led out)	PCKE3#	55	56	PCKE4#	(not led out)
PCIe Reset active low	PERST#	57	58	PEWAKE#	PCIe Wake active low
SMBus Clock	SMBCLK	59	60	SMBDAT	SMBus Data
KEY					
SMBus Alert active low	SMB-Alert#	61	62	1Wire	1-Wire
(not led out)	PCKE5/OC4#	63	64	PCKE6#/ OC3#	(not led out)
(not led out)	PCKE7/OC2#	65	66	PCKE8#/ OC1#	USB Overcurrent active low
Ground	GND	67	68	GND	Ground
(not led out)	PE5-TX/ USB3-4-TX/ USBC1-TX	69	70	USBC1 RX/ USB3-4 RX/ PE5 RX	(not led out)
(not led out)	PE5-TX#/ USB3-4-TX#/ USBC1_TX#	71	72	USBC1 RX#/ USB3-4 RX#/ PE5 RX#	(not led out)
(not led out)	USB2-4 (GND)	73	74	USB2-8 (GND)	(not led out)
(not led out)	PECLK5/ USBC_SBU1 (GND)	75	76	PECLK6 (GND)	(not led out)
(not led out)	PECLK5#/ USBC-SBU2 (GND)	77	78	PECLK6# (GND)	(not led out)
(not led out)	USB2-4# (GND)	79	80	USB2-8 D# (GND)	(not led out)

Description	Signal	Pin		Signal	Description
(not led out)	PE6-TX/ USB3-3-TX/ USBC2-TX	81	82	USBC2 RX/ USB3-3 RX/ PE6 RX	(not led out)
(not led out)	PE6-TX#/ USB3-3-TX#/ USBC2-TX#	83	84	USBC2 RX#/ USB3-3 RX#/ PE6 RX#	(not led out)
Ground	GND	85	86	GND	Ground
(not led out)	PE7-TX/ USB3-2-TX/ SSIC-TX	87	88	SSIC RX/ USB3-2 RX/ PE7 RX	(not led out)
(not led out)	PE7-TX#/ USB3-2-TX#/ SSIC-TX#	89	90	SSIC RX#/ USB3-2 RX#/ PE7 RX#	(not led out)
USB 2.0 Channel 3 +	USB2-2 (GND)	91	92	USB2-1	USB 2.0 Channel 10 +
Ground	(GND)	93	94	PECLK8	PCIe Lane 8 Clock +
Ground	(GND)	95	96	PECLK8#	PCIe Clock Lane 8 -
USB 2.0 Channel 3 -	USB2-2# (GND)	97	98	USB2-1#	USB 2.0 Channel 10 -
(not led out)	PE8-TX/ USB3-1-TX	99	100	USB3-1 RX/ PE8 RX	(not led out)
(not led out)	PE8-TX#/ USB3-1-TX#	101	102	USB3-1 RX#/ PE8 RX#	(not led out)
Ground	GND	103	104	GND	Ground
KEY					
SATA GP1	GPIO1/ SATAGP1	105	106	SATAGP2/ GPIO2	(not led out)
SATA GP3	GPIO3/ SATAGP3/ USBC-CC1	107	108	USB-CC2/ SATAGP4/ GPIO4	(not led out)
TwinCAT LED Red	GPIO5/ TCLEDR	109	110	GPIO6/ TCLEDG	TwinCAT LED Green
TwinCAT LED Blue	GPIO7/ TCLEDB	111	112	GPIO8	(not led out)
SATA LED active low	SATA-LED	113	114	USBPWREN	USB Power Enable
RTC Battery	BATT	115	116	PWRFAIL	SUSV
Power Management Event active low	PME#	117	118	PWRGOOD	Power good
Power button active low	PWRBTN#	119	120	MRST#	Reset button active low
PSON	PSON	121	122	ATXPWRGD	ATX Power good
Ground	GND	123	124	GND	Ground
DP / HDMI switchover	DP/DVI#	125	126	DDCC/ DPAUX	DisplayPort Aux +/ DDC Clock
DisplayPort Hot Plug Detect	DPHPD	127	128	DDCD/ DPAUX#	DisplayPort Aux - / DDC Data
Ground	GND	129	130	GND	Ground
DisplayPort Lane 0 +	DPL0	131	132	DPL1	DisplayPort Lane 1 +

Description	Signal	Pin		Signal	Description
DisplayPort Lane 0 -	DPL0#	133	134	DPL1#	DisplayPort Lane 1 -
Ground	GND	135	136	GND	Ground
DisplayPort Lane 2 +	DPL2	137	138	DPL3	DisplayPort 3 +
DisplayPort Lane 2 -	DPL2#	139	140	DPL3#	DisplayPort 3 -

6.5.3 Internal: FAN

The CB6263 has a 3-pin fan connection (JST BM03B-SRSS-TBT(LF)-(SN)). This enables a fan with a supply voltage of 5 V to be connected directly to the module. The connection has a speed monitoring function. The connected fan must supply a corresponding tachometer signal if this is to be used.

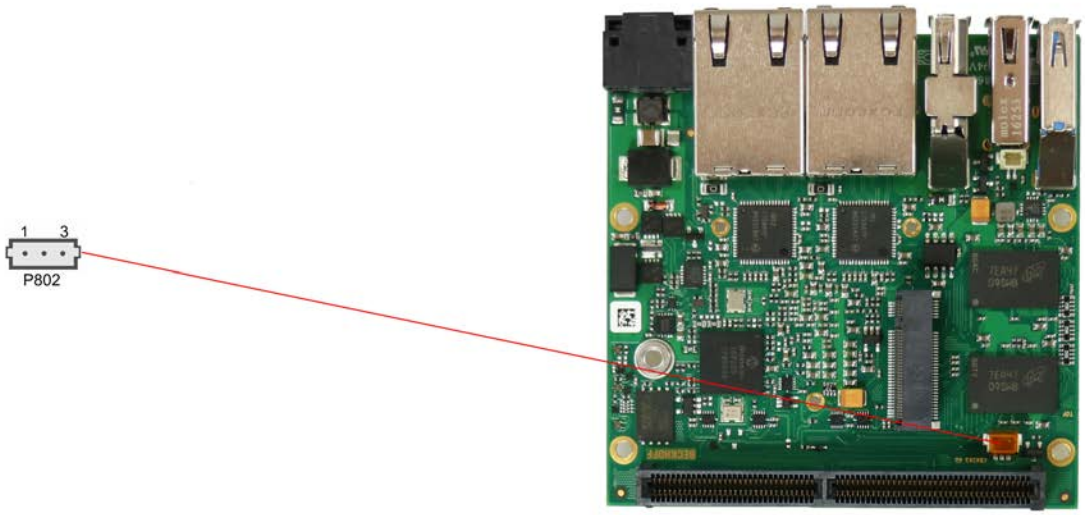


Fig. 10: CB6263 FAN

Pin assignment of fan connector:

Pin	Signal	Description
1	GND	Ground (PWM-controlled)
2	5 V	Supply voltage 5 V regulated
3	TACHO	Fan monitoring signal

6.5.4 Internal: RTC

The CB6263 can be connected to an external RTC battery via a bipolar housing plug (JST BM02B-SRSS-TBT(LP)(SN)) to provide power to the integrated clock even if there is no power supply. The battery voltage must not exceed 3.3V.

	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.

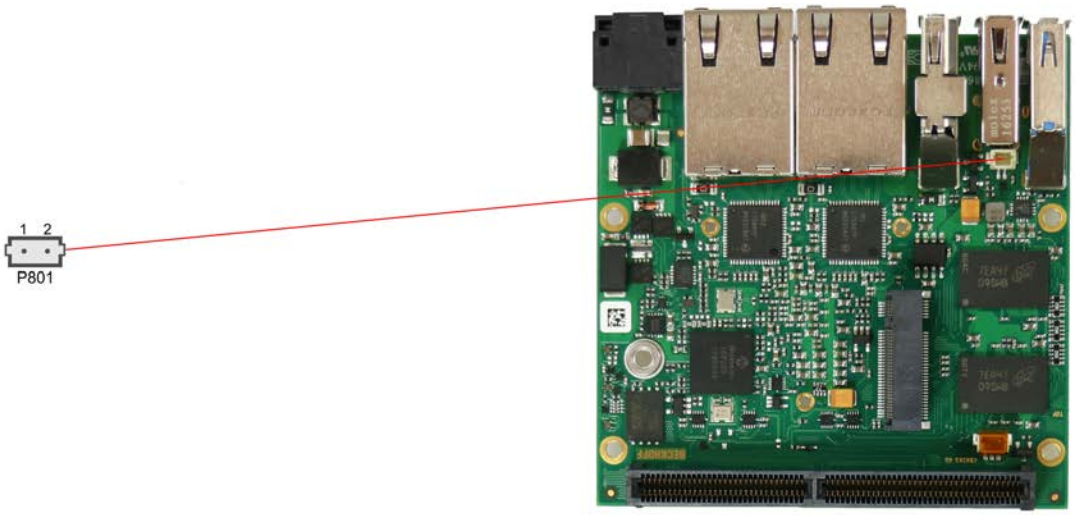


Fig. 11: CB6263 RTC

Synchronism of the RTC

The quartz of the RTC reacts to temperature fluctuations. Therefore, correct synchronism of the RTC is possible only with suitable and sufficient cooling!

Pin assignment RTC battery plug:

Pin	Name	Description
1	BATT	3.3 V battery voltage
2	GND	Ground

7 BIOS

7.1 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 & Exit").

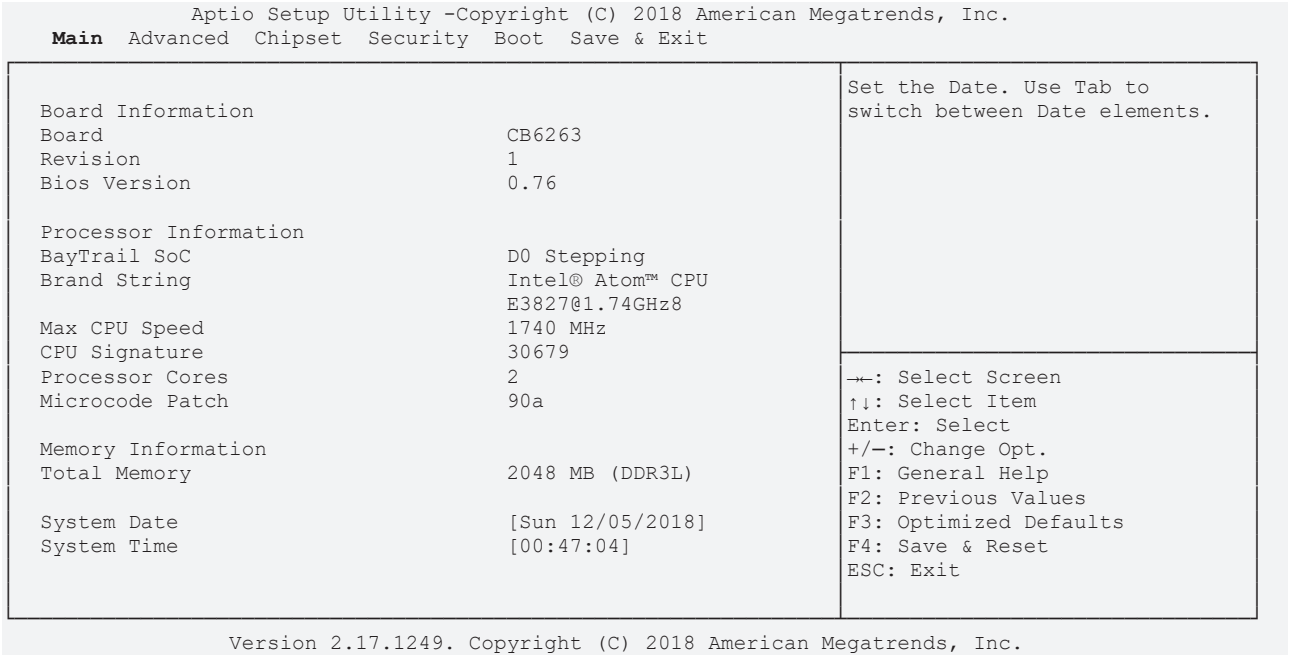
A “►” sign in front of the menu item indicates that a submenu is available. Use the arrow keys to navigate between menu items. Use the Enter key to select menu items and call submenus or selection dialogs.

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.

Note on Setup Documentation

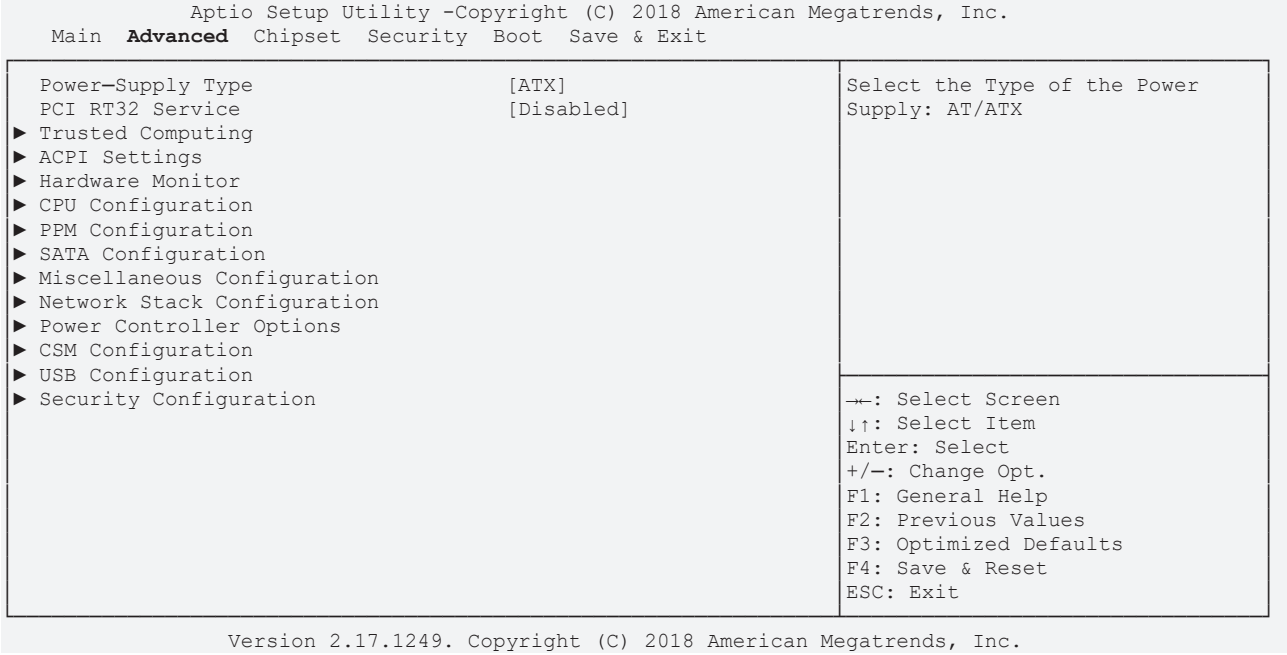
The BIOS is regularly updated so that the available setup options can change at any time without notice. This may result in differences between the options actually available and those described below. It should also be noted that the settings shown in the setup menus below are not necessarily the recommended or default settings. Which settings must be selected depends on the application scenario in which the board is operated.

7.2 Main CB6263



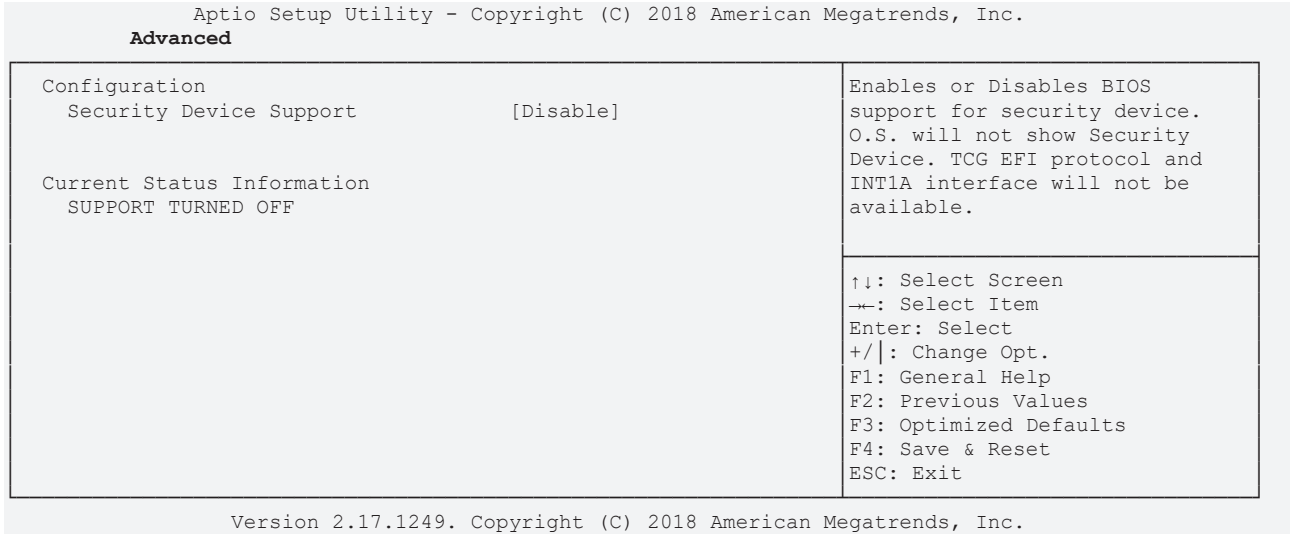
Setup entry	Option
Board	None
Revision	None
Bios version	None
Processor Information	
BayTrail SoC	None
Brand String	None
Max CPU Speed	None
CPU Signature	None
Processor Cores	None
Microcode Patch	None
Memory Information	
Total Memory	None
System Date	The system date can be set here.
System Time	The system time can be set here.

7.3 Advanced



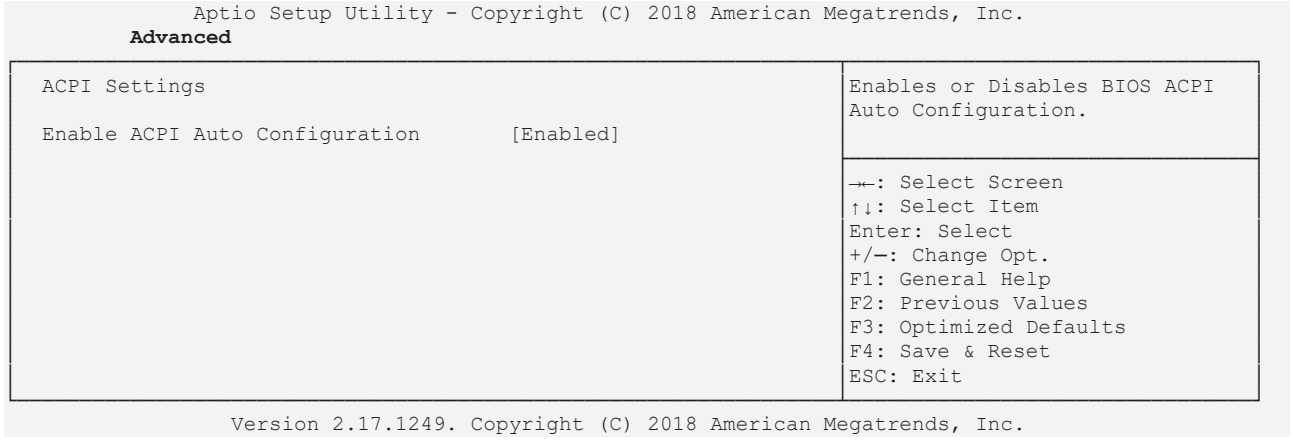
Bios-entry	Options
Power-Supply Type	ATX / AT
ACPI Settings	Submenu: ACPI Settings [▶ 31]
Hardware Monitor	Submenu: Hardware Monitor [▶ 32]
CPU Configuration	Submenu: CPU Configuration [▶ 33]
PPM Configuration	Submenu: PPM Configuration [▶ 36]
SATA Configuration	Submenu: SATA Configuration [▶ 37]
Miscellaneous Configuration	Submenu: Miscellaneous Configuration [▶ 38]
Network Stack Configuration	Submenu: Network Stack Disabled [▶ 39]
Power Controller Options	Submenu: Power Controller Options [▶ 41]
CSM Configuration	Submenu: CSM Configuration [▶ 42]
USB Configuration	Submenu: USB Configuration [▶ 43]
Security ConfigurationIntel	Submenu: Security Configuration [▶ 44]

7.3.1 Trusted Computing



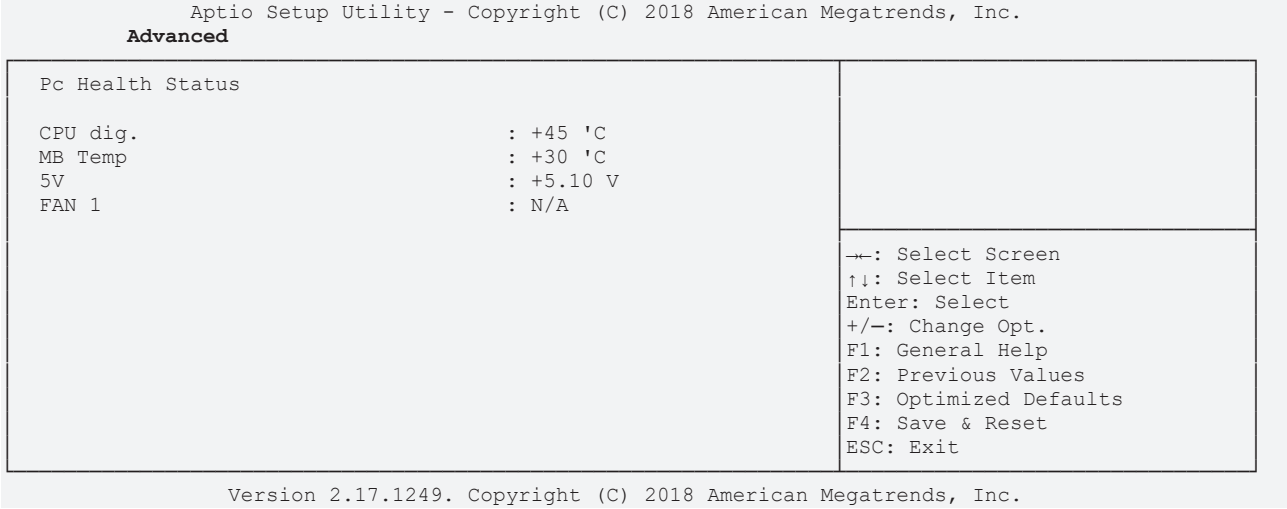
Bios-Entry	Options
Configuration	
Security Device Support	Disabled / Enabled
Current Status Information SUPPORT TURNED OFF	None

7.3.2 ACPI Settings



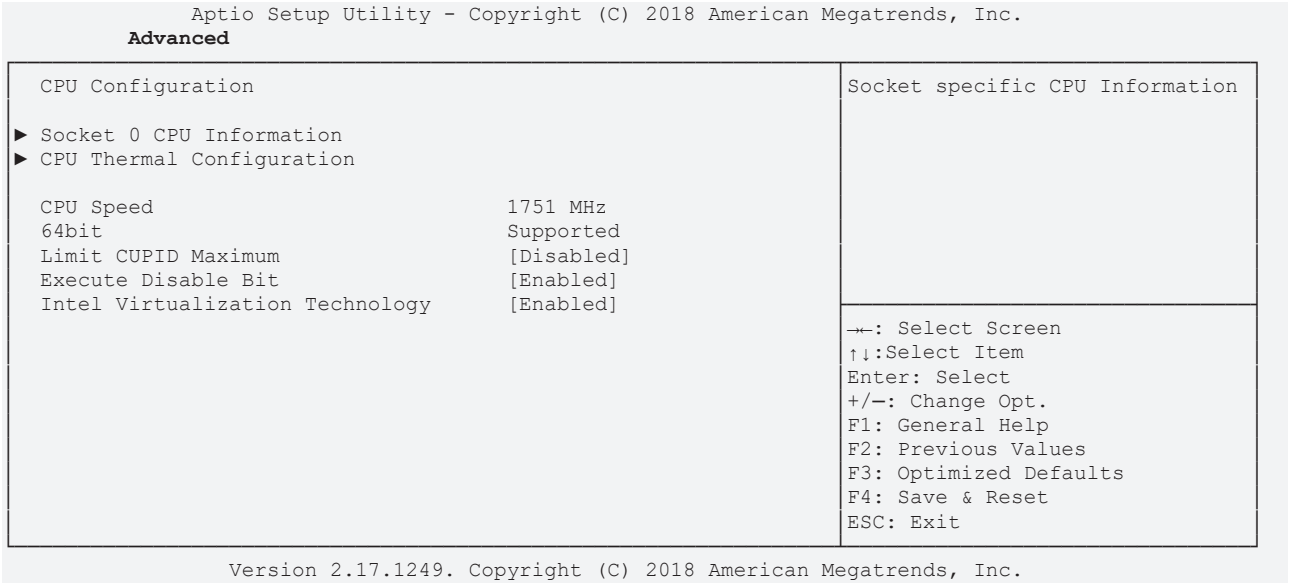
Bios-Entry	Options
ACPI Settings	
Enable ACPI Auto Configuration	Disabled / Enabled

7.3.3 Hardware Monitor



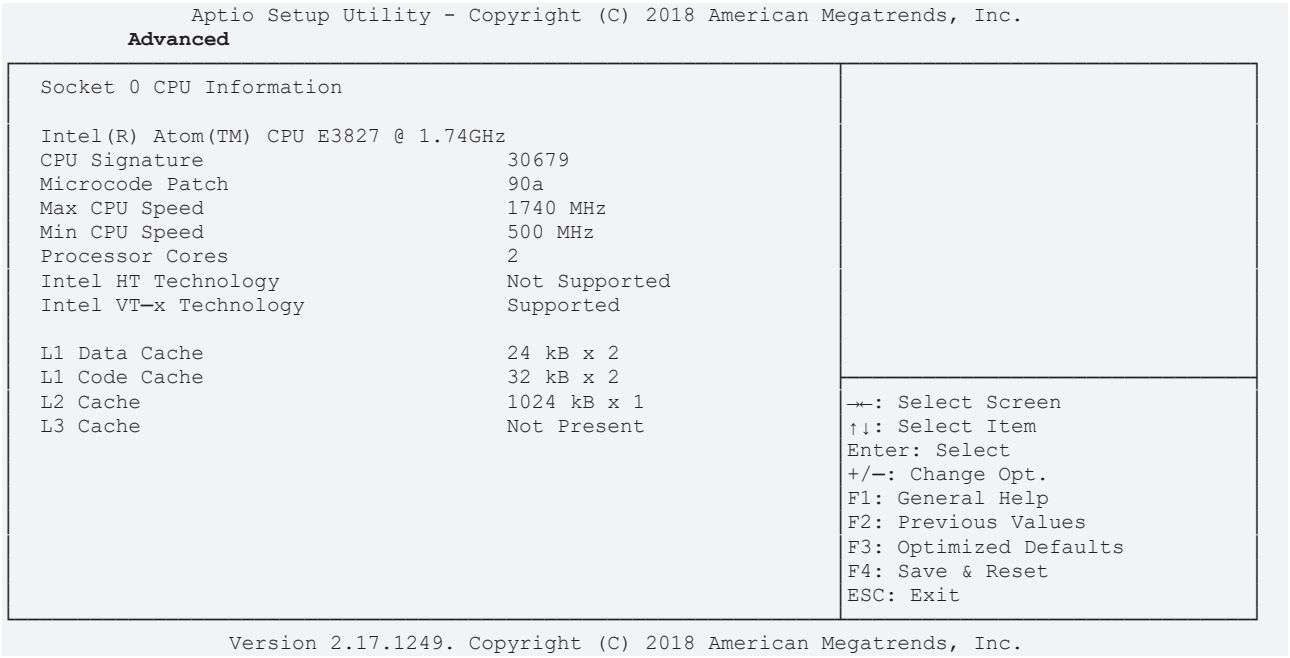
Bios-Entry	Options
PC Health Status	None

7.3.4 CPU Configuration



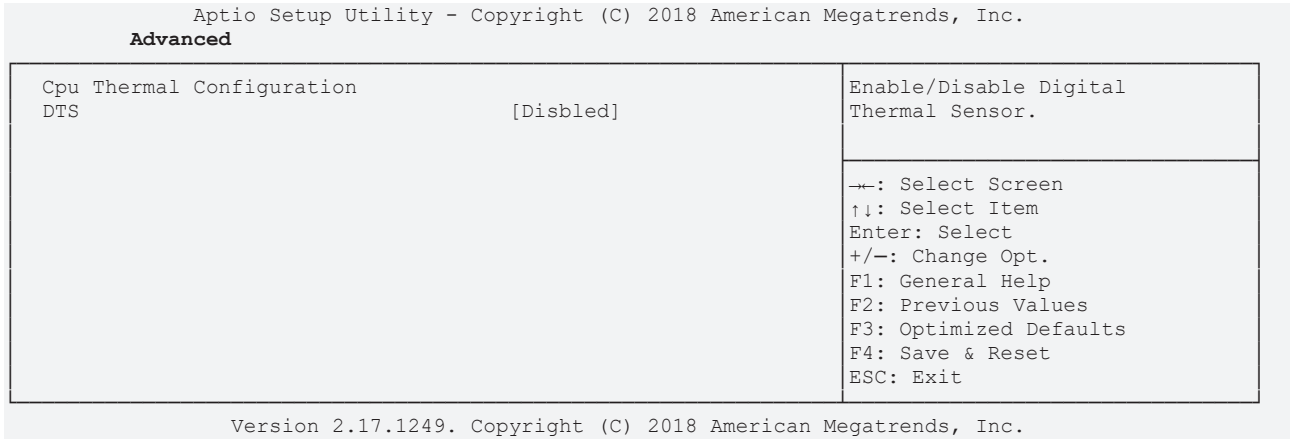
Bios-Entry	Options
CPU Configuration	
Socket 0 CPU Configuration	Submenu: Socket CPU Information [▶ 34]
CPU Thermal Configuration	Submenu: CPU Thermal Configuration [▶ 35]
CPU Speed	None
64 bit	None
Limit CUPID Maximum	Disabled / Enabled
Execute Disable Bit	Enabled / Disabled
Intel Virtualization Technology	Enabled / Disabled

7.3.4.1 Socket CPU Information



Bios-Entry	Options
Socket CPU Information	
CPU Signature	None
Microcode Patch	None
Max CPU Speed	None
Min CPU Speed	None
Processor Cores	None
Intel HT Technology	None
Intel VT-x Technology	None
L1 Data Cache	None
L1 Code Cache	Noine
L2 Cache	None
L3 Cache	None

7.3.4.2 CPU Thermal Configuration

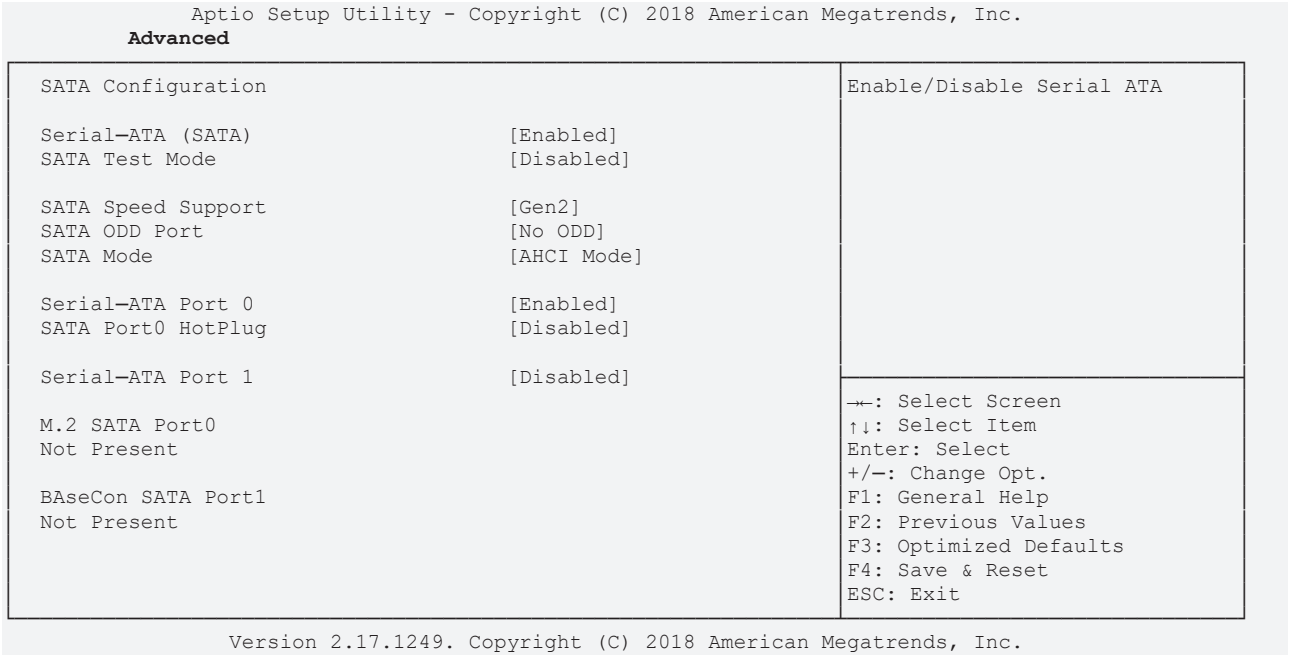


Bios-Entry	Options
Cpu Thermal Configuration	
DTS	Disabled / Enabled

7.3.5 PPM Configuration

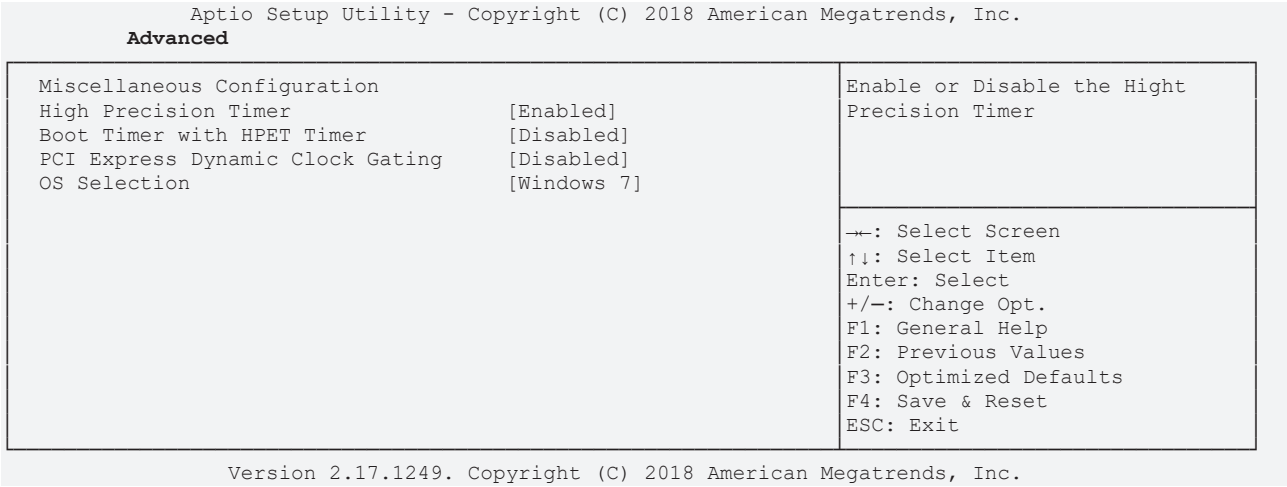
Bios-Entry	Options
PPM Configuration	
CPU C state Report	Disabled / Enabled
Soix	Disabled / Enabled

7.3.6 SATA Configuration



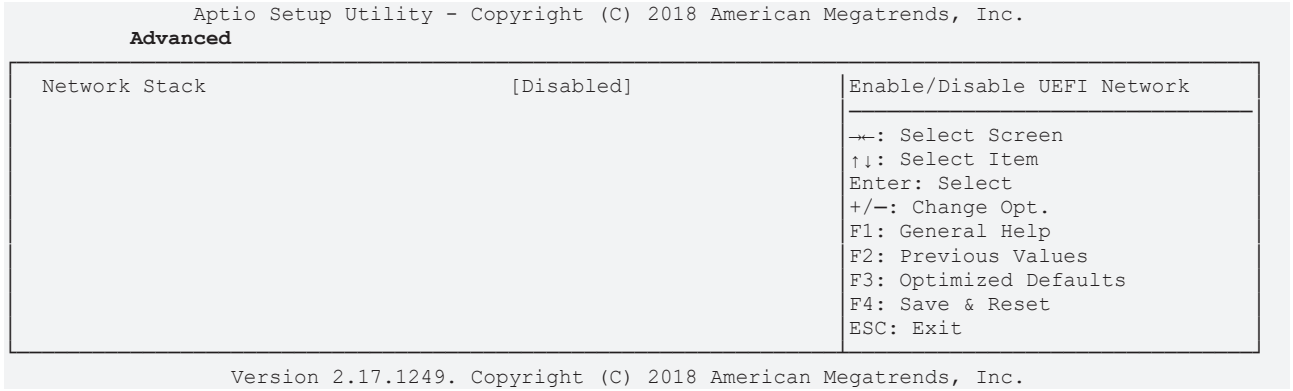
Bios-Entry	Options
SATA Configuration	
Serial ATA (SATA)	Enabled / Disabled
SATA Test Mode	Enabled / Disabled
SATA Speed Report	Gen2 / Gen1
SATA ODD Port	No ODD / Port0 ODD / Port1 ODD
SATA Mode	AHCI Mode / IDE Mode
Serial-ATA Port 0	Enabled / Disabled
SATA Port 0 HotPlug	Disabled / Enabled
Serial-ATA Port 1	None
M.2 SATA Port 0 Not Present	None
BAseCon SATA Port1 Not Present	None

7.3.7 Miscellaneous Configuration



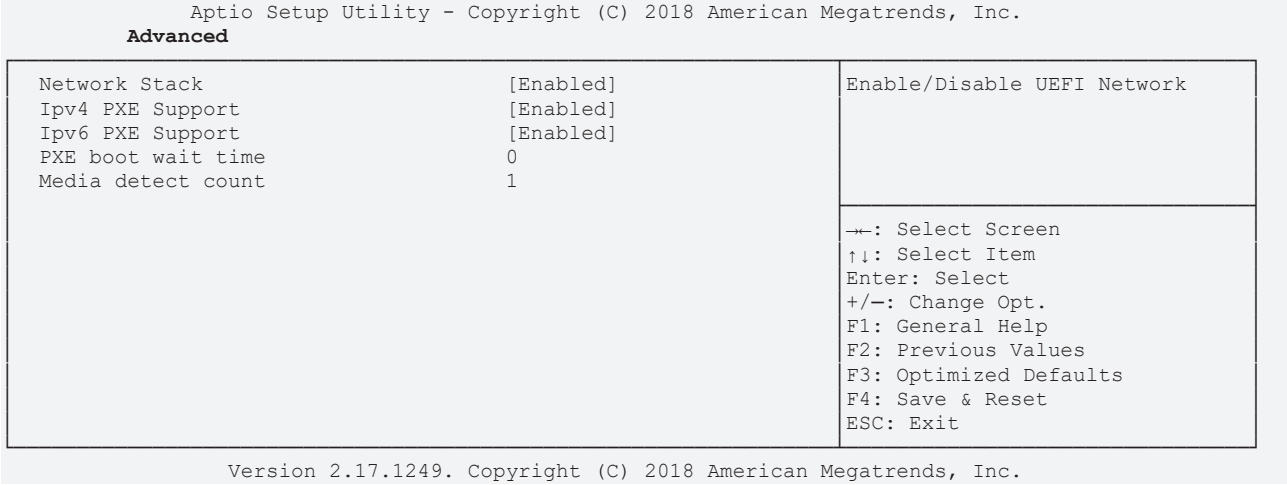
Bios-Entry	Options
Miscellaneous Configuration	
High Precision Timer	Enabled / Disabled
Boot Timer with HPET Timer	Disabled / Enabled
PCI Express Dynamic Clock Gating	Disabled / Enabled
OS Selection	Windows 7 / Windows 8.X

7.3.8 Network Stack Disabled



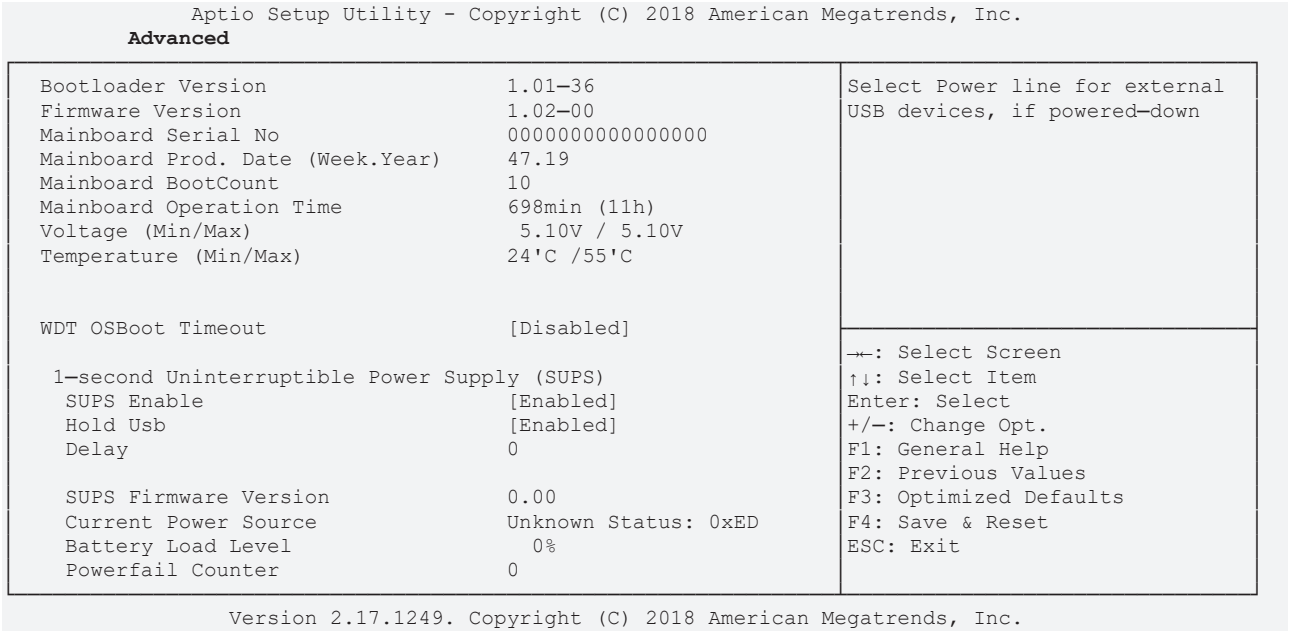
Bios-Entry	Options
Network Stack	Disabled / Enabled

7.3.9 Network Stack Enabled



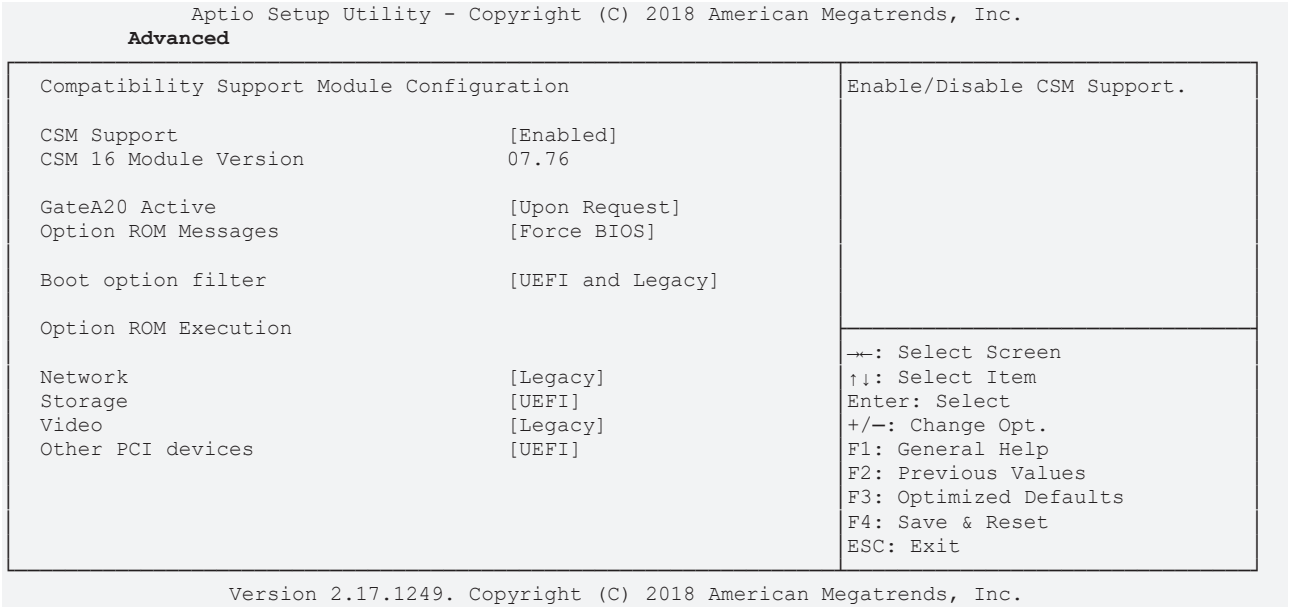
Bios-Entry	Options
Network Stack	Enabled / Disabled
Ipv4 PXE Support	Enabled / Disabled
Ipv6 PXE Support	Enabled / Disabled
PXE boot wait time	None
Media detect count	None

7.3.10 Power Controller Options



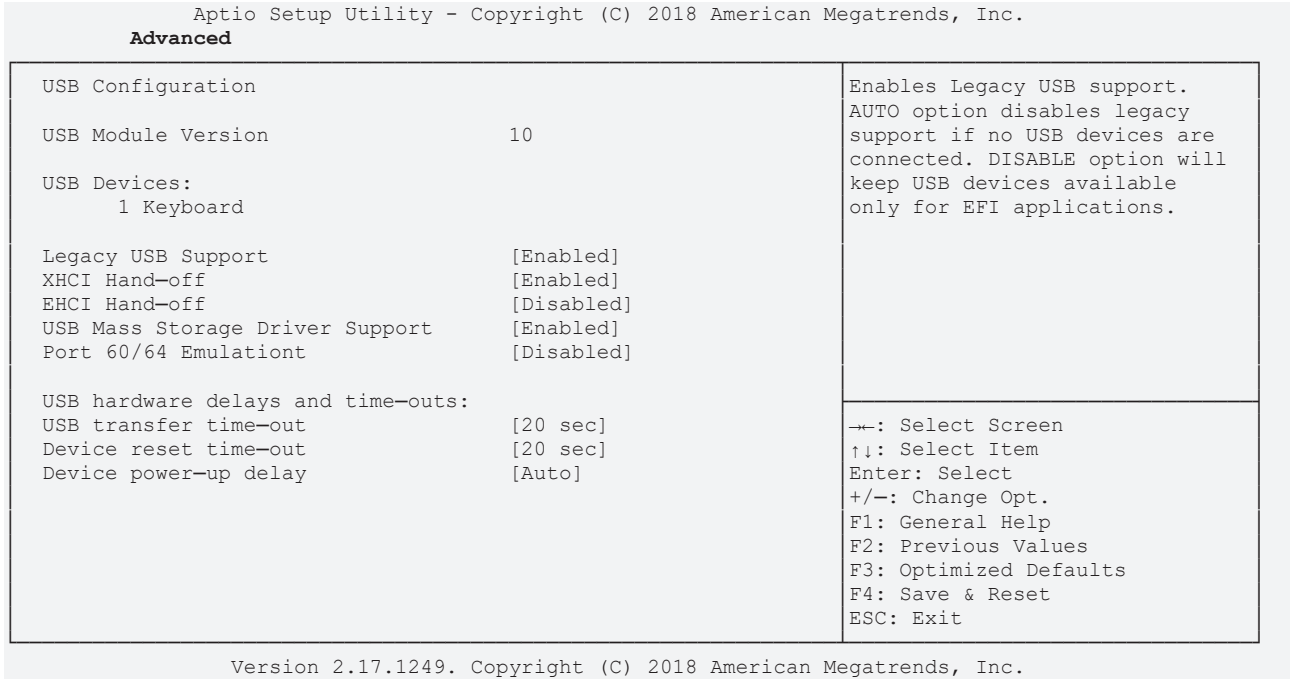
Bios-Entry	Options
Bootloader Version	None
Firmware Version	None
Mainboard Serial No	None
Mainboard Prod. Date (Week.Year)	None
Mainboard BootCount	None
Mainboard Operation Time	None
Voltage (Min/Max)	None
Temperature (Min/Max)	None
WDT OSBoot Timeout	Disabled / 45/60/75…225/240/255 Seconds
1-second uninterruptible Power Supply (SUPS)	
SUPS Enable	Enabled / Disabled
Hold Usb	Enabled / Disabled
Delay	0
Sups Firmware Version	None
Current Power Source	None
Battery Load Level	None
Powerfail Counter	None

7.3.11 CSM Configuration



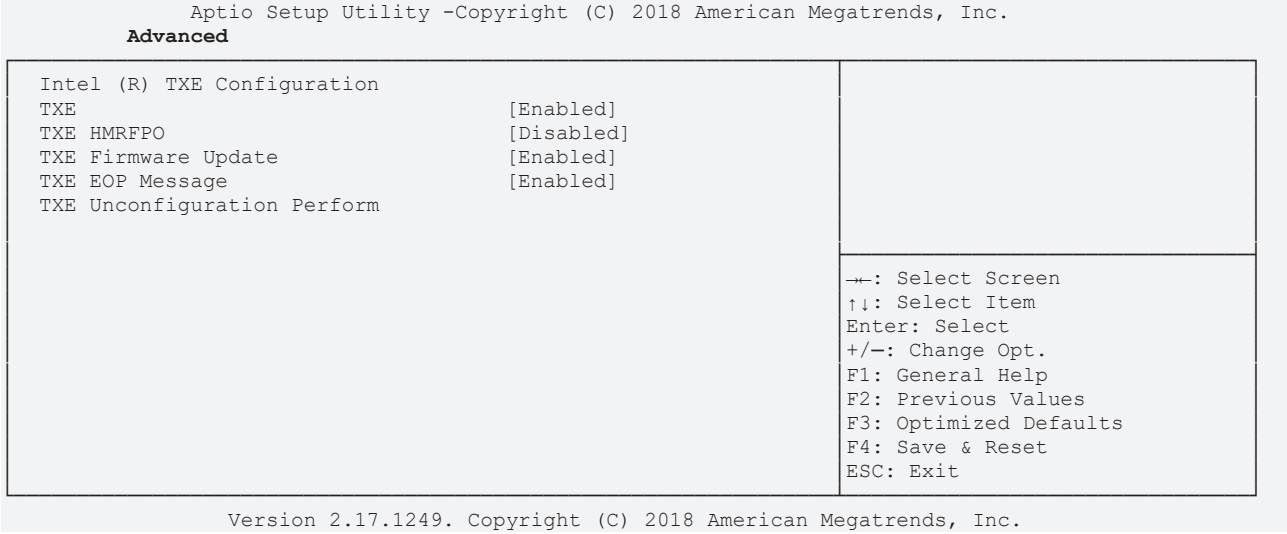
Bios-Entry	Optioons
Compatibility Support Module Configuration	
CSM Support	Enabled / Disabled
CSM 16 Module Version	None
Gate A20 Active	Upon Request / Always
Option ROM Messages	Force BIOS / Keep Current
Boot option filler	UEFI and Legacy / Legacy only / UEFI only
Option ROM execution	
Network	Do not launch / UEFI / Legacy
Storage	Do not launch / UEFI / Legacy
Video	Do not launch / UEFI / Legacy
Other PCI devices	Do not launch / UEFI / Legacy

7.3.12 USB Configuration



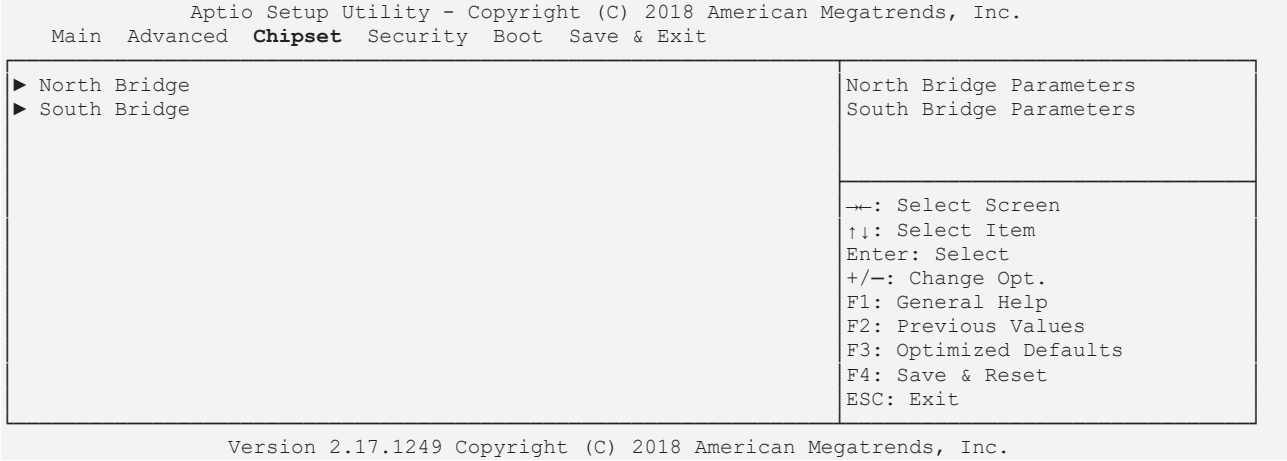
Bios-Entry	Options
USB Configuration	
USB Module Version	None
USB Devices	None
Legacy USB support	Enabled / Disabled / Auto
XHCI Hand-off	Enabled / Disabled
USB Mass Storage Driver Support	Enabled / disabled
Port 60/64 Emulation	Enabled / Disabled
USB hardware delays and time-outs:	
USB transfer time-out	1 / 5 / 10 / 20 sec
Device reset time-out	10 / 20 / 30 / 40 sec
Device power-up delay	Auto / Manual

7.3.13 Security Configuration



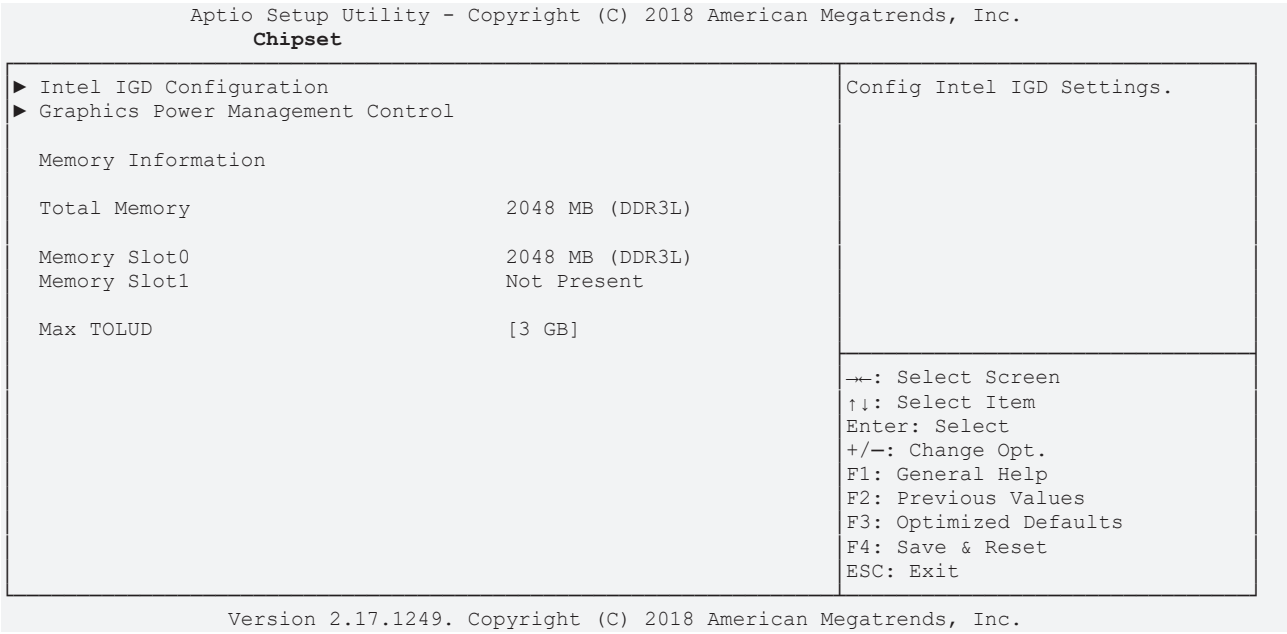
Bios-Entry	Options
Intel® TXE Configuration	
TXE	Enabled / Disabled
TXE HMRFPO	Disabled / Enabled
TXE Firmware Update	Enabled / Disabled
TXE EOP Message	Enabled / Disabled
TXE Unconfiguration Perform	None

7.4 Chipset



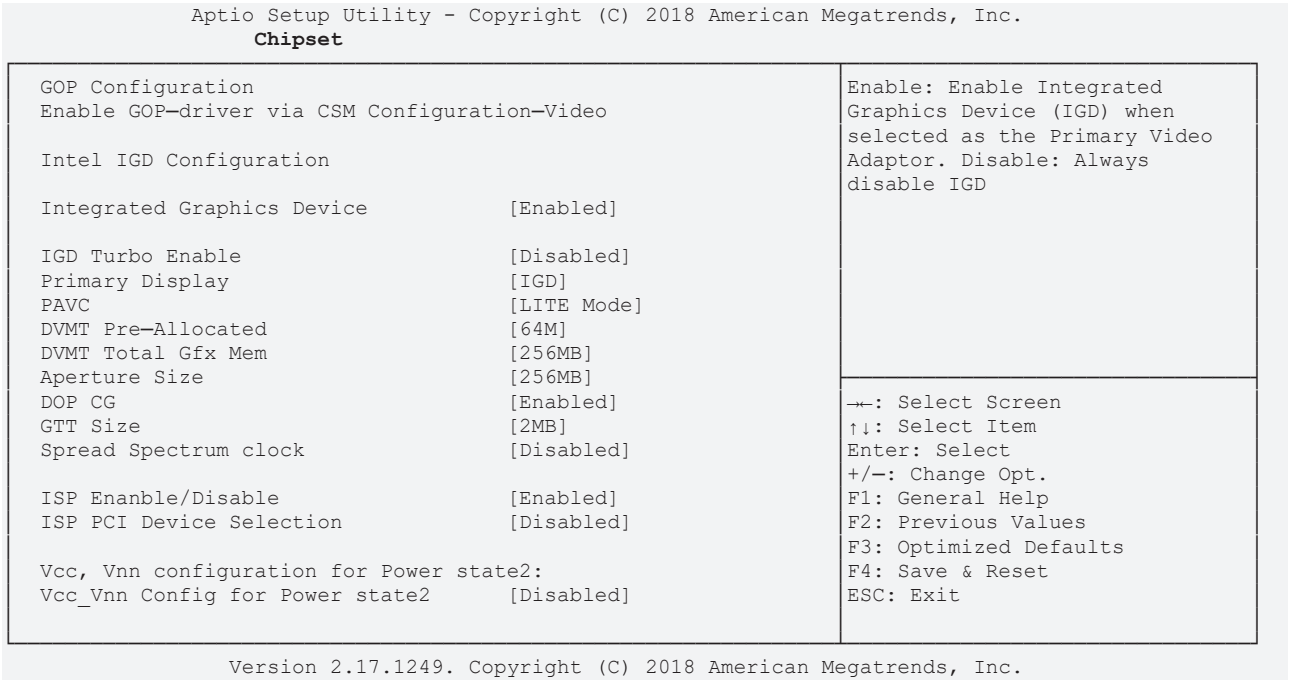
Bios-Entry	Options
North Bridge	Submenu: North Bridge [▶ 45]
South Bridge	Submenu: South Bridge [▶ 48]

7.4.1 North Bridge



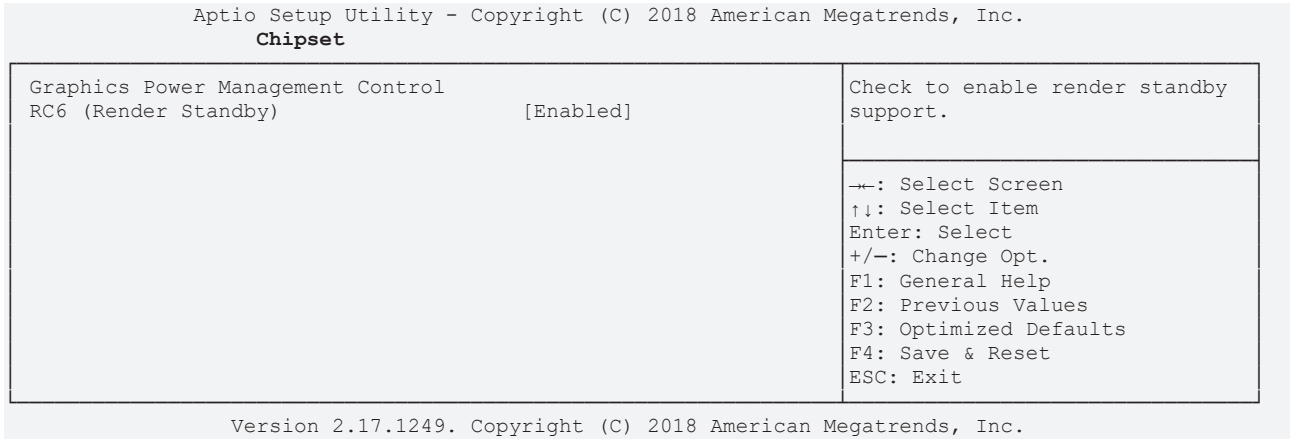
Bios-Entry	Options
Intel IGD Configuration	Submenu: Intel IGD Configuration [▶ 46]
Graphics Power Management Control	Submenu: Graphics Power Management Control [▶ 47]
Total Memory	None
Memory Slot 0	None
Memory Slot 2	None
Max TOLUD	Dynamic / 2 GB / 2.25 GB /…/ 3 GB

7.4.1.1 Intel IGD Configuration



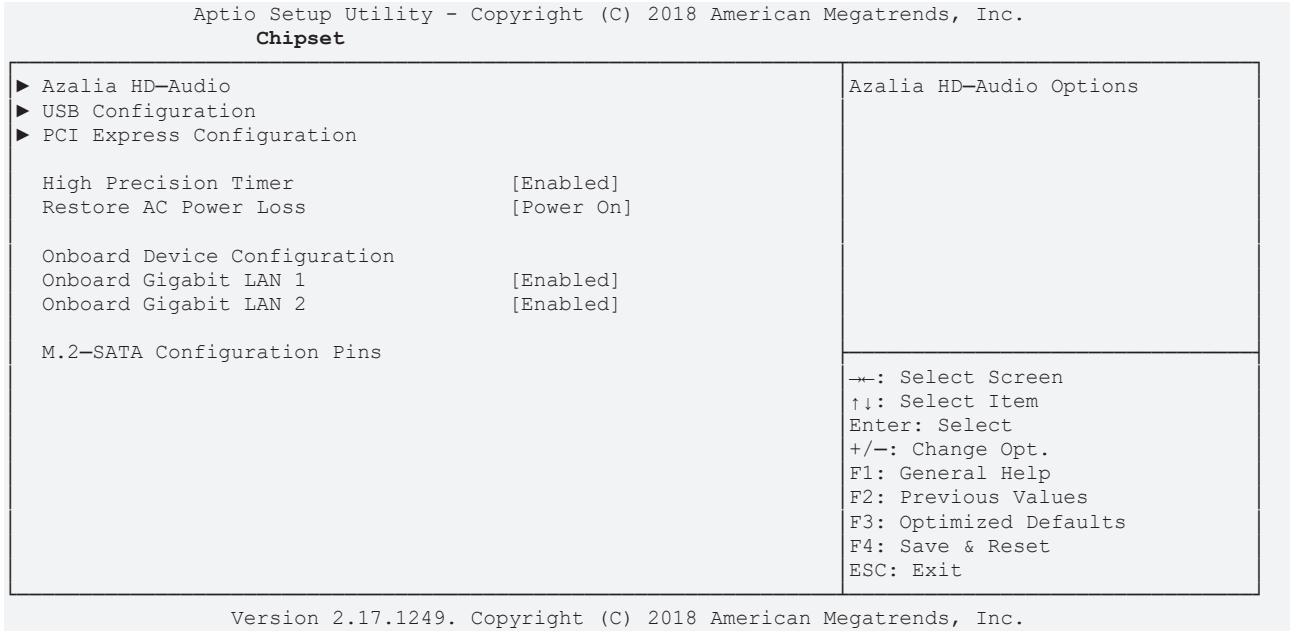
Bios-Entry	Options
GOP Configuration	
Enable GOP-driver via CSM Configuration-Video	
Intel IGD Configuration	
Integrated Graphics Device	Enabled / Disabled
IGD Turbo Enable	Enabled / Disabled
Primary Display	IGD / PCIe
PAVC	Disabled / LITE Mode / Serpent Mode
DVMT Pre-Allocated	64M / 96M / 128M / …448M / 480M / 512M
DVMT Total Gfx Mem	128MB / 256MB / Max
Aperture Size	128MB / 256MB / 512MB
DOP CG	Enabled / Disabled
GTT Size	1MB / 2MB
Spread Spectrum Clock	Enabled / Disabled
ISP Enable/Disable	Enabled / Disabled
ISP PCI Device Selection	Disabled / ISP PCI Device as B0D2F0 / ISP PCI Device as B0D3F0
Vcc_Vnn Config Power State2	Enabled / Disabled

7.4.1.2 Graphics Power Management Control



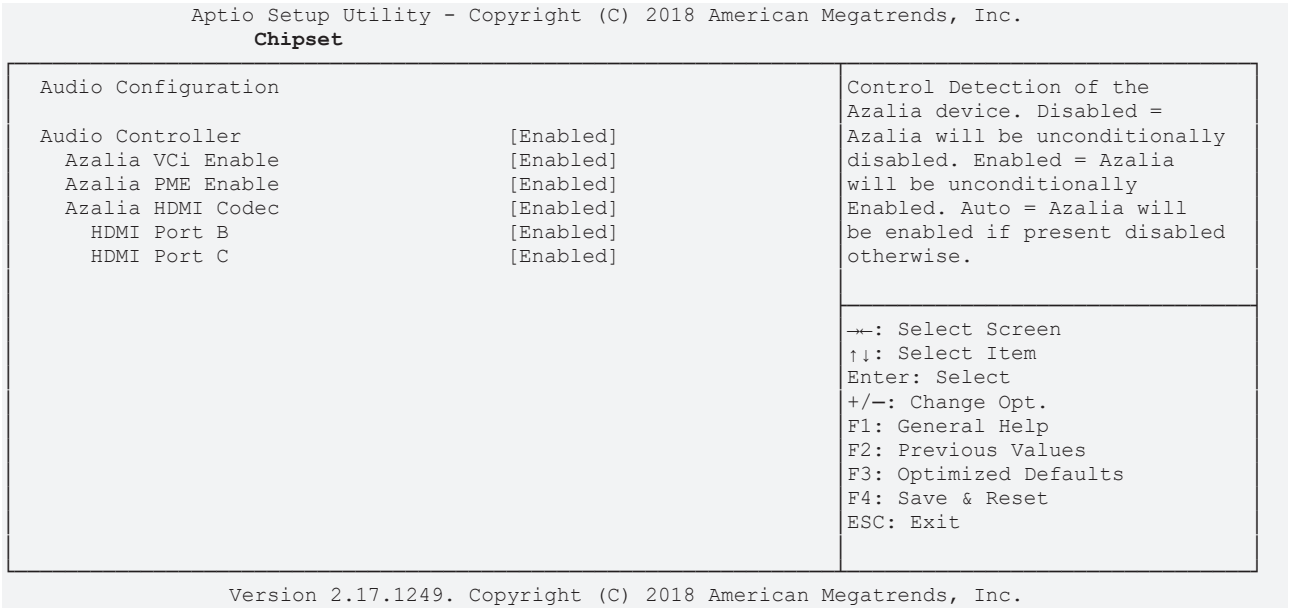
Bios-Entry	Options
Graphics Power Management Control	
RC6 (Render Standby)	Enabled / Disabled

7.4.2 South Bridge



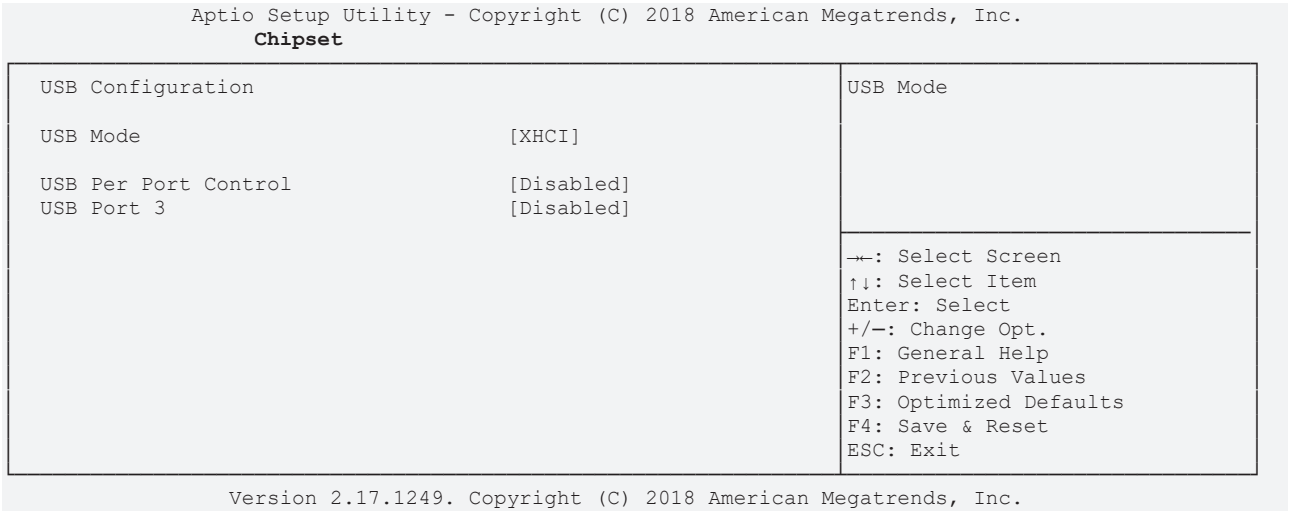
Bios-Entry	Options
Azalia HD Audio	Submenu: Azalia HD Audio [▶ 49]
USB Configuration	Submenu: USB Configuration [▶ 50]
PCI Express Configuration	Submenu: PCI Express Configuration [▶ 51]
High Precision Timer	Enabled / Disabled
Restore AC Power Loss	Power Off / Power On / Last State
Onboard Device Configuration	
Onboard Gigabit LAN 1	Enabled / Disabled
Onboard Gigabit LAN 2	Enabled / Disabled
M.2-SATA Configuration Pins	None

7.4.2.1 Azalia HD Audio



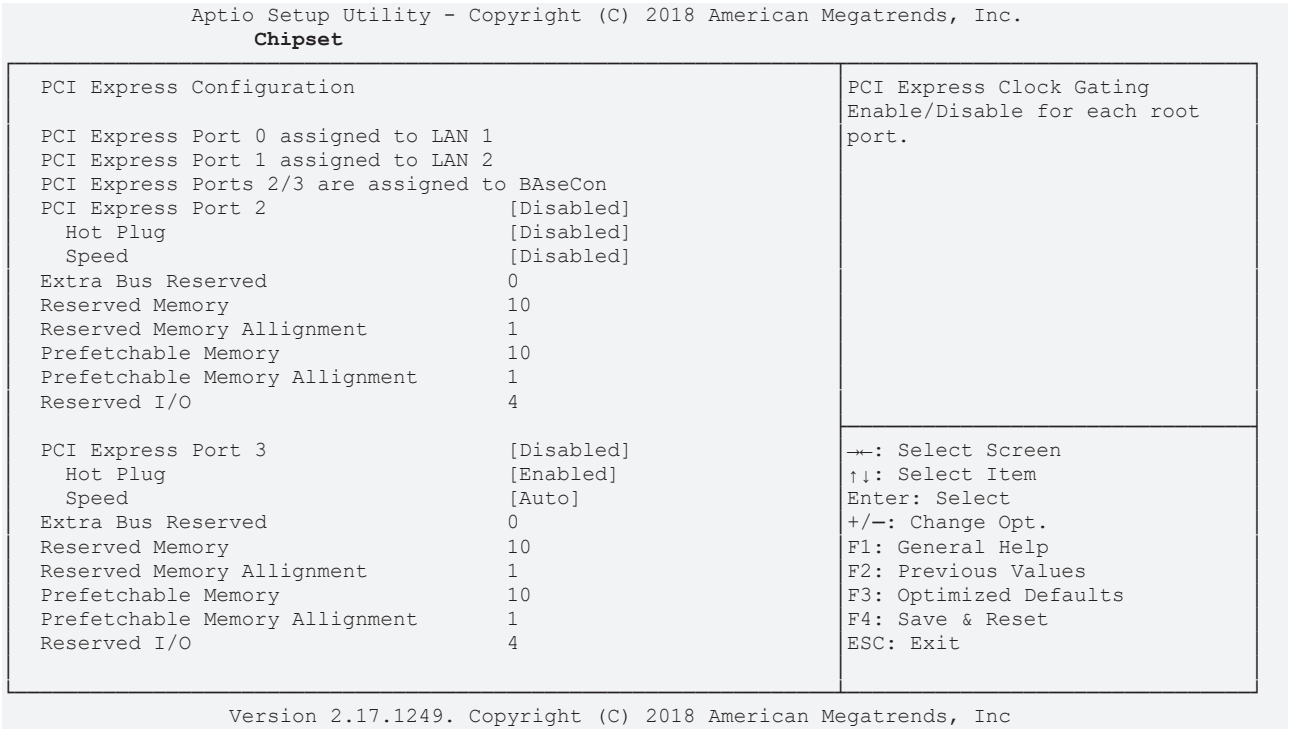
Bios-Entry	Options
Audio Configuration	
Audio Controller	Enabled / Disabled
Azalia VCI Enable	Enabled / Disabled
Azalia PME Enabled	Enabled / Disabled
Azalia HDMI Enabled	Enabled / Disabled
HDMI Port B	Enabled / Disabled
HDMI Port C	Enabled / Disabled

7.4.2.2 USB Configuration



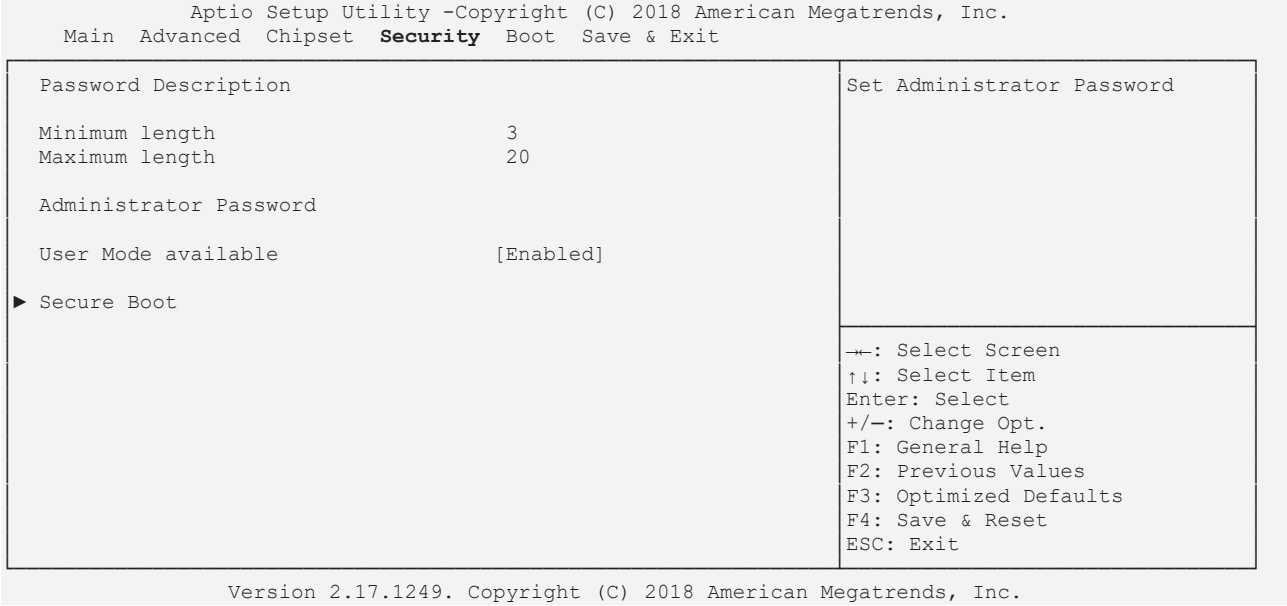
Bios-Entry	Options
PCI Boot Configuration	
USB Mode	XHCI / EHCI
USB Per Port Control	Disabled / Enabled
USB Port 3	Disabled / Enabled

7.4.2.3 PCI Express Configuration



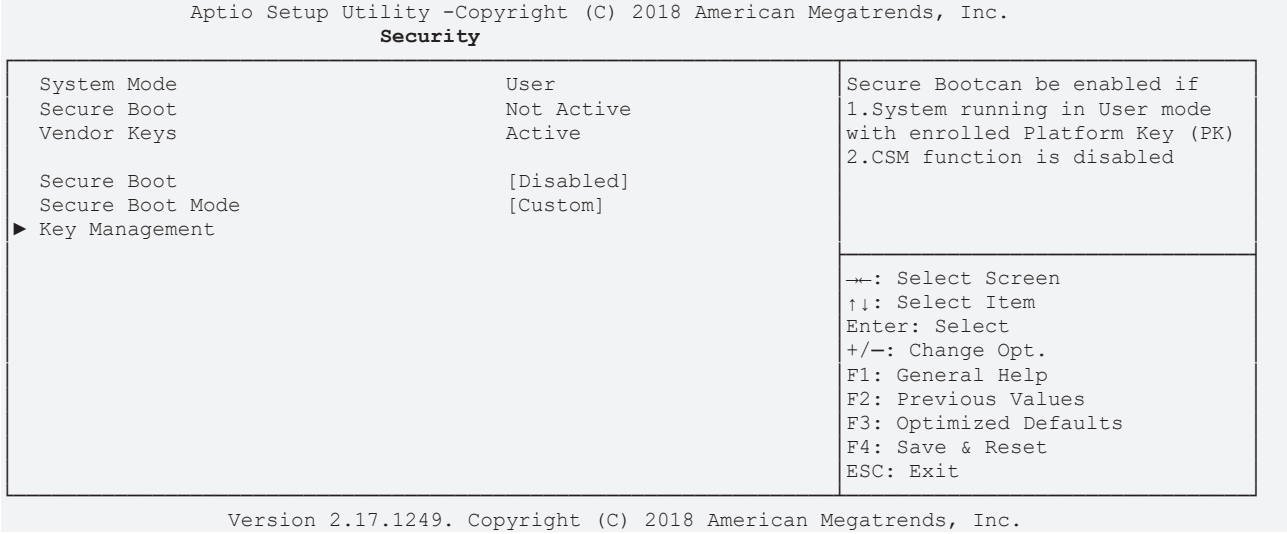
Bios-Entry	Options
PCI Express Configuration	
PCI Express Port 0 is assigned to LAN 1	
PCI Express Port 0 is assigned to LAN 2	
PCI Express Ports 2/3 are assigned to BAseCon	
PCI Express Port 2	None
Hot Plug	None
Speed	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved Memory Alignment	None
Prefetchable Memory	None
Prefetchable Memory Alignment	None
Reserved I/O	None
PCI Express Port 3	None
Hot Plug	None
Speed	None
Extra Bus Reserved	None
Reserved Memory	None
Reserved Memory Alignment	None
Prefetchable Memory	None
Prefetchable Memory Alignment	None
Reserved I/O	None

7.5 Security



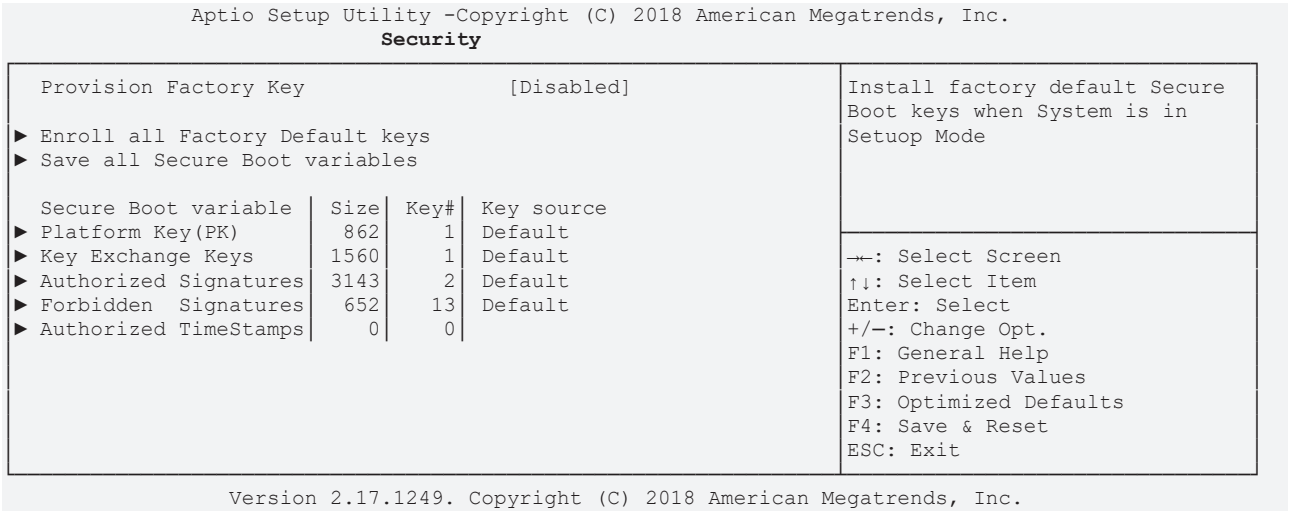
Bios-Entry	Options
Password Description	
Minimum Length	None
Maximum Length	None
Administrator Password	An administrator-password can be set here.
User Mode available	Enabled / Disabled
Secure Boot menu	Submenu: Secure Boot [▶ 53]

7.5.1 Secure Boot



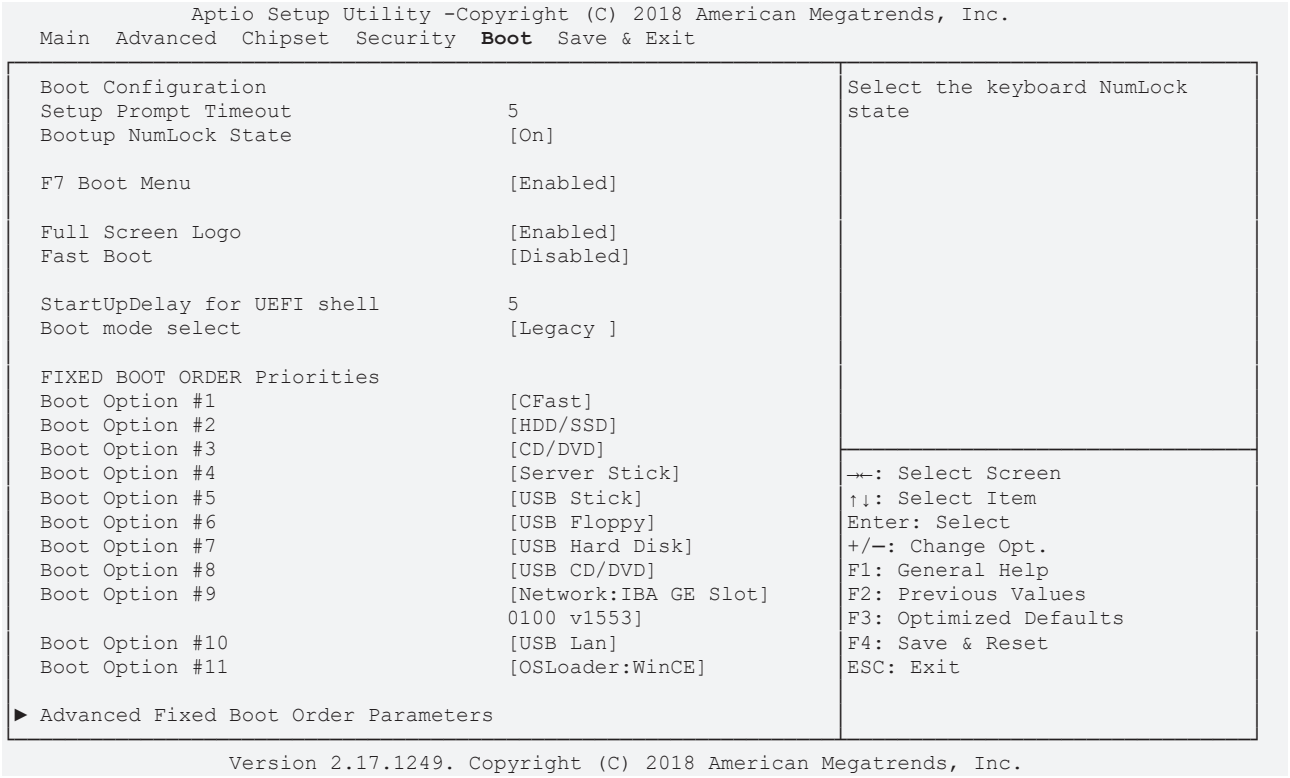
Bios-Entry	Options
System Mode	None
Secure Boot	None
Vendor Keys	None
Secure Boot	Disabled / Enabled
Secure Boot Mode	Standard / Custom
Key Management	Submenu: Key Management [▶ 54]

7.5.1.1 Key Management



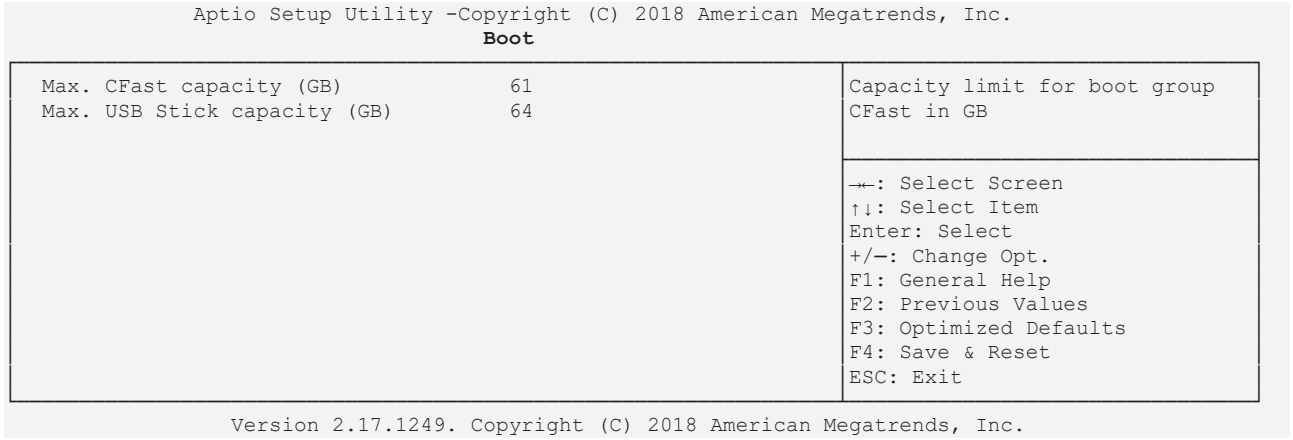
Bios-Entry	Options
Provision Factory Default Keys	Disabled / Enabled
Enroll all Factory Default keys	Press enter key
Save all Secure Boot variables	Press enter key
Secure Boot variables	
Platform Key(PK)	Press enter key
Key Exchange Keys	Press enter key
Authorized Signatures	Press enter key
Forbidden Signatures	Press enter key
Authorized TimeStamps	Press enter key

7.6 Boot



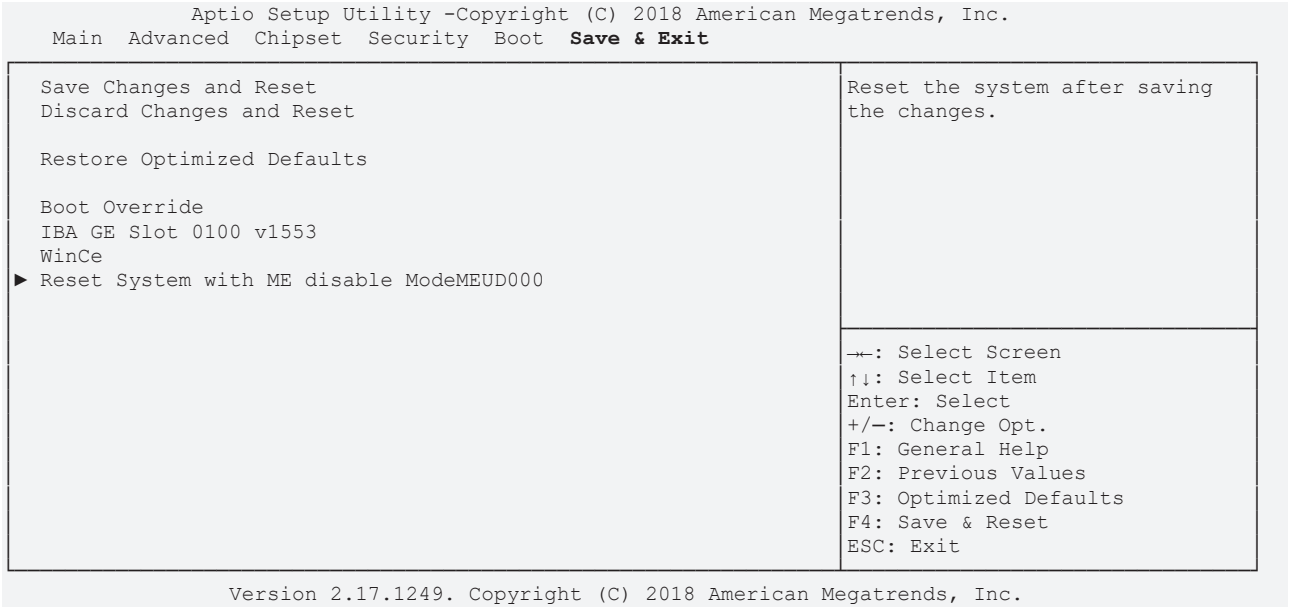
Bios-Entry	Options
PCI Boot Configuration	
Setup Prompt Timeout	None
Bootup NumLock State	On / Off
F7 Boot Menu	Disabled / Enabled
Full Screen Logo	Disabled / Enabled
Fast Boot	Disabled / Enabled
StartUpDelay for UEFI shell	None
Boot mode select	Legacy / UEFI / Dual
Fixed Boot Order Priorities	
Boot Option #1-11	Here you can set the order of boot media to be used.
Advanced Fixed Boot Order Parameters	Submenu: Advanced Fixed Boot Order Parameters [▶ 56]

7.6.1 Advanced Fixed Boot Order Parameters



Bios-Entry	Options
Max. CFast/SSD capacity	None
Max. USB Stick capacity (GB)	None

7.7 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
IBA GE Slot 0100 v1553	None
WinCE	None
Reset System with ME disable ModeMEUD000	None

7.8 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. DecdFlsh also exists as a UEFI tool for calling from the UEFI shell.

A running Flash procedure must never be interrupted, as otherwise the BIOS on the board will be destroyed. The Flash procedure takes about 75 seconds. The necessary firmware update takes place automatically.

Avoid damage due to incorrect update execution!

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.

8 Mechanical drawings

Dimensional notation

All dimensions are in mil (1 mil = 0.0254 mm). Data in square brackets are in mm.

8.1 PCB: Holes

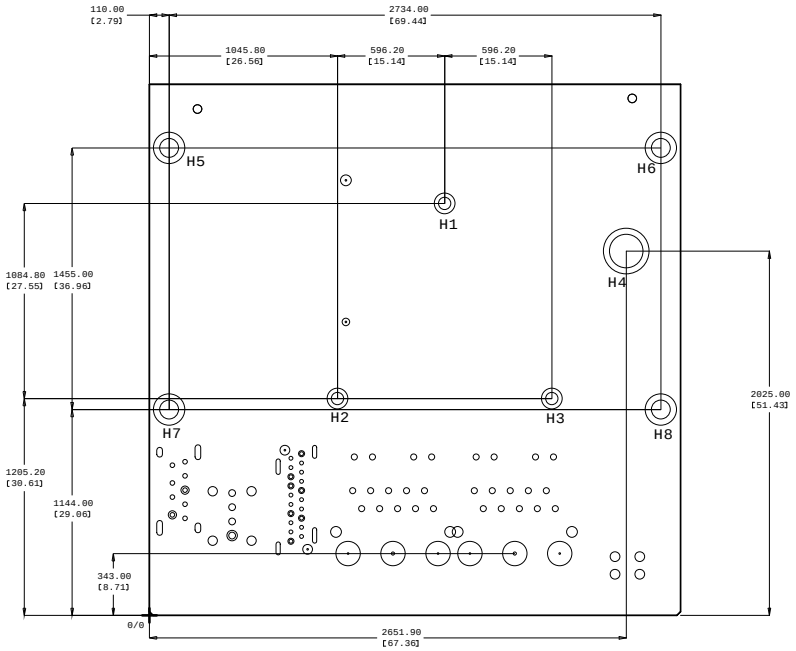


Fig. 12: Holes CB6263

8.2 PCB: Dimensions

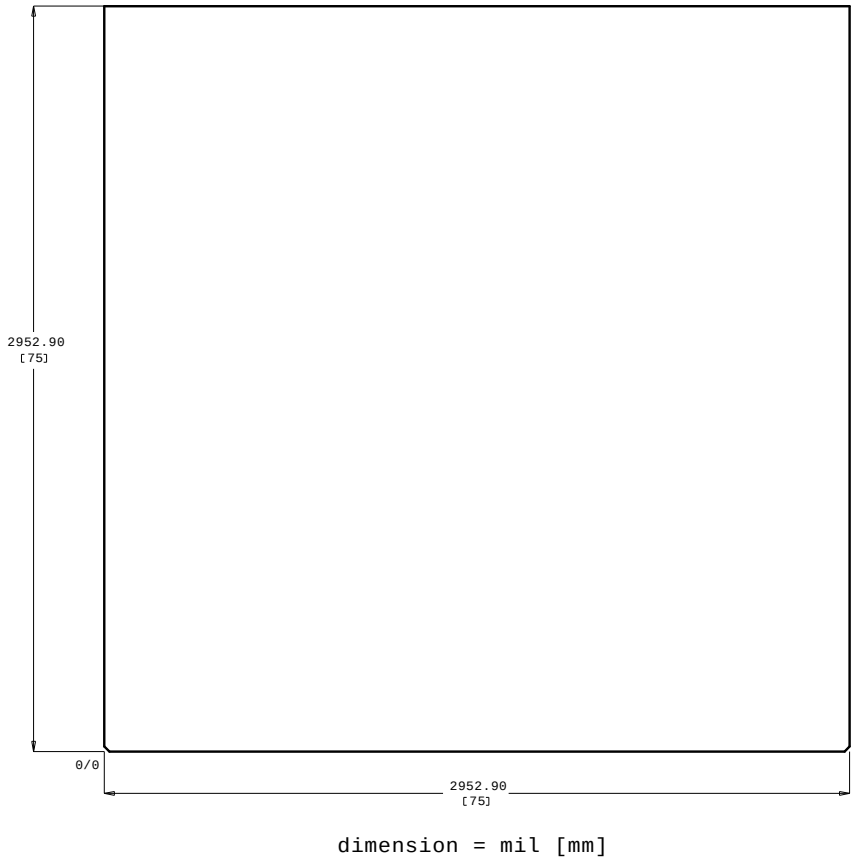


Fig. 13: Dimensions CB6263

9 Technical data

9.1 Electrical data

Power supply	
Board	24 V (+/- 5%)
RTC	>= 3 µA

Power consumption	
RTC	<= 10 µA

9.2 Environmental conditions

Temperature range	
Operating	0 °C to +60 °C (extended temperature range on request)
Storage	-25°C to +85°C
Dispatch	-25 °C to +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
Dispatch	1.0 °C per minute, for packed boards

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

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

Vibrations	
Operating	10 to 58 Hz, amplitude 0.075 mm 58 to 500 Hz, 10 m/s²
Storage	5 to 9 Hz, amplitude 3.5 mm 9 to 500 Hz, 10 m/s²
Dispatch	5 to 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.

9.3 Thermal specifications

The board is specified for an ambient temperature range of 0 °C to +60 °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 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.

NOTE

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.

10 Support and Service

10.1 Beckhoff Support

Beckhoff Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- world-wide support
- design, programming and commissioning of complex automation systems
- extensive training program for Beckhoff system components.

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Fax: +49(0)5246/963-9157

E-mail: support@beckhoff.com

10.2 Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline: +49(0)5246/963-460

Fax: +49(0)5246/963-479

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10.3 Beckhoff headquarters

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Further Support and Service addresses can be found on our website at http://www.beckhoff.de.

You will also find further documentation for Beckhoff components there.

11 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 update started

12 Appendix II: Resources

12.1 Interrupt

The resources used are independent of the setup setting. The listed interrupts and their use are given by the AT compatibility. Exclusivity on the PCI side is neither given nor possible.

Address	Function
IRQ0	Timer
IRQ1	
IRQ2(8)	
IRQ3	
IRQ4	
IRQ5	
IRQ6	
IRQ7	
IRQ8	RTC
IRQ9	
IRQ10	
IRQ11	SMBus Controller
IRQ12	
IRQ13	FPU
IRQ14	
IRQ15	
IRQ16	PCI Bridge(0-1) x1(x1)
IRQ17	PCI Bridge(0-2) x1(x1)
IRQ18	PCI Bridge(0-3) x1(x1)
IRQ19	PCI Bridge(0-4) x0(x1)
IRQ20	
IRQ21	
IRQ22	High Def Audio

12.2 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 deactivated, the bus numbers of other devices may change as a result.

INT	REQ	Bus	Dev.	Fct.	Controller / Slot
-	-	0	0	0	Host Bridge ID0F00h
A	-	0	2	0	VGA Controller ID0F31h
A	-	0	19	0	SATA (AHCI 1.0) ID0F23h
A	-	0	20	0	XHCI Controller ID0F35h
A	-	0	27	0	HD Audio ID0F04h
A	-	0	28	0	PCI Express Port 1 ID0F48h
B	-	0	28	1	PCI Express Port 2 ID0F4Ah
C	-	0	28	2	PCI Express Port 3 ID0F4ch
D	-	0	28	3	PCI Express Port 4 ID0F4Eh
-	-	0	31	0	ISA Bridge ID0F1Ch
B	-	0	31	3	SMBus Interface ID0F12h
A	-	1	0	0	Ethernet Controller 1xID1533h
A	-	2	0	0	Ethernet Controller 1xID1533h

12.3 SMB devices

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

NOTE

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 unit
36-39	Reserved
5C-5D	NCT7491
70-73	POST Code output
88-89	Slave address defined by BIOS
92-93	I210 default
A0-A7	Reserved for DDR
B0-B3	Power controller (access via BIOS-API)
B8-BB	Power controller (access via BIOS-API)