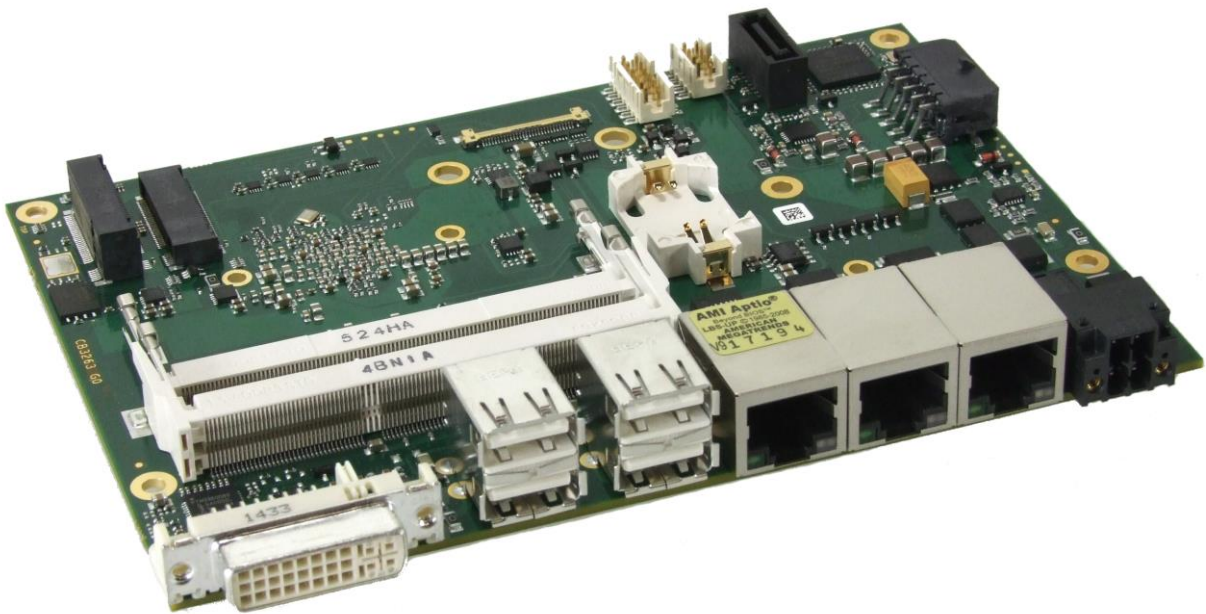


# ADLE3800HDC

## Manual

rev. 0.2





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Preliminary

## 0 Document History

Version	Changes
0.1	first pre-release
0.2	updated BIOS chapter

All company names, brand names, and product names referred to in this manual are registered or unregistered trademarks of their respective holders and are, as such, protected by national and international law.

# 1 Introduction

## 1.1 Important Notes

Please read this manual carefully before you begin installation of this hardware device. To avoid Electrostatic Discharge (ESD) or transient voltage damage to the board, adhere to the following rules at all times:

- You must discharge your body from electricity before touching this board.
- Tools you use must be discharged from electricity as well.
- Please ensure that neither the board you want to install, nor the unit on which you want to install this board, is energized before installation is completed.
- Please do not touch any devices or components on the board.

### **WARNING**

**As soon as the board is connected to a working power supply, touching the board may result in electrical shock, even if the board has not been switched on yet. Please also note that the mounting holes for heat sinks are connected to ground, so when using an externally AC powered device, a substantial ground plane differential can occur if the external device's AC power supply or cable does not include an earth ground. This could also result in electrical shock when touching the device and the heat sink simultaneously.**

## 1.2 Technical Support

Technical support for this product can be obtained in the following ways:

- By contacting our support staff at +1 858-490-0597 or +49 (0) 271 250 810 0
- By contacting our staff via e-mail at [support@adl-usa.com](mailto:support@adl-usa.com) or [support@adl-europe.com](mailto:support@adl-europe.com)
- Via our website at [www.adl-usa.com/support](http://www.adl-usa.com/support) or [www.adl-europe.com/support](http://www.adl-europe.com/support)

## 1.3 Warranty

This product is warranted to be free of defects in workmanship and material. ADL Embedded Solutions' sole obligation under this warranty is to provide replacement parts or repair services at no charge, except shipping cost. Such defects which appear within 12 months of original shipment of ADL Embedded Solutions will be covered, provided a written claim for service under warranty is received by ADL Embedded Solutions no less than 30 days prior to the end of the warranty period or within 30 days of discovery of the defect – whichever comes first. Warranty coverage is contingent upon proper handling and operation of the product. Improper use such as unauthorized modifications or repair, operation outside of specified ratings, or physical damage may void any service claims under warranty.

## 1.4 Return Authorization

All equipment returned to ADL Embedded Solutions for evaluation, repair, credit return, modification, or any other reason must be accompanied by a Return Material Authorization (RMA) number. ADL Embedded Solutions requires a completed RMA request form to be submitted in order to issue an RMA number. The form can be found under the Support section at our website: [www.adl-usa.com](http://www.adl-usa.com) or [www.adl-europe.com](http://www.adl-europe.com). Submit the completed form to [support@adl-usa.com](mailto:support@adl-usa.com) or fax to +1 858-490-0599 for the USA office, or to [rma@adl-europe.com](mailto:rma@adl-europe.com) or fax to +49 (0) 271 250 810 20 to request an RMA from the European office in Germany. Following a review of the information provided, ADL Embedded Solutions will issue an RMA number.

## 1.5 Description of Safety Symbols

The following safety symbols are used in this documentation. They are intended to alert the reader to the associated safety instructions.



**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



**NOTICE**

**NOTICE** is used to address practices not related to physical injury.

## 1.6 RoHS

The PCB and all components are RoHS compliant (RoHS = Restriction of Hazardous Substances Directive). The soldering process is lead free.

## 1.7 FCC Approval for Canada

FCC: Canadian Notice

This equipment does not exceed the Class A limits for radiated emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

## 1.8 FCC Approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



## 2 Overview

### 2.1 Features

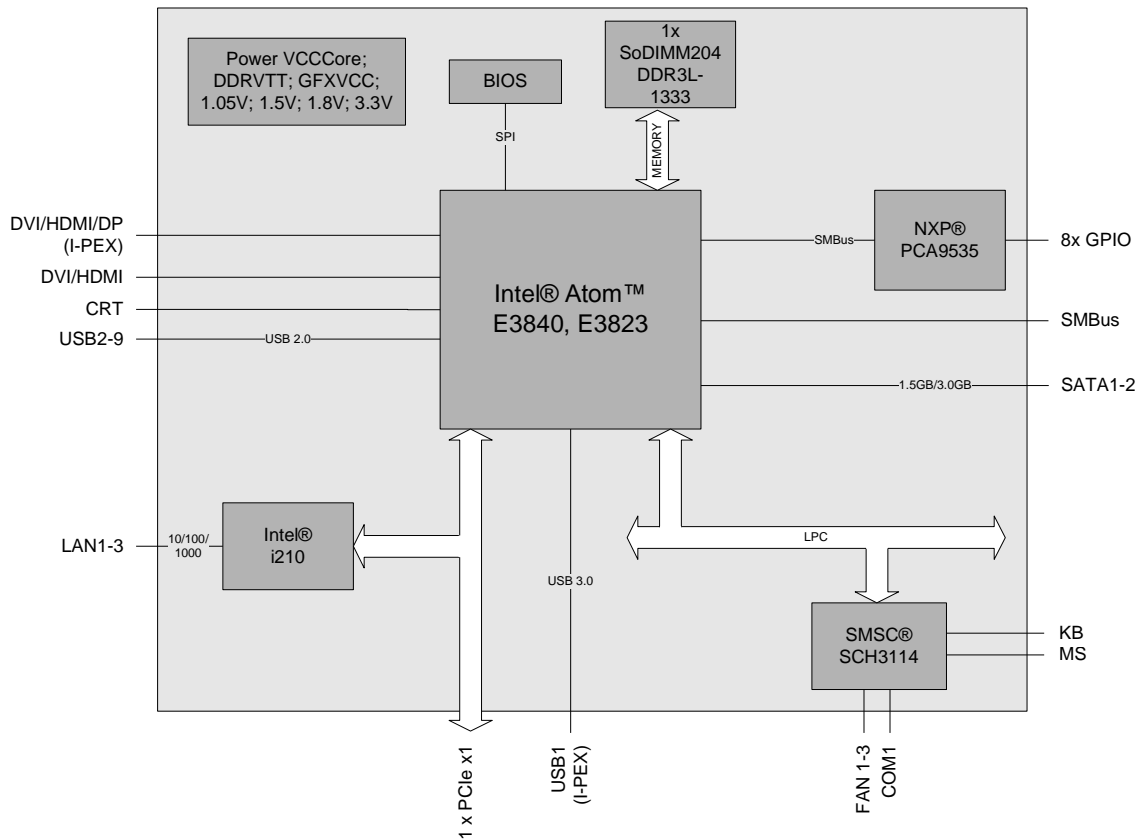
The ADLE3800HDC is a highly complex 3,5-inch board which incorporates complete motherboard functionality. It's based on a System-On-Chip (SoC) of Intel®'s Atom E3800 product family. Modern low voltage DDR3L technology provides top-notch memory performance, accomodating up to 16 GByte of RAM (DDR3L-1333) via SO-DIMM204.

The frontpanel provides standard interfaces, such as a DVI/HDMI/DisplayPort connector, 3 Gigabit LAN interfaces and 4 USB2.0 interfaces.

The ADLE3800HDC also provides internal interfaces, such as an 30pin I-PEX connector, which makes DVI/HDMI/DP signals and a USB3.0 interface available, a SATA connector and two M.2(B) sockets, which make PCI Express (1 x PCIe x1) and SATA signals available.

The power supply is realized via a 4pin connector. For connected peripherals, such as a display or a SSD, the ADLE3800HDC provides two additional power supplies via internal FCI connectors.

Input voltage is 24V.



## 2.2 Feature List

<b>ADLE3800HDC</b>	<b>3,5"-Board</b>
<b>CPU</b>	Atom™ E3845 (QC, 2M, 1.91 GHz), TDP 10W
	Atom™ E3827 (DC, 1M, 1.75 GHz), TDP 8W
	Atom™ E3826 (DC, 1M, 1.46 GHz), TDP 7W
	Atom™ E3825 (DC, 1M, 1.33 GHz), TDP 6W
	Atom™ E3815 (SC, 1M, 1.46 GHz), TDP 5W
<b>Memory</b>	Variants with Intel® Atom™ E3815 oder E3825: 1 socket with DDR3L @1066/1333MHz à 8GB Variants with Intel® Atom™ E3826, E3827 or E3845: 2 sockets, each with 1x DDR3L @ 1066/1333MHz à 8GB (up to 16GB total memory)
<b>I/O</b>	1 x SATA 2.0
	1 x I-PEX
	1 x M.2(B) Typ 2242 for SSD connection (SATA)
	1 x M.2(B) Typ 2280 for PCIe connection
	4 x USB 2.0
	3 x GBit-LAN, Intel® i210
	1 x DVI-I (DVI / HDMI / DP)
<b>Graphics</b>	HDMI / DVI: 1920 x 1200 (at 16:10), 1920 x 1600 (at 16:9)
	DP / eDP: 2560 x 1600 (at 16:10), 2560 x 1440 (at 16:9)
<b>RTC</b>	changeable horizontal onboard battery
<b>BIOS</b>	AMI® Aptio V
<b>Power Supply</b>	16V - 36V input voltage range
	Over- and undervoltage protection
	S-UPS connection
	Reverse voltage protection
	not galvanically isolated
<b>Format</b>	102 mm x 147 mm

## 2.3 Specifications and Documents

In making this manual and for further reading of technical documentation, the following documents, specifications and web-pages were used and are recommended.

- PCI specification  
Version 2.3 bzw. 3.0  
[www.pcisig.com](http://www.pcisig.com)
- PCI Express® Base specification  
Version 2.0  
[www.pcisig.com](http://www.pcisig.com)
- ACPI specification  
Version 3.0  
[www.acpi.info](http://www.acpi.info)
- ATA/ATAPI specification  
Version 7 Rev. 1  
[www.t13.org](http://www.t13.org)
- USB specifications  
[www.usb.org](http://www.usb.org)
- SM-Bus specification  
Version 2.0  
[www.smbus.org](http://www.smbus.org)
- Intel® Chip Description  
Intel® Atom™ Processor E3800 Product Family datasheet  
[www.intel.com](http://www.intel.com)
- Intel® Chip Description  
i210 Datasheet  
[www.intel.com](http://www.intel.com)
- SMSC® Chip Description  
SCH3114 Datasheet  
[www.smsc.com](http://www.smsc.com)  
(NDA required)
- American Megatrends®  
Aptio™ Text Setup Environment (TSE) User Manual  
[www.ami.com](http://www.ami.com)
- American Megatrends®  
Aptio™ 4.x Status Codes  
[www.ami.com](http://www.ami.com)

## 3 Detailed Description

### 3.1 Power Supply / UPS

The ADLE3800HDC needs an external power supply of 24V (will tolerate 20V-30V). This input is galvanically isolated from the board's internal circuitry. It is also used for charging any UPS device that may be present. This UPS device is either capacitor-based or connected externally as a Pb-battery pack. With a UPS installed and charged, the module can stay operational even when a power failure occurs. A capacitor-based UPS can keep the board alive only for a few seconds while a Pb-battery typically allows for several minutes of continued operation. The exact amount of time is hard to predict as it also depends on factors such as the UPS' charge level at the time of the power failure, CPU/chipset power consumption etc. Generally, a Pb-battery needs a much longer time to reach full charge level compared to a capacitor-based UPS.

### 3.2 SUPS

Optionally the ADLE3800HDC can be equipped with a plug-in SUPS, which can keep the board alive over a short period of time in case of power failure or voltage fluctuation. The exact amount of time is hard to predict as it also depends on factors such as the SUPS' capacitors and the boards' power consumption etc. The capacitors size is only limited by the required space.

### 3.3 CPU

The motherboard employs an Intel® Atom™ processor of the E3800 family, which is a system-on-chip (SoC) being optimized for low power consumption while at the same time providing state-of-the-art computing performance.

The processors include a second level cache of 512 KByte. They also offer many features known from the desktop range such as MMX2, serial number, loadable microcode etc.

The Atom™ CPU operates in an extended range of thermal conditions and therefore is capable for use in industrial systems.

### 3.4 Memory

The ADLE3800HDC is equipped with two SO-DIMM204 sockets for DDR3L-1333-RAM. For technical and mechanical reasons it is possible that particular memory modules cannot be employed. Please ask your distributor for recommended memory modules.

With currently available SO-DIMM204 modules a memory extension up to 16 GByte is possible - depending on the variants components. Product variants with Intel® Atom processors E3815 or E3825 provide only one memory socket. Therefore with those variants a memory extension is possible only up to 8 GByte.

If both memory sockets are in use, notice that you must use identical memory modules.

Please notice, that if only one memory socket shall be used, this one must be the memory socket U500 (which is the lower one).

### 3.5 M.2

M.2 is a PCIe based standard. With it's four PCI Express lanes and a SATA port it allows a great I/O flexibility. SSDs can reach a higher speed, which is no longer limited by the SATA interface. Therefore the M.2 standard enables the use of various PCBs and customized SATA/PCIe cards.

The ADLE3800HDC offers two M.2 sockets (both with keying B). The M.2-2280 socket provides PCI Express signals (1x PCIe x1), the M.2-2242 socket provides SATA signals and enables the connection of SSD cards.

#### **NOTICE**

**For optimal driver compatibility we recommend the use of a Microsoft® Windows® 8 operating system.**

## 4 Connectors

This section describes all the connectors found on the ADLE3800HDC.

### **NOTICE**

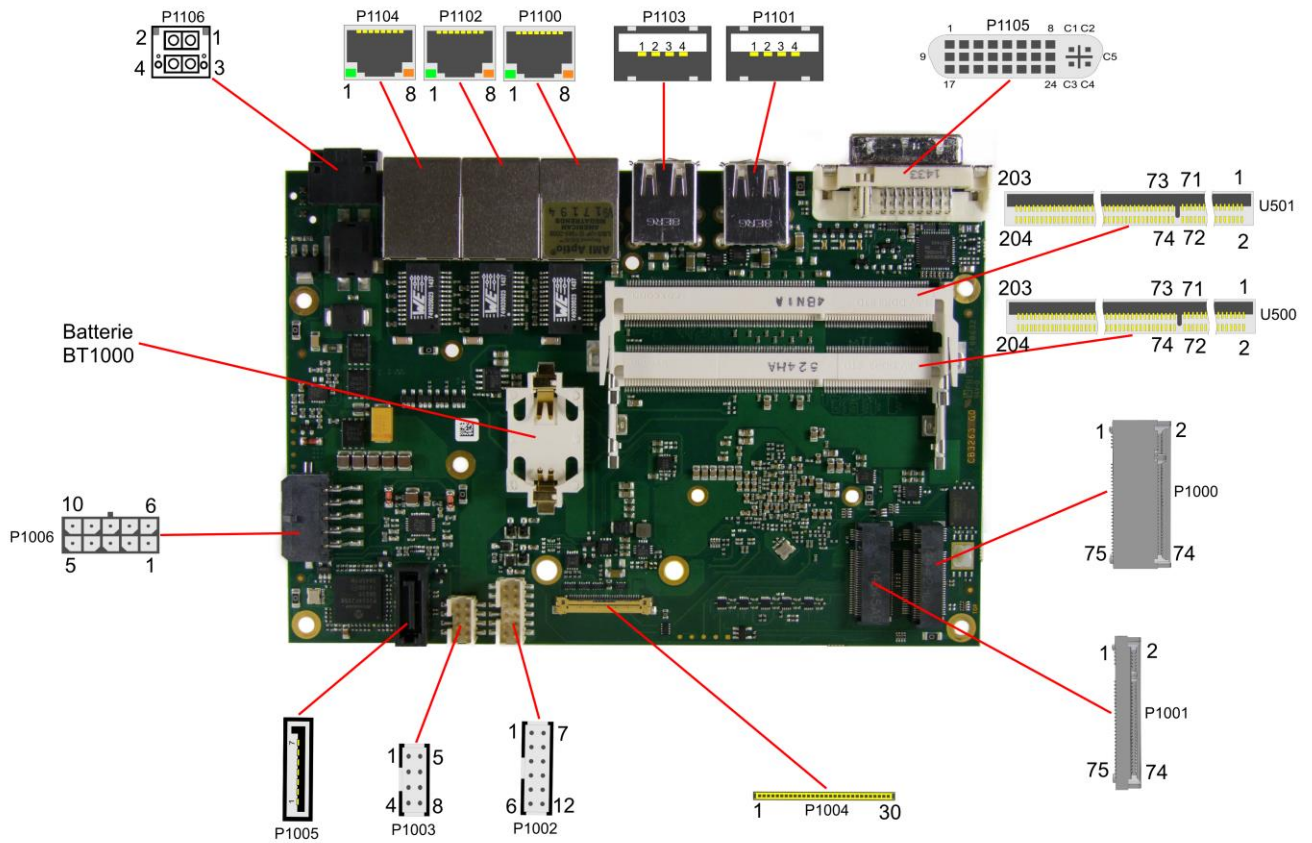
**Please consider the requirements on the cabling!**

For most interfaces, the cables must meet certain requirements. For instance, USB 2.0 requires twisted and shielded cables to reliably maintain full speed data rates. Restrictions on maximum cable length are also in place for many high speed interfaces and for power supply. Please refer to the respective specifications and use suitable cables at all times.

Preliminary

### 4.1 Connector Map

Please use the connector map below for quick reference. Only connectors on the component side are shown. For more information on each connector refer to the table below.



Ref.-No.	Function	Page
U500/501	"Memory"	p. 24
P1000	"M.2 2280 (Keying B)"	p. 27
P1001	"M.2 2242 (Keying B)"	p. 29
P1002	"Power Supply for Peripherals (I-PEX)"	p. 16
P1003	"Power Supply for Peripherals (SATA)"	p. 17
P1004	"DVI/HDMI/DisplayPort and USB3.0"	p. 31
P1005	"SATA Interface"	p. 33
P1006	"S-UPS"	p. 18
P1100/2/4	"LAN"	p. 23
P1101/3	"USB"	p. 22
P1105	"DVI / HDMI / VGA"	p. 20
P1106	"Mainboard Power Supply"	p. 15

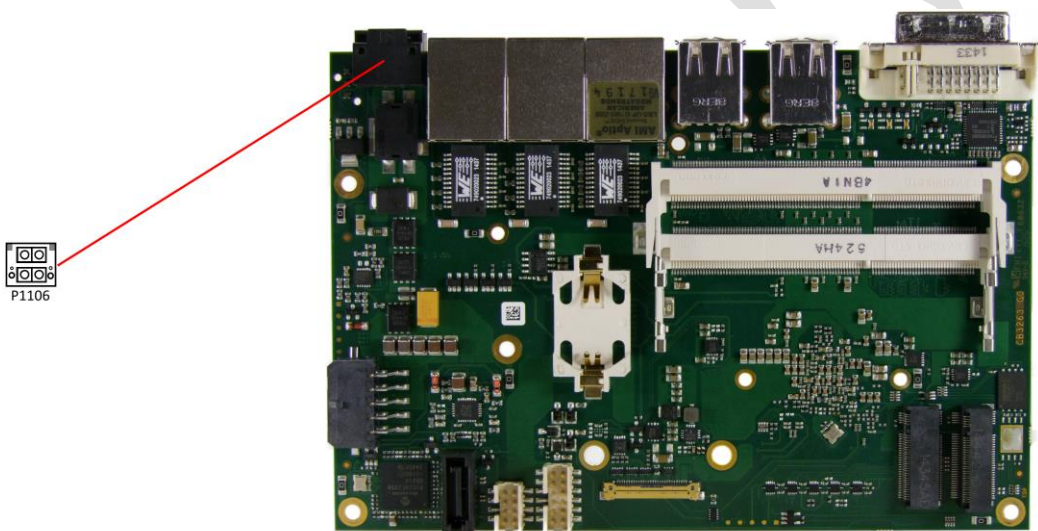
## 4.2 Power Supply

### 4.2.1 Mainboard Power Supply

The power supply of the ADLE3800HDC is realized via a 2x2pin connector (P20THR-1787014). The main 24V power lines are assigned to pin 3.

If a UPS is present you need to have a possibility to shut down the board in a regular way without activating the UPS, thereby preventing premature aging of UPS components. That's what pin 1 (PC\_START) is for. When pulled high (24V) a regular shutdown without UPS activity is triggered. As a part of this regular shutdown pin 2 (PC\_AKTIV) is pulled from 24V to 0V.

Manufacturer	Description	Mating Connector
Phoenix	P20THR-1787014	DFMC 1,5/ 2-ST-3,5-LR- 1790292



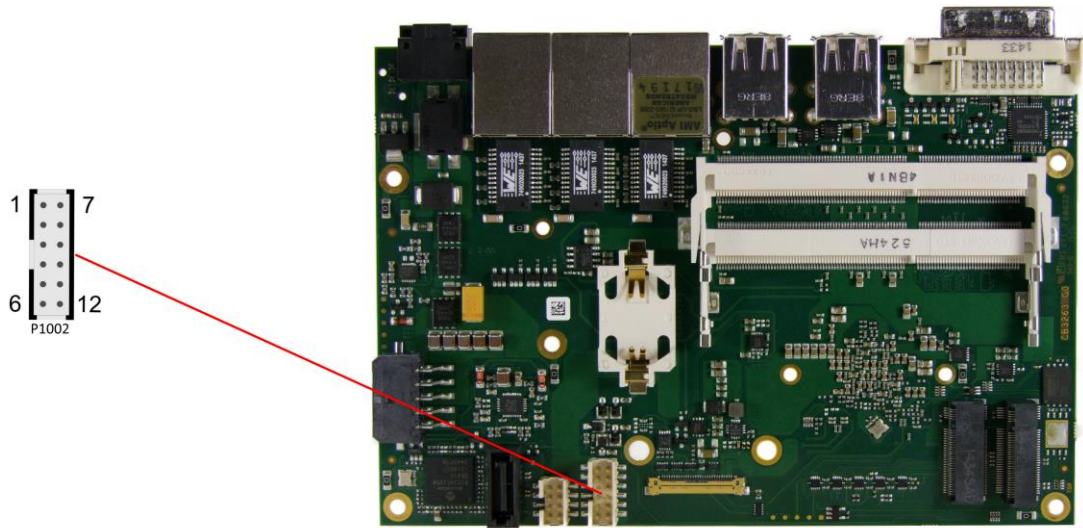
Description	Name	Pin	Name	Description
PC Start	PC_START	1	2	PC_AKTIV
Power Supply 24V	Vin	3	3	GND
				PC Status
				Ground

### 4.2.2 Power Supply for Peripherals (I-PEX)

The ADLE3800HDC has a 2x6pin connector, which provides the power supply for displays, which are connected via I-PEX.

Maximum current is 6 amperes for VCC combined (2A per contact), and also 6 amperes for 12V (2A per contact).

Manufacturer	Description	Mating Connector
FCI	FCI 98424-G52-12LF	FCI 90311-012LF



Pinout power connector 2x6:

Description	Name	Pin	Name	Description
power supply 5V	VCC	1	7	VCC
power supply 5V	VCC	2	8	GND
ground	GND	3	9	GND
ground	GND	4	10	GND
power supply 12V	12V	5	11	GND
power supply 12V	12V	6	12	12V

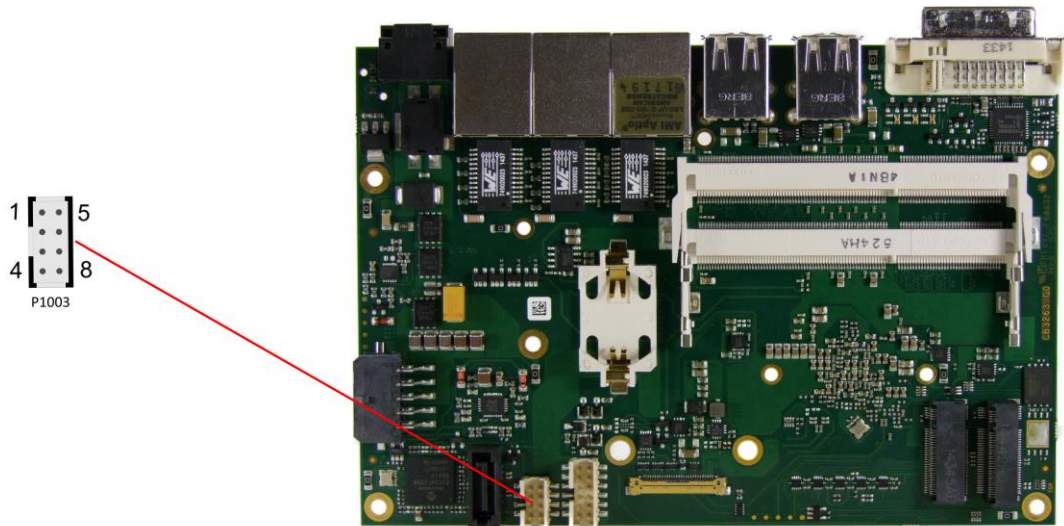


### 4.2.3 Power Supply for Peripherals (SATA)

The ADLE3800HDC has a 2x4pin connector, which provides the power supply for devices, which are connected via SATA.

Maximum current is 2 amperes for VCC combined (2A per contact), and also 2 amperes for 12V and 3,3V (2A per contact).

Manufacturer	Description	Mating Connector
FCI	98424-G52-08LF	90311-008LF



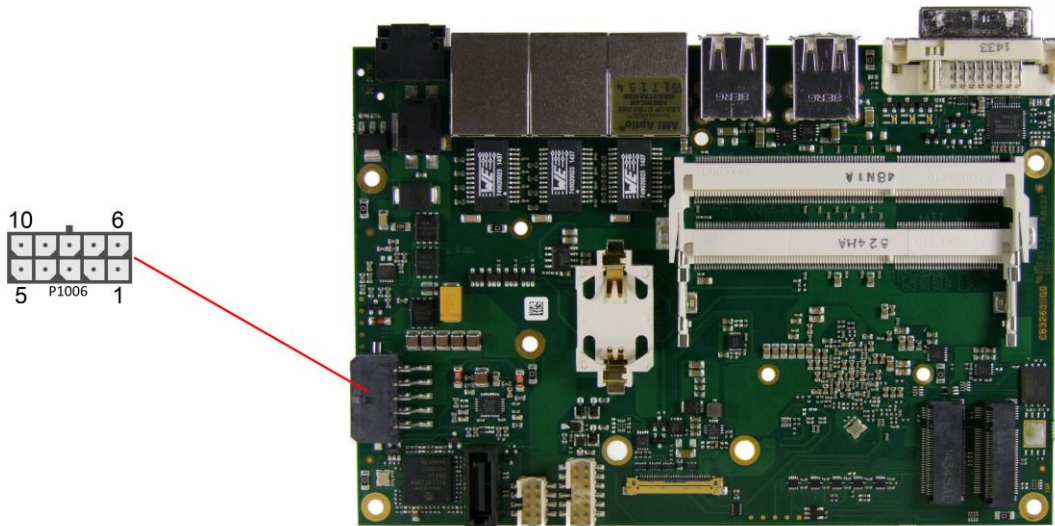
Pinout power connector 2x4:

Description	Name	Pin	Name	Description
battery (Input)	BATT_E	1	5	GND
power supply 3,3V	3,3V	2	6	GND
power supply	VCC	3	7	GND
power supply	12V	4	8	GND

### 4.2.4 S-UPS

A S-UPS module can be connected to the ADLE3800HDC via a 2x5pin connector. The S-UPS is able to maintain the power supply for the ADLE3800HDC for a few seconds, depending on the capacity and power consumption.

Manufacturer	Description	Mating Connector
Molex	43045-1009	Molex 43025-1009

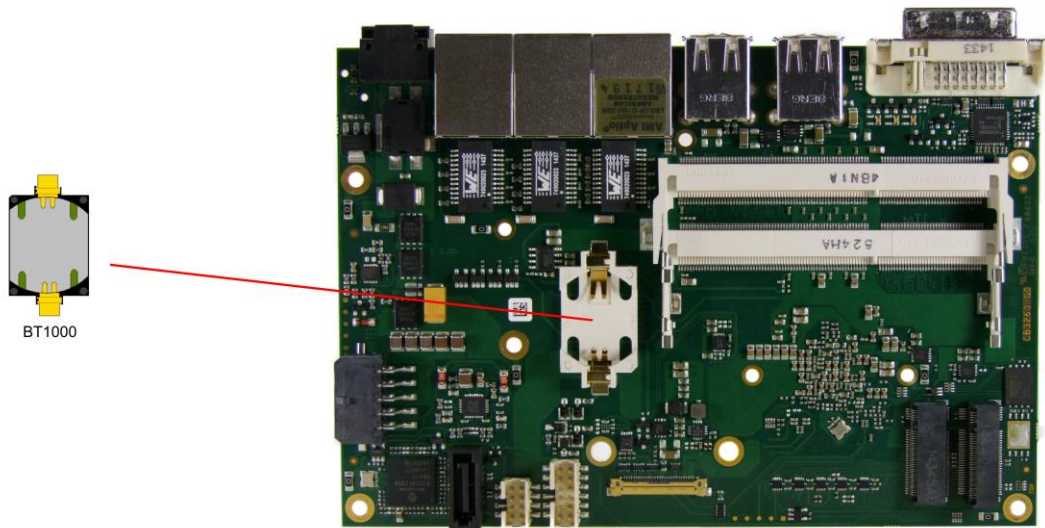


Pinout Molex 2x5:

Description	Name	Pin	Name	Description	
output voltage	Voutreg	1	6	Voutreg	output voltage
output voltage	Vout	2	7	Vout	output voltage
ground	GND	3	8	GND	ground
SUSV	SUSV	4	9	SMBALERT#	SMB alert
SMB data	SMB-DAT	5	10	SMB-CLK	SMB clock

### 4.2.5 External CMOS Battery

The board ships with a CR2032 battery holder (Renata VBH2032-1) and 3V battery.



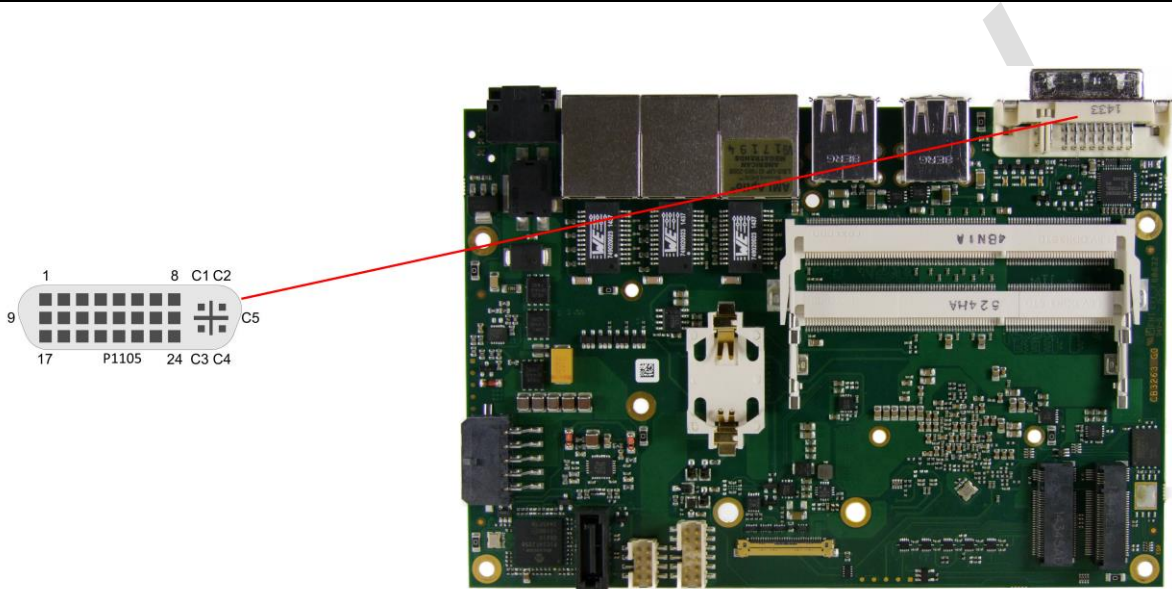
### 4.3 Front Panel Connectors

A range of standard connectors are available: You can connect displays, USB, LAN etc. The following connectors are located on the front-panel of the ADLE3800HDC.

#### 4.3.1 DVI / HDMI / VGA

The ADLE3800HDC is connected to an external display via a DVI-I connector, which supports analog and digital displays. A HDMI display can be connected.

Manufacturer	Description	Mating Connector
Molex	74320-9010	standard DVI connector



Pinout DVI-I:

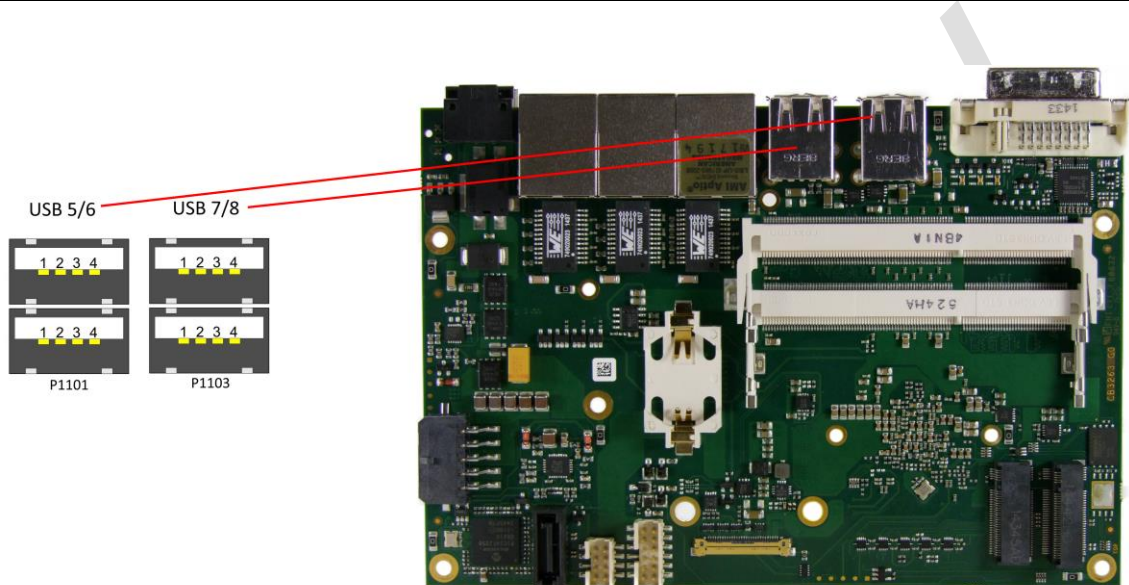
Pin	Name	Description
1	TMDSDAT2#	DVI data 2 -
2	TMDSDAT2	DVI data 2 +
3	GND	ground
4	N/C	reserved
5	N/C	reserved
6	DDC CLK	DDC clock (DVI/VGA)
7	DDC DAT	DDC data (DVI/VGA)
8	VSYNC	VGA vertical synchronization
9	TMDSDAT1#	DVI data 1 -
10	TMDSDAT1	DVI data 1 +
11	GND	ground
12	N/C	reserved
13	N/C	reserved
14	VCC	5 volt supply
15	GND	ground
16	HP_DETECT	hot plug detect
17	TMDSDAT0#	DVI data 0 -
18	TMDSDAT0	DVI data 0 +
19	GND	ground
20	N/C	reserved
21	N/C	reserved
22	GND	ground

Pin	Name	Description
23	TMDS CLK	DVI clock
24	TMDS CLK#	DVI clock
C1	C_RED	VGA red
C2	C_GREEN	VGA green
C3	C_BLUE	VGA blue
C4	C_HSYNC	VGA horizontal synchronization
C5	GND	ground

### 4.3.2 USB

USB channels 5 to 8 are provided via two standard USB connectors. The USB channels support USB 2.0. You may note that the setting of USB keyboard or USB mouse support in the BIOS-setup is only necessary and advisable, if the OS offers no USB-support. BIOS-setup can be changed with a USB keyboard without enabling USB keyboard support. Running Windows with these features enabled may lead to significant performance or functionality limitations. Every USB interface provides up to 500 mA current and is protected by an electronically resettable fuse. In ACPI state S5 via USB connected devices will not be energized.

Manufacturer	Description	Mating Connectors
Foxconn	UB11121C-8D1-4F	(standard connector)



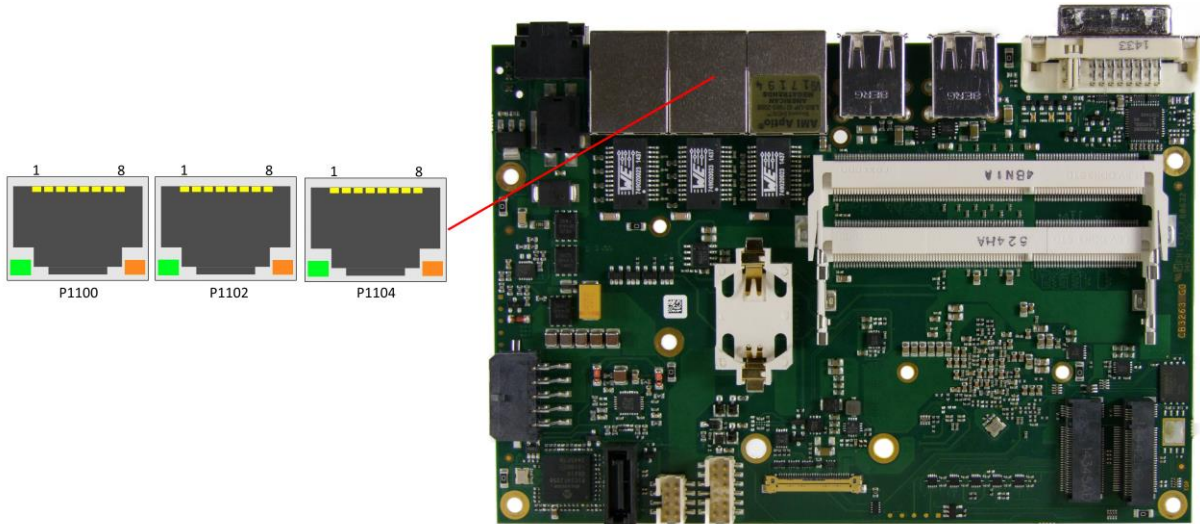
Pinout USB connector for channel X:

Pin	Name	Description
1	VCC	5 volt for USBX
2	USBX#	minus channel USBX
3	USBX	plus channel USBX
4	GND	ground

### 4.3.3 LAN

The module has three LAN interfaces of which all three support 10BaseT, 100BaseT, and 1000BaseT compatible net components with automatic bandwidth selection. Controller chip is Intel® i210. Auto-cross and auto-negotiate functionality is available as is PXE and WOL.

Manufacturer	Description	Mating Connector
Assmann	AMJ-188-0101-C5-GO-A	(standard connector)



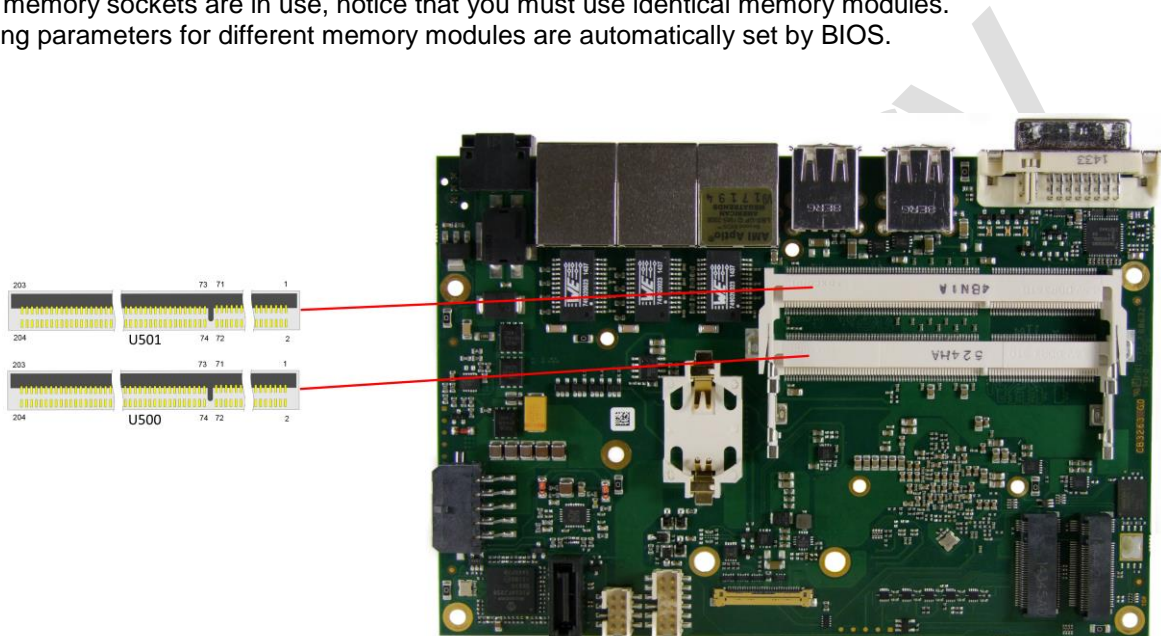
Pinout LAN 10/100/1000:

Pin	Name	Description
1	LAN-0	LAN channel 0 plus
2	LAN-0#	LAN channel 0 minus
3	LAN-1	LAN channel 1 plus
4	LAN-2	LAN channel 2 plus
5	LAN-2#	LAN channel 2 minus
6	LAN-1#	LAN channel 1 minus
7	LAN-3	LAN channel 3 plus
8	LAN-3#	LAN channel 3 minus

## 4.4 Internal Connectors

### 4.4.1 Memory

Conventional SO-DIMM204 memory modules, as familiar from notebook computers, are used to equip the board with memory. For technical and mechanical reasons it is possible that particular memory modules cannot be employed. Please ask your distributor for recommended memory modules. With currently available SO-DIMM204 modules a memory extension up to 16 GByte is possible (DDR3L-1333) - depending on the variants components. Product variants with Intel® Atom processors E3815 or E3825 provide only one memory socket. Therefore with those variants a memory extension is possible only up to 8 GByte. If both memory sockets are in use, notice that you must use identical memory modules. All timing parameters for different memory modules are automatically set by BIOS.



Pinout SO-DIMM204:

Description	Name	Pin	Name	Description
memory reference current	REF-DQ	1	2	GND
ground	GND	3	4	DQ4
data 0	DQ0	5	6	DQ5
data 1	DQ1	7	8	GND
ground	GND	9	10	DQS0#
data mask 0	DM0	11	12	DQS0
ground	GND	13	14	GND
data 2	DQ2	15	16	DQ6
data 3	DQ3	17	18	DQ7
ground	GND	19	20	GND
data 8	DQ8	21	22	DQ12
data 9	DQ9	23	24	DQ13
ground	GND	25	26	GND
data strobe 1 -	DQS1#	27	28	DM1
data strobe 1 +	DQS1	29	30	RESET#
ground	GND	31	32	GND
data 10	DQ10	33	34	DQ14
data 11	DQ11	35	36	DQ15
ground	GND	37	38	GND
data 16	DQ16	39	40	DQ20
data 17	DQ17	41	42	DQ21



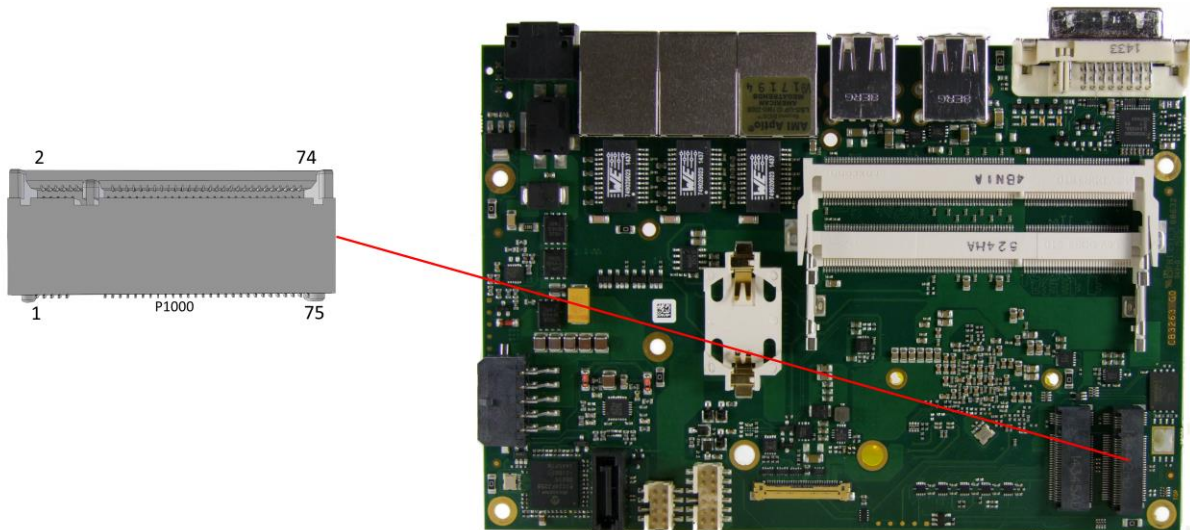
Description	Name	Pin		Name	Description
ground	GND	43	44	GND	ground
data strobe 2 -	DQS2#	45	46	DM2	data mask 2
data strobe 2 +	DQS2	47	48	GND	ground
ground	GND	49	50	DQ22	data 22
data 18	DQ18	51	52	DQ23	data 23
data 19	DQ19	53	54	GND	ground
ground	GND	55	56	DQ28	data 28
data 24	DQ24	57	58	DQ29	data 29
data 25	DQ25	59	60	GND	ground
ground	GND	61	62	DQS3#	data strobe 3 -
data mask 3	DQM3	63	64	DQS3	data strobe 3 +
ground	GND	65	66	GND	ground
data 26	DQ26	67	68	DQ30	data 30
data 27	DQ27	69	70	DQ31	data 31
ground	GND	71	72	GND	ground
clock enables 0	CKE0	73	74	CKE1	clock enables 1
1.5 volt supply	1.5V	75	76	1.5V	1.5 volt supply
reserved	N/C	77	78	(A15)	reserved
SDRAM bank 2	BA2	79	80	A14	address 14
1.5 volt supply	1.5V	81	82	1.5V	1.5 volt supply
address 12 (burst chop)	A12/BC#	83	84	A11	address 11
address 9	A9	85	86	A7	address 7
1.5 volt supply	1.5V	87	88	1.5V	1.5 volt supply
address 8	A8	89	90	A6	address 6
address 5	A5	91	92	A4	address 4
1.5 volt supply	1.5V	93	94	1.5V	1.5 volt supply
address 3	A3	95	96	A2	address 2
address 1	A1	97	98	A0	address 0
1.5 volt supply	1.5V	99	100	1.5V	1.5 volt supply
Clock 0 +	CK0	101	102	CK1	clock 1 +
Clock 0 -	CK0#	103	104	CK1#	clock 1 -
1.5 volt supply	1.5V	105	106	1.5V	1.5 volt supply
address 10 (auto precharge)	A10/AP	107	108	BA1	SDRAM bank 1
SDRAM Bank 0	BA0	109	110	RAS#	row address strobe
1.5 volt supply	1.5V	111	112	1.5V	1.5 volt supply
write enable	WE#	113	114	S0#	chip select 0
column address strobe	CAS#	115	116	ODT0	on die termination 0
1.5 volt supply	1.5V	117	118	1.5V	1.5 volt supply
address 13	A13	119	120	ODT1	on die termination 1
Chip Select 1	S1#	121	122	N/C	reserved
1.5 volt supply	1.5V	123	124	1.5V	1.5 volt supply
reserved	(TEST)	125	126	REF-CA	reference current
ground	GND	127	128	GND	ground
data 32	DQ32	129	130	DQ36	data 36
data 33	DQ33	131	132	DQ37	data 37
ground	GND	133	134	GND	ground
data strobe 4 -	DQS4#	135	136	DQM4	data mask 4
data strobe 4 +	DQS4	137	138	GND	ground
ground	GND	139	140	DQ38	data 38
data 34	DQ34	141	142	DQ39	data 39
data 35	DQ35	143	144	GND	ground
ground	GND	145	146	DQ44	data 44
data 40	DQ40	147	148	DQ45	data 45
data 41	DQ41	149	150	GND	ground
ground	GND	151	152	DQS5#	data strobe 5 -

Description	Name	Pin		Name	Description
data mask 5	DQM5	153	154	DQS5	data strobe 5 +
ground	GND	155	156	GND	ground
data 42	DQ42	157	158	DQ46	data 46
data 43	DQ43	159	160	DQ47	data 47
ground	GND	161	162	GND	ground
data 48	DQ48	163	164	DQ52	data 52
data 49	DQ49	165	166	DQ53	data 53
ground	GND	167	168	GND	ground
data strobe 6 -	DQS6#	169	170	DQM6	data mask 6
data strobe 6	DQS6	171	172	GND	ground
ground	GND	173	174	DQ54	data 54
data 50	DQ50	175	176	DQ55	data 55
data 51	DQ51	177	178	GND	ground
ground	GND	179	180	DQ60	data 60
data 56	DQ56	181	182	DQ61	data 61
data 57	DQ57	183	184	GND	ground
ground	GND	185	186	DQS7#	data strobe 7 -
data mask 7	DQM7	187	188	DQS7	data strobe 7 +
ground	GND	189	190	GND	ground
data 58	DQ58	191	192	DQ62	data 62
data 59	DQ59	193	194	DQ63	data 63
ground	GND	195	196	GND	ground
SPD address 0	SA0	197	198	EVENT#	Event
3.3 volt supply	3.3V	199	200	SDA	SMBus data
SPD address 1	SA1	201	202	SCL	SMBus clock
termination current	VTT	203	204	VTT	termination current

### 4.4.2 M.2 2280 (Keying B)

The ADLE3800HDC is equipped with an M.2 socket, in which M.2-2280 cards (keying B) can be inserted. The socket leads PCIe signals (1x PCIe x1) through. Adaptor cards with standard PCIe sockets are available, please contact your distributor.

Manufacturer	Description	Mating connector
FCI	10128796-004RLF	(card)



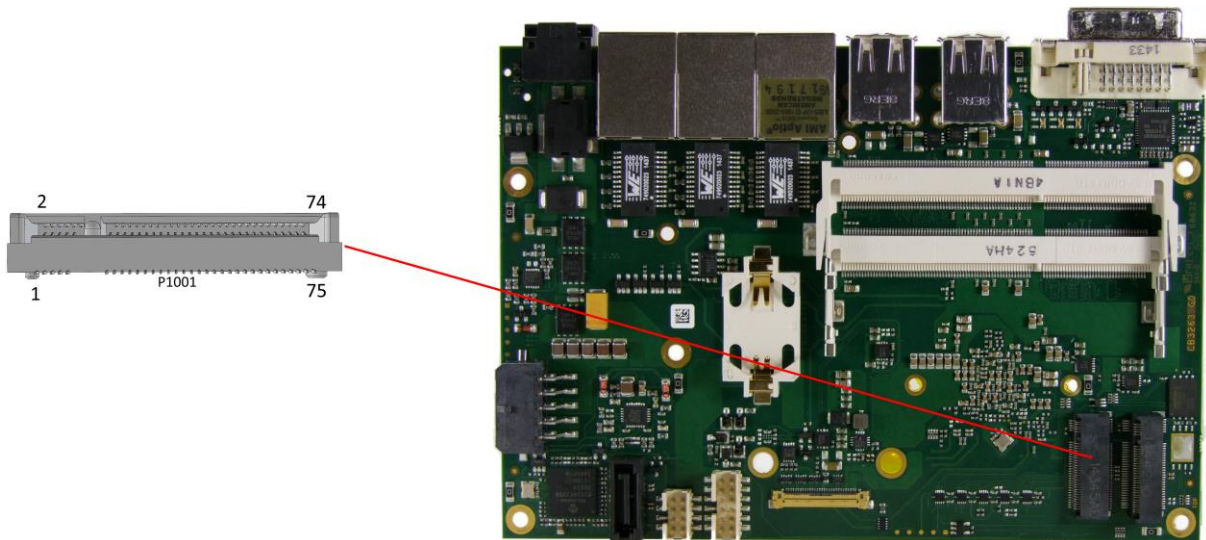
Description	Name	Pin	Name	Description
	CONFIG_3	1 2	3.3V	power supply 3,3V
ground	GND	3 4	3.3V	power supply 3,3V
ground	GND	5 6	FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V)	Full Card Power OFF
USB data +	USB_D+	7 8	N/C	reserved
USB data -	USB_D-	9 10	N/C	reserved
ground	GND	11 12		
Connector Key		13 14	Connector Key	
		15 16		
		17 18		
		19 20		N/C
	CONFIG_0	21 22	N/C	reserved
reserved	N/C	23 24	N/C	reserved
reserved	N/C	25 26	N/C	reserved
reserved	N/C	27 28	N/C	reserved
reserved	N/C	29 30	N/C	reserved
reserved	N/C	31 32	N/C	reserved
reserved	N/C	33 34	N/C	reserved
reserved	N/C	35 36	N/C	reserved
reserved	N/C	37 38	DEVSLEEP (O)	Device Sleep
ground	GND	39 40	N/C	reserved
PCIe Lane 0 Receive -	PERn0	41 42	N/C	reserved
PCIe Lane 0 Receive +	PERp0	43 44	N/C	reserved
ground	GND	45 46	N/C	reserved
PCIe Lane 0 Transmit -	PETn0	47 48	N/C	reserved
PCIe Lane 0 Transmit +	PETp0	49 50	PERST# (O)(0/3.3V)	PCIe Reset

Description	Name	Pin		Name	Description
ground	GND	51	52	CLKREQ# (I/O)(0/3.3V)	Clock Control
Reference Clock-	REFCLKn	53	54	PEWAKE# (I/O)(0/3.3V)	Link Reactivation
Reference Clock +	REFCLKp	55	56	N/C	reserved
ground	GND	57	58	N/C	reserved
reserved	N/C	59	60	N/C	reserved
reserved	N/C	61	62	N/C	reserved
reserved	N/C	63	64	N/C	reserved
reserved	N/C	65	66	N/C	reserved
	RESET# (O)(0/1.8V)	67	68	SUSCLK(32kHz) (O)(0/3.3V)	
	CONFIG_1	69	70	3.3V	power supply 3,3V
ground	GND	71	72	3.3V	power supply 3,3V
ground	GND	73	74	3.3V	power supply 3,3V
	CONFIG_2	75			

### 4.4.3 M.2 2242 (Keying B)

The ADLE3800HDC is equipped with a further M.2 socket, in which M.2-2242 cards (keying B) can be inserted. The socket leads SATA signals (up to 6 Gb/s) through, which enables the use of an SSD card.

Manufacturer	Description	Mating connector
FCI	10128793-004RLF	(card)



Description	Name	Pin	Name	Description
	CONFIG_3	1	2	3.3V power supply 3,3V
ground	GND	3	4	3.3V power supply 3,3V
ground	GND	5	6	FULL_CARD_POWER_OFF# (O)(0/1.8V or 3.3V) Full Card Power OFF
USB data +	USB_D+	7	8	N/C reserved
USB data -	USB_D-	9	10	N/C reserved
ground	GND	11	12	
Connector Key		13	14	Connector Key
		15	16	
		17	18	
		19	20	
	CONFIG_0	21	22	N/C reserved
reserved	N/C	23	24	N/C reserved
reserved	N/C	25	26	N/C reserved
reserved	N/C	27	28	N/C reserved
reserved	N/C	29	30	N/C reserved
reserved	N/C	31	32	N/C reserved
reserved	N/C	33	34	N/C reserved
reserved	N/C	35	36	N/C reserved
reserved	N/C	37	38	DEVSLP (O) Device Sleep
ground	GND	39	40	N/C reserved
SATA Lane A Receive -	SATA-B+	41	42	N/C reserved
SATA Lane A Receive +	SATA-B-	43	44	N/C reserved
Masse	GND	45	46	N/C reserved
SATA Lane A Transmit -	SATA-A-	47	48	N/C reserved
SATA Lane A Transmit +	SATA-A+	49	50	PERST# (O)(0/3.3V) PCIe Reset

Description	Name	Pin		Name	Description
ground	GND	51	52	CLKREQ# (I/O)(0/3.3V)	Clock Control
Reference Clock-	REFCLKn	53	54	PEWAKE# (I/O)(0/3.3V)	Link Reactivation
Reference Clock +	REFCLKp	55	56	N/C	reserved
ground	GND	57	58	N/C	reserved
reserved	N/C	59	60	N/C	reserved
reserved	N/C	61	62	N/C	reserved
reserved	N/C	63	64	N/C	reserved
reserved	N/C	65	66	N/C	reserved
	RESET# (O)(0/1.8V)	67	68	SUSCLK(32kHz) (O)(0/3.3V)	
	CONFIG_1	69	70	3.3V	power supply 3,3V
ground	GND	71	72	3.3V	power supply 3,3V
ground	GND	73	74	3.3V	power supply 3,3V
	CONFIG_2	75			

#### 4.4.4 DVI/HDMI/DisplayPort and USB3.0

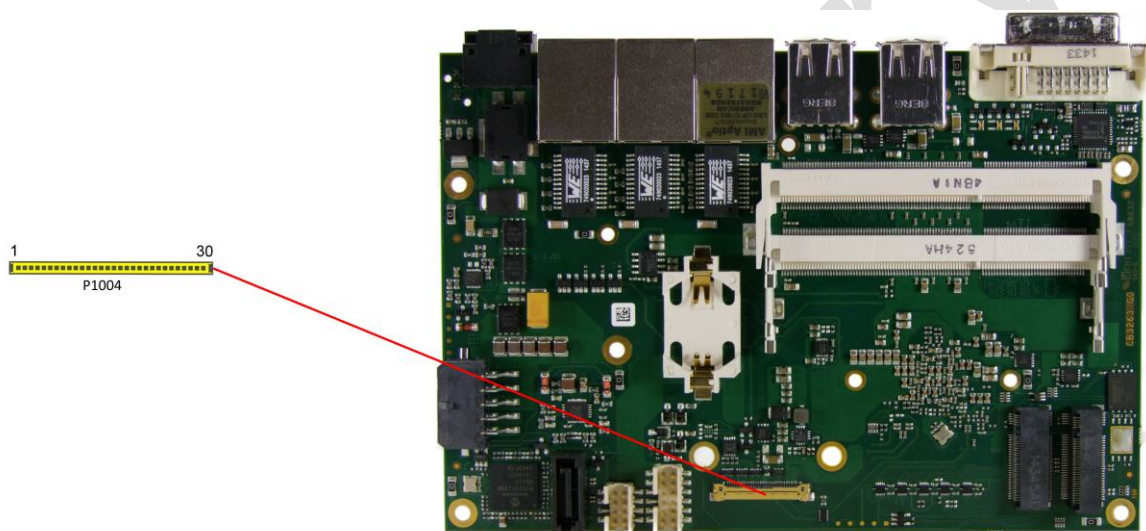
The ADLE3800HDC provides a second DVI interface which is realized as a 30pin flat cable header (I-PEX Cabline-VS 20455-030E-12). Analog VGA is not available on this connector. However, an HDMI device or DisplayPort device can be connected.

This custom connector also carries an additional USB interface. The USB channel support USB 3.0. The USB interface provides up to 900 mA current and is protected by an electronically resettable fuse. In ACPI state S5 via USB connected devices will not be energized.

Maximum current is 2 amperes for VCC combined (0.5A per contact), and 1 ampere for 3.3V (0.5A per contact).

Please note that a custom cable design is required.

Manufacturer	Description	Mating Connector
Rutronik	20455-030E-12	custom design



Pinout 30pin connector DVI/HDMI/DisplayPort:

Pin	Name	Description
1	TMDS0#/DP2#	DVI Data 0 - / DP Lane 2 -
2	TMDS0/DP2	DVI Data 0 + / DP Lane 2 +
3	TMDS1#/DP1#	DVI Data 1 - / DP Lane 1 -
4	TMDS1/DP1	DVI Data 1 + / DP Lane 1 +
5	TMDS2#/DP0#	DVI Data 2 - / DP Lane 0 -
6	TMDS2/DP0	DVI Data 2 + / DP Lane 0 +
7	TMDSCLK#/DP3#	DVI Clock - / DP Lane 3 -
8	TMDSCLK/DP3	DVI Clock + / DP Lane 3 +
9	N/C	reserved
10	SEL_DVI/DP#	DVI-DisplayPort Select
11	DDCK/DPAUX	EDID Clock / DP Aux +
12	DDDA/DPAUX#	EDID Data / DP Aux -
13	VCC	5V supply
14	GND	ground
15	HPD	hot plug detect
16	USBVCC	5V supply for USB
17	USBVCC	5V supply for USB
18	N/C	reserved
19	N/C	reserved

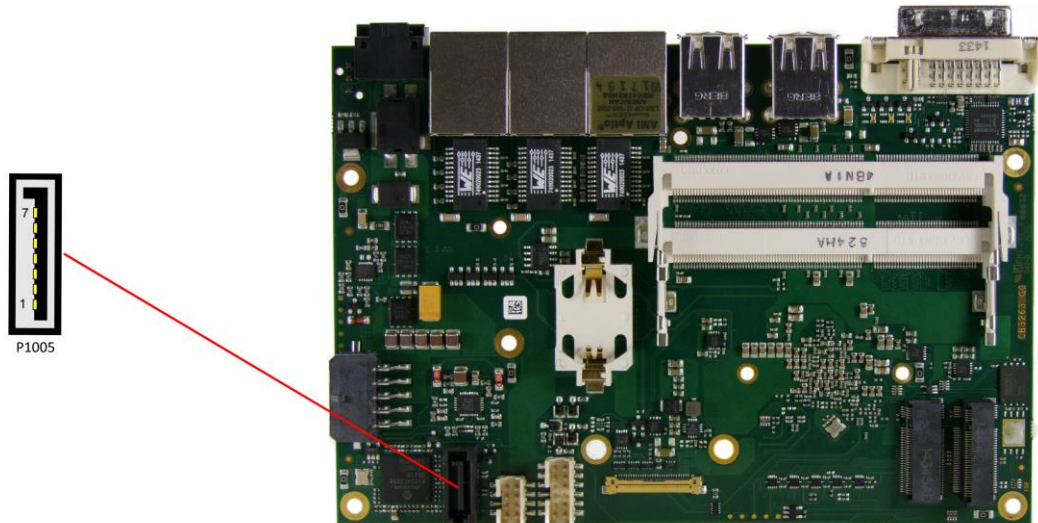
Pin	Name	Description
20	SSTX#	Super Speed receiver -
21	SSTX	Super Speed receiver +
22	USB#	USB -
23	USB	USB +
24	SSRX#	Super Speed transmitter -
25	SSRX	Super Speed transmitter
26	3.3V	3.3V supply
27	3.3V	3.3V supply
28	VCC	5V supply
29	VCC	5V supply
30	VCC	5V supply



### 4.4.5 SATA Interface

The ADLE3800HDC provides one SATA interfaces which allows transfer rates of up to 3 Gb/s. The interface is made available via a standard SATA connector and supports RAID 0/1/5/10. The required settings are made in the BIOS setup.

Manufacturer	Description	Mating Connector
Amphenol	SATA-001-22223-CTR	(standard connector)



Pinout SATA:

Pin	Name	Description
1	GND	ground
2	SATATX	SATA transmit +
3	SATATX#	SATA transmit -
4	GND	ground
5	SATARX	SATA receive -
6	SATARX#	SATA receive +
7	GND	ground

## 5 BIOS Settings

### 5.1 General Remarks

In each setup page, standard values for all setup entries can be loaded. Previously saved settings are loaded by pressing F2 and factory defaults are loaded with F3. Both F2 and F3, and also F4 ("Save & Exit") always affect the whole set of setup entries.

Setup entries starting with a „▶" sign represent submenus. Navigation between entries is done using the arrow keys on the keyboard, with the <Enter> key being used to select an entry, which either opens up a dialog box or opens a whole new submenu of setup entries.

Each setup entry has a short help text associated with it. This is displayed in the upper right hand corner of the screen.

#### **NOTICE**

**BIOS features and setup options are subject to change without notice. The settings displayed in the screenshots on the following pages are meant to be examples only. They do not represent the recommended settings or the default settings. Determination of the appropriate settings is dependent upon the particular application scenario in which the board is used.**

## 5.2 Main

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
 MAIN Advanced Chipset Security Boot Save & Exit

<pre> Board Information Board                ADLE3800HDC Revision             f Bios Version         0.08  CPU Configuration Microcode Patch      321 BayTrail SoC         B2 Stepping  Memory Information Total Memory         8192 MB (LPDDR3)  System Date           [Sun 12/05/2014] System Time           [00:47:04] </pre>	<pre> Set the Date. Use Tab to switch between Data elements.  -----: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit </pre>
--	--

Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

- ✓ **Board**  
Options: none
- ✓ **Revision**  
Options: none
- ✓ **Bios Version**  
Options: none
- ✓ **Microcode Patch**  
Options: none
- ✓ **BayTrail SoC**  
Options: none
- ✓ **Total Memory**  
Options: none
- ✓ **System Date**  
Options: The system date can be adjusted here.
- ✓ **System Time**  
Options: The system time can be adjusted here.

## 5.3 Advanced

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Main ADVANCED Chipset Security Boot Save & Exit

<pre> Power-Supply Type                [ATX] ▶ PCI RT32 Service                [Disabled] ▶ ACPI Settings ▶ Hardware Monitor ▶ CPU Configuration ▶ PPM Configuration ▶ SATA Configuration ▶ Miscellaneous Configuration ▶ Network Stack Configuration ▶ Power Controller Options ▶ CSM Configuration ▶ NVMe Configuration ▶ SDIO Configuration ▶ USB Configuration  ▶ Intel(R) I210 Gigabit Network Connection - 00:01:05:... ▶ Intel(R) I210 Gigabit Network Connection - 00:01:05:... ▶ Intel(R) I210 Gigabit Network Connection - 00:01:05:... </pre>	<pre> Select the Type of the Power Supply: AT/ATX  ---: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit </pre>
--	---

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- ✓ **Power-Supply Type**  
Options: ATX / AT
- ✓ **PCI RT32 Service**  
Options: Enabled / Disabled
- ✓ **ACPI Settings**  
Sub menu: see "ACPI Settings" (page 38)
- ✓ **H/W Monitor**  
Sub menu: see "H/W Monitor" (page 39)
- ✓ **CPU Configuration**  
Sub menu: see "CPU Configuration" (page 40)
- ✓ **PPM Configuration**  
Sub menu: see "PPM Configuration" (page 43)
- ✓ **SATA Configuration**  
Sub menu: see "SATA Configuration" (page 44)
- ✓ **Miscellaneous Configuration**  
Sub menu: see "Miscellaneous Configuration" (page 45)
- ✓ **Network Stack**  
Sub menu: see "Network Stack" (page 46)
- ✓ **Power Controller Options**  
Sub menu: see "Power Controller Options" (page 47)
- ✓ **CSM Configuration**  
Sub menu: see "CSM Configuration" (page 48)
- ✓ **NVMe Configuration**  
Sub menu: see "Advanced-Menü-NVMe Configuration" (page 49)

- ✓ **SDIO Configuration**  
Sub menu: see "SDIO Configuration" (page 50)
- ✓ **USB Configuration**  
Sub menu: see "USB Configuration" (page 51)
- ✓ **Security Configuration**  
Sub menu: see "Security Configuration" (page 52)
- ✓ **Intel(R) Gigabit Network Connection**  
Sub menu: see "Intel(R) I210 Gigabit Network Connection" (page 53)
- ✓ **Driver Health**  
Sub menu: see "Driver Health" (page 55)

### 5.3.1 ACPI Settings

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Advanced

<p>ACPI Settings</p> <p>Enable ACPI Auto Configuration [Disabled]</p> <p>Enable Hibernation [Enabled]</p> <p>ACPI Sleep State [Suspend Disabled]</p> <p>Lock Legacy Resources [Disabled]</p>	<p>Enables or Disables BIOS ACPI Auto Configuration.</p>
<p>←: Select Screen                  ↑↓: Select Item                  Enter: Select                  +/-: Change Opt.                  F1: General Help                  F2: Previous Values                  F3: Optimized Defaults                  F4: Save &amp; Exit                  ESC: Exit</p>	

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- ✓ **Enable ACPI Auto Configuration**  
Options: Enabled / Disabled
- ✓ **Enable Hibernation**  
Options: Enabled / Disabled
- ✓ **ACPI Sleep State**  
Options: Suspend Disabled / S1 (CPU Stop Clock)
- ✓ **Lock Legacy Resources**  
Options: Enabled / Disabled

### 5.3.2 H/W Monitor

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Advanced

Pc Health Status	
CPU dig.	: +44 'C
MB Temp	: +44 'C
PwrCtrlVCC	: +5.20 V
←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	

Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

- ✓ **CPU dig.**  
Options: none
- ✓ **MB Temp**  
Options: none
- ✓ **PwrCtrlVCC**  
Options: none

### 5.3.3 CPU Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

<p>CPU Configuration</p> <ul style="list-style-type: none"> <li>▶ Socket 0 CPU Information</li> <li>▶ CPU Thermal Configuration</li> </ul> <p>CPU Speed    1467 MHz 64-bit    Supported</p> <p>Limit CPUID Maximum                              [Disabled] Execute Disable Bit                                [Enabled] Intel Virtualization Technology                 [Enabled]</p>	<p>Socket specific CPU Information</p>           <p>←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
---	---

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- ✓ **Socket 0 CPU Information**  
Sub menu: see "Socket CPU Information" (page 41)
- ✓ **CPU Thermal Configuration**  
Sub menu: see "CPU Thermal Configuration" (page 42)
- ✓ **CPU Speed**  
Options: none
- ✓ **64-bit**  
Options: none
- ✓ **Limit CPUID Maximum**  
Options: Enabled / Disabled
- ✓ **Execute Disable Bit**  
Options: Enabled / Disabled
- ✓ **Intel Virtualization Technology**  
Options: Enabled / Disabled



5.3.3.1 Socket CPU Information

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Advanced

Socket 0 CPU Information	
Intel(R) Atom(TM) CPU E3845 @ 1.91GHz	
CPU Signature	30679
Microcode Patch	901
Max CPU Speed	1910 MHz
Min CPU Speed	500 MHz
Processor Cores	4
Intel HT Technology	Not Supported
Intel VT-x Technology	Supported
L1 Data Cache	24 kB x 4
L1 Code Cache	32 x kB 4
L2 Cache	1024 kB x 2
L3 Cache	Not Present
←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	

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- ✓ **CPU Signature**  
Options: none
- ✓ **Microcode Patch**  
Options: none
- ✓ **Max CPU Speed**  
Options: none
- ✓ **Min CPU Speed**  
Options: none
- ✓ **Processor Cores**  
Options: none
- ✓ **Intel HT Technology**  
Options: none
- ✓ **Intel VT-x Technology**  
Options: none
- ✓ **L1 Data Cache**  
Options: none
- ✓ **L1 Code Cache**  
Options: none
- ✓ **L2 Cache**  
Options: none
- ✓ **L3 Cache**  
Options: none

### 5.3.3.2 CPU Thermal Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

CPU Thermal Configuration DTS [Disabled]	Enabled/Disable Digital Thermal Sensor.  ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
---	--

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- ✓ **DTS**  
Options: Enabled / Disabled

### 5.3.4 PPM Configuration

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Advanced

PPM Configuration		Enable/Disable CPU C state report to OS
CPU C state Report	[Enabled]	
Max CPU C-state	[ C7]	
Soix	[Disabled]	
		←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **CPU C state Report**  
Options: Disabled / Enabled
- ✓ **Max CPU C-state**  
Options: C7 / C6 / C1
- ✓ **S0ix**  
Options: Disabled / Enabled

### 5.3.5 SATA Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

SATA Configuration		Enable or disable SATA Device.
Serial-ATA (SATA)	[Enabled]	
SATA Test Mode	[Disabled]	
SATA Speed Support	[Gen2]	
SATA ODD Port	[No ODD]	
SATA Mode	[AHCI Mode]	
Serial-ATA Port 0	[Enabled]	
SATA Port0 HotPlug	[Disabled]	
Serial-ATA Port 1	[Enabled]	
SATA Port1 HotPlug	[Disabled]	
SATA Port0	Not Present	
SATA Port1	Not Present	
		←: Select Screen ↑↓: Select Item n Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **Serial-ATA (SATA)**  
Options: Enabled / Disabled
- ✓ **SATA Test Mode**  
Options: Enabled / Disabled
- ✓ **SATA Speed Support**  
Options: Gen1 / Gen2
- ✓ **SATA ODD Port**  
Options: Port0 ODD / Port1 ODD / No ODD
- ✓ **SATA Mode**  
Options: IDE Mode / AHCI Mode
- ✓ **Serial-ATA Port X**  
Options: Enabled / Disabled

### 5.3.6 Miscellaneous Configuration

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Advanced

<pre> Miscellaneous Configuration High Precision Timer           [Enabled] Boot Timer with HPET Timer     [Disabled] PCI Express Dynamic Clock Gating [Disabled] OS Selection                   [Windows 7]                 </pre>	<pre> Enable or Disable the High Precision Event Timer  -----  ←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit                 </pre>
--	--

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- ✓ **High Precision Timer**  
Options: Disabled / Enabled
- ✓ **Boot Timer with HPET Timer**  
Options: Enabled / Disabled
- ✓ **PCI Express Dynamic Clock Gating**  
Options: Enabled / Disabled
- ✓ **OS Selection**  
Options: Windows 8.X / Windows 7

### 5.3.7 Network Stack

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

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

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- ✓ **Network stack**  
Options: Disabled / Enabled
- ✓ **IPv4 PXE Support**  
Options: Disabled / Enabled
- ✓ **IPv6 PXE Support**  
Options: Disabled / Enabled
- ✓ **PXE boot wait time**  
Options: 0..5
- ✓ **Media detect count**  
Options: none

### 5.3.8 Power Controller Options

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

<pre> Bootloader Version      1.00-23 Firmware Version       1.00-43 Mainboard Serial No    0948251130007 Mainboard Prod. Date (Week.Year) 14.14 Mainboard BootCount   114 Mainboard Operation Time 10470min (17h) Voltage (Min/Max)     3.10V / 4.80V Temperature (Min/Max) 24'C /59'C                     </pre>	<p>Select Power line for external USB devices, if powered-down</p> <hr/> <p>←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
--	---

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- ✓ **Bootloader Version**  
Options: none
- ✓ **Firmware Version**  
Options: none
- ✓ **Mainboard Serial No**  
Options: none
- ✓ **Mainboard Prod. Date (Week.Year)**  
Options: none
- ✓ **Mainboard Boot Count**  
Options: none
- ✓ **Mainboard Operation Time**  
Options: none
- ✓ **Voltage (Min/Max)**  
Options: none
- ✓ **Temperature (Min/Max)**  
Options: none

### 5.3.9 CSM Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

Compatibility Support Module Configuration		Enable/Disable CSM Support.
CSM Support	[Enabled]	
CSM16 Module Version	07.76	
GateA20 Active	[Upon Request]	
Option ROM Messages	[Force BIOS]	
Boot option filter	[UEFI and Legacy]	
Option ROM execution order		
Network	[UEFI only]	←: Select Screen
Storage	[UEFI only]	↑↓: Select Item
Video	[Legacy only]	Enter: Select
Other PCI devices	[UEFI only]	+/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

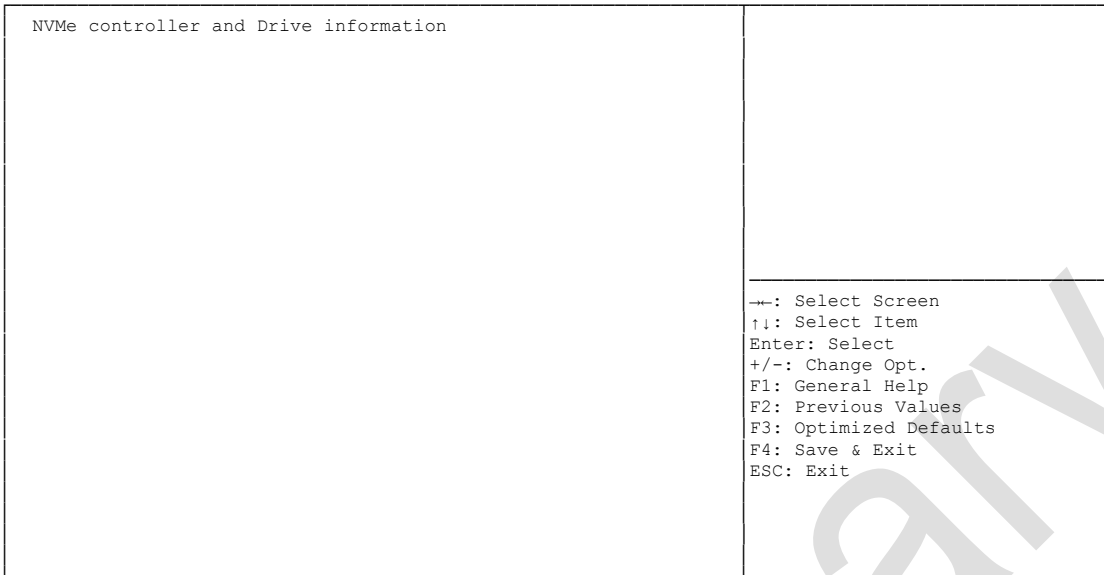
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

- ✓ **CSM Support**  
Options: Disabled / Enabled
- ✓ **CSM16 Module Version**  
Options: none
- ✓ **GateA20 Active**  
Options: Upon Request / Always
- ✓ **Option ROM Messages**  
Options: Force BIOS / Keep Current
- ✓ **Boot option filter**  
Options: UEFI and Legacy / Legacy only / UEFI only
- ✓ **Network**  
Options: Do not launch / UEFI only / Legacy only
- ✓ **Storage**  
Options: Do not launch / UEFI only / Legacy only
- ✓ **Video**  
Options: Do not launch / UEFI only / Legacy only
- ✓ **Other PCI devices**  
Options: UEFI only / Legacy only



### 5.3.10 Advanced-Menü-NVMe Configuration

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Advanced



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- ✓ **NVMe controller and Drive information**  
Options: none

### 5.3.11 SDIO Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

SDIO Configuration  SDIO Access Mode [AUTO]	Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode. PIO Option: Access SD device in PIO mode.  →: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
---	--

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- ✓ **SDIO Access Mode**  
Options: Auto / DMA / PIO

### 5.3.12 USB Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

USB Configuration USB Module Version                    10 USB Devices: 1 Keyboard, 2 Hubs Legacy USB Support                    [Enabled] XHCI Hand-off                            [Enabled] EHCI Hand-off                            [Disabled] USB Mass Storage Driver Support      [Enabled] Port 60/64 Emulation                   [Enabled] USB hardware delays and time-outs: USB transfer time-out                  [20 sec] Device reset time-out                  [20 sec] Device power-up delay                  [Manual] Device power-up delay in seconds      5	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.  ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
---	---

Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.

- ✓ **USB Devices**  
Options: none
- ✓ **Legacy USB Support**  
Options: Enabled / Disabled / Auto
- ✓ **XHCI Hand-off**  
Options: Enabled / Disabled
- ✓ **EHCI Hand-off**  
Options: Enabled / Disabled
- ✓ **Mass Storage Driver Support**  
Options: Disabled / Enabled
- ✓ **USB transfer time-out**  
Options: 5 sec / 10 sec / 20 sec
- ✓ **Device reset time-out**  
Options: 10 sec / 20 sec / 30 sec / 40 sec
- ✓ **Device power-up delay**  
Options: Auto / Manual
- ✓ **Device power-up delay in seconds**  
Options: 1..40

### 5.3.13 Security Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

Intel(R) TXE Configuration		Send EOP Message Before Enter OS
TXE	[Enabled]	
TXE HMRFPPO	[Disabled]	
TXE Firmware Update	[Enabled]	
TXE EOP Message	[Enabled]	
TXE Unconfiguration Perform		
		←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **TXE**  
Options: Enabled / Disabled
- ✓ **TXE HMRFPPO**  
Options: Enabled / Disabled
- ✓ **TXE Firmware Update**  
Options: Enabled / Disabled
- ✓ **TXE EOP Message**  
Options: Enabled / Disabled
- ✓ **TXE Unconfiguration Perform**  
Options: none

### 5.3.14 Intel(R) I210 Gigabit Network Connection

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

<p>▶ NIC Configuration</p> <p>Blink LEDs 0</p> <p>UEFI Driver Intel(R) PRO/1000 5.7.06</p> <p>Adapter PBA: FFFFFFFF-OFF</p> <p>Device Name Intel(R) I210 Gigabit N</p> <p>Chip Type Intel i210</p> <p>PCI Device ID 153A</p> <p>PCI Address 01:00:00</p> <p>Link Status [Disconnected]</p> <p>MAC Address 00:01:05:24:7D:2E</p> <p>Virtual MAC Address 00:01:05:24:7D:2E</p>		<p>Click to configure the network device port.</p> <hr/> <p>←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
--	--	---

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- ✓ **NIC Configuration**  
Sub menu: see "NIC Configuration" (page 54)
- ✓ **Blink LEDs**  
Options: none
- ✓ **UEFI Driver**  
Options: none
- ✓ **Adapter PBA**  
Options: none
- ✓ **Device Name**  
Options: none
- ✓ **Chip Type**  
Options: none
- ✓ **PCI Device ID**  
Options: none
- ✓ **PCI Address**  
Options: none
- ✓ **Link Status**  
Options: none
- ✓ **MAC Address**  
Options: none
- ✓ **Virtual MAC Address**  
Options: none

5.3.14.1 NIC Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Advanced

Link Speed Wake On LAN	[Auto Neg] [Enabled]	Specifies the port speed used for the selected boot protocol.
←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit		

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- ✓ **Link Speed**  
Options: Auto Negotiated / 10Mbps Half / 10Mbps full / 100Mbps Half / 100Mbps Full
- ✓ **Wake On LAN**  
Options: Enabled / Disabled

### 5.3.15 Driver Health

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Advanced

<p>▶ Intel(R) PRO/1000 5.7.06 PCI-E                                    Healthy</p>	<p>Provides Health Status for the Drivers/Controllers</p> <hr/> <p>←→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
--	---

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- ✓ **Intel(R) PRO/1000 5.7.06 PCI-E**  
Sub menu: see "Intel(R) PRO/1000 PCI-E" (page 56)

5.3.15.1 Intel(R) PRO/1000 PCI-E

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Advanced

Controller b7c95c18 Child 0      Healthy Intel(R) I210 Gigabit Network Connection      Healthy Controller b7c95718 Child 0      Healthy Intel(R) I210 Gigabit Network Connection      Healthy Controller b7c95318 Child 0      Healthy Intel(R) I210 Gigabit Network Connection      Healthy	Provides Health Status for the Drivers/Controllers
←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	

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- ✓ **Controller x Child n**  
Options: none



## 5.4 Chipset

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Main Advanced CHIPSET Boot Security Save & Exit

<ul style="list-style-type: none"><li>▶ North Bridge</li><li>▶ South Bridge</li></ul>	<p>North Bridge Parameters</p> <hr/> <p>←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
---	--

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- ✓ **North Bridge**  
Sub menu: see "North Bridge" (page 58)
- ✓ **South Bridge**  
Sub menu: see "South Bridge" (page 62)

## 5.4.1 North Bridge

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Chipset

<pre> ▶ Intel IGD Configuration ▶ Graphics Power Management Control  Memory Information  Total Memory                8192 MB (LPDDR3)  Memory Slot0                8192 MB (LPDDR3) Memory Slot1                Not Present  Max TOLUD                   [Dynamic] </pre>	<pre> Config Intel IGD Settings.  ---: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit </pre>
---	--

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- ✓ **Intel IGD Configuration**  
Sub menu: see "Intel IGD Configuration" (page 59)
- ✓ **Graphics Power Management Control**  
Sub menu: see "Graphics Power Management Control" (page 61)
- ✓ **Total Memory**  
Options: none
- ✓ **Memory SlotX**  
Options: none
- ✓ **Max TOLUD**  
Options: Dynamic / 1GB / 1.25GB / .. / 3GB

### 5.4.1.1 Intel IGD Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Chipset

GOP Configuration Enable GOP-driver via CSM Configuration-Video		Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disable: Always disable IGD
Intel IGD Configuration		
Integrated Graphics Device	[Enabled]	
IGD Turbo Enable	[Enabled]	
Primary Display	[IGD]	
PAVC	[LITE Mode]	
DVMT Pre-Allocated	[64M]	
DVMT Total Gfx Mem	[256MB]	
Aperture Size	[256MB]	
DOP CG	[Enabled]	
GTT Size	[2MB]	
Spread Spectrum Clock	[Disabled]	
ISP Enable/Disable	[Enabled]	
ISP PCI Device Selection	[Disabled]	
Vcc, Vnn Configuration for Power state2: Vcc_Vnn Config for Power state2	[Disabled]	
		→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **Integrated Graphics Device**  
Options: Enabled / Disabled
- ✓ **IGD Turbo Enable**  
Options: Enabled / Disabled
- ✓ **Primary Display**  
Options: IGD / PCI
- ✓ **PAVC**  
Options: Disabled / LITE Mode / SERPENT Mode
- ✓ **DVMT Pre-Allocated**  
Options: 32M / 64M ... 480M / 512M
- ✓ **DVMT Total Gfx Mem**  
Options: 128M / 256M / MAX
- ✓ **Aperture Size**  
Options: 128MB / 256MB / 512MB
- ✓ **DOP CG**  
Options: Enabled / Disabled
- ✓ **GTT Size**  
Options: 1MB / 2MB
- ✓ **Spread Spectrum clock**  
Options: Enabled / Disabled
- ✓ **ISP Enable/ Disable**  
Options: Enabled / Disabled
- ✓ **ISP PCI Device Selection**  
Options: Disabled / ISP PCI Device as B0D2F0 / ISP PCI Device as B0D3F0

- 
- ✓ **Vcc\_Vnn Config for Power state2**  
Options: Enabled / Disabled

Preliminary

5.4.1.2 Graphics Power Management Control

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Chipset

<p>Graphics Power Management Control RC6(Render Standby) [Enabled]</p>	<p>Check to enable render standby support.</p> <hr/> <p>←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
--	---

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- ✓ **RC6 (Render Standby)**  
Options: Enabled / Disabled

## 5.4.2 South Bridge

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Chipset

<pre> ▶ Azalia HD Audio ▶ USB Configuration ▶ PCI Express Configuration  High Precision Timer           [Enabled] Restore AC Power Loss         [Power On]  Onboard Device Configuration Onboard Gigabit LAN 1         [Enabled] Onboard Gigabit LAN 2         [Enabled] Onboard Gigabit LAN 3         [Enabled]  M.2-PCIe Configuration Pins    M.2-PCIe M.2-SATA Configuration Pins    M.2-SATA </pre>	<p>Azalia HD Audio Options</p> <hr/> <pre> ←→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit </pre>
--	--

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- ✓ **Azalia HD Audio**  
Sub menu: see "Azalia HD Audio" (page 63)
- ✓ **USB Configuration**  
Sub menu: see "USB Configuration" (page 64)
- ✓ **PCI Express Configuration**  
Sub menu: see "PCI Express Configuration" (page 65)
- ✓ **High Precision Timer**  
Options: Disabled / Enabled
- ✓ **Restore AC Power Loss**  
Options: Power Off / Power On / Last State
- ✓ **Onboard Gigabit LAN X**  
Options: Enabled / Disabled
- ✓ **M.2-PCIe Configuration Pins**  
Options: none
- ✓ **M.2-SATA Configuration Pins**  
Options: none

**5.4.2.1 Azalia HD Audio**

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Chipset

<p>Audio Configuration</p> <p>Audio Controller [Enabled]                  Azalia VCI Enable [Enabled]                  Azalia PME Enable [Enabled]                  Azalia HDMI Codec [Enabled]                      HDMI Port B [Enabled]                      HDMI Port C [Enabled]</p>	<p>Control Detection of the Azalia device. Disabled = Azalia will be unconditionally</p> <hr/> <p>←: Select Screen                  ↑↓: Select Item                  Enter: Select                  +/-: Change Opt.                  F1: General Help                  F2: Previous Values                  F3: Optimized Defaults                  F4: Save &amp; Exit                  ESC: Exit</p>
---	---

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- ✓ **Audio Controller**  
Options: Disabled / Enabled
- ✓ **Azalia VCI Enable**  
Options: Disabled / Enabled
- ✓ **Azalia PME Enable**  
Options: Disabled / Enabled
- ✓ **Azalia HDMI Codec**  
Options: Disabled / Enabled
- ✓ **HDMI Port X**  
Options: Disabled / Enabled

5.4.2.2 USB Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Chipset

USB Configuration		Mode of operation of xHCI controller
USB Mode	[XHCI]	
USB Per Port Control	[Enabled]	
USB Port 0	[Enabled]	
USB Port 1	[Enabled]	
USB Port 2	[Enabled]	
USB Port 3	[Enabled]	
		←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **USB Mode**  
Options: EHCI / XHCI
- ✓ **USB Per Port Control**  
Options: Enabled / Disabled
- ✓ **USB Port x**  
Options: Disabled / Enabled



### 5.4.2.3 PCI Express Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Chipset

<p>PCI Express Configuration</p> <p>PCI Express Port 0 is assigned to LAN 1 PCI Express Port 1 is assigned to LAN 2 PCI Express Port 2 is assigned to LAN 3</p> <p>PCI Express Port 3 is assigned to M.2-PCIe</p>	<p>Enable or Disable the PCI Express Port 2 and Port 3 in the Chipset.</p> <hr/> <p>←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</p>
---	---

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- ✓ **PCIe Port x is assigned to**  
Options: none

## 5.5 Security

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Main Advanced Chipset SECURITY Boot Save & Exit

Password Description	Set Administrator Password
Minimum length 3	
Maximum length 20	
Administrator Password	
► Secure Boot menu	
	→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **Secure Boot menu**  
Sub menu: see "Secure Boot menu" (page 67)

## 5.5.1 Secure Boot menu

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Main Advanced Chipset SECURITY Boot Save & Exit

Sytem Mode	Setup	Secure Boot can be enabled if 1.System running in User mode with enrolled Platform Key(PK) 2.CSM function is disabled
Secure Boot	Not Active	
Vendor Keys	Not Active	
Secure Boot	[Disabled]	←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Secure Boot Mode	[Custom]	
▶ Key Management		

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- ✓ **System Mode**  
Options: none
- ✓ **Secure Boot**  
Options: none
- ✓ **Vendor Keys**  
Options: none
- ✓ **Secure Boot Mode**  
Options: Standard / Custom
- ✓ **Key Management**  
Sub menu: see "Key Management" (page 68)

## 5.5.1.1 Key Management

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.  
Security

Provision Factory Default [Disabled] ▶ Enroll all Factory Default Keys ▶ Save all Secure Boot Variables  <table border="1"> <thead> <tr> <th>Secure Boot variable</th> <th>Size</th> <th>Key#</th> <th>Key source</th> </tr> </thead> <tbody> <tr> <td>▶ Platform Key(PK)</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>▶ Key Exchange Keys</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>▶ Authorized Signatures</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>▶ Forbidden Signatures</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>▶ Authorized TimeStamps</td> <td>0</td> <td>0</td> <td></td> </tr> </tbody> </table>	Secure Boot variable	Size	Key#	Key source	▶ Platform Key(PK)	0	0		▶ Key Exchange Keys	0	0		▶ Authorized Signatures	0	0		▶ Forbidden Signatures	0	0		▶ Authorized TimeStamps	0	0		Install factory default Secure Boot keys when System is in Setup Mode.          ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Secure Boot variable	Size	Key#	Key source																						
▶ Platform Key(PK)	0	0																							
▶ Key Exchange Keys	0	0																							
▶ Authorized Signatures	0	0																							
▶ Forbidden Signatures	0	0																							
▶ Authorized TimeStamps	0	0																							

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- ✓ **Provision Factory Default keys**  
Options: Enabled / Disabled
- ✓ **Enroll All Factory Default Keys**  
Options: Press [Enter]
- ✓ **Save All Secure Boot Variables**  
Options: Press [Enter]
- ✓ **Platform Key(PK)**  
Options: Set New Key
- ✓ **Key Exchange Keys**  
Options: Set New Key / Append Key
- ✓ **Authorized Signatures**  
Options: Set New Key / Append Key
- ✓ **Forbidden Signatures**  
Options: Set New Key / Append Key
- ✓ **Authorized TimeStamps**  
Options: Set New Key / Append Key

## 5.6 Boot

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Main Advanced Chipset Security BOOT Save & Exit

Boot Configuration Setup Prompt Timeout                    5 Bootup NumLock State                    [On]		Number of 1/10 sec. to wait for setup activation key. 0 means no wait.
Full Screen Logo                            [Enabled] Fast Boot                                    [Enabled] VGA Support                                [EFI Driver] USB Support                                [Partial Initial] PS2 Devices Support                    [Enabled] NetWork Stack Driver Support        [Disabled]		
Boot mode select                           [LEGACY]		←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
FIXED BOOT ORDER Priorities Boot Option #1                            [Hard Disk] Boot Option #2                            [CD/DVD] Boot Option #3                            [USB Hard Disk] Boot Option #4                            [USB CD/DVD] Boot Option #5                            [USB Key] Boot Option #6                            [USB Floppy] Boot Option #7                            [Network]		
▶ Advanced Fixed Boot Order Parameters		

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- ✓ **Setup Prompt Timeout**  
Options: 0...65535 [x 1/10 sec.]
- ✓ **Bootup NumLock State**  
Options: On / Off
- ✓ **Full Screen Logo**  
Options: Disabled / Enabled
- ✓ **Fast Boot**  
Options: Disabled / Enabled
- ✓ **VGA Support**  
Options: Auto / EFI Driver
- ✓ **USB Support**  
Options: Disabled / Full Initial / Partial Initial
- ✓ **PS2 Devices Support**  
Options: Disabled / Enabled
- ✓ **NetWork Stack Driver Support**  
Options: Disabled / Enabled
- ✓ **Boot mode select**  
Options: Legacy / UEFI / DUAL
- ✓ **Fixed Boot Order Priorities**  
Options: Review or change the sequence of available boot devices
- ✓ **Advanced Fixed Boot Order Parameters**  
Sub menu: see "Advanced Fixed Boot Order Parameters" (page 70)

### 5.6.1 Advanced Fixed Boot Order Parameters

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Advanced

Max. CFast/SSD capacity (GB)	200	Enable or Disable the High Precision Event Timer
Max. USB Stick capacity (GB)	64	
		←: Select Screen ↑: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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- ✓ **Max. CFast/SSD capacity (GB)**  
Options: none
- ✓ **Max USB Stick capacity (GB)**  
Options: none

## 5.7 Save & Exit

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Main Advanced Chipset Security Boot SAVE & EXIT

<pre> Save Changes and Reset Discard Changes and Reset  Restore Optimized Defaults  Boot Override IBA GE Slot 0100 v1553 WinCE ▶ Reset System with ME disable ModeMEUD000 </pre>	<pre> Reset the system after saving the changes.  ----- ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit </pre>
--	--

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- ✓ **Save Changes and Reset**  
Options: Press [Enter]
- ✓ **Discard Changes and Reset**  
Options: Press [Enter]
- ✓ **Restore Defaults**  
Options: Press [Enter]
- ✓ **Reset System with ME disable ModeMEUD000**  
Options: Press [Enter]

## 5.8 BIOS-Update

If a BIOS update needs to be done, the program “DecdFlash” as well as a bootable medium which contains the newest BIOS version is used for this. It is important, that the program is started from a DOS environment without a virtual memory manager, for example “EMM386.EXE”. In case such a memory manager is loaded, the program will stop with an error message.

DecdFlash is a program which provides automatic BIOS updates on any AMI-BIOS boards. All files need to be copied from the .zip-file in another directory.

The system may not be interrupted during the flash process, otherwise the update is stopped and the BIOS is destroyed afterwards.

The program should be started as follows:

```
DecdFlsh BIOS-Filename
```

After checking the name of the BIOS file and its length the BIOS will be programmed.

The flashing takes nearly 75 seconds. The firmware will get updated automatically.

### NOTICE

**A faulty BIOS-Update process may cause damages on the board!**

**Updating the BIOS in an improper way can render the board unusable.**

**Therefore, you should only update the BIOS if you really need the changes/corrections which come with the new BIOS version.**

**Before you proceed to update the BIOS you need to make absolutely sure that you have the right BIOS file which was issued for the exact board and exact board revision that you wish to update. If you try to update the BIOS using the wrong file the board will not start up again.**



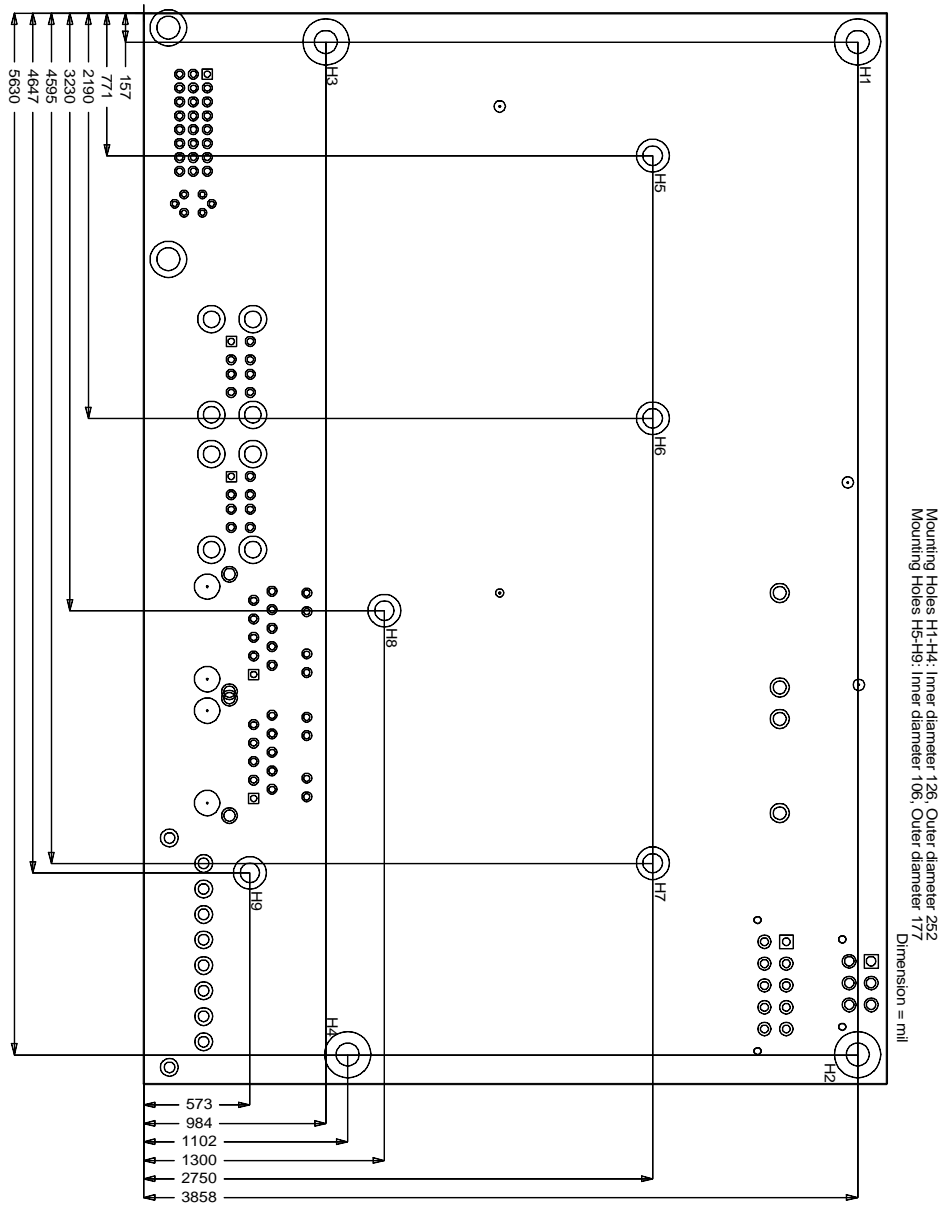
# 6 Mechanical Drawings

**NOTICE**

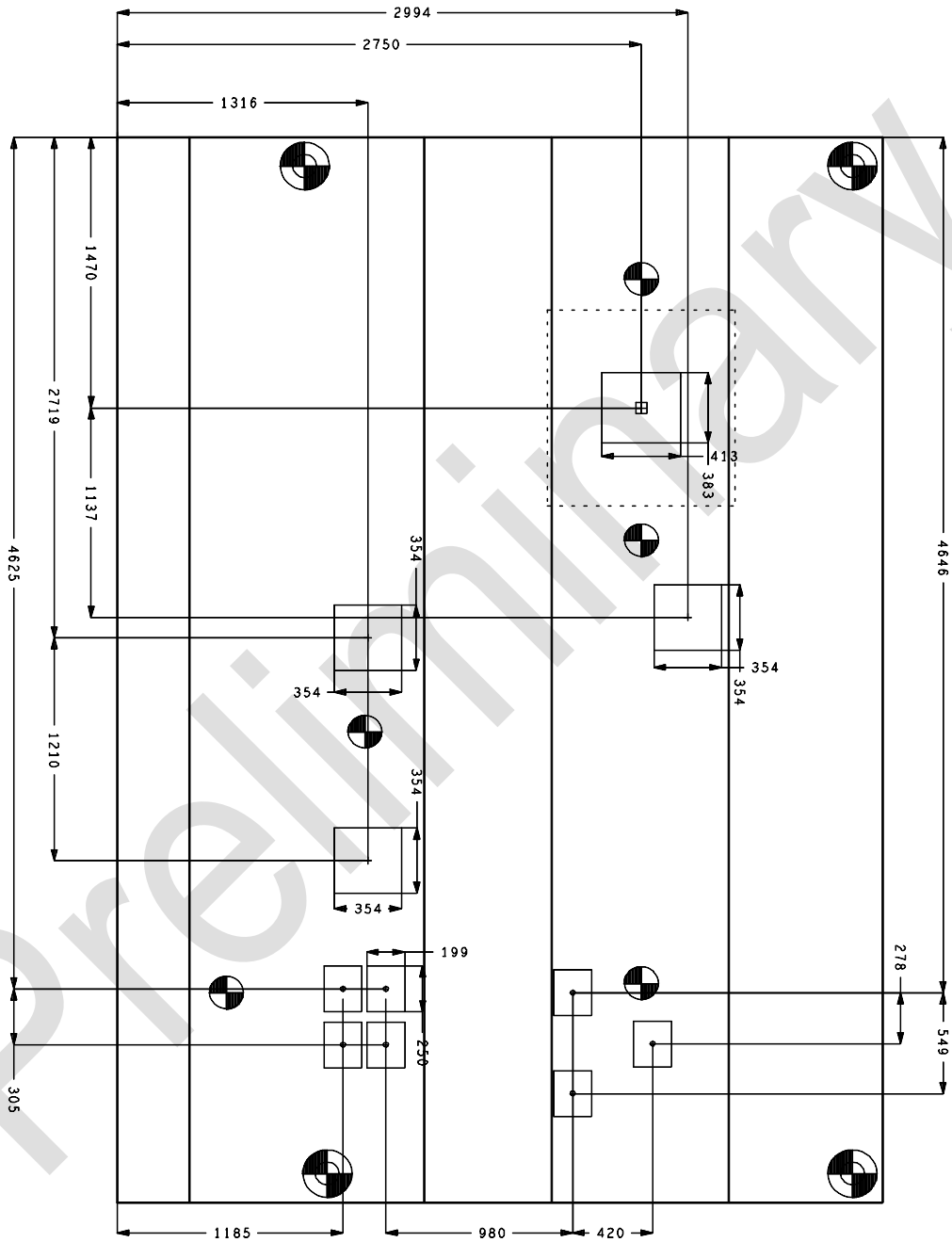
All dimensions are in mil (1 mil = 0,0254 mm)

## 6.1 PCB: Mounting Holes

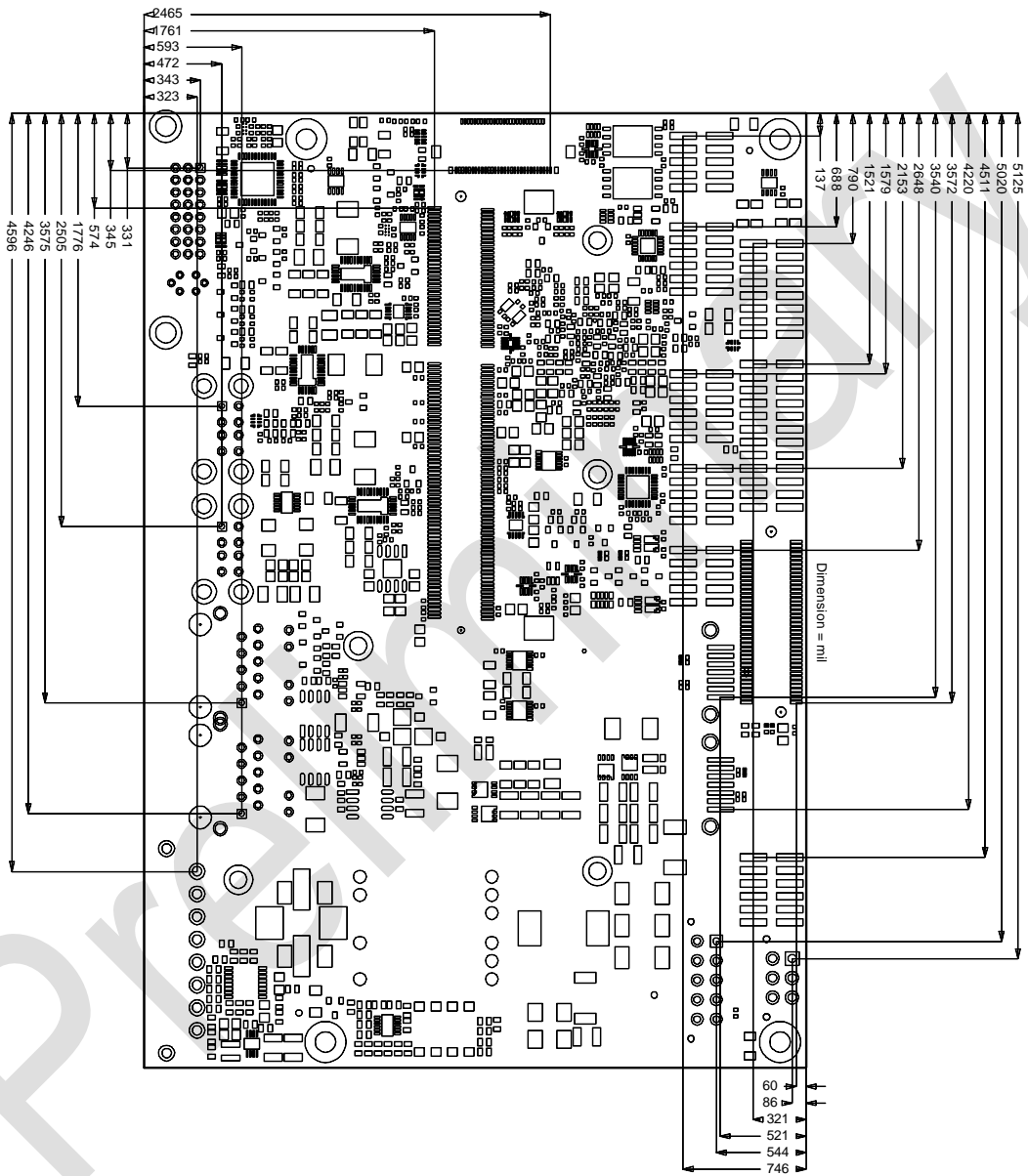
A true dimensioned drawing can be found in the PC/104 specification.



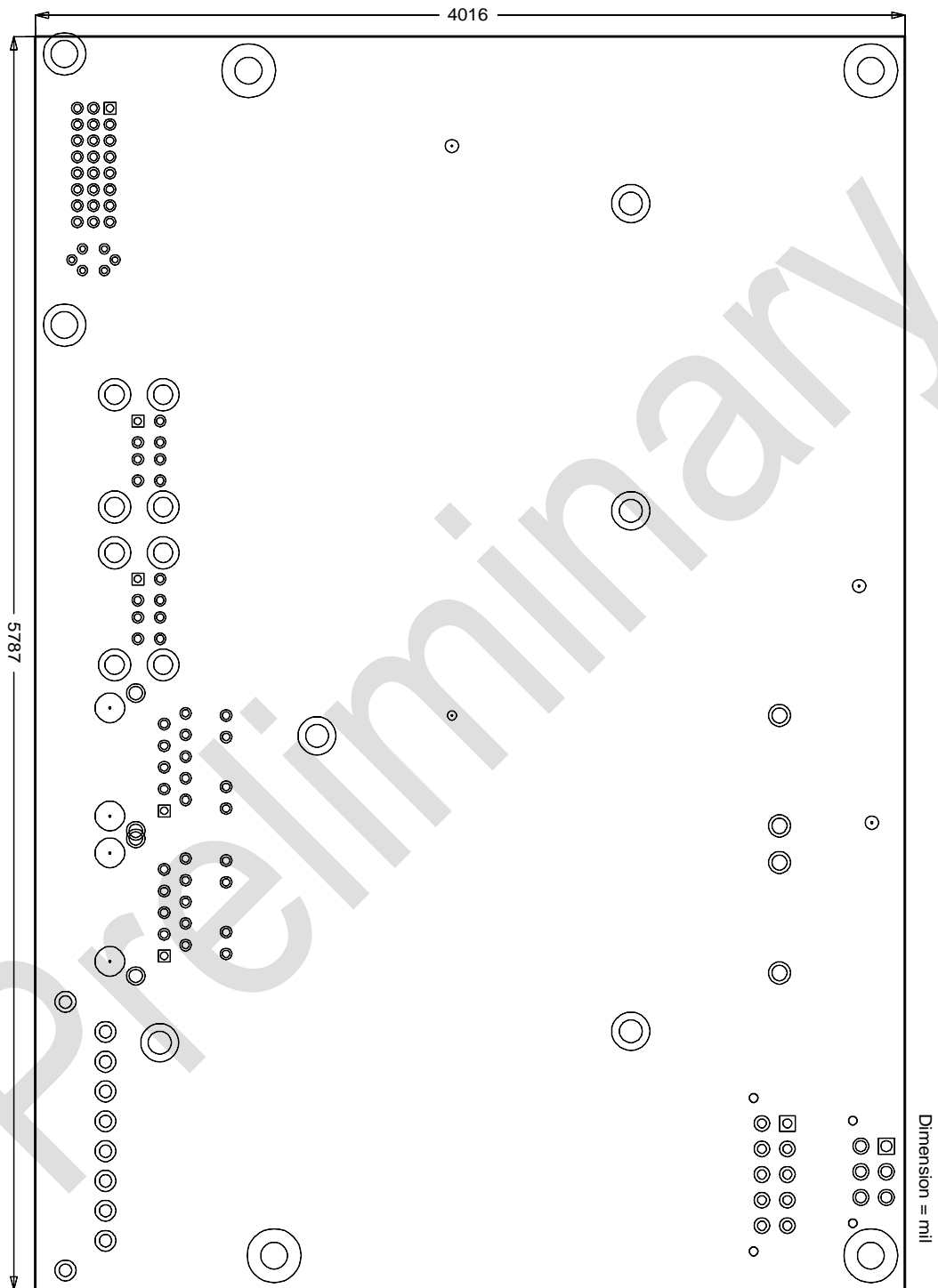
### 6.2 PCB: Die Center



### 6.3 PCB: Pin 1 Dimensions



### 6.4 PCB: Outlines

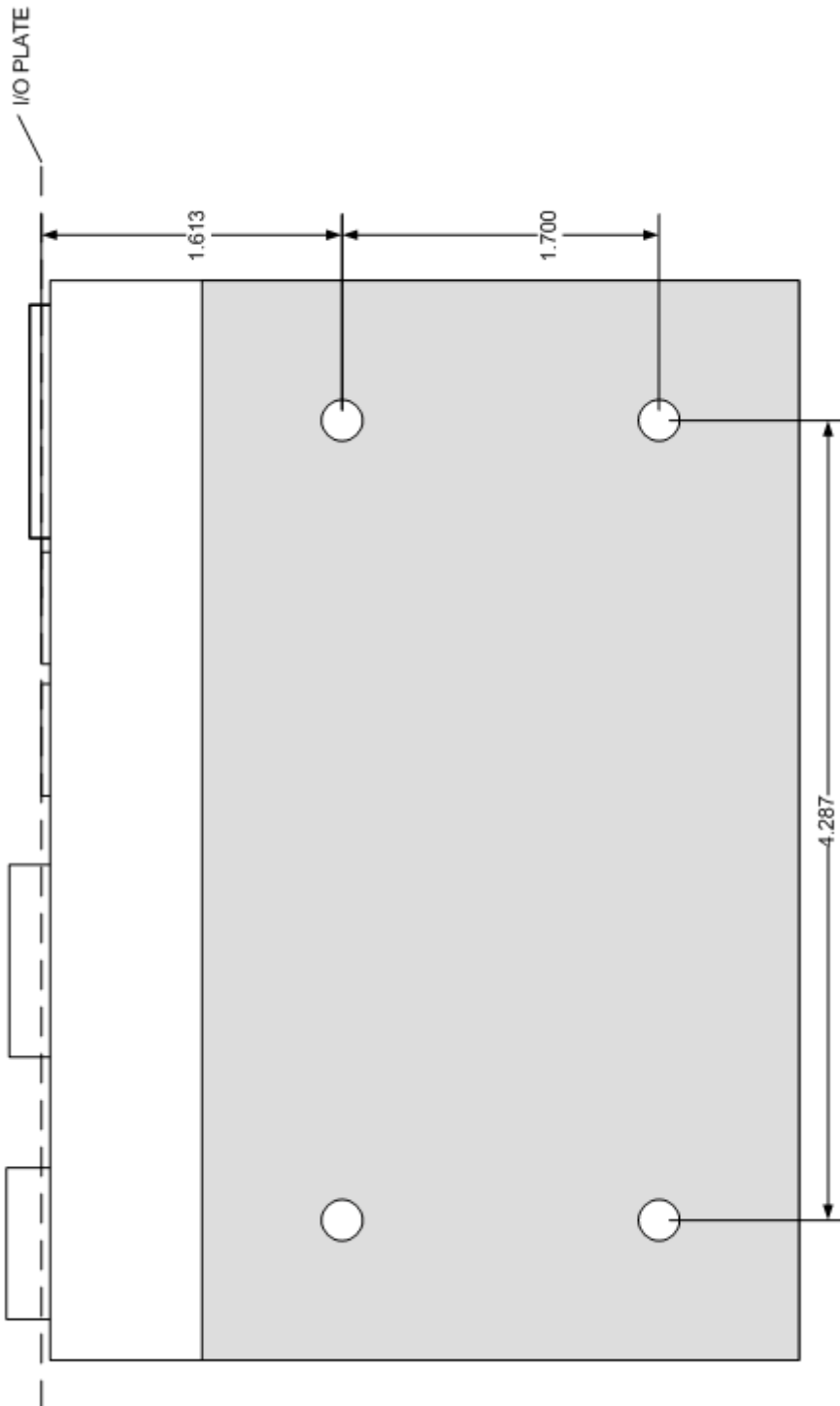


### 6.5 Heat Spreader: Chassis Mount

The figure below includes all hole spacing for each heat spreader available and can be used to aid in mating the heat spreader to a bulkhead or chassis.

**NOTE**

Dimensions are in inch (1 in = 2.54cm; 1 mil = 0.0254 mm)



## 7 Technical Data

### 7.1 Electrical Data

#### Power Supply:

Board: 5 Volt +/- 5% (5 Volt Suspend / 12 Volt Fan)  
 RTC: >= 3 Volt

#### Electric Power Consumption:

RTC: <= 10 $\mu$ A

### 7.2 Environmental Conditions

#### Temperature Range:

Operating: -25°C to +70°C (using approved thermal solution)  
 -40°C up to +85°C (when pre-screened for use with an approved thermal solution)  
 Storage: -40°C up to +85°C  
 Shipping: -40°C up to +85°C, for packaged boards

#### Temperature Changes:

Operating: 0.5°C per minute, 7.5°C per 30 minutes  
 Storage: 1.0°C per minute  
 Shipping: 1.0°C per minute, for packaged boards

#### Relative Humidity:

Operating: 5% up to 85% (non condensing)  
 Storage: 5% up to 95% (non condensing)  
 Shipping: 5% up to 100% (non condensing), for packaged boards

#### Shock:

Operating: 150m/s<sup>2</sup>, 6ms  
 Storage: 400m/s<sup>2</sup>, 6ms  
 Shipping: 400m/s<sup>2</sup>, 6ms, for packaged boards

#### Vibration:

Operating: 10 up to 58Hz, 0.075mm amplitude  
 58 up to 500Hz, 10m/s<sup>2</sup>  
 Storage: 5 up to 9Hz, 3.5mm amplitude  
 9 up to 500Hz, 10m/s<sup>2</sup>  
 Shipping: 5 up to 9Hz, 3.5mm amplitude  
 9 up to 500Hz, 10m/s<sup>2</sup>, for packaged boards

### NOTICE

**Shock and vibration figures pertain to the motherboard alone and do not include additional components such as heat sinks, memory modules, cables etc.**

## 7.3 Thermal Specifications

The board is specified to operate in an environmental temperature range from -25°C to +70°C when using an approved thermal solution, and an extended temperature range of -40°C to +85°C when pre-screened for use with an approved thermal solution.

Maximum die temperature is 100°C. To keep the processor under this threshold an appropriate cooling solution needs to be applied. This solution has to take typical and maximum power consumption into account. The maximum power consumption may be twice as high and should be used as a basis for the cooling concept. Additional controllers may also affect the cooling concept. The power consumption of such components may be comparable to the consumption of the processor.

The board design includes thermal solution mounting points that will provide the best possible thermal interface between die and solution. Since we take thermal solutions seriously we have several advanced, aggressive cooling solutions in our product portfolio. Please contact your sales representative to order or discuss your thermal solution needs.

### **NOTICE**

**The end customer has the responsibility to ensure that the die temperature of the processor does not exceed 100°C. Permanent overheating may destroy the board!**

**In case the temperature exceeds 100°C the environmental temperature must be reduced. Under certain circumstances sufficient air circulation must be provided.**

Preliminary



## I Annex: Post-Codes

During boot, the BIOS generates a sequence of status codes (so-called "POST codes"), which can be viewed using a special output device (POST code card). The meaning of these codes is described in the document "Aptio™ 4.x Status Codes" by American Megatrends®, which can be downloaded from their website <http://www.ami.com>. The following additional OEM POST codes are generated:

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

## II Annex: Resources

### IO Range

The used resources depend on setup settings.

The given values are ranges, which are fixed by AT compatibility. Other IO ranges are used, which are dynamically adjusted by Plug & Play BIOS while booting.

Adress	Function
0-FF	Reserved IO area of the board
170-17F	
1F0-1F7	
278-27F	
2E8-2EF	
2F8-2FF	COM2
370-377	
378-37F	
3BC-3BF	
3E8-3EF	
3F0-3F7	
3F8-3FF	COM1

### Memory-Bereich

Die verwendeten Ressourcen sind abhängig von der Setup-Einstellung.

Wenn der gesamte Bereich durch Option-ROM's belegt wird, können diese Funktionen nicht mehr aktiviert werden bzw. funktionieren nicht mehr.

Adresse	Funktion
A0000-BFFFF	VGA-RAM
90927000-909277FF	AHCI BIOS / RAID / PXE (falls verfügbar)
FF000000-FFFFFFFF	Intel(R) 82802 Firmwarehub

### Interrupt

The used resources depend on setup settings.

The listed interrupts and their use are given through AT compatibility.

If interrupts must exclusively be available on the ISA side, they have to be reserved through the BIOS setup. The exclusivity is not given and not possible on the PCI side.

Adress	Function
IRQ0	Timer
IRQ1	PS/2 Keyboard
IRQ2 (8)	
IRQ3	COM2
IRQ4	COM1
IRQ5	
IRQ6	
IRQ7	
IRQ8	RTC
IRQ9	
IRQ10	
IRQ11	
IRQ12	
IRQ13	
IRQ14	

Adress	Function
IRQ15	

## PCI Devices

All listed PCI devices exist on the board. Some PCI devices or functions of devices may be disabled in the BIOS setup. Once a device is disabled other devices may get PCI bus numbers different from the ones listed in the table.

AD	INTA	REQ	Bus	Dev.	Fkt.	Kontroller / Slot
	-	-	0	0	0	Host Bridge ID0F00h
	A	-	0	2	0	VGA Graphics ID0F31h
	A	-	0	18	0	SD Host Control (DMA) ID0F16h
	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 x1 ID1533h
	A	-	2	0	0	Ethernet Controller x1 ID1533h
	A	-	3	0	0	Ethernet Controller x1 ID1533h

## SMB Devices

The following table contains all reserved SM-Bus device addresses in 8-bit notation. Note that external devices must not use any of these addresses even if the component mentioned in the table is not present on the motherboard.

Address	Function
10-11	Standard slave address
40-41	GPIO
60-61	BIOS internal
70-73	POST code output
88-89	BIOS-defined slave address
A0-A1	DIMM 1
A2-A3	DIMM 2
A4-AF	BIOS internal
B0-BF	BIOS internal
D2-D3	Clock