ADLQM87PC

Manual

rev. 2.0

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Contents

0 Document History

Version	Changes
0.1	first pre-release
1.0	minor changes, added TPM
1.1	added Watchdog to feature list and block diagram, updated temperature range
1.2	updated Displayport chapter
1.3	updated chapter 2.1
1.4	corrected block diagram
1.5	corrected connector- and mating connector description (SATA, USB3.0, DP)
1.6	chapter 4: added LAN LEDs (from G2 onwards)
1.7	chapter 3.17: pinout pin 7 and 9 corrected; updated BIOS-Setup
1.8	updated BIOS-Setup
1.9	added dimensional drawing
2.0	DP pinout: added HDMI corrected DVI pinout corrected chapter 2.1 and 3.14 chapter 2.1: added resolutions

NOTE

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 or support@adl-europe.com
- Via our website at www.adl-usa.com/support or 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 then 30 days prior to the end of the warranty period of 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 or www.adl-europe.com. Submit the completed form to support@adl-usa.com or fax to +1 858-490-0599 for the USA office, or to 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	**DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
WARNING	**WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
CAUTION	**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.**

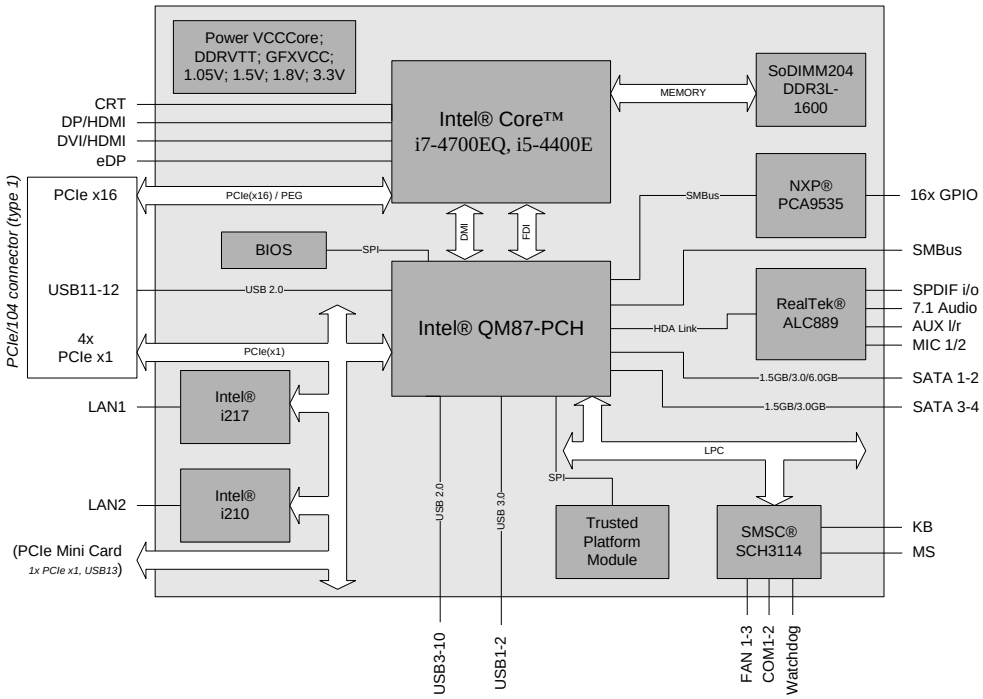
1.6 RoHS

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

2 Overview

2.1 Features

The ADLQM87PC is a highly complex computer motherboard in the PC/104™ form factor, complying with the state-of-the-art "PCIe/104™" standard. It's based on Intel®'s 4th Generation Core™ CPUs (BGA, embedded) combined with the QM87 PCH. Modern low voltage DDR3 technology provides top-notch memory performance, accomodating up to 8 GByte of RAM (DDR3L-1600) via SO-DIMM204. PCI-Express is available through the PCI/104-Express Type 1 connector, offering one x16 connection and four x1 lanes for connecting all kinds of expansion cards in a PCIe/104™ stack-down fashion. For connecting graphics devices, several interfaces are available: CRT, HDMI, DisplayPort and Embedded DisplayPort. Additional interfaces include two serial ports, two Gigabit Ethernet interfaces (LAN), four SATA channels (two of which offering up to 6Gb/s), an audio interface (HDA 7.1), ten USB2.0- channels and two USB3.0-channels. There are also 16 discrete programmable GPIO signals available.



- Processor Intel® Core™ i7-4700EQ, i5-4400E
- Chipset Intel® QM87 PCH
- SO-DIMM204 socket for one DDR3L-1600 module of up to 8 GByte
- Two serial interfaces COM1-2
- Two LAN interfaces Ethernet 10/100/1000 (Base-T)
- Four SATA channels (two of which up to 6Gb/s transfer rate)
- PS2 keyboard / mouse interface
- Ten USB 2.0 interfaces (two on PCI104-Express connector)
- Two USB 3.0 interfaces
- BIOS AMI® Aptio
- DisplayPort interface
- Embedded DisplayPort interface
- HDMI interface
- CRT connection
- Resolution: HDMI max. 2560 x 1600, DVI max. 1900 x 1200, DP max. 3840 x 2160
- HDA compatible sound controller with SPDIF in and out

- RTC with external CMOS battery
- PCI-Express bus via PCI/104-Express connector (type 1, one x16, four x1 lanes)
- miniPCI-Express bus via miniPCIe-card connector
- 16x GPIO
- Trusted Platform Module
- Watchdog
- 5V and 12V supply voltage
- Size: 96 mm x 90 (115.5) mm

2.2 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.

- PC/104™ Specification
  Version 2.5
  www.pc104.org
- PC/104-Plus™ Specification
  Version 2.0
  www.pc104.org
- PCI/104-Express™ Specification
  Version 2.0
  www.pc104.org
- PCI Specification
  Version 2.3 and 3.0
  www.pcisig.com
- ACPI Specification
  Version 5.0
  www.acpi.info
- ATA/ATAPI Specification
  Version 7 Rev. 1
  www.t13.org
- USB Specifications
  www.usb.org
- SM-Bus Specification
  Version 2.0
  www.smbus.org
- Intel® Chipset Description
  Intel® 8 Series Chipset Datasheet
  www.intel.com
- Intel® Chip Description
  4th Generation Core™ Processor Family Datasheet
  www.intel.com
- SMSC® Chip Description
  SCH3114 Datasheet
  www.smsc.com
  (NDA required)
- Intel® Chip Description
  i210 Datasheet
  www.intel.com
- Intel® Chip Description
  i217 Datasheet
  www.intel.com
- Realtek® Chip Description
  ALC885/889 Datasheet
  www.realtek.com.tw
- Chrontel® Chip Description
  Chrontel 7318C Datasheet
  www.chrontel.com

- American Megatrends®
  Aptio™ Text Setup Environment (TSE) User Manual
  www.ami.com
- American Megatrends®
  Aptio™ 4.x Status Codes
  www.ami.com

3 Connectors

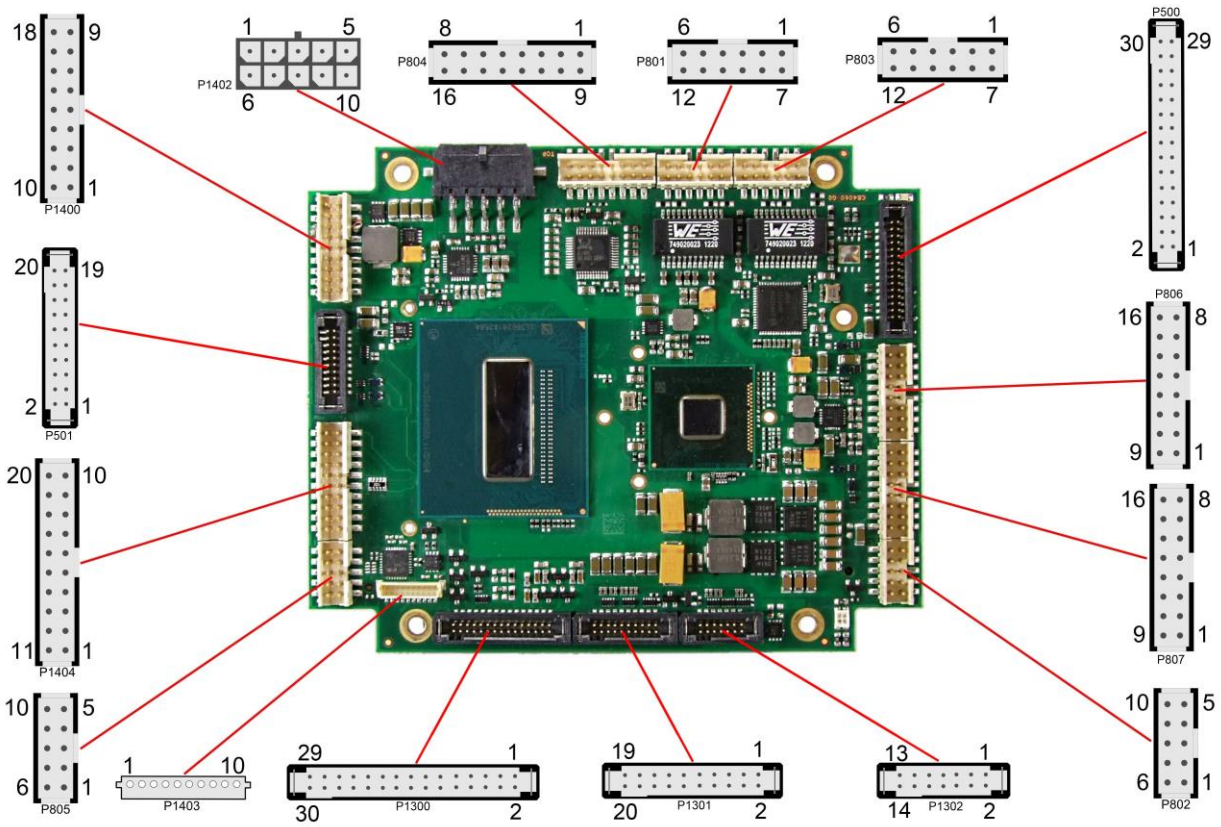
This section describes all the connectors found on the ADLQM87PC.

NOTICE

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.

3.1 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
P500	"SATA Interfaces"	p. 30
P501	"USB 3.0"	p. 27
U600*	"Memory"	p. 17
P801/3	"LAN"	p. 28
P802/5	"COM1 and COM2"	p. 31
P804	"Audio"	p. 29
P806/7	"USB 2.0"	p. 26
P1200*	"PCIe/104 Connector"	p. 20
P1201*	"PCI-Express Mini Card with mSATA"	p. 22
P1300	"DVI/HDMI/VGA"	p. 23
P1301	"DisplayPort"	p. 24
P1302	"Embedded DisplayPort"	p. 25
P1400	"System/SM-Bus"	p. 16
P1402	"Power Supply"	p. 15
P1403	"Monitoring Functions"	p. 33
P1404	"GPIO"	p. 32

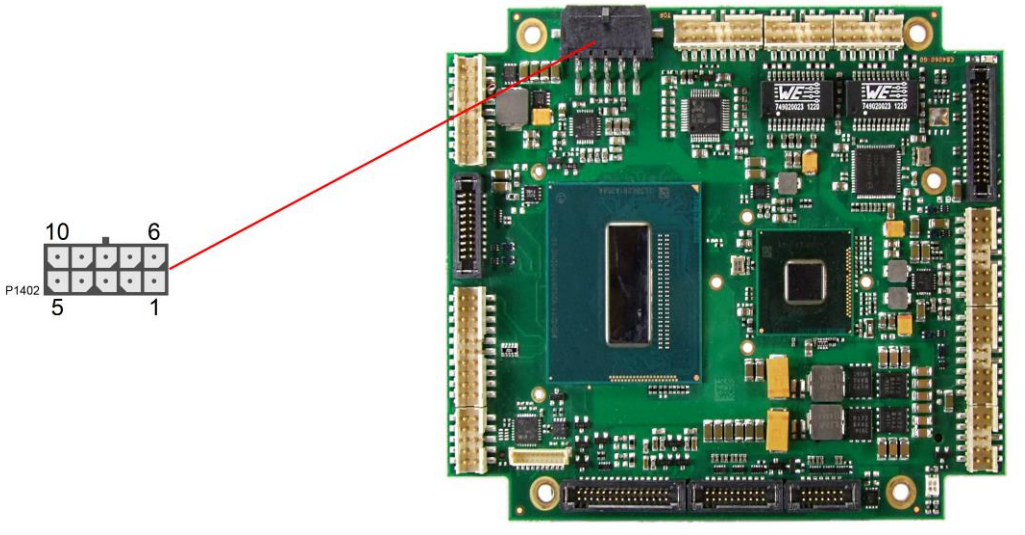
* not pictured (see bottom of the board)

3.2 Power Supply

The power supply of the hardware module is realized via a 2x5-pin connector (Molex PS 43045-10xx, mating connector: Molex PS 43025-10xx). Both 5V VCC/SVCC and 12V need to be provided. The 12V input can optionally be tied to 5V if 12V is not required by attached peripherals. It cannot, however, be left unconnected.

NOTICE

The ADLQM87PC includes circuitry that will notify an intelligent power supply to shut down if the processor reaches a critical temperature. This is achieved by deasserting the (low-active) PS_ON# signal found on the SM-Bus connector. When PS_ON# is no longer pulled low, an intelligent power supply would take this as a signal to shut down power. For this to work, PS_ON# must be connected to the power supply's PS_ON input. If PS_ON# is not otherwise connected, the ADLQM87PC can be damaged beyond repair if a thermal shutdown event occurs. In rare instances, if power is not shut down, the board will continue to heat up until failure occurs.



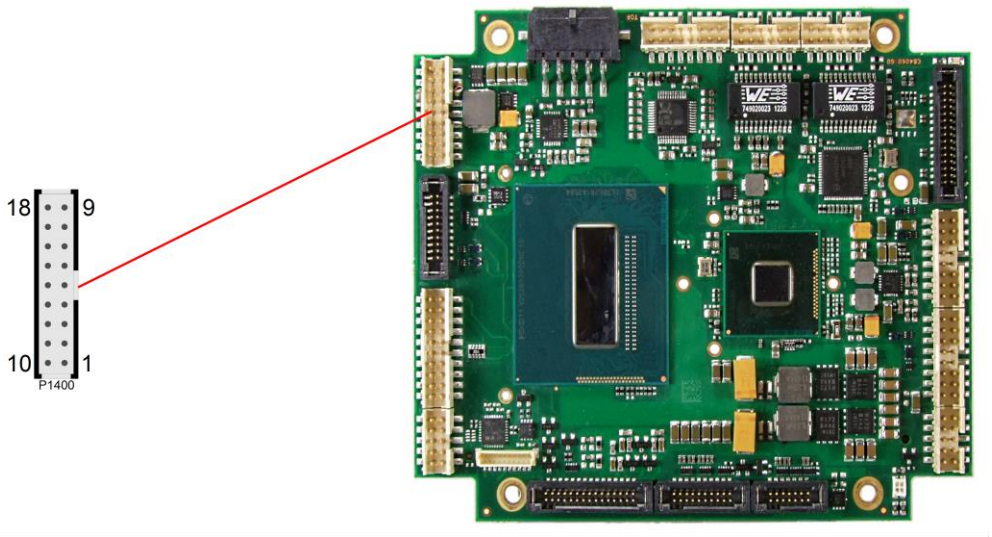
NOTICE

Since this is a 90 degree connector, the symbol in the drawing below represents the connector face as seen from the side (PCB on bottom) rather than from above.

Description	Name	Pin		Name	Description
12 volt supply	12V	1	6	12V	12 volt supply
ground	GND	2	7	GND	ground
ground	GND	3	8	SVCC	standby-supply 5V
ground	GND	4	9	GND	ground
5 volt supply	VCC	5	10	VCC	5 volt supply

3.3 System/SM-Bus

Both SM-Bus signals, and signals for PS/2 keyboard, PS/2 mouse and speaker are provided through a 2x9pin connector (FCI 98424-G52-18LF, mating connector e.g. FCI 90311-018LF). For the #PSON signal, please refer to the cautionary note in the chapter "Power Supply" (page 15).

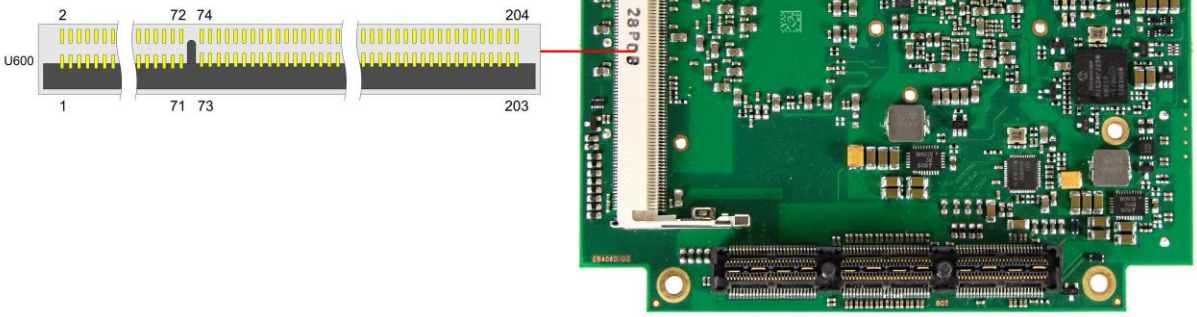


Pinout 2x9pin connector:

Description	Name	Pin		Name	Description
speaker to 5V	SPEAKER	1	10	GND	ground
reset to ground	RSTBTN#	2	11	N/C	reserved
keyboard data	KDAT	3	12	KCLK	keyboard clock
mouse data	MDAT	4	13	MCLK	mouse clock
battery	BATT	5	14	VCC	5 volt supply
power supply on	PS-ON#	6	15	SMBCLK	SMB clock
standby supply 3.3V	S3.3V	7	16	SMBDAT	SMB data
power button	PWRBTN#	8	17	SMBALERT#	SMB alert
ground	GND	9	18	3.3V	3.3 volt supply

3.4 Memory

There is one conventional SO-DIMM204 socket available to equip the board with memory (DDR3L-1600). It is located on the bottom side of the board. For technical and mechanical reasons it is possible that particular memory modules cannot be employed. Please ask your sales representative for recommended memory modules.
With currently available SO-DIMM modules a memory extension up to 8 GByte is possible. The timing parameters for different memory modules are automatically set by BIOS.



Pinout SO-DIMM204:

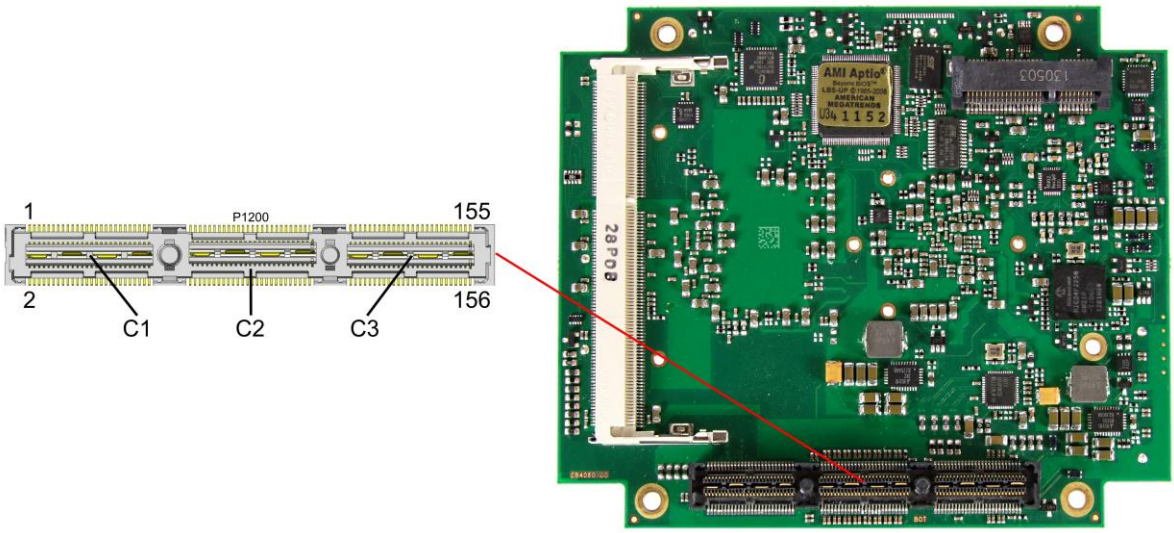
Description	Name	Pin		Name	Description
memory reference current	REF-DQ	1	2	GND	ground
ground	GND	3	4	DQ4	data 4
data 0	DQ0	5	6	DQ5	data 5
data 1	DQ1	7	8	GND	ground
ground	GND	9	10	DQS0#	data strobe 0 -
data mask 0	DM0	11	12	DQS0	data strobe 0 +
ground	GND	13	14	GND	ground
data 2	DQ2	15	16	DQ6	data 6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

Description	Name	Pin		Name	Description
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 -
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

Description	Name	Pin		Name	Description
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

3.5 PCIe/104 Connector

Expansion modules for the PCI-Express bus can be connected to the board using the PCIe/104™ connector. This is a "type 1" connector which offers full PCI-Express x16. "Stacking Error" functionality is available. For specifics, please refer to the PCI/104-Express™ documentation (rev. 2.0).

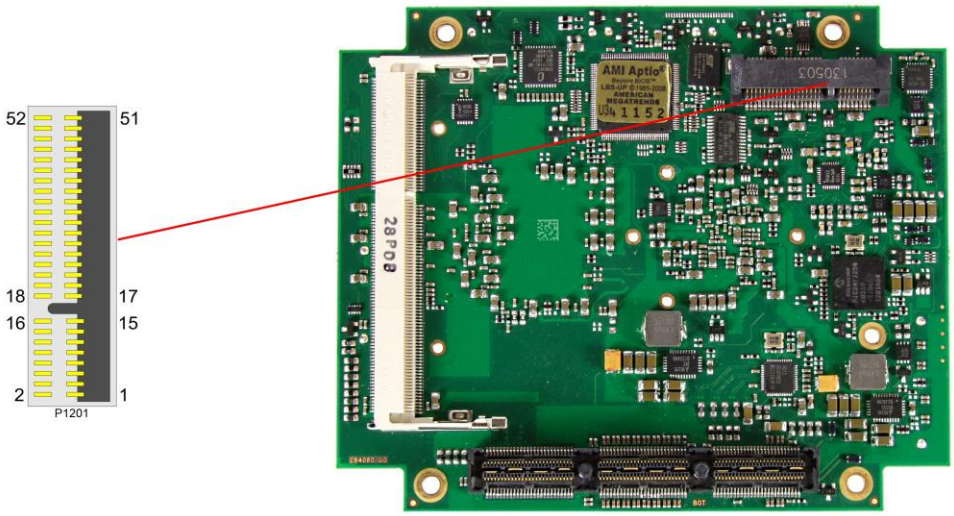


Description	Name	Pin		Name	Description
overcurrent detection	USBOC#	1	2	PERST#	PCIe reset
3.3 volt supply	3.3V	3	4	3.3V	3.3 volt supply
USB2 lane 12 data +	USB2-12.D+	5	6	USB2-11.D+	USB2 lane 11 data +
USB2 lane 12 data -	USB2-12.D-	7	8	USB2-11.D-	USB2 lane 11 data -
ground	GND	9	10	GND	ground
transmit lane 2 +	PET2	11	12	PET1	transmit lane 1 +
transmit lane 2 -	PET2#	13	14	PET1#	transmit lane 1 -
ground	GND	15	16	GND	ground
transmit lane 3 +	PET3	17	18	PET4	transmit lane 4 +
transmit lane 3 -	PET3#	19	20	PET4#	transmit lane 4 -
ground	GND	21	22	GND	ground
receive lane 2 +	PER2	23	24	PER1	receive lane 1 +
receive lane 2 -	PER2#	25	26	PER1#	receive lane 1 -
ground	GND	27	28	GND	ground
receive lane 3 +	PER3	29	30	PER4	receive lane 4 +
receive lane 3 -	PER3#	31	32	PER4#	receive lane 4 -
ground	GND	33	34	GND	ground
clock slot 2 +	PECLK1	35	36	PECLK0	clock slot 0 +
clock slot 2 -	PECLK1#	37	38	PECLK0#	clock slot 0 -
5 volt standby supply	SVCC	39	40	SVCC	5 volt standby supply
clock slot 3 +	PECLK2	41	42	PECLK3	clock slot 3 +
clock slot 3 -	PECLK2#	43	44	PECLK3#	clock slot 3 -
CPU direction	CPU_DIR	45	46	PWRGOOD	powergood
SMBus data	SMBDAT	47	48	PECLKx16	clock x16 slot +
SMBus clock	SMBCLK	49	50	PECLKx16#	clock x16 slot -
SMBus alert	SMBALERT	51	52	PSON#	PSU on
link reactivation	PEWAKE#	53	54	PEGENA#	PCIe graphics enable
ground	GND	55	56	GND	ground

Description	Name	Pin		Name	Description
x16 transmit lane 8 +	PE16T8	57	58	PE16T0	x16 transmit lane 0 +
x16 transmit lane 8 -	PE16T8#	59	60	PE16T0#	x16 transmit lane 0 -
ground	GND	61	62	GND	ground
x16 transmit lane 9 +	PE16T9	63	64	PE16T1	x16 transmit lane 1 +
x16 transmit lane 9 -	PE16T9#	65	66	PE16T1#	x16 transmit lane 1 -
ground	GND	67	68	GND	ground
x16 transmit lane 10 +	PE16T10	69	70	PE16T2	x16 transmit lane 2 +
x16 transmit lane 10 -	PE16T10#	71	72	PE16T2#	x16 transmit lane 2 -
ground	GND	73	74	GND	ground
x16 transmit lane 11 +	PE16T11	75	76	PE16T3	x16 transmit lane 3 +
x16 transmit lane 11 -	PE16T11#	77	78	PE16T3#	x16 transmit lane 3 -
ground	GND	79	80	GND	ground
x16 transmit lane 12 +	PE16T12	81	82	PE16T4	x16 transmit lane 4 +
x16 transmit lane 12 -	PE16T12#	83	84	PE16T4#	x16 transmit lane 4 -
ground	GND	85	86	GND	ground
x16 transmit lane 13 +	PE16T13	87	88	PE16T5	x16 transmit lane 5 +
x16 transmit lane 13 -	PE16T13#	89	90	PE16T5#	x16 transmit lane 5 -
ground	GND	91	92	GND	ground
x16 transmit lane 14 +	PE16T14	93	94	PE16T6	x16 transmit lane 6 +
x16 transmit lane 14 -	PE16T14#	95	96	PE16T6#	x16 transmit lane 6 -
ground	GND	97	98	GND	ground
x16 transmit lane 15 +	PE16T15	99	100	PE16T7	x16 transmit lane 7 +
x16 transmit lane 15 -	PE16T15#	101	102	PE16T7#	x16 transmit lane 7 -
ground	GND	103	104	GND	ground
reserved	N/A	105	106	SDVOCLK	SDVO clock
ground	GND	107	108	GND	ground
x16 receive lane 8 +	PE16R8	109	110	PE16R0	x16 receive lane 0 +
x16 receive lane 8 -	PE16R8#	111	112	PE16R0#	x16 receive lane 0 -
ground	GND	113	114	GND	ground
x16 receive lane 9 +	PE16R9	115	116	PE16R1	x16 receive lane 1 +
x16 receive lane 9 -	PE16R9#	117	118	PE16R1#	x16 receive lane 1 -
ground	GND	119	120	GND	ground
x16 receive lane 10 +	PE16R10	121	122	PE16R2	x16 receive lane 2 +
x16 receive lane 10 -	PE16R10#	123	124	PE16R2#	x16 receive lane 2 -
ground	GND	125	126	GND	ground
x16 receive lane 11 +	PE16R11	127	128	PE16R3	x16 receive lane 3 +
x16 receive lane 11 -	PE16R11#	129	130	PE16R3#	x16 receive lane 3 -
ground	GND	131	132	GND	ground
x16 receive lane 12 +	PE16R12	133	134	PE16R4	x16 receive lane 4 +
x16 receive lane 12 -	PE16R12#	135	136	PE16R4#	x16 receive lane 4 -
ground	GND	137	138	GND	ground
x16 receive lane 13 +	PE16R13	139	140	PE16R5	x16 receive lane 5 +
x16 receive lane 13 -	PE16R13#	141	142	PE16R5#	x16 receive lane 5 -
ground	GND	143	144	GND	ground
x16 receive lane 14 +	PE16R14	145	146	PE16R6	x16 receive lane 6 +
x16 receive lane 14 -	PE16R14#	147	148	PE16R6#	x16 receive lane 6 -
ground	GND	149	150	GND	ground
x16 receive lane 15 +	PE16R15	151	152	PE16R7	x16 receive lane 7 +
x16 receive lane 15 -	PE16R15#	153	154	PE16R7#	x16 receive lane 7 -
ground	GND	155	156	GND	ground
5 volt supply	VCC	C1			
5 volt supply	VCC	C2			
12 volt supply	12V	C3			

3.6 PCI-Express Mini Card with mSATA

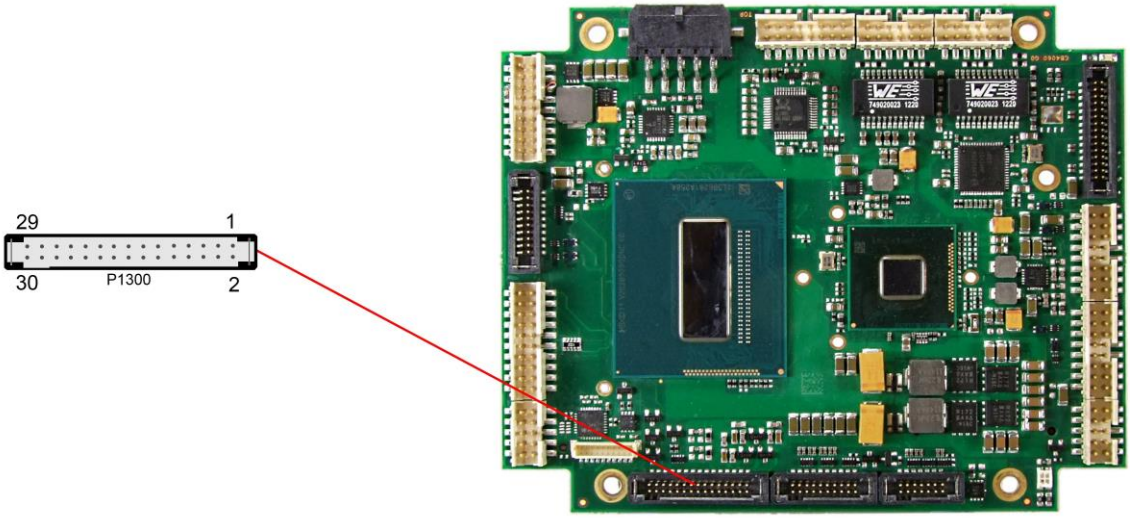
As a soldering option, the ADLQM87PC can be equipped with PCI-Express Mini Card connector to interface with approved peripherals, such as Wi-FI and storage cards via miniPCIe. In addition the PCIe Mini Card connector supports storage modules via mSATA.



Description	Name	Pin		Name	Description
PCIe ake	PEWAKE#	1	2	S3.3V	3.3 volt standby supply
reserved	N/C	3	4	GND	ground
reserved	N/C	5	6	1.5V	1.5 volt supply
clock enable	PEMCLKen#	7	8	N/C	reserved
ground	GND	9	10	N/C	reserved
clock -	PECLKMC#	11	12	N/C	reserved
clock +	PECLKMC	13	14	N/C	reserved
ground	GND	15	16	N/C	reserved
reserved	N/C	17	18	GND	ground
reserved	N/C	19	20	WDISABLE#	wireless disable
ground	GND	21	22	PERST#	PCIe reset
PCIe receive -	PERMC#	23	24	S3.3V	3.3 volt standby supply
PCIe receive +	PERMC	25	26	GND	ground
ground	GND	27	28	1.5V	1.5 volt supply
ground	GND	29	30	SMB-CLK	SM-bus clock
PCIe transmit -	PETMC#	31	32	SMB-DAT	SM-bus data
PCIe transmit +	PETMC	33	34	GND	ground
ground	GND	35	36	USBMC#	USB -
ground	GND	37	38	USBMC	USB +
3.3 volt standby supply	S3.3V	39	40	GND	ground
3.3 volt standby supply	S3.3V	41	42	N/C	reserved
ground	GND	43	44	N/C	reserved
reserved	N/C	45	46	N/C	reserved
reserved	N/C	47	48	1.5V	1.5 volt supply
reserved	N/C	49	50	GND	ground
reserved	N/C	51	52	S3.3V	3.3 volt standby supply

3.7 DVI/HDMI/VGA

The ADLQM87PC provides a DVI/HDMI/VGA-interface which is realized as a 2x15pin header (TFM 115-02-S-D-WT, mating connector e.g. SFM 115-02-S-D-xx).

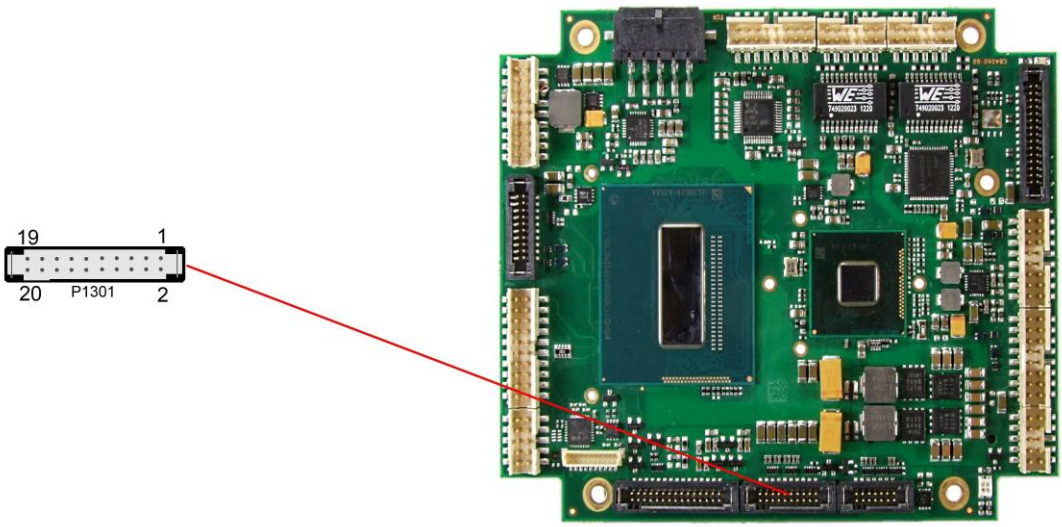


Pinout 2x15 connector DVI/HDMI/VGA:

Description	Name	Pin		Name	Description
Red	Red	1	2	GND	ground
Green	Green	3	4	CS-DDDA	DDC data
Blue	Blue	5	6	CS-DDCK	DDC clock
CS-VSYNC (Vertical synchronization)	CS-VSYNC	7	8	GND	ground
CS-HSYNC (Horizontal synchronization)	CS-HSYNC	9	10	GND	ground
5 volt supply	VCC	11	12	GND	ground
Hot Plug Detect	HPD	13	14	N/A	reserved
DDC clock	DDCCLK	15	16	DDCDAT	DDC data +
5 volt supply	VCC	17	18	GND	ground
ground	GND	19	20	TMDSCLK#	TMDS clock -
TMDS data -	TMDS#0	21	22	TMDSCLK	TMDS clock
TMDS data +	TMDS0	23	24	GND	ground
ground	GND	25	26	TMDS#1	TMDS data -
TMDS data -	TMDS#2	27	28	TMDS1	TMDS data +
TMDS data +	TMDS2	29	30	GND	ground

3.8 DisplayPort

The ADLQM87PC offers a DisplayPort interface which is realized as 2x10pin connector (TFM-110-02-S-D-WT, mating connector SFM-110-02-S-D-xx). This interface can also be operated in HDMI/DVI mode. To achieve this, pin 2 must be connected to 3.3V (e.g. pin 5).

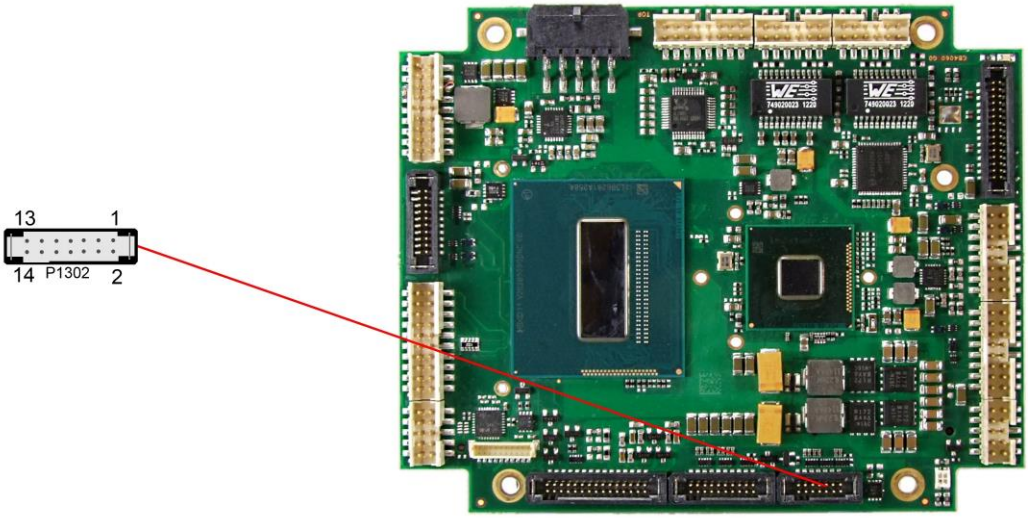


Pinout 2x10pin DisplayPort connector:

Description	Name	Pin		Name	Description
Hotplug detect	DPHPD	1	2	HDMIEN	HDMI enable
DP Aux + / EDID Clock	DPAUX/DDCK	3	4	DPAUX#/DDDA	DP Aux - / EDID data
3.3V supply	3.3V	5	6	GND	Ground
Ground	GND	7	8	DPL3#/TMDSCLK#	DP Lane 3 - / HDMI Clock -
DP Lane 2 - / HDMI 0 -	DPL2#/TMDS0#	9	10	DPL3/TMDSCLK	DP Lane 3 + / HDMI Clock +
DP Lane 2 + / HDMI 0 +	DPL2/TMDS0	11	12	GND	Ground
Ground	GND	13	14	DPL1#/TMDS1#	DP Lane 1 - / HDMI 1 -
DP Lane 0 - / HDMI 2 -	DPL0#/TMDS2#	15	16	DPL1/TMDS1	DP Lane 1 + / HDMI 1 +
DP Lane 0 + / HDMI 2 +	DPL0/TMDS2	17	18	GND	Ground
Reserved	N/C	19	20	GND	Ground

3.9 Embedded DisplayPort

The ADLQM87PC offers an Embedded DisplayPort interface which is realized as 2x7pin connector (TFM-107-02-S-D-WT, mating connector e.g. SFM 107-02-S-D-xx).

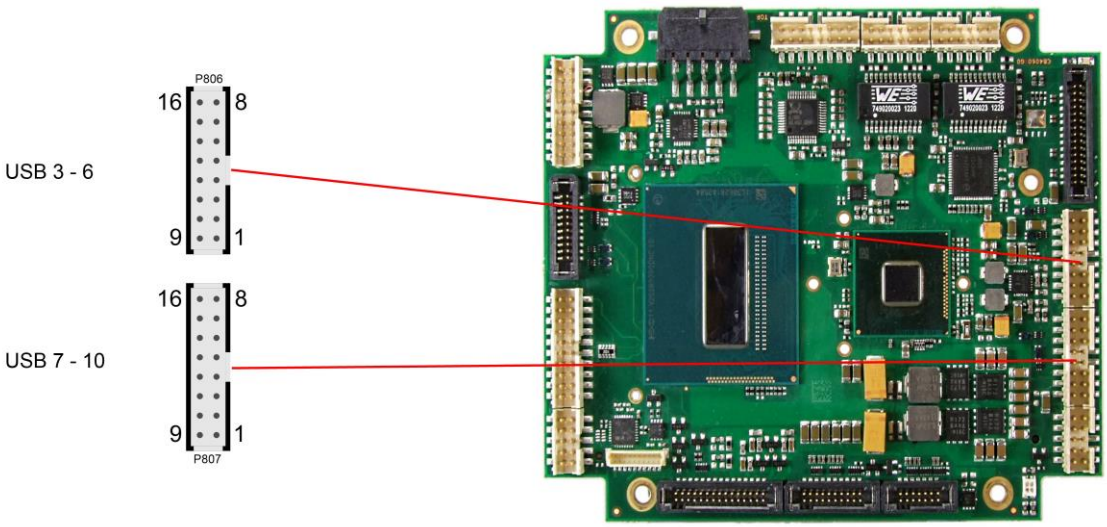


Pinout Embedded DisplayPort:

Beschreibung	Name	Pin		Name	Beschreibung
Hotplug Detect	EDPHPD	1	2	EDPBKLEN	BKLEN
eDisplayport Aux +	EDPAUX	3	4	EDPAUX#	eDisplayport Aux -
BKLCTRL	BKLCTRL	5	6	GND	Ground
Ground	GND	7	8	EDPTX1#	eDisplayport Transmit 1 -
eDisplayport Transmit -	EDPTX0#	9	10	EDPTX1	eDisplayport Transmit1 +
eDisplayport Transmit +	EDPTX0	11	12	FP_3,3V	Ground
Ground	GND	13	14	VCC	Supply Voltage

3.10 USB 2.0

USB channels 3 to 10 are provided via two 2x8pin connectors (FCI 98424-G52-16LF, mating connector e.g. FCI 90311-016LF).
All 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 a USB supporting OS (such as Microsoft® 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.

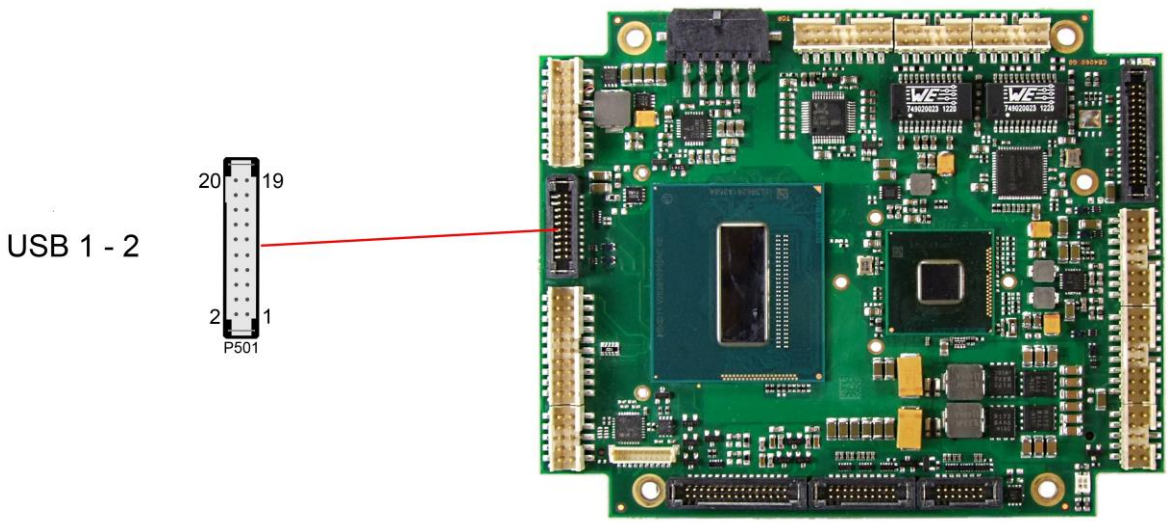


Pinout USB 3-10:

Description	Name	Pin		Name	Description
5 volt for USB1	USB1 VCC	1	9	USB2VCC	5 volt for USB2
minus channel USB1	USB1#	2	10	USB2#	minus channel USB2
plus channel USB1	USB1	3	11	USB2	plus channel USB2
ground	GND	4	12	GND	ground
ground	GND	5	13	GND	ground
plus channel USB3	USB3	6	14	USB4	plus channel USB4
minus channel USB3	USB3#	7	15	USB4#	minus channel USB4
5 volt for USB3	USB3VCC	8	16	USB4VCC	5 volt for USB4

3.11 USB 3.0

USB channels 1 and 2 are provided via one 2x10pin connector (TFM-110-02-S-D-WT, mating connector SFM-110-02-S-D-xx). Both USB-channels support USB 3.0. 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 a USB supporting OS (such as Microsoft® Windows®) with these features enabled may lead to significant performance or functionality limitations.
Every USB interface provides up to 900 mA current and is protected by an electronically resettable fuse.

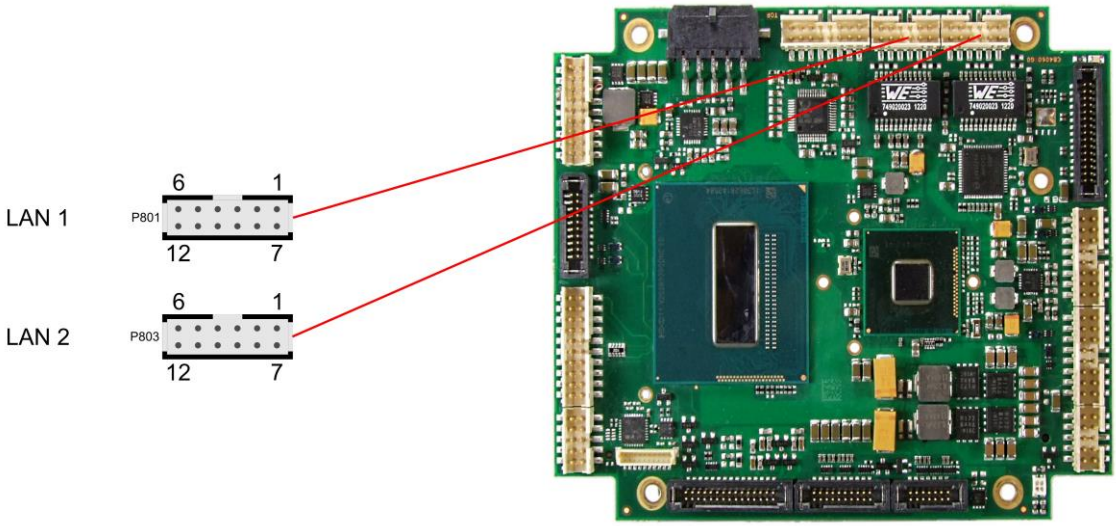


Pinout connector USB3.0 port X/Y:

Description	Name	Pin		Name	Description
reserved	N/A	1	2	USB3-y.D+	USB y data +
USB x data +	USB3-x.D+	3	4	USB3-y.D-	USB y data -
USB x data -	USB3-x.D-	5	6	GND	ground
ground	GND	7	8	SSTXy+	USB y transmit +
USB x transmit +	SSTXx+	9	10	SSTXy-	USB y transmit -
USB x transmit -	SSTXx-	11	12	GND	ground
ground	GND	13	14	SSRXy+	USB y receive +
USB x receive +	SSRX+	15	16	SSRXy-	USB y receive -
USB x receive -	SSRX-	17	18	VCC	5 volt for USB y
5 volt for USB x	VCC	19	20	N/A	reserved

3.12 LAN

Both LAN interfaces are provided via a 2x6pin connector (FCI 98424-G52-12LF, mating connector e.g. FCI 90311-012LF). The interfaces support 10BaseT, 100BaseT, and 1000BaseT compatible network components with automatic bandwidth selection. Additional outputs are provided for status LEDs. Auto-negotiate and auto-cross functionality is available, PXE and RPL are available on request.

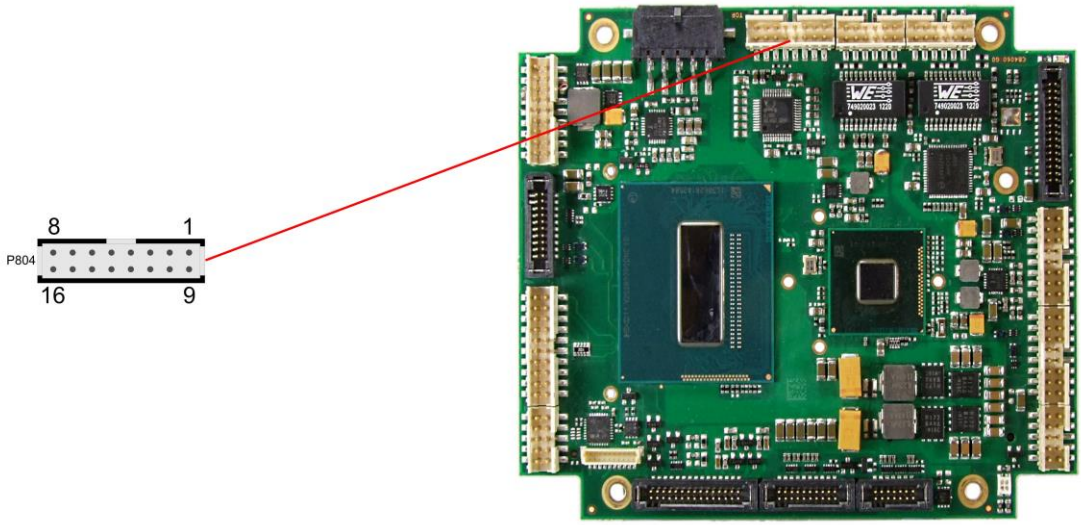


Pinout LAN interface:

Description	Name	Pin		Name	Description
LAN activity	LINKACT	1	7	SPEED1000	LAN speed 1000Mbit
LAN channel 1 plus	LAN1	2	8	LAN0	LAN channel 0 plus
LAN channel 1 minus	LAN1#	3	9	LAN0#	LAN channel 0 minus
LAN channel 3 plus	LAN3	4	10	LAN2	LAN channel 2 plus
LAN channel 3 minus	LAN3#	5	11	LAN2#	LAN channel 2 minus
LAN speed 100Mbit	SPEED100	6	12	3.3V	3.3 volt supply

3.13 Audio

The ADLQM87PC's audio functions are provided via a 2x8pin connector (FCI 98424-G52-16LF, mating connector e.g. FCI 90311-016LF). This interface provides eight output channels for full 7.1 sound output. Two microphone inputs and two AUX inputs are also available.
The signals "SPDIFI" and "SPDIFO" provide digital input and output. If a transformation to a coaxial or optical connector is necessary this must be performed externally.

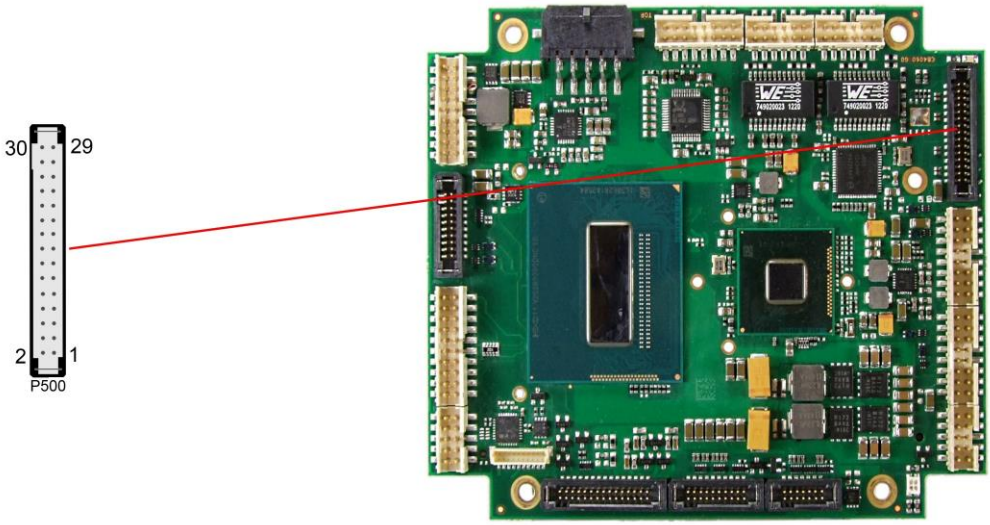


Pinout Audio:

Description	Name	Pin		Name	Description
digital output SPDIF	SPDIFO	1	9	3.3V	3.3 volt supply
digital input SPDIF	SPDIFI	2	10	S_AGND	analog ground sound
sound output right	LOUT_R	3	11	LOUT_L	sound output left
AUX input right	AUXA_R	4	12	AUXA_L	AUX input left
microphone input 1	MIC1	5	13	MIC2	microphone input 2
surround out right	SOUT_R	6	14	SOUT_L	surround out left
center output	CENOUT	7	15	LFEOUT	LFE output
side surround out right	SSOUT_R	8	16	SSOUT_L	side surround out left

3.14 SATA Interfaces

The ADLQM87PC provides four SATA interfaces from which SATA 3 and 4 allow transfer rates of up to 3 Gb/s. Additionally SATA 1 and 2 allow transfer rates up to 6 Gb/s. All these interfaces are made available via a 2x15pin connector (TFM-115-02-S-D-WT, mating connector SFM-115-02-S-D-xx) and support RAID 0/1/5/10.
The required settings are made in the BIOS setup.

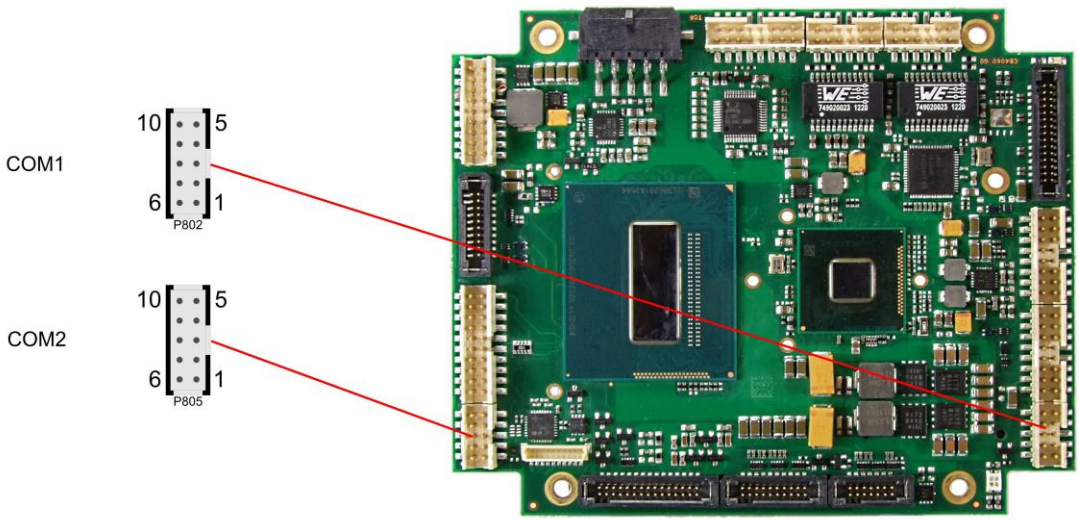


Pinout SATA 2x15:

Description	Name	Pin	Pin	Name	Description
ground	GND	1	2	GND	groune
SATA1 send +	SATA1TX	3	4	SATA2TX	SATA2 send +
SATA1 send -	SATA1TX#	5	6	SATA2TX#	SATA2 send -
ground	GND	7	8	GND	ground
SATA1 receive -	SATA1RX#	9	10	SATA2RX#	SATA2 receive -
SATA1 receive +	SATA1RX	11	12	SATA2RX	SATA2 receive +
ground	GND	13	14	GND	ground
reserved	N/A	15	16	N/A	reserved
ground	GND	17	18	GND	ground
SATA3 send +	SATA3TX	19	20	SATA4TX	SATA4 send
SATA3 send -	SATA3TX#	21	22	SATA4TX#	SATA4 send -
ground	GND	23	24	GND	ground
SATA3 receive -	SATA3RX#	25	26	SATA4RX#	SATA4 receive -
SATA3 receive +	SATA3RX	27	28	SATA4RX	SATA4 receive
ground	GND	29	30	GND	ground

3.15 COM1 and COM2

The serial interfaces COM1 and COM2 are provided via a 2x5pin connector (FCI 98424-G52-10LF, mating connector e.g. FCI 90311-010LF).

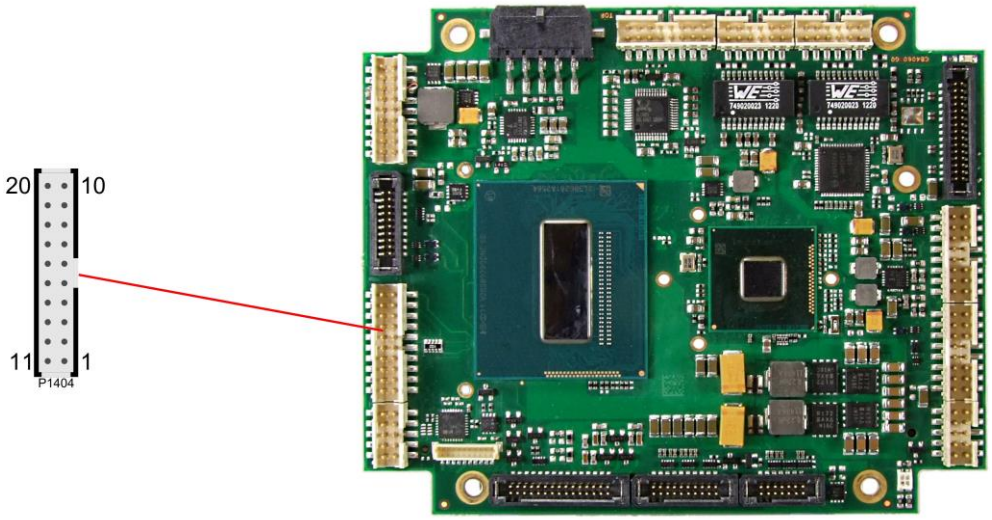


Pinout COM connector:

Description	Name	Pin		Name	Description
data carrier detect	DCD	1	6	DSR	data set ready
receive data	RXD	2	7	RTS	request to send
transmit data	TXD	3	8	CTS	clear to send
data terminal ready	DTR	4	9	RI	ring indicator
ground	GND	5	10	VCC	5 volt supply

3.16 GPIO

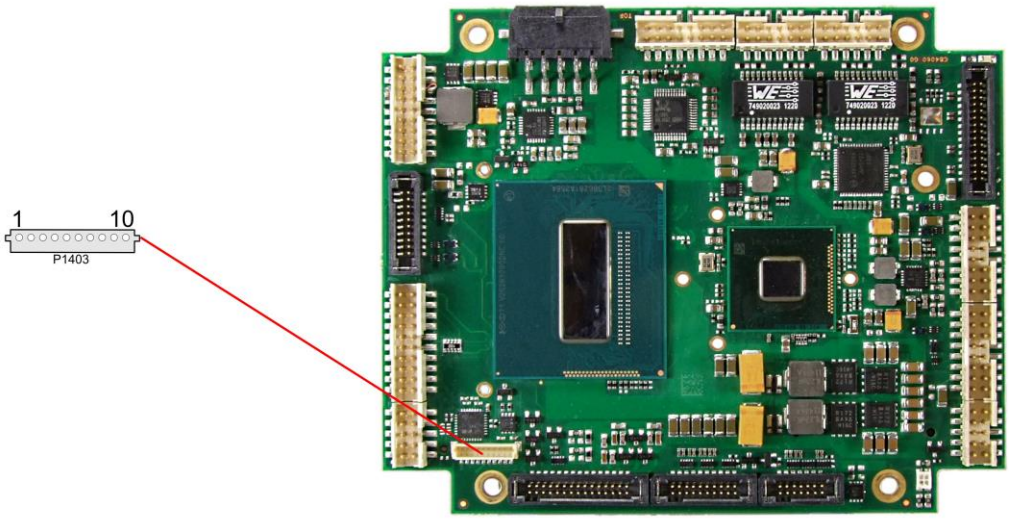
The General Purpose Input/Output interface is made available through a 2x10 pin connector (FCI 98424-G52-20LF, mating connector e.g. FCI 90311-020LF). To make use of this interface the SIO unit must be programmed accordingly. Please refer to your sales representative for information on available software support.



Description	Name	Pin		Name	Description
ground	GND	1	11	3.3V	3.3 volt supply
GP input/output 00	GPIO00	2	12	GPIO10	GP input/output 10
GP input/output 01	GPIO01	3	13	GPIO11	GP input/output 11
GP input/output 02	GPIO02	4	14	GPIO12	GP input/output 12
GP input/output 03	GPIO03	5	15	GPIO13	GP input/output 13
GP input/output 04	GPIO04	6	16	GPIO14	GP input/output 14
GP input/output 05	GPIO05	7	17	GPIO15	GP input/output 15
GP input/output 06	GPIO06	8	18	GPIO16	GP input/output 16
GP input/output 07	GPIO07	9	19	GPIO17	GP input/output 17
3.3 volt supply	3.3V	10	20	GND	ground

3.17 Monitoring Functions

Additional monitoring functions, such as the status of the fan or of other devices connected over SM-Bus (e. g. temperature sensor), are accessible via an 10 pin connector (JST BM10B-SRSS-TB, mating connector: SHR-10V-S(-B)).

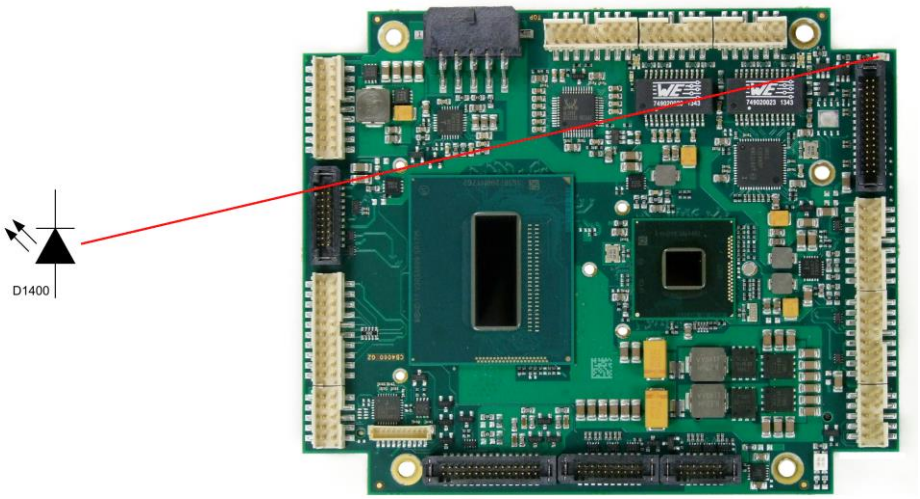


Pin	Name	Description
1	3.3V	3.3 volt supply
2	CS-SMB-CLK	SMBus clock
3	CS-SMB-DAT	SMBus data
4	GND	ground
5	VCC	5 volt supply
6	FANCTRL1	fan 1 monitoring signal
7	FANON1	ground (switched)
8	FANCTRL2	fan 2 monitoring signal
9	FANON2	ground (switched)
10	FANCTRL3	fan 3 (external) monitoring signal

4 State LEDs

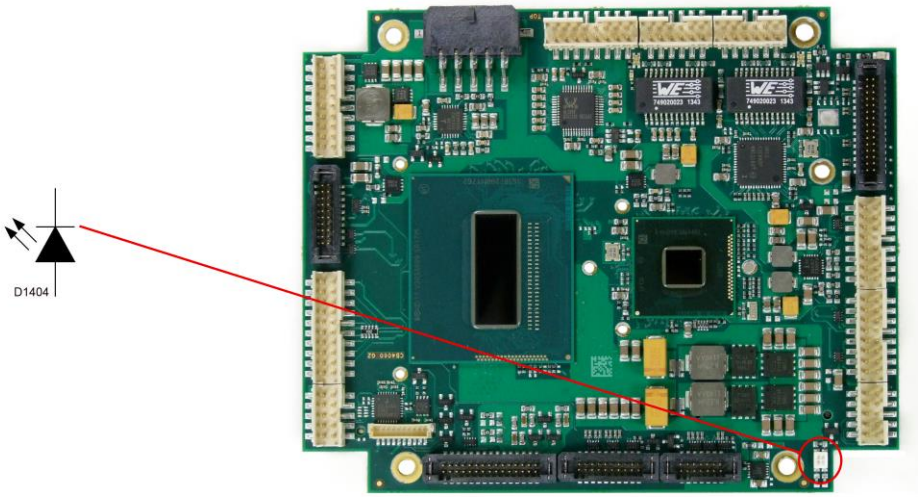
4.1 HD LED

Harddisk activity is signalled by a dedicated LED.



4.2 RGB LED

The ADLQM87PC has an RGB LED, which can signal status messages by using different colors and flash intervals.



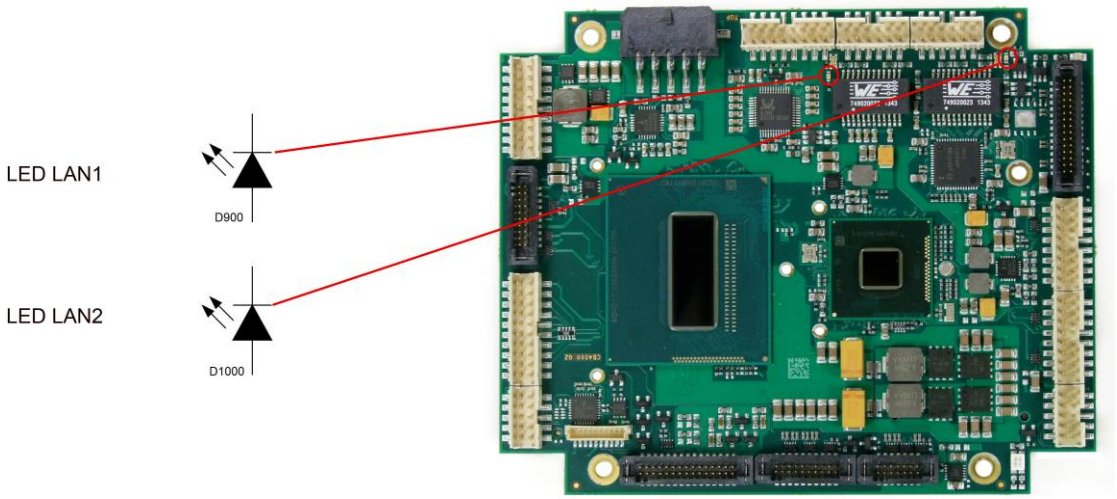
Status Codes RGB LED:

Color	Interval		Meaning
non	solid		Invalid system state
White	once		Powerfail
Cyan	solid		Reserved
Magenta	solid		if present: SUPS active
Blue	solid		Reserved
Yellow	solid		S5 state
Green	solid		S0 state
Red	solid		Reset/Start
Green/Yellow	flashing		Bootloader operates normal
Red/Yellow	flashing		Bootloader is being started (starting sequence still running)
Red/Magenta	flashing		Checksum error during i2C transmission in bootloader
Red/Blue	flashing		Update completed, waiting for manual Reset
Yellow	flashing (6s)		S4 state
Yellow	flashing (3s)		S3 state
Blue	flashing (0,5s)		if present: SUPS test of capacity

NOTICE **If the board appears to be in Reset (Red LED lit) then this could also indicate a PCI104-Express "stacking error". Such an error could occur when the stack contains a peripheral card which has the wrong type of connector (PCI104-Express Type 1 instead of Type 2 or vice versa).**

4.3 LAN Activity LED

The ADLQM87PC has two unicolor LEDs, which signal LAN activity of the current LAN port.



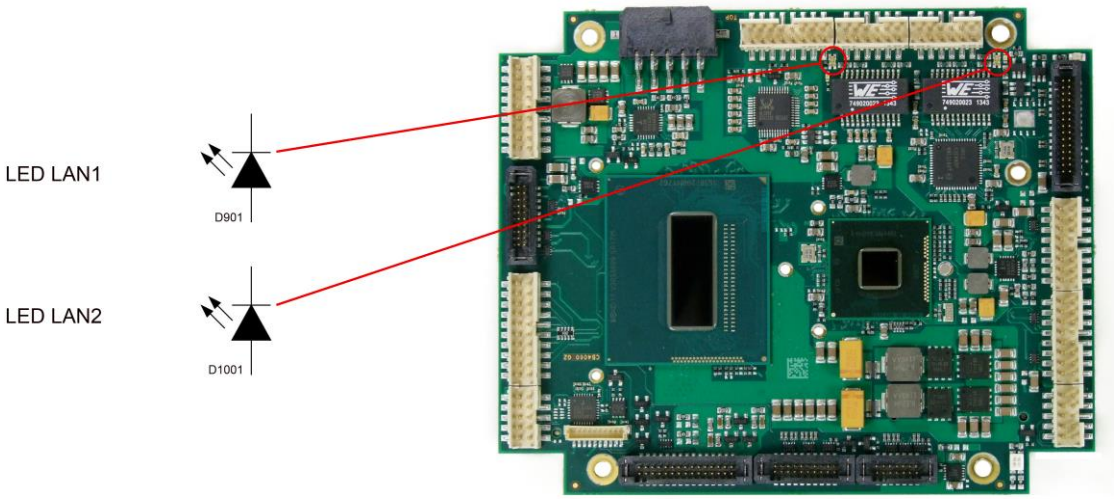
LAN link activity:

Color	Interval		Meaning
none	solid		no LAN activity
green	flashing		LAN active

NOTICE The G1 version of the ADLQM87PC does not provide the described LEDs.

4.4 LAN Speed LED

Two bicolor LEDs show the links speed of the current LAN port.



LAN speed:

Color	Interval		Meaning
none	solid		10 Mbit/s
orange	solid		100 Mbit/s
green	solid		1000 Mbit/s

NOTICE The G1 version of the ADLQM87PC does not provide the described LEDs.

5 BIOS Settings

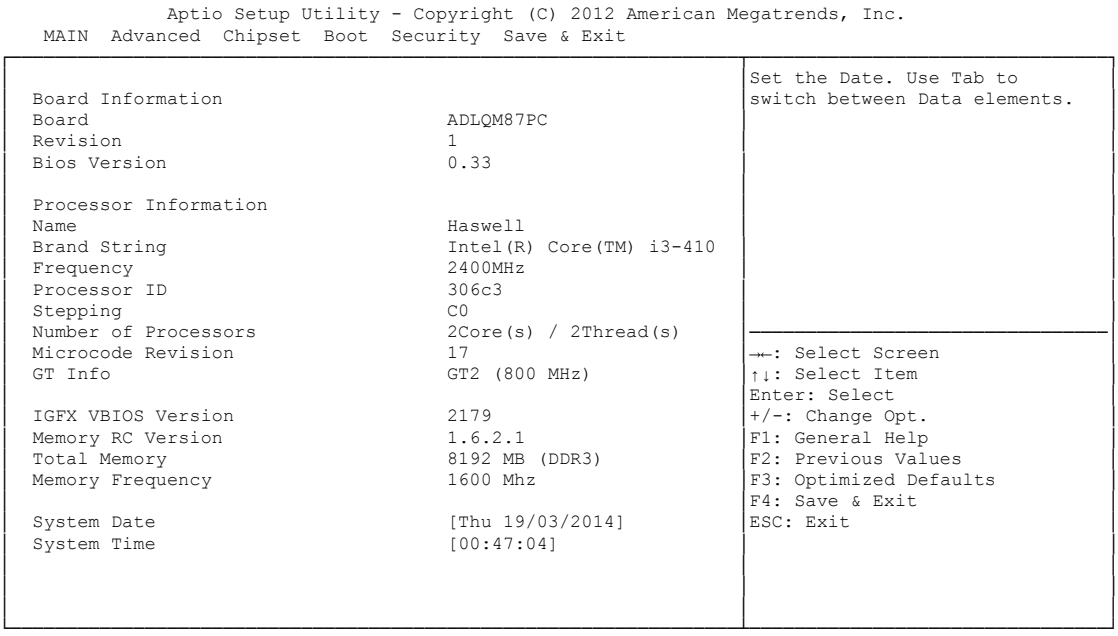
5.1 General Remarks

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



- ✓ **Board**
  Options: none
- ✓ **Revision**
  Options: none
- ✓ **Bios Version**
  Options: none
- ✓ **Processor Information**
  Options: none
- ✓ **Name**
  Options: none
- ✓ **Brand String**
  Options: none
- ✓ **Frequency**
  Options: none
- ✓ **Processor ID**
  Options: none
- ✓ **Stepping**
  Options: none
- ✓ **Number of Processors**
  Options: none
- ✓ **Microcode Revision**
  Options: none

- ✓ **GT Info**
  Options: none

- ✓ **IGFX VBIOS Version**
  Options: none

- ✓ **Memory RC Version**
  Options: none

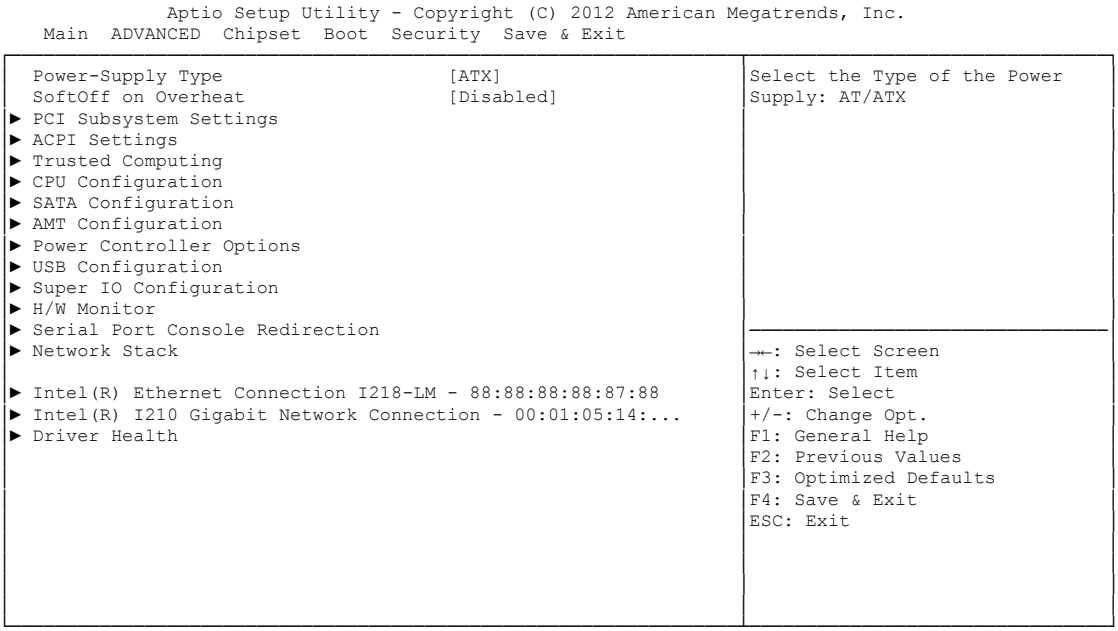
- ✓ **Total Memory**
  Options: none

- ✓ **Memory Frequency**
  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



- ✓ **Power-Supply Type**
  Options: ATX / AT

- ✓ **SoftOff on Overheat**
  Options: Disabled / Enabled

- ✓ **PCI Subsystem Settings**
  Sub menu: see "PCI Subsystem Settings" (page 43)

- ✓ **ACPI Settings**
  Sub menu: see "ACPI Settings" (page 45)

- ✓ **Trusted Computing**
  Sub menu: see "Trusted Computing" (page 46)

- ✓ **CPU Configuration**
  Sub menu: see "CPU Configuration" (page 47)

- ✓ **SATA Configuration**
  Sub menu: see "SATA Configuration" (page 50)

- ✓ **AMT Configuration**
  Sub menu: see "AMT Configuration" (page 53)

- ✓ **Power Controller Options**
  Sub menu: see "Power Controller Options" (page 55)

- ✓ **USB Configuration**
  Sub menu: see "USB Configuration" (page 57)

- ✓ **Super IO Configuration**
  Sub menu: see "Super IO Configuration" (page 58)

- ✓ **H/W Monitor**
  Sub menu: see "H/W Monitor" (page 60)

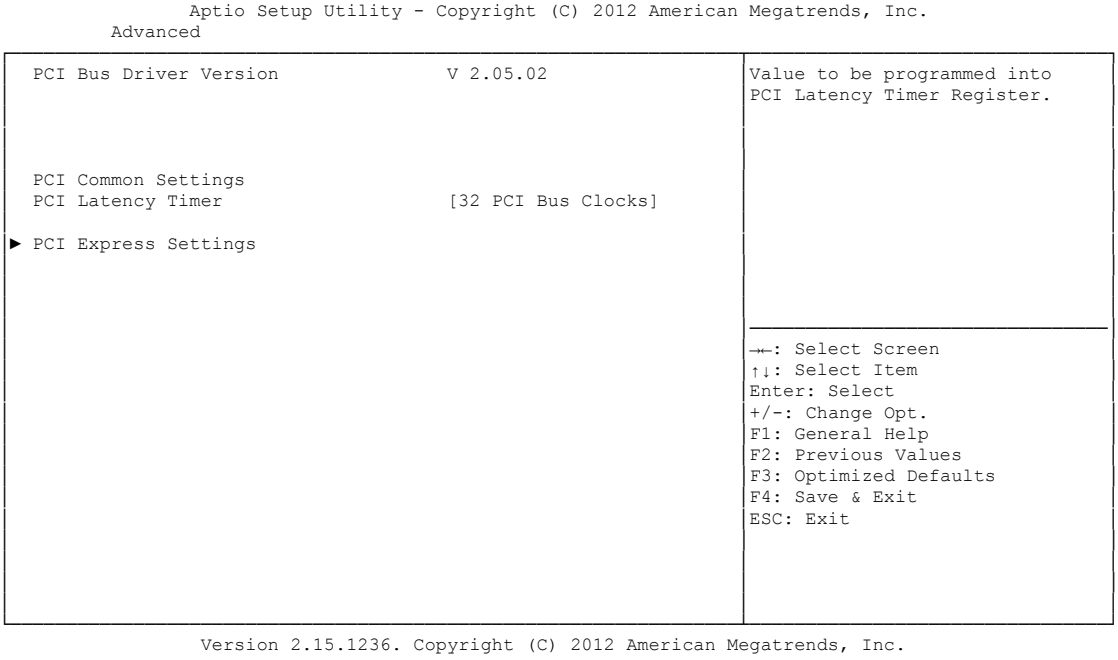
- ✓ **Serial Port Console Redirection**
  Sub menu: see "Serial Port Console Redirection" (page 62)

- ✓ **Network Stack**
  Sub menu: see "Network Stack" (page 65)

- ✓ **Intel(R) Ethernet Connection I218**
  Sub menu: see "Intel(R) Ethernet Connection I218-LM" (page 66)

- ✓ **Driver Health**
  Sub menu: see "Driver Health" (page 70)

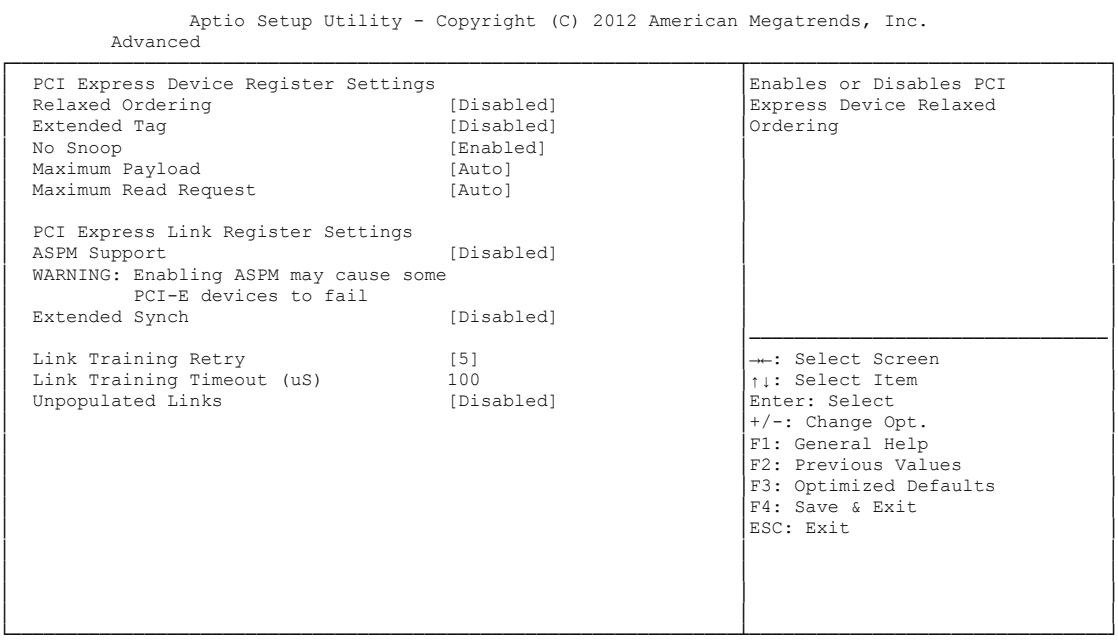
5.3.1 PCI Subsystem Settings



- ✓ **PCI Latency Timer**
  Options: 32, 64,...224, 248 PCI Bus Clocks

- ✓ **PCI Express Settings**
  Sub menu: see "PCI Express Settings" (page 44)

5.3.1.1 PCI Express Settings



- ✓ **Relaxed Ordering**
  Options: Enabled / Disabled

- ✓ **Extended Tag**
  Options: Enabled / Disabled

- ✓ **No Snoop**
  Options: Enabled / Disabled

- ✓ **Maximum Payload**
  Options: Auto / 128 Bytes / 256 Bytes / 512 Bytes / 1024 Bytes / 2048 Bytes / 4096 Bytes

- ✓ **Maximum Read Request**
  Options: Auto / 128 Bytes / 256 Bytes / 512 Bytes / 1024 Bytes / 2048 Bytes / 4096 Bytes

- ✓ **ASPM Support**
  Options: Disabled / Auto / Force L0s

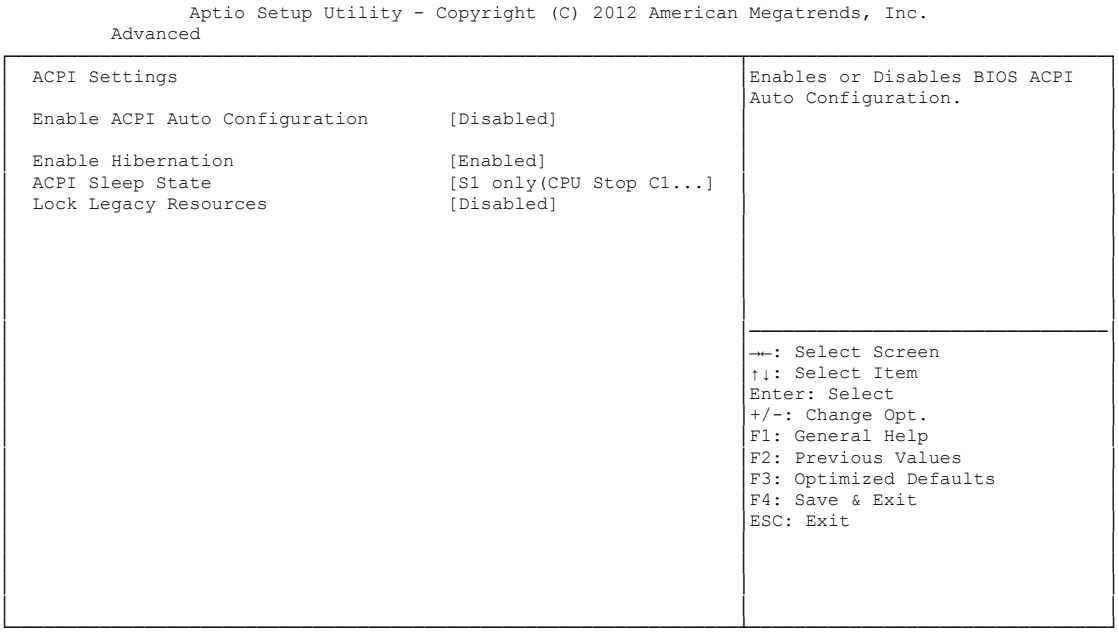
- ✓ **Extended Synch**
  Options: Enabled / Disabled

- ✓ **Link Training Retry**
  Options: Disabled / 2 / 3 / 5

- ✓ **Link Training Timeout (uS)**
  Options: 10...1000

- ✓ **Unpopulated Links**
  Options: Keep Link ON / Disable Link

5.3.2 ACPI Settings



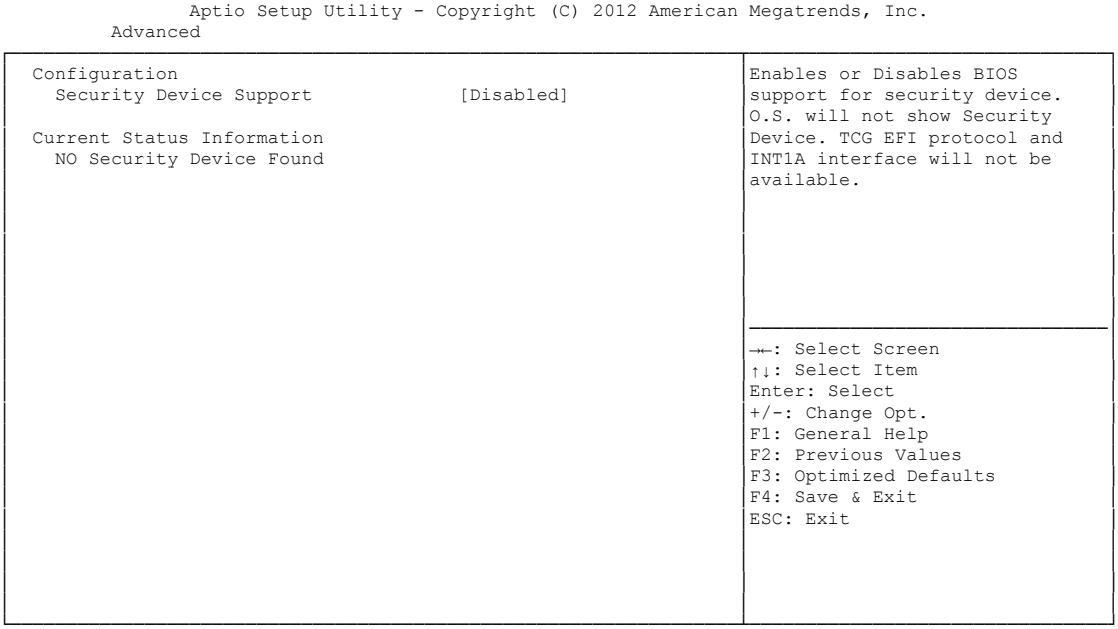
- ✓ **Enable ACPI Auto Configuration**
  Options: Enabled / Disabled

- ✓ **Enable Hibernation**
  Options: Enabled / Disabled

- ✓ **ACPI Sleep State**
  Options: Suspend Disabled / S1 (CPU Stop Clock)

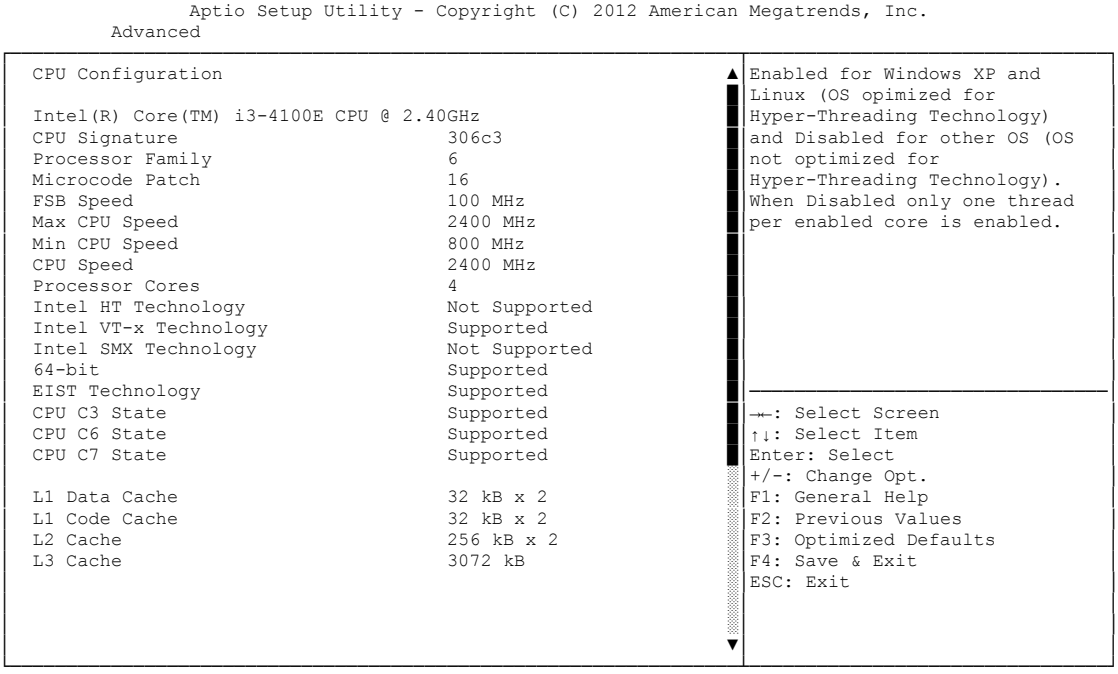
- ✓ **Lock Legacy Resources**
  Options: Enabled / Disabled

5.3.3 Trusted Computing



✓ **Security Device Support**
Options: Enabled / Disabled

5.3.4 CPU Configuration



- ✓ **CPU Signature**
  Options: none

- ✓ **Processor Family**
  Options: none

- ✓ **Microcode Patch**
  Options: none

- ✓ **FSB Speed**
  Options: none

- ✓ **Max CPU Speed**
  Options: none

- ✓ **Min CPU Speed**
  Options: none

- ✓ **CPU Speed**
  Options: none

- ✓ **Processor Cores**
  Options: none

- ✓ **Intel HT Technology**
  Options: none

- ✓ **Intel VT-x Technology**
  Options: none

- ✓ **Intel SMX Technology**
  Options: none

- ✓ **64-bit**
  Options: none

- ✓ **EIST Technology**
  Options: none

- ✓ **CPU C3 state**
  Options: none

- ✓ **CPU C6 state**
  Options: none

- ✓ **CPU C7 state**
  Options: none

- ✓ **L1 Data Cache**
  Options: none

- ✓ **L1 Code Cache**
  Options: none

- ✓ **L2 Cache**
  Options: none

- ✓ **L3 Cache**
  Options: none

- ✓ **Hyper-threading**
  Options: Enabled / Disabled

- ✓ **Active Processor Cores**
  Options: All

- ✓ **Overclocking lock**
  Options: Disabled / Enabled

- ✓ **Limit CPUID Maximum**
  Options: Enabled / Disabled

- ✓ **Execute Disable Bit**
  Options: Enabled / Disabled

- ✓ **Intel Virtualization Technology**
  Options: Enabled / Disabled

- ✓ **Hardware Prefetcher**
  Options: Disabled / Enabled

- ✓ **Adjacent Cache Line Prefetch**
  Options: Disabled / Enabled

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

- ✓ **Turbo Mode**
  Options: Enabled / Disabled

- ✓ **Package power limit lock**
  Options: Disabled / Enabled

- ✓ **CPU Power Limit1**
  Options: 0..255

- ✓ **CPU Power Limit1 Time**
  Options: 0..255

- ✓ **CPU Power Limit 2**
  Options: 0..255

- ✓ **Platform power limit lock**
  Options: Disabled / Enabled

- ✓ **CPU Power Limit3**
  Options: 0..255

- ✓ **CPU Power Limit3 Time**
  Options: 0..255

- ✓ **CPU Power Limit3 Duty Cycle**
  Options: 0..100

- ✓ **DDR Power Limit1**
  Options: 0..255

- ✓ **DDR Power Limit1 Time**
  Options: 0..255

- ✓ **DDR Power Limit2**
  Options: 0..255

- ✓ **1-Core Ratio Limit**
  Options: 0..255

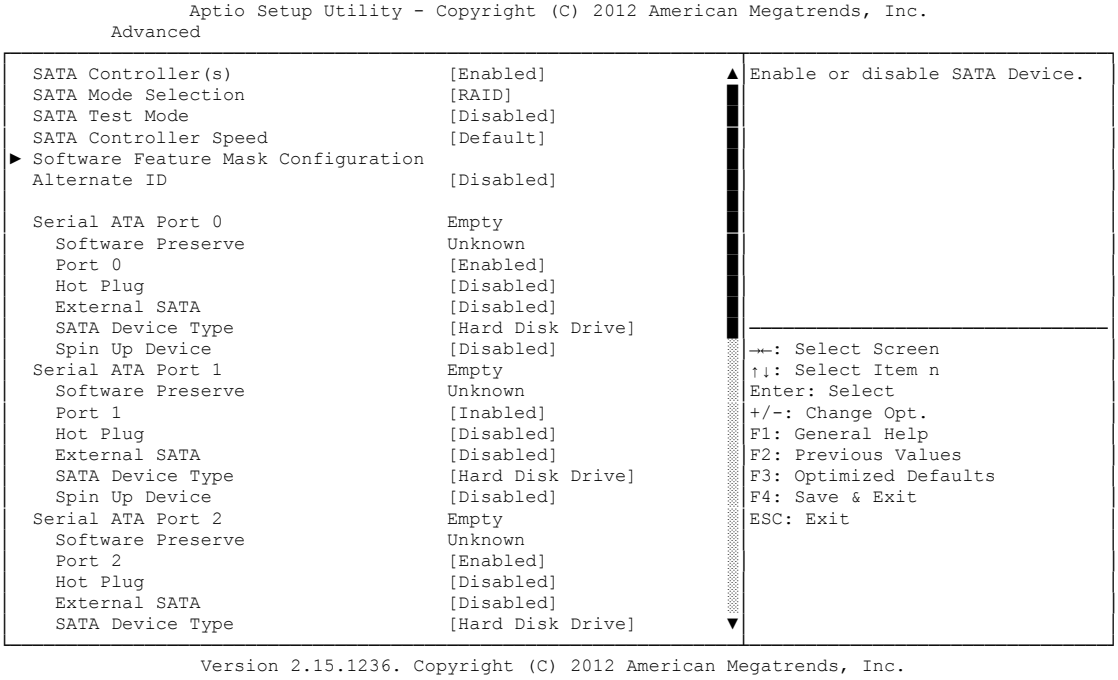
- ✓ **2-Core Ratio Limit**
  Options: 0..255

- ✓ **TCC Activation Offset**
  Options: 0...15

- ✓ **ACPI T State**
  Options: Disabled / Enabled

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

5.3.5 SATA Configuration



- ✓ **SATA Controller(s)**
  Options: Enabled / Disabled

- ✓ **SATA Mode Selection**
  Options: IDE / AHCI / RAID

- ✓ **SATA Test Mode**
  Options: Enabled / Disabled

- ✓ **SATA Controller Speed**
  Options: Default / Gen1 / Gen2 / Gen3

- ✓ **Software Feature Mask Configuration**
  Sub menu: see "Software Feature Mask Configuration" (page 52)

- ✓ **Alternate ID**
  Options: Enabled / Disabled

- ✓ **Serial ATA Port X**
  Options: none

- ✓ **Software Preserve**
  Options: none

- ✓ **Port X**
  Options: Enabled / Disabled

- ✓ **Hot Plug**
  Options: Enabled / Disabled

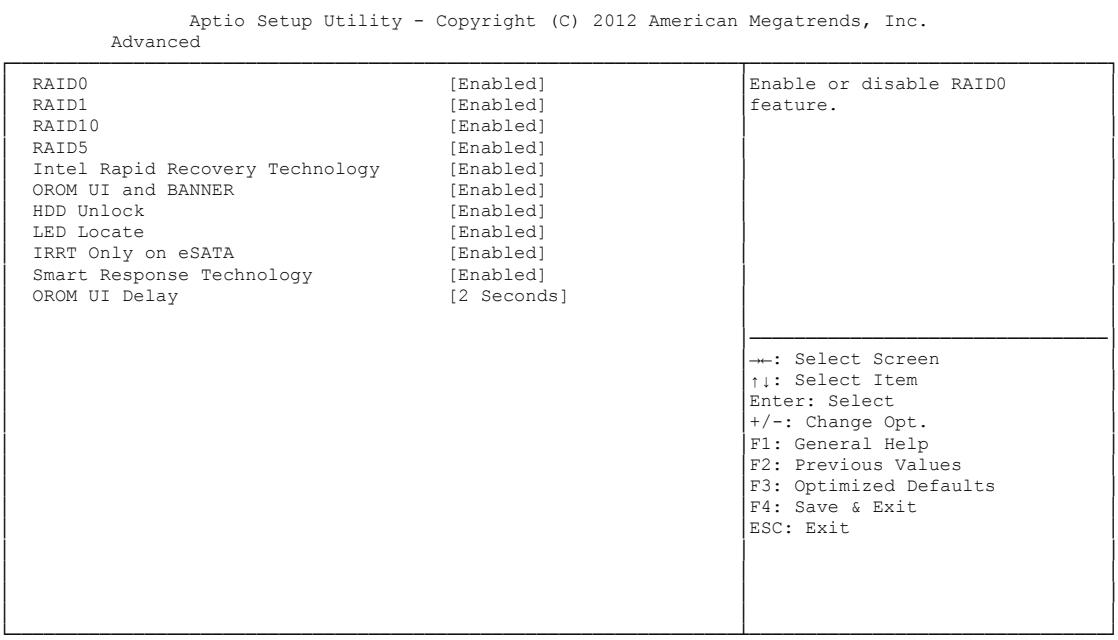
- ✓ **Mechanical Presence Switch**
  Options: Disabled / Enabled

- ✓ **External SATA**
  Options: Enabled / Disabled

- ✓ **SATA Device Type**
  Options: Hard Disk Drive / Solid State Drive

- ✓ **Spin Up Device**
  Options: Enabled / Disabled

5.3.5.1 Software Feature Mask Configuration



- ✓ **RAID0**
  Options: Enabled / Disabled

- ✓ **RAID1**
  Options: Enabled / Disabled

- ✓ **RAID10**
  Options: Enabled / Disabled

- ✓ **RAID5**
  Options: Enabled / Disabled

- ✓ **Intel Rapid Recovery Technology**
  Options: Enabled / Disabled

- ✓ **OROM UI and BANNER**
  Options: Enabled / Disabled

- ✓ **HDD Unlock**
  Options: Enabled / Disabled

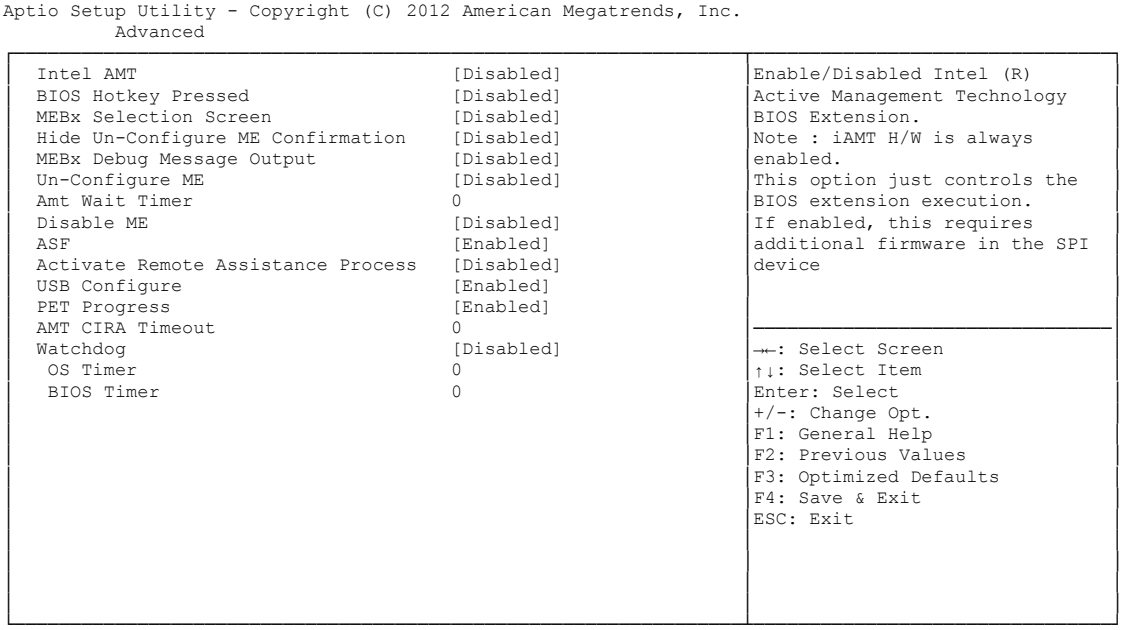
- ✓ **LED Locate**
  Options: Enabled / Disabled

- ✓ **IRRT Only on eSATA**
  Options: Enabled / Disabled

- ✓ **Smart Response Technology**
  Options: Enabled / Disabled

- ✓ **OROM UI Delay**
  Options: 2 / 4 / 6 / 8 Seconds

5.3.6 AMT Configuration



- ✓ **Intel AMT**
  Options: Disabled / Enabled

- ✓ **BIOS Hotkey Pressed**
  Options: Disabled / Enabled

- ✓ **MEBx Selection Screen**
  Options: Disabled / Enabled

- ✓ **Hide Un-Configure ME Configuration**
  Options: Disabled / Enabled

- ✓ **MEBx Debug Message Output**
  Options: Disabled / Enabled

- ✓ **Un-Configure ME**
  Options: Disabled / Enabled

- ✓ **Amt Wait Timer**
  Options: none

- ✓ **Disable ME**
  Options: Disabled / Enabled

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

- ✓ **Activate Remote Assistance Process**
  Options: Disabled / Enabled

- ✓ **USB Configure**
  Options: Disabled / Enabled

- ✓ **PET Progress**
  Options: Disabled / Enabled

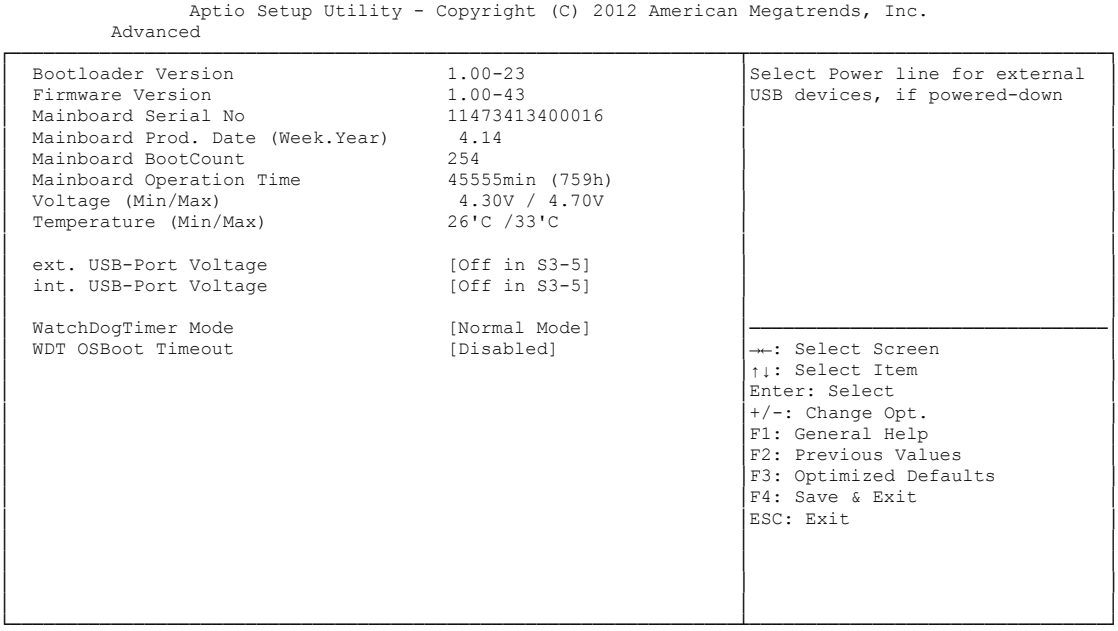
- ✓ **AMT CIRA Timeout**
  Options: none

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

- ✓ **OS Timer**
  Options: none

- ✓ **BIOS Timer**
  Options: none

5.3.7 Power Controller Options



- ✓ **Bootloader Version**
  Options: none

- ✓ **Firmware Version**
  Options: none

- ✓ **Mainboard Serial No**
  Options: none

- ✓ **Mainboard Prod. Date (Week.Year)**
  Options: none

- ✓ **Boot Count**
  Options: none

- ✓ **Minute Meter**
  Options: none

- ✓ **Voltage (Min/Max)**
  Options: none

- ✓ **Temperature (Min/Max)**
  Options: none

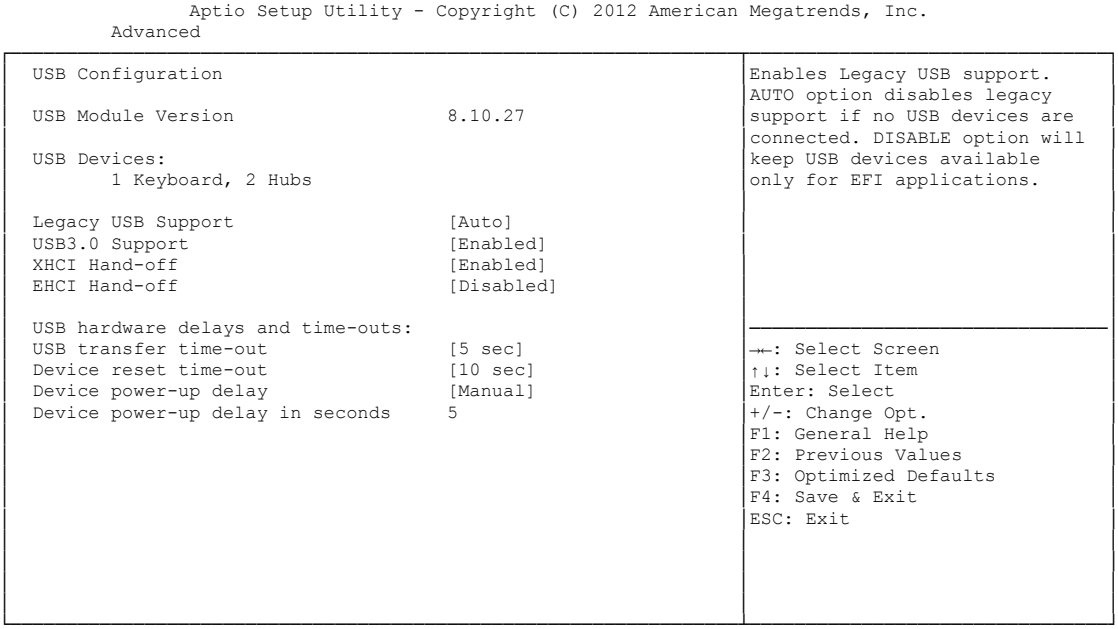
- ✓ **ext. USB-Port Voltage**
  Options: Off in S3-5 / by SVCC

- ✓ **int. USB-Port Voltage**
  Options: Off in S3-5 / by SVCC

- ✓ **WatchDogTimer Mode**
  Options: Normal Mode / Compatibility Mode

✓ **WDT OSBoot Timeout**
Options: Disabled / 45 Seconds ... 255 Seconds

5.3.8 USB Configuration



- ✓ **USB Module Version**
  Options: none

- ✓ **USB Devices**
  Options: none

- ✓ **Legacy USB Support**
  Options: Enabled / Disabled / Auto

- ✓ **USB3.0 Support**
  Options: Enabled / Disabled

- ✓ **XHCI Hand-off**
  Options: Enabled / Disabled

- ✓ **EHCI Hand-off**
  Options: Enabled / Disabled

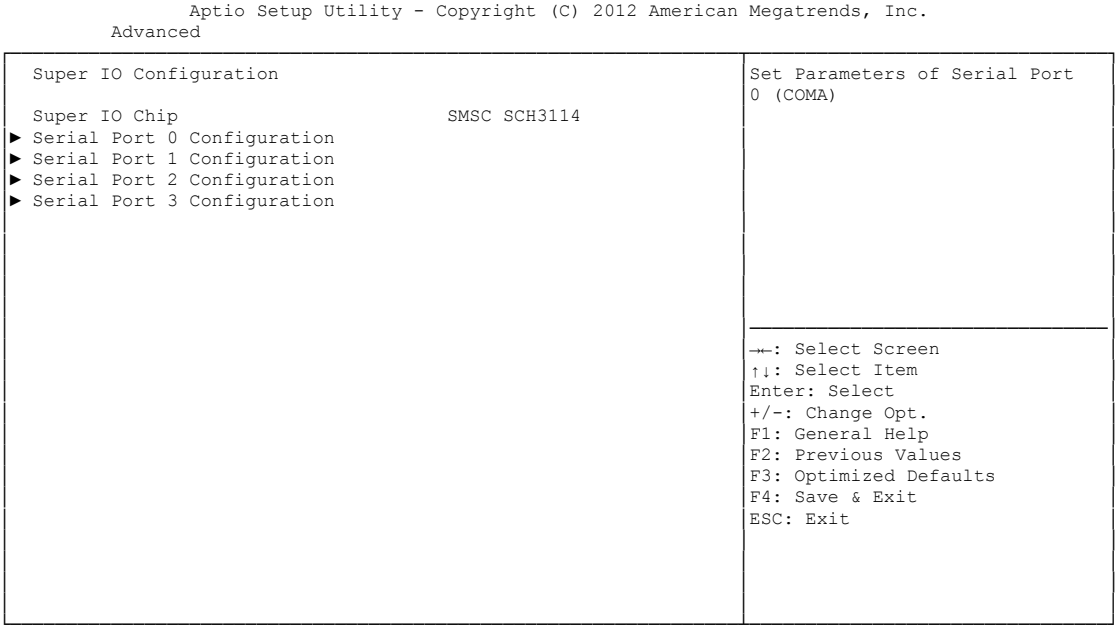
- ✓ **USB transfer time-out**
  Options: 5 sec / 10 sec / 20 sec

- ✓ **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

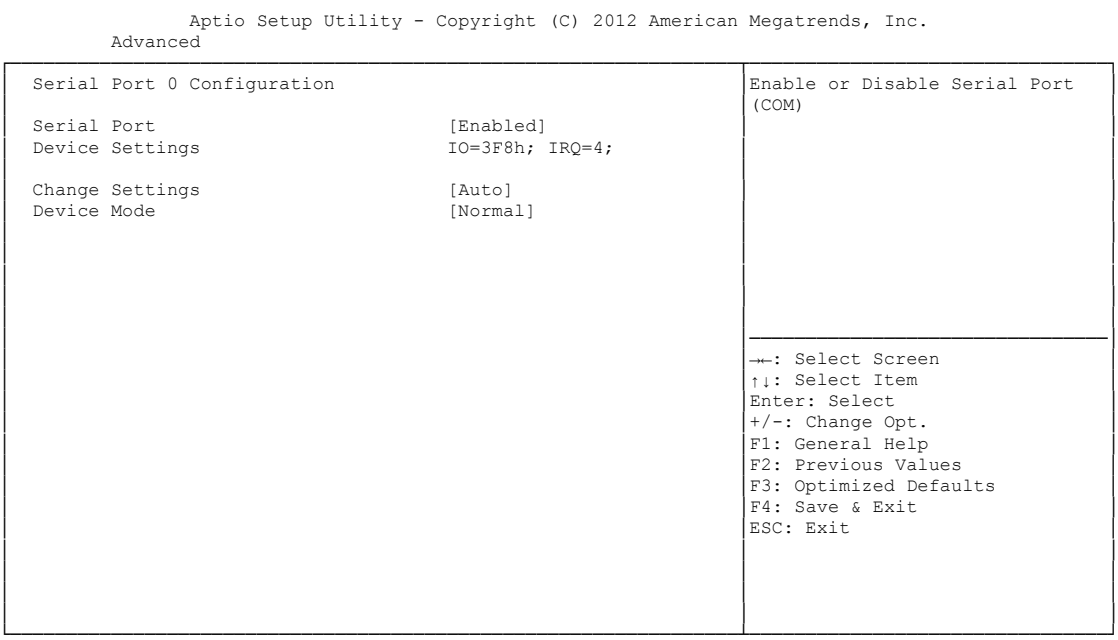
5.3.9 Super IO Configuration



✓ **Super IO Chip**
Options: none

✓ **Serial Port X Configuration**
Sub menu: see "Serial Port Configuration" (page 59)

5.3.9.1 Serial Port Configuration



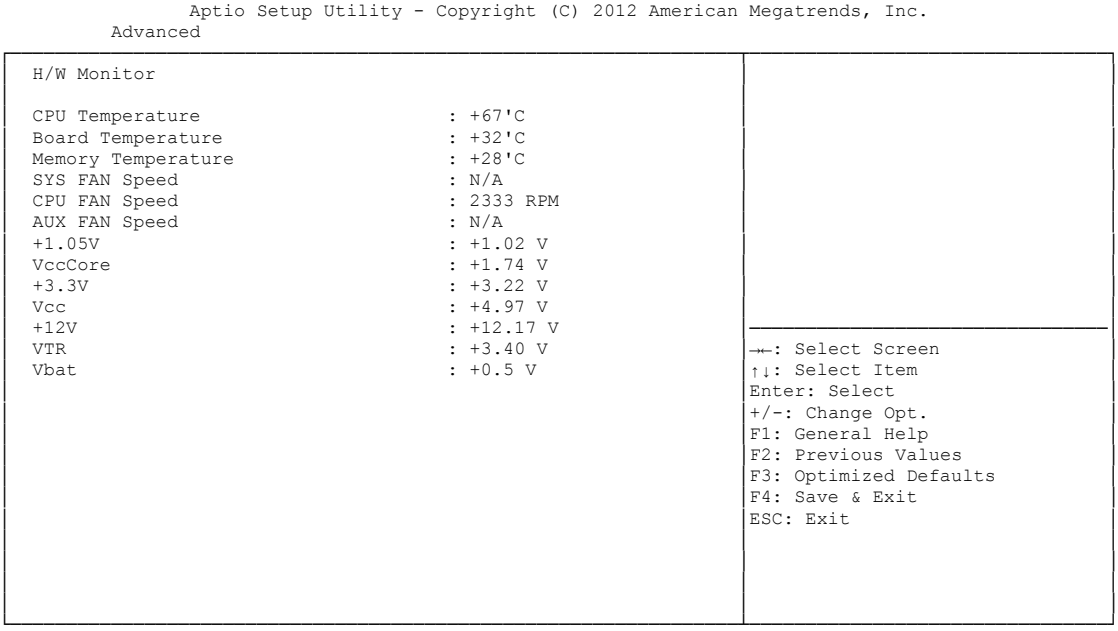
- ✓ **Serial Port**
  Options: Enabled / Disabled

- ✓ **Device Settings**
  Options: none

- ✓ **Change Settings**
  Options: Auto / IO=3F8h; IRQ=4 / IO=3F8h; IRQ=3, ...12 / IO=2F8h; IRQ=3, ...12 / IO=3E8h; IRQ=3, ...12 / IO=2E8h; IRQ=3, ...12

- ✓ **Device Mode**
  Options: Normal / High Speed

5.3.10 H/W Monitor



- ✓ **CPU Temperature**
  Options: none

- ✓ **Board Temperature**
  Options: none

- ✓ **Memory Temperature**
  Options: none

- ✓ **SYS FAN Speed**
  Options: none

- ✓ **CPU FAN Speed**
  Options: none

- ✓ **AUX FAN Speed**
  Options: none

- ✓ **+1.05V**
  Options: none

- ✓ **VccCore**
  Options: none

- ✓ **+3.3V**
  Options: none

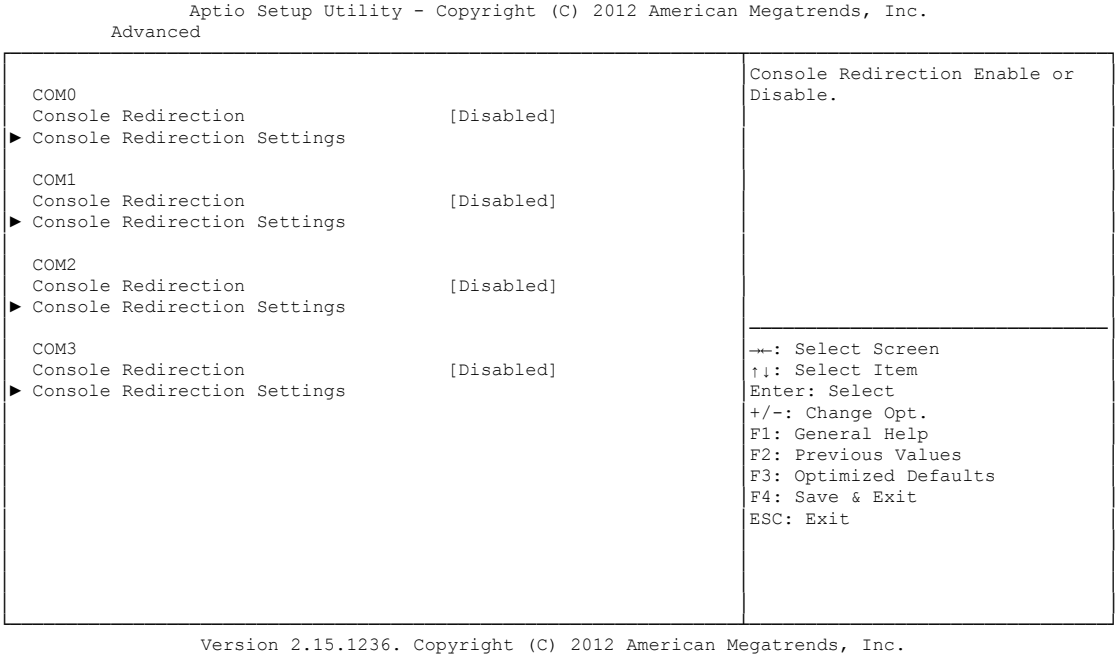
- ✓ **Vcc**
  Options: none

- ✓ **+12V**
  Options: none

- ✓ **VTR**
  Options: none

- ✓ **Vbat**
  Options: none

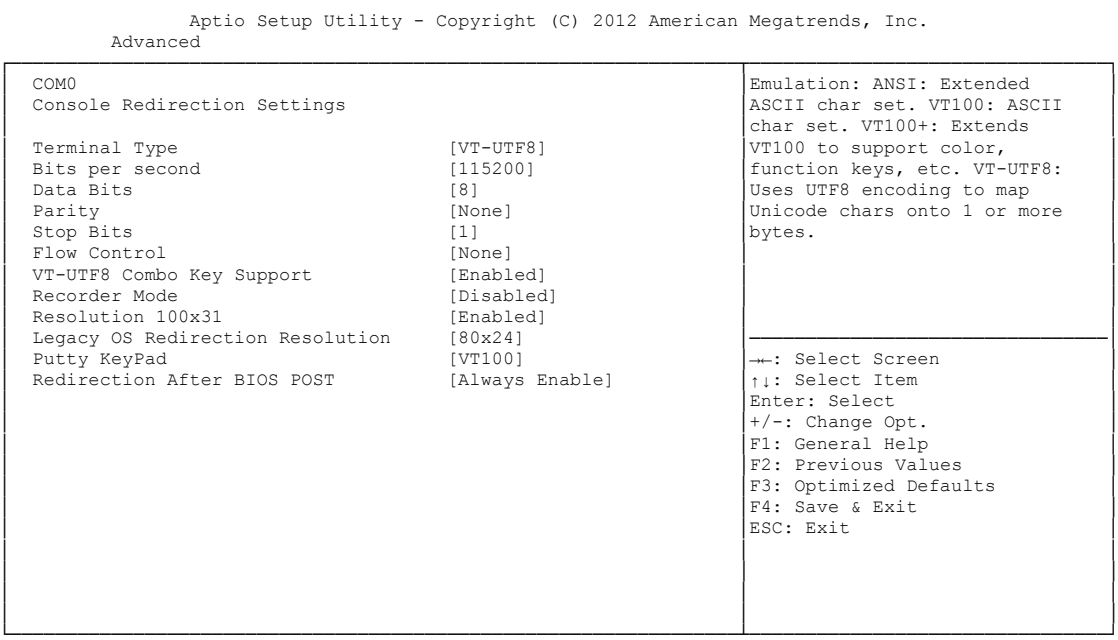
5.3.11 Serial Port Console Redirection



- ✓ **Console Redirection**
  Options: Enabled / Disabled

- ✓ **Console Redirection Settings**
  Sub menu: see "Console Redirection Settings" (page 63)

5.3.11.1 Console Redirection Settings



- ✓ **Terminal Type**
  Options: VT100 / VT100+ / VT-UTF8 / ANSI

- ✓ **Bits per second**
  Options: 9600 / 19200 / 38400 / 57600 / 115200

- ✓ **Data Bits**
  Options: 7 / 8

- ✓ **Parity**
  Options: None / Even / Odd / Mark / Space

- ✓ **Stop Bits**
  Options: 1 / 2

- ✓ **Flow Control**
  Options: None / Hardware RTS/CTS

- ✓ **VT-UTF8 Combo Key Support**
  Options: Disabled / Enabled

- ✓ **Recorder Mode**
  Options: Disabled / Enabled

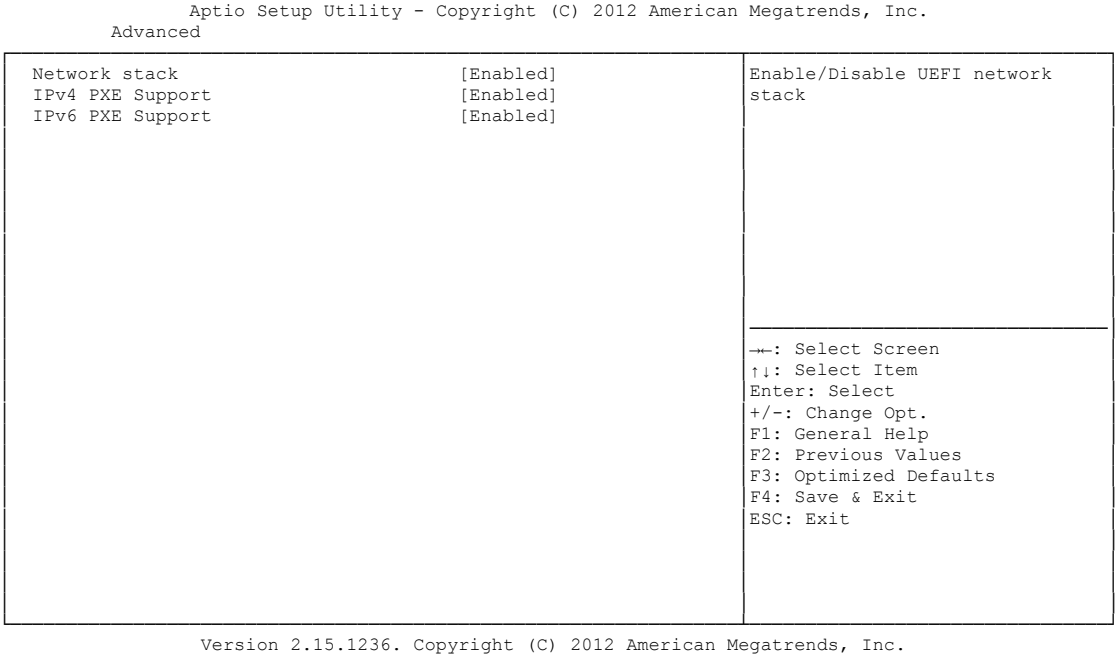
- ✓ **Resolution 100x31**
  Options: Disabled / Enabled

- ✓ **Legacy OS Redirection Resolution**
  Options: 80x24 / 80x25

- ✓ **Putty KeyPad**
  Options: VT100 / LINUX / XTERMR6 / SCO / ESCN / VT400

✓ **Redirection After BIOS POST**
Options: Always Enable / BootLoader

5.3.12 Network Stack

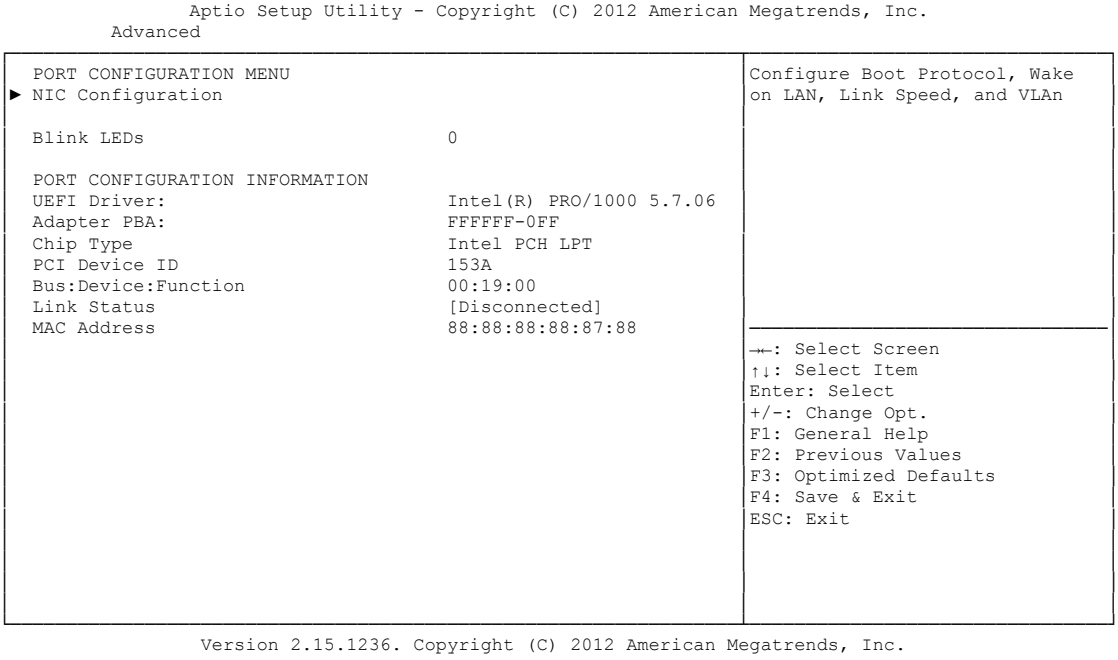


- ✓ **Network stack**
  Options: Disabled / Enabled

- ✓ **IPv4 PXE Support**
  Options: Disabled / Enabled

- ✓ **IPv6 PXE Support**
  Options: Disabled / Enabled

5.3.13 Intel(R) Ethernet Connection I218-LM



- ✓ **NIC Configuration**
  Sub menu: see "NIC Configuration" (page 67)

- ✓ **Blink LEDs**
  Options: none

- ✓ **UEFI Driver:**
  Options: none

- ✓ **Adapter PBA:**
  Options: none

- ✓ **Chip Type**
  Options: none

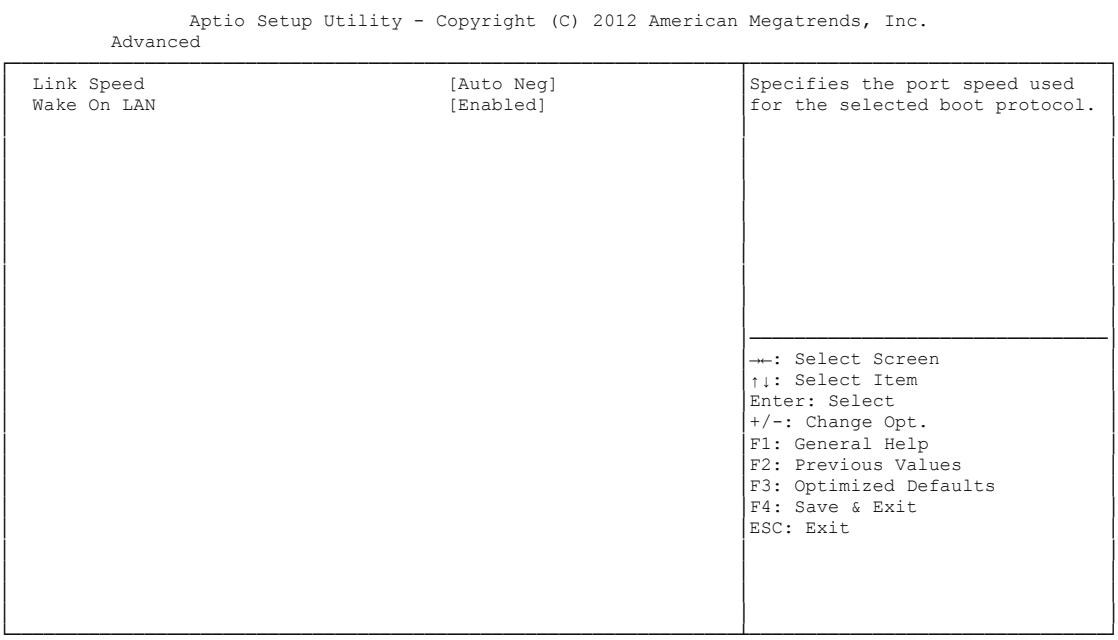
- ✓ **PCI Device ID**
  Options: none

- ✓ **PCI Bus:Device:Function**
  Options: none

- ✓ **Link Status**
  Options: none

- ✓ **Factory MAC Adress**
  Options: none

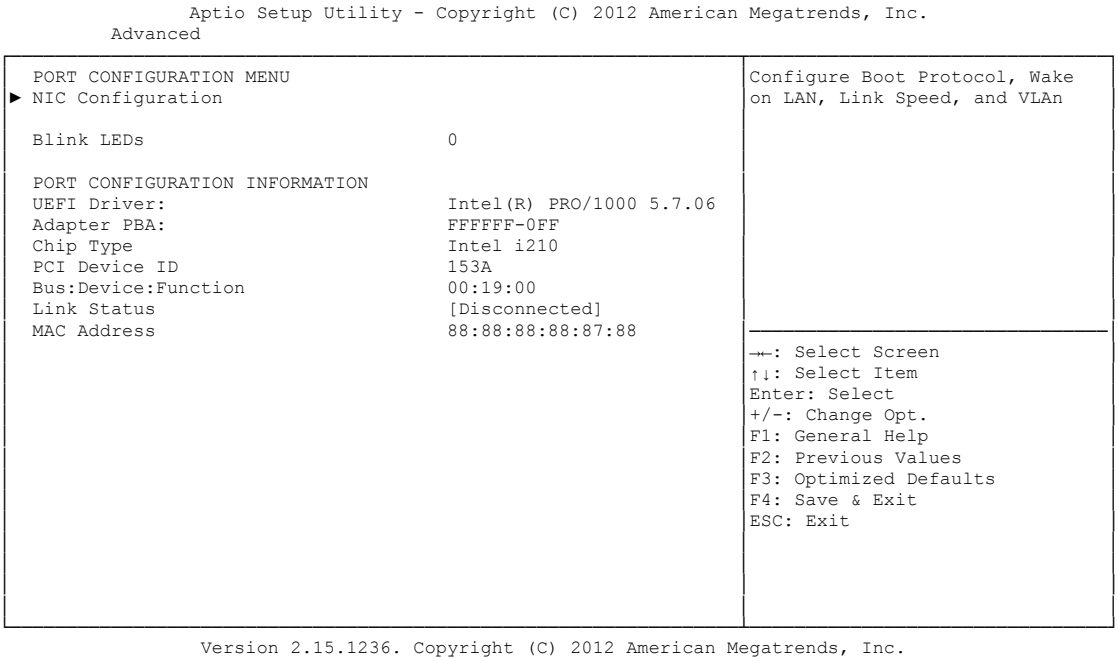
5.3.13.1 NIC Configuration



- ✓ **Link Speed**
  Options: Auto Negotiated / 10Mbps Half / 10Mbps full / 100Mbps Half / 100Mbps Full

- ✓ **Wake On LAN**
  Options: Enabled / Disabled

5.3.14 Intel(R) I210 Gigabit Network Connection



- ✓ **NIC Configuration**
  Sub menu: see "NIC Configuration" (page 67)

- ✓ **Blink LEDs**
  Options: none

- ✓ **UEFI Driver:**
  Options: none

- ✓ **Adapter PBA:**
  Options: none

- ✓ **Chip Type**
  Options: none

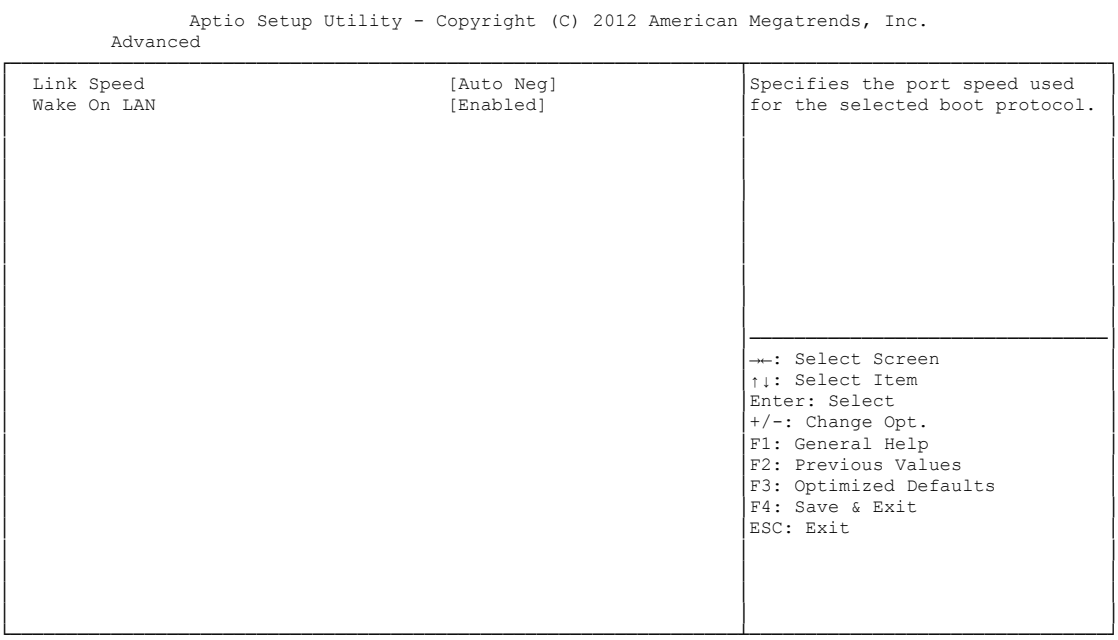
- ✓ **PCI Device ID**
  Options: none

- ✓ **PCI Bus:Device:Function**
  Options: none

- ✓ **Link Status**
  Options: none

- ✓ **Factory MAC Adress**
  Options: none

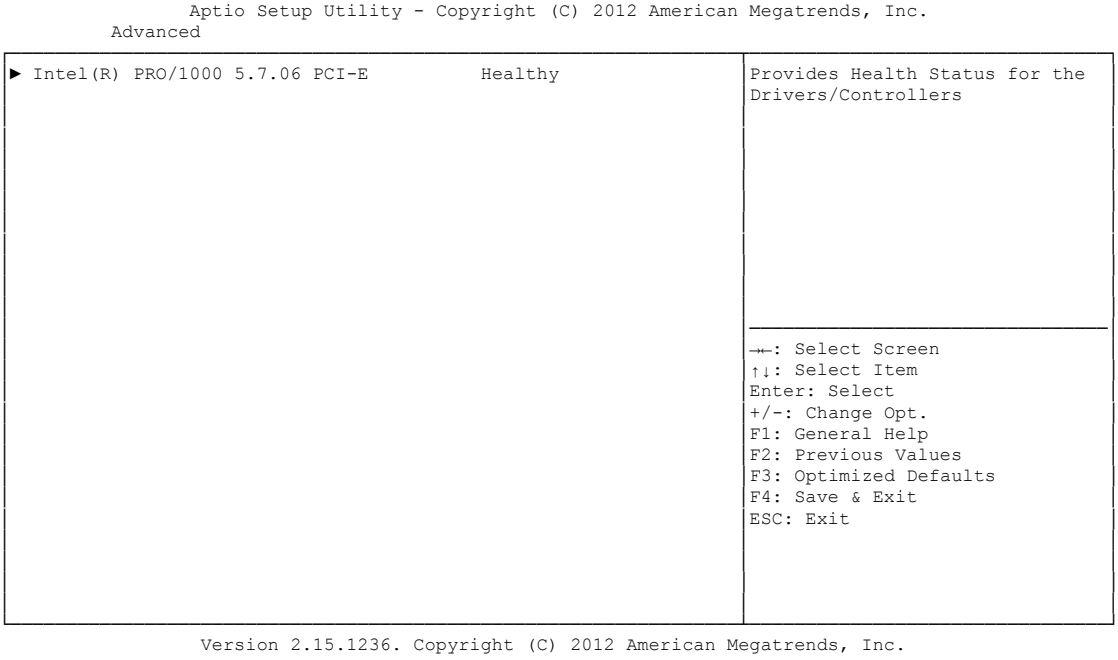
5.3.14.1 NIC Configuration



- ✓ **Link Speed**
  Options: Auto Negotiated / 10Mbps Half / 10Mbps full / 100Mbps Half / 100Mbps Full

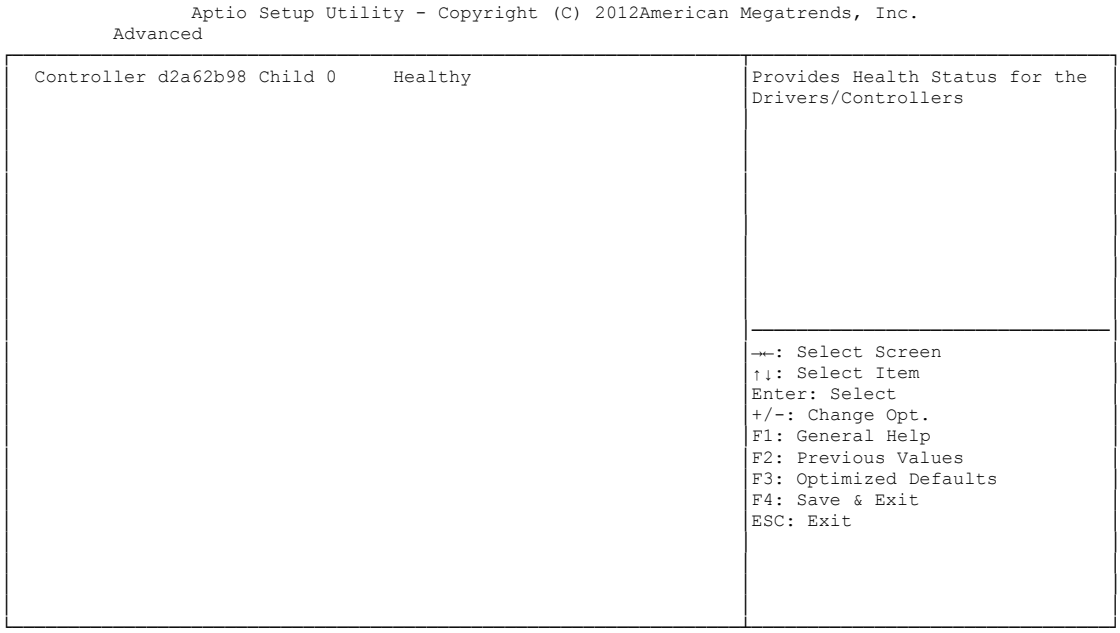
- ✓ **Wake On LAN**
  Options: Enabled / Disabled

5.3.15 Driver Health



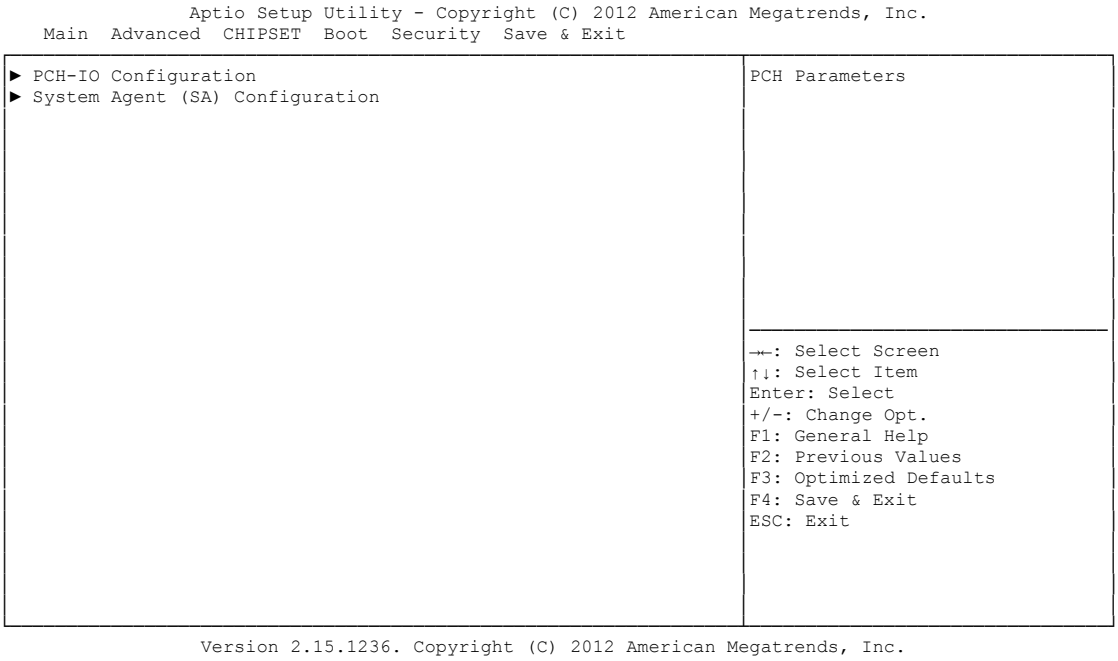
✓ **Intel(R) PRO/1000 5.7.06 PCI-E**
Sub menu: see "Intel(R) Pro/1000 5.7.06 PCI-E" (page 71)

5.3.15.1 Intel(R) Pro/1000 5.7.06 PCI-E



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

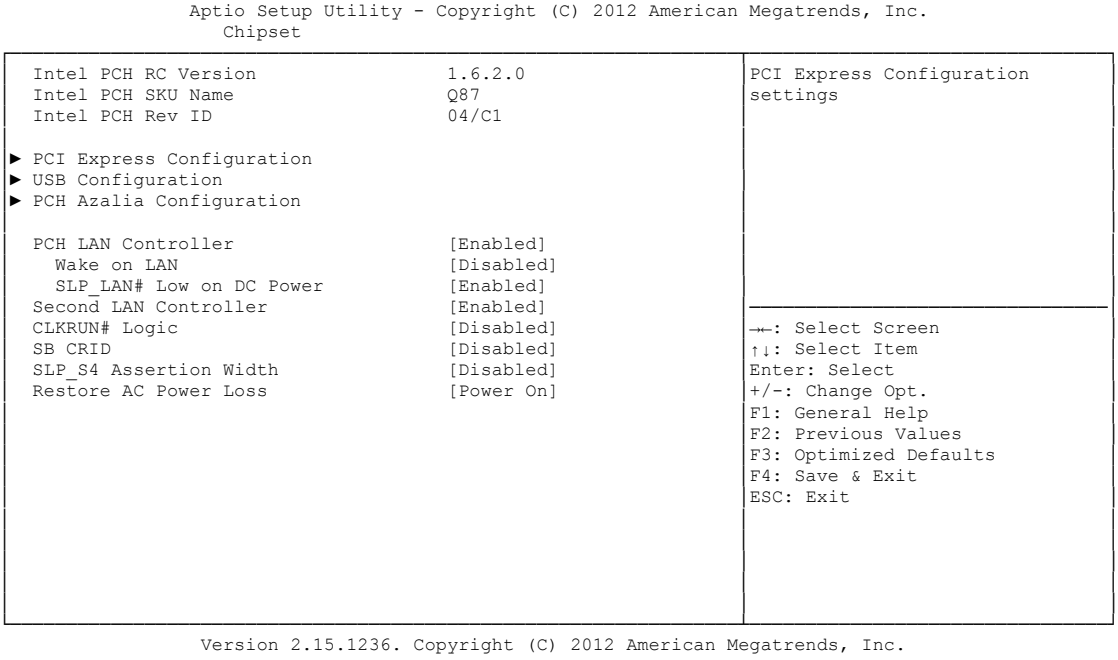
5.4 Chipset



- ✓ **PCH-IO Configuration**
  Sub menu: see "PCH-IO Configuration" (page 73)

- ✓ **System Agent (SA) Configuration**
  Sub menu: see "System Agent (SA) Configuration" (page 80)

5.4.1 PCH-IO Configuration



- ✓ **Intel PCH RC Version**
  Options: none

- ✓ **Intel PCH SKU Name**
  Options: none

- ✓ **Intel PCH Rev ID**
  Options: none

- ✓ **PCI Express Configuration**
  Sub menu: see "PCI Express Configuration" (page 75)

- ✓ **USB Configuration**
  Sub menu: see "USB Configuration" (page 78)

- ✓ **PCH Azalia Configuration**
  Sub menu: see "PCH Azalia Configuration" (page 79)

- ✓ **PCH LAN Controller**
  Options: Disabled / Enabled

- ✓ **Wake on LAN**
  Options: Disabled / Enabled

- ✓ **SLP_LAN# Low on DC Power**
  Options: Disabled / Enabled

- ✓ **Second LAN Controller**
  Options: Disabled / Enabled

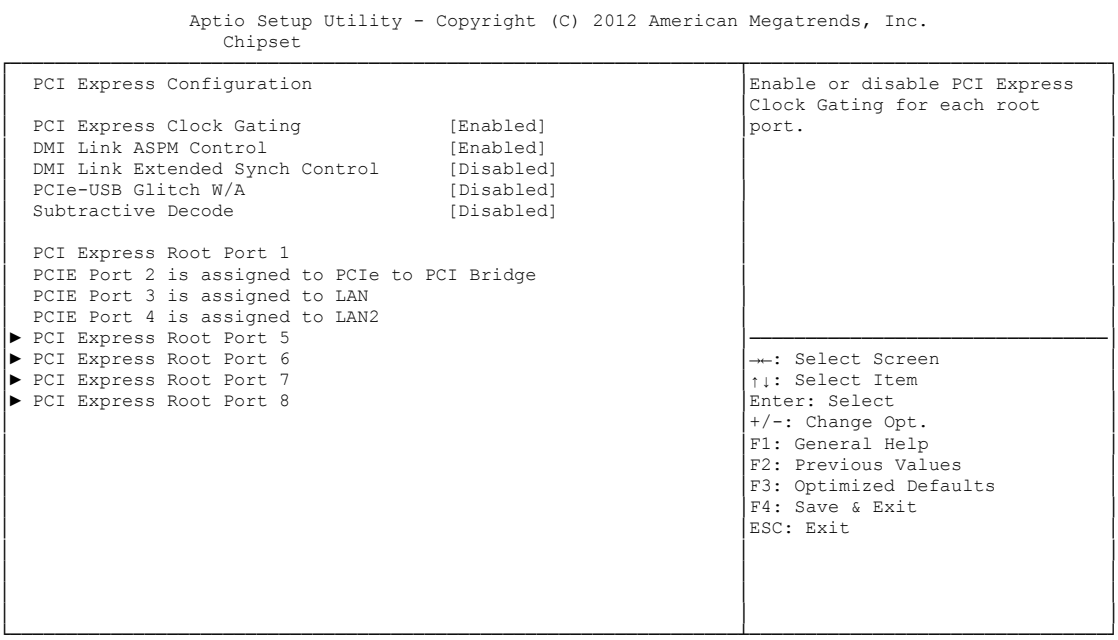
- ✓ **CLKRUN# Logic**
  Options: Disabled

- ✓ **SB CRID**
  Options: Disabled / Enabled

- ✓ **SLP_S4 Assertion Width**
  Options: Disabled / 1-2 Seconds / 2-3 Seconds / 3-4 Seconds / 4-5 Seconds

- ✓ **Restore AC Power Loss**
  Options: Power Off / Power On / Last State

5.4.1.1 PCI Express Configuration



- ✓ **PCI Express Clock Gating**
  Options: Disabled / Enabled

- ✓ **DMI Link ASPM Control**
  Options: Disabled / Enabled

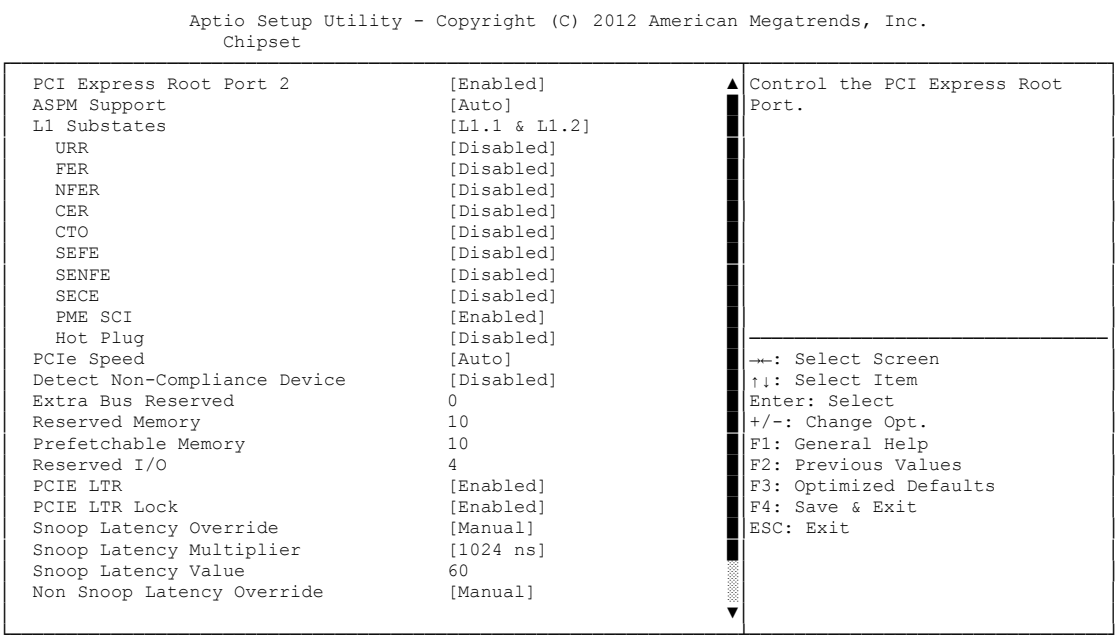
- ✓ **DMI Link Extended Synch Control**
  Options: Disabled / Enabled

- ✓ **PCIe-USB Glitch W/A**
  Options: Disabled / Enabled

- ✓ **Subtractive Decode**
  Options: Disabled

- ✓ **PCI Express Root Port X**
  Sub menu: see "PCI Express Root Port" (page 76)

5.4.1.1.1 PCI Express Root Port



- ✓ **PCI Express Root Port x**
  Options: Disabled / Enabled

- ✓ **ASPM Support**
  Options: Disabled / L0s / L1 / L0sL1 / Auto

- ✓ **L1 Substates**
  Options: Disabled / L1.1 / L1.2 / L1.1 & L1.2

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

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

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

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

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

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

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

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

- ✓ **PME SCI**
  Options: Disabled / Enabled

- ✓ **Hot Plug**
  Options: Disabled / Enabled

- ✓ **PCIe Speed**
  Options: Auto / Gen1 / Gen2

- ✓ **Detect Non-Compliance Device**
  Options: Disabled / Enabled

- ✓ **Extra Bus Reserved**
  Options: 0...7

- ✓ **Reserved Memory**
  Options: 1...20

- ✓ **Prefetchable Memory**
  Options: 1...20

- ✓ **Reserved I/O**
  Options: 4 / 8 / 12 / 16 / 20

- ✓ **PCIE LTR**
  Options: Disabled / Enabled

- ✓ **PCIE LTR Lock**
  Options: Disabled / Enabled

- ✓ **Snoop Latency Override**
  Options: Disabled / Manual / Auto

- ✓ **Snoop Latency Multiplier**
  Options: 1 / 32 / 1024 / 32768 / 1048576 / 33554432 ns

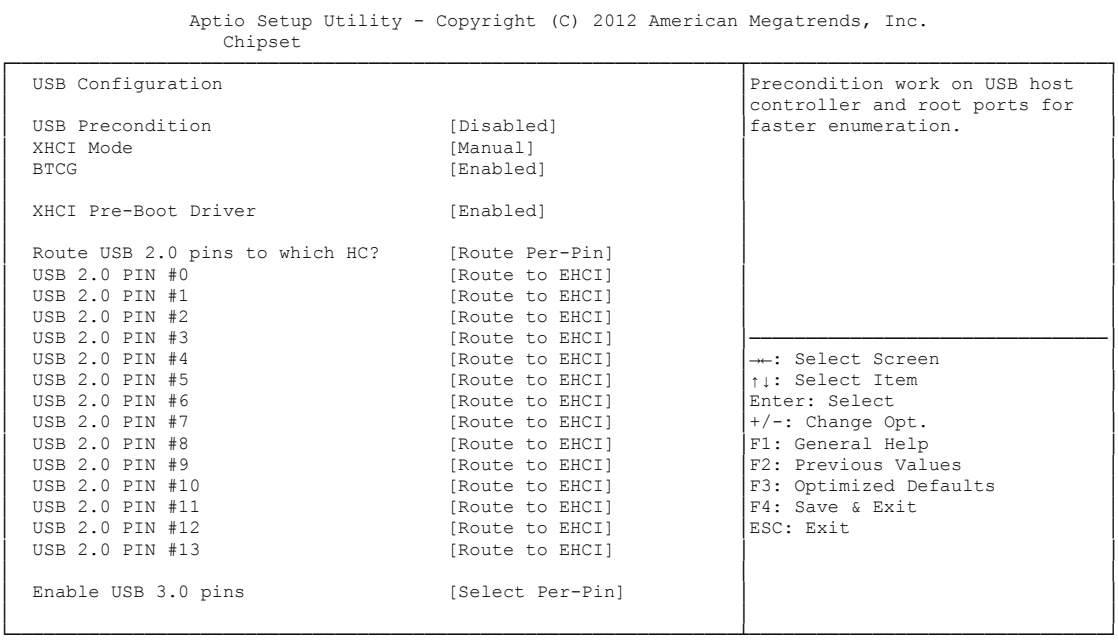
- ✓ **Snoop Latency Value**
  Options: none

- ✓ **Non Snoop Latency Override**
  Options: Disabled / Manual / Auto

- ✓ **Non Snoop Latency Multiplier**
  Options: 1 / 32 / 1024 / 32768 / 1048576 / 33554432 ns

- ✓ **Non Snoop Latency Value**
  Options: none

5.4.1.2 USB Configuration



- ✓ **USB Precondition**
  Options: Disabled / Enabled

- ✓ **XHCI Mode**
  Options: Smart Auto / Auto / Enabled / Disabled / Manual

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

- ✓ **XHCI Pre-Boot Driver**
  Options: Disabled / Enabled

- ✓ **Route USB 2.0 pins to which HC?**
  Options: Route Per-Pin / Route all Pins to EHCI / Route all Pins to XHCI

- ✓ **USB 2.0 PIN #X**
  Options: Route to EHCI / Route to XHCI

- ✓ **Enable USB 3.0 pins**
  Options: Select Per-Pin / Disable all Pins / Enable all Pins

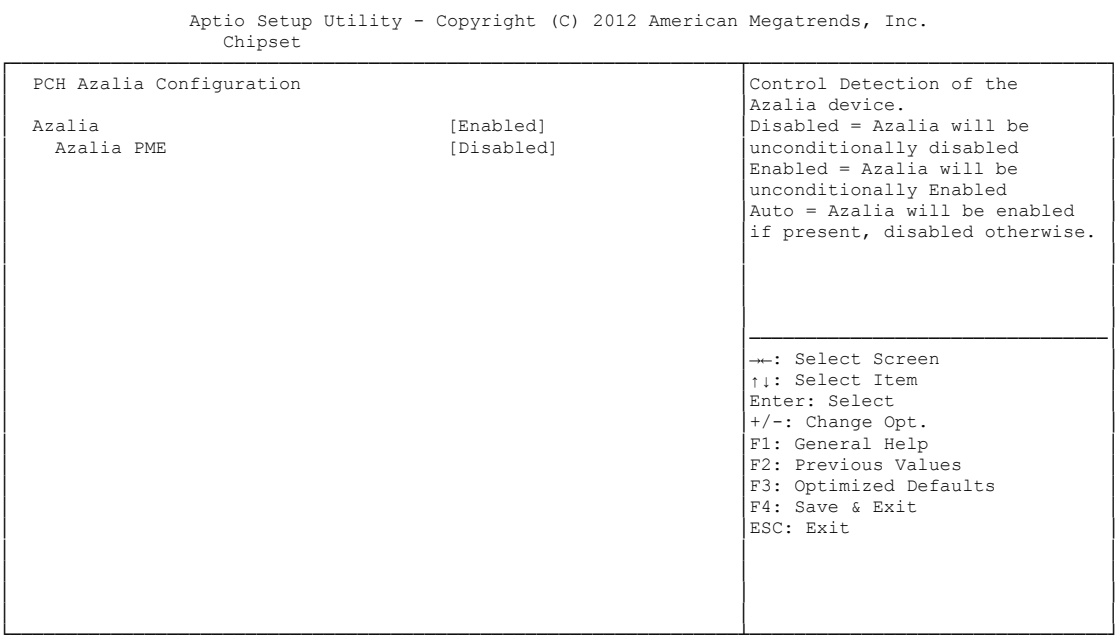
- ✓ **USB 3.0 PIN #X**
  Options: Disabled / Enabled

- ✓ **USB Ports Per-Port Disable Control**
  Options: Disabled / Enabled

- ✓ **USB Port #X**
  Options: Disabled / Enabled

- ✓ **USB3.0 Port #X**
  Options: Disabled / Enabled

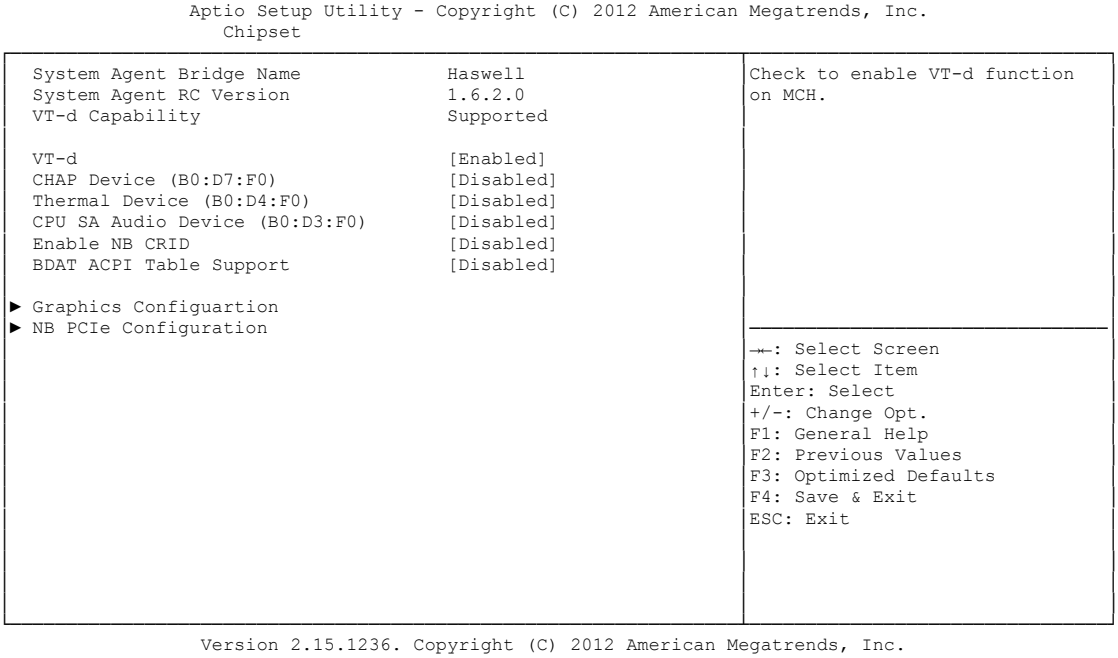
5.4.1.3 PCH Azalia Configuration



- ✓ **Azalia**
  Options: Disabled / Enabled / Auto

- ✓ **Azalia PME**
  Options: Disabled / Enabled

5.4.2 System Agent (SA) Configuration



- ✓ **CHAP Device (B0:D7:F0)**
  Options: Disabled / Enabled

- ✓ **Thermal Device (B0:D4:F0)**
  Options: Disabled / Enabled

- ✓ **CPU SA Audio Device (B0:D3:F0)**
  Options: Disabled / Enabled

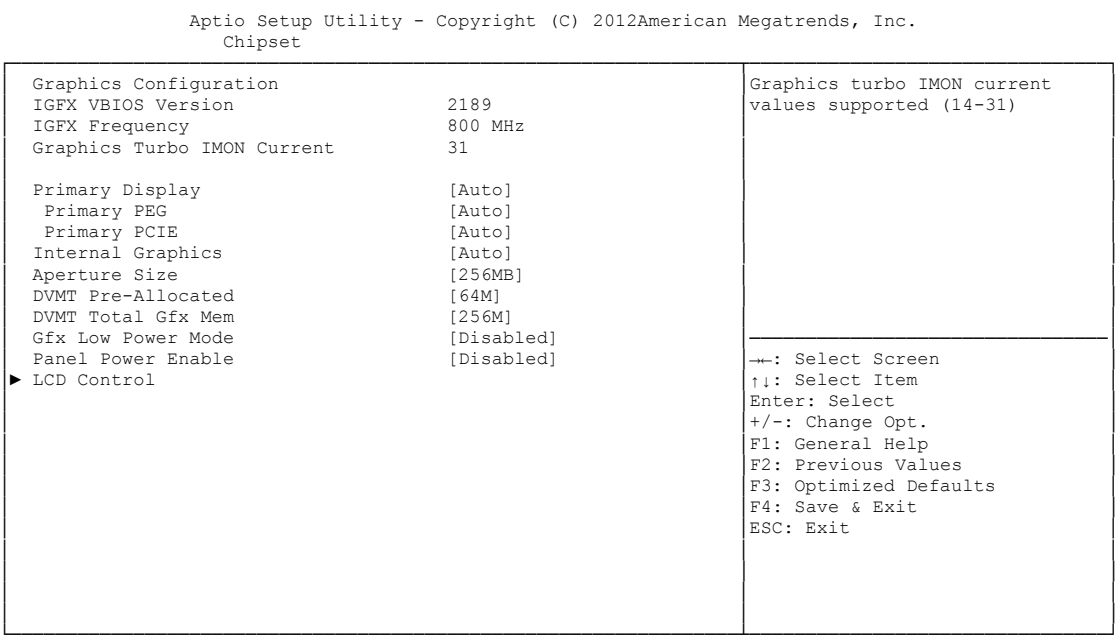
- ✓ **Enable NB CRID**
  Options: Disabled / Enabled

- ✓ **BDAT ACPI Table Support**
  Options: Disabled / Enabled

- ✓ **Graphics Configuration**
  Sub menu: see "Graphics Configuration" (page 81)

- ✓ **NB PCIe Configuration**
  Sub menu: see "NB PCIe Configuration" (page 84)

5.4.2.1 Graphics Configuration



- ✓ **IGFX VBIOS Version**
  Options: none

- ✓ **IGFX Frequency**
  Options: none

- ✓ **Graphics Turbo IMON Current**
  Options: 14...31

- ✓ **Primary Display**
  Options: Auto / IGFX / PEG / PCI

- ✓ **Primary PEG**
  Options: Auto / PEG11 / PEG 12

- ✓ **Primary PCIE**
  Options: Auto / PCIE1 / PCIE2 / ... / PCIE7

- ✓ **Internal Graphics**
  Options: Auto / Disabled / Enabled

- ✓ **Aperture Size**
  Options: 128MB / 256MB / 512MB

- ✓ **DVMT Pre-Allocated**
  Options: 32M / 64M ... 480M / 512M / 1024M

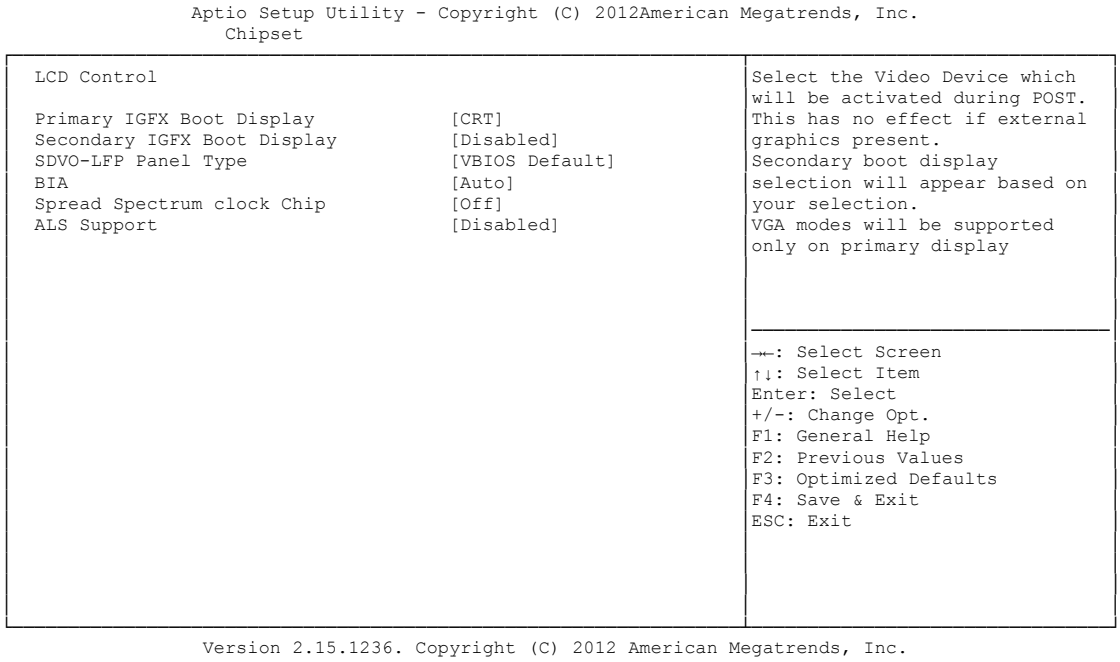
- ✓ **DVMT Total Gfx Mem**
  Options: 128M / 256M / MAX

- ✓ **Gfx Low Power Mode**
  Options: Disabled / Enabled

- ✓ **Panel Power Enable**
  Options: Disabled / Enabled

- ✓ **LCD Control**
  Sub menu: see "LCD Control" (page 83)

5.4.2.1.1 LCD Control



- ✓ **Primary IGFX Boot Display**
  Options: VBIOS Default / CRT / EFP / LFP / EFP3 / EFP2 / LFP2

- ✓ **Secondary IGFX Boot Display**
  Options: VBIOS Default / CRT / EFP / LFP / EFP3 / EFP2 / LFP2

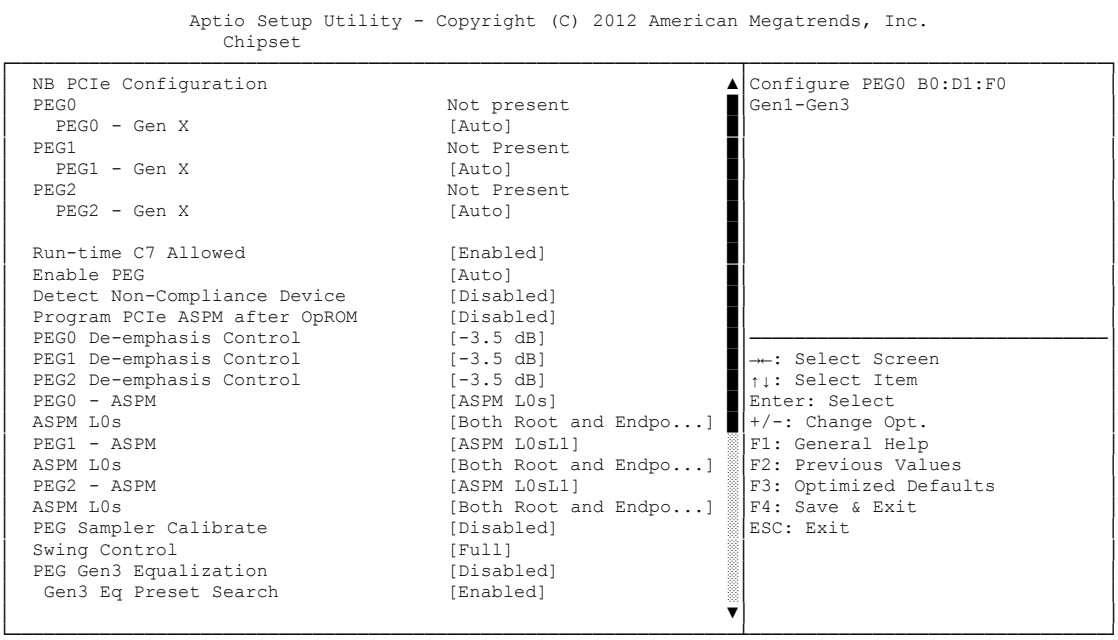
- ✓ **SDVO-LFP Panel Type**
  Options: VBIOS Default / 1024x768 SDVO-LFP / 1280x1024 SDVO-LFP / 1400x1050 SDVO-LFP / 1600x1200 SDVO-LFP

- ✓ **BIA**
  Options: Auto / Disabled / Level 1..5

- ✓ **Spread Spectrum Clock Chip**
  Options: Off / Hardware / Software

- ✓ **ALS Support**
  Options: Disabled / Enabled

5.4.2.2 NB PCIe Configuration



- ✓ **PEGn - Gen X**
  Options: Auto / Gen1 / Gen2 / Gen3

- ✓ **Run-time C7 Allowed**
  Options: Disabled / Enabled

- ✓ **Enable PEG**
  Options: Disabled / Enabled / Auto

- ✓ **Detect Non-Compliance Device**
  Options: Disabled / Enabled

- ✓ **Program PCIe ASPM after OpROM**
  Options: Enabled / Disabled

- ✓ **De-emphasis Control**
  Options: -6 dB / -3.5 dB

- ✓ **PEGn ASPM**
  Options: Disabled / Auto / ASPM L0s / ASPM L1 / ASPM L0sL1

- ✓ **ASPM L0s**
  Options: Root Port Only / Endpoint Port Only / Both Root and Endpoint Ports

- ✓ **PEG Sampler Calibrate**
  Options: Auto / Disabled / Enabled

- ✓ **Swing Control**
  Options: Reduced / Half / Full

- ✓ **Gen3 Equalization**
  Options: Disabled / Enabled

- ✓ **Gen3 Eq Preset Search**
  Options: Enabled / Disabled

- ✓ **Always re-search Gen3 Eq Preset**
  Options: Enabled / Disabled

- ✓ **Allow PERST# GPIO Usage**
  Options: Enabled / Disabled

- ✓ **Preset Search Dwell Time**
  Options: 0-65535

- ✓ **Timing Margin Steps**
  Options: 1-255

- ✓ **Timing Start Margin**
  Options: 4-255

- ✓ **Voltage Margin Steps**
  Options: 1-255

- ✓ **Voltage Start Margin**
  Options: 4-255

- ✓ **Favor Timing Margin**
  Options: Enabled / Disabled

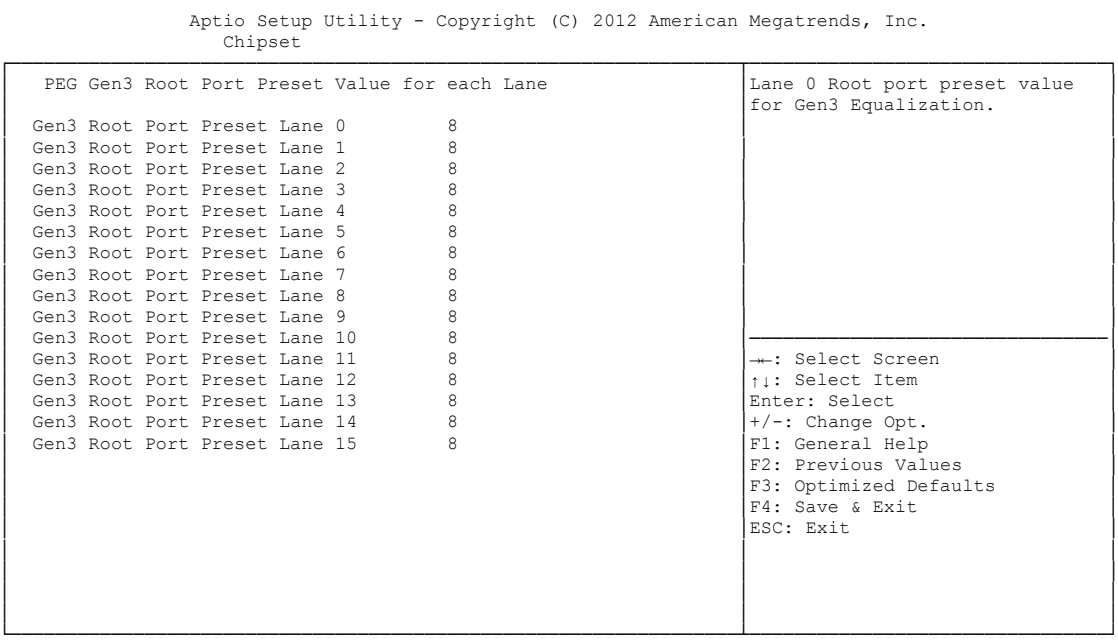
- ✓ **Error Target**
  Options: 0-65535

- ✓ **PEG RxCEM LoopBack Mode**
  Options: Enabled / Disabled

- ✓ **PEG Lane number for Test**
  Options: 0-15

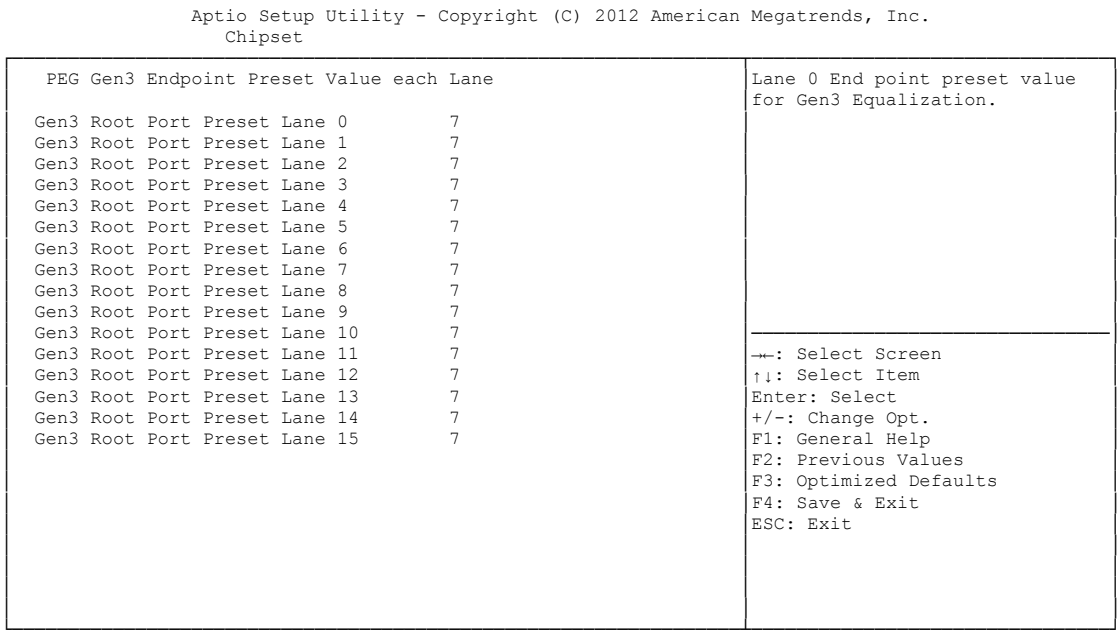
- ✓ **PCIe Gen3 RxCTLEp Setting**
  Options: 0...15

5.4.2.2.1 PEG Gen3 Root Port Preset Value for each Lane



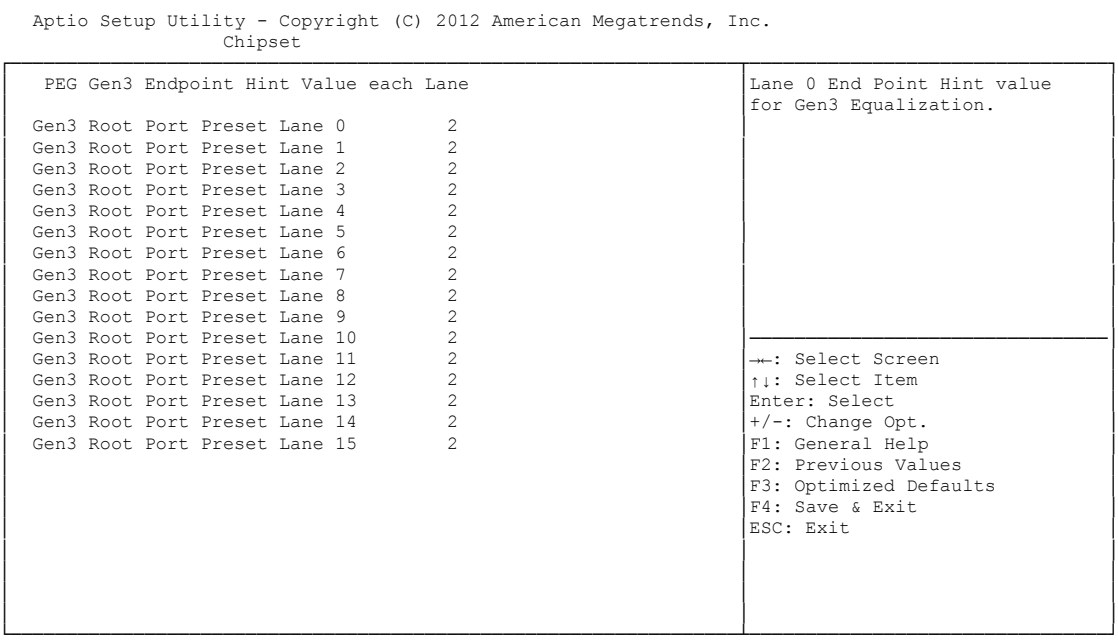
✓ **Gen3 Root Port Preset Value for each Lane**
Options: 1..11

5.4.2.2.2 PEG Gen3 Endpoint Preset Value each Lane



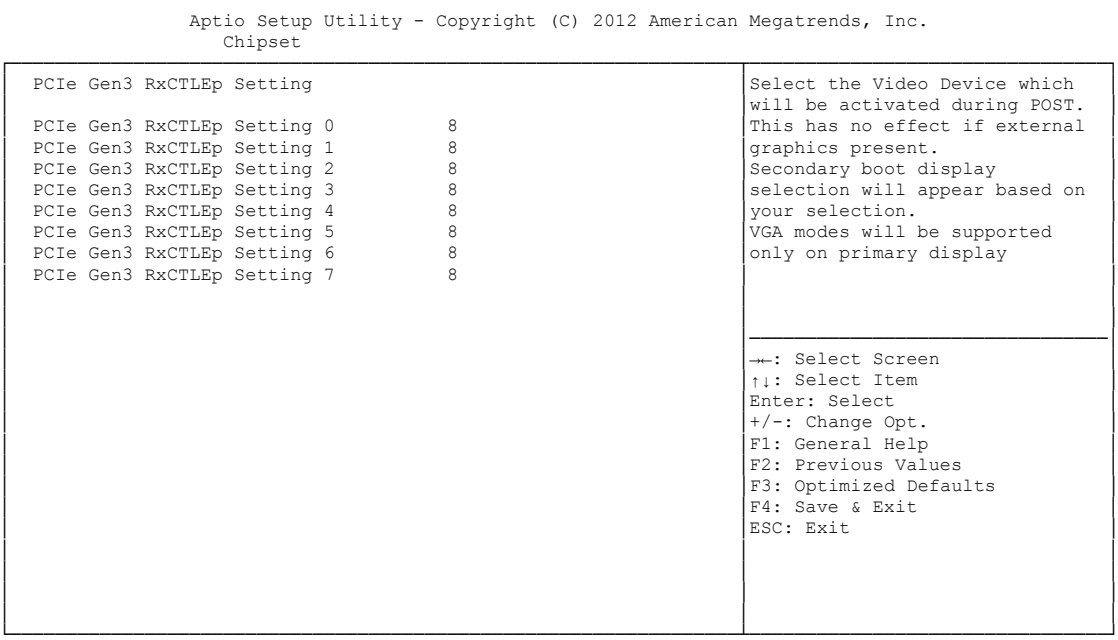
✓ **Gen3 Endpoint Preset Value each Lane**
Options: 0..11

5.4.2.2.3 PEG Gen3 Endpoint Hint Value each Lane



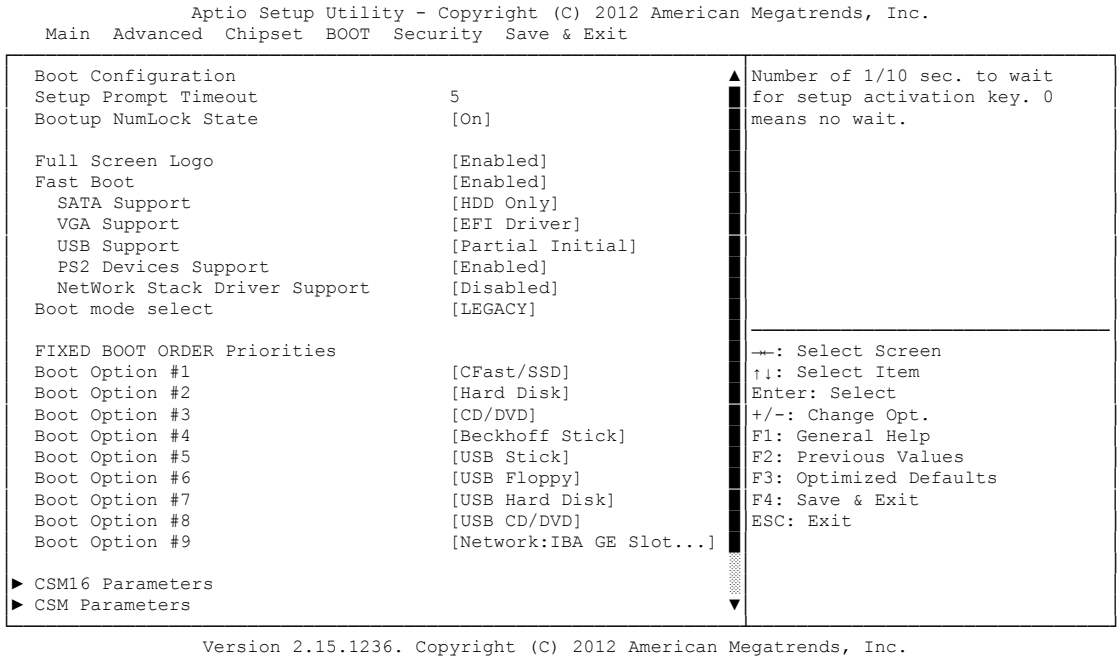
✓ **PEG Gen3 Endpoint Hint Value each Lane**
Options: 0..11

5.4.2.2.4 PCIe Gen3 RxCTLEp Setting



- ✓ **PCIe Gen3 RxCTLEp Setting x**
  Options: 0..15

5.5 Boot



- ✓ **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

- ✓ **SATA Support**
  Options: Last Boot HDD Only / All Sata Devices / HDD Only

- ✓ **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

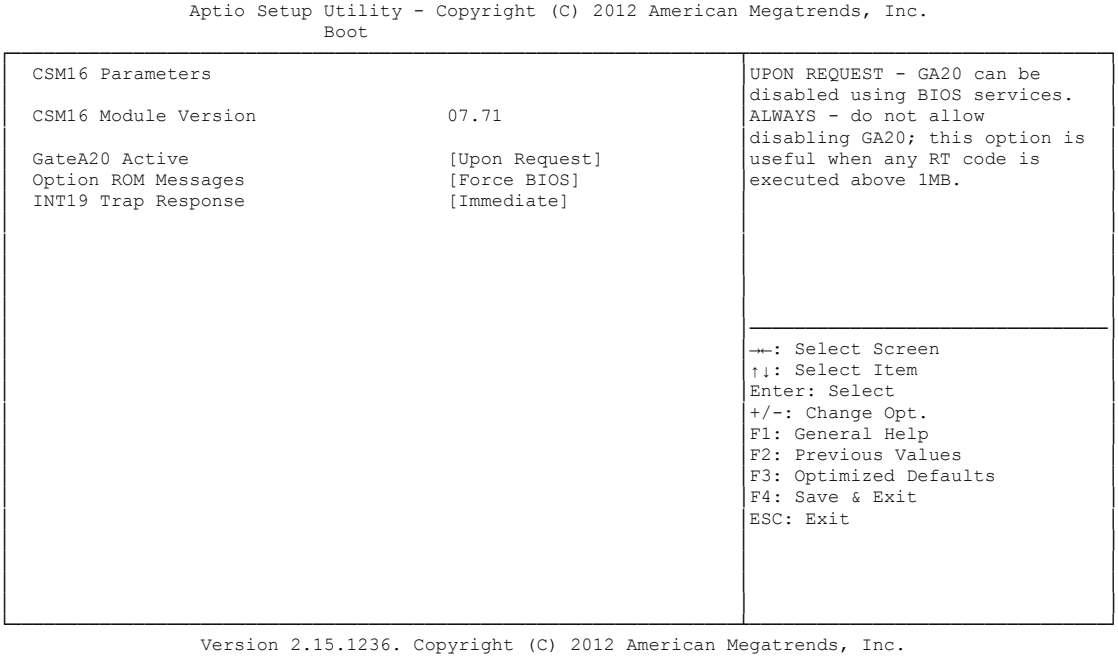
- ✓ **Boot mode select**
  Options: Legacy / UEFI / DUAL

- ✓ **Fixed Boot Order Priorities**
  Options: Review or change the sequence of available boot devices

- ✓ **CSM16 Parameters**
  Sub menu: see "CSM16 Parameters" (page 92)

- ✓ **CSM Parameters**
  Sub menu: see "CSM Parameters" (page 93)

5.5.1 CSM16 Parameters

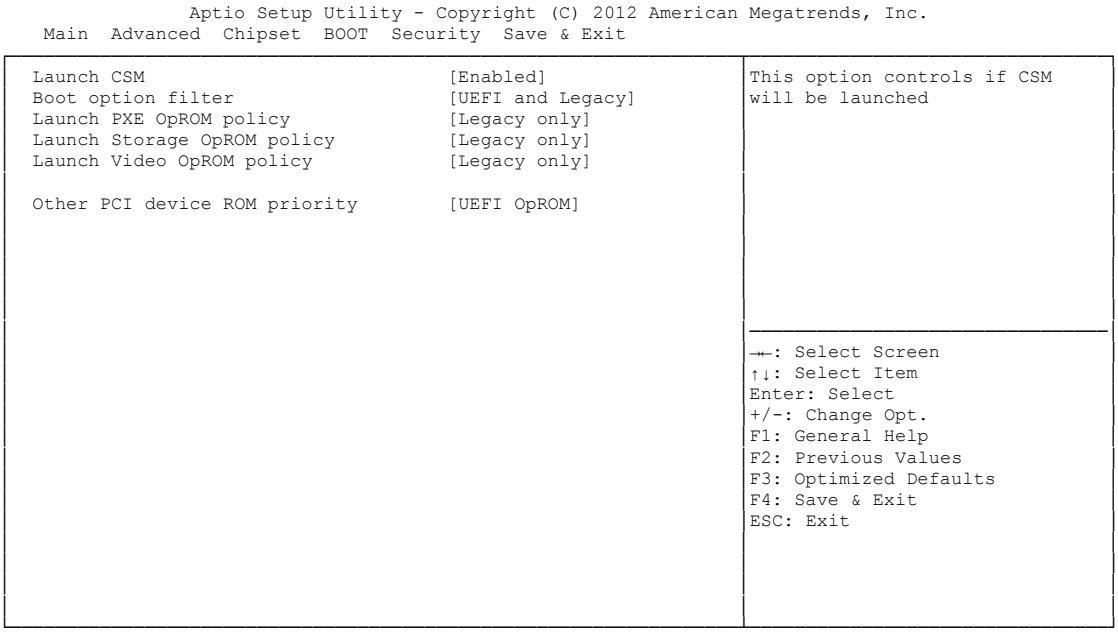


- ✓ **GateA20 Active**
  Options: Upon Request / Always

- ✓ **Option ROM Messages**
  Options: Force BIOS / Keep Current

- ✓ **INT9 Trap Response**
  Options: Immediate / Postponed

5.5.2 CSM Parameters



- ✓ **Launch CSM**
  Options: Enabled / Disabled

- ✓ **Boot option filter**
  Options: UEFI and Legacy / Legacy only / UEFI only

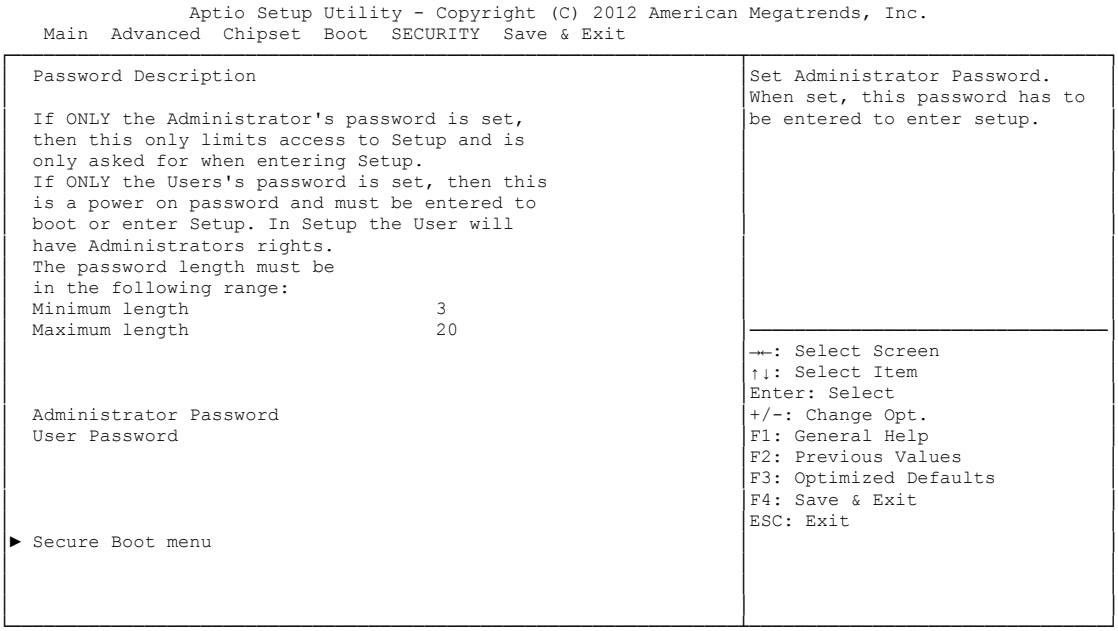
- ✓ **Launch PXE OpROM policy**
  Options: Disable / Enable

- ✓ **Launch Storage OpROM policy**
  Options: Do not launch / UEFI only / Legacy only

- ✓ **Launch Video OpROM policy**
  Options: Do not launch / UEFI only / Legacy only

- ✓ **Other PCI device ROM priority**
  Options: UEFI OpROM / Legacy OpROM

5.6 Security

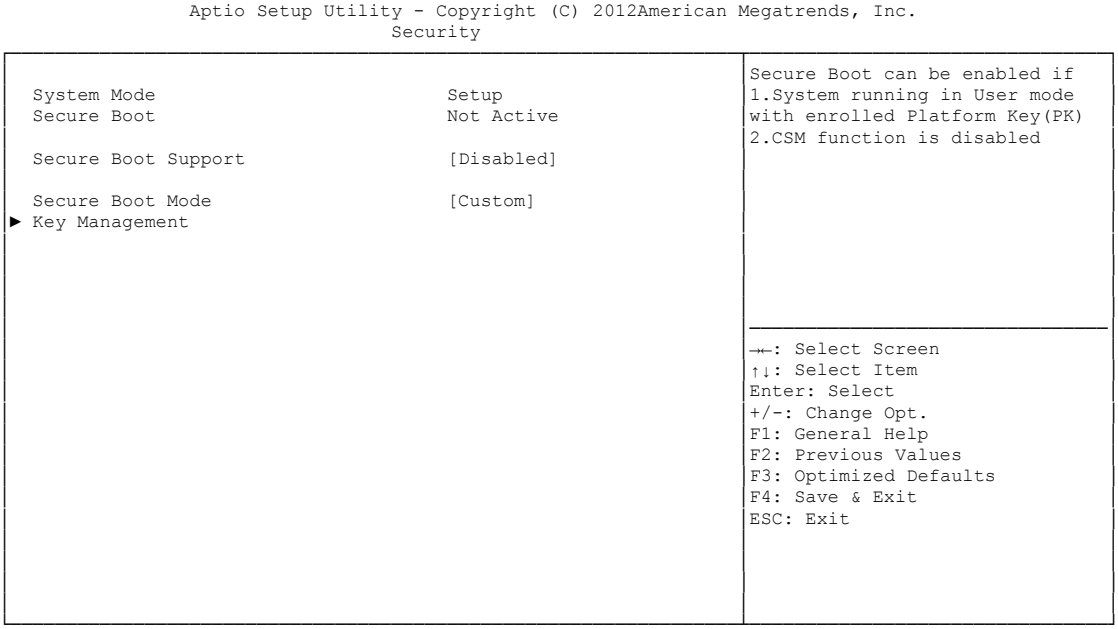


- ✓ **Administrator Password**
  Options: Press [Enter]

- ✓ **User Password**
  Options: Press [Enter]

- ✓ **Secure Boot menu**
  Sub menu: see "Secure Boot Menu" (page 95)

5.6.1 Secure Boot Menu

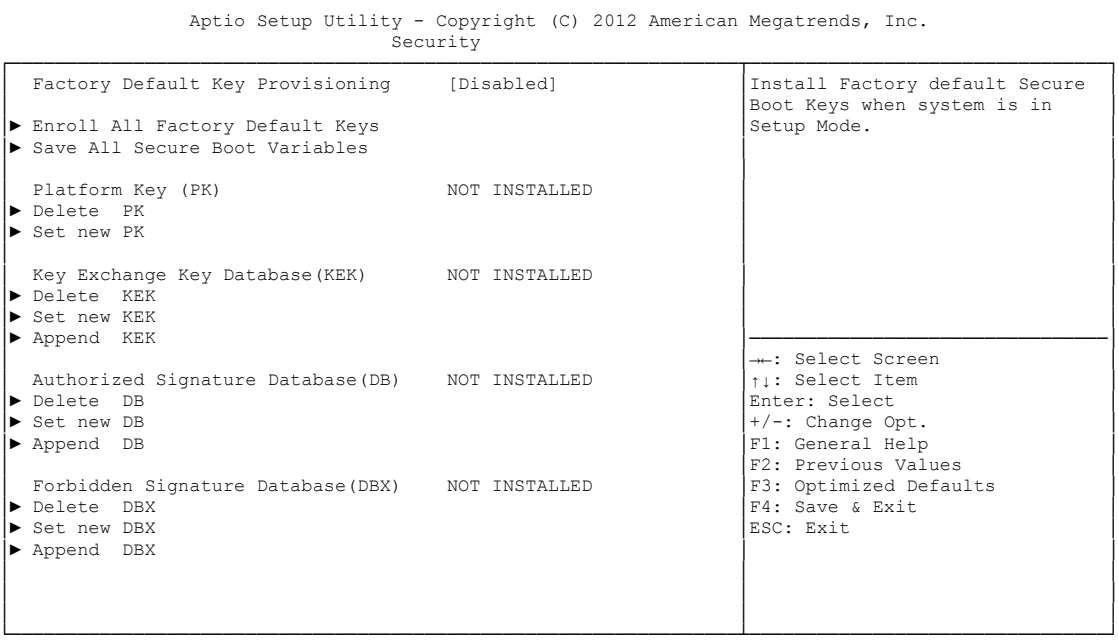


- ✓ **Secure Boot Support**
  Options: Disabled / Enabled

- ✓ **Secure Boot Mode**
  Options: Standard / Custom

- ✓ **Key Management**
  Sub menu: see "Key Management" (page 96)

5.6.1.1 Key Management



- ✓ **Factory Default Key Provisioning**
  Options: Disabled / Enabled

- ✓ **Enroll All Factory Default Keys**
  Options: Press [Enter]

- ✓ **Save All Secure Boot Variables**
  Options: Press [Enter]

- ✓ **Delete PK**
  Options: Press [Enter]

- ✓ **Set new PK**
  Options: Press [Enter]

- ✓ **Delete KEK**
  Options: Press [Enter]

- ✓ **Set new KEK**
  Options: Press [Enter]

- ✓ **Append KEK**
  Options: Press [Enter]

- ✓ **Delete DB**
  Options: Press [Enter]

- ✓ **Set new DB**
  Options: Press [Enter]

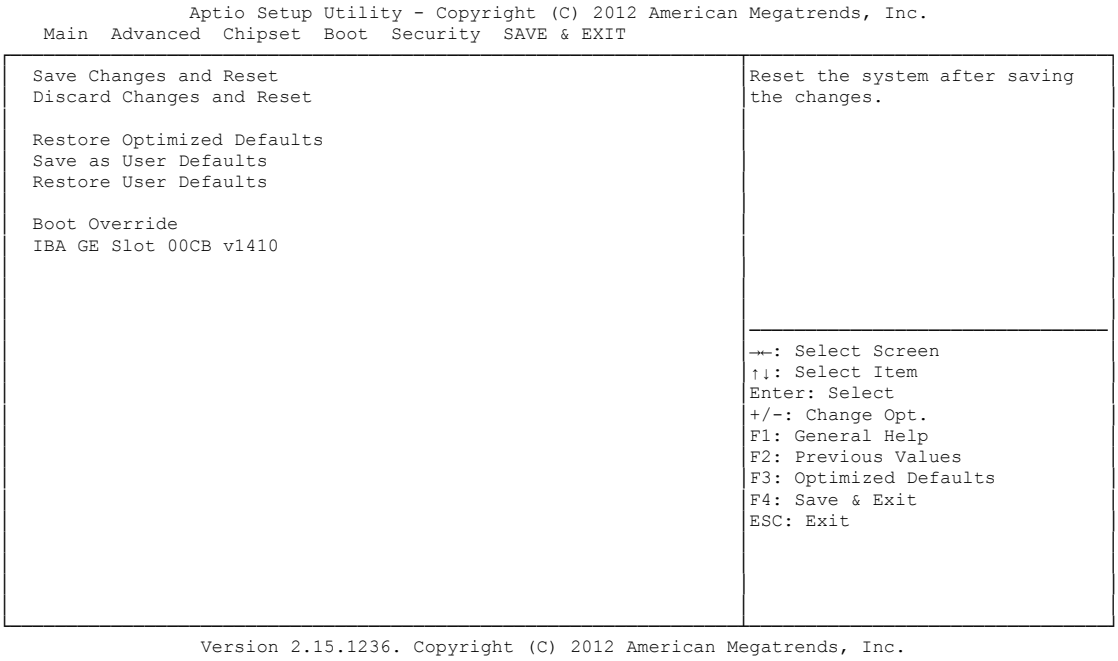
- ✓ **Append DB**
  Options: Press [Enter]

- ✓ **Delete DBX**
  Options: Press [Enter]

- ✓ **Set new DBX**
  Options: Press [Enter]

- ✓ **Append DBX**
  Options: Press [Enter]

5.7 Save & Exit



- ✓ **Save Changes and Reset**
  Options: Press [Enter]

- ✓ **Discard Changes and Reset**
  Options: Press [Enter]

- ✓ **Restore Defaults**
  Options: Press [Enter]

- ✓ **Save as User Defaults**
  Options: Press [Enter]

- ✓ **Restore User Defaults**
  Options: Press [Enter]

- ✓ **Boot Override**
  Options: Press [Enter]

- ✓ **IBA GE Slot 00C8 v1381**
  Options: none

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.

DescdFlash 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

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.

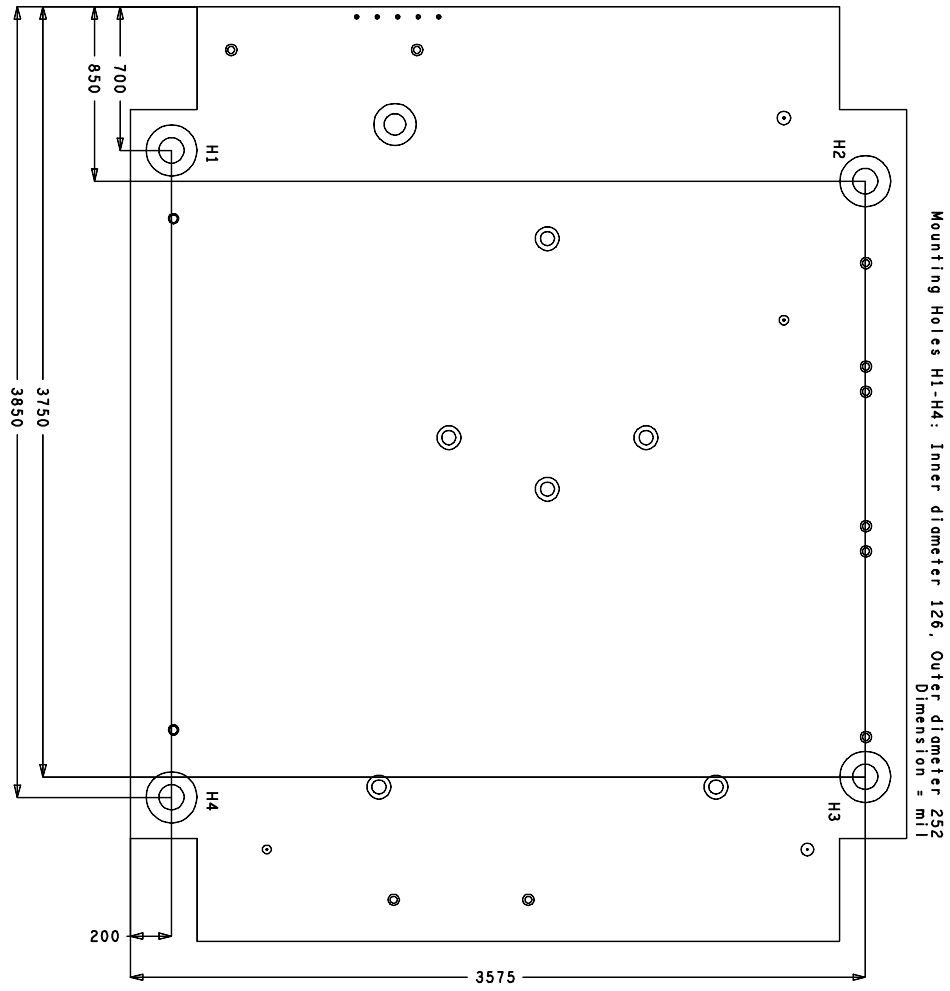
6 Mechanical Drawings

NOTICE

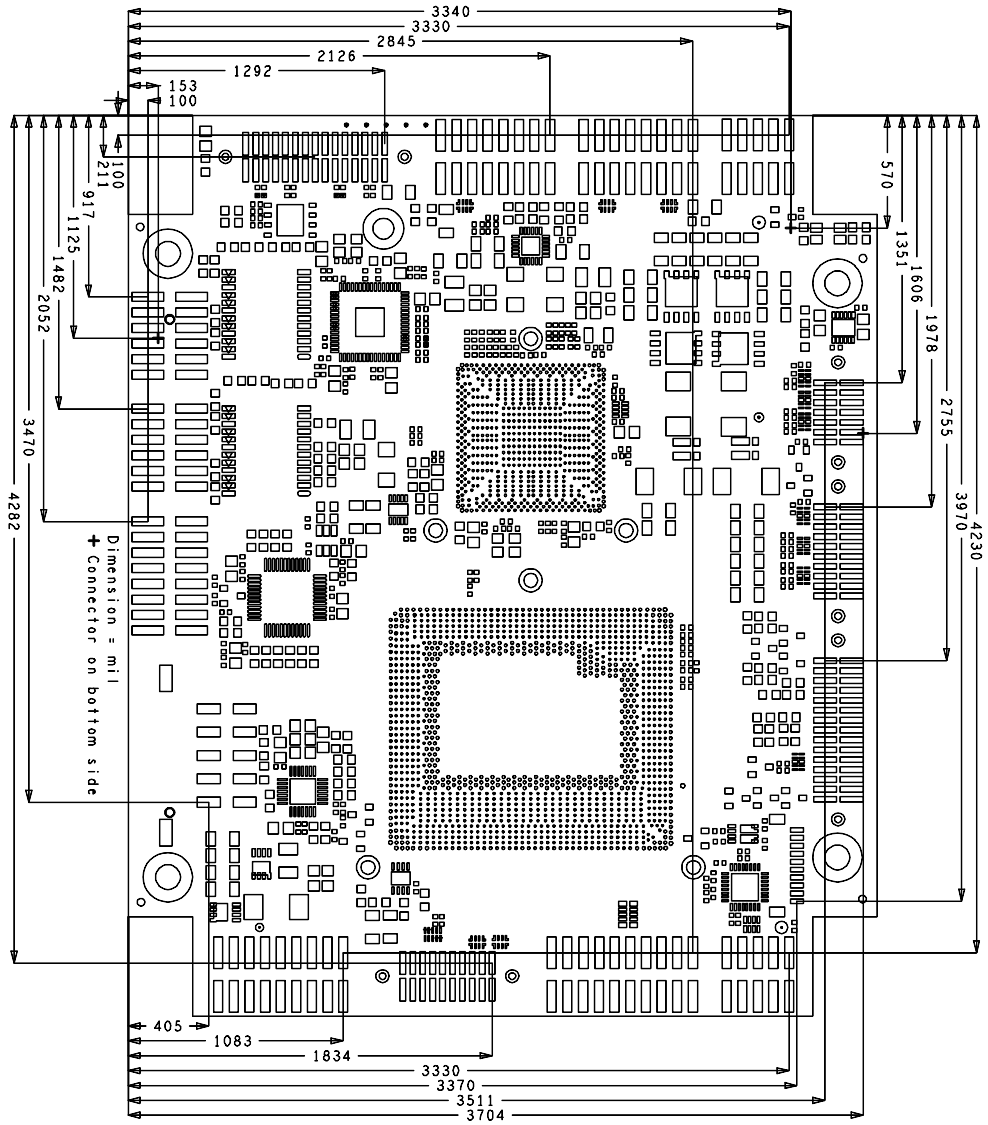
All dimensions are in mil (1 mil = 0,0254 mm)

6.1 PCB: Mounting Holes

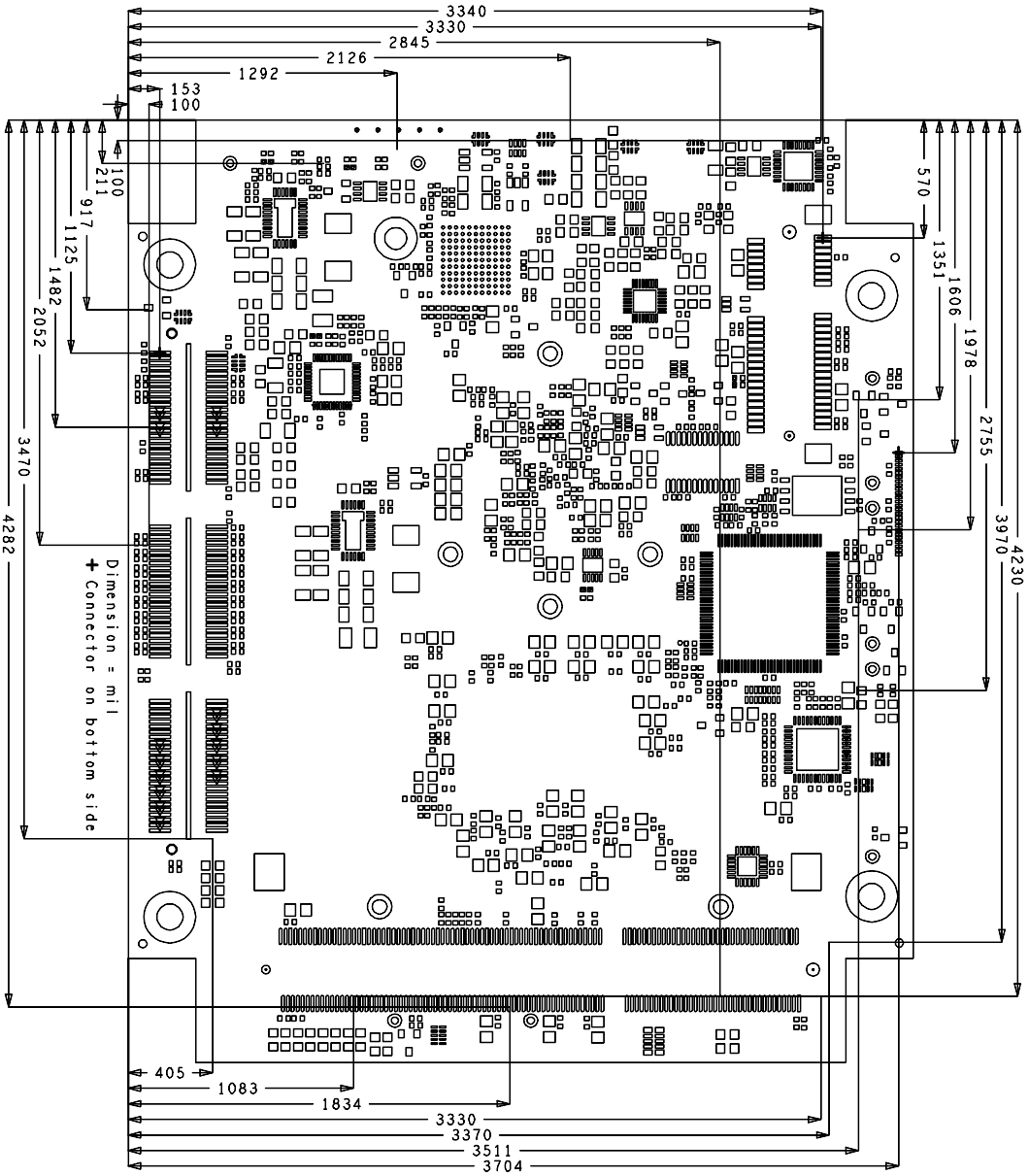
A true dimensioned drawing can be found in the PC/104 specification.



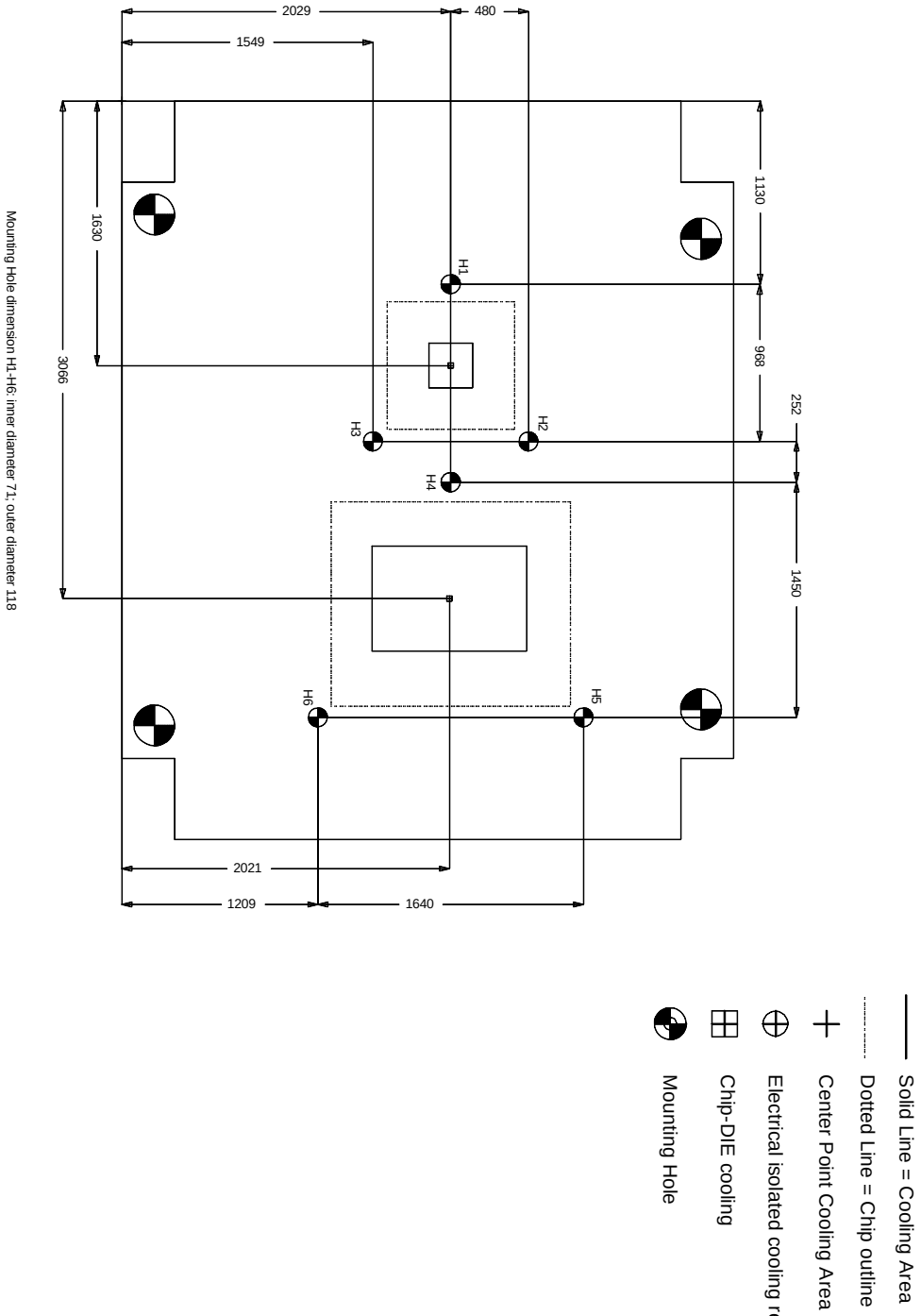
6.2 PCB: Pin 1 Dimensions - Top



6.3 PCB: Pin 1 Dimensions - Bottom



6.4 PCB: Heat Sink/Die Center



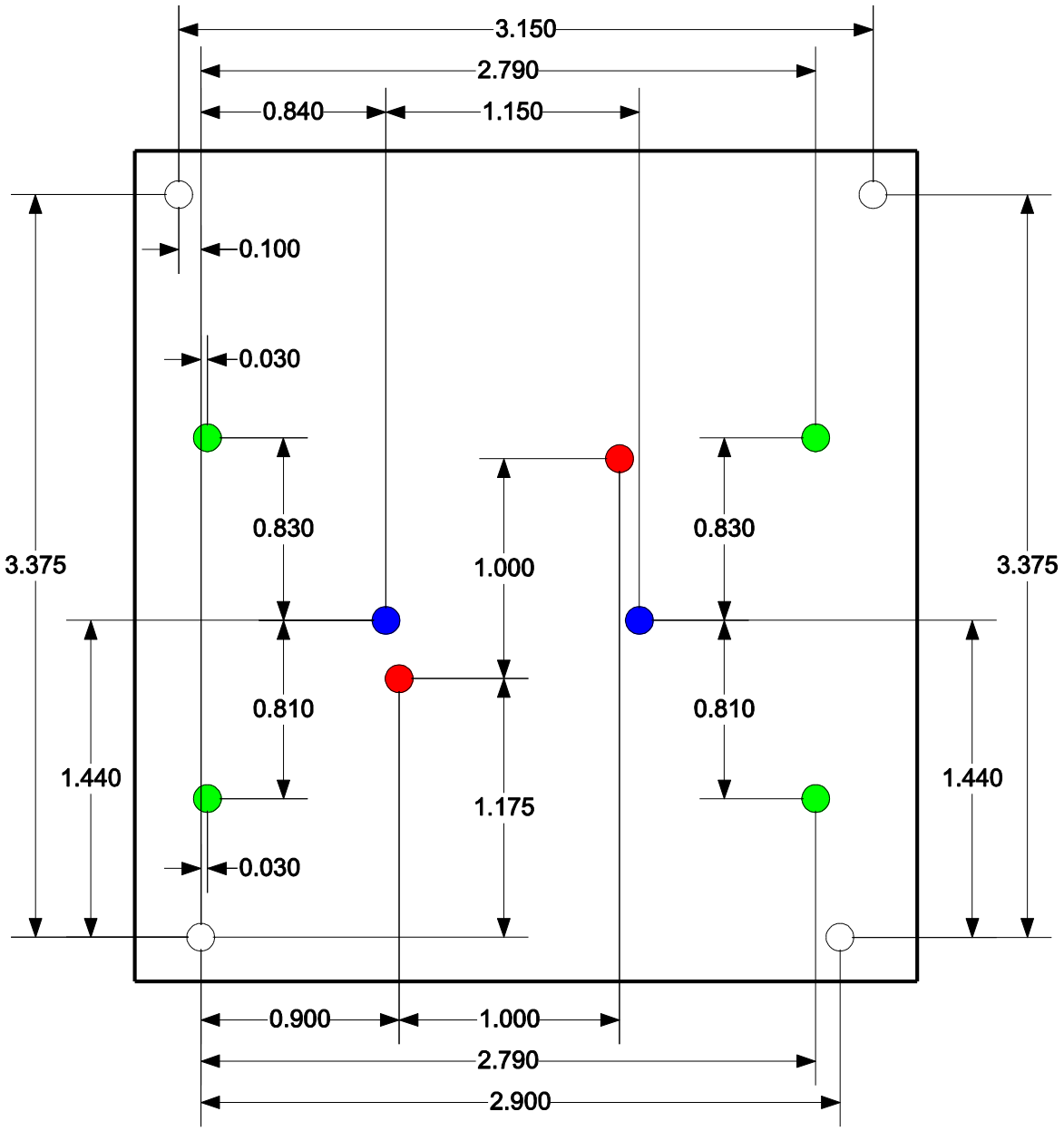
6.5 Heat Spreader: Chassis Mount

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. The colors in the figure refer to the heat spreaders as follows:

- Small heat spreader: Blue holes
- Medium heat spreader: Blue and red holes
- Full size heat spreader: Blue and green holes

To determine which heat spreaders are available for the ADLQM87PC, please refer to the ADLQM87PC datasheet.

NOTICE **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 and 12 Volt (+/- 5%)
RTC:	>= 3 Volt

Electric Power Consumption:

RTC:	<= 10µA

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^2, 6ms
Storage:	400m/s^2, 6ms
Shipping:	400m/s^2, 6ms, for packaged boards

Vibration:

Operating:	10 up to 58Hz, 0.075mm amplitude
	58 up to 500Hz, 10m/s^2
Storage:	5 up to 9Hz, 3.5mm amplitude
	9 up to 500Hz, 10m/s^2
Shipping:	5 up to 9Hz, 3.5mm amplitude
	9 up to 500Hz, 10m/s^2, 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.

The ADLQM87PC includes circuitry that will notify an intelligent power supply to shut down if the processor reaches a critical temperature. This is achieved by deasserting the (low-active) PS_ON# signal found on the SM-Bus connector. When PS_ON# is no longer pulled low, an intelligent power supply would take this as a signal to shut down power. For this to work, PS_ON# must be connected to the power supply's PS_ON input. If PS_ON# is not otherwise connected, the ADLQM87PC can be damaged beyond repair if a thermal shutdown event occurs. In rare instances, if power is not shut down, the board will continue to heat up until failure occurs.

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.

Address	Function
0-FF	Reserved IO area of the board
170-17F	
1F0-1F7	
278-27F	
2E8-2EF	COM4
2F8-2FF	COM2
370-377	
378-37F	
3BC-3BF	
3E8-3EF	COM3
3F0-3F7	
3F8-3FF	COM1

Memory Range

The used resources depend on setup settings.
If the entire range is clogged through option ROMs, these functions do not work anymore.

Address	Function
A0000-BFFFF	VGA RAM
C0000-CFFFF	VGA BIOS
D0000-E7FFF	AHCI BIOS / RAID / PXE (if available)
E8000-FFFFF	System BIOS

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.

Address	Function
IRQ0	Timer
IRQ1	PS/2 Keyboard
IRQ2 (9)	
IRQ3	COM1
IRQ4	COM2
IRQ5	
IRQ6	
IRQ7	
IRQ8	RTC
IRQ9	
IRQ10	COM4
IRQ11	COM3
IRQ12	PS/2 Mouse
IRQ13	FPU

Address	Function
IRQ14	
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.	Fct.	Controller / Slot
	-	-	0	0	0	Host Bridge ID0C00h
	A	-	0	2	0	VGA Graphics ID0402h
	A	-	0	20	0	USB xHCI QM87 ID8C31h
	A	-	0	22	0	Intel® ME Interface#1 QM87 ID8C3Ah
	A	-	0	22	1	Intel® ME Interface#2 QM87 ID8C3Bh
	A	-	0	22	2	IDE-R QM87 ID8C3Ch
	A	-	0	22	3	KT QM87 ID8C3Dh
	A	-	0	25	0	LAN QM87 ID153A
	A	-	0	26	0	USB EHCI Controller #2 QM87 ID8C2Dh
	A	-	0	27	0	HDA Controller QM87 ID8C20h
	A	-	0	28	0	PCI Express Port 1 QM87 ID8C10h
	B	-	0	28	1	[PCI Express Port 2 QM87 ID8C12h]
	C	-	0	28	2	[PCI Express Port 3 QM87 ID8C14h]
	D	-	0	28	3	[PCI Express Port 4 QM87 ID8C16h]
	A	-	0	28	4	PCI Express Port 5 QM87 ID8C18h
	B	-	0	28	5	PCI Express Port 6 QM87 ID8C1Ah
	C	-	0	28	6	PCI Express Port 7 QM87 ID8C1Ch
	D	-	0	28	7	[PCI Express Port 8 QM87 ID8C1Eh]
	A	-	0	29	0	USB EHCI Controller #1 QM87 ID8C26h
	-	-	0	31	0	ISA Bridge QM87 ID8C4Fh
	B	-	0	31	2	SATA Interface #1 QM87 ID8C01h
	B	-	0	31	3	SMBus Interface QM87 ID8C22h
	B	-	0	31	5	SATA Interface #2 QM87 ID8C09h
	A	-	m	0	0	LAN i210 ID1533
	A	-	n	0	0	PCIe-to-PCI Bridge IDE111h
20	A	0	o	4	0	mPCI Slot 1

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

Address	Function
A4-AF	BIOS internal
B0-BF	BIOS internal
D2-D3	Clock