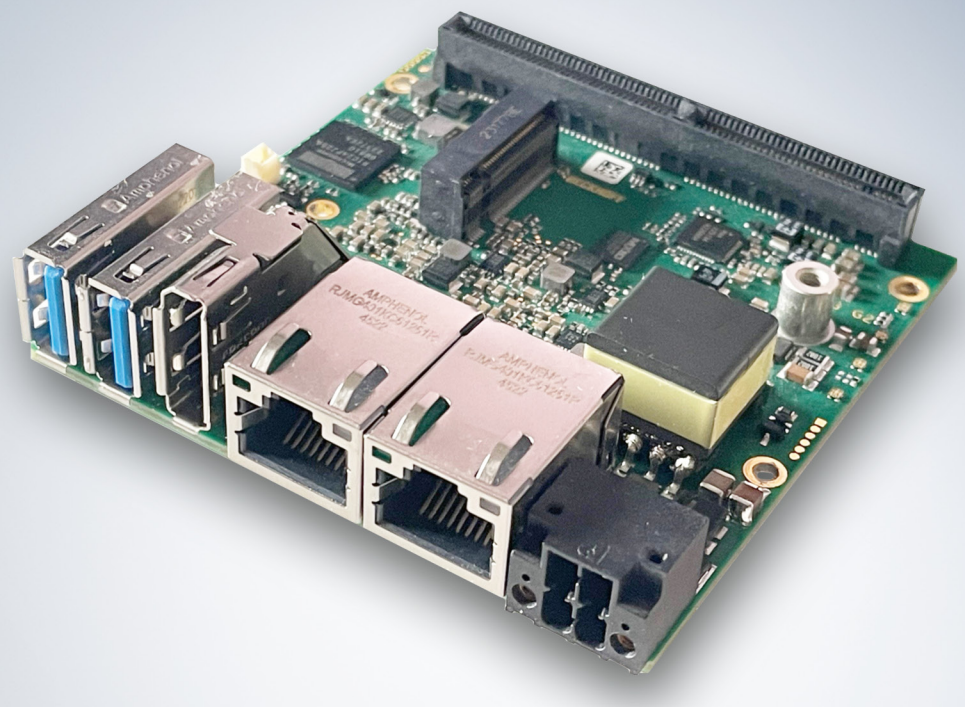
BECKHOFF New Automation Technology

Manual | EN

CB6293

Computerboard



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1 Documentation issue status

Version	Modifications
1.0	First publication

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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The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:
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 the 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. Changes to the hardware or software configurations other than those described in the documentation are not permitted and will result in the exclusion of liability on the part 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

This documentation uses the following symbols with an adjacent 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 next to this symbol will result in immediate danger to life and health!

⚠ WARNING

Risk of injury!

Failure to follow the safety instructions next to this symbol will result in danger to life and health!

⚠ CAUTION

Personal injuries!

Failure to follow the safety instructions next to this symbol may result in personal injury!

NOTICE

Damage to the environment or devices

Failure to follow the safety instructions next to this symbol may result in 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 CB6283 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 considered improper use.

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

4 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

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5 Overview

The following documents, specifications, or webpages, in their current or most recent versions, have been used in the preparation of this manual or as additional technical documentation.

PCI specification

www.pcisig.com

PCI Express® Base Specification

www.pcisig.com

ACPI specification

www.acpi.info

ATA/ATAPI specification

www.t13.org

USB specifications

www.usb.org

SMBus specification

www.smbus.org

Intel® chip descriptions

Intel® Celeron™, Core™ Tiger Lake-H 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™ Status Codes

www.ami.com

5.1 Properties

The CB6293 is conceived as a compact PC. It offers basic functions, on-board main memory and a powerful Intel® Amston Lake generation CPU in the smallest possible space.

The CB6293 provides 1x DisplayPort/HDMI, 2x USB3.2 and 2x Gigabit LAN as I/O interfaces via the front panel.

The BeaCon140 connector enables flexible expansion of the I/O functions of the CB6293. It provides one SATA Gen3 (6GBit) lane and up to five PCIe® lanes, two of which can be multiplexed with USB 3.2 signals. The I/O functions are configured 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.

A status LED provides information about the status of the power controller.

Despite its extremely small format, the CB6293 offers the full functionality of a motherboard.

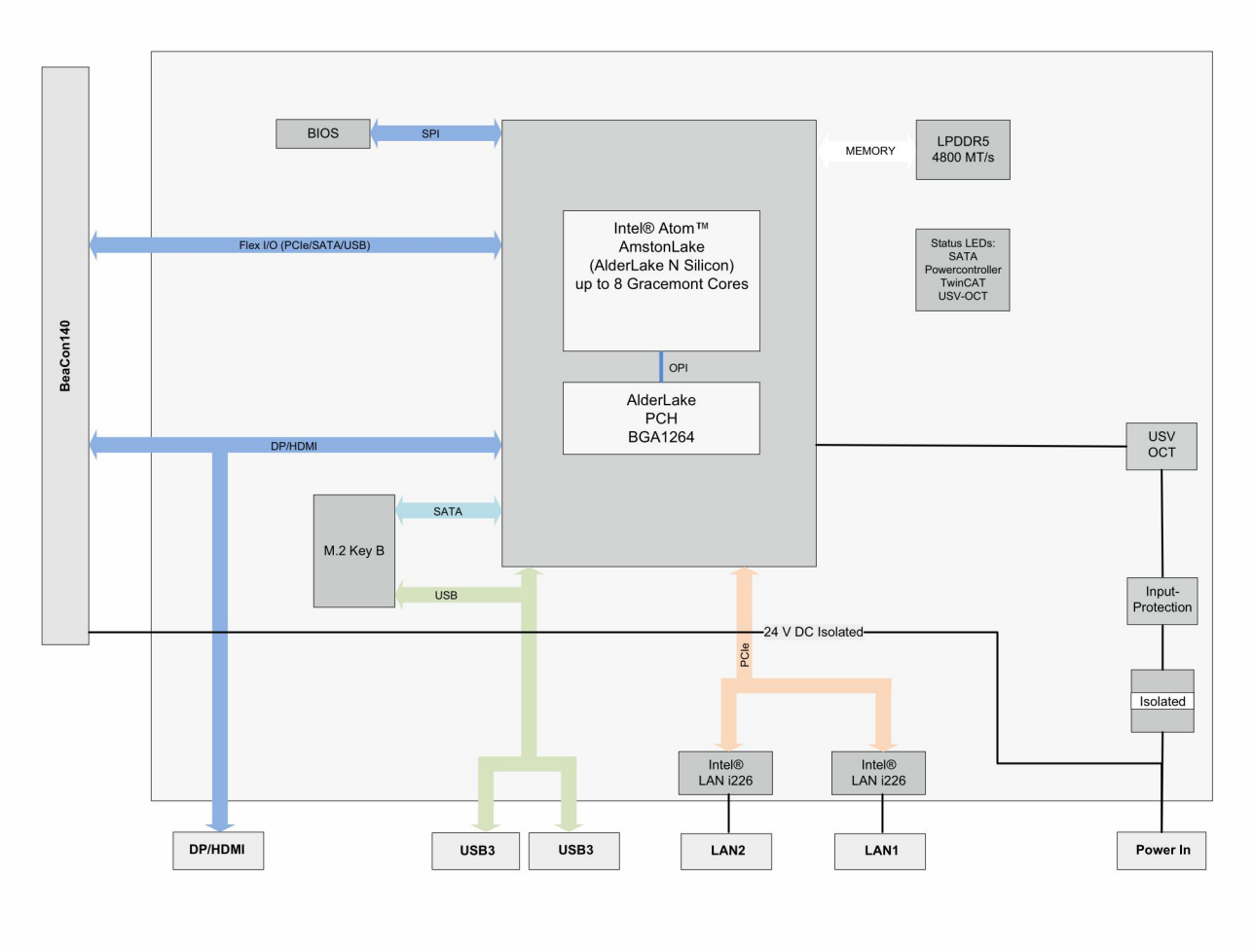


Fig. 1: CB6293 block diagram Amston Lake

5.2 List of features

CB6293	75 x 75 Board
CPU	Intel Atom® X7213RE (DC/6M/3.4 GHz), TDP 9 W Intel Atom® X7433RE (QC/6M/3.4 GHz), TDP 9 W
Socket	FCBGA1264
Memory	LPDDR5 / 4800 MHz (up to 32 GB)
I/O front panel	1 x power 1x DisplayPort (connection of an HDMI adapter for an HDMI signal is possible.) 2x LAN 10/100/1000/2500 2x USB 3.2
I/O internal	1x M.2 (B) socket, signals dependent on chipset, see: Internal: M.2 (Key B) 1x BeaCon140, signals, see: Internal: BeaCon140
Graphics resolution	HDMI 2.1: 4096x2160 @ 60 Hz DisplayPort 1.4/eDP 1.4b: 4096x2160 @ 60 Hz 4K support @60 Hz
RTC	With external CMOS battery (via 2-pin contact strip or expansion card)
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	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.

6 Detailed description

6.1 CPU

The processors used are System-on-a-Chip models from Intel®. These SoCs are based on processors from the Atom™- X product series, which are characterized by very low power consumption while still offering modern performance with clock speeds 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 of the Atom™- X product series have an extended ambient temperature range and are therefore particularly suitable for use in industrial systems.

6.2 Memory

Four SDRAM memory modules up to a maximum of 32 GB are permanently installed on the CB6283 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.

6.3 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 CB6283 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 Interface overview

The following figure shows the interfaces of the CB6283 board. The table below shows the function of each interface, as well as the manual page where you can find more detailed information.

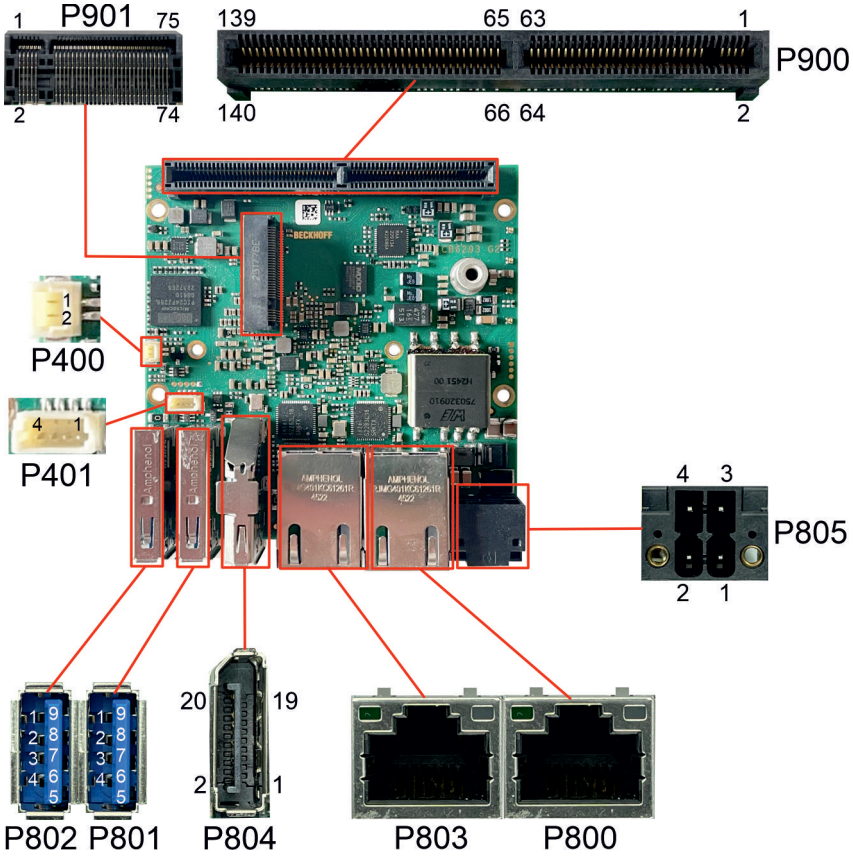


Fig. 2: CB6293 interface overview

7.2 List of interfaces

Number	Function (designation)	Page
P805	Vin	Front panel: power supply (P805) [▶ 16]
P800	LAN 1	Front panel: LAN (P800, P803) [▶ 17]
P803	LAN 2	Front panel: LAN (P800, P803) [▶ 17]
P804	DisplayPort	Front panel: DisplayPort / HDMI / DVI (P804) [▶ 18]
P801	USB3.2	Front panel: USB 3.2 (P801, P802) [▶ 19]
P802	USB3.2	Front panel: USB 3.2 (P801, P802) [▶ 19]
P401	Fan connection housing connector (four-pin)	Intern: FAN [▶ 20]
P400	RTC connector (two-pin)	Internal: RTC [▶ 20]
P901	M.2 socket	Internal: M.2 (Key B) [▶ 21]
P900	BeaCon140	Internal: BeaCon140 [▶ 24]

Interfaces order

The interfaces are listed in clockwise order, starting with the P805 power connection.

7.3 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.

7.4 External interfaces

This chapter describes the external interfaces.

7.4.1 Front panel: power supply (P805)

The connection to the power supply is implemented as a 2x2-pin housing connector (Phoenix Contact P20THR-1818504). The main power supply (24 V) for the module is on pin 3. This can also be implemented as UPS-OCT (One Cable Technology), i.e. the signal for the UPS is also transmitted to the board via this cable.

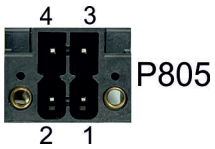


Fig. 3: CB6283 Power P805

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

Function restrictions PC_On switch

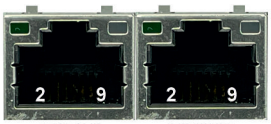
Please note that there are system states in which the activation of a connected PC_On switch is ignored by the system, e.g. during booting of a Windows operating system.

In this case, repeat the operation of the switch after a few seconds.

The same applies to connected PC_On buttons.

7.4.2 Front panel: LAN (P800, P803)

The board has two Gigabit-LAN connections. 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. The controller is an Intel® i226-IT.



P803 P800

Fig. 4: CB6293 LAN P800, P803

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

i226: The LEDs of the LAN interfaces indicate the activity and speed of the data transmission (Mbit/s). The left LED lights up when there is a connection and activity, and the right LED during data transmission:

Left LED **Steadily lit when there is a connection,** **flashing during data transmission**	**Right LED** **Steadily lit during data transmission**	**Mbit/s**
Green	Green	2500
Green	Orange	1000
Green	Off	100/10

7.4.3 Front panel: DisplayPort / HDMI / DVI (P804)

An appropriate standard connector 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).

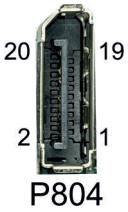


Fig. 5: CB6293 DP P804

Pin assignment DisplayPort A and B:					
Description	**Signal**	**Pin**		**Signal**	**Description**
Display Port Lane 0 +	L0	1	2	GND	Ground
Display Port Lane 0 -	L#0	3	4	L1	Display Port Lane 1 +
Ground	GND	5	6	L#1	Display Port Lane 1 -
Display Port Lane 2 +	L2	7	8	GND	Ground
Display Port Lane 2 -	L#2	9	10	L3	Display Port Lane 3 +
Ground	GND	11	12	L#3	Display Port Lane 3 -
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	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 according to the DisplayPort specification 1.1 automatically to HDMI signals.

7.4.4 Front panel: USB 3.2 (P801, P802)

The USB channels are made available via standard USB connectors.

These USB ports support the USB 3.2 specification. For higher performance requirements, devices with their own power supply must be used. 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. 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: CB6293 USB P801, P802

USB 3.2 connector pin assignment:		
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)

7.5 Internal interfaces

This chapter describes the internal interfaces.

7.5.1 Internal: FAN

The CB6283 computer board has a four-pin fan connector. This allows you to connect a fan with a supply voltage of 5 V directly to the computer board. A signal for monitoring the fan speed is also available.

P401

Fig. 7: CB6283 FAN P401

Pin assignment of fan connector:		
Pin	**Signal**	**Description**
1	GND	Ground (PWM-controlled)
2	VCC	Supply voltage 5 V, regulated
3	FANCTRL	Speed monitoring
4	FANON	Speed control

7.5.2 Internal: RTC

You can connect the CB6283 to an external RTC battery via a two-pin housing connector (JST BM02B-SRSS-TBT(LP)(SN)). This means that the integrated clock continues to be supplied even if the supply voltage is lost. The battery voltage must not exceed 3.3 V.

P400

Fig. 8: CB6283 RTC P400

Pin assignment RTC battery connector:		
Pin	**Name**	**Description**
1	BATT	3.3 V battery voltage
2	GND	Ground

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.

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!

7.5.3 Internal: M.2 (Key B)

The CB6283 is equipped with an M.2 connector that accepts an M.2-2242 card (B button). SATA signals (GEN3) are routed out via this socket, enabling the connection of an M.2 SSD card. Alternatively, you can also feed out 1x PCIe® signals.

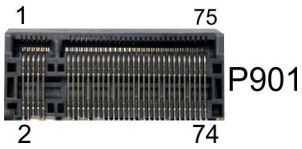


Fig. 9: CB6283 M.2 P901

Pin assignment M.2 connector:					
Description	**Signal**	**Pin**		**Signal**	**Description**
Configuration pin	CONFIG_3	1	2	3.3V1	Standby supply voltage S3.3 V
Ground	GND	3	4	3.3V2	Standby supply voltage S3.3 V
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# USB3RX# SSICRX#	29	30	UIM RST	(not led out)
(not led out)	PER1 USB3RX SSICRX	31	32	UIM CLK	(not led out)
Ground	GND	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	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)

Pin assignment M.2 connector:					
Description	**Signal**	**Pin**		**Signal**	**Description**
(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)
Powergood	RESET#	67	68	SUSCLK	Suspendclock
Configuration pin	CFG1	69	70	3.3 V	Standby supply voltage S3.3 V
Ground	GND	71	72	3.3 V	Standby supply voltage S3.3 V
Ground	GND	73	74	3.3 V	Standby supply voltage S3.3 V
Configuration pin	CFG2	75			

7.5.4 Internal: BeaCon140

The BeaCon140 connector (Samtec HSEC-170-01-L-DV-A-K-TR) enables flexible expansion of the IO functions of the CB6283. It provides one SATA Gen3 (6Gbit) lane and up to five PCIe® lanes, two of which can be multiplexed with USB3.1 signals. DisplayPort, HSIC, SMBus and 1Wire signals are also led out via the BeaCon connector. The extension board takes care of the configuration of the I/O 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.

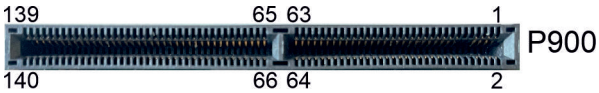


Fig. 10: CB6293 BeaCon140 P900

Pin assignment of BeaCon140 connector:					
Description	**Signal**	**Pin**		**Signal**	**Description**
SUPS output 24 V	VOLOAD1	1	2	P_VIN/VIN1	SUPS input 24 V
SUPS output 24 V	VOLOAD2	3	4	P_VIN/VIN2	SUPS input 24 V
(not led out)	5V1/NC1	5	6	GND	Ground
(not led out)	5V2/NC2	7	8	GND	Ground
		INSULATION			
SVCC 5 V	S5V	13	14	S3.3V	Standby supply voltage 3.3 V
Ground	GND	15	16	GND	Ground
PCIe® Lane 1 Transmit +	PE1/ SATA4-TX	17	18	RX-SATA4/ PE1	PCIe® Lane 1 Receive +
PCIe® Lane 1 Transmit -	PE1/ SATA4-TX#	19	20	RX-SATA4/ PE1#	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
PCIe® Lane 2 Transmit +	PE2/ SATA3-TX	29	30	RX-SATA3/ PE2	PCIe® Lane 2 Receive +
PCIe® Lane 2 Transmit -	PE2/ SATA3-TX#	31	32	RX-SATA3/ PE2#	PCIe® Lane 2 Receive -
Ground	GND	33	34	GND	Ground
PCIe® Lane 3 Transmit +	PE3/ SATA2-TX	35	36	RX-SATA2/ PE3	PCIe® Lane 3 Receive +
PCIe® Lane 3 Transmit -	PE3/ SATA2-TX#	37	38	RX-SATA2/ PE3#	PCIe® Lane 3 Receive -
Ground	GND	39	40	GND	Ground
PCIe Clock Lane 3 +	PECLK3	41	42	PECLK4	(not led out)
PCIe Clock Lane 3 -	PECLK3#	43	44	PECLK4#	(not led out)
Ground	GND	45	46	GND	Ground
PCIe® Lane 4 Transmit +	PE4/ SATA1-TX	47	48	RX-SATA1/ PE4	PCIe® Lane 4 Receive +
PCIe® Lane 4 Transmit -	PE4/ SATA1-TX#	49	50	RX-SATA1/ PE4#	PCIe® Lane 4 Receive -
Ground	GND	51	52	GND	Ground
PCIe® Clock Enable Lane 1 active low	PCKE1#	53	54	PCKE2#	PCIe® Clock Enable Lane 2 active low
PCIe® Clock Enable Lane 3 active low	PCKE3#	55	56	PCKE4#	PCIe® Clock Enable Lane 4 active low
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
PCIe® Clock Enable Lane 5 active low	PCKE5/ OC4#	63	64	OC3/ PCKE6#/	PCIe® Clock Enable Lane 6 active low
PCIe® Clock Enable Lane 7 active low	PCKE7/ OC2#	65	66	OC1/ PCKE8#	PCIe® Clock Enable Lane 8 active low
Ground	GND	67	68	GND	Ground

Pin assignment of BeaCon140 connector:					
Description	**Signal**	**Pin**		**Signal**	**Description**
(not led out)	PE5/ USB3-4/ USBC1-TX	69	70	RX-USBC1/ USB3-4 RX/ PE5	(not led out)
(not led out)	PE5/ USB3-4/ USBC1-TX#	71	72	RX-USBC1/ USB3-4/ PE5#	(not led out)
USB4.D+	USB2-4 (GND)	73	74	(GND) USB2-3	USB3.D +
Ground	PECLK5/ USBC- SBU1 (GND)	75	76	(GND) PECLK6	Ground
Ground	PECLK5#/ USBC- SBU2 (GND)	77	78	(GND) PECLK6#	Ground
USB4.D-	USB2-4# (GND)	79	80	(GND) USB2-3 D#	USB3.D -
(not led out)	PE6/ USB3-3/ USBC2-TX	81	82	RX-USBC2/ USB3-3/ PE6	(not led out)
(not led out)	PE6/ USB3-3/ USBC2-TX#	83	84	RX-USBC2/ USB3-3/ PE6#	(not led out)
Ground	GND	85	86	GND	Ground
PCIe® Lane 7 Transmit +	PE7/ USB3-2-TX	87	88	RX-SSIC/ USB3-2/ PE7	PCIe® Lane 7 Receive +
PCIe® Lane 7 Transmit -	PE7/ USB3-2- TX#	89	90	RX-SSIC/ USB3-2/ PE7#	PCIe® Lane 7 Receive -
USB 2.D+	USB2-2 (GND)	91	92	(GND) USB2-1	USB 1.D +
PCIe Clock Lane 7 +	PECLK7 (GND)	93	94	(GND) PECLK8	PCIe Lane 8 Clock +
PCIe Clock Lane 7 -	PECLK7# (GND)	95	96	(GND) PECLK8#	PCIe Lane 8 Clock -
USB 2.D-	USB2-2# (GND)	97	98	(GND) USB2-1#	USB 1.D -
PCIe® Lane 8 Transmit +	PE8/ USB3-1-TX	99	100	RX-USB3-1/ PE8	PCIe® Lane 8 Receive +
PCIe® Lane 8 Transmit -	PE8/ USB3-1 TX#	101	102	RX-USB3-1/ PE8#	PCIe® Lane 8 Receive -
Ground	GND	103	104	GND	Ground
SATA GP1	SATAGP1	105	106	SATAGP2	(not led out)
(not led out)	SATAGP3/ USBC-CC1	107	108	USB-CC2/ SATAGP4	(not led out)
TwinCAT LED Red	TCLEDR	109	110	TCLEDG	TwinCAT LED Green
TwinCAT LED Blue	TCLEDB	111	112	RES	LAN-SYNC
SATA LED active low	SATALED	113	114	USBPWREN	USB Power Enable
Battery	BATT	115	116	PWRFAIL	SUPS
(not led out)	PME#	117	118	PWRGOOD	Powergood
Power button active low	PWRBTN#	119	120	MRST#	Reset button active low

Pin assignment of BeaCon140 connector:					
Description	**Signal**	**Pin**		**Signal**	**Description**
PSON	PSON	121	122	ATXPWRGD	ATX Powergood
Ground	GND	123	124	GND	Ground
DPB#-HDMIB	DP/DVI#	125	126	DDCC/ DPAUX	DDC Clock/ DisplayPort Aux +
DPB.HDP	DPHPD	127	128	DDCD/ DPAUX#	DDC data/ DisplayPort Aux -
Ground	GND	129	130	GND	Ground
DisplayPort Lane 0 +	DPL0/ TMDSD2	131	132	TMDSD1/ DPL1	DisplayPort Lane 1+
DisplayPort Lane 0 -	DPL0/ TMDSD2#	133	134	TMDSD1/ DPL1#	DisplayPort Lane 1 -
Ground	GND	135	136	GND	Ground
DisplayPort Lane 2 +	DPL2/ TMDSD0	137	138	TMDSCLK/ DPL3	DisplayPort Lane3 +
DisplayPort Lane 2 -	DPL2/ TMDSD0#	139	140	TMDSCLK/ DPL3#	DisplayPort Lane 3 -

8 LEDs

8.1 LED: Power control

There is an RGB LED on the board with which status messages of the power controller are output by means of colors and flashing intervals.

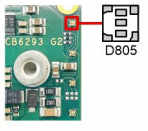


Fig. 11: CB6293 CLED D805

Color	Interval	Meaning
None	Steadily lit	System in error state
White	Steadily lit	Power fail
Cyan	Steadily lit	Reserved
Magenta	Steadily lit	SUPS active (if present)
Blue	Steadily lit	Reserved
Yellow	Steadily lit	S5 state
Green	Steadily lit	S0 state
Red	Steadily lit	Reset/Start
Green/yellow	Flashing	Bootloader running without error
Red/yellow	Flashing	Bootloader is started (start sequence is being run through)
Yellow	Flashing (6 s)	S4 state
Yellow	Flashing (3 s)	S3 state
Magenta	Flashing (0.5 s)	SUPS capacitance test (if SUPS present)
Red/magenta	Flashing	Checksum error during I^2C transmission in the bootloader

A steadily lit red LED can indicate a hardware error.

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.

8.2 LED: TwinCAT

An RGB LED indicates the status of TwinCAT activity.

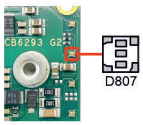


Fig. 12: CB6293 TCLED D807

Color	Interval	Meaning
Green	Steadily lit	TwinCAT Run Mode
Blue	Steadily lit	TwinCAT Config Mode
Red	Steadily lit	TwinCAT Stop

8.3 LED: HDD

A further RGB LED indicates the hard disk activity.

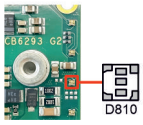


Fig. 13: CB6293 HDLED D810

Color	Interval	Meaning
Green	Steadily lit	Activity (access)

8.4 LED: UPS-OCT

There is an RGB LED on the board with which the transmission quality of the OCT signals is indicated by means of colors and flashing intervals.

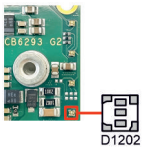


Fig. 14: CB6293 OCTLED D1202

Color	Interval	Meaning
None	Steadily lit	No UPS OCT connected
Blue	Flashing	Boot loader active
Yellow	Flashing	Moderate signal quality
Green	Flashing	Good signal quality
Red	Flashing	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 BIOS

9.1 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.

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.

9.2 Main CB6293

```
                Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

 Board Information
 Board                                  CB6293
 Revision                               2
 Bios Version                           1.00
 BIOSAPI Version                        2.46.0002
 BIOS Configuration Override            Performance Optimized

 Processor Information
 Name                                   AlderLake ULX
 Type                                   Intel(R) Atom(TM)
                                        x7433RE
                                        Processr @ 1.40 GHz
 Speed                                  1500 MHz
 ID                                     0xB060E
 Stepping                               A0
 Number of Processors                   4Cores(s) / 4Thread(s)
 Microcode Revision                     1D
 GT Info                                0x46D0

 IGFX GOP Version                       21.1.6
 Memory RC Version                      1.0.4.75
 Total Memory                            8192 MB
 Memory Data Rate                        4800 MHz

 PCH Information
 Name                                   PCH N
 Stepping                               A0

 ME FW Version                          16.50.20.1647

 System Date                            [Sun 01/01/2023]
 System Time                            [02:09:07]

 →←: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/—: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Reset
 ESC: Exit

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```

Setup entry	Option
Board	None
Revision	None
Bios Version	None
BIOSAPI Version	None
BIOS Configuration Override	None
Processor 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.

9.3 Advanced

```
                Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

  Power-Supply Type                    [ATX]                    Select the Type of the Power
  Show postcode on screen              [Disabled]               Supply: AT/ATX
▶ RC ACPI Settings
▶ CPU Configuration
▶ Trusted Computing
▶ ACPI Settings
▶ Hardware Monitor
▶ Intel TXT Information
▶ USB Configuration
▶ Network Stack Configuration
▶ NVMe Configuration
▶ Power Controller Options
▶ BeaCon Configuration
                                                              →←: Select Screen
▶ TLS Auth Configuration                                      ↓↑: Select Item
▶ Intel(R) Ethernet Controller I226-IT - 00:01:05:A7:70:45    Enter: Select
▶ MAC:000105A77045-IPv4 Network Configuration                 +/-: Change Opt.
▶ MAC:000105A77045-IPv6 Network Configuration                 F1: General Help
                                                              F2: Previous Values
▶ Driver Health                                               F3: Optimized Defaults
                                                              F4: Save & Reset
                                                              ESC: Eit

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```

BIOS entry	Option
Power-Supply Type	ATX / AT
Show postcode on screen	Disabled / Enabled
▶ RC ACPI Settings	Submenu: RC ACPI settings [▶ 35]
▶ CPU Configuration	Submenu: CPU Configuration [▶ 36]
▶ Trusted Computing	Submenu: Trusted Computing [▶ 38]
▶ ACPI Settings	Submenu: ACPI Settings [▶ 39]
▶ Hardware Monitor	Submenu: Hardware Monitor [▶ 39]
▶ Intel® TXT Information	Submenu:
▶ USB Configuration	Submenu: USB Configuration [▶ 41]
▶ Network Stack Configuration	Submenu:
▶ NVMe™ Configuration	Submenu: NVMe Configuration [▶ 44]
▶ Power Controller Options	Submenu: Power Controller Options [▶ 45]
▶ BeaCon Configuration	Submenu: BeaCon Configuration [▶ 46]
▶ TLS Auth Configuration	Submenu: TLs Auth Configuration [▶ 46]
▶ Intel® Ethernet Controller I226-IT - 00:01:05:A7:70:45	Submenu: Intel Ethernet Controller I226-IT [▶ 47]
▶ MAC:000105A77045 – IPv4 Network Configuration	Submenu:
▶ MAC:000105A77045 – IPv6 Network Configuration	Submenu:
▶ Driver Health	Submenu: Driver Health [▶ 50]

9.3.1 RC ACPI settings

```
                Aptio Setup - AMI
          Advanced

RC ACPI Settings                                          PTID Support will be loaded if
                                                          enabled.
PTID Support                          [Enabled]
PECI Access Method                    [Direct I/O]
Native PCIE Enable                    [Enabled]
BDAT ACPI Table Support               [Disabled]
ACPI Debug                            [Disabled]

MSI enabled                           [Enabled]
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/—: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Reset
                                                          ESC: Exit

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```

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

9.3.2 CPU Configuration

```
                Aptio Setup - AMI
          Advanced

CPU Configuration                                        Displays the E-core Information


▶ Efficient-core Information
▶ Performance-core Information

  ID                                    0xB06E0
  Brand String                          Intel(R) Atom(TM)
                                        x7433RE
  VMX                                   Supported
  SMX/TXT                               Not Supported

  C6DRAM                                [Enabled]
  CPU Flex Ratio Override               [Disabled]
  CPU Flex Ratio Settings               15
  Hardware Prefetcher                   [Enabled]
  Adjacent Cache Line Prefetch          [Enabled]
  Intel (VMX) Virtualization            [Enabled]
  Technology
  PECI                                  [Enabled]
  AVX                                   [Enabled]
  Active Efficient-cores                [All]
  BIST                                  [Disabled]
  AP threads Idle Manner                [MWAIT Loop]
  AES                                   [Enabled]
  MachineCheck                          [Enabled]
▶ CPU SMM Enhancement

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```

BIOS entry	Options
CPU Configuration	
▶Efficient-core information	Submenu: Efficient-core Information [▶ 37]
▶Performance-core information	None
ID	None
Brand String	None
VMX	None
SMX/TXT	None
C6DRAM	Enabled / Disabled
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
AVX	Enabled / Disabled
Active Efficient-cores	All / 1 - 0
BIST	Disabled / Enabled
AP threads Idle Manner	MWait Loop / Halt Loop / Run Loop
AES	Enabled / Disabled
MachineCheck	Enabled / Disabled
▶CPU SMM Enhancement	Submenu: CPU SMM Enhancement [▶ 37]

9.3.2.1 Efficient-core Information

```
                Aptio Setup - AMI
          Advanced

  Efficient-core Information                                  |
                                                              |
  L1 Data Cache                        32 KB x 4              |
  L1 Instruction                       64 KB x 4              |
  L2 Cache                             2048 KB                |
  L3 Cache                             6 MB                   |
                                                              |
                                                              |  →←: Select Screen
                                                              |  ↑↓: Select Item
                                                              |  Enter: Select
                                                              |  +/-: Change Opt.
                                                              |  F1: General Help
                                                              |  F2: Previous Values
                                                              |  F3: Optimized Defaults
                                                              |  F4: Save & Reset
                                                              |  ESC: Exit

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```

BIOS entry	Options
Efficient-core Information	
L1 Data Cache	None
L1 Instruction	None
L2 Cache	None
L3 Cache	None

9.3.2.2 CPU SMM Enhancement

```
                Aptio Setup - AMI
          Advanced

  CPU SMM enhancement                                         |  Enable/Disable usage of
                                                              |  SMM_DELAYED MSR for MP sync in
  SMM Use Delay Indication             [Enabled]              |  SMI
  SMM Use Block Indication             [Enabled]              |
  SMM Use SMM en-US Indication         [Enabled]              |
                                                              |
                                                              |  →←: Select Screen
                                                              |  ↑↓: Select Item
                                                              |  Enter: Select
                                                              |  +/-: Change Opt.
                                                              |  F1: General Help
                                                              |  F2: Previous Values
                                                              |  F3: Optimized Defaults
                                                              |  F4: Save & Reset
                                                              |  ESC: Exit

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```

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

9.3.3 Trusted Computing

```
                Aptio Setup - AMI
          Advanced

     TPM 2.0 Device Found                                    Enables or Disables BIOS
     Firmware Version:                  600.18               support for security device.
     Vendor:                            INTC                 O.S. will not show Security
                                                             Device. TCG EFI protocol and
     Security Device Support            [Enable]             INT1A interface will not be
     Active PCR banks                   SHA256               available.
     Available PCR banks                SHA256, SHA384, SM3

     SHA256 PCR Bank                    [Enabled]
     SHA384 PCR Bank                    [Disabled]
     SM3_256 PCR Bank                   [Disabled]

     Pending operation                  [None]               →←: Select Screen
     Platform Hierarchy                 [Enabled]            ↑↓: Select Item
     Storage Hierarchy                  [Enabled]            Enter: Select
     Endorsement Hierarchy              [Enabled]            +/—: Change Opt.
     Physical Presence Spec Version     [1.3]                F1: General Help
     TPM 2.0 InterfaceType              [CRB]                F2: Previous Values
     Device Select                      [Auto]               F3: Optimized Defaults
                                                             F4: Save & Reset
                                                             ESC: Exit

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```

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

9.3.4 ACPI Settings

```
                Aptio Setup - AMI
          Advanced

  ACPI Settings                                          Enables or Disables BIOS ACPI
                                                         Auto Configuration.
  Enable ACPI Auto Configuration        [Disabled]

  Enable Hibernation                    [Enabled]
  Lock Legacy Resources                 [Disabled]
                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/—: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Reset
                                                         ESC: Exit

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```

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

9.3.5 Hardware Monitor

```
                Aptio Setup - AMI
          Advanced

  Pc Health Status

  CPU dig.                              : +60 'C
  MB Temp                               : +58 'C
  5V                                    : +5.10 V
  FAN 1                                 : +96 RPM
                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/—: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Reset
                                                         ESC: Exit

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```

BIOS entry	Options
PC Health Status	None

9.3.6 Intel® TXT Information

```
                Aptio Setup - AMI
          Advanced

 Intel TXT Information                                  |
                                                        |
 Chipset                          Production Fused      |
 BiosAcm                          Production Fused      |
 Chipset Txt                      Not Supported         |
 Cpu Txt                          Not Supported         |
 Error Code                       None                  |
   Class Code                     None                  |  →←: Select Screen
   Major Code                     None                  |  ↑↓: Select Item
   Monor Code                     None                  |  Enter: Select
                                                        |  +/—: Change Opt.
                                                        |  F1: General Help
                                                        |  F2: Previous Values
                                                        |  F3: Optimized Defaults
                                                        |  F4: Save & Reset
                                                        |  ESC: Exit

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```

BIOS entry	Options
PC Health Status	None

9.3.7 USB Configuration

```
                Aptio Setup - AMI
          Advanced

  USB Configuration                                          Enables Legacy USB support.
                                                             AUTO option disables legacy
  USB Module Version                    32                   support if no USB devices are
                                                             connected. DISABLE option will
  USB Controllers:                                           keep USB devices available
        2 XHCIs                                              only for EFI applications.
  USB Devices:
        1 Keyboard

  Legacy USB Support                    [Enabled]
  XHCI Hand-off                         [Enabled]
  USB Mass Storage Driver Support       [Enabled]

  USB hardware delays and time-outs:                         →←: Select Screen
  USB transfer time-out                 [20 sec]             ↓↑: Select Item
  Device reset time-out                 [20 sec]             Enter: Select
  Device power-up delay                 [Auto]               +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Reset
                                                             ESC: Exit

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```

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

9.3.8 Network Stack Configuration

```
                Aptio Setup - AMI
          Advanced

 Network Stack                        [Disabled]          Enable/Disable UEFI Network
                                                          Stack

                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/—: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Reset
                                                          ESC: Exit

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```

BIOS entry	Options
Network Stack	Disabled / Enabled

9.3.8.1 Network Stack Configuration enabled

```
                Aptio Setup - AMI
          Advanced

  Network Stack                          [Enabled]          Enable/Disable UEFI Network
  IPv4 PXE Support                       [Disabled]         Stack
  IPv4 HTTP Support                      [Disabled]
  IPv6 PXE Support                       [Disabled]
  IPv6 HTTP Support                      [Disabled]         →←: Select Screen
  PXE boot wait time                     0                  ↑↓: Select Item
  Media detect count                     1                  Enter: Select
                                                            +/—: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Reset
                                                            ESC: Exit

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```

BIOS entry	Options
Network Stack	Enabled / Disabled
Ipv4 PXE Support	Disabled / Enabled
Ipv4 HTTP Support	Disabled / Enabled
Ipv6 PXE Support	Disabled / Enabled
Ipv6 HTTP Support	Disabled / Enabled

9.3.9 NVMe Configuration

```
                Aptio Setup - AMI
          Advanced

NVMe Configuration                                  |
                                                    |
No NVME Device Found                                |
                                                    |
                                                    |  →←: Select Screen
                                                    |  ↑↓: Select Item
                                                    |  Enter: Select
                                                    |  +/—: Change Opt.
                                                    |  F1: General Help
                                                    |  F2: Previous Values
                                                    |  F3: Optimized Defaults
                                                    |  F4: Save & Reset
                                                    |  ESC: Exit

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```

BIOS entry	Options
NVMe™ Configuration	
No NVMe™ Device Found	None

9.3.10 Power Controller Options

```
                Aptio Setup - AMI
          Advanced

  Bootloader Version                  1.93-06                  Select Power line for external
  Firmware Version                    1.02-79                  USB devices, if powered-down
  Mainboard Serial No                 ................
  Mainboard Prod. Date (Week.Year)    -1.-1
  Mainboard BootCount                 909
  Mainboard Operation Time            24344min (405h)
  Voltage (Min/Max)                    5.00V / 5.20V
  Temperature (Min/Max)               23'C /63'C

  USB-Port Voltage                    [Off in S3-5]

  WatchDogTimer Mode                  [Normal Mode]            →←: Select Screen
  WDT OSBoot Timeout                  [Disabled]               ↓↑: Select Item
                                                               Enter: Select
  UPS OCT-Access                      [Auto]                   +/-: Change Opt.
  UPS                                 [not detected]           F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Reset
                                                               ESC: Exit

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```

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
USB-Port voltage	Off in S3-5 / by SVCC
WatchDogTimer Mode	Normal Mode / Compatibility Mode
WDT OSBoot Timeout	Disabled / 45/60/75…225/240/255 Seconds
UPS OCT-Access	Auto / Off
UPS	None

9.3.11 BeaCon Configuration

```
                Aptio Setup - AMI
          Advanced

  BeaCon Configuration                                  |
  No BeaCon device found!                               |
                                                        |
                                                        |  →←: Select Screen
                                                        |  ↑↓: Select Item
                                                        |  Enter: Select
                                                        |  +/—: Change Opt.
                                                        |  F1: General Help
                                                        |  F2: Previous Values
                                                        |  F3: Optimized Defaults
                                                        |  F4: Save & Reset
                                                        |  ESC: Exit

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```

BIOS entry	Options
BeaCon Configuration	
No BeaCon device found!	None

9.3.12 TLs Auth Configuration

```
                Aptio Setup - AMI
          Advanced

  ▶ Server CA Configuration                             |  Press <Enter> to configure
                                                        |  Server CA.
  ▶ Client Cert Configuration                           |
                                                        |
                                                        |  →←: Select Screen
                                                        |  ↑↓: Select Item
                                                        |  Enter: Select
                                                        |  +/—: Change Opt.
                                                        |  F1: General Help
                                                        |  F2: Previous Values
                                                        |  F3: Optimized Defaults
                                                        |  F4: Save & Reset
                                                        |  ESC: Exit

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```

BIOS entry	Options
▶Server CA Configuration	Submenu: Server CA Configuration [▶ 46]
▶Client Cert Configuration	None

9.3.12.1 Server CA Configuration

```
                Aptio Setup - AMI
          Advanced

  ▶ Enroll Cert                                         |  Press <Enter> to enroll cert.
                                                        |
  ▶ Delete Cert                                         |
                                                        |
                                                        |  →←: Select Screen
                                                        |  ↑↓: Select Item
                                                        |  Enter: Select
                                                        |  +/—: Change Opt.
                                                        |  F1: General Help
                                                        |  F2: Previous Values
                                                        |  F3: Optimized Defaults
                                                        |  F4: Save & Reset
                                                        |  ESC: Exit
```

```
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```

BIOS entry	Options
▶Enroll Cert	Submenu: Enroll Cert [▶ 47]
▶Delete Cert	None

9.3.12.1.1 Enroll Cert

```
                Aptio Setup - AMI
          Advanced

▶ Enroll Cert Using File                    Enroll Cert Using File

  Cert GUID

▶ Commit Changes and Exit
▶ Discard Changes and Exit                  →←: Select Screen
                                            ↑↓: Select Item
                                            Enter: Select
                                            +/—: Change Opt.
                                            F1: General Help
                                            F2: Previous Values
                                            F3: Optimized Defaults
                                            F4: Save & Reset
                                            ESC: Exit

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```

BIOS entry	Options
▶Enroll Cert Using File	None
▶Commit Changes and Exit	None
▶Discard Changes and Exit	None

Also see about this

- Enroll Cert [▶ 47]

9.3.13 Intel Ethernet Controller I226-IT

```
                Aptio Setup - AMI
          Advanced

  UEFI Driver                       Intel (R) Pro/1000 Open
                                    Source 4.9.99 PCI—E
  Device Name                       Intel (R) Ethernet
                                    Controller I226—IT
  PCI Device ID                     125D

  Link Status                       [Disconnected]

  PCI Address                       00:01:05:A7:70:45

                                    →←: Select Screen
                                    ↑↓: Select Item
                                    Enter: Select
                                    +/—: Change Opt.
                                    F1: General Help
                                    F2: Previous Values
                                    F3: Optimized Defaults
                                    F4: Save & Reset
                                    ESC: Exit

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```

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

9.3.14 ► MAC:000105A77045 – IPv4 Network Configuration

```
                Aptio Setup - AMI
          Advanced

  Configured                          [Enabled]          Indicate whether network
  Enable DHCP                         [Disabled]         address configured
  LocalIP Address                                        successfully or not
  Local NetMask
  Local Gateway
  Local DNS Servers                                      →←: Select Screen
                                                         ↑↓: Select Item
  Save Changes and Exit                                  Enter: Select
                                                         +/—: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Reset
                                                         ESC: Exit

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```

BIOS entry	Options
Configured	Enabled / Disabled
Enable DHCP	Disabled / Enabled

9.3.15 MAC000105A77045 – IPv6 Network Configuration

```
                Aptio Setup - AMI
          Advanced

 ▶ Enter Configuration Menu                          Press ENTER to enter
                                                     configuration menu for IPv6
                                                     configuration.

                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/—: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Reset
                                                     ESC: Exit

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```

BIOS entry	Options
▶Enter Configuration Menu	Submenu: MAC000105A77045-IPv6 Network Configuration Menu [▶ 50]

9.3.15.1 MAC000105A77045-IPv6 Network Configuration Menu

```
                Aptio Setup - AMI
          Advanced

  Interface Name        :          eth0                    The 64 bit alternative
  Interface Type        :          Ethernet                interface ID for the device.
  MAC address           :          00-01-05-A7-70-45       The string is colon separated.
  Host address          :          FE80::201:5FF:FEA7:7045/ e.g.ff:dd:88:66:cc:1:2:3:
                                   64

  Route Table           :
                                   FE80::/64 >>::          →←: Select Screen
  Gateway address       :                                  ↑↓: Select Item
  DNS address           :                                  Enter: Select
  Intrface ID                      2:1:5:FF:FE:A7:70:45    +/—: Change Opt.
  DAD Transmit Count               1                       F1: General Help
  Policy                           [automatic]             F2: Previous Values
                                                           F3: Optimized Defaults
  Save Changes and Exit                                    F4: Save & Reset
                                                           ESC: Exit

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```

BIOS entry	Options
Policy	automatic

9.3.16 Driver Health

```
                Aptio Setup - AMI
          Advanced

 ▶ Intel(R) Ethernet Connection I219 0.2.03       Healthy   Provides Health Status for the
 ▶ Intel(R) PRO/1000 Open Source 4.9.99 PCI—E     Healthy   Drivers/Controllers

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/—: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Reset
                                                            ESC: Exit
```

```
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
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```

BIOS entry	Options
► Intel®(R) PRO/1000 Open Source 4.9.99 PCIe®	None

9.3.16.1 Driver Health

```
                Aptio Setup - AMI
        Advanced

 Controller 6D34BA18 Child 0                    Healthy        Provides Health Status for the
                                                               Drivers/Controllers
 Intel(R) Ethernet Controller I226-IT           Healthy

                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/—: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Reset
                                                               ESC: Exit

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```

BIOS entry	Options
Intel®(R) Ethernet Controller I226-IT	None

9.4 Chipset

```
                Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

▶ System Agent (SA) Configuration                    System Agent (SA) Parameters
▶ PCH-IO Configuration

                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Reset
                                                     ESC: Exit

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```

BIOS entry	Options
▶System Agent (SA) Configuration	Submenu: System Agent (SA) Configuration [▶ 53]
▶PCH-IO Configuration	Submenu: PCH-IO Configuration [▶ 67]

9.4.1 System Agent (SA) Configuration

```
                Aptio Setup - AMI
                     Chipset

  System Agent (SA) Configuration                    Graphics Configuration

  VT-d                                Supported

▶ Graphics Configuration
▶ PCI Express Configuration

  VT-d                                [Enabled]
  Control Iommu Pre-boot Behavior     [Enabled IOMMU during
                                      boot]
  X2APIC Opt Out                      [Disabled]     →←: Select Screen
  DMA Control Guarantee               [Enabled]      ↑↓: Select Item
  GNA Device (B0:D8:F0)               [Enabled]      Enter: Select
  CRID Support                        [Disabled]     +/-: Change Opt.
  Above 4GB MMIO BIOS assignment      [Enabled]      F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Reset
                                                     ESC: Exit

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```

BIOS entry	Options
System Agent (SA) Configuration	
VT-d	None
► Graphics Configuration	Submenu: Graphics Configuration [▶ 55]
► PCI Express® Configuration	Submenu: PCI Express Configuration [▶ 60]
VT-d	Enabled / Disabled
Control Iommu Pre-boot Behavior	Enable IOMMU / Disable IOMMU
X2APIC Opt Out	Disabled / Enabled
DMA Control Guarantee	Enabled / Disabled
GNA Device (B0:D8:F0)	Enabled / Disabled
CRID Support	Disabled / Enabled
Above 4GB MMIO BIOS assignment	Enabled / Disabled

9.4.1.1 Graphics Configuration

```
                Aptio Setup - AMI
                     Chipset

  Graphics Configuration                                  Graphics turbo IMON current
                                                          values supported (14-31)
  Graphics Turbo IMON Current          31
  Skip Scaning of External Gfx Card   [Disabled]

  Primary Display                      [Auto]
▶ External Gfx Card Primary Display Configuration
  Internal Graphics                    [Auto]
  Headlessmode                         [Disabled]
  GTT Size                             [8MB]
  Aperture Size                        [256MB]
  PSMI SUPPORT                         [Disabled]
  DVMT Pre-Allocated                   [60M]
  Intel Graphics Pei Display Peim      [Disdabled]          →←: Select Screen
  VDD Enable                           [Enabled]            ↑↓: Select Item
  Configure GT for use                 [Enabled]            Enter: Select
  RC1p Support                         [Disabled]           +/-: Change Opt.
  PAVP Enable                          [Enabled]            F1: General Help
  Cdynmax Clamping Enable              [Disabled]           F2: Previous Values
  Cd Clock Frequency                   [Max CDClock freq    F3: Optimized Defaults
                                       based on Reference Clk] F4: Save & Reset
  Enable Display Audio Link in         [Disabled]           ESC: Exit
  Pre-OS
  Cd Clock Frequency                   [Max CDClock freq
                                       based on Reference Clk]
  IUER Button Enable                   [Disabled]
▶ LCD Control
▶ Intel (R) Ultrabook Event Support

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```

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 [▶ 57]
Internal Graphics	Auto / Disabled / Enabled
Headlessmode	Disabled / Enabled
GTT Size	2 / 4 / 8 MB
Aperture Size	128 / 256 / 512 / 1024 MB
PSMI SUPPORT	Disabled / Enabled
DVMT Pre-Allocated	0M – 160 M, various
Intel® Graphics Pei Display Peim	Disabled / Enabled
VDD Enable	Enabled / Disabled
Configure GT for use	Enabled / Disabled
RC1p Support	Disabled / Enabled
PAVP Enable	Enabled / Disabled
Cdynmax Clamping Enable	Disabled / Enabled
Cd Clock Frequency	192 / 307.2 / 556.8 / 652.8 Mhz Max CdClock freq based on Reference Clk
Enable Display Audio Link in Pre-OS	Disabled / Enabled
Cd Clock Frequency	192 / 307.2 / 556.8 / 652.8 Mhz Max CdClock freq based on Reference Clk
IUER Button Enable	Disabled / Enabled
► LCD Control	Submenu: LCD Control [▶ 58]
► Intel® Ultrabook Event Support	Submenu: Intel Ultrabook Event Support [▶ 59]

9.4.1.1.1 External Gfx Card Primary Display Configuration

```
                Aptio Setup - AMI
                     Chipset

External Gfx Card Primary Display Configuration

 Primary PEG                          [Auto]
 Primary PCIE                         [Auto]

Select PEG0/PEG1/PEG2/PEG3
Graphics device should be
Primary PEG

→←: Select Screen
↓↑: Select Item
Enter: Select
+/—: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Reset
ESC: Exit

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```

BIOS entry	Options
External Gfx Card Primary Display Configuration	
Primary PEG	Auto / PEG11 / PEG 12
Primary PCIE	Auto / PCI1 - PCIE19

9.4.1.1.2 LCD Control

```
                Aptio Setup - AMI
                     Chipset

 LCD Control                                          Select the Video Device which
                                                      will be activated during POST.
 Primary IGFX Boot Display          [VBIOS Default]   This has no effect if external
 LCD Panel Type                     [VBIOS DEFAULT]   graphics present.
 Panel Scaling                      [Auto]            Secondary boot display
 Backlight Control                  [PWM Normal]      selection will appear based on
 Active LFP                         [eDP Port-A]      your selection.
 Panel Color Depth                  [18 Bit]          VGA modes will be supported
 Backlight Brightness               255                only on primary display

                                                      →←: Select Screen
                                                      ↓↑: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Reset
                                                      ESC: Exit

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```

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

9.4.1.1.3 Intel Ultrabook Event Support

```
                Aptio Setup - AMI
                     Chipset
Intel (R) Ultrabook Event Support                    Enable/Disable IUER Slate
                                                     Functionality
IUER Slate Enable                    [Disabled]
IUER Dock Enable                     [Disabled]

                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/—: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Reset
                                                     ESC: Exit

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```

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

9.4.1.2 PCI Express Configuration

```
                Aptio Setup - AMI
                     Chipset

  PCI Express Configuration                                  Load Fia Configuration if
                                                             Enabled for each root
  Fia Programming                        [Enabled]
  Compliance Test Mode                   [Disabled]
  CDR Relock                             [Enabled]
  Assertion on Link Down GPIOs           [Disabled]
  PCI Express Slot Selection             [M2]
▶ PCI Express Root Port 1
▶ PCI Express Root Port 2
▶ PCI RPort 3 (disabled on BeaCon)                         →←: Select Screen
                                                           ↓↑: Select Item
                                                           Enter: Select
                                                           +/—: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Reset
                                                           ESC: Exit

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```

BIOS entry	Options
PCI Express® Configuration	
Fia Programming	Enabled / Disabled
Compliance Test Mode	Disabled / Enabled
CDR Relock	Enabled / Disabled
Assertion On Link Down GPIOs	Disabled / Enabled
PCI Express® Slot Selection	M2 / CEMx4 Slot
▶ PCI Express® Root Port 1	Submenu: PCI Express® Root Port 1 [▶ 60]
▶ PCI Express® Root Port 2	Submenu: PCI Express® Root Port 2 [▶ 63]
PCI™ RPort 3 (disabled on BeaCon)	Submenu: PCI™ RPort 3 (disabled on BeaCon) [▶ 65]

9.4.1.2.1 PCI Express® Root Port 1

```
                Aptio Setup - AMI
                     Chipset

  PCI Express Root Port 1                [Enabled]          ▲ Control the PCI Express Root
  Connection Type                        [Slot]             Port.
  PCI Express Clock Gating               [Enabled]
  PCI Express Power Gating               [Enabled]
  ASPM                                   [Disabled]
  L1 Substates                           [L1.1 & L1.2]
  Gen3 Eq Phase3 Method                  [Hardware]
  Gen4 Eq Phase3 Method                  [Hardware]
  ACS                                    [Enabled]
  PTM                                    [Disabled]
  DPC                                    [Enabled]
  FOM Scoreboard Control Policy          [Auto]
  Multi—VC                               [Disabled]
  EDPC                                   [Enabled]
    URR                                  [Disabled]
    FER                                  [Disabled]
    NFER                                 [Disabled]         →←: Select Screen
    CER                                  [Disabled]         ↓↑: Select Item
    CTO                                  [Disabled]         Enter: Select
    SEFE                                 [Disabled]         +/—: Change Opt.
    SENFE                                [Disabled]         F1: General Help
    SECE                                 [Disabled]         F2: Previous Values
    PME SCI                              [Enabled]          F3: Optimized Defaults
    Hot Plug                             [Disabled]         F4: Save & Reset
    Advanced Error Reporting             [Enabled]          ESC: Exit
  PCIe Speed                             [Auto]
```

```
Enable ClockReq Messaging            [Enabled]
  Transmitter Half Swing             [Disabled]
Detect Timeout                       0
P2P Support                          [Disabled]
CPU PCIE Func0 Link Disable          [Disabled]

SA PCIe LTR Congguration
LTR                                  [Enabled]
  Snoop Latency Override             [Auto]
  Non Snoop Latency Override         [Auto]
  Force LTR Override                 [Disabled]

LTR Lock                             [Disabled]

CPU PCIe Gen3 HWEQ Config
UPTP                                 5
DPTP                                 7

CPU PCIe Gen4 HWEQ Config
UPTP                                 8
DPTP                                 9
                                                  ▼

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```

BIOS entry	Options
PCI Express® Root Port 1	Enabled / Disabled
Connection Type	Slot / Built–in
PCI Express® Clock Gating	Enabled / Disabled
PCI Express® Power Gating	Enabled / Disabled
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
Gen3 Eq Phase3 Method	Hardware / Static Coeff.
Gen4 Eq Phase3 Method	Hardware / Static Coeff.
ACS	Enabled / Disabled
PTM	Disabled / Enabled
DPC	Enabled / Disabled
FOM Scoreboard Control Policy	Auto / Gen3 / Gen4 / Gen3 / Gen4
Multi-VC	Disabled / Enabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
CTO	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Enabled / Disabled
Hot Plug	Disabled / Enabled
Advanced Error Reporting	Enabled / Disabled
PCIe® Speed	Auto / Gen1 / Gen2 / Gen3 / Gen4
Enable ClockReq Messaging	Enabled / Disabled
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
P2P Support	Disabled / Enabled
CPU PCIE Func0 Link Disable	Disabled / Enabled
SA 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
CPU PCIe® Gen3 HWEQ Config	
UPTP	None
DPTP	None
CPU PCIe® Gen4 HWEQ Config	
UPTP	None
DPTP	None

9.4.1.2.2 PCI Express® Root Port 2

```
                Aptio Setup - AMI
                     Chipset

 PCI Express Root Port 2              [Enabled]          Control the PCI Express Root
 Connection Type                      [Slot]             Port.
 PCI Express Clock Gating             [Enabled]
 PCI Express Power Gating             [Enabled]
 ASPM                                 [Disabled]
 L1 Substates                         [L1.1 & L1.2]
 Gen3 Eq Phase3 Method                [Hardware]
 Gen4 Eq Phase3 Method                [Hardware]
 ACS                                  [Enabled]
 PTM                                  [Disabled]
 DPC                                  [Enabled]
 FOM Scoreboard Control Policy        [Auto]
 Multi-VC                             [Disabled]
 EDPC                                 [Enabled]
   URR                                [Disabled]
   FER                                [Disabled]
   NFER                               [Disabled]         →←: Select Screen
   CER                                [Disabled]         ↓↑: Select Item
   CTO                                [Disabled]         Enter: Select
   SEFE                               [Disabled]         +/-: Change Opt.
   SENFE                              [Disabled]         F1: General Help
   SECE                               [Disabled]         F2: Previous Values
   PME SCI                            [Enabled]          F3: Optimized Defaults
   Hot Plug                           [Disabled]
   Advanced Error Reporting           [Enabled]          F4: Save & Reset
 PCIe Speed                           [Auto]             ESC: Exit
 Enable ClockReq Messaging            [Enabled]
   Transmitter Half Swing             [Disabled]
 Detect Timeout                       0
 P2P Support                          [Disabled]
 CPU PCIE Func0 Link Disable          [Disabled]

 SA PCIe LTR Congguration
 LTR                                  [Enabled]
   Snoop Latency Override             [Auto]
   Non Snoop Latency Override         [Auto]
   Force LTR Override                 [Disabled]
 LTR Lock                             [Disabled]

 CPU PCIe Gen3 HWEQ Config
 UPTP                                 7
 DPTP                                 7
 CPU PCIe Gen4 HWEQ Config
 UPTP                                 7
 DPTP                                 5
 CPU PCIe Gen5 HWEQ Config
 UPTP                                 5
 DPTP                                 7

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```

BIOS entry	Options
PCI Express® Root Port 2	Enabled / Disabled
Connection Type	Slot / Built-in
PCI Express® Clock Gating	Enabled / Disabled
PCI Express® Power Gating	Enabled / Disabled
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
Gen3 Eq Phase3 Method	Hardware / Static Coeff.
Gen4 Eq Phase3 Method	Hardware / Static Coeff.
ACS	Enabled / Disabled
PTM	Disabled / Enabled
DPC	Enabled / Disabled
FOM Scoreboard Control Policy	Auto / Gen3 / Gen4 / Gen3 / Gen4
Multi-VC	Disabled / Enabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
CTO	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Enabled / Disabled
Hot Plug	Disabled / Enabled
Advanced Error Reporting	Disabled / Enabled
PCIe® Speed	Auto / Gen1 / Gen2 / Gen3 / Gen4
Enable ClockReq Messaging	Enabled / Disabled
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
P2P Support	Disabled / Enabled
CPU PCIE Func0 Link Disable	Disabled / Enabled
SA 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
CPU PCIe® Gen3 HWEQ Config	
UPTP	None
DPTP	None
CPU PCIe® Gen4 HWEQ Config	
UPTP	None
DPTP	None
CPU PCIe® Gen5 HWEQ Config	
UPTP	None
DPTP	None

9.4.1.2.3 PCI™ RPort 3 (disabled on BeaCon)

```
                Aptio Setup - AMI
                     Chipset

PCI Express Root Port 3                [Enabled]          Control the PCI Express Root
Connection Type                        [Slot]             Port.
PCI Express Clock Gating               [Enabled]
PCI Express Power Gating               [Enabled]
ASPM                                   [Disabled]
L1 Substates                           [L1.1 & L1.2]
Gen3 Eq Phase3 Method                  [Hardware]
Gen4 Eq Phase3 Method                  [Hardware]
ACS                                    [Enabled]
PTM                                    [Disabled]
DPC                                    [Enabled]
FOM Scoreboard Control Policy          [Auto]
Multi-VC                               [Disabled]
EDPC                                   [Enabled]
  URR                                  [Disabled]
  FER                                  [Disabled]
  NFER                                 [Disabled]         →←: Select Screen
  CER                                  [Disabled]         ↓↑: Select Item
  CTO                                  [Disabled]         Enter: Select
  SEFE                                 [Disabled]         +/-: Change Opt.
  SENFE                                [Disabled]         F1: General Help
  SECE                                 [Disabled]         F2: Previous Values
  PME SCI                              [Enabled]          F3: Optimized Defaults
  Hot Plug                             [Disabled]         F4: Save & Reset
  Advanced Error Reporting             [Enabled]          ESC: Exit
PCIe Speed                             [Auto]
Enable ClockReq Messaging              [Enabled]
  Transmitter Half Swing               [Disabled]
Detect Timeout                         0
P2P Support                            [Disabled]
CPU PCIE Func0 Link Disable            [Disabled]

SA PCIe LTR Congguration
LTR                                    [Enabled]
  Snoop Latency Override               [Auto]
  Non Snoop Latency Override           [Auto]
  Force LTR Override                   [Disabled]

LTR Lock                               [Disabled]

CPU PCIe Gen3 HWEQ Config
UPTP                                   5
DPTP                                   7

CPU PCIe Gen4 HWEQ Config
UPTP                                   8
DPTP                                   9

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```

BIOS entry	Options
PCI Express® Root Port 3	Enabled / Disabled
Connection Type	Slot / Built-in
PCI Express® Clock Gating	Enabled / Disabled
PCI Express® Power Gating	Enabled / Disabled
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
Gen3 Eq Phase3 Method	Hardware / Static Coeff.
Gen4 Eq Phase3 Method	Hardware / Static Coeff.
ACS	Enabled / Disabled
PTM	Enabled / Disabled
DPC	Enabled / Disabled
FOM Scoreboard Control Policy	Auto / Gen3 / Gen4 / Gen3 / Gen4
Multi-VC	Disabled / Enabled
EDPC	Enabled / Disabled
URR	Disabled / Enabled
FER	Disabled / Enabled
NFER	Disabled / Enabled
CER	Disabled / Enabled
CTO	Disabled / Enabled
SEFE	Disabled / Enabled
SENFE	Disabled / Enabled
SECE	Disabled / Enabled
PME SCI	Enabled / Disabled
Advanced Error Reporting	Disabled / Enabled
PCIe® Speed	Auto / Gen1 / Gen2 / Gen3 / Gen4
Enable ClockReq Messaging	Enabled / Disabled
Transmitter Half Swing	Disabled / Enabled
Detect Timeout	None
P2P Support	Disabled / Enabled
CPU PCIE Func0 Link Disable	Disabled / Enabled
SA 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
CPU PCIe® Gen3 HWEQ Config	
UPTP	None
DPTP	None
CPU PCIe® Gen4 HWEQ Config	
UPTP	None
DPTP	None

9.4.2 PCH-IO Configuration

```
                Aptio Setup - AMI
                     Chipset

  PCH-IO Configuration                                  PCI Express Configuration
                                                        settings
▶ PCI Express Configuration
▶ SATA Configuration
▶ USB Configuration
▶ HD Audio Configuration

  Foxville I225 LAN Controller          [Disabled]
  State After G3                        [S0 State]
  Legacy IO Low Latency                 [Disabled]
  Enable TCO Timer                      [Disabled]

                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Reset
                                                        ESC: Exit

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```

BIOS entry	Options
PCH-IO Configuration	
▶ PCI Express® Configuration	Submenu: PCI Express Configuration [▶ 68]
▶ SATA Configuration	Submenu: SATA Configuration [▶ 75]
▶ USB Configuration	Submenu: USB Configuration [▶ 77]
▶ HD Audio Configuration	Submenu: HD Audio Configuration [▶ 78]
Foxville I225 LAN Controller	Disabled / Enabled
State After G3	S0 State / S5 State
Legacy IO Low Latency	Disabled / Enabled
Enable TCO Timer	Disabled / Enabled

9.4.2.1 PCI Express Configuration

```
                Aptio Setup - AMI
                     Chipset

  PCI Express Configuration                                  The Control of Active State
                                                             Power Management of the DMI
  DMI Link ASPM Control                [Disabled]            Link.
  Compliance Test Mode                 [Disabled]
  PCH PCIE Clock Gating                [Disabled]
  PCH PCIE Power Gating                [Disabled]

▶ PCI Express Root Port 1
▶ PCI Express Root Port 2
  PCIe RP 3 (disabled on BeaCon)       Lane configured as
                                       USB/SATA/UFS
  PCI RP 4 (disabled on BeaCon)        Lane configured as
                                       USB/SATA/UFS          →←: Select Screen
  PCI Express Root Port 5              Not present in this SKU ↓↑: Select Item
  PCI Express Root Port 6              Not present in this SKU  Enter: Select
▶ PCIe RP 7 (disabled on BeaCon)                              +/—: Change Opt.
  PCI Express Root Port 8              Not present in this SKU F1: General Help
▶ PCIe RP 9 (disabled on BeaCon)                              F2: Previous Values
▶ PCIe RP 10 (disabled on BeaCon)                             F3: Optimized Defaults
▶ PCI Express Root Port 11                                    F4: Save & Reset
▶ PCIe RP 12 (disabled on BeaCon)                             ESC: Exit

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```

BIOS entry	Options
PCI Express® Configuration	
DMI Link ASPM Control	Disabled / L0s / L1 / L0sL1 / Auto
Compliance Test Mode	Disabled / Enabled
PCH PCIE Clock Gating	Disabled / Enabled
PCH PCIE Power Gating	Disabled / Enabled
▶ PCI Express® Root Port 1	Submenu: PCI Express® Root Port 1 [▶ 69]
▶ PCI Express® Root Port 2	Submenu:PCI Express® Root Port 2 [▶ 71]
PCI Express® Root Port 3 (disabled on BeaCon)	None
PCI Express® Root Port 4 (disabled on BeaCon)	None
PCI Express® Root Port 5	None
PCI Express® Root Port 6	None
▶ PCIe® RP 7 (disabled on BeaCon)	None
PCI Express® Root Port 8	None
▶ PCIe® RP 9 (disabled on BeaCon)	None
▶ PCIe® RP 10 (disabled on BeaCon)	None
▶ PCI Express® Root Port 11	Submenu: PCI Express® Root Port 11 [▶ 73]
▶ PCIe® RP 12 (disabled on BeaCon)	None

9.4.2.1.1 PCI Express® Root Port 1

```
                Aptio Setup - AMI
                     Chipset

 PCI Express Root Port 1              [Enabled]          Control the PCI Express Root
 Connection Type                      [Slot]             Port.
 ASPM                                 [Disabled]
 L1 Substates                         [L1.1]& L1.2]
 L1 Low                               [Enabled]
 ACS                                  [Enabled]
 PTM                                  [Disabled]
 DPC                                  [Enabled]
 EDPC                                 [Enabled]
   URR                                [Disabled]
   FER                                [Disabled]
   NFER                               [Disabled]         →←: Select Screen
   CER                                [Disabled]         ↓↑: Select Item
   SEFE                               [Disabled]         Enter: Select
   SENFE                              [Disabled]         +/—: Change Opt.
   SECE                               [Disabled]         F1: General Help
   PME SCI                            [Enabled]          F2: Previous Values
   Hot Plug                           [Disabled]         F3: Optimized Defaults
   Advanced Error Reporting           [Enabled]          F4: Save & Reset
 PCIe Speed                           [Auto]             ESC: Exit
   Transmitter Half Swing             [Disabled]
 Detect Timeout                       0
 Extra Bus Reserved                   0
 Reserved Memory                      10
 Reserved I/O                         4

 PCH PCIe LTR Configuration
 LTR                                  [Enabled]
   Snoop Latency Override             [Auto]
   Non Snoop Latency Override         [Auto]
   Force LTR Override                 [Disabled]

 LTR Lock                             [Disabled]

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```

BIOS entry	Options
PCI Express® Root Port 1	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
L1 Low	Enabled / Disabled
ACS	Enabled / Disabled
PTM	Disabled / Enabled
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	Enabled / Disabled
Hot Plug	Disabled / Enabled
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

9.4.2.1.2 PCI Express® Root Port 2

```
                Aptio Setup - AMI
                     Chipset

 PCI Express Root Port 2              [Enabled]          Control the PCI Express Root
 Connection Type                      [Slot]             Port.
 ASPM                                 [Disabled]
 L1 Substates                         [L1.1]& L1.2]
 L1 Low                               [Enabled]
 ACS                                  [Enabled]
 PTM                                  [Disabled]
 DPC                                  [Enabled]
 EDPC                                 [Enabled]
   URR                                [Disabled]
   FER                                [Disabled]
   NFER                               [Disabled]         →←: Select Screen
   CER                                [Disabled]         ↓↑: Select Item
   SEFE                               [Disabled]         Enter: Select
   SENFE                              [Disabled]         +/—: Change Opt.
   SECE                               [Disabled]         F1: General Help
   PME SCI                            [Enabled]          F2: Previous Values
   Hot Plug                           [Disabled]         F3: Optimized Defaults
   Advanced Error Reporting           [Enabled]          F4: Save & Reset
 PCIe Speed                           [Auto]             ESC: Exit
   Transmitter Half Swing             [Disabled]
 Detect Timeout                       0
 Extra Bus Reserved                   0
 Reserved Memory                      10
 Reserved I/O                         4

 PCH PCIe LTR Configuration
 LTR                                  [Enabled]
   Snoop Latency Override             [Auto]
   Non Snoop Latency Override         [Auto]

 LTR Lock                             [Disabled]
 Peer Memory Write Enable             [Disabled]

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```

BIOS entry	Options
PCI Express® Root Port 1	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
L1 Low	Enabled / Disabled
ACS	Enabled / Disabled
PTM	Disabled / Enabled
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	Enabled / Disabled
Hot Plug	Disabled / Enabled
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
LTR Lock	Disabled / Enabled
Peer Memory Write Enable	Disabled / Enabled

9.4.2.1.3 PCI Express® Root Port 11

```
                Aptio Setup - AMI
                     Chipset

 PCI Express Root Port 11            [Enabled]          Control the PCI Express Root
 Connection Type                     [Slot]             Port.
 ASPM                                [Disabled]
 L1 Substates                        [L1.1]& L1.2]
 L1 Low                              [Enabled]
 ACS                                 [Enabled]
 PTM                                 [Disabled]
 DPC                                 [Enabled]
 EDPC                                [Enabled]
   URR                               [Disabled]
   FER                               [Disabled]
   NFER                              [Disabled]         →←: Select Screen
   CER                               [Disabled]         ↓↑: Select Item
   SEFE                              [Disabled]         Enter: Select
   SENFE                             [Disabled]         +/—: Change Opt.
   SECE                              [Disabled]         F1: General Help
   PME SCI                           [Enabled]          F2: Previous Values
   Hot Plug                          [Disabled]         F3: Optimized Defaults
   Advanced Error Reporting          [Enabled]          F4: Save & Reset
 PCIe Speed                          [Auto]             ESC: Exit
   Transmitter Half Swing            [Disabled]
 Detect Timeout                      0
 Extra Bus Reserved                  0
 Reserved Memory                     10
 Reserved I/O                        4

 PCH PCIe LTR Configuration
 LTR                                 [Enabled]
   Snoop Latency Override            [Auto]
   Non Snoop Latency Override        [Auto]

 LTR Lock                            [Disabled]
 Peer Memory Write Enable            [Disabled]

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```

BIOS entry	Options
PCI Express® Root Port 11	Enabled / Disabled
Connection Type	Slot / Built-in
ASPM	Disabled / Enabled
L1 Substates	L1.1 & L1.2 / L1.1 / Disabled
L1 Low	Enabled / Disabled
ACS	Enabled / Disabled
PTM	Disabled / Enabled
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	Enabled / Disabled
Hot Plug	Disabled / Enabled
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
LTR Lock	Disabled / Enabled
Peer Memory Write Enable	Disabled / Enabled

9.4.2.2 SATA Configuration

```
                Aptio Setup — AMI
                     Chipset

SATA Configuration                                      ▲ Enable/Disable SATA Device.

SATA Controller(s)                    [Enabled]
SATA Ports Multipler Mode             [Disabled]
Aggressive LPM Support                [Enabled]

Serial ATA Port 0                     Empty
  Software Preserve                   Unknown
  Port 0                              [Enabled]           →←: Select Screen
  Hot Plug                            [Disabled]          ↑↓: Select Item
  Configured As eSATA                 Hot Plug Supported  Enter: Select
  External                            [Disabled]          +/—: Change Opt.
  Spin Up Device                      [Disabled]          F1: General Help
  SATA Device Type                    [Hard Disk Drive]   F2: Previous Values
  Topology                            [Unknown]           F3: Optimized Defaults
  SATA Port 0 DevSlp                  [Disabled]          F4: Save & Reset
  DITO Configuration                  [Disabled]          ESC: Exit
  DITO Value                          625
  DM Value                            15
Serial ATA Port 1                     Empty
  Software Preserve                   Unknown
  Port 1                              [Enabled]
  Hot Plug                            [Disabled]
  Configured As eSATA                 Hot Plug Supported
  External                            [Disabled]
  Spin Up Device                      [Disabled]
  SATA Device Type                    [Hard Disk Drive]
  Topology                            [Unknown]
  SATA Port 1 DevSlp                  [Enabled]
  DITO Configuration                  [Disabled]
  DITO Value                          625
  DM Value                            15

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```

BIOS entry	Options
SATA Configuration	
SATA Controller(s)	Enabled / Disabled
SATA ports multiple mode	Disabled / Enabled
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
DITO Configuration	Disabled / Enabled
DITO Value	None
DM Value	None
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
DITO Value	None
DM Value	None

9.4.2.3 USB Configuration

```
                Aptio Setup - AMI
                     Chipset

  USB Configuration                                          Port Selection value in
                                                             decimal for Gen1; Default -
  USB3.1 Portx Speed Selection          0                    Gen2; Bit 0 corresponds to
                                                             Port 0 and so on
  USB SS Physical Connector #0          [Enabled]
  USB SS Physical Connector #1          [Enabled]
  USB SS Phys.Conn.#2 (to BeaCon)       [Disabled]
  USB SS Phys.Conn.#3 (to BeaCon)       [Disabled]           →←: Select Screen
  USB HS Physical Connector #0          [Enabled]            ^v: Select Item
  USB HS Physical Connector #1          [Enabled]            Enter: Select
  USB HS Physical Connector #2          [Enabled]            +/—: Change Opt.
  USB HS Phys.Conn.#3 (to BeaCon)       [Disabled]           F1: General Help
  USB HS Phys.Conn.#4 (to BeaCon)       [Disabled]           F2: Previous Values
  USB HS Phys.Conn.#5 (to BeaCon)       [Disabled]           F3: Optimized Defaults
  USB HS Phys.Conn.#6 (to BeaCon)       [Disabled]           F4: Save & Reset
  USB HS Physical Connector #7          [Enabled]            ESC: Exit
  USB HS Physical Connector #8          [Disabled]
  USB HS Physical Connector #9          [Enabled]

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```

BIOS entry	Options
USB Configuration	
USB3.1 Portx Speed Selection	none
USB SS Physical Connector #0	Enabled / Disabled
USB SS Physical Connector #1	Enabled / Disabled
USB SS Phys.Conn.#2 (to BeaCon)	Disabled / Enabled
USB SS Phys.Conn.#3 (to BeaCon)	Disabled/ Enabled
USB HS Physical Connector #0	Enabled/Disabled
USB HS Physical Connector #1	Enabled/Disabled
USB HS Physical Connector #2	Enabled/Disabled
USB HS Phys.Conn.#3 (to BeaCon)	Disabled / Enabled
USB HS Phys.Conn.#4 (to BeaCon)	Disabled / Enabled
USB HS Phys.Conn.#5 (to BeaCon)	Disabled / Enabled
USB HS Phys.Conn.#6 (to BeaCon)	Disabled / Enabled
USB HS Physical Connector #7	Enabled/Disabled
USB HS Physical Connector #8	Disabled / Enabled
USB HS Physical Connector #9	Enabled/Disabled

9.4.2.4 HD Audio Configuration

```
                Aptio Setup - AMI
                     Chipset

  HD Audio Subsystem Configuration Settings                  Control Detection of the
                                                             HD-Audio device.
  HD Audio                              [Enabled]            Disabled = HDA will be
   Audio DSP                            [Enabled]            unconditionally disabled
   Audio DSP Compliance Mode            [Non-UAA (IntelSST)] Enabled = HDA will be
    HDA Link                            [Enabled]            unconditionally enabled.
    DMIC #0                             [Disabled]
    DMIC #1                             [Disabled]
    SSP #0                              [Disabled]
    SSP #1                              [Disabled]
    SSP #2                              [Disabled]           →←: Select Screen
    SSP #3                              [Disabled]           ↑↓: Select Item
    SSP #4                              [Disabled]           Enter: Select
    SSP #5                              [Disabled]           +/-: Change Opt.
    SNDW #0                             [Disabled]           F1: General Help
    SNDW #1                             [Disabled]           F2: Previous Values
    SNDW #2                             [Disabled]           F3: Optimized Defaults
    SNDW #3                             [Disabled]           F4: Save & Reset
▶ HD Audio Advanced Configuration                            ESC: Exit
▶ HD Audio DSP Features Configuration
  HD Audio Bus Controller subsystem     [727080869]
  ID
  Virtual Channel Type                  [VC0]
 HDA Codec ALC245 Configuration         [No Dmic to Codec]

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```

BIOS entry	Options
HD Audio Subsystem Configuration Settings	
HD Audio	Enabled / Disabled
Audio DSP	Enabled / Disabled
Audio DSP Compliance Mode	Non-UAA (Intel® SST) / UAA (HDA Inbox/Intel® SST)
HDA Link	Enabled / Disabled
DMIC #0	Disabled / Enabled
DMIC #1	Disabled / Enabled
SSP #0	Disabled / Enabled
SSP #1	Disabled / Enabled
SSP #2	Disabled / Enabled
SSP #3	Disabled / Enabled
SSP #4	Disabled / Enabled
SSP #5	Disabled / Enabled
SNDW #0	Disabled / Enabled
SNDW #1	Disabled / Enabled
SNDW #2	Disabled / Enabled
SNDW #3	Disabled / Enabled
▶ HD Audio Advanced Configuration	Submenu: HD Audio Advanced Configuration [▶ 79]
▶ HD Audio DSP Features Configuration	Submenu: HD Audio DSP Features Configuration [▶ 80]
HD Audio Bus Controller subsystem	72708086
ID	
Virtual Channel Type	VCO
HDA Codec ALC245 Configuration	No Dmic to Codec

9.4.2.4.1 HD Audio Advanced Configuration

```
                Aptio Setup - AMI
                     Chipset

 HD Audio Subsystem Advanced Configuration Settings

 iDisplay Audio Disconnect            [Disabled]
 Codec Sx Wake Capability             [Disabled]
 PME Enable                           [Disabled]
 Statically Switchable BCLK Clock
 Frequency Configuration
  HD Audio Link Frequency             [24 MHz]
  iDisplay Audio Link Frequency       [96 MHz]
  iDisplay Audio Link T—Mode          [8T Mode]
 Autonomous Clock Stop SNDW #0        [Disabled]
 Autonomous Clock Stop SNDW #1        [Disabled]
 Autonomous Clock Stop SNDW #2        [Disabled]
 Autonomous Clock Stop SNDW #3        [Disabled]
 Data On Active Interval Select       [11 clock periods]
 SNDW #0
 Data On Active Interval Select       [11 clock periods]
 SNDW #1
 Data On Active Interval Select       [11 clock periods]
 SNDW #2
 Data On Active Interval Select       [11 clock periods]
 SNDW #3
 Data On Delay Select SNDW #0         [3 clock periods]
 Data On Delay Select SNDW #1         [3 clock periods]
 Data On Delay Select SNDW #2         [3 clock periods]
 Data On Delay Select SNDW #3         [3 clock periods]

Disconnects SDI2 signal to
hide/disable iDisplay Audio
Codec.

→←: Select Screen
↑↓: Select Item
Enter: Select
+/—: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Reset
ESC: Exit

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```

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 #0	Disabled / Enabled
Autonomous Clock Stop SNDW #1	Disabled / Enabled
Autonomous Clock Stop SNDW #2	Disabled / Enabled
Autonomous Clock Stop SNDW #3	Disabled / Enabled
Data On Active Interval Select SNDW #0	11 clock periods
Data On Active Interval Select SNDW #1	11 clock periods
Data On Active Interval Select SNDW #2	11 clock periods
Data On Active Interval Select SNDW #3	11 clock periods
Data On Delay Select SNDW #0	2 / 3 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

9.4.2.4.2 HD Audio DSP Features Configuration

```
                Aptio Setup — AMI
                     Chipset

 HD Audio Subsystem Features Configuration (ACPI)

 Audio DSP NHLT Endpoints
 Configuration:
  Dmic Mono 38.4MHZ                    [Disabled]
  Dmic Stereo 38.4MHZ                  [Disabled]
  Dmic Quad 38.4MHZ                    [Disabled]
  Dmic Mono 24MHZ                      [Disabled]
  Dmic Stereo 24 MHZ                   [Disabled]
  Dmic Quad24MHZ                       [Disabled]
  Bluetooth 38.4MHZ                    [Enabled]
  Bluetooth 24MHZ                      [Disabled]
  I2S ALC274 38.4MHZ                   [Disabled]
  I2S ALC274 24MHZ                     [Disabled]
  LontiumI2S0                          [Disabled]
  LontiumI2S2                          [Disabled]
  EVEREST8316                          [Disabled]
  I2S Codec Select                     [Disabled]
  I2S Codec Bus Number                 [I2C0 Controller]

 Audio DSP Feature Support:
  WoV (Wake on Voice)                  [Enabled]
  Bluetooth Sideband                   [Enabled]
  BT Intel HFP                         [Enabled]
  BT Intel A2DP                        [Enabled]
  BT Intel Low Energy                  [Disabled]
  Codec based VAD                      [Disabled]
  DSP based Speech                     [Disabled]
  Pre-Processing Disabled
  Voice Activity Detection             [Windows 10 Voice
                                       Activation]

 Audio DSP Pre/Post-Processing
 Module Support:
  Waves Post-process                   [Disabled]
  DTS                                  [Disabled]
  IntelSST Speech                      [Disabled]
  Dolby                                [Disabled]
  Waves Pre-process                    [Disabled]
  Audyssey                             [Disabled]
  Maxim Smart AMP                      [Disabled]
  ForteMedia SAMSoft                   [Disabled]
  Sound Research IP                    [Disabled]
  Conexant Pre-Process                 [Disabled]
  Conexant Smart Amp                   [Disabled]
  Realtek Post-Process                 [Disabled]
  Realtek Smart Amp                    [Disabled]
  Icepower IP MFX sub module           [Disabled]
  Icepower IP EFX sub module           [Disabled]
  Icepower IP SFX sub module           [Disabled]
  Voice Preprocessing                  [Disabled]
  Acoustic Context Awareness (ACA)     [Disabled]
  Custom Module 'Alpha'                [Disabled]
  Custom Module 'Beta'                 [Disabled]
  Custom Module 'Gamma'                [Disabled]

 Enables/Disables DSP Feature.
 Bitmark structure:
 [BIT0] - WoV
 [BIT1] - BT Sideband
 [BIT2] - Codec based VAD
 [BIT5] - BT Intel HFP
 [BIT6] - BT Intel A2DP
 [BIT7] - DSP based speech
 pre-processing disabled (for
 Intel WoV mode)
 [BIT8] - WoV Mode: Intel WoV /

 →←: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/—: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Reset
 ESC: Exit

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```

BIOS entry	Options
HD Audio Subsystem Features Configuration (ACPI)	
Audio DSP NHLT Endpoints Configuration:	
Dmic Mono 38.4MHz	Disabled/ Enabled
Dmic Stereo 38.4 MHz	Disabled/ Enabled
Dmic Quad 38.4 MHz	Disabled/ Enabled
Dmic Mono 24 MHz	Disabled/ Enabled
Dmic Stereo 24 MHz	Disabled/ Enabled
Dmic Quad 24 MHz	Disabled/ Enabled
Bluetooth® 38.4 MHz	Enabled / Disabled
Bluetooth® 24 MHz	Disabled/ Enabled
I2S Alc274 38.4 MHz	Disabled/ Enabled
I2S Alc274 24 MHz	Disabled/ Enabled
LONTIUMI2S0	Disabled/ Enabled
LONTIUMI2S2	Disabled/ Enabled
EVEREST8316	Disabled/ Enabled
I2S Codec Select	Disabled/ Enabled
I2S Codec Bus Number	I2C0 Controller
Audio DSP Feature Support:	
WoV (Wake on Voice)	Enabled / Disabled
Bluetooth® Sideband	Enabled / Disabled
BT Intel® HFP	Enabled / Disabled
BT Intel® A2DP	Enabled / Disabled
BT Intel® Low Energy	Disabled / Enabled
Codec based VAD	Disabled / Enabled
DSP based Speech	Disabled / Enabled
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
Intel® SST 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

BIOS entry	Options
Voice Preprocessing	Disabled / Enabled
Acoustic Context Awareness (ACA)	Disabled / Enabled
Custom Module 'Alpha'	Disabled / Enabled
Custom Module 'Beta'	Disabled / Enabled
Custom Module 'Gamma'	Disabled / Enabled

9.5 Security

```
                Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

  Password Description                                    Set Administrator Password

  Minimum length                        3
  Maximum length                        20

  Administrator Password


▶ Secure Boot                                             →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/—: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Reset
                                                          ESC: Exit

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```

BIOS entry	Options
Password Description	
Minimum Length	None
Maximum Length	None
Administrator Password	Set an administrator password here.
Secure Boot menu	Submenu: Secure Boot [▶ 84]

9.5.1 Secure Boot

```
                Aptio Setup - AMI
                          Security

  System Mode                          User                    Secure Boot feature is Active
                                                               if Secure Boot is Enabled,
  Secure Boot                          [Disabled]              Platform Key(PK) is enrolled
                                       Not Active              and the System is in User mode.
                                                               The mode change requires
  Secure Boot Mode                     [Custom]                platform reset
▶ Restore Factory Keys
▶ Reset To Setup Mode

▶ Key Management
                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/—: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Reset
                                                               ESC: Exit

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```

BIOS entry	Options
System Mode	None
Secure Boot	Disabled / Enabled
Secure Boot Mode	Standard / Custom
▶ Restore Factory Keys	Press enter key
▶ Reset To Setup Mode	Press enter key
▶ Key Management	Submenu: Key Management [▶ 85]

9.5.1.1 Restore factory keys

```
                Aptio Setup - AMI
                          Security
 System Mode                          Setup                  Force System to User Mode.
                                                             Install factory default Secure
 Secure Boot                          [Disabled]             Boot key databases
                                      Not Active

 Secure Boot Mode                     [Custom]
▶ Restore Factory Keys
▶ Reset To Setup Mode

▶ Key Management            ──────── Install factory defaults ────────
                            Press 'Yes' to proceed 'No' to cancel
                            ──────────────────────────────────────────
                                   Yes                  No
                                                                 elect Screen
                                                                 elect Item
                                                                 : Select
                                                                 Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Reset
                                                             ESC: Exit

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```

BIOS entry	Options
Secure Boot	Disabled / Enabled
▶ Restore Factory Keys	Press enter key
▶ Reset To Setup Mode	Press enter key
▶ Key Management	Press enter key

Also see about this

- Restore factory keys [▶ 85]
- Key Management [▶ 85]

9.5.1.2 Key Management

```
                Aptio Setup - AMI
                          Security
 Vendor Keys                          Valid                  Install factory default Secure
                                                             Boot keys after the platform
 Factory Key Provision                [Enabled]              reset and while the System is
▶ Restore Factory Keys                                       in Setup mode
▶ Reset To Setup Mode
▶ Enroll Efi Image
▶ Export Secure Boot variables

 Secure Boot variable  | Size | Keys | Key Source
▶ Platform Key(PK)     |    0 |    0 | No Keys        →←: Select Screen
▶ Key Exchange Keys    |    0 |    0 | No Keys        ↑↓: Select Item
▶ Authorized Signatures|    0 |    0 | No Keys        Enter: Select
▶ Forbidden  Signatures|    0 |    0 | No Keys        +/—: Change Opt.
▶ Authorized TimeStamps|    0 |    0 | No Keys        F1: General Help
▶ OsRecovery Signatures|    0 |    0 | No Keys        F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Reset
                                                      ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
Factory Key Provision	Enabled / Disabled
▶ Restore Factory Keys	Submenu: Restore factory keys [▶ 87]
▶ Reset To Setup Mode	Press enter key
▶ Enroll Efi Image	Submenu: Enroll Efi Image [▶ 87]
▶ Export Secure Boot variables	Press enter key
Secure Boot variables	
▶ Platform Key(PK)	Submenu: Platform Key (PK) [▶ 88]
▶ Key Exchange Keys	Submenu: Key Exchange Keys [▶ 88]
▶ Authorized Signatures	Submenu: Authorized Signatures [▶ 89]
▶ Forbidden Signatures	Submenu: Forbidden Signatures [▶ 89]
▶ Authorized TimeStamps	Submenu: Authorized TimeStamps [▶ 90]
▶ OS Recovery Signatures	Submenu: OsRecovery Signatures [▶ 90]

9.5.1.2.1 Restore factory keys

```
                Aptio Setup - AMI
                          Security
┌──────────────────────────────────────────────────────────────────┬──────────────────────────────────┐
│  Vendor Keys                          Valid                      │Force System to User Mode.        │
│                                                                  │Install factory default Secure    │
│  Factory Key Provision                [Enabled]                  │Boot key databases                │
│▶ Restore Factory Keys                                            │                                  │
│▶ Reset To Setup Mode                                             │                                  │
│▶ Enroll Efi Image                                                │                                  │
│▶ Export Secure Boot variables                                    │                                  │
│                                                                  │                                  │
│  Secure Boot variable       │ Size│ Keys│ Key Source             │                                  │
│▶ Platform Key          (PK) │──────── Install factory defaults ──────────┐                        │
│▶ Key Exchange Keys    (KEK) │                                            │                        │
│▶ Authorized Signatures (db) │ Press 'Yes' to proceed 'No' to cancel      │                        │
│▶ Forbidden  Signatures(dbx) │                                            │                        │
│▶ Authorized TimeStamps(dbt) │────────────────────────────────────────────│                        │
│▶ OsRecovery Signatures(dbr) │        Yes                    No           │                        │
│                                                                  │                                  │
│                                                                  │F1: General Help                  │
│                                                                  │F2: Previous Values               │
│                                                                  │F3: Optimized Defaults            │
│                                                                  │F4: Save & Reset                  │
│                                                                  │ESC: Exit                         │
└──────────────────────────────────────────────────────────────────┴──────────────────────────────────┘
                Version 2.22.1293 Copyright (C) 2025 AMI
```

BIOS entry	Options
Vendor Keys	None
▶ Restore Factory Keys	See box

9.5.1.2.2 Enroll Efi Image

```
                Aptio Setup - AMI
                          Security
┌──────────────────────────────────────────────────────────────────┬──────────────────────────────────┐
│  Vendor Keys                          Valid                      │Allow Efi image to run in         │
│                                                                  │Secure Boot mode.                 │
│  Factory Key Provision                [Enabled]                  │Enroll SHA256 Hash certificate    │
│▶ Restore Factory Keys                                            │of a PE image into Authorized     │
│▶ Reset To Setup Mode                                             │Signature Database (db)           │
│▶ Enroll Efi Image                                                │                                  │
│▶ Export Secure Boot variables                                    │                                  │
│                                                                  │                                  │
│  Secure Boot variable       │ Size│ Keys│ Key Source             │                                  │
│▶ Platform Key          (PK) │──────── File System ──────────┐                                      │
│▶ Key Exchange Keys    (KEK) │                                   │                                  │
│▶ Authorized  Signatures(db) │ No Valid File System Available    │                                  │
│▶ Forbidden  Signatures(dbX) │                                   │                                  │
│▶ Authorized TimeStamps(dbt) │───────────────────────────────────│                                  │
│▶ OSRecovery Signatures(dbr) │                Ok                 │                                  │
│                                                                  │                                  │
│                                                                  │ : Select Screen                  │
│                                                                  │ : Select Item                    │
│                                                                  │ ter: Select                      │
│                                                                  │ —: Change Opt.                   │
│                                                                  │F1: General Help                  │
│                                                                  │F2: Previous Values               │
│                                                                  │F3: Optimized Defaults            │
│                                                                  │F4: Save & Reset                  │
│                                                                  │ESC: Exit                         │
└──────────────────────────────────────────────────────────────────┴──────────────────────────────────┘
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```

BIOS entry	Options
Vendor Keys	None
Enroll Efi Image	See box

9.5.1.2.3 Platform Key (PK)

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid

  Factory Key Provision                [Enabled]
▶ Restore Factory Keys
▶ Reset To Setup Mode
▶ Enroll Efi Image
▶ Export Secure Boot variables

  Secure Boot variable          | Size| Keys| Key Source
▶ Platform Key             (PK)
▶ Key Exchange Keys       (KEK)
▶ Authorized Signatures    (db)
▶ Forbidden  Signatures   (dbx)
▶ Authorized TimeStamps   (dbt)
▶ OsRecovery Signatures   (dbr)

                                 Platform Key(PK)
                                 Update

                                 0|     0| No Keys

Enroll Factory Defaults or
load certificates from a file:
 1.Public Key Certificate:
  a)EFI_SIGNATURE_LIST
  b)EFI_CERT_X509 (DER)
  c)EFI_CERT_RSA2048 (bin)
  d)EFI_CERT_SHAXXX

 2.Authenticated UEFI Variable
 3.EFI PE/COFF Image(SHA256)
Key Source:
 Factory,Modified,Mixed

→←: Select Screen
↑↓: Select Item
Enter: Select
+/—: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Reset
ESC: Exit

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```

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

9.5.1.2.4 Key Exchange Keys

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid

  Factory Key Provision                [Enabled]
▶ Restore Factory Keys
▶ Reset To Setup Mode
▶ Enroll Efi Image
▶ Export Secure Boot variables

  Secure Boot variable
▶ Platform Key             (PK)
▶ Key Exchange Keys       (KEK)
▶ Authorized Signatures    (db)
▶ Forbidden  Signatures   (dbx)
▶ Authorized TimeStamps   (dbt)
▶ OsRecovery Signatures   (dbr)

                                 Key Exchange Keys
                                 Update
                                 Append

                                 0|     0| No Keys

Enroll Factory Defaults or
load certificates from a file:
 1.Public Key Certificate:
  a)EFI_SIGNATURE_LIST
  b)EFI_CERT_X509 (DER)
  c)EFI_CERT_RSA2048 (bin)
  d)EFI_CERT_SHAXXX
 2.Authenticated UEFI Variable
 3.EFI PE/COFF Image(SHA256)
Key Source:
 Factory,Modified,Mixed

→←: Select Screen
↑↓: Select Item
Enter: Select
+/—: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Reset
ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
Key Exchange Keys	See box

9.5.1.2.5 Authorized Signatures

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid                    Enroll Factory Defaults or
                                                                load certificates from a file:
  Factory Key Provision                [Enabled]                 1.Public Key Certificate:
▶ Restore Factory Keys                                           a)EFI_SIGNATURE_LIST
▶ Reset To Setup Mode                                            b)EFI_CERT_X509 (DER)
▶ Enroll Efi Image                                               c)EFI_CERT_RSA2048 (bin)
▶ Export Secure Boot variables                                   d)EFI_CERT_SHAXXX
                                                                 2.Authenticated UEFI Variable
  Secure Boot variable                 Authorized Signatures (db)  3.EFI PE/COFF Image(SHA256)
▶ Platform Key              (PK)     ------------------------   Key Source:
▶ Key Exchange Keys        (KEK)     Update                      Factory,Modified,Mixed
▶ Authorized Signatures     (db)     Append
▶ Forbidden  Signatures    (dbx)
▶ Authorized TimeStamps    (dbt)      0|     0| No Keys         →←: Select Screen
▶ OsRecovery Signatures    (dbr)                                 ↑↓: Select Item
                                                                 Enter: Select
                                                                 +/—: Change Opt.
                                                                 F1: General Help
                                                                 F2: Previous Values
                                                                 F3: Optimized Defaults
                                                                 F4: Save & Reset
                                                                 ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
Authorized Signatures (db)	See box

9.5.1.2.6 Forbidden Signatures

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid                    Enroll Factory Defaults or
                                                                load certificates from a file:
  Factory Key Provision                [Enabled]                 1.Public Key Certificate:
▶ Restore Factory Keys                                           a)EFI_SIGNATURE_LIST
▶ Reset To Setup Mode                                            b)EFI_CERT_X509 (DER)
▶ Enroll Efi Image                                               c)EFI_CERT_RSA2048 (bin)
▶ Export Secure Boot variables                                   d)EFI_CERT_SHAXXX
                                                                 2.Authenticated UEFI Variable
  Secure Boot variable                 Forbidden Signatures (dbx)  3.EFI PE/COFF Image(SHA256)
▶ Platform Key              (PK)     ------------------------   Key Source:
▶ Key Exchange Keys        (KEK)     Update                      Factory,Modified,Mixed
▶ Authorized Signatures     (db)     Append
▶ Forbidden  Signatures    (dbx)
▶ Authorized TimeStamps    (dbt)      0|     0| No Keys         →←: Select Screen
▶ OsRecovery Signatures    (dbr)                                 ↑↓: Select Item
                                                                 Enter: Select
                                                                 +/—: Change Opt.
                                                                 F1: General Help
                                                                 F2: Previous Values
                                                                 F3: Optimized Defaults
                                                                 F4: Save & Reset
                                                                 ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
Key Exchange Keys	See box

9.5.1.2.7 Authorized TimeStamps

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid                    Enroll Factory Defaults or
                                                                load certificates from a file:
  Factory Key Provision                [Enabled]                 1.Public Key Certificate:
▶ Restore Factory Keys                                           a)EFI_SIGNATURE_LIST
▶ Reset To Setup Mode                                            b)EFI_CERT_X509 (DER)
▶ Enroll Efi Image                                               c)EFI_CERT_RSA2048 (bin)
▶ Export Secure Boot variables                                   d)EFI_CERT_SHAXXX
                                                                 2.Authenticated UEFI Variable
  Secure Boot variable                 Authorized TimeStamps (dbt)  3.EFI PE/COFF Image(SHA256)
▶ Platform Key              (PK)     ------------------------  Key Source:
▶ Key Exchange Keys        (KEK)     Update                     Factory,Modified,Mixed
▶ Authorized Signatures     (db)     Append
▶ Forbidden  Signatures    (dbx)
▶ Authorized TimeStamps    (dbt)      0|     0| No Keys        ---------------------------
▶ OsRecovery Signatures    (dbr)                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Reset
                                                                ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
Authorized TimeStamps (dbt)	See box

9.5.1.2.8 OsRecovery Signatures

```
                 Aptio Setup - AMI
                          Security

  Vendor Keys                          Valid                    Enroll Factory Defaults or
                                                                load certificates from a file:
  Factory Key Provision                [Enabled]                 1.Public Key Certificate:
▶ Restore Factory Keys                                           a)EFI_SIGNATURE_LIST
▶ Reset To Setup Mode                                            b)EFI_CERT_X509 (DER)
▶ Enroll Efi Image                                               c)EFI_CERT_RSA2048 (bin)
▶ Export Secure Boot variables                                   d)EFI_CERT_SHAXXX
                                                                 2.Authenticated UEFI Variable
  Secure Boot variable                 OsRecovery Signatures (dbr)  3.EFI PE/COFF Image(SHA256)
▶ Platform Key              (PK)     ------------------------  Key Source:
▶ Key Exchange Keys        (KEK)     Update                     Factory,Modified,Mixed
▶ Authorized Signatures     (db)     Append
▶ Forbidden  Signatures    (dbx)
▶ Authorized TimeStamps    (dbt)      0|     0| No Keys        ---------------------------
▶ OsRecovery Signatures    (dbr)                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Reset
                                                                ESC: Exit

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```

BIOS entry	Options
Vendor Keys	None
OsRecovery Signatures (dbr)	See box

9.6 Boot

```
                Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

   Boot Configuration                                      Number of seconds to wait for
   Setup Prompt Timeout                 1                  setup activation key.
   Bootup NumLock State                 [On]               65535(0xFFFF) means indefinite
   F7 Boot Menu                         [Enabled]          waiting
   Quiet Boot                           [Enabled]
   StartUpDelay for UEFI shell          5

   FIXED BOOT ORDER Priorities
   Boot Option #1                       [Service Stick]
   Boot Option #2                       [CFast]
   Boot Option #3                       [SSD]
   Boot Option #4                       [HDD]              →←: Select Screen
   Boot Option #5                       [CD/DVD]           ↑↓: Select Item
   Boot Option #6                       [USB Stick]        Enter: Select
   Boot Option #7                       [USB Floppy]       +/—: Change Opt.
   Boot Option #8                       [Hard Disk]        F1: General Help
   Boot Option #9                       [USB CD/DVD]       F2: Previous Values
   Boot Option #10                      [Network]          F3: Optimized Defaults
   Boot Option #11                      [USB Lan]          F4: Save & Reset
                                                           ESC: Exit
▶  Advanced Fixed Boot Order Parameters

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```

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 [▶ 92]

9.6.1 Advanced Fixed Boot Order Parameters

```
                Aptio Setup - AMI
                              Boot

  Min. CFast capacity (GB)            0                    Lower capacity limit for boot
  Max. CFast capacity (GB)            119                  group CFast in GB
  Min. SSD capacity (GB)              119
  Max. SSD capacity (GB)              481
  Min. HDD capacity (GB)              481
  Max. HDD capacity (GB)              8000000
  Max. USB Stick capacity (GB)        64

  UEFI BDS Boot Filter                [Enabled]
  Re-enable UEFI Disks                [Enabled]
                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Reset
                                                           ESC: Exit

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```

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

9.7 Save & Exit

```
                Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

  Save Changes and Reset                          Restore/Load Default values
  Discard Changes and Reset                       the changes.

  Restore Defaults

  Boot Override
  Launch EFI Shell from filesystem device

                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/—: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Reset
                                                  ESC: Exit

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```

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

9.8 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.

10 Mechanical drawings

Dimensional notation

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

10.1 PCB: Dimensions

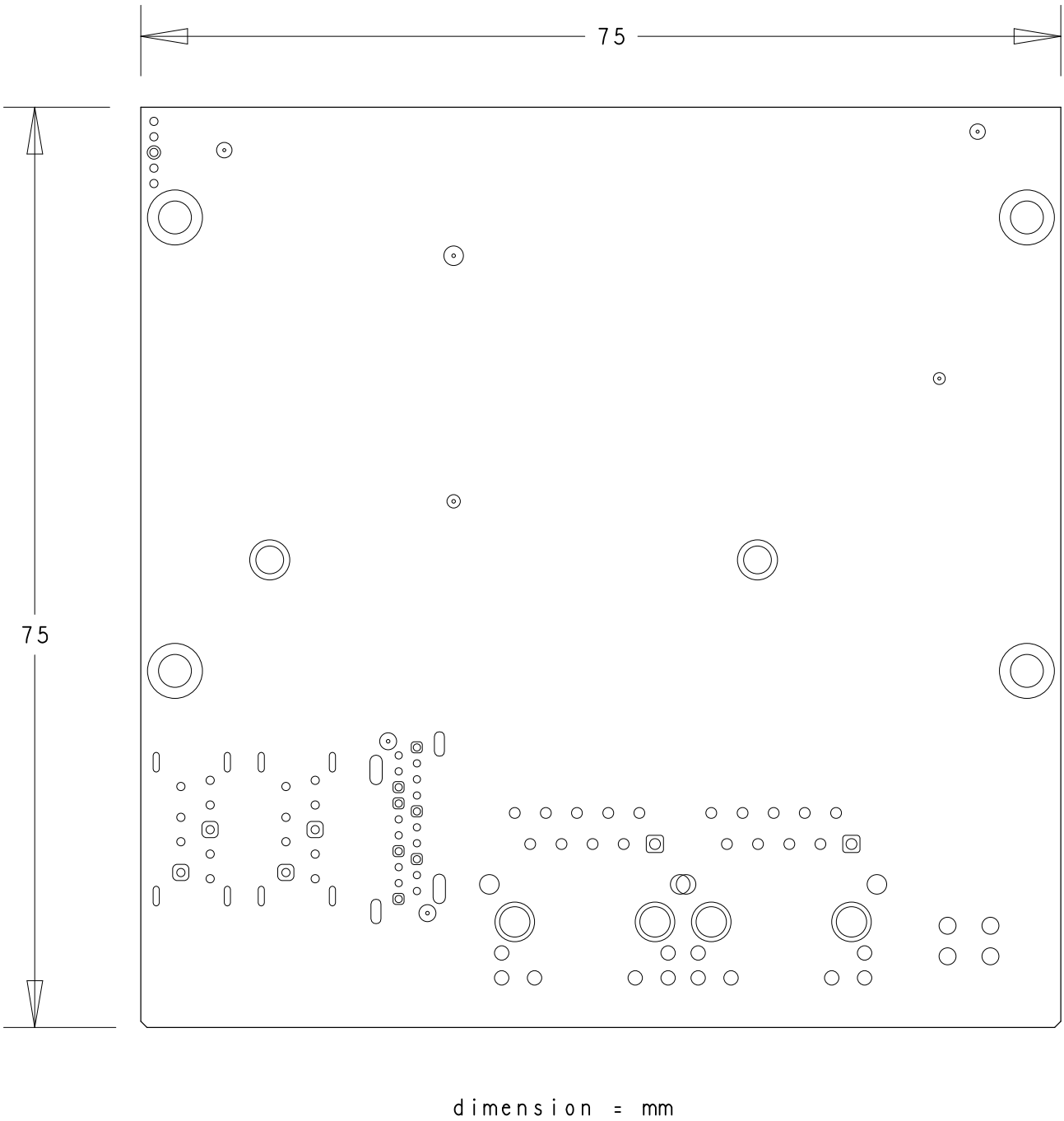
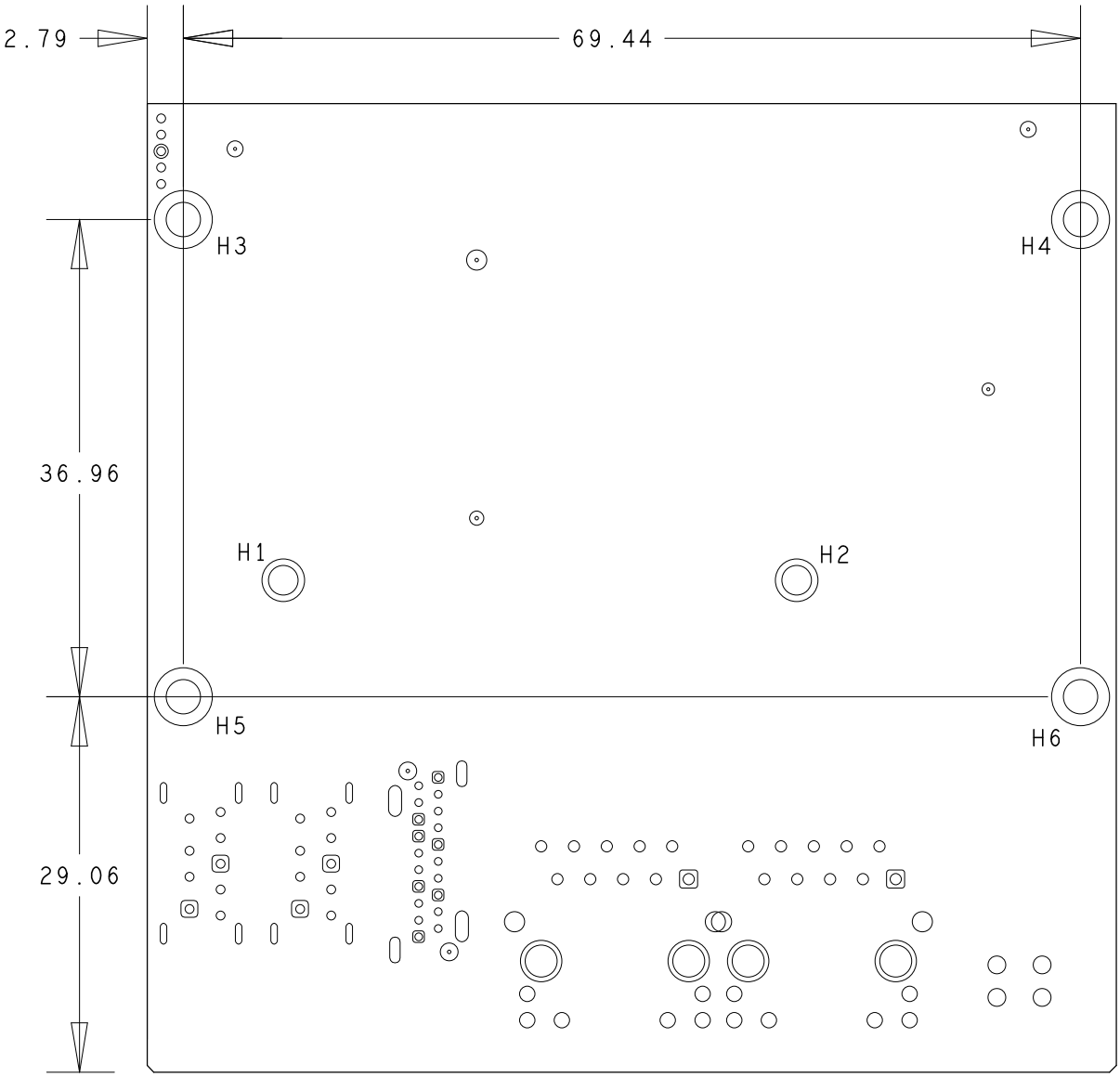


Fig. 15: CB6293 MZ

10.2 PCB: mounting holes



dimension mil[mm]

H1-H2: drill= 2.3mm
outer diameter= 3.8mm Top / 3.3mm Bottom

H3-H6: drill= 2.7mm
outer diameter= 4.5mm

Fig. 16: CB6293 MZ MH

11 Technical data

11.1 Electrical data

Power supply	
Board	24 VDC power supply (+20 % / - 15 %)
RTC	≥3 V
Power	
Transformer	30 W continuous load 50 W peak load
Current consumption	
RTC	≤ 10 µA

11.2 Environmental conditions

Temperature range	
Operating	0 °C to +60 °C (extended temperature range on request)
Storage	-25 °C ... +85 °C
Shipping	-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
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 to 58 Hz, 0.075 mm amplitude 58 to 500 Hz, 10 m/s²
Storage	5 to 9 Hz, 3.5 mm amplitude 9 to 500 Hz, 10 m/s²
Shipping	5 ... 9 Hz, 3.5 mm amplitude 9 ... 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 +60 °C (extended temperature range on request). In addition, care must be taken that the temperature of the processor die does not exceed 105 °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

Do not exceed maximum die temperature!

It is the end customer's responsibility to ensure that the die temperature of the processor does not exceed 105 °C! Continuous overheating can destroy the board!

If the temperature exceeds 105 °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 meaning of the POST Codes is explained in the document “Aptio™ 5.x Status Codes” from American Megatrends®, which is available on 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

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. 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

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.

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

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
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)

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