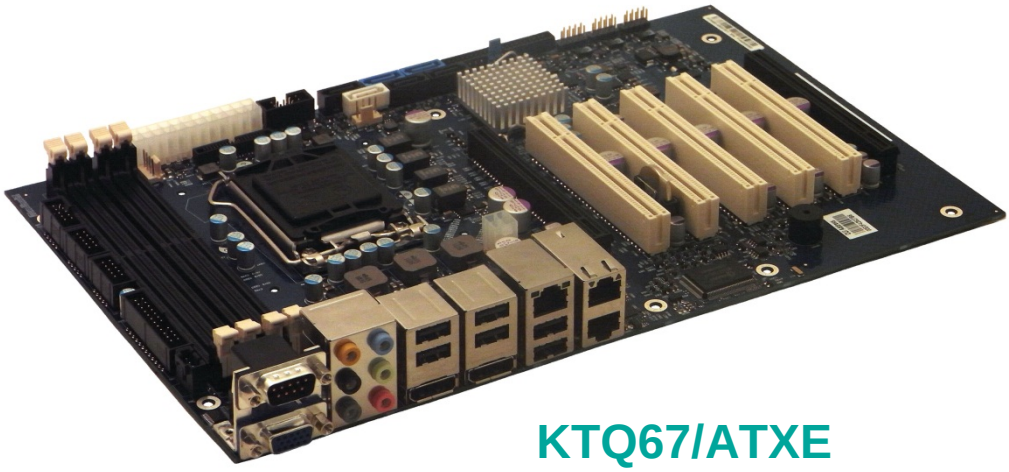
» Kontron User's Guide «

KTQ67/Flex



KTQ67/ATXE

KTQ67 Users Guide

KTD-N0829-D

Document revision history.

Revision	Date	By	Comment
D	Jul. 4th 2012	MLA	Corrected qm67 reference to Q67. Update of OS support. Added PCI Flexible Riser support. Modified SATA_LED# description. Added USB port/EHCI relation. Added BIOS info and normal beep info.
C	Jan 2nd 2012	MLA	Processor list updated. LPT removed. Added KTQ67/ATXE pictures and related info. Added cooling info. Added SPI connector correction and description.
B	Nov. 9th 2011	MLA	Added Power consumptions. Corrected GPIO8-12. Battery type no. replaced. Minor updated info.
A	Sept. 8th 2011	MLA	Preliminary version. Corrections. LVDS optionally.
0	Aug 26th 2011	MLA	Preliminary version

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- CPU Board
  1. Type.
  2. Part Number (find PN on label)
  3. Serial Number if available (find SN on label)
- Configuration
  1. CPU Type, Clock speed
  2. DRAM Type and Size.
  3. BIOS Revision (Find the Version Info in the BIOS Setup).
  4. BIOS Settings different than *Default* Settings (Refer to the BIOS Setup Section).
- System
  1. O/S Make and Version.
  2. Driver Version numbers (Graphics, Network, and Audio).
  3. Attached Hardware: Harddisks, CD-rom, LCD Panels etc.

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   C. Causes external to the product, such as electric power fluctuations or failure.
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2. ANY OTHER DAMAGES, WHETHER INCIDENTAL, CONSEQUENTIAL OR OTHERWISE.
3. ANY CLAIM AGAINST THE CUSTOMER BY ANY OTHER PARTY.

Contents

Introduction

This manual describes the KTQ67/Flex and KTQ67/ATXE boards made by KONTRON Technology A/S. The boards will also be denoted KTQ67 family if no differentiation is required.

The KTQ67 boards, all based on the Q67 chipset, support 2nd generation Intel® i7 -, i5 -, i3 2Core and 4Core processor and the Celeron B810 2Core, see “Processor Support Table for more specific details.

The KTQ67 family consist on members having different form factors, and the same functionality except for the functions listed in the table below.

KTQ67 variants	Format	PCI	LPT	LVDS
KTQ67/Flex	Flex	2	-	-
KTQ67/ATXE	ATX	5	-	-

Note. LPT and LVDS is optionally for future variants. LPT and LVDS connectors can be found on some EFT samples, but is unsupported.

Use of this Users Guide implies a basic knowledge of PC-AT hard- and software. This manual is focused on describing the KTQ67 board’s special features and is not intended to be a standard PC-AT textbook.

New users are recommended to study the short installation procedure stated in the following chapter before switching-on the power.

All configuration and setup of the CPU board is either done automatically or manually by the user via the CMOS setup menus. Only exception is the Clear CMOS jumper.

1 Installation procedure

1.1 Installing the board

To get the board running, follow these steps. If the board shipped from KONTRON has already components like DRAM, CPU and cooler mounted, then relevant steps below, can be skipped.

1. **Turn off the PSU (Power Supply Unit)**

Warning: Turn off PSU (Power Supply Unit) completely (no mains power connected to the PSU) or leave the Power Connectors unconnected while configuring the board. Otherwise components (DRAM, LAN cards etc.) might get damaged. Make sure PSU has 3.3V monitoring watchdog (standard ATX PSU feature), running the board without 3.3V will damage the board within minutes.

2. **Insert the DRAM(s) (UDIMM 240pin)**
   Be careful to push it in the slot(s) before locking the tabs. For a list of approved DRAM contact your Distributor or FAE. See also chapter “System Memory Support”.

3. **Install the processor**
   The CPU is keyed and will only mount in the CPU socket in one way. Use finger to open/ close the CPU socket. Refer to supported processor overview for details.

4. **Cooler Installation**
   Use heat paste or adhesive pads between CPU and cooler and connect the Fan electrically to the FAN_CPU connector.

5. **Connecting Interfaces**
   Insert all external cables for hard disk, keyboard etc. A monitor must be connected in order to be able change CMOS settings.

6. **Connect and turn on PSU**
   Connect PSU to the board by the ATX/BTXPWR and the 4-pin ATX+12V connectors.

7. **Power Button**
   The PWRBTN_IN must be toggled to start the Power supply; this is done by shorting pins 16 (PWRBTN_IN) and pin 18 (GND) on the FRONTPNL connector (see Connector description). A “normally open” switch can be connected via the FRONTPNL connector.

8. **BIOS Setup**
   Enter the BIOS setup by pressing the <Del> key during boot up.
   Enter Exit Menu and Load Optimal Defaults.
   Refer to the “BIOS Configuration / Setup“ section of this manual for details on BIOS setup.

Note: To clear all CMOS settings, including Password protection, move the Clear CMOS jumper in the Clear CMOS position (with or without power) for ~10 sec. This will Load Failsafe Defaults and make sure Secure CMOS is disabled.

9. **Mounting the board to chassis**

Warning: When mounting the board to chassis etc. please notice that the board contains components on both sides of the PCB which can easily be damaged if board is handled without reasonable care. A damaged component can result in malfunction or no function at all.

When fixing the Motherboard on a chassis it is recommended using screws with integrated washer and having diameter of ~7mm.

Note: Do not use washers with teeth, as they can damage the PCB and may cause short circuits.

1.2 Requirement according to IEC60950

Users of KTQ67 family boards should take care when designing chassis interface connectors in order to fulfil the IEC60950 standard:

When an interface/connector has a VCC (or other power) pin, which is directly connected to a power plane like the VCC plane:

To protect the external power lines of the peripheral devices, the customer has to take care about:

- That the wires have suitable rating to withstand the maximum available power.
- That the enclosure of the peripheral device fulfils the fire protecting requirements of IEC60950.

Lithium Battery precautions:

CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.	**VORSICHT!** Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch den selben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.
ADVARSEL! Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.	**ADVARSEL** Eksplosjonsfare ved feilaktig skifte av batteri. Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten. Brukte batterier kasseres i henhold til fabrikantens instruksjoner.
VARNING Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.	**VAROITUS** Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laltevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

2 System Specification

2.1 Component main data

The table below summarizes the features of the KTQ67/Flex and KTQ67/ATXE embedded motherboards.

Form factor	KTQ67/Flex: Flex-ATX (190,5 mm by 228,6 mm) KTQ67/ATXE: ATX (190,5 mm by 304,8 mm)
Processor	Support the following 2nd Generation Intel® Core™ (Sandy Bridge) and Intel® Pentium® Desktop processors via Socket H2 (LGA1155), ZIF Socket • Intel® Core™ i7 • Intel® Core™ i5 • Intel® Core™ i3 • Intel® Pentium® Desktop • 1066/1333MHz system bus and 3/6/8MB internal cache. (Intel® Pentium® Desktop G622 only 1066MHz) • Up to 95W (Thermal Guideline)
Memory	• 4x DDR3 UDIMM 240pin socket • Support single and dual ranks DDR3 1066/1333MT/s (PC3-8500/PC3-10600) • Support system memory from 256MB and up to 4x 8GB Note: Less than 4GB displayed in System Properties using 32bit OS (Shared Video Memory/PCI resources is subtracted) • ECC not supported (chipset limitation)
Chipset	Intel Q67 PCH (Platform Controller Hub) • Intel ® VT-d (Virtualisation Technology for Directed I/O) • Intel ® TXT (Trusted Execution Technology) • Intel ® vPRO • Intel ® AMT (Active Management Technology) version 7 • Intel ® AT (Anti-Theft Technology) • Intel ® HD Audio Technology • Intel ® RST (Rapid Storage Technology) • Intel ® RRT (Rapid Recover Technology) • SATA (Serial ATA) 6Gb/s and 3Gb/s. • USB revision 2.0 • PCI Express revision 2.0 • ACPI 3.0b compliant • Dual Display support (Dual Graphic Pipes) • Blue-ray HD video playback
Security	• Intel® Integrated TPM 1.2 support
Management	• Intel® Active Management Technology (Intel® AMT) 7.0
Audio	Audio, 7.1 Channel High Definition Audio Codec using the VIA 1708B codec • Line-out • Line-in • Surround output: SIDE, LFE, CEN, BACK and FRONT • Microphone: MIC1 and MIC2 • CDROM in • SPDIF (electrical Interface only) • On-board speaker (Electromagnetic Sound Generator like Hycom HY-05LF)

Video	Intel ® i3, i5 or i7 processor supports Intel ® HD Graphics 2000/3000. Intel ® Pentium Desktop ® Processor supports Intel ® HD Graphics. Analogue VGA and digital display ports (2x DP) via the Mobile Intel ® Q67 Chipset. • VGA (analogue panel) • DP (DisplayPorts) dual, comply with DisplayPort 1.1a specification. • LVDS panel support up to 24 bit, 2 pixels/clock and 1920x1200. • HDMI panel support via DP to HDMI Adapter Converter. • Second VGA panel support via DP to VGA Adapter Converter • Second DVI panel support via DP to DVI Adapter Converter • Dual independent pipes for Mirror and Dual independent display support • LVDS up to two pixel/clock 24 bit (optional)
I/O Control	Via ITE IT8516E Embedded Controller and Winbond W83627DHG I/O Controller (both via LPC Bus interface)
Peripheral interfaces	• Six USB 2.0 ports on I/O area • Eight USB 2.0 ports on internal pinrows • Four Serial ports (RS232) on internal pinrows • Two Serial ATA-600 IDE interfaces (blue) • Four Serial ATA-300 IDE interfaces (black) • RAID 0/1/5/10 support • mSATA via mSATA connector • PS/2 keyboard and mouse ports via pinrow
LAN Support	• 1x 10/100/1000Mbits/s LAN (ETHER1) using Intel® Lewisville 82579LM Gigabit PHY connected to Q67 supporting AMT 7.0 • 2x 10/100/1000Mbits/s LAN (ETHER2/ETHER3)using Intel® Hartwell 82574L PCI Express controllers • PXE Netboot supported. • Wake On LAN (WOL) supported
Expansion Capabilities	• PCI Bus routed to PCI slot(s) (PCI Local Bus Specification Revision 3.0, 33MHz) o KTQ67/Flex: 2 o KTQ67/ATXE: 5 • PCI-Express slot(s) (PCIe 2.0), for all KTQ67 family members: o 1 slot PCIe x16 o 1 slot PCIe x4 (in a x16 slot) (EFT samples support only PCIe x1) o 1 slot miniPCI-Express • SMBus, compatible with ACCES BUS and I2C BUS, (via Feature connector) • SPI bus routed to SPI connector • DDC Bus routed to DP connector when DP Adapters are connected • 5 x digital input, (via Feature connector) • 13 x GPIOs (General Purpose I/Os), (via Feature connector) • DAC, ADC, PWM and TIMER (Multiplexed), (via Feature connector) • WAKE UP / Interrupt Inputs (Multiplexed), (via Feature connector) • 3 Wire Bus for GPIO Expansion (up to 152 GPIOs), (via Feature connector) • 8 bit Timer output, (via Feature connector)

Hardware Monitor Subsystem	• Smart Fan control system, support Thermal® and Speed® cruise for FAN_CPU • CPU die temperature input (Precision +/- 3ºC) • Voltage monitoring • Intrusion (Case Open) detect input, (via Feature connector) • Sleep S4/S5# Indication, (via Feature connector) • System Powergood Signal, (via Feature connector)
Power Supply Unit	ATX/BTX (w. ATX+12V) PSU for full PCI/PCIe load.
Battery	Exchangeable 3.0V Lithium battery for on-board Real Time Clock and CMOS RAM. Manufacturer Panasonic / Part-number CR-2032L/BN, CR2032N/BN or CR-2032L/BE. Approximate 5 years retention. Current draw is 5,7µA when PSU is disconnected and 0 µA in S0 – S5. **CAUTION: Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**

BIOS	• Kontron Technology / AMI BIOS (EFI core version)
	• Support for ACPI 3.0 (Advanced Configuration and Power Interface), Plug & Play
	  o Suspend (S1 mode)
	  o Suspend To Ram (S3 mode)
	  o Suspend To Disk (S4 mode)
	• "Always On" BIOS power setting
	• RAID Support (RAID modes 0,1, 5 and 10)

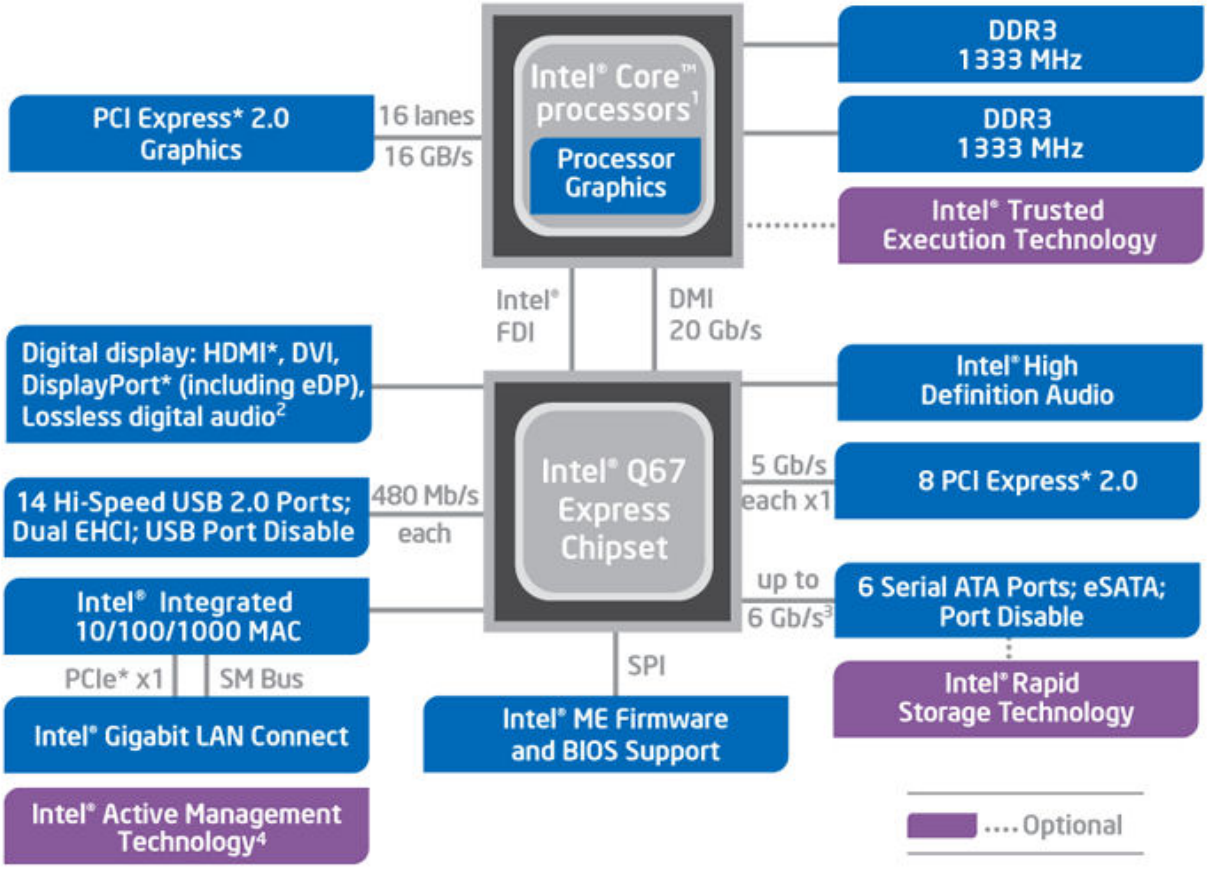
Operating Systems Support	• WinXP (32b *) • Windows 7 (32b + 64b *) • WES7 (32b * + 64b *) • Linux Fedora * • Linux Ubuntu * • VxWorks (not ready yet) *= Out Of The Box installation test only

Environmental Conditions	**Operating**: 0°C – 60°C operating temperature (forced cooling). It is the customer's responsibility to provide sufficient airflow around each of the components to keep them within allowed temperature range. 10% - 90% relative humidity (non-condensing) **Storage**: -20°C – 70°C; lower limit of storage temperature is defined by specification restriction of on-board CR2032 battery. Board with battery has been verified for storage temperature down to -40°C by Kontron. 5% - 95% relative humidity (non-condensing) **Electro Static Discharge (ESD) / Radiated Emissions (EMI):** (Pending) All Peripheral interfaces intended for connection to external equipment are ESD/ EMI protected. EN 61000-4-2:2000 ESD Immunity EN55022:1998 class B Generic Emission Standard. **Safety:** IEC 60950-1: 2005, 2nd Edition UL 60950-1 CSA C22.2 No. 60950-1 Product Category: Information Technology Equipment Including Electrical Business Equipment Product Category CCN: NWGQ2, NWGQ8 File number: E194252 **Theoretical MTBF:** 211.994 / 100.475 hours @ 40ºC / 60ºC for the KTQ67/Flex 200.897 / 94.529 hours @ 40ºC / 60ºC for the KTQ67/ATXE **Restriction of Hazardous Substances (RoHS):** All boards in the KTQ67 family are RoHS compliant. **Capacitor utilization:** No Tantalum capacitors on board Only Japanese brand Solid capacitors rated for 100 ºC used on board

2.2 System overview

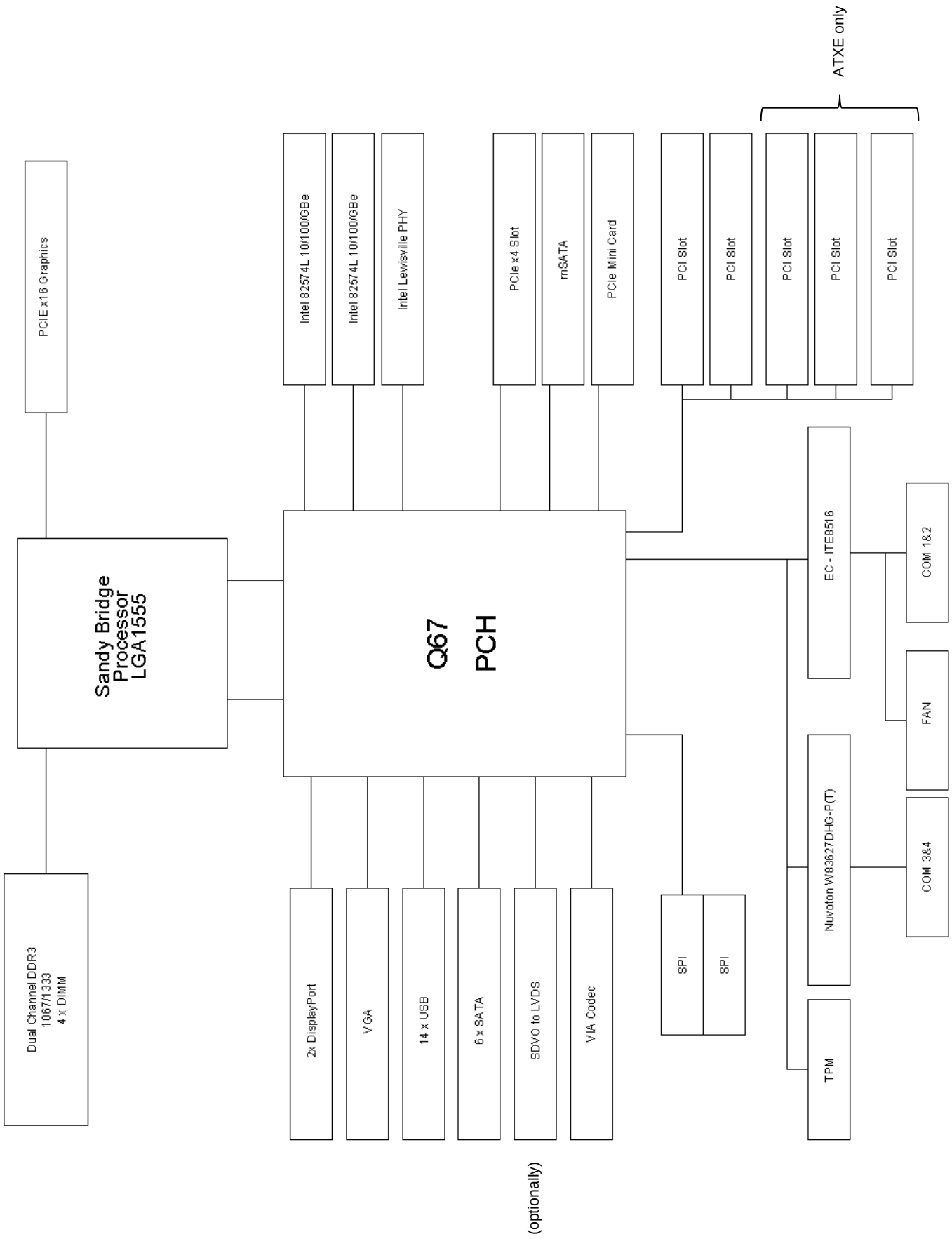
The block diagram below shows the architecture and main components of the KTQ67. The key component on the board is the Intel® Q67 (Cougar Point) Mobile Express Chipset.

Some components (PCI/PCIe/miniPCIe slots) are optional depending on board type.



[1] 2nd generation Intel® Core™ processor family
[2] Available with Intel processor graphics only
[3] All SATA ports capable of 3 Gb/s. 2 ports capable of 6 Gb/s.
[4] Requires 2nd generation Intel® Core™ vPro processor

More detailed block diagram on next page.


ATXE only
PCIE x16 Graphics
Intel 82574L 10/100/GBe
Intel 82574L 10/100/GBe
Intel Lewisville PHY
PCIe x4 Slot
mSATA
PCIe Mini Card
PCI Slot
PCI Slot
PCI Slot
PCI Slot
PCI Slot
Sandy Bridge
Processor
LGA1555
Q67
PCH
EC - ITE8516
COM 1&2
FAN
COM 3&4
Nuvoton W83627DHG-P(T)
TPM
Dual Channel DDR3
1067/1333
4 x DIMM
2x DisplayPort
VGA
14 x USB
6 x SATA
SDVO to LVDS
VIA Codec
SPI
SPI
(optionally)

2.3 Processor Support Table

The KTQ67 is designed to support the following LGA1155 processors (up to 95W power consumption):

2nd generation Intel® Core™ i7 processor

2nd generation Intel® Core™ i5 processor

2nd generation Intel® Core™ i3 processor

Intel® Pentium® Desktop processor

In the following list you will find all CPU's supported by the chipset in according to Intel but also other CPU's if successfully tested.

Embedded CPU's are indicated by green text, successfully tested CPU's are indicated by **highlighted** text, successfully tested embedded CPU's are indicated by **green and highlighted** text and failed CPU's are indicated by red text.

Some processors in the list are distributed from Kontron, those CPU's are marked by an * (asterisk). However please notice that this marking is only guide line and maybe not fully updated.

Processor Brand	Clock Speed [GHz]	Turbo Speed [GHz]	Cores / Threads	Bus Speed [MHz]	Cache [MB]	CPU Number	sSpec no.	Step.	Thermal Guideline [Watt]
	3.4	**3.8**	**4 / 8**	**1066/1333**	**8**	**2600**	**SR00B**	**D2**	**95**
	3.4	3.8	4 / 8	1066/1333	8	2600K	SR00C	D2	95
	2.8	3.8	4 / 8	1066/1333	8	2600S	SR00E	D2	65
	3.3	3.7	4 / 4	1066/1333	6	2500K	SR008	D2	95
	3.3	3.7	4 / 4	1066/1333	6	2500	SR00T	D2	95
	3.1	**3.4**	**4 / 4**	**1066/1333**	**6**	**2400**	**SR00Q**	**D2**	**95**
	2.7	3.7	4 / 4	1066/1333	6	2500S	SR009	D2	65
	2.7	3.5	2 / 4	1066/1333	3	2390T	SR065	-	35
	2.5	3.3	4 / 4	1066/1333	6	2405S	SR0BB	D2	65
	2.5	3.3	4 / 4	1066/1333	6	2400S	SR00S	D2	65
	2.3	3.3	4 / 4	1066/1333	6	2500T	SR00A	D2	45
	3.4	-	2 / 4	1066/1333	3	2130	SR05W	-	65
	3.3	-	2 / 4	1066/1333	3	2125	SR0AY	J1	65
	3.3	**-**	**2 / 4**	**1066/1333**	**3**	**2120**	**SR05Y**	**-**	**65**
	3.1	-	2 / 4	1066/1333	3	2105	SR0BA	J1	65
	3.1	-	2 / 4	1066/1333	3	2100	SR05C	-	65
(no vPRO)	3.1	-	2 / 4	1066/1333	3	2102	SR05D	-	65
	2.6	-	2 / 4	1066/1333	3	2120T	SR060	-	35
	2.5	-	2 / 4	1066/1333	3	2100T	SR05Z	-	35
	3.0	-	2 / 2	1066/1333	3	G860	SR058	-	65
	2.9	**-**	**2 / 2**	**1066/1333**	**3**	**G850**	**SR05Q**	**-**	**65**
	2.8	-	2 / 2	1066/1333	3	G840	SR05P	-	65
	2.7	-	2 / 2	1066	3	G632	-	-	65
	2.7	-	2 / 2	1066	3	G630	SR05S	-	65
	2.6	-	2 / 2	1066	3	G620	SR05R	-	65
(no vPRO)	2.6	-	2 / 2	1066	3	G622	-	-	65
	2.2	-	2 / 2	1066	3	G620T	SR05T	-	35
	2.3	-	2 / 2	1066	3	G630T	SR05U	-	35
	2.5	**-**	**2 / 2**	**1066**	**2**	**G540**	**SR05J**	**-**	**65**
	2.4	-	2 / 2	1066	2	G530	SR05H	-	65
	2.0	-	2 / 2	1066	2	G530T	SR05K	-	35
(no vPRO)	1.6	-	1 / 1	1066	1	G440	SR0BY	-	35

Not all CPU even of same type support all functions ex. i7 2600K and i5 2500K doesn't support vPro.

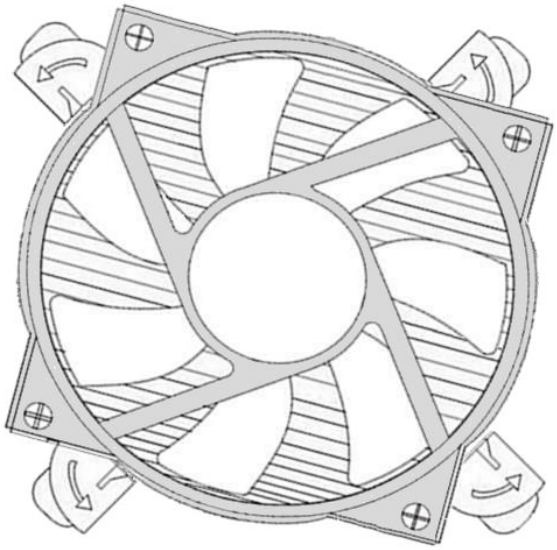
All the CPUs in the list above, inclusive the Pentium Desktop processors, but except G440, are supporting the Enhanced Intel® SpeedStep® which is improved SpeedStep technology for faster transition between voltage (power saving states) and frequency states with the result of improved power/performance balance.

Intel® Turbo Boost Technology 2.0 is supported by i5 and i7, as indicated in above list of processors, and is enabling overclocking of all cores, when operated within the limits of thermal design power, temperature and current.

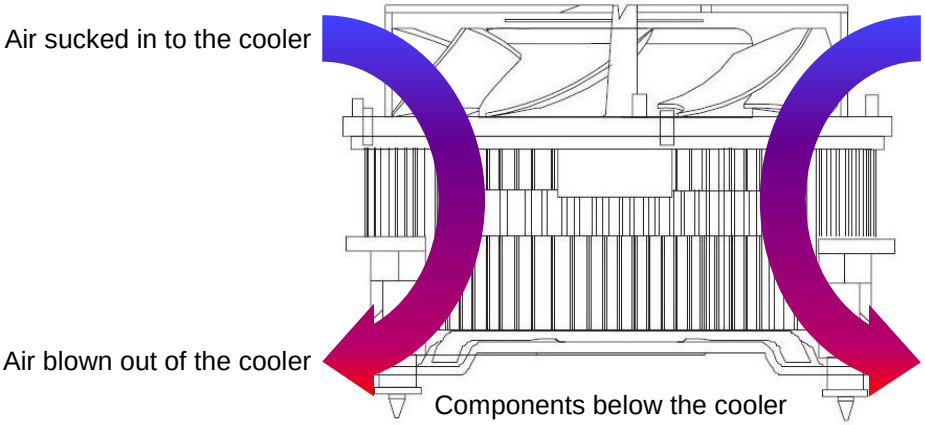
Sufficient cooling must be applied to the CPU in order to remove the effect as listed in above table (Thermal Guideline). The sufficient cooling is also depending on the maximum (worst-case) ambient operating temperature and the actual load of processor.

Warning: Make sure sufficient airflow is always present around the components located below the cooler. Different coolers are available on the market and some is not generating any airflow or is blocking the airflow around these components, causing reduced lifetime.

It is recommended to use a cooler like the Kontron PN 1046-6305 "KTQ67 Cooler".



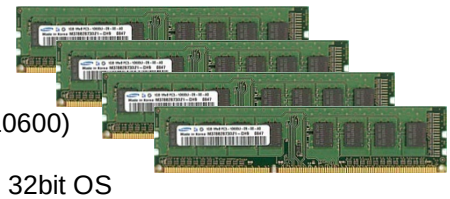
The design of this cooler makes sure airflow is always present around the components below the cooler. Even if Fan is set to be off, it is still running a minimum RPM (Rotation Per Minute).



Note: The temperature of the air blown out of the cooler should be 70°C maximum.

2.4 System Memory support

The KTQ67/FLEX and /ATXE have four DDR3 UDIMM sockets. The sockets support the following memory features:



- 4x DDR3 1.5V UDIMM 240-pin
- Dual-channel with 2 UDIMM per channel
- Single/dual rank unbuffered 1066/1333MT/s (PC3-8500/PC3-10600)
  From 256MB and up to 4x 8GB.
  Note: Less than 4GB displayed in System Properties using 32bit OS (Shared Video Memory/PCI resources is subtracted)
- SPD timings supported
- ECC not supported

The installed DDR3 DIMM should support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read and configure the memory controller for optimal performance. If non-SPD memory is used, the BIOS will attempt to configure the memory settings, but performance and reliability may be impacted.

Memory Operating Frequencies
Regardless of the DIMM type used, the memory frequency will either be equal to or less than the processor system bus frequency. For example, if DDR3 1600 memory is used with a 1333 MHz system bus frequency processor, the memory clock will operate at 666 MHz. The table below lists the resulting operating memory frequencies based on the combination of DIMMs and processors.

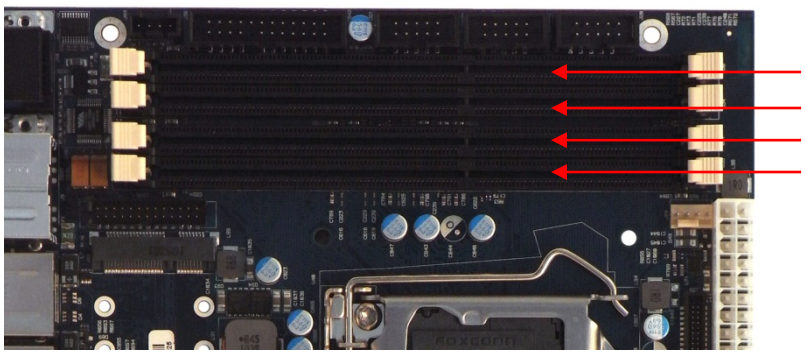
DIMM Type	Module name	Memory Data transfers [Mill/s]	Processor system bus frequency [MHz]	Resulting memory clock frequency [MHz]	Peak transfer rate [MB/s]
DDR3 1066	PC3-8500	1066	1066 / 1333	533	8533
DDR3 1333	PC3-10600	1333	1333	666	10666
DDR3 1600	PC3-12800	1600	1333	666	10666

Notes: Kontron offers the following memory modules:

1028-6891 1GB DDR3 1066
1030-5747 2GB DDR3 1066

1030-5722 1GB DDR3 1333
1028-6892 2GB DDR3 1333
1050-3141 4GB DDR3 1333
1050-3780 8GB DDR3 1333

In order to support Intel ® AMT (Management Engine) SLOT A0 **must** always be populated.



DDR3 (SLOT B1)
DDR3 (SLOT B0)
DDR3 (SLOT A1)
DDR3 (SLOT A0)

(Example Flex version)

2.5 KTQ67 Graphics Subsystem

The KTQ67 equipped with Intel ® i3, i5 or i7 processor, supports Intel ® HD Graphics 2000/3000.
The KTQ67 equipped Intel ® Pentium Desktop ® Processor, supports Intel ® HD Graphics.

All KTQ67 versions support analogue VGA and digital display ports (2x DP) via the Intel ® Q67 Chipset. Optionally LVDS support.

The DP interface supports the DisplayPort 1.1a specification. The PCH supports High-bandwidth Digital Content Protection for high definition content playback over digital interfaces. The PCH also integrates audio codecs for audio support over DP interfaces.

Up to two displays (any two display outputs) can be activated at the same time and be used to implement dual independent display support or mirror display support. PCIe and PCI graphics cards can be used to replace on-board graphics or in combination with on-board graphics.

2.5.1 Intel® HD Graphics 3000

Features of the Intel HD Graphics 3000 build into the i3, i5 and i7 processors, includes:

- High quality graphics engine supporting
  - DirectX10.1 and OpenGL 3.0 compliant
  - Shader Model 4.1 support
  - Intel ® Clear Video HD Technology
  - Intel ® Quick Sync Video Technology
  - Intel ® Flexible Display Interface (Intel ® FDI)
  - Core frequency of 350 - 1300 (Turbo) MHz
  - Memory Bandwidth up to 21.3 GB/s
  - 12 3D Execution Units
  - 1.62 GP/s and 2.7 GP/S pixel rate (DP outputs)
  - Hardware Acceleration full MPEG2, full VC-1 and full AVC
  - Dynamic Video Memory Technology (DVMT) support up to 1720 MB

- LVDS panel Support (optional), 18/24 bit colours in up to WUXGA (1920x1200) @60 Hz and SPWG (VESA) colour coding. OpenLDI (JEIDA) colour coding is 18 bit with or without Dithering.

- DP0 and DP1
  - 24/30 bit colours in WQXGA (2560x1600 pixels) and HDCP.

Use of DP Adapter Converters can implement HDMI support or second VGA or DVI panel support.

The HDMI interface supports the HDMI 1.4a specification and includes audio codecs. However limitations to the resolution apply:
2048x1536 VGA
1920x1200 HDMI and DVI

DP to VGA PN 1045-5779 | DP to HDMI PN 1045-5781 | DP to DVI-D PN 1045-5780

2.6 Power Consumption

In order to ensure safe operation of the board, the ATX12V power supply must monitor the supply voltage and shut down if the supplies are out of range – refer to the hardware manual for the actual power supply specification. The KTQ67 board is powered through the ATX/BTX connector and ATX+12V connector. Both connectors must be used in according to the ATX12V PSU standard.

The requirements to the supply voltages are as follows:

Supply	Min	Max	Note
VCC3.3	3.168V	3.432V	Should be ±4% for compliance with the ATX specification
Vcc	4.75V	5.25V	Should be ±5% for compliance with the ATX specification. Should be minimum 5.00V measured at USB connectors in order to meet the requirements of USB standard.
+12V	11.4V	12.6V	Should be ±5% for compliance with the ATX specification
–12V	–13.2V	–10.8V	Should be ±10% for compliance with the ATX specification
-5V	-5,50V	-4.5V	Not required for the KTQ67 board
5VSB	4.75V	5.25V	Should be ±5% for compliance with the ATX specification

More detailed Static Power Consumption

On the following pages the power consumption of the KTQ67 Board is measured under:

1- DOS, idle, mean
2- Windows7, Running 3DMARK 2005 & BiT 6, mean
3- S1, mean
4- S3, mean
5- S4, mean

The following items were used in the test setup:

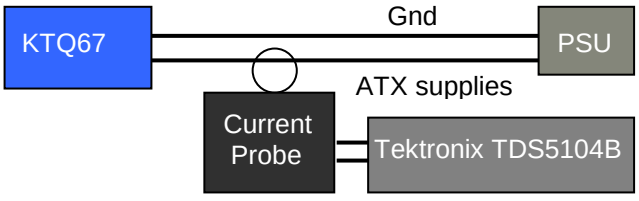
Low Power Setup

Standard system configuration equipped with PCI card, Internal graphics, 2x SATA disks, Intel i3 CPU, 2x DIMM (1GB Modules), CRT Monitor, Keyboard & Mouse. 1x 1-4GB USB Flash Stick.

High Power Setup

Standard system configuration equipped with PCI card, PCIex4, PCIex16, miniPCIe WLAN, 4x SATA disks, Intel i7 CPU, 4x DIMM (2+2+2+1 Modules), CRT Monitor, Keyboard & Mouse, 4x 1-4GB USB Flash Stick.

1. 12V active cooler (Intel BOX).
2. USB Keyboard/Mouse Genius
3. CRT Sampo AlphaScan 912
4. 2.5” HDD Fujitsu MHY2120BH
5. ATX Fortron 400W
6. Tektronix TDS5104B
7. Tektronix TCPA300
8. Tektronix TCP312
9. Fluke 289
10. ATX rail switch



Note: The Power consumption of Display and HD are not included.

Low Power Setup results:

DOS Idle, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0.258A	3.096W
+12V P4	1.363A	16.366W
+5V	1.417A	7.083W
+3V3	0.490A	1.618W
-12V	0.035A	0.416W
5VSB	0.006A	0.030W
Total		**28.6W**

Windows 7, mean 3DMARK2005 (first scene) & BiT 6		
Supply	**Current draw**	**Power consumption**
+12V	0.293A	3.516W
+12V P4	2.642A	31.702W
+5V	2.170A	10.850W
+3V3	0.443A	1.463W
-12V	0.037A	0.442W
5VSB	0.006A	0.030W
Total		**48.0W**

S1 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0.212A	2.540W
+12V P4	0.238A	2.854W
+5V	0.828A	4.140W
+3V3	0.265A	0.878W
-12V	0.039A	0.469W
5VSB	0.006A	0.030W
Total		**10.9W**

S3 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0A	0W
+12V P4	0A	0W
+5V	0A	0W
+3V3	0A	0W
-12V	0A	0W
5VSB	0.153A	0.765W
Total		**0.77W**

S4 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0A	0W
+12V P4	0A	0W
+5V	0A	0W
+3V3	0A	0W
-12V	0A	0W
5VSB	0.120A	0.600W
Total		**0.60W**

High Power Setup results:

DOS Idle, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	1.978A	23.737W
+12V P4	1.827A	21.924W
+5V	2.061A	10.306W
+3V3	1.032A	3.404W
-12V	0.032A	0.384W
5VSB	0.006A	0.030W
Total		**59.8W**

Windows 7, mean 3DMARK2005 (first scene) & BiT 6		
Supply	**Current draw**	**Power consumption**
+12V	3.115A	37.380W
+12V P4	4.957A	59.484W
+5V	2.457A	12.285W
+3V3	1.659A	5.475W
-12V	0.038A	0.456W
5VSB	0.006A	0.030W
Total		**115.1W**

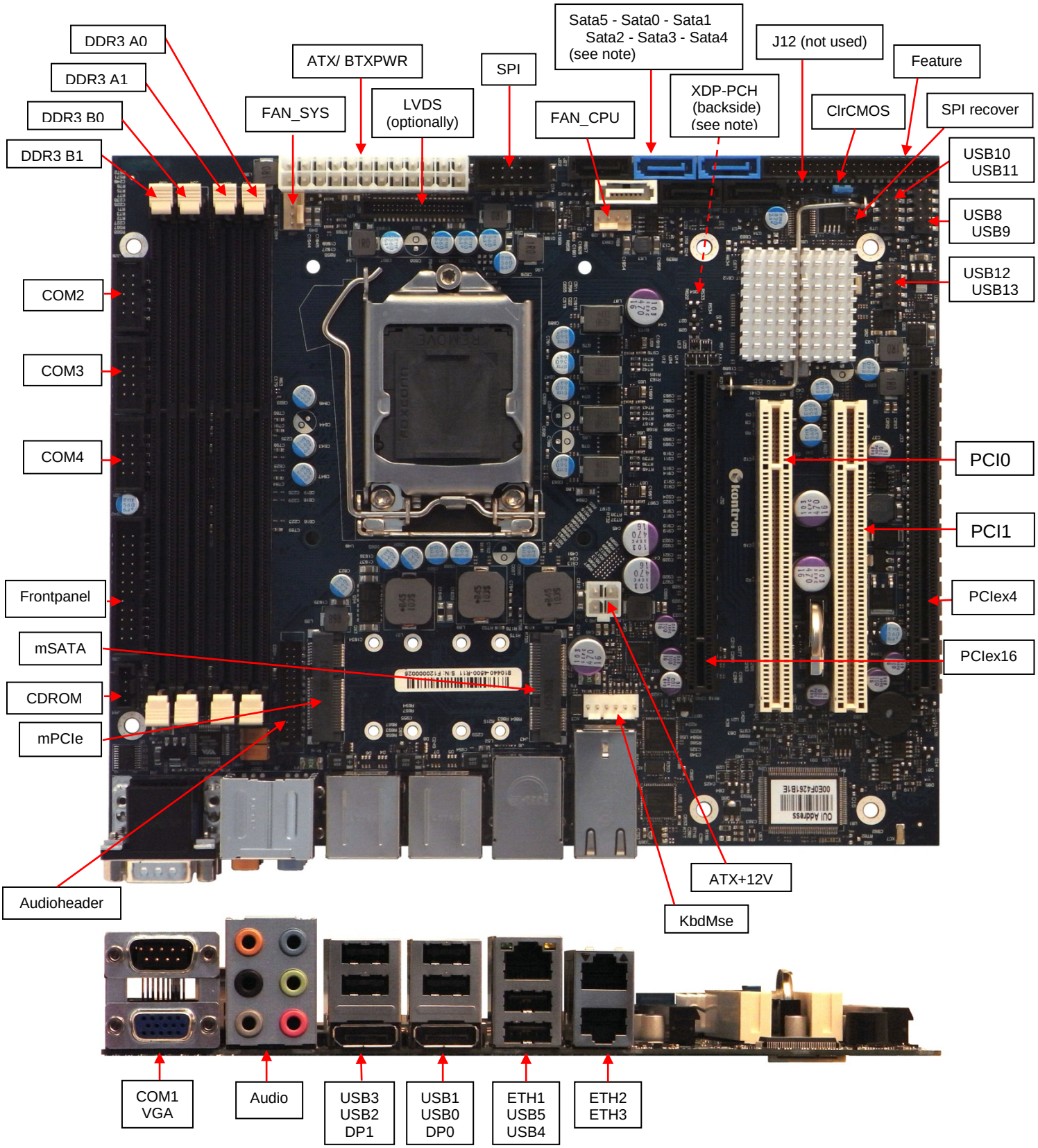
S1 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	2.179A	26.144W
+12V P4	0.594A	7.128W
+5V	1.076A	5.380W
+3V3	1.348A	4.447W
-12V	0.043A	0.516W
5VSB	0.006A	0.030W
Total		**43.6W**

S3 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0A	0W
+12V P4	0A	0W
+5V	0A	0W
+3V3	0A	0W
-12V	0A	0W
5VSB	0.364A	1.820W
Total		**1.82W**

S4 Mode, Mean, No external load		
Supply	**Current draw**	**Power consumption**
+12V	0A	0W
+12V P4	0A	0W
+5V	0A	0W
+3V3	0A	0W
-12V	0A	0W
5VSB	0.295A	1.475W
Total		**1.48W**

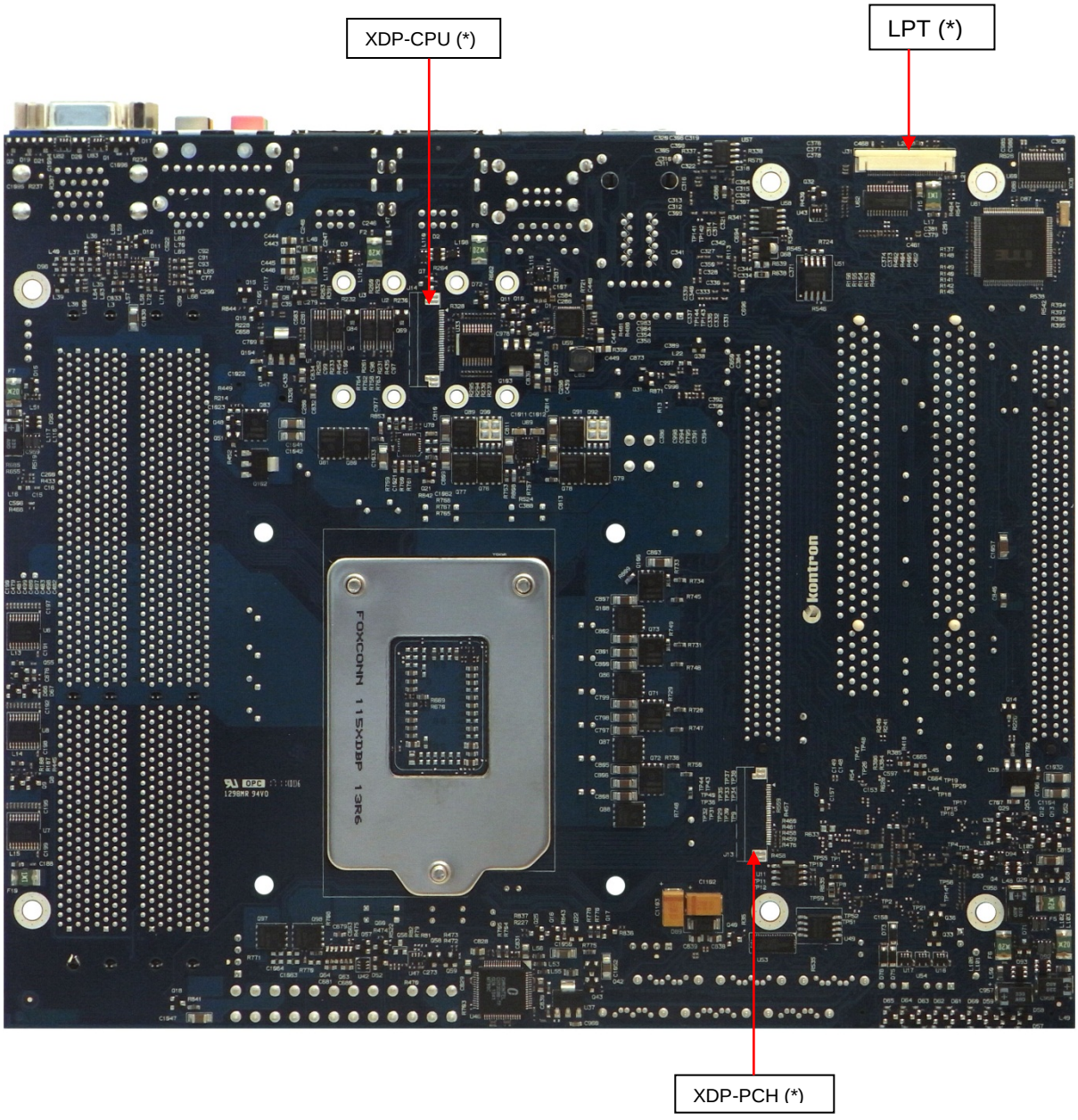
3 Connector Locations

3.1 KTQ67/Flex – frontside



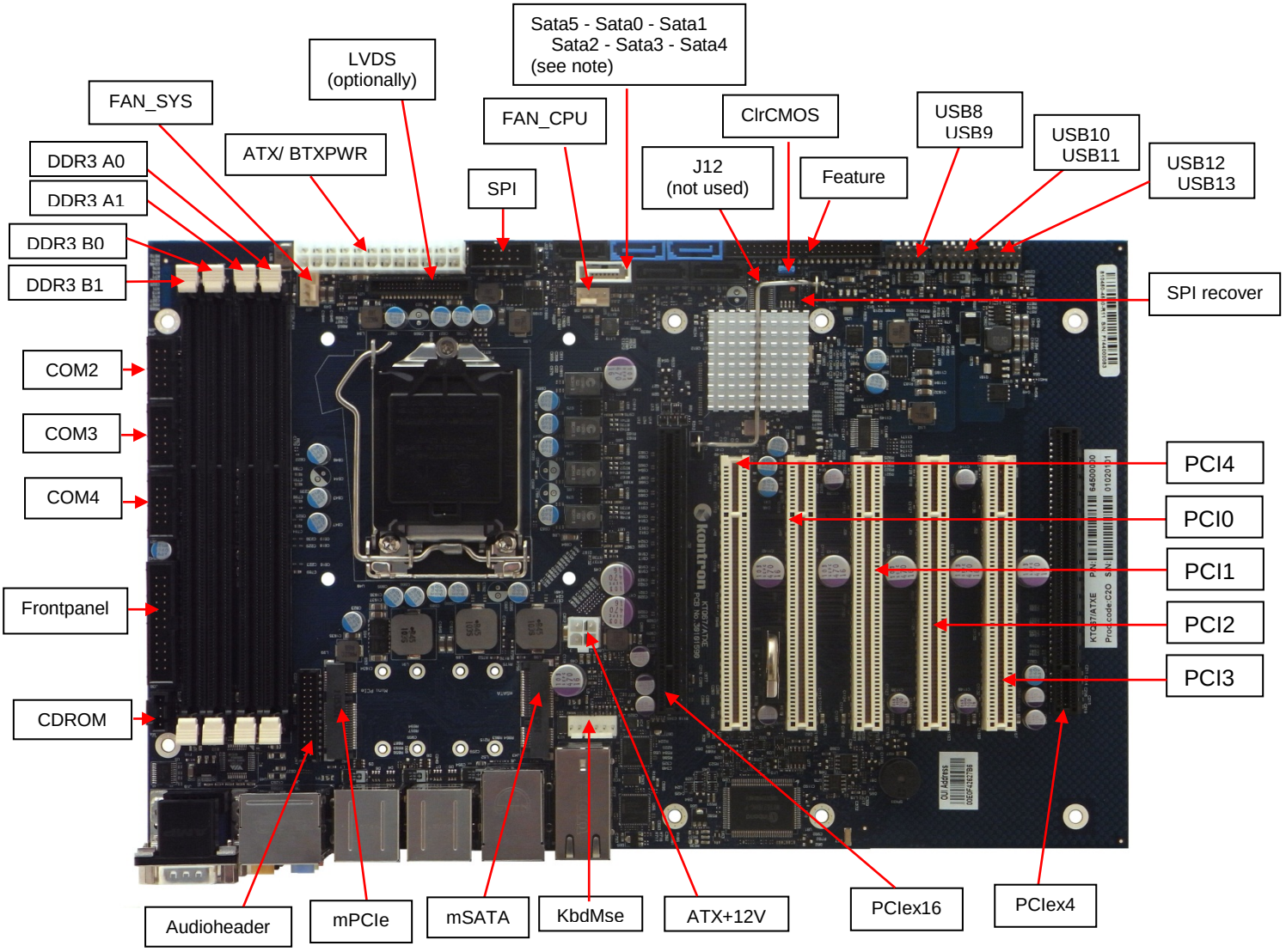
Notes: Sata0/Sata1support up to 6GB/s and Sata2/Sata3/Sata4/Sata5 support up to 3GB/S.

3.2 KTQ67/Flex - backside



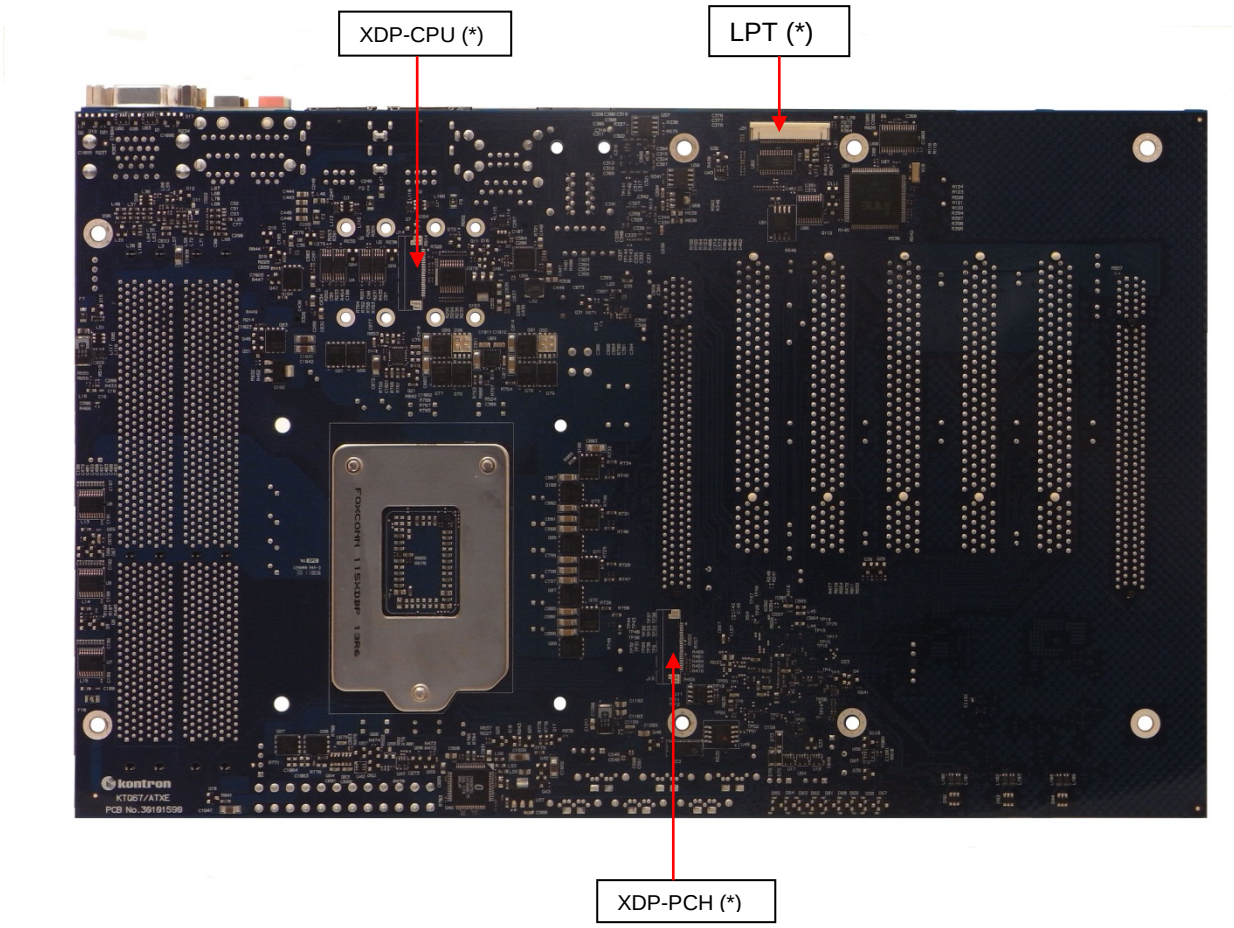
(*) The LPT connector and the XDP connectors are not mounted in volume production.

3.3 KTQ67/ATXE



For location of the IO Area connectors, see “KTQ67/Flex- frontside”.

3.4 KTQ67/ATXE - backside



(*) The LPT connector and the XDP connectors are not mounted in volume production.

4 Connector Definitions

The following sections provide pin definitions and detailed description of all on-board connectors.

The connector definitions follow the following notation:

Column name	Description
Pin	Shows the pin-numbers in the connector. The graphical layout of the connector definition tables is made similar to the physical connectors.
Signal	The mnemonic name of the signal at the current pin. The notation “XX#” states that the signal “XX” is active low.
Type	AI: Analogue Input. AO: Analogue Output. I: Input, TTL compatible if nothing else stated. IO: Input / Output. TTL compatible if nothing else stated. IOT: Bi-directional tristate IO pin. IS: Schmitt-trigger input, TTL compatible. IOC: Input / open-collector Output, TTL compatible. IOD: Input / Output, CMOS level Schmitt-triggered. (Open drain output) NC: Pin not connected. O: Output, TTL compatible. OC: Output, open-collector or open-drain, TTL compatible. OT: Output with tri-state capability, TTL compatible. LVDS: Low Voltage Differential Signal. PWR: Power supply or ground reference pins.
	Ioh: Typical current in mA flowing out of an output pin through a grounded load, while the output voltage is > 2.4 V DC (if nothing else stated). Iol: Typical current in mA flowing into an output pin from a VCC connected load, while the output voltage is < 0.4 V DC (if nothing else stated).
Pull U/D	On-board pull-up or pull-down resistors on input pins or open-collector output pins.
Note	Special remarks concerning the signal.

The abbreviation *TBD* is used for specifications which are not available yet or which are not sufficiently specified by the component vendors.

5 IO-Area Connectors

5.1 Display connectors (IO Area)

The KTQ67 family provides one on-board Analogue VGA port, two on-board DP's (DisplayPort) and optionally one on-board LVDS panel interface. Two graphic pipes are supported; meaning that up to two independent displays can be implemented using any two of the above mentioned graphic ports.
.

5.1.1 Analogue VGA (VGA)

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
						6	GND	PWR	-	-	
	/75R	-	A0	RED	1	11	NC	-	-	-	
						7	GND	PWR	-	-	
	/75R	-	A0	GREEN	2	12	DDCDAT	IO	TBD	2K2	
						8	GND	PWR	-	-	
	/75R	-	A0	BLUE	3	13	HSYNC	O	TBD		
						9	5V	PWR	-	-	1
	-	-	-	NC	4	14	VSYNC	O	TBD		
						10	GND	PWR	-	-	
	-	-	PWR	GND	5	15	DDCCLK	IO	TBD	2K2	

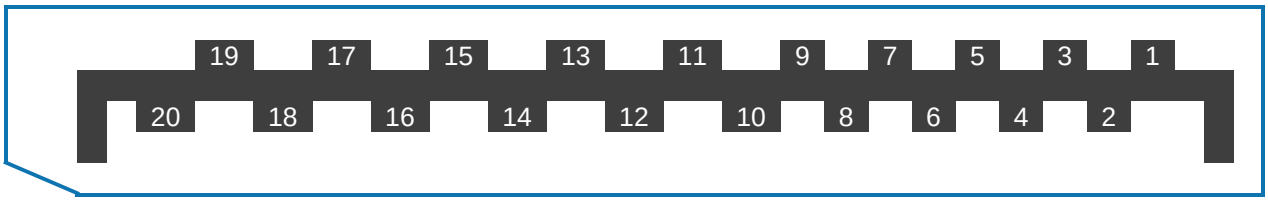
Note 1: The +5V supply is fused by a 1.1A resettable fuse

Signal Description - VGA Connector:

Pin	Signal	Description
1	RED	Analogue output carrying the red colour values. (75 Ohm cable impedance).
2	GREEN	Analogue output carrying the green colour values. (75 Ohm cable impedance).
3	BLUE	Analogue output carrying the blue colour values. (75 Ohm cable impedance).
4	NC	No Connection
5-8	GND	
9	5V	This 5V supply is fused by a 1.1A resettable fuse.
10	GND	
11	NC	No Connection
12	DDCDAT	Display Data Channel Data. Used as data signal to/from monitors with DDC interface.
13	HSYNC	CRT horizontal synchronization output.
14	VSYNC	CRT vertical synchronization output.
15	DDCCLK	Display Data Channel Clock. Used as clock signal to/from monitors with DDC interface.

5.1.2 DP Connectors (DP0/DP1)

The DP (DisplayPort) connectors are based on standard DP type Foxconn 3VD51203-H7JJ-7H or similar.



Pin	Signal	Description	Type	Note
1	Lane 0 (p)		LVDS	
2	GND		PWR	
3	Lane 0 (n)		LVDS	
4	Lane 1 (p)		LVDS	
5	GND		PWR	
6	Lane 1 (n)		LVDS	
7	Lane 2 (p)		LVDS	
8	GND		PWR	
9	Lane 2 (n)		LVDS	
10	Lane 3 (p)		LVDS	
11	GND		PWR	
12	Lane 3 (n)		LVDS	
13	Config1	Aux or DDC selection	I	Internally pull down (1Mohm). Aux channel on pin 15/17 selected as default (when NC) DDC channel on pin 15/17, If HDMI adapter used (3.3V)
14	Config2	(Not used)	O	Internally connected to GND
15	Aux Ch (p)	Aux Channel (+) or DDC Clk		AUX (+) channel used by DP DDC Clk used by HDMI
16	GND		PWR	
17	Aux Ch (n)	Aux Channel (-) or DDC Data		AUX (-) channel used by DP DDC Data used by HDMI
18	Hot Plug		I	Internally pull down (100Kohm).
19	Return		PWR	Same as GND
20	3.3V		PWR	Fused by 1.5A resetable PTC fuse, common for DP0 and DP1

5.2 Ethernet Connectors (IO Area)

The KTQ67 boards supports three channels of 10/100/1000Mb Ethernet, one (ETH1) is based on Intel® Lewisville 82579LM Gigabit PHY with AMT 7.0 support and the two other controllers (ETHER2 & ETHER3) are based on Intel® Hartwell 82574L PCI Express controller.

In order to achieve the specified performance of the Ethernet port, minimum Category 5 twisted pair cables must be used with 10/100MB and minimum Category 5E, 6 or 6E with 1Gb LAN networks.

The signals for the Ethernet ports are as follows:

Signal	Description
MDI[0]+ / MDI[0]-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
MDI[1]+ / MDI[1]-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
MDI[2]+ / MDI[2]-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
MDI[3]+ / MDI[3]-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair. In MDI crossover mode, this pair acts as the BI_DC+/- pair.

Note: MDI = Media Dependent Interface.

Ethernet connector 1 (ETH1) is mounted together with USB Ports 4 and 5.
Ethernet connector 2 (ETH2) is mounted together with and above Ethernet connector 3 (ETH3).

The pinout of the RJ45 connectors is as follows:

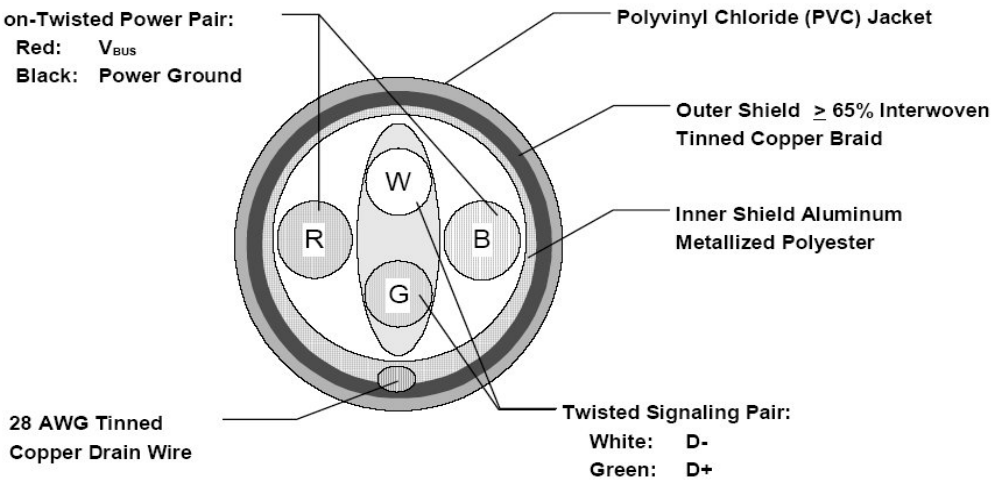
Signal	PIN	Type	Ioh/Iol	Note
MDI0+				
MDI0-				
MDI1+				
MDI2+				
MDI2-				
MDI1-				
MDI3+				
MDI3-				
	8 7 6 5 4 3 2 1			

5.3 USB Connectors (IO Area)

The KTQ67 board contains two EHCI (Enhanced Host Controller Interface) host controllers (EHCI1 and EHCI2) that support up to fourteen USB 2.0 ports allowing data transfers up to 480Mb/s. Legacy Keyboard/Mouse and wakeup from sleep states are supported. Over-current detection on all fourteen USB ports is supported. The following USB connectors are available in the IO Area.

USB Port 0 (via EHCI1) and 1 are supplied on the combined USB0, USB1 and DP0 connector.
USB Port 2 and 3 (via EHCI1) are supplied on the combined USB2, USB3 and DP1 connector.
USB Port 4 and 5 (via EHCI1) are supplied on the combined ETH1, USB4 and USB5 connector.

Note: It is required to use only HiSpeed USB cable, specified in USB2.0 standard:



5.3.1 USB Connector 0/1 (USB0/1)

USB Ports 0 and 1 are mounted together with DP0 port.

Note	Type	Signal	PIN	Signal	Type	Note
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB1-		USB1+	IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB0-		USB0+	IO	

Note 1: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

Signal	Description
USB0+ USB0- USB1+ USB1-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

5.3.2 USB Connector 2/3 (USB2/3)

USB Ports 2 and 3 are mounted together with DP1 port.

Note	Type	Signal	PIN	Signal	Type	Note
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB3-		USB3+	IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB2-		USB2+	IO	

Note 1: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

Signal	Description
USB2+ USB2- USB3+ USB3-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

5.3.3 USB Connector 4/5 (USB4/5)

USB Ports 4 and 5 are mounted together with ETH1 port.

Note	Type	Signal	PIN	Signal	Type	Note
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB5-		USB5+	IO	
1	PWR	5V/SB5V	1 2 3 4	GND	PWR	
	IO	USB4-		USB4+	IO	

Note 1: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

Signal	Description
USB4+ USB4- USB5+ USB5-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

5.4 Audio Connector (IO Area)

The on-board Audio circuit implements 7.1+2 Channel High Definition Audio with UAA (Universal Audio Architecture), featuring five 24-bit stereo DACs and three 20-bit stereo ADCs. The Following Audio connector is available in IO Area.

Audio Speakers, Line-in and Microphone are available in the stacked audiojack connector

Note	Type	Signal			Signal	Type	Note
	OA	CEN-OUT	TIP	TIP	LINE1-IN-L	IA	
	OA	LFE-OUT	RING	RING	LINE1-IN-R	IA	
	PWR	GND	SLEEVE	SLEEVE	GND	PWR	
	OA	REAR-OUT-L	TIP	TIP	FRONT-OUT-L	OA	
	OA	REAR-OUT-R	RING	RING	FRONT-OUT-R	OA	
	PWR	GND	SLEEVE	SLEEVE	GND	PWR	
	OA	SIDE-OUT-L	TIP	TIP	MIC1-L	IA	
	OA	SIDE-OUT-R	RING	RING	MIC1-R	IA	
	PWR	GND	SLEEVE	SLEEVE	GND	PWR	

Signal	Description	Note
FRONT-OUT-L	Front Speakers (Speaker Out Left).	Shared with Audio Header
FRONT-OUT-R	Front Speakers (Speaker Out Right).	Shared with Audio Header
REAR-OUT-L	Rear Speakers (Surround Out Left).	Shared with Audio Header
REAR-OUT-R	Rear Speakers (Surround Out Right).	Shared with Audio Header
SIDE-OUT-L	Side speakers (Surround Out Left)	Shared with Audio Header
SIDE-OUT-R	Side speakers (Surround Out Right)	Shared with Audio Header
CEN-OUT	Center Speaker (Center Out channel).	Shared with Audio Header
LFE-OUT	Subwoofer Speaker (Low Freq. Effect Out).	Shared with Audio Header
MIC1	MIC Input 1	Shared with Audio Header
LINE1-IN	Line in 1 signals	Shared with Audio Header

Port	2-channel	4-channel	6-channel	8-channel
Light Blue	Line in	Line in	Line in	Line in
Lime	Line out	Front speaker out	Front speaker out	Front speaker out
Pink	Mic in	Mic in	Mic in	Mic in
Audio header	-	-	-	Side speaker out
Audio header	-	Rear speaker out	Rear speaker out	Rear speaker out
Audio header	-	-	Center/ Subwoofer	Center/ Subwoofer

5.5 COM1 Connector (IO Area)

Four RS232 serial ports are available on the KTQ67, COM1 is available in the IO Area while the other COM ports are available on internal pin header connectors.

The typical definition of the signals in the COM ports is as follows:

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates to the modem etc. that the on-board UART is ready to establish a communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect, indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.

The pinout of Serial ports COM1 is as follows:

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
	-	-	PWR	GND	5					
					9	RI	I	-	/5K	
	-		O	DTR	4					
					8	CTS	I	-	/5K	
	-		O	TxD	3					
					7	RTS	O		-	
	/5K	-	I	RxD	2					
					6	DSR	I	-	/5K	
	/5K	-	I	DCD	1					

6 Internal Connectors

6.1 Power Connector (ATX/BTXPWR)

The KTQ67 boards are designed to be supplied from a standard ATX (or BTX) power supply. Use of BTX supply is not required for operation, but may be required to drive high-power PCIe cards.

ATX/ BTX Power Connector (J45):

Note	Type	Signal	PIN		Signal	Type	Note
	PWR	3V3	12	24	GND	PWR	
	PWR	+12V	11	23	5V	PWR	
	PWR	+12V	10	22	5V	PWR	
	PWR	SB5V	9	21	5V	PWR	
	I	P_OK	8	20	-5V	PWR	1
	PWR	GND	7	19	GND	PWR	
	PWR	5V	6	18	GND	PWR	
	PWR	GND	5	17	GND	PWR	
	PWR	5V	4	16	PSON#	OC	
	PWR	GND	3	15	GND	PWR	
	PWR	3V3	2	14	-12V	PWR	
	PWR	3V3	1	13	3V3	PWR	

Note 1: -5V supply is not used on-board.

See chapter “Power Consumption” regarding input tolerances on 3.3V, 5V, SB5V, +12 and -12V (also refer to ATX specification version 2.2).

ATX+12V-4pin Power Connector (J46):

Note	Type	Signal	PIN		Signal	Type	Note
	PWR	GND	2	4	+12V	PWR	1
	PWR	GND	1	3	+12V	PWR	1

Note 1: Use of the 4-pin ATX+12V Power Connector is required for operation of all KTQ67 board versions.

Signal	Description
P_OK	P_OK is a power good signal and should be asserted high by the power supply to indicate that the +5VDC and +3.3VDC outputs are above the undervoltage thresholds of the power supply. When this signal is asserted high, there should be sufficient energy stored by the converter to guarantee continuous power operation within specification. Conversely, when the output voltages fall below the undervoltage threshold, or when mains power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, P_OK should be de-asserted to a low state. The recommended electrical and timing characteristics of the P_OK (PWR_OK) signal are provided in the *ATX12V Power SupplyDesign Guide*. It is strongly recommended to use an ATX or BTX supply in order to implement the supervision of the 5V and 3V3 supplies. These supplies are not supervised on-board.
PS_ON#	Active low open drain signal from the board to the power supply to turn on the power supply outputs. Signal must be pulled high by the power supply.

6.2 Fan Connectors (FAN_CPU) (J28) and (FAN_SYS) (J29)

The **FAN_CPU** is used for the connection of the FAN for the CPU.
The **FAN_SYS** can be used to power, control and monitor a fan for chassis ventilation etc.

The 4pin header is recommended to be used for driving 4-wire type Fan in order to implement FAN speed control. 3-wire Fan is also possible, but no fan speed control is integrated.

4-pin Mode:

PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
1	CONTROL	O	-	-	
2	SENSE	I	-	4K7	
3	+12V	PWR	-	-	
4	GND	PWR	-	-	

Signal	Description
CONTROL	PWM signal for FAN speed control
SENSE	Tacho signal from the fan for supervision. The signals shall be generated by an open collector transistor or similar. On-board is a pull-up resistor 4K7 to +12V. The signal has to be pulsed, typically twice per rotation.
12V	+12V supply for fan. A maximum of 2000mA can be supplied from this pin.
GND	Power Supply GND signal

3-pin Mode:

PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
-					
2	SENSE	I	-	4K7	
3	+12V	PWR	-	-	
4	GND	PWR	-	-	

Signal	Description
SENSE	Tacho signal from the fan for supervision. The signals shall be generated by an open collector transistor or similar. On-board is a pull-up resistor 4K7 to +12V. The signal has to be pulsed, typically twice per rotation.
12V	+12V supply for fan. A maximum of 2000mA can be supplied from this pin.
GND	Power Supply GND signal

6.3 PS/2 Keyboard and Mouse connector (KBDMSE) (J15)

Attachment of a PS/2 keyboard/mouse can be done through the pinrow connector KBDMSE (J15). Both interfaces utilize open-drain signalling with on-board pull-up.

The PS/2 mouse and keyboard is supplied from SB5V when in standby mode in order to enable keyboard or mouse activity to bring the system out from power saving states. The supply is provided through a 1.1A resettable fuse.

PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
1	KBDCLK	IOD	/14mA	2K7	
2	KBDDAT	IOD	/14mA	2K7	
3	MSCLK	IOD	/14mA	2K7	
4	MSDAT	IOD	/14mA	2K7	
5	5V/SB5V	PWR	-	-	
6	GND	PWR	-	-	

Signal Description – Keyboard & and mouse Connector (KBDMSE).

Signal	Description
MSCLK	Bi-directional clock signal used to strobe data/commands from/to the PS/2 mouse.
MSDAT	Bi-directional serial data line used to transfer data from or commands to the PS/2 mouse.
KDBCLK	Bi-directional clock signal used to strobe data/commands from/to the PC-AT keyboard.
KBDDAT	Bi-directional serial data line used to transfer data from or commands to the PC-AT keyboard.

6.4 Display connectors (Internal)

The KTQ67 family provides optionally internal on-board LVDS panel interface. For IO Area Display Connectors (VGA and two DP's), see earlier section.

Two graphic pipes are supported; meaning that up to two independent displays can be implemented using any two display connectors in IO Area - and Internal (LVDS) connector (optionally).

6.4.1 LVDS Flat Panel Connector (LVDS) (J39) (optionally)

Two graphic pipes are supported; meaning that up to two independent displays can be implemented using any two of display connectors (IO Area - and Internal connectors).

Note	Type	Signal	PIN		Signal	Type	Note
Max. 0.5A	PWR	+12V	1	2	+12V	PWR	Max. 0.5A
Max. 0.5A	PWR	+12V	3	4	+12V	PWR	Max. 0.5A
Max. 0.5A	PWR	+12V	5	6	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	+5V	7	8	GND	PWR	Max. 0.5A
Max. 0.5A	PWR	LCDVCC	9	10	LCDVCC	PWR	Max. 0.5A
2K2Ω, 3.3V	OT	DDC CLK	11	12	DDC DATA	OT	2K2Ω, 3.3V
3.3V level	OT	BKLTCTL	13	14	VDD ENABLE	OT	3.3V level
3.3V level	OT	BKLTEN#	15	16	GND	PWR	Max. 0.5A
	LVDS	LVDS A0-	17	18	LVDS A0+	LVDS	
	LVDS	LVDS A1-	19	20	LVDS A1+	LVDS	
	LVDS	LVDS A2-	21	22	LVDS A2+	LVDS	
	LVDS	LVDS ACLK-	23	24	LVDS ACLK+	LVDS	
	LVDS	LVDS A3-	25	26	LVDS A3+	LVDS	
Max. 0.5A	PWR	GND	27	28	GND	PWR	Max. 0.5A
	LVDS	LVDS B0-	29	30	LVDS B0+	LVDS	
	LVDS	LVDS B1-	31	32	LVDS B1+	LVDS	
	LVDS	LVDS B2-	33	34	LVDS B2+	LVDS	
	LVDS	LVDS BCLK-	35	36	LVDS BCLK+	LVDS	
	LVDS	LVDS B3-	37	38	LVDS B3+	LVDS	
Max. 0.5A	PWR	GND	39	40	GND	PWR	Max. 0.5A

Note: The KTQ67 on-board LVDS connector supports single/dual channel, 18/24bit SPWG panels up to resolution 1600x1200 or 1920x1080 (1920x1200 with limited frame rate is possible).

Signal Description – LVDS Flat Panel Connector:

Signal	Description
LVDS A0..A3	LVDS A Channel data
LVDS ACLK	LVDS A Channel clock
LVDS B0..B3	LVDS B Channel data
LVDS BCLK	LVDS B Channel clock
BKLTCTL	Backlight control (1), PWM signal to implement voltage in the range 0-3.3V
BKLTEN#	Backlight Enable signal (active low) (2)
VDD ENABLE	Output Display Enable.
LCDVCC	VCC supply to the display. Power-on/off sequencing depending on selected (in BIOS setup) display type. 5V or 3.3V selected in BIOS setup. Maximum load is 1A.
DDC CLK	DDC Channel Clock

Notes: Windows API will be available to operate the BKLTCTL signal. Some Inverters have a limited voltage range 0- 2.5V for this signal: If voltage is > 2.5V the Inverter might latch up. Some Inverters generates noise on the BKLTCTL signal, resulting in making the LVDS transmission failing (corrupted picture on the display). By adding a 1Kohm resistor in series with this signal, mounted in the Inverter end of the cable kit, the noise is limited and the picture is stable.
If the Backlight Enable is required to be active high, then check the following BIOS Chipset setting: Backlight Signal Inversion = Enabled.

6.5 SATA (Serial ATA) Disk interface (J22 – J27)

The KTQ67 boards have an integrated SATA Host controller (integrated in the PCH) that supports independent DMA operation on six ports. One device can be installed on each port for a maximum of six SATA devices. A point-to-point interface (SATA cable) is used for host to device connections. Data transfer rates of up to 6.0Gb/s (typically 600MB/s) on SATA0 and SATA1 (blue connectors) and 3.0Gb/s (typically 300MB/s) on SATA2, SATA3, SATA4 and SATA5 (black connectors). In case mSATA is used then the SATA2 is disabled.

The SATA controller supports:

2 to 6-drive RAID 0 (data striping)
2-drive RAID 1 (data mirroring)
3 to 6-drive RAID 5 (block-level striping with parity).
4-drive RAID 10 (data striping and mirroring)
2 to 6-drive matrix RAID (different parts of a single drive can be assigned to different RAID devices).
AHCI (Advanced Host Controller Interface)
NCQ (Native Command Queuing). NCQ is for faster data access.
Hot Swap
Intel® Rapid Recover Technology
2 – 256TB volume (Data volumes only)
Capacity expansion
TRIM in Windows 7 (in AHCI and RAID mode for drives not part of a RAID volume). (TRIM is for SSD data garbage handling).

The RAID (Redundant Array of Independent Drives) functionality is based on a firmware system with support for RAID modes 0 1, 5 and 10.

SATA connector pinning:
The pinout of SATA ports SATA0 (J27), SATA1 (J26), SATA2 (J25), SATA3 (J24), SATA4 (J23) and SATA5 (J22) is as follows:

PIN	Signal	Type	Ioh/Iol	Pull U/D	Note
1	GND	PWR	-	-	
2	SATA* TX+				
3	SATA* TX-				
4	GND	PWR	-	-	
5	SATA* RX-				
6	SATA* RX+				
7	GND	PWR	-	-	

The signals used for the primary SATA hard disk interface are the following:

Signal	Description
SATA* RX+ SATA* RX-	Host transmitter differential signal pair
SATA* TX+ SATA* TX-	Host receiver differential signal pair

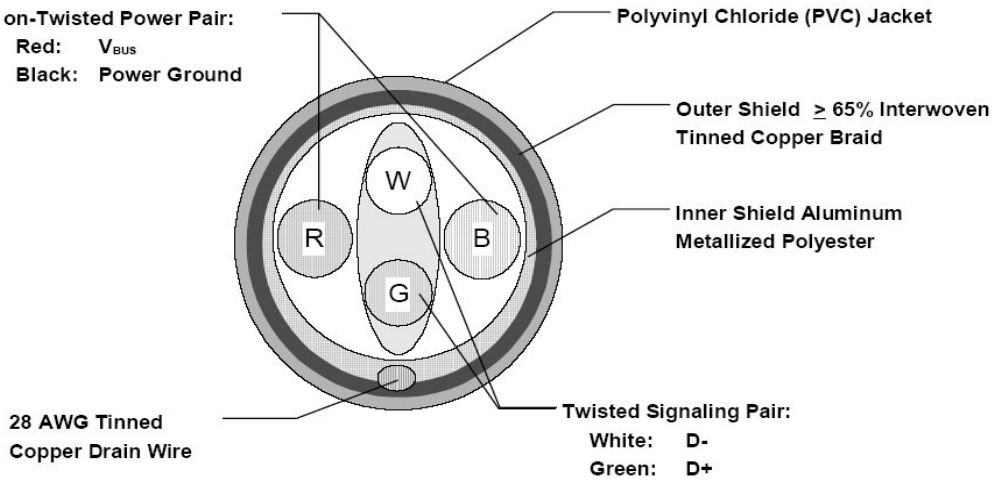
“*” specifies 0, 1, 2, 3, 4, 5 depending on SATA port.

6.6 USB Connectors (USB)

The KTQ67 board contains two EHCI (Enhanced Host Controller Interface) host controllers (EHCI1 and EHCI2) that support up to fourteen USB 2.0 ports allowing data transfers up to 480Mb/s. Legacy Keyboard/Mouse and wakeup from sleep states are supported. Over-current detection on all fourteen USB ports is supported. The following USB ports are available on Internal Pinrows:

USB Port 6 and 7 (via EHCI1) are supplied on the USB6/7 internal pinrow FRONTPNL connector.
USB Port 8 and 9 (via EHCI2) are supplied on the USB8/9 internal pinrow connector.
USB Port 10 and 11 (via EHCI2) are supplied on the USB10/11 internal pinrow connector.
USB Port 12 and 13 (via EHCI2) are supplied on the USB12/13 internal pinrow connector.

Note: It is required to use only HiSpeed USB cable, specified in USB2.0 standard:



6.6.1 USB Connector 6/7

See Frontpanel Connector (FRONTPNL) description.

6.6.2 USB Connector 8/9 (USB8/9) (J18)

USB Ports 8 and 9 are supplied on the internal USB8/9 pinrow connector J18.

Note	Type	Signal	PIN		Signal	Type	Note
1	PWR	5V/SB5V	1	2	5V/SB5V	PWR	1
	IO	USB8-	3	4	USB9-	IO	
	IO	USB8+	5	6	USB9+	IO	
	PWR	GND	7	8	GND	PWR	
	NC	KEY	9	10	NC	NC	

Signal	Description
USB8+ USB8- USB9+ USB9-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

6.6.3 USB Connector 10/11 (USB10/11) (J17)

USB Ports 10 and 11 are supplied on the internal USB10/11 pinrow connector J17.

Note	Type	Signal	PIN		Signal	Type	Note
1	PWR	5V/SB5V	1	2	5V/SB5V	PWR	1
	IO	USB10-	3	4	USB11-	IO	
	IO	USB10+	5	6	USB11+	IO	
	PWR	GND	7	8	GND	PWR	
	NC	KEY	9	10	NC	NC	

Signal	Description
USB10+ USB10- USB11+ USB11-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

6.6.4 USB Connector 12/13 (USB12/13) (J16)

USB Ports 12 and 13 are supplied on the internal USB12/13 pinrow connector J16.

Note	Type	Signal	PIN		Signal	Type	Note
1	PWR	5V/SB5V	1	2	5V/SB5V	PWR	1
	IO	USB12-	3	4	USB13-	IO	
	IO	USB12+	5	6	USB13+	IO	
	PWR	GND	7	8	GND	PWR	
	NC	KEY	9	10	NC	NC	

Signal	Description
USB12+ USB12- USB13+ USB13-	Differential pair works as Data/Address/Command Bus.
5V/SB5V	5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1A fuse covering both USB ports.

Note 1: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

6.7 Serial COM2 – COM4 Ports (J19, J20, J21)

Three RS232 serial ports are available on the KTQ67 via pin-row connector. (COM 1 is in the IO area and is based on standard DB9 connector, see other section for more info).

The typical definition of the signals in the COM ports is as follows:

Signal	Description
TxD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates to the modem etc. that the on-board UART is ready to establish a communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to exchange data.
CTS	Clear To Send, indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect, indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.

The pinout of Serial ports COM2 (J20), COM3 (J19) and COM4 (J21) is as follows:

Note	Ioh/Iol	Type	Signal	PIN	Signal	Type	Ioh/Iol	Note
	-	I	DCD	1 2	DSR	I	-	
	-	I	RxD	3 4	RTS	O		
		O	TxD	5 6	CTS	I	-	
		O	DTR	7 8	RI	I	-	
	-	PWR	GND	9 10	5V	PWR	-	1

Note 1: The COM2, COM3 and COM4 5V supply is fused with common 1.1A resettable fuse.

DB9 adapter cables (PN 821016 200mm long and 821017 100mm long) are available for implementing standard COM ports on chassis.

6.8 Audio Connectors

The on-board Audio circuit implements 7.1+2 Channel High Definition Audio with UAA (Universal Audio Architecture), featuring five 24-bit stereo DACs and three 20-bit stereo ADCs.

The following Audio connectors are available as internal connectors.

6.8.1 CDROM Audio Input (CDROM) (J44)

CD-ROM audio input may be connected to this connector or it can be used as secondary line-in signal.

PIN	Signal	Type	Note
1	CD_Left	IA	1
2	CD_GND	IA	
3	CD_GND	IA	
4	CD_Right	IA	1

Note 1: The definition of which pins are used for the Left and Right channels is not a worldwide accepted standard. Some CDROM cable kits expect reverse pin order.

Signal	Description
CD_Left CD_Right	Left and right CD audio input lines or secondary Line-in.
CD_GND	Analogue GND for Left and Right CD. (This analogue GND is **not** shorted to the general digital GND on the board).

6.8.2 Line2 and Mic2

Line2 and Mic2 are accessible via Feature Connector, see Feature connector description.

6.8.1 Audio Header Connector (AUDIO_HEAD) (J47)

Note	Type	Signal	PIN		Signal	Type	Note
1	AO	LFE-OUT	1	2	CEN-OUT	AO	1
	PWR	AAGND	3	4	AAGND	PWR	
1	AO	FRONT-OUT-L	5	6	FRONT-OUT-R	AO	1
	PWR	AAGND	7	8	AAGND	PWR	
1	AO	REAR-OUT-L	9	10	REAR-OUT-R	AO	1
1	AO	SIDE-OUT-L	11	12	SIDE-OUT-R	AO	1
	PWR	AAGND	13	14	AAGND	PWR	
1	AI	MIC1-L	15	16	MIC1-R	AI	1
	PWR	AAGND	17	18	AAGND	PWR	
1		LINE1-L	19	20	LINE1-R		1
	NC	NC	21	22	AAGND	PWR	
	PWR	GND	23	24	NC	NC	
	O	SPDIF-OUT	25	26	GND	PWR	

Note 1: Shared with Audio Stack connector

Signal	Description
FRONT-OUT-L	Front Speakers (Speaker Out Left).
FRONT-OUT-R	Front Speakers (Speaker Out Right).
REAR-OUT-L	Rear Speakers (Surround Out Left).
REAR-OUT-R	Rear Speakers (Surround Out Right).
SIDE-OUT-L	Side speakers (Surround Out Left)
SIDE-OUT-R	Side speakers (Surround Out Right)
CEN-OUT	Center Speaker (Center Out channel).
LFE-OUT	Subwoofer Speaker (Low Freq. Effect Out).
NC	No connection
MIC1	MIC Input 1
LINE1	Line 1 signals
F-SPDIF-OUT	S/PDIF Output
AAGND	Audio Analogue ground

6.9 Front Panel Connector (FRONTPNL) (J36)

Note	Pull U/D	Ioh/ Iol	Type	Signal	PIN		Signal	Type	Ioh/ Iol	Pull U/D	Note
	-	-	PWR	USB6/7_5V	1	2	USB6/7_5V	PWR	-	-	
	-	-		USB6-	3	4	USB7-		-	-	
	-	-		USB6+	5	6	USB7+		-	-	
	-	-	PWR	GND	7	8	GND	PWR	-	-	
	-	-	NC	NC	9	10	LINE2-L		-	-	
	-	-	PWR	+5V	11	12	+5V	PWR	-	-	
	-	/7mA	O	SATA_LED#	13	14	SUS_LED	O	7mA	-	
	-	-	PWR	GND	15	16	PWRBTN_IN#	I		1K1	
	4K7	-	I	RSTIN#	17	18	GND	PWR	-	-	
	-	-	PWR	SB3V3	19	20	LINE2-R		-	-	
	-	-	PWR	AGND	21	22	AGND	PWR	-	-	
	-	-	AI	MIC2-L	23	24	MIC2-R	AI	-	-	

Signal	Description
USB10/11_5V	5V supply for external devices. SB5V is supplied during power down to allow wakeup on USB device activity. Protected by resettable 1.1A fuse covering both USB ports.
USB1+ USB1-	Universal Serial Bus Port 1 Differentials: Bus Data/Address/Command Bus.
USB3+ USB3-	Universal Serial Bus Port 3 Differentials: Bus Data/Address/Command Bus.
+5V	Maximum load is 1A or 2A per pin if using IDC connector flat cable or crimp terminals respectively.
SATA_LED#	SATA Activity LED, active low signal (via 470Ω). Recommended is using Low Power LED like HLMP4700 with anode connected to +5V (pin 11). When red color LED is used, possible weak glowing could be noticed when the LED supposed to be off. In order to eliminate this problem a resistor 3K3 can be connected in parallel with the LED or a diode can be connected in series with the LED.
SUS_LED	Suspend Mode LED (active high signal). Output 3.3V via 470Ω.
PWRBTN_IN#	Power Button In. Toggle this signal low to start the ATX / BTX PSU and boot the board.
RSTIN#	Reset Input. When pulled low for a minimum 16ms, the reset process will be initiated. The reset process continues even though the Reset Input is kept low.
LINE2	Line2 is second stereo Line signals
MIC2	MIC2 is second stereo microphone input.
SB3V3	Standby 3.3V voltage
AGND	Analogue Ground for Audio

Note: In order to meet the requirements of USB standard, the 5V input supply must be at least 5.00V.

6.10 Feature Connector (FEATURE) (J30)

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
2	2M/	-	I	CASE_OPEN#	1	2	SMBC		/4mA	10K/	1
	-	25/25mA	O	S5#	3	4	SMBD		/4mA	10K/	1
	-	25/25mA	O	PWR_OK	5	6	EXT_BAT	PWR	-	-	
	-		O	FAN3OUT	7	8	FAN3IN	I	-	-	
	-	-	PWR	SB3V3	9	10	SB5V	PWR	-	-	
	-		IOT	GPIO0	11	12	GPIO1	IOT		-	
	-		IOT	GPIO2	13	14	GPIO3	IOT		-	
	-		IOT	GPIO4	15	16	GPIO5	IOT		-	
	-		IOT	GPIO6	17	18	GPIO7	IOT		-	
	-	-	PWR	GND	19	20	GND	PWR	-	-	
	-		I	GPIO8	21	22	GPIO9	I		-	
	-		I	GPIO10	23	24	GPIO11	I		-	
	-		I	GPIO12	25	26	GPIO13	IOT		-	
	-		IOT	GPIO14	27	28	GPIO15	IOT		-	
	-		IOT	GPIO16	29	30	GPIO17	IOT		-	
	-	-	PWR	GND	31	32	GND	PWR	-	-	
	-	8/8mA	O	EGCLK	33	34	EGCS#	O	8/8mA	-	
	-	8/8mA		EGAD	35	36	TMA0	O			
	-		PWR	+12V	37	38	GND	PWR	-	-	
	-		O	FAN4OUT	39	40	FAN4IN	I	-	-	
	-	-	PWR	GND	41	42	GND	PWR	-	-	
	-	-	PWR	GND	43	44	S3#	O	25/25mA	-	

Notes: **1**. Pull-up to +3V3Dual (+3V3 or SB3V3). **2**. Pull-up to on-board Battery.

Signal	Description
CASE_OPEN#	CASE OPEN, used to detect if the system case has been opened. This signal's status is readable, so it may be used like a GPI when the Intruder switch is not required.
SMBC	SMBus Clock signal
SMBD	SMBus Data signal
S3#	S3 sleep mode, active low output, optionally used to deactivate external system.
S5#	S5 sleep mode, active low output, optionally used to deactivate external system.
PWR_OK	PoWeR OK, signal is high if no power failures are detected. (This is not the same as the P_OK signal generated by ATX PSU).
EXT_BAT	(EXTernal BATtery) option for connecting + terminal of an external primary cell battery (2.5 - 4.0 V) (– terminal connected to GND etc. pin 20). The external battery is protected against charging and can be used with or without the on-board battery installed.
FAN3OUT	FAN 3 speed control OUTput, 3.3V PWM signal can be used as Fan control voltage.
FAN3IN	FAN3 Input. 0V to +3V3 amplitude Fan 3 tachometer input.
FAN4OUT	FAN 4 speed control OUTput, 3.3V PWM signal can be used as Fan control voltage.
FAN4IN	FAN4 Input. 0V to +3V3 amplitude Fan 3 tachometer input.
SB3V3	Max. load is 0.75A (1.5A < 1 sec.)
SB5V	StandBy +5V supply.
GPIO0..17	General Purpose Inputs / Output. These Signals may be controlled or monitored through the use of the KT-API-V2 (Application Programming Interface).
EGCLK	Extend GPIO Clock signal
EGAD	Extend GPIO Address Data signal
EGCS#	Extend GPIO Chip Select signal, active low
TMA0	Timer Output
+12V	Max. load is 0.75A (1.5A < 1 sec.)

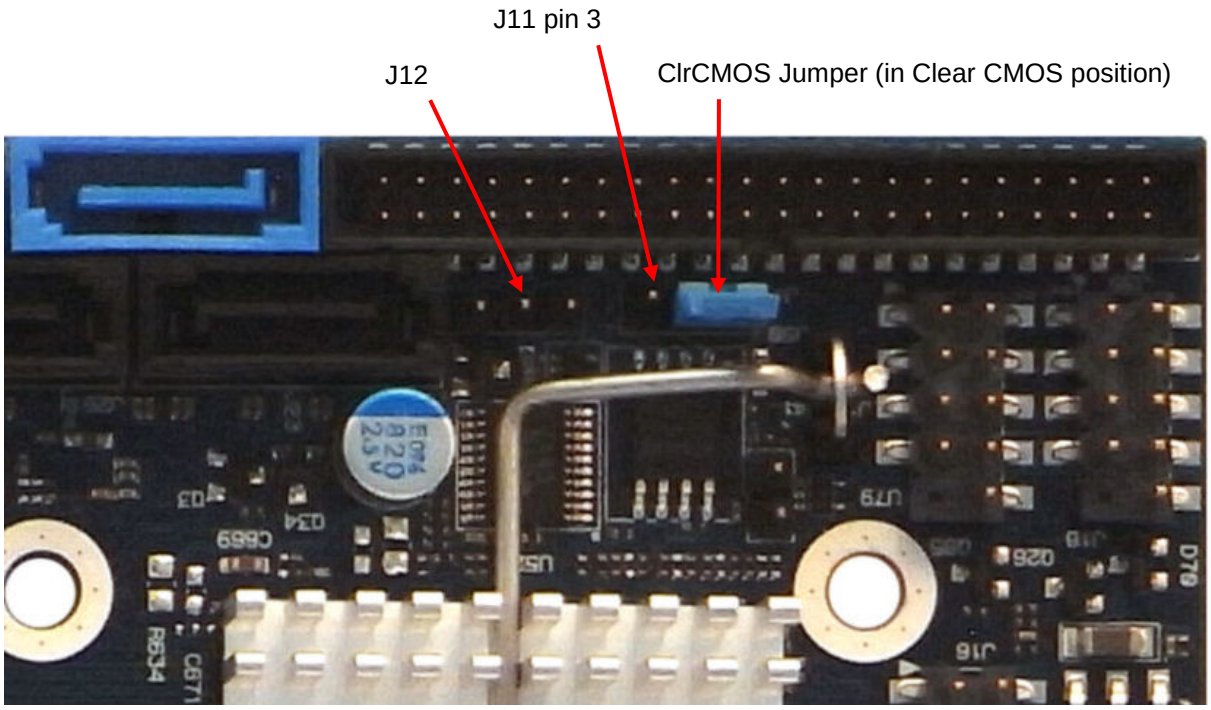
GPIO in more details.

The GPIO's are controlled via the ITE IT8516F Embedded Controller. Each GPIO has 100pF to ground, clamping Diode to 3V3 and has multiplexed functionality. Some pins can be DAC (Digital to Analogue Converter output), PWM (Pulse Width Modulated signal output), ADC (Analogue to Digital Converter input), TMRI (Timer Counter Input), WUI (Wake Up Input), RI (Ring Indicator Input) or some special function.

Signal	IT8516F pin name	Type	+5V tolerant	Description
GPIO0	DAC0/GPJ0	AO/IOS	No	
GPIO1	DAC1/GPJ1	AO/IOS	No	
GPIO2	DAC2/GPJ2	AO/IOS	No	
GPIO3	DAC3/GPJ3	AO/IOS	No	
GPIO4	PWM2/GPA2	O8/IOS	Yes	
GPIO5	PWM3/GPA3	O8/IOS	Yes	
GPIO6	PWM4/GPA4	O8/IOS	Yes	
GPIO7	PWM5/GPA5	O8/IOS	Yes	
GPIO8	ADC0/GPI0	AI/IS	No	
GPIO9	ADC1/GPI1	AI/IS	No	
GPIO10	ADC2/GPI2	AI/IS	No	
GPIO11	ADC3/GPI3	AI/IS	No	
GPIO12	ADC4/WUI28/GPI4	AI/IS/IS	No	
GPIO13	RI1#/WUI0/GPD0	IS/IS/IOS	Yes	
GPIO14	RI2#/WUI1/GPD1	IS/IS/IOS	Yes	
GPIO15	TMRI0/WUI2/GPC4	IS/IS/IOS	Yes	
GPIO16	TMRI1/WUI3/GPC6	IS/IS/IOS	Yes	
GPIO17	L80HLAT/BAO/WUI24/GPE0	O4/O4/IS/IOS	Yes	

6.11 Clear CMOS Jumper (J11)

The Clear-CMOS Jumper (J11) is used to clear the CMOS content.



J11		
pin1-2	pin2-3	Description
X	-	Clear CMOS data
-	X	Default positions
-	-	Secure CMOS function is disabled and Default values are used

Warning: Don't leave the jumper in position 1-2, otherwise the battery will fully depleted within a few weeks if power to the board is disconnected.

To clear CMOS settings, including Password protection, move the Clear CMOS jumper to pin 1-2 for a few seconds (~10 sec) (works with or without power connected to the system).

To disable the Secure CMOS function (selected in BIOS), remove the jumper completely from J11.

Leave the Jumper in position 2-3 (default position).

6.12 ClrRTC (J12)

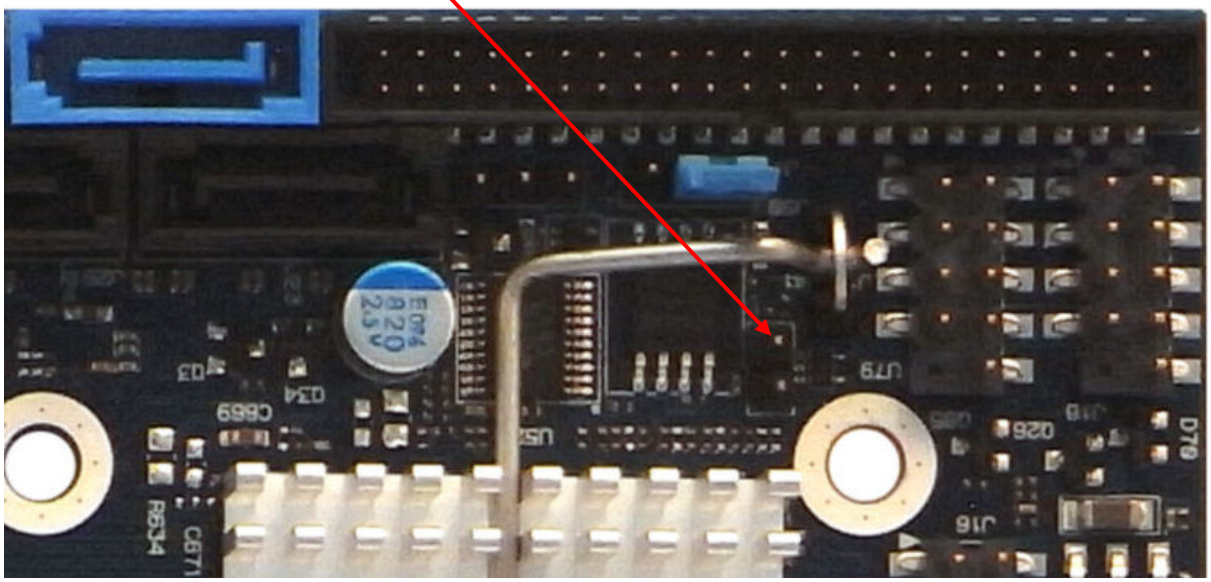
The ClrRTC (J12) connector is not used. Do not install any jumper in case J12 pin row is available.

6.13 SPI Recover Jumper (J41)

The SPI Recover Jumper is used to select BIOS Recovery SPI Flash instead of the BIOS Default SPI Flash.

Normally Jumper is not installed and board boots on the BIOS Default SPI Flash.

Only in case the Default BIOS gets corrupted and board do not boot:
Then turn off power
Install Jumper (J41)
Try rebooting



After rebooting, remove the Jumper before Default BIOS is recovered by reloading BIOS (for instance by using latest BIOS upgrade package from web product page).

Verify that Default BIOS has been recovered by making a successful reboot.

Warning: If the jumper (J41) is mounted and you make BIOS Upgrade etc. then the BIOS Recovery SPI Flash will be Upgraded and not the BIOS Default SPI Flash.
This means that in case something goes wrong (power interruption or incorrect BIOS package used etc.) when Upgrading BIOS, then the BIOS Recovery SPI Flash might get corrupted.

6.14 SPI Connector (SPI) (J40)

The SPI Connector is normally not used. If however a SPI BIOS is connected via the SPI Connector then the board will try to boot on it.

Note	Pull U/D	Ioh/Iol	Type	Signal	PIN		Signal	Type	Ioh/Iol	Pull U/D	Note
	-			CLK	1	2	SB3V3	PWR	-	-	
	-		I	CS0#	3	4	ADDIN	IO		/10K	
	10K/		-	NC	5	6	NC	-	-	-	
	10K/		IO	MOSI	7	8	ISOLATE#	IO		/10K	
	-		IO	MISO	9	10	GND	PWR	-	-	

Signal	Description
CLK	Serial Clock
SB3V3	3.3V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC.
MOSI	Master Output, Slave Input
ISOLATE#	The ISOLATE# input, active low, is normally NC, but must be connected to GND when loading SPI flash. Power Supply to the Motherboard must be turned off when loading SPI flash. The pull up resistor is connected via diode to 5VSB.
MISO	Master Input, Slave Output

6.15 XDP-CPU (Debug Port for CPU) (J14)

The XDP-CPU (Intel Debug Port for CPU) connector is not mounted and not supported. XDP connector layout (pads) is located on the backside of PCB and is prepared for the Molex 52435-2671 (or 52435-2672).

Pin	Signal	Description	Type	Pull Up/Down	Note
1	OBSFN_A0				
2	OBSFN_A1				
3	GND		PWR	-	
4	NC		NC	-	
5	NC		NC	-	
6	GND		PWR	-	
7	NC		NC	-	
8	NC		NC	-	
9	GND		PWR	-	
10	HOOK0				
11	HOOK1				
12	HOOK2				
13	HOOK3				
14	HOOK4				
15	HOOK5				
16	+5V		PWR	-	
17	HOOK6				
18	HOOK7			500R	(500R by 2x1K in parallel)
19	GND		PWR	-	
20	TDO			/51R	
21	TRST#			/51R	
22	TDI			/51R	
23	TMS			/51R	
24	NC		NC	-	
25	GND		PWR	-	
26	TCK0			/51R	

6.16 XDP-PCH (Debug Port for Chipset) (J13)

The XDP-PCH (Intel Debug Port for Chipset) connector is not mounted and not supported. XDP-PCH connector layout (pads) is prepared for the Molex 52435-2671 (or 52435-2672).

Pin	Signal	Description	Type	Pull Up/Down	Note
1	NC		NC	-	
2	NC		NC	-	
3	GND		PWR	-	
4	NC		NC	-	
5	NC		NC	-	
6	GND		PWR	-	
7	NC		NC	-	
8	NC		NC	-	
9	GND		PWR	-	
10	HOOK0	RSMRST#			Connected to HOOK6
11	HOOK1	PWRBTN#			
12	HOOK2		NC	-	
13	HOOK3		NC	-	
14	HOOK4		NC	-	
15	HOOK5		NC	-	
16	+5V		PWR	-	
17	HOOK6				Connected to HOOK1
18	HOOK7	RESET#		500R	(500R by 2x1K in parallel)
19	GND		PWR	-	
20	TDO			210R/100R	
21	TRST#				
22	TDI			210R/100R	
23	TMS			210R/100R	
24	NC		NC	-	
25	GND		PWR	-	
26	TCK0			/51R	

7 Slot Connectors (PCIe, mSATA, miniPCIe, PCI)

7.1 PCIe Connectors

All members of the KTQ67 family supports one (x16) (16-lane) PCI Express port, one x4 PCI Express port (in a x16 PCI Express connector) and two miniPCI Express ports.

The **16-lane (x16) PCI Express** (PCIe 2.0) port can be used for external PCI Express cards inclusive graphics card. It is located nearest the CPU. Maximum theoretical bandwidth using 16 lanes is 16 GB/s.

The two **miniPCIe** (PCIe 2.0) is located on the backside of the board.

The **4-lane (x4) PCI Express** (PCIe 2.0) can be used for any PCIex1, PCIex2 or PCIex4 cards inclusive “Riser PCIex1 to PCI Dual flexible card“. (EFT samples support only PCIe x1).

7.1.1 PCI-Express x16 Connector (PCIe x16)

Note	Type	Signal	PIN		Signal	Type	Note
		+12V	B1	A1	NC		
		+12V	B2	A2	+12V		
		+12V	B3	A3	+12V		
		GND	B4	A4	GND		
		SMB_CLK	B5	A5	NC		
		SMB_DATA	B6	A6	NC		
		GND	B7	A7	NC		
		+3V3	B8	A8	NC		
		NC	B9	A9	+3V3		
		SB3V3	B10	A10	+3V3		
		WAKE#	B11	A11	RST#		
		NC	B12	A12	GND		
		GND	B13	A13	PCIE_x16 CLK		
		PEG_TXP[0]	B14	A14	PCIE_x16 CLK#		
		PEG_TXN[0]	B15	A15	GND		
		GND	B16	A16	PEG_RXP[0]		
		CLKREQ	B17	A17	PEG_RXN[0]		
		GND	B18	A18	GND		
		PEG_TXP[1]	B19	A19	NC		
		PEG_TXN[1]	B20	A20	GND		
		GND	B21	A21	PEG_RXP[1]		
		GND	B22	A22	PEG_RXN[1]		
		PEG_TXP[2]	B23	A23	GND		
		PEG_TXN[2]	B24	A24	GND		
		GND	B25	A25	PEG_RXP[2]		
		GND	B26	A26	PEG_RXN[2]		
		PEG_TXP[3]	B27	A27	GND		
		PEG_TXN[3]	B28	A28	GND		
		GND	B29	A29	PEG_RXP[3]		
		NC	B30	A30	PEG_RXN[3]		
		CLKREQ	B31	A31	GND		
		GND	B32	A32	NC		
		PEG_TXP[4]	B33	A33	NC		
		PEG_TXN[4]	B34	A34	GND		
		GND	B35	A35	PEG_RXP[4]		

		GND	B36	A36	PEG_RXN[4]		
		PEG_TXP[5]	B37	A37	GND		
		PEG_TXN[5]	B38	A38	GND		
		GND	B39	A39	PEG_RXP[5]		
		GND	B40	A40	PEG_RXN[5]		
		PEG_TXP[6]	B41	A41	GND		
		PEG_TXN[6]	B42	A42	GND		
		GND	B43	A43	PEG_RXP[6]		
		GND	B44	A44	PEG_RXN[6]		
		PEG_TXP[7]	B45	A45	GND		
		PEG_TXN[7]	B46	A46	GND		
		GND	B47	A47	PEG_RXP[7]		
		CLKREQ	B48	A48	PEG_RXN[7]		
		GND	B49	A49	GND		
		PEG_TXP[8]	B50	A50	NC		
		PEG_TXN[8]	B51	A51	GND		
		GND	B52	A52	PEG_RXP[8]		
		GND	B53	A53	PEG_RXN[8]		
		PEG_TXP[9]	B54	A54	GND		
		PEG_TXN[9]	B55	A55	GND		
		GND	B56	A56	PEG_RXP[9]		
		GND	B57	A57	PEG_RXN[9]		
		PEG_TXP[10]	B58	A58	GND		
		PEG_TXN[10]	B59	A59	GND		
		GND	B60	A60	PEG_RXP[10]		
		GND	B61	A61	PEG_RXN[10]		
		PEG_TXP[11]	B62	A62	GND		
		PEG_TXN[11]	B63	A63	GND		
		GND	B64	A64	PEG_RXP[11]		
		GND	B65	A65	PEG_RXN[11]		
		PEG_TXP[12]	B66	A66	GND		
		PEG_TXN[12]	B67	A67	GND		
		GND	B68	A68	PEG_RXP[12]		
		GND	B69	A69	PEG_RXN[12]		
		PEG_TXP[13]	B70	A70	GND		
		PEG_TXN[13]	B71	A71	GND		
		GND	B72	A72	PEG_RXP[13]		
		GND	B73	A73	PEG_RXN[13]		
		PEG_TXP[14]	B74	A74	GND		
		PEG_TXN[14]	B75	A75	GND		
		GND	B76	A76	PEG_RXP[14]		
		GND	B77	A77	PEG_RXN[14]		
		PEG_TXP[15]	B78	A78	GND		
		PEG_TXN[15]	B79	A79	GND		
		GND	B80	A80	PEG_RXP[15]		
		CLKREQ	B81	A81	PEG_RXN[15]		
		NC	B82	A82	GND		

7.1.2 mSATA (J43)

The mSATA support mSATA SSD cards (up to full size). mPCI Express is not supported. When mSATA card is installed then SATA2 (J25) is disabled.

Note	Type	Signal	PIN		Signal	Type	Note
		WAKE#	1	2	+3V3	PWR	
	NC	NC	3	4	GND	PWR	
	NC	NC	5	6	+1.5V	PWR	
1		CLKREQ#	7	8	NC	NC	
	PWR	GND	9	10	NC	NC	
		PCIE_mini CLK#	11	12	NC	NC	
		PCIE_mini CLK	13	14	NC	NC	
	PWR	GND	15	16	NC	NC	
	NC	NC	17	18	GND	PWR	
	NC	NC	19	20	W_Disable#		2
	PWR	GND	21	22	RST#		
		PCIE_RXN	23	24	+3V3 Dual	PWR	
		PCIE_RXP	25	26	GND	PWR	
	PWR	GND	27	28	+1.5V	PWR	
	PWR	GND	29	30	SMB_CLK		
		PCIE_TXN	31	32	SMB_DATA		
		PCIE_TXP	33	34	GND	PWR	
	PWR	GND	35	36	NC	NC	
	PWR	GND	37	38	NC	NC	
	PWR	+3V3 Dual	39	40	GND	PWR	
	PWR	+3V3 Dual	41	42	NC	NC	
	PWR	GND	43	44	NC	NC	
		CLK_MPCIE	45	46	NC	NC	
		DATA_MPCIE	47	48	+1.5V	PWR	
		RST_MPCIE#	49	50	GND	PWR	
3		SEL_MSATA	51	52	+3V3 Dual	PWR	

Note 1: 10K ohm pull-up to 3V3.

Note 2: 2K2 ohm pull-up to 3V3 Dual.

Note 3: 100K ohm pull-up to 1V8 (S0 mode)

7.1.3 miniPCI-Express mPCIe (J42)

The miniPCI Express port mPCIe supports mPCIe cards only. (mSATA not supported)

Note	Type	Signal	PIN		Signal	Type	Note
		WAKE#	1	2	+3V3	PWR	
	NC	NC	3	4	GND	PWR	
	NC	NC	5	6	+1.5V	PWR	
1		CLKREQ#	7	8	NC	NC	
	PWR	GND	9	10	NC	NC	
		PCIE_mini CLK#	11	12	NC	NC	
		PCIE_mini CLK	13	14	NC	NC	
	PWR	GND	15	16	NC	NC	
	NC	NC	17	18	GND	PWR	
	NC	NC	19	20	W_Disable#		2
	PWR	GND	21	22	RST#		
		PCIE_RXN	23	24	+3V3 Dual	PWR	
		PCIE_RXP	25	26	GND	PWR	
	PWR	GND	27	28	+1.5V	PWR	
	PWR	GND	29	30	SMB_CLK		
		PCIE_TXN	31	32	SMB_DATA		
		PCIE_TXP	33	34	GND	PWR	
	PWR	GND	35	36	NC	NC	
	NC	NC	37	38	NC	NC	
	NC	NC	39	40	GND	PWR	
	NC	NC	41	42	NC	NC	
	NC	NC	43	44	NC	NC	
	NC	NC	45	46	NC	NC	
	NC	NC	47	48	+1.5V	PWR	
	NC	NC	49	50	GND	PWR	
	NC	NC	51	52	+3V3	PWR	

Note 1: 10K ohm pull-up to 3V3 Dual.

Note 2: 2K2 ohm pull-up to 3V3 Dual.

7.1.4 PCI-Express x4 Connector (PCIe x4) (J33)

The KTQ67 supports one PCIex4 in a PCIex16 slot. All GND pins in the PCIEx16 connector are connected to GND, but all signal pins from pin 33 and above are all unconnected. (EFT samples support only PCIe x1).

Note	Type	Signal	PIN		Signal	Type	Note
		+12V	B1	A1	NC		
		+12V	B2	A2	+12V		
		+12V	B3	A3	+12V		
		GND	B4	A4	GND		
		SMB_CLK	B5	A5	NC		
		SMB_DATA	B6	A6	NC		
		GND	B7	A7	NC		
		+3V3	B8	A8	NC		
		NC	B9	A9	+3V3		
		SB3V3	B10	A10	+3V3		
		WAKE#	B11	A11	RST#		
		NC	B12	A12	GND		
		GND	B13	A13	PCIE_x16 CLK		
		PEG_TXP[0]	B14	A14	PCIE_x16 CLK#		
		PEG_TXN[0]	B15	A15	GND		
		GND	B16	A16	PEG_RXP[0]		
1		CLKREQ	B17	A17	PEG_RXN[0]		
		GND	B18	A18	GND		
		PEG_TXP[1]	B19	A19	NC		
		PEG_TXN[1]	B20	A20	GND		
		GND	B21	A21	PEG_RXP[1]		
		GND	B22	A22	PEG_RXN[1]		
		PEG_TXP[2]	B23	A23	GND		
		PEG_TXN[2]	B24	A24	GND		
		GND	B25	A25	PEG_RXP[2]		
		GND	B26	A26	PEG_RXN[2]		
		PEG_TXP[3]	B27	A27	GND		
		PEG_TXN[3]	B28	A28	GND		
		GND	B29	A29	PEG_RXP[3]		
		NC	B30	A30	PEG_RXN[3]		
		NC	B31	A31	GND		
		GND	B32	A32	NC		

Note 1: 10K ohm pull-up to 3V3 Dual.

7.2 PCI Slot Connectors

KTQ67/Flex support 2 PCI slots PCI0 – PCI1 (J1 – J2).
KTQ67/ATXE supports 5 PCI slots PCI0 – PCI4 (J48 – J52).

Note	Type	Signal	Terminal S	Terminal C	Signal	Type	Note
	PWR	-12V	F01	E01	TRST#	O	
	O	TCK	F02	E02	+12V	PWR	
	PWR	GND	F03	E03	TMS	O	
NC	I	TDO	F04	E04	TDI	O	
	PWR	+5V	F05	E05	+5V	PWR	
	PWR	+5V	F06	E06	INTA#	I	
	I	INTB#	F07	E07	INTC#	I	
	I	INTD#	F08	E08	+5V	PWR	
NC	-	-	F09	E09	-	-	NC
NC	-	-	F10	E10	+5V (I/O)	PWR	
NC	-	-	F11	E11	-	-	NC
	PWR	GND	F12	E12	GND	PWR	
	PWR	GND	F13	E13	GND	PWR	
NC	-	-	F14	E14	GNT3#	OT	
	PWR	GND	F15	E15	RST#	O	
	O	CLKB	F16	E16	+5V (I/O)	PWR	
	PWR	GND	F17	E17	GNT0#	OT	
	I	REQ0#	F18	E18	GND	PWR	
	PWR	+5V (I/O)	F19	E19	PME#	I	
	IOT	AD31	F20	E20	AD30	IOT	
	IOT	AD29	F21	E21	+3.3V	PWR	
	PWR	GND	F22	E22	AD28	IOT	
	IOT	AD27	F23	E23	AD26	IOT	
	IOT	AD25	F24	E24	GND	PWR	
	PWR	+3.3V	F25	E25	AD24	IOT	
	IOT	C/BE3#	F26	E26	GNT1#	OT	
	IOT	AD23	F27	E27	+3.3V	PWR	
	PWR	GND	F28	E28	AD22	IOT	
	IOT	AD21	F29	E29	AD20	IOT	
	IOT	AD19	F30	E30	GND	PWR	
	PWR	+3.3V	F31	E31	AD18	IOT	
	IOT	AD17	F32	E32	AD16	IOT	
	IOT	C/BE2#	F33	E33	+3.3V	PWR	
	PWR	GND	F34	E34	FRAME#	IOT	
	IOT	IRDY#	F35	E35	GND	PWR	
	PWR	+3.3V	F36	E36	TRDY#	IOT	
	IOT	DEVSEL#	F37	E37	GND	PWR	
	PWR	GND	F38	E38	STOP#	IOT	
	IOT	LOCK#	F39	E39	+3.3V	PWR	
	IOT	PERR#	F40	E40	SDONE	IO	
	PWR	+3.3V	F41	E41	SB0#	IO	
	IOC	SERR#	F42	E42	GND	PWR	
	PWR	+3.3V	F43	E43	PAR	IOT	
	IOT	C/BE1#	F44	E44	AD15	IOT	
	IOT	AD14	F45	E45	+3.3V	PWR	
	PWR	GND	F46	E46	AD13	IOT	
	IOT	AD12	F47	E47	AD11	IOT	
	IOT	AD10	F48	E48	GND	PWR	
	PWR	GND	F49	E49	AD09	IOT	
SOLDER SIDE					**COMPONENT SIDE**		
	IOT	AD08	F52	E52	C/BE0#	IOT	
	IOT	AD07	F53	E53	+3.3V	PWR	
	PWR	+3.3V	F54	E54	AD06	IOT	
	IOT	AD05	F55	E55	AD04	IOT	
	IOT	AD03	F56	F56	GND	PWR	
	PWR	GND	F57	E57	AD02	IOT	
	IOT	AD01	F58	E58	AD00	IOT	
	PWR	+5V (I/O)	F59	E59	+5V (I/O)	PWR	
	IOT	ACK64#	F60	E60	REQ64#	IOT	
	PWR	+5V	F61	E61	+5V	PWR	
	PWR	+5V	F62	E62	+5V	PWR	

7.2.1 Signal Description – PCI Slot Connector

SYSTEM PINS	
CLK	Clock provides timing for all transactions on PCI and is an input to every PCI device. All other PCI signals, except RST#, INTA#, INTB#, INTC#, and INTD#, are sampled on the risingedge of CLK and all other timing parameters are defined with respect to this edge. PCI operates at 33MHz.
PME#	Power Management Event interrupt signal. Wake up signal.
RST#	Reset is used to bring PCI-specific registers, sequencers, and signals to a consistent state. What effect RST# has on a device beyond the PCI sequencer is beyond the scope of this specification, except for reset states of required PCI configuration registers. Anytime RST# is asserted, all PCI output signals must be driven to their benign state. In general, this means they must be asynchronously tri-stated. SERR# (open drain) is floated. REQ# and GNT# must both be tri-stated (they cannot be driven low or high during reset). To prevent AD, C/BE#, and PAR signals from floating during reset, the central resource may drive these lines during reset (bus parking) but only to a logic low level–they may not be driven high. RST# may be asynchronous to CLK when asserted or deasserted. Although asynchronous, deassertion is guaranteed to be a clean, bounce-free edge. Except for configuration accesses, only devices that are required to boot the system will respond after reset.
ADDRESS AND DATA	
AD[31::00]	Address and Data are multiplexed on the same PCI pins. A bus transaction consists of an address phase followed by one or more data phases. PCI supports both read and write bursts. The address phase is the clock cycle in which FRAME# is asserted. During the address phase AD[31::00] contain a physical address (32 bits). For I/O, this is a byte address; for configuration and memory, it is a DWORD address. During data phases AD[07::00] contain the least significant byte (lsb) and AD[31::24] contain the most significant byte (msb). Write data is stable and valid when IRDY# is asserted and read data is stable and valid when TRDY# is asserted. Data is transferred during those clocks where both IRDY# and TRDY# are asserted.
C/BE[3::0]#	Bus Command and Byte Enables are multiplexed on the same PCI pins. During the address phase of a transaction, C/BE[3::0]# define the bus command. During the data phase C/BE[3::0]# are used as Byte Enables. The Byte Enables are valid for the entire data phase and determine which byte lanes carry meaningful data. C/BE[0]# applies to byte 0 (lsb) and C/BE[3]# applies to byte 3 (msb).
PAR	Parity is even parity across AD[31::00] and C/BE[3::0]#. Parity generation is required by all PCI agents. PAR is stable and valid one clock after the address phase. For data phases, PAR is stable and valid one clock after either IRDY# is asserted on a write transaction or TRDY# is asserted on a read transaction. Once PAR is valid, it remains valid until one clock after the completion of the current data phase. (PAR has the same timing as AD[31::00], but it is delayed by one clock.) The master drives PAR for address and write data phases; the target drives PAR for read data phases.
INTERFACE CONTROL PINS	
FRAME#	Cycle Frame is driven by the current master to indicate the beginning and duration of an access. FRAME# is asserted to indicate a bus transaction is beginning. While FRAME# is asserted, data transfers continue. When FRAME# is deasserted, the transaction is in the final data phase or has completed.
IRDY#	Initiator Ready indicates the initiating agent's (bus master's) ability to complete the current data phase of the transaction. IRDY# is used in conjunction with TRDY#. A data phase is completed on any clock both IRDY# and TRDY# are sampled asserted. During a write, IRDY# indicates that valid data is present on AD[31::00]. During a read, it indicates the master is prepared to accept data. Wait cycles are inserted until both IRDY# and TRDY# are asserted together.
TRDY#	Target Ready indicates the target agent's (selected device's) ability to complete the current data phase of the transaction. TRDY# is used in conjunction with IRDY#. A data phase is completed on any clock both TRDY# and IRDY# are sampled asserted. During a read, TRDY# indicates that valid data is present on AD[31::00]. During a write, it indicates the target is prepared to accept data. Wait cycles are inserted until both IRDY# and TRDY# are asserted together.
STOP#	Stop indicates the current target is requesting the master to stop the current transaction.
LOCK#	Lock indicates an atomic operation that may require multiple transactions to complete. When LOCK# is asserted, non-exclusive transactions may proceed to an address that is not currently locked. A grant to start a transaction on PCI does not guarantee control of LOCK#. Control of LOCK# is obtained under its own protocol in conjunction with GNT#. It is possible for different agents to use PCI while a single master retains ownership of LOCK#. If a device implements Executable Memory, it should also implement LOCK# and guarantee complete access exclusion in that memory. A target of an access that supports LOCK# must provide exclusion to a minimum of 16 bytes (aligned). Host bridges that have system memory behind them should implement LOCK# as a target from the PCI bus point of view and optionally as a master.
IDSEL	Initialization Device Select is used as a chip select during configuration read and write transactions.
DEVSEL#	Device Select, when actively driven, indicates the driving device has decoded its address as the target of the current access. As an input, DEVSEL# indicates whether any device on the bus has been selected.

ARBITRATION PINS (BUS MASTERS ONLY)	
REQ#	Request indicates to the arbiter that this agent desires use of the bus. This is a point to point signal. Every master has its own REQ# which must be tri-stated while RST# is asserted.
GNT#	Grant indicates to the agent that access to the bus has been granted. This is a point to point signal. Every master has its own GNT# which must be ignored while RST# is asserted. While RST# is asserted, the arbiter must ignore all REQ# lines since they are tri-stated and do not contain a valid request. The arbiter can only perform arbitration after RST# is deasserted. A master must ignore its GNT# while RST# is asserted. REQ# and GNT# are tri-state signals due to power sequencing requirements when 3.3V or 5.0V only add-in boards are used with add-in boards that use a universal I/O buffer.
ERROR REPORTING PINS. The error reporting pins are required by all devices and maybe asserted when enabled	
PERR#	Parity Error is only for the reporting of data parity errors during all PCI transactions except a Special Cycle. The PERR# pin is sustained tri-state and must be driven active by the agent receiving data two clocks following the data when a data parity error is detected. The minimum duration of PERR# is one clock for each data phase that a data parity error is detected. (If sequential data phases each have a data parity error, the PERR# signal will be asserted for more than a single clock.) PERR# must be driven high for one clock before being tri-stated as with all sustained tri-state signals. There are no special conditions when a data parity error may be lost or when reporting of an error may be delayed. An agent cannot report a PERR# until it has claimed the access by asserting DEVSEL# (for a target) and completed a data phase or is the master of the current transaction.
SERR#	System Error is for reporting address parity errors, data parity errors on the Special Cycle command, or any other system error where the result will be catastrophic. If an agent does not want a non-maskable interrupt (NMI) to be generated, a different reporting mechanism is required. SERR# is pure open drain and is actively driven for a single PCI clock by the agent reporting the error. The assertion of SERR# is synchronous to the clock and meets the setup and hold times of all bused signals. However, the restoring of SERR# to the deasserted state is accomplished by a weak pullup (same value as used for s/t/s) which is provided by the system designer and not by the 60signaling agent or central resource. This pull-up may take two to three clock periods to fully restore SERR#. The agent that reports SERR#s to the operating system does so anytime SERR# is sampled asserted.
INTERRUPT PINS (OPTIONAL). Interrupts on PCI are optional and defined as “level sensitive,” asserted low (negative true), using open drain output drivers. The assertion and deassertion of INTx# is asynchronous to CLK. A device asserts its INTx# line when requesting attention from its device driver. Once the INTx# signal is asserted, it remains asserted until the device driver clears the pending request. When the request is cleared, the device deasserts its INTx# signal. PCI defines one interrupt line for a single function device and up to four interrupt lines for a multi-function device or connector. For a single function device, only INTA# may be used while the other three interrupt lines have no meaning.	
INTA#	Interrupt A is used to request an interrupt.
INTB#	Interrupt B is used to request an interrupt and only has meaning on a multi-function device.
INTC#	Interrupt C is used to request an interrupt and only has meaning on a multi-function device.
INTD#	Interrupt D is used to request an interrupt and only has meaning on a multi-function device.

7.2.2 KTQ67 PCI IRQ & INT routing

Board type	Slot	REQ	GNT	IDSEL	INTA	INTB	INTC	INTD
KTQ67/Flex	0	REQ0	GNT0	17	INTA	INTB	INTC	INTD
	1	REQ1	GNT1	18	INTF	INTG	INTH	INTE
KTQ67/ATXE	0	REQ0	GNT0	17	INTA	INTB	INTC	INTD
	1	REQ1	GNT1	18	INTF	INTG	INTH	INTE
	2	REQ2	GNT2	19	INTG	INTH	INTE	INTF
	3	REQ3	GNT3	20	INTH	INTE	INTF	INTG
	4	REQ4	GNT4	21	INTE	INTF	INTG	INTH

When using the 820982 “PCI Riser - Flex - 2slot w. arbiter” the lower slot has IDSEL / IRQs routed straight through and the top slot has the routing: IDSEL=AD22, INT_PIRQ#F, INT_PIRQ#G, INT_PIRQ#H, INT_PIRQ#E. 820982 PCI Riser shall be plugged into Slot 0 and jumper in AD30.

8 On-board - & mating connector types

The Mating connectors / Cables are connectors or cable kits which are fitting the On-board connector. The highlighted cable kits (in **bold**) are included in the "KTQ67 Cable & Driver Kit" PN 826599, in different quantities depending on type of connector. For example there are 4x 821017 COM cables and 6x 821035 SATA cables.

Connector	On-board Connectors		Mating Connectors / Cables	
	Manufacturer	Type no.	Manufacturer	Type no.
FAN_CPU	Foxconn	HF2704E-M1	AMP	1375820-4 (4-pole)
FAN_SYS	AMP	1470947-1	AMP	1375820-3 (3-pole)
KBDMSE	Molex	22-23-2061	Molex	22-01-2065
			Kontron	**KT 1046-3381**
CDROM	Foxconn	HF1104E	Molex	50-57-9404
	Molex	70543-0038		
SATA	Hon Hai	LD1807V-S52T	Molex	67489-8005
			Kontron	**KT 821035** (cable kit)
ATXEWR	Molex	44206-0002	Molex	5557-24R
ATX+12V-4pin	Lotes	ABA-POW-003-K02	Molex	39-01-2045
EDP	Tyco	5-2069716-3	Tyco	2023344-3
LVDS	Don Connex	C44-40BSB1-G	Don Connex	A32-40-C-G-B-1
			Kontron	KT 910000005
			Kontron	**KT 821515** (cable kit)
			Kontron	KT 821155 (cable kit)
COM1,2, 3, 4	Wuerth	61201020621	Molex	90635-1103
			Kontron	KT 821016 (cable kit)
			Kontron	**KT 821017** (cable kit)
USB68/9, 10/11, 12/13	Pinrex	512-90-10GBB2	Kontron	**KT 821401** (cable kit)
USB6/7 (*)	(FRONTPNL)	-	Kontron	**KT 821401** (cable kit)
AUDIO_HEAD	Molex	87831-2620	Molex	51110-2651
			Kontron	**KT 821043** (cable kit)
FRONTPNL	Pinrex	512-90-24GBB3	Molex	90635-1243
			Kontron	**KT 821042** (cable kit)
FEATURE	Foxconn	HS5422F	Don Connex	A05c-44-B-G-A-1-G
				KT 1052-5885 (cable kit)

* USB6/USB7 is located in FRONTPNL connector. Depending on application KT 821401 can be used.

Note: Only one connector will be mentioned for each type of on-board connector even though several types with same fit, form and function are approved and could be used as alternative. Please also notice that standard connectors like DVI, DP, PCIe, miniPCIe, PCI, Audio Jack, Ethernet and USB is not included in the list.

9 System Resources

9.1 Memory Map

Address (hex)		Size (hex)	Description
0xFF000000	0xFFFFFFFF	1000000	Motherboard resources
0xFEE10000	0xFEFFFFFF	1F0000	PCI bus
0xFEE00000	0xFEE0FFFF	10000	Motherboard resources
0xFED94000	0xFEDFFFFF	6C000	PCI bus
0xFED90000	0xFED93FFF	4000	Motherboard resources
0xFED40000	0xFED8FFFF	50000	PCI bus
0xFED20000	0xFED3FFFF	20000	Motherboard resources
0xFED1C000	0xFED1FFFF	4000	Motherboard resources
0xFED1A000	0xFED1BFFF	2000	PCI bus
0xFED10000	0xFED19FFF	A000	Motherboard resources
0xFED09000	0xFED0FFFF	7000	PCI bus
0xFED08000	0xFED08FFF	1000	Motherboard resources
0xFED00400	0xFED07FFF	7BFF	PCI bus
0xFED00000	0xFED003FF	400	High Precision Event Timer
0xFEC00000	0xFECFFFFF	100000	Motherboard resources
0xFE52A010	0xFEBFFFFF	6D5FF0	PCI bus
0xFE52A000	0xFE52A00F	10	Intel® Management Engine Interface
0xFE529000	0xFE529FFF	1000	Intel® AMT – SOL (COM5)
0xFE528000	0xFE528FFF	1000	Intel® 82579LM Gigabit Network
0xFE527400	0xFE527FFF	C00	PCI bus
0xFE527000	0xFE5273FF	400	Intel® Chipset USB EHCI – 1C2D
0xFE526400	0xFE526FFF	C00	PCI bus
0xFE526000	0xFE5263FF	400	Intel® Chipset USB EHCI – 1C26
0xFE525800	0xFE525FFF	800	PCI bus
0xFE525000	0xFE5257FF	800	Intel® Chipset 6 port SATA ACHI – 1C02
0xFE524100	0xFE524FFF	F00	PCI bus
0xFE524000	0xFE5240FF	100	Intel® Chipset SMBus Controller – 1C22
0xFE520000	0xFE523FFF	4000	High Definition Audio Controller
0xFE500000	0xFE51FFFF	20000	Intel® 82579LM Gigabit Network
0xFE400000	0xFE4FFFFF	100000	Intel® Chipset PCIe Root port 1 – 1C26 LAN controller
0xFE000000	0xFE3FFFFF	400000	Video Controller
0xF0000000	0xFDFFFFFF	E000000	PCI bus
0xE0000000	0xEFFFFFFF	10000000	Motherboard resources
0xD0000000	0xDFFFFFFF	10000000	Video Controller
0xBFA00000	0xCFFFFFFF	10600000	PCI bus
0xC0000	0xDFFFF	20000	PCI bus
0xA0000	0xBFFFF	20000	VgaSave PCI bus

9.2 PCI Devices

Bus #	Device #	Function #	Vendor ID	Device ID	Chip	Device Function
0	0	0	8086	0100	CPU	Intel – DRAM Controller
0	2	0	8086	0102	CPU	Intel - VGA Controller
0	22	0	8086	1C3A	Q67 Chipset	Intel – Management Engine
0	25	0	8086	1502	82579LM LAN	Intel - Ethernet Controller
0	26	0	8086	1C2D	Q67 Chipset	Intel - USB
0	27	0	8086	0403	Q67 Chipset	Intel - HD Audio
0	28	0	8086	1C10	Q67 Chipset	Intel – PCIe Root Port 1
0	29	0	8086	1C26	Q67 Chipset	Intel - USB
0	30	0	8086	244E	82801 PCI Bridge	Intel – PCI Bridge
0	31	0	8086	1C4E	Q67 Chipset	Intel - LPC
0	31	2	8086	1C03	Q67 Chipset	Intel - SATA AHCI Controller
0	31	3	8086	1C22	Q67 Chipset	Intel - SMBus
1	0	0	8086	10D3	82574L LAN	Intel - Ethernet Controller

9.3 Interrupt Usage

IRQ	System timer	PS/2 Keyboard	COM2 Selection in BIOS	COM1 Selection in BIOS	Intel(R) SMBus -1C22	COM4 Selection in BIOS	System CMOS/real-time watch	COM3 Selection in BIOS	PS2 Mouse	Numerical Data Processor	Intel(R) USB EHCI – 1C2D	Intel(R) Management Engine Interface	Intel(R) AMT – SOL (COM5)	Intel(R) SATA ACHI - 1C02	High Definition Audio	Intel(R) USB EHCI - 1C26							Notes
NMI																							
IRQ0	X																						
IRQ1		X																					
IRQ2																							
IRQ3			X																				
IRQ4				X																			
IRQ5					X																		
IRQ6																							
IRQ7						X																	
IRQ8							X																
IRQ9																							
IRQ10								X															
IRQ11																							
IRQ12									X														
IRQ13										X													
IRQ14																							
IRQ15																							
IRQ16											X	X											
IRQ17													X										
IRQ18																							
IRQ19														X									
IRQ20																							
IRQ21																							
IRQ22																							
IRQ23															X	X							
IRQ24																							
IRQ25																							
IRQ26																							

IO Map

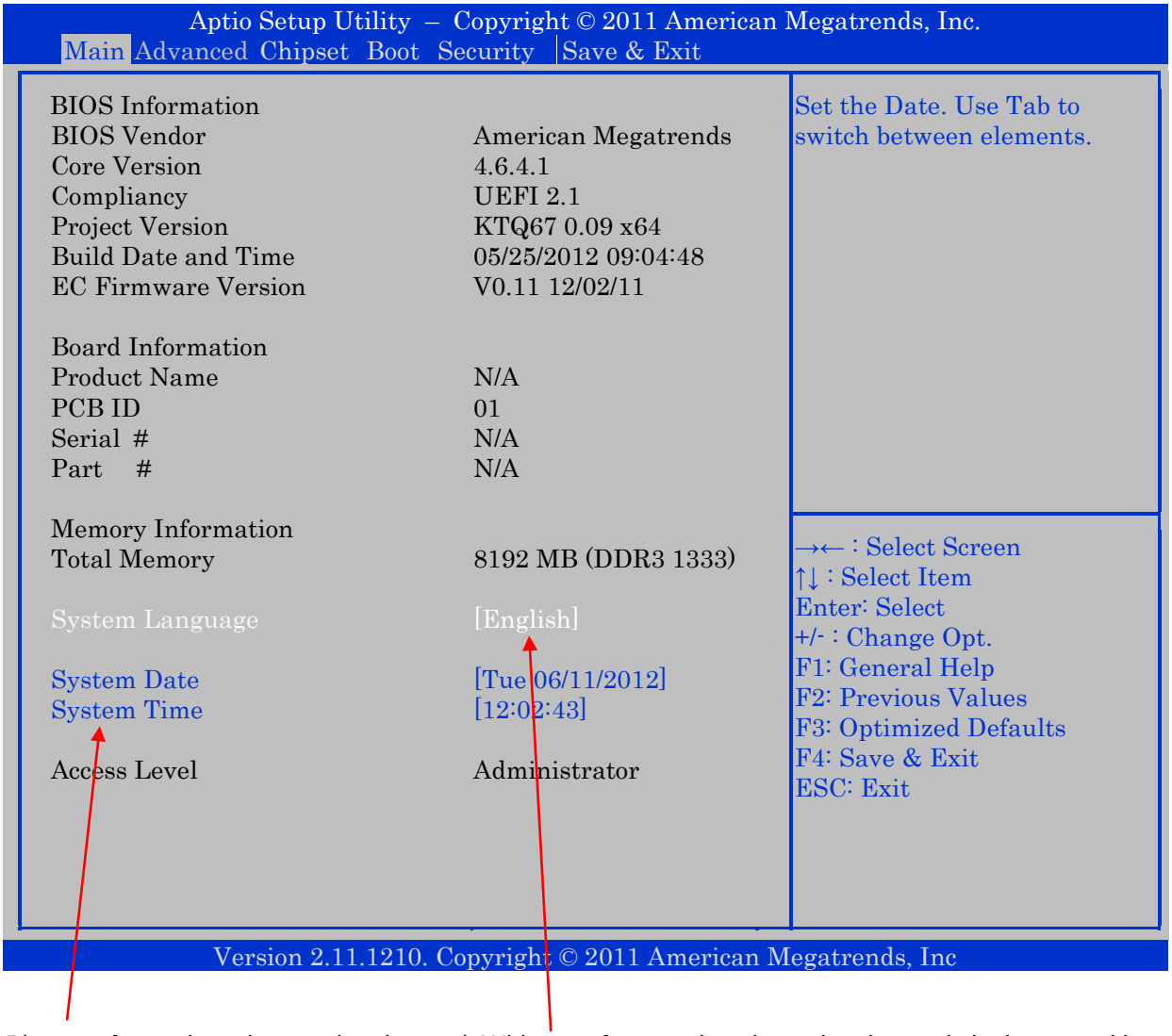
Address range (hex)		Size (hex)	Description
0x0000F130	0x0000F137	8	Standard Dual Channel IDE Controller
0x0000F120	0x0000F123	4	Standard Dual Channel IDE Controller
0x0000F110	0x0000F117	8	Standard Dual Channel IDE Controller
0x0000F100	0x0000F103	4	Standard Dual Channel IDE Controller
0x0000F0F0	0x0000F0FF	10	Standard Dual Channel IDE Controller
0x0000F0E0	0x0000F0E7	8	Intel® AMT - SOL (COM5)
0x0000F0D0	0x0000F0D7	8	Intel® 6 port SATA AHCI - 1C03
0x0000F0C0	0x0000F0C3	4	Intel® 6 port SATA AHCI - 1C03
0x0000F0B0	0x0000F0B7	8	Intel® 6 port SATA AHCI - 1C03
0x0000F0A0	0x0000F0A3	4	Intel® 6 port SATA AHCI - 1C03
0x0000F060	0x0000F07F	20	Intel® 6 port SATA AHCI - 1C03
0x0000F040	0x0000F05F	20	Intel® SMBus - 1C22
0x0000F000	0x0000F03F	40	Intel® HD Graphics family
0x0000E000	0x0000EFFF	1000	Intel® 82574L LAN, CIe Root port 4 - 1C10
0x00001180	0x0000119F	20	Motherboard resources
0x00000D00	0x0000FFFF	F300	PCI bus
0x00000A00	0x00000A2F	30	Motherboard resources
0x00000500	0x0000057F	80	Motherboard resources
0x000004D0	0x000004D1	2	Programmable interrupt controller
0x00000400	0x0000047F	80	Motherboard resources
0x000003F8	0x000003FF	8	COM1
0x000003E8	0x000003EF	8	COM4
0x000003C0	0x000003DF	20	Intel® HD Graphics family
0x000003B0	0x000003BB	C	Intel® HD Graphics family
0x000002F8	0x000002FF	8	COM2
0x000002E8	0x000002EF	8	COM3
0x00000290	0x0000029F	10	Motherboard resources
0x0000020E	0x0000020F	2	Motherboard resources
0x000000F0	0x000000FF	10	Numeric data processor
0x000000E0	0x000000EF	10	Motherboard resources
0x000000D0	0x000000DF	10	Direct memory access controller
0x000000A2	0x000000BF	1E	Motherboard resources
0x000000A0	0x000000A1	2	Programmable interrupt controller
0x00000090	0x0000009F	10	Motherboard resources
0x0000008F	0x0000008F	1	Direct memory access controller
0x0000008C	0x0000008E	3	Motherboard resources
0x00000089	0x0000008B	3	Direct memory access controller
0x00000088	0x00000088	1	Motherboard resources
0x00000087	0x00000087	1	Direct memory access controller
0x00000084	0x00000086	3	Motherboard resources
0x00000081	0x00000083	3	Direct memory access controller
0x00000072	0x00000080	F	Motherboard resources
0x00000070	0x00000071	2	System CMOS/real time clock
0x00000065	0x0000006F	B	Motherboard resources
0x00000064	0x00000064	1	Standard PS/2 Keyboard
0x00000062	0x00000063	2	Motherboard resources
0x00000061	0x00000061	1	System Speaker
0x00000060	0x00000060	1	Standard PS/2 Keyboard
0x00000044	0x0000005F	1C	Motherboard resources
0x00000040	0x00000043	4	System Timer
0x00000022	0x0000003F	1E	Motherboard resources
0x00000020	0x00000021	2	Programmable interrupt controller
0x00000010	0x0000001F	10	Motherboard resources
0x00000000	0x0000000F	10	Direct memory access controller

BIOS

The BIOS Setup is used to view and configure BIOS settings for the board. The BIOS Setup is accessed by pressing the <Del> -key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins.

The BIOS settings will be loaded automatically when loading “Restore Default” see “Save & Exit” menu. In this Users Guide the default settings are indicated by **bold**. Please notice that “Restore User Defaults” might have different set of default values.

9.4 Main

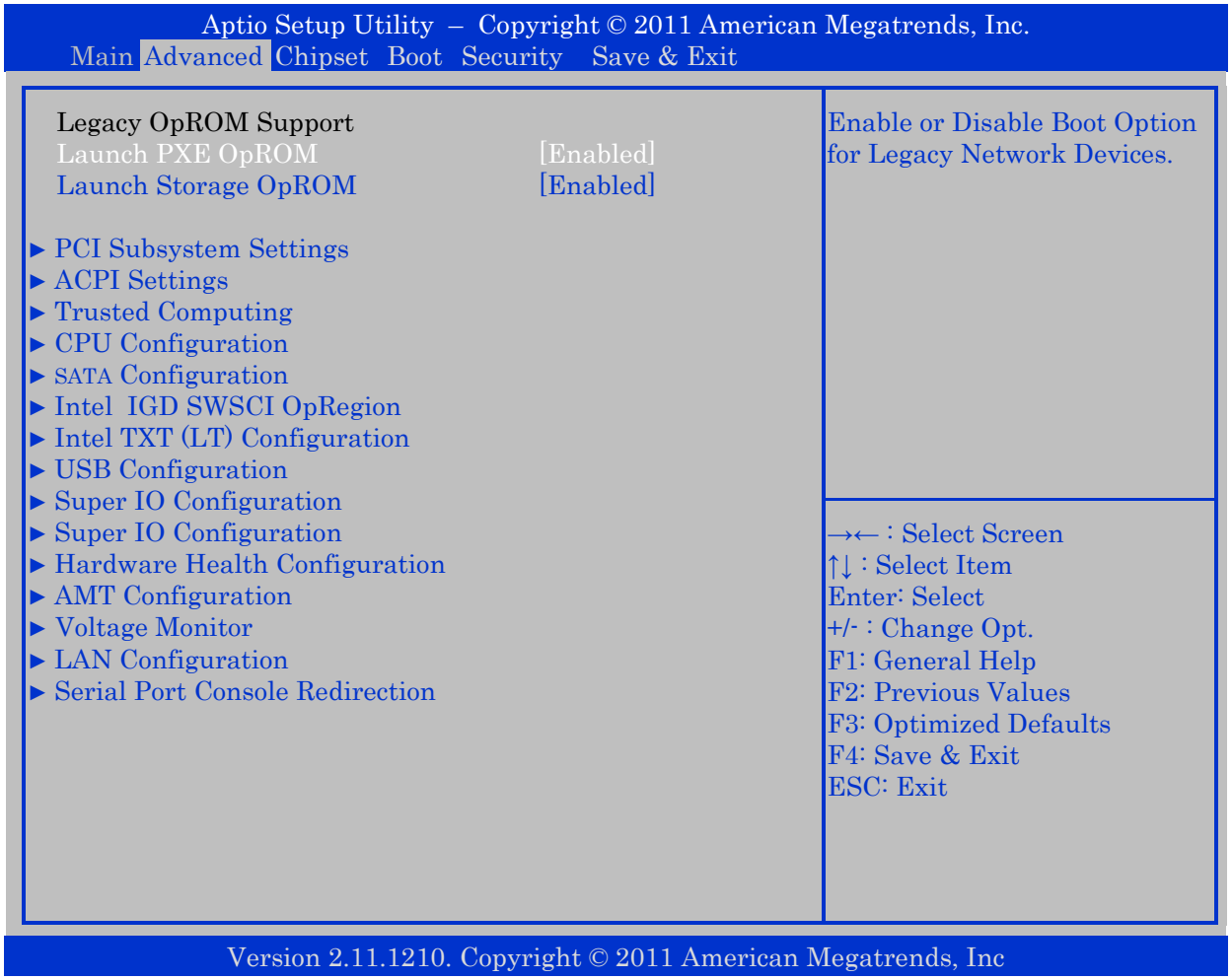


Blue text for settings that can be changed. White text for actual setting to be changed via the control keys (Black text for settings that cannot be changed via control keys)

The following table describes the changeable settings:

Feature	Options	Description
System Date	MM/DD/YYYY	Set the system date.
System Time	HH:MM:SS	Set the system time.

9.5 Advanced



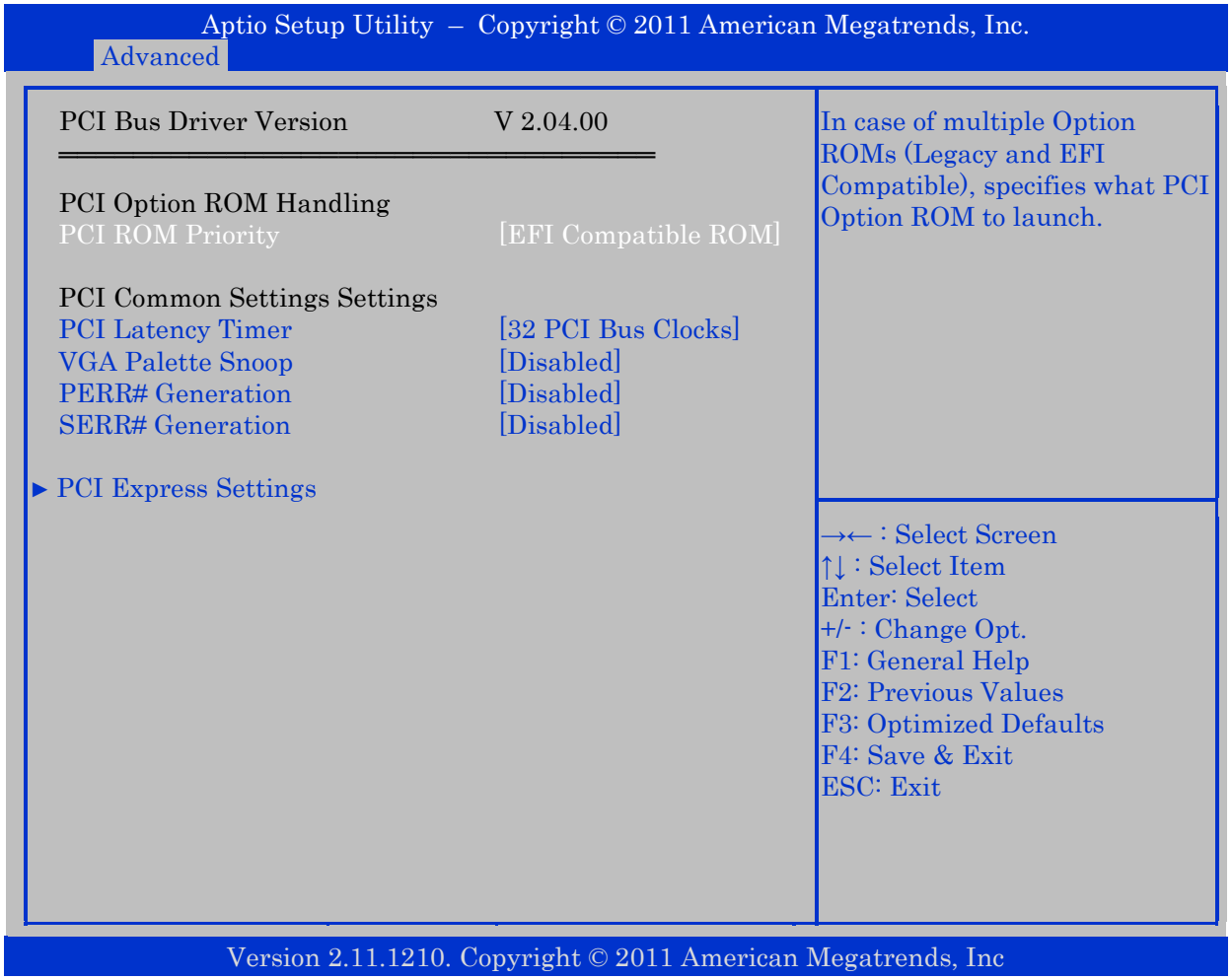
Function	Selection	Description
Launch PXE OpROM	Disabled **Enabled**	Enable or Disable Boot Option for Legacy Network Devices.
Launch Storage OpROM	Disabled **Enabled**	Enable or Disable Boot Option for Legacy Mass Storage Devices Option ROM.

Note: The selection in **bold** is the default selection.

The Advanced (main) menu contains submenu selections which will be described in more details on the following pages.

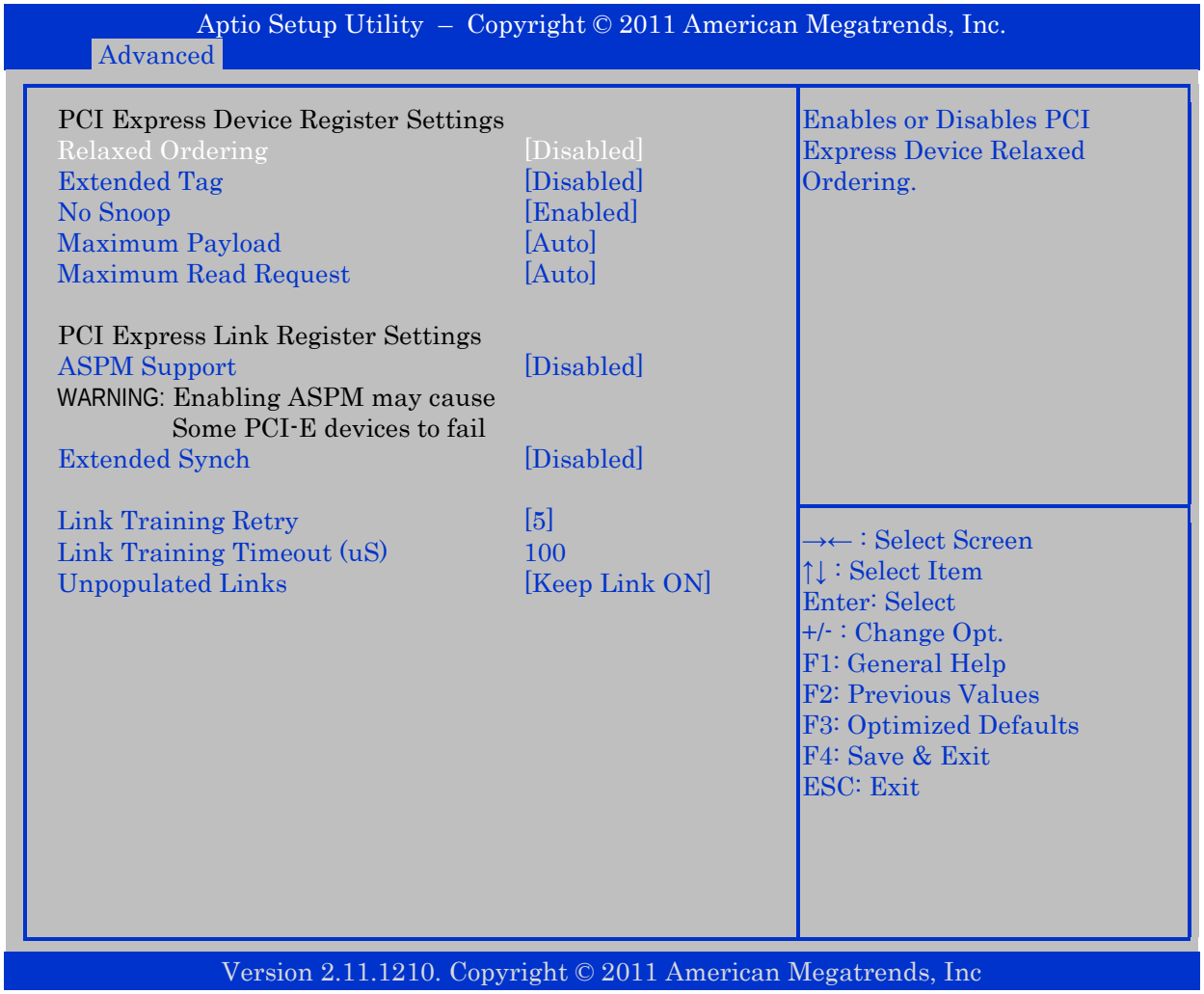
In order to make a selection of a submenu activated the ↑↓ keys until the requested submenu becomes white color, then activate the <Enter>.

9.5.1 Advanced - PCI Subsystem Settings



Function	Selection	Description
PCI ROM Priority	Legacy ROM **EFI Compatible ROM**	In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.
PCI Latency Timer	**32 PCI Bus Clocks** 64 PCI Bus Clocks 96 PCI Bus Clocks 128 PCI Bus Clocks 160 PCI Bus Clocks 192 PCI Bus Clocks 224 PCI Bus Clocks 248 PCI Bus Clocks	Value to be programmed into PCI Latency Timer Register.
VGA Palette Snoop	**Disabled** Enabled	Enables or Disables VGA Palette Registers Snooping.
PERR# Generation	**Disabled** Enabled	Enables or Disables PCI Device to Generate PERR#.
SERR# Generation	**Disabled** Enabled	Enables or Disables PCI Device to Generate SERR#.

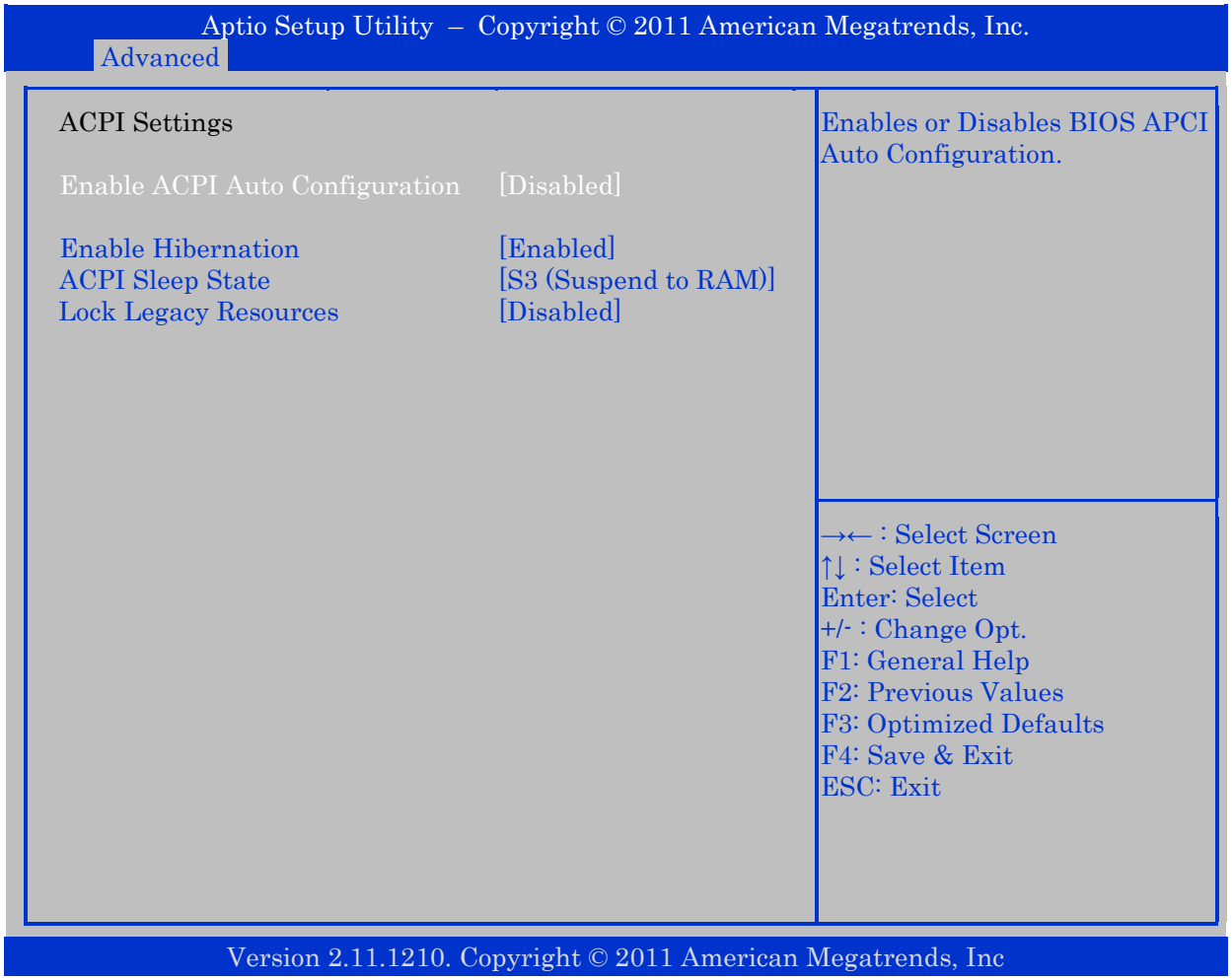
9.5.1.1 PCI Express Settings



Function	Selection	Description
Relaxed Ordering	**Disabled** Enabled	Enables or Disables PCI Express Device Relaxed Ordering.
Extended Tag	**Disabled** Enabled	If ENABLED allows Device to use 8-bit Tag field as a requester.
No Snoop	**Disabled** Enabled	Enables or Disables PCI Express Device No Snoop option.
Maximum Payload	**Auto** 128 Bytes 256 Bytes 512 Bytes 1024 Bytes 2048 Bytes 4096 Bytes	Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.
Maximum Read Request	**Auto** 128 Bytes 256 Bytes 512 Bytes 1024 Bytes 2048 Bytes 4096 Bytes	Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.
ASPM Support	**Disabled** Auto Force L0s	Set the ASPM Level: Force L0s - Force all links to L0s State: Auto – BIOS auto configure: Disable – Disabled ASPM
Extended Synch	**Disabled** Enabled	If ENABLED allows generation of Extended Synchronization patterns.
Link Training Retry	Disabled 2 3 **5**	Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.
Link Training Timeout (uS)	**100** (note1)	Defines number of Microseconds software will wait before polling ´Link Training´ bit in Link Status register. Value range from 1 to 100uS.
Unpopulated Links	**Keep Link ON** Disable Link	In order to save power, software will disable unpopulated PCI Express links, if this option set to ´Disabled Link´.

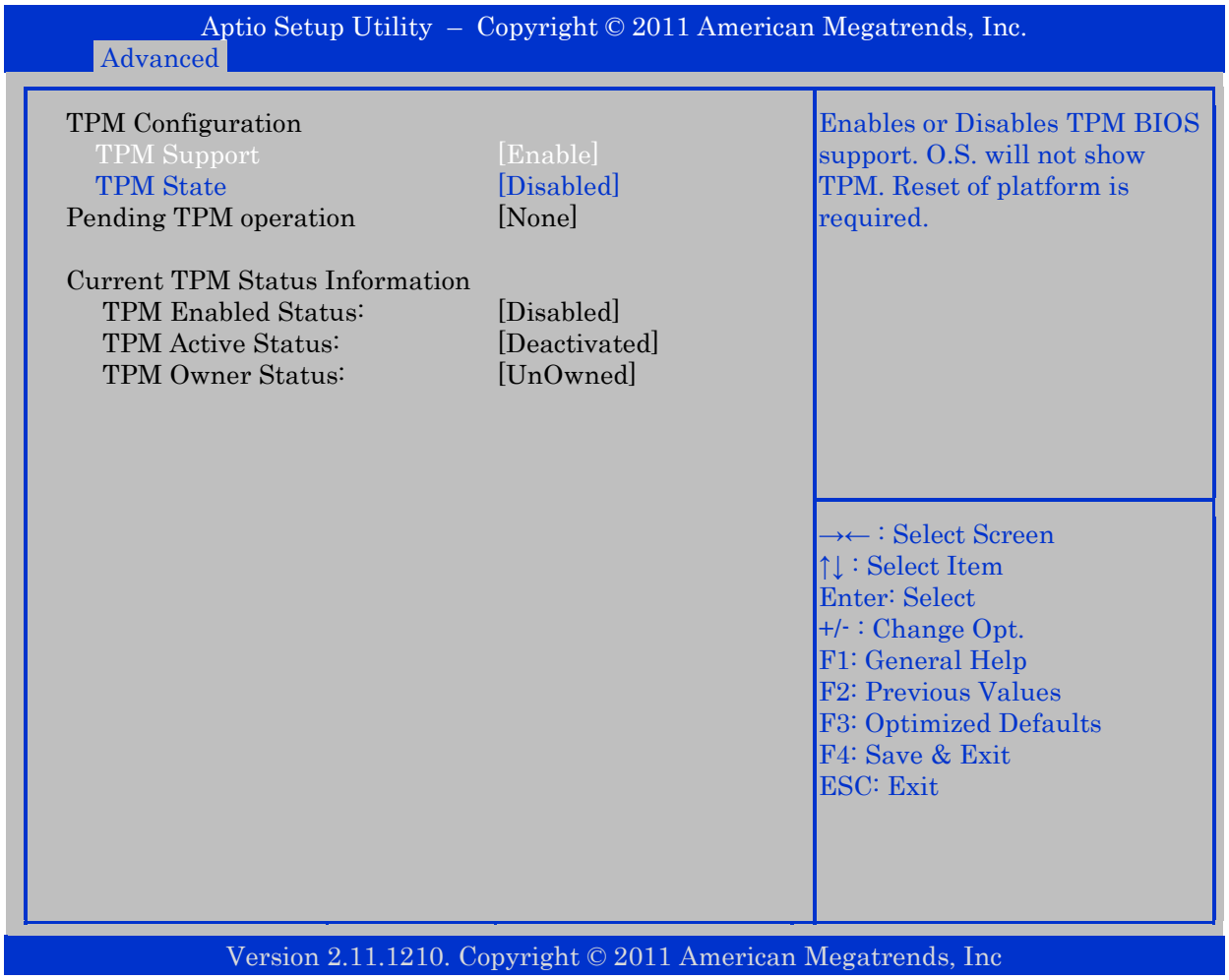
Note1: Use either digit keys to enter value or +/- keys to increase/decrease value. Don’t use mix of digit keys and +/- keys.

9.5.2 Advanced - APCI Settings



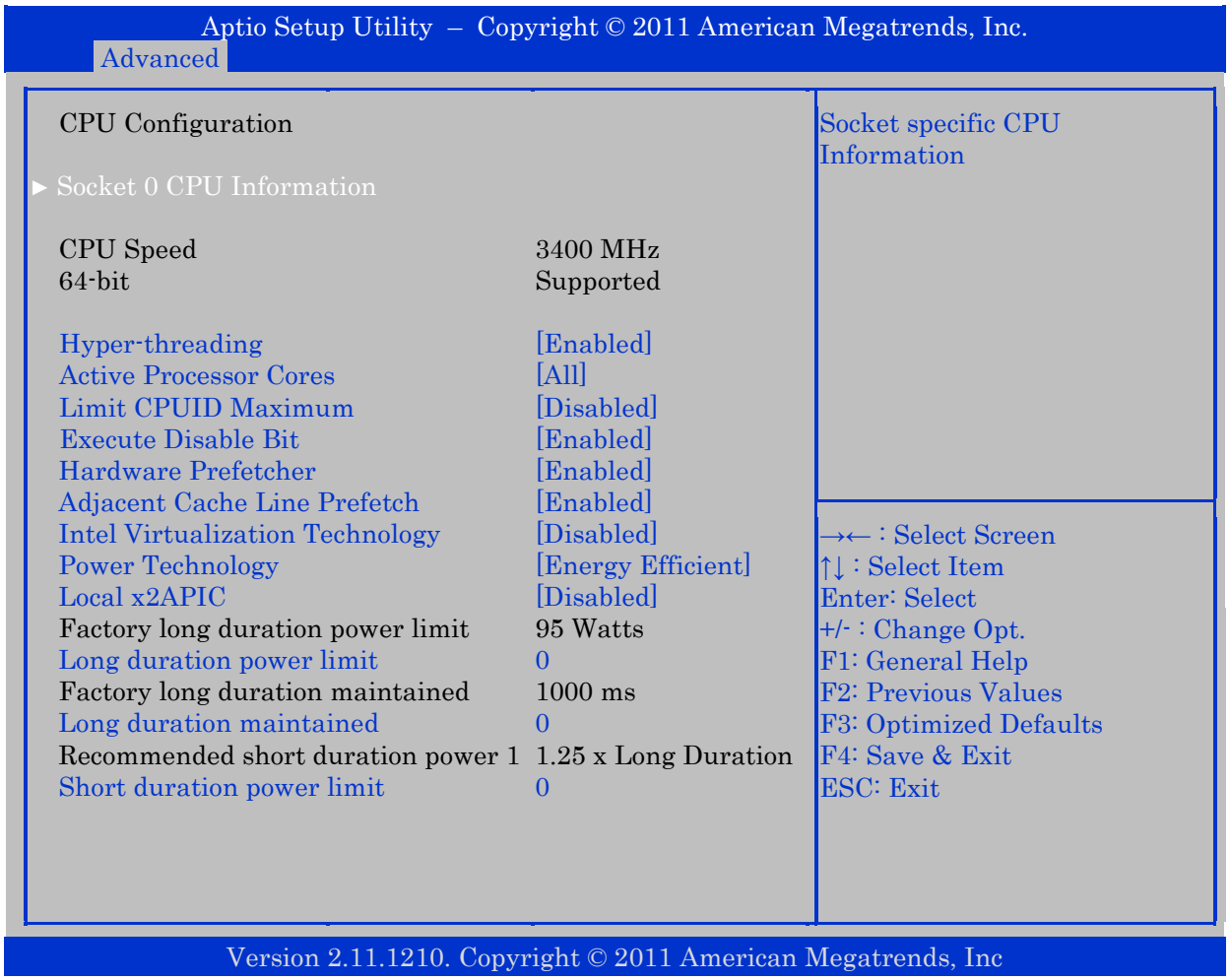
Function	Selection	Description
Enable ACPI Auto Configuration	**Disabled** Enabled	Enables or Disables BIOS APCI Auto Configuration.
Enable Hibernation	Disabled **Enabled**	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Suspend Disabled S1 only(CPU Stop Clock) **S3 only(Suspend to RAM)**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
Lock Legacy Resources	**Disabled** Enabled	Enables or Disables Lock of Legacy Resources.

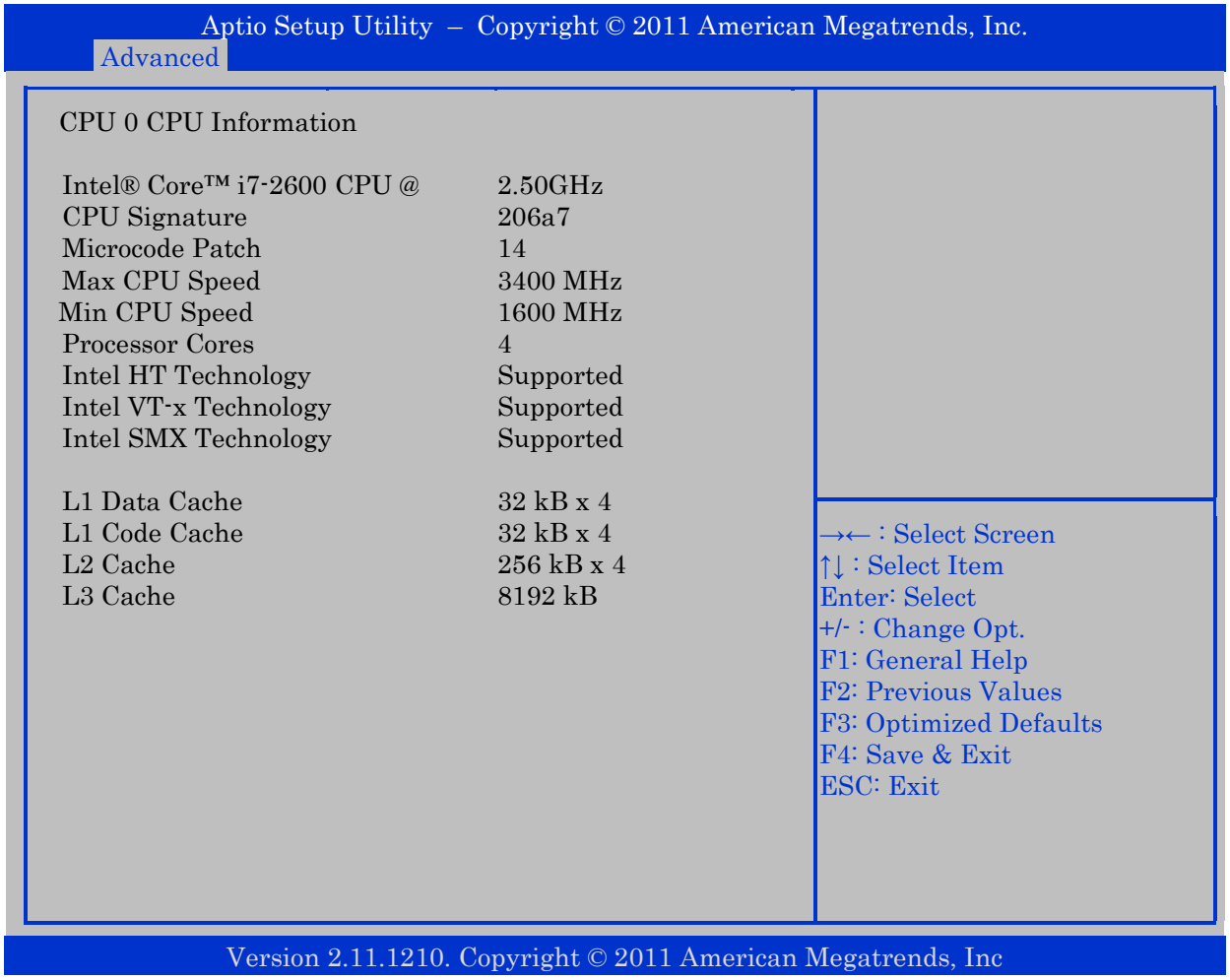
9.5.3 Advanced - Trusted Computing



Function	Selection	Description
TPM Support	**Disabled** Enabled	Enables or Disables TPM BIOS support. O.S. will not show TPM. Reset of platform is required.
TPM State	**Disabled** Enabled	Turn TPM Enable/Disable. NOTE: Your Computer will reboot during restart in order to change State of TPM.
Pending operation	**None** Enable Take Ownership Disable Take Ownership TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of the Device.

9.5.4 Advanced - CPU Configuration




Aptio Setup Utility – Copyright © 2011 American Megatrends, Inc.
Advanced
CPU 0 CPU Information
Intel® Core™ i7-2600 CPU @ 2.50GHz
CPU Signature 206a7
Microcode Patch 14
Max CPU Speed 3400 MHz
Min CPU Speed 1600 MHz
Processor Cores 4
Intel HT Technology Supported
Intel VT-x Technology Supported
Intel SMX Technology Supported
L1 Data Cache 32 kB x 4
L1 Code Cache 32 kB x 4
L2 Cache 256 kB x 4
L3 Cache 8192 kB
→← : Select Screen
↑↓ : Select Item
Enter: Select
+/- : Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright © 2011 American Megatrends, Inc

Function	Selection	Description
Hyper-threading	Disabled **Enabled**	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.
Active Processor Cores	**All** 1 2 3	Number of cores to enable in each processor package.
Limit CPUID Maximum	**Disabled** Enabled	Disabled for Windows XP
Execute Disable Bit	Disabled **Enabled**	XD can prevent certain classes of malicious buffer overflow attacks when combined with supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)
Hardware Prefetcher	Disabled **Enabled**	To turn on/off the Mid Level Cache (L2) streamer prefetcher.
Adjacent Cache Line Prefetch	Disabled **Enabled**	To turn on/off the prefetching of adjacent cache line.
Intel Virtualization Technology	**Disabled** Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Power Technology	Disable **Energy Efficient** Custom	Enable the power management features.
Local x2APIC	**Disabled** Enabled	Enable Local x2APIC. Some OSes do not support this.
Long duration power limit	**0** (0 – 255)	Long duration power limit in Watts.
Factory long duration maintained	**0** (0 – 32000)	Time window which the long duration power is maintained.
Recommended short duration power 1	**0** (0 – 255)	Short duration power limit in Watts.

Notes:

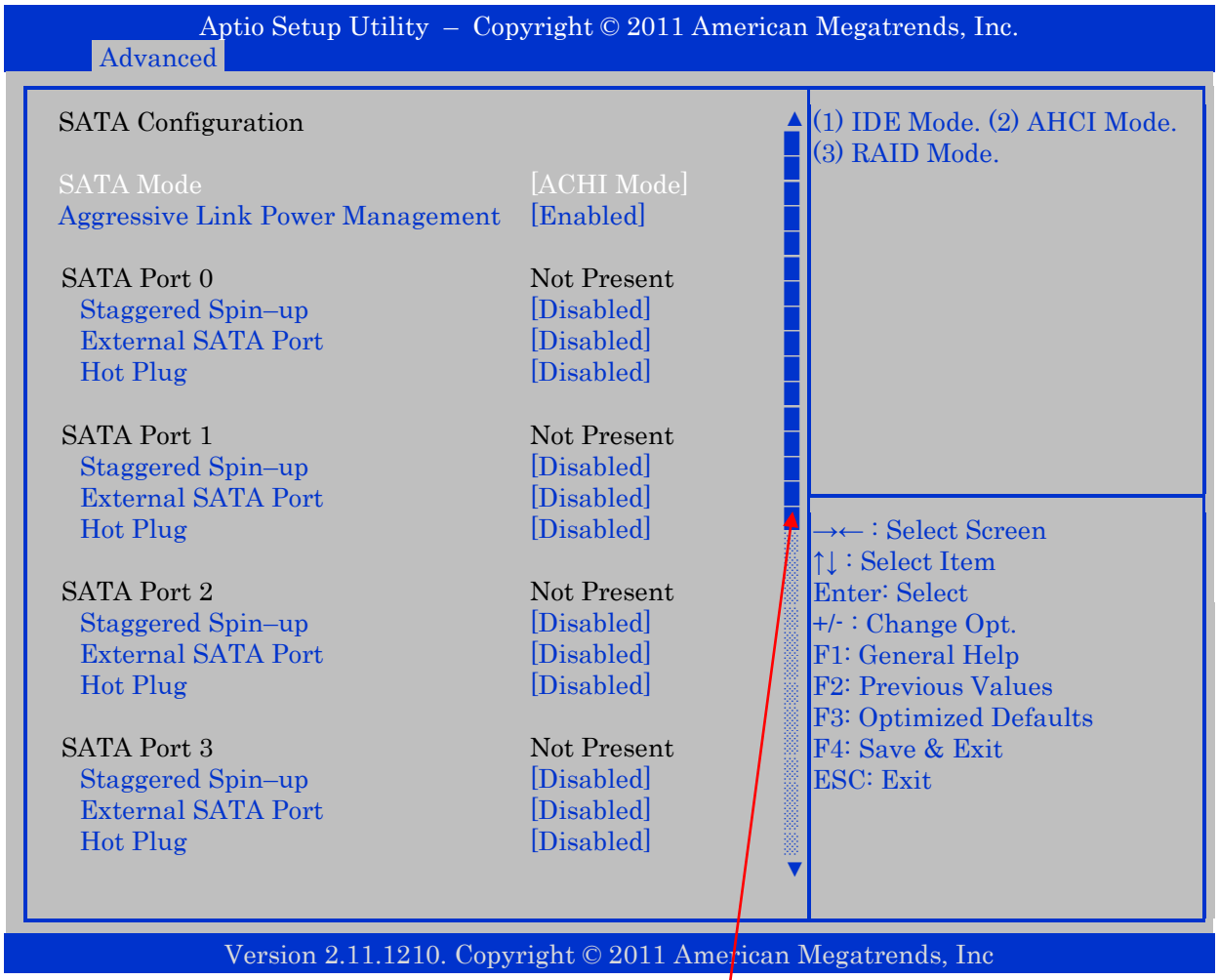
Intel HT Technology (Hyper Threading Technology) is a performance feature which allows one core on the processor to appear like 2 cores to the operating system. This doubles the execution resources available to the O/S, which potentially increases the performance of your overall system.

Intel VT-x Technology (Virtualization Technology) Previously codenamed "Vanderpool", VT-x represents Intel's technology for virtualization on the x86 platform. In order to support “Virtualization Technology” the CPU must support VT-x and the BIOS setting “Intel Virtualization Technology” must be enabled.

Intel SMX Technology (Safer Mode Extensions Technology) is a part of the Trusted Execution Technology.

9.5.5 Advanced - SATA Configuration

The below description is only when SATA Mode = AHCI Mode. For other SATA Modes see next pages.

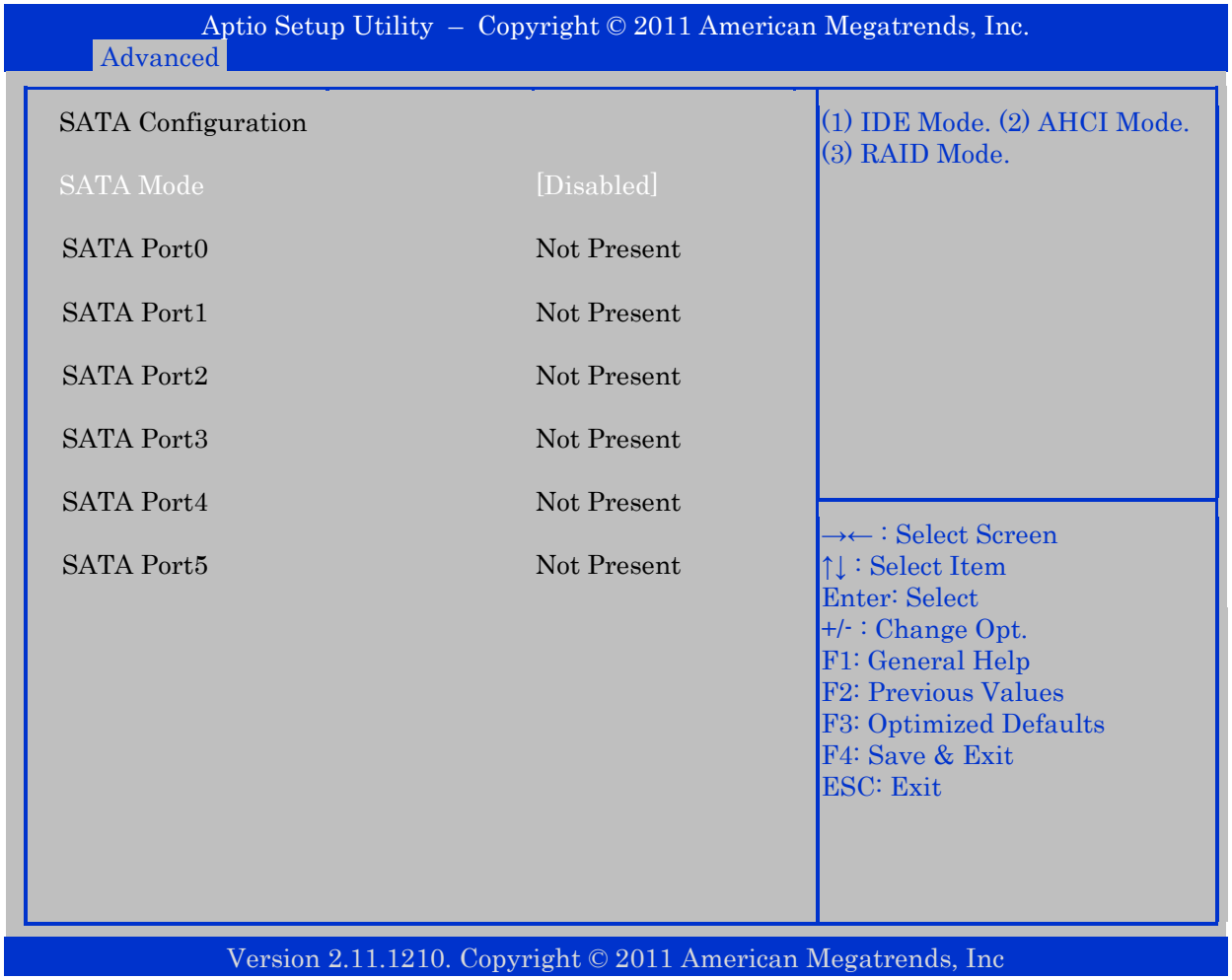


(Scroll indicator bar)

Note: By scrolling down (or up) also settings for SATA Port 4 - 5 can be accessed.

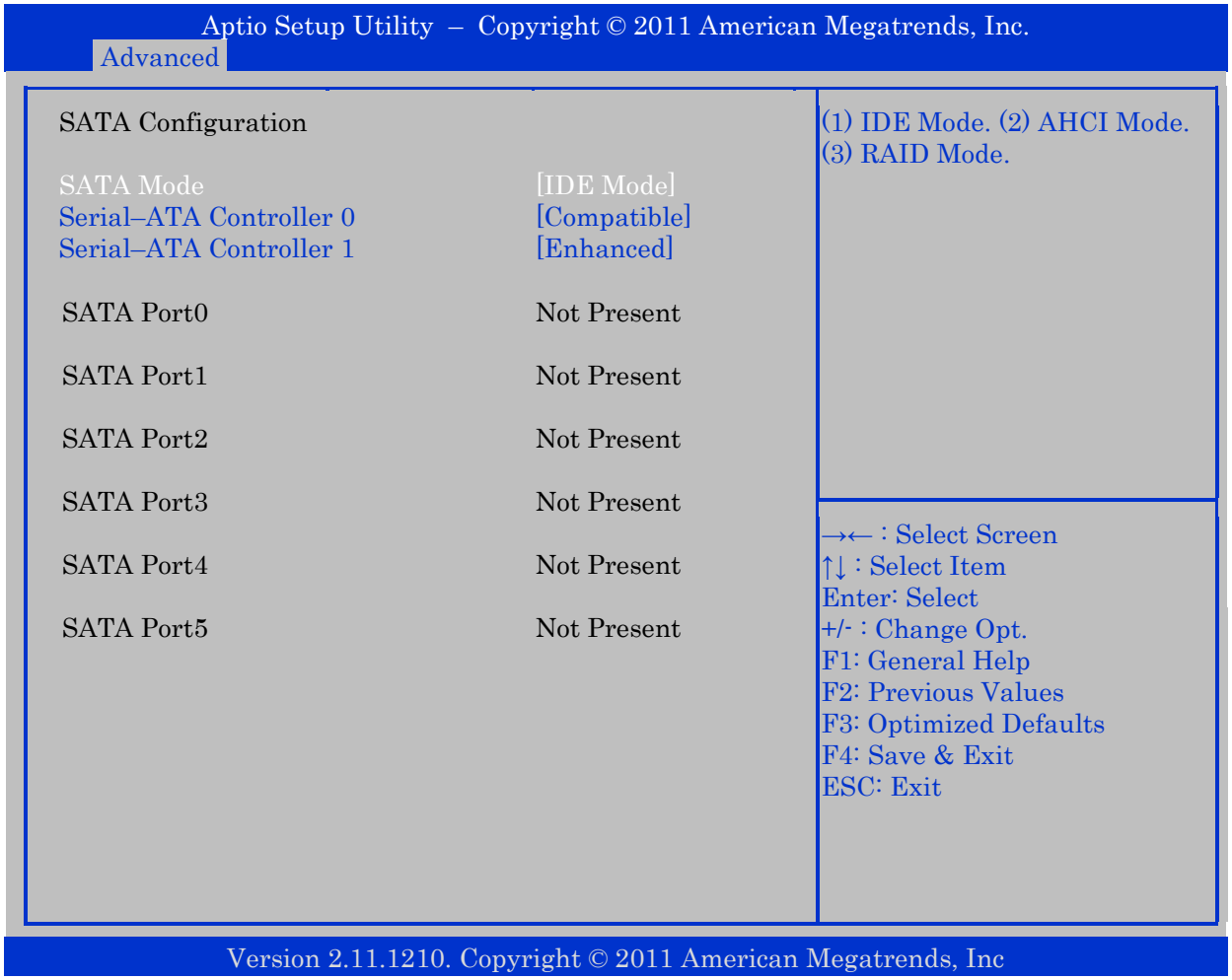
Function	Selection	Description
SATA Mode	IDE **ACHI** RAID	(1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.
Aggressive Link Power Management	Disabled **Enabled**	Aggressive Link Power Management Support. For Cougar Point B0 stepping onwards.
Staggered Spin–up	**Disabled** Enabled	AHCI Supports Staggered Spin-up
External SATA Port	**Disabled** Enabled	eSATA Ports Support
Hot Plug	**Disabled** Enabled	SATA Ports Hot Plug Support

The below description is only when SATA Mode = Disabled.



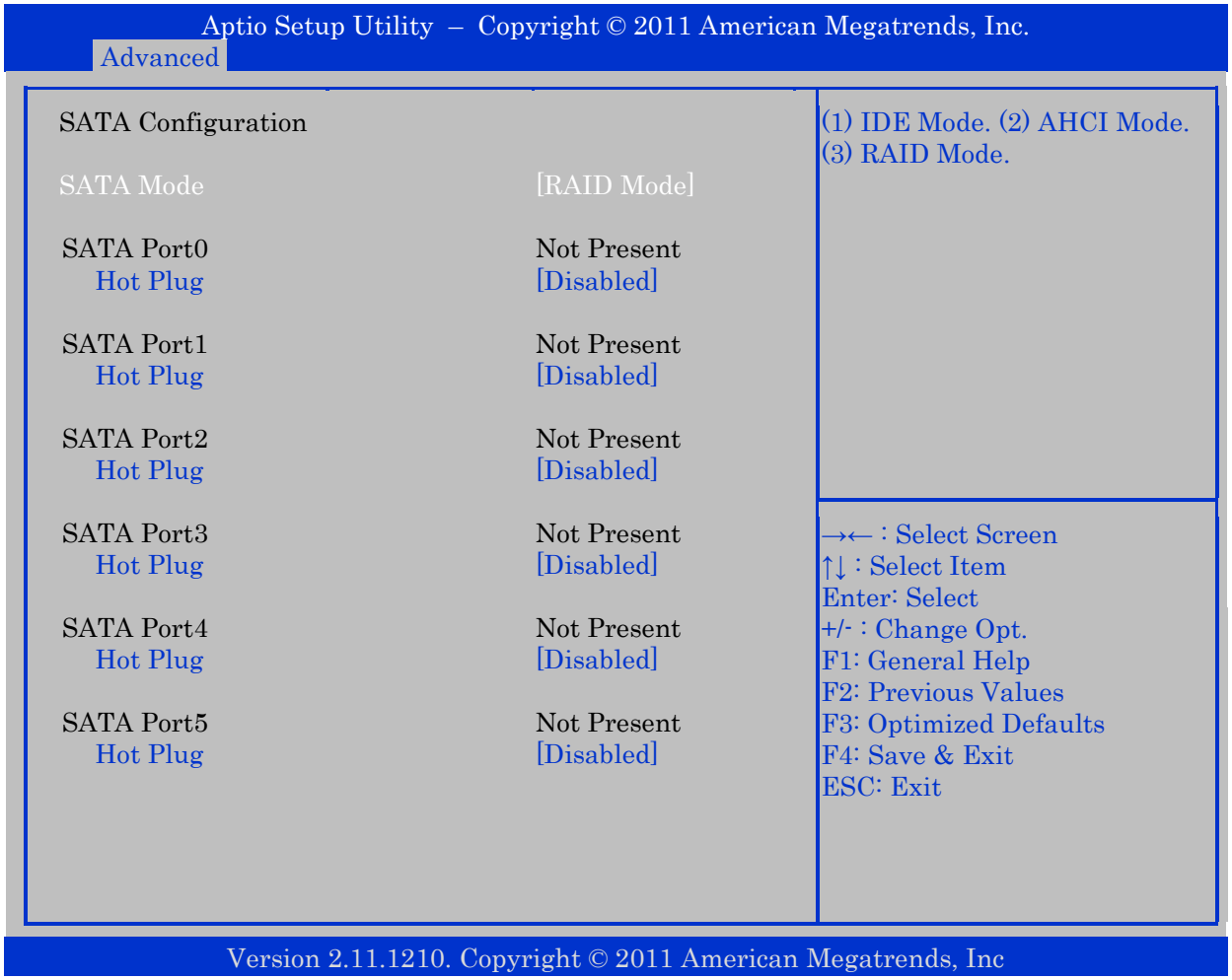
Function	Selection	Description
SATA Mode	IDE **ACHI** RAID	(1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.

The below description is only when SATA Mode = IDE Mode.



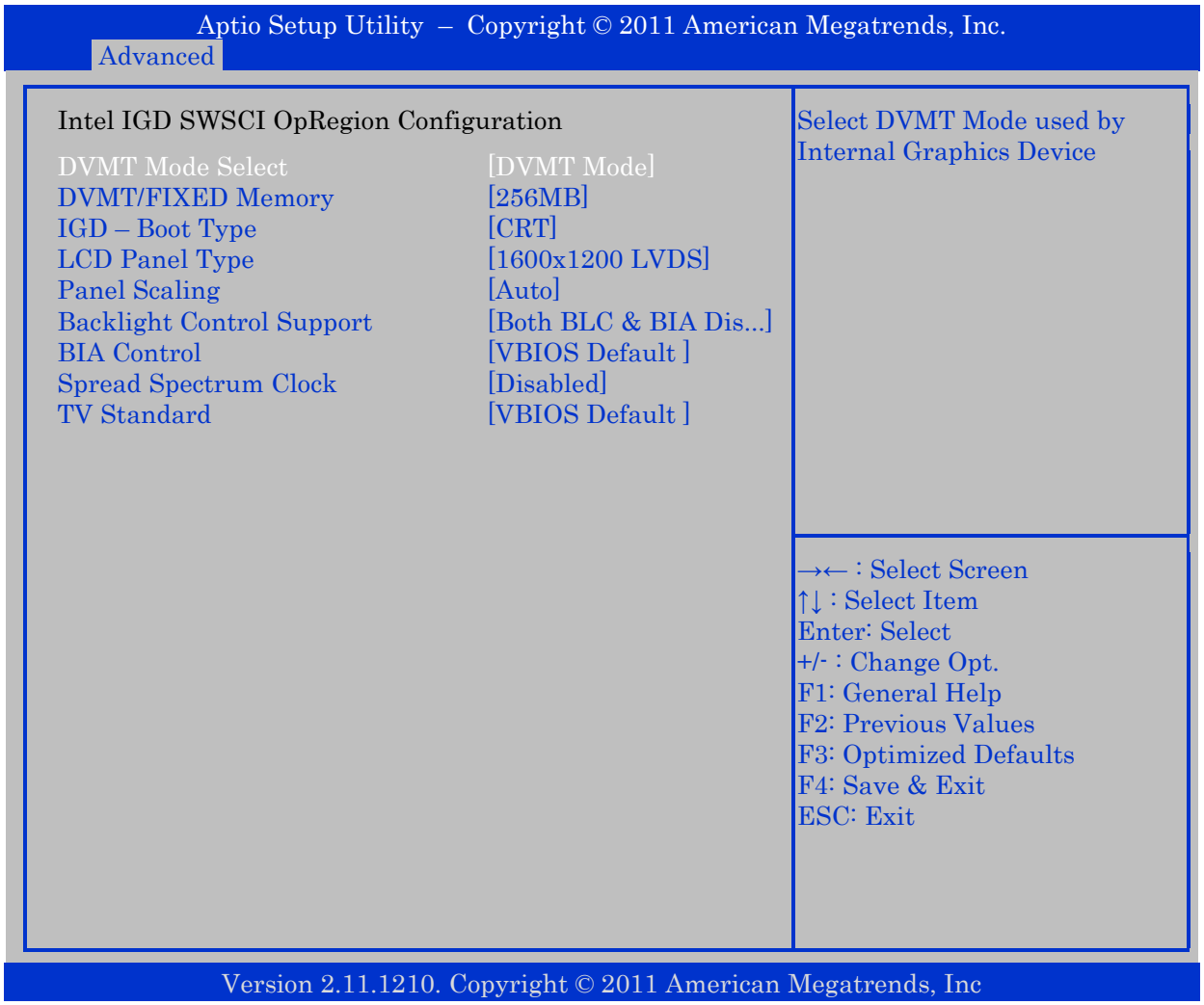
Function	Selection	Description
SATA Mode	IDE **ACHI** RAID	(1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.
Serial–ATA Controller 0	Disabled Enhanced **Compatible**	Enabled/Disabled Serial ATA Controller 0.
Serial–ATA Controller 1	Disabled **Enhanced**	Enabled/Disabled Serial ATA Controller 1.

The below description is only when SATA Mode = RAID Mode.



Function	Selection	Description
SATA Mode	IDE **ACHI** RAID	(1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.
Hot Plug	**Disabled** Enabled	SATA Ports Hot Plug Support

9.5.6 Advanced - Intel IGD SWSCI OpRegion



Function	Selection	Description
DVMT Mode Select	Fixed Mode **DVMT Mode**	Select DVMT Mode used by Internal Graphics Device
DVMT/FIXED Memory	128MB **256MB** Maximum	Select DVMT/FIXED Mode Memory size used by Internal Graphics Device
IGD – Boot Type	**VBIOS Default** CRT LFP CRT + LFP CRT + LFP-SDVO EFP EFP2 EFP3 CRT + LFP-SDVO CRT + EFP	Select the Video Device which will be activated during POST. This has no effect if external graphics present.

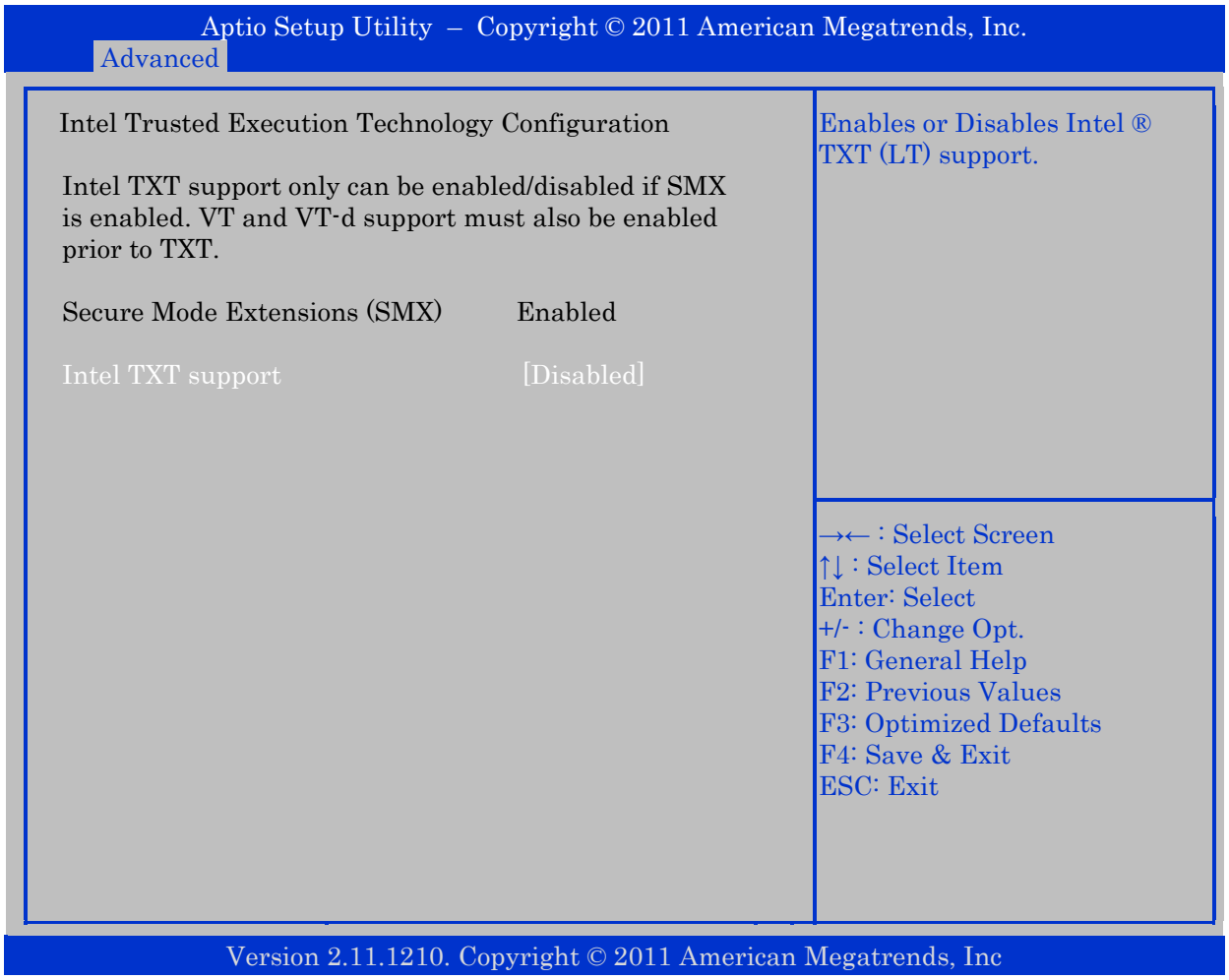
Continued

Function	Selection	Description
LCD Panel Type	800x600 LVDS 1024x768 LVDS 1280x1024 LVDS 1400x1050 LVDS1 1400x1050 LVDS2 1600x1200 LVDS 1280x768 LVDS 1680x1050 LVDS 1920x1200 LVDS 1280x800 LVDS 1280x600 LVDS 2048x1536 LVDS	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item
Panel Scaling	**Auto** Force Scaling Off	Select the LCD panel scaling option used by the Internal Graphics Device
Backlight Control Support	**Both BLC & BIA Dis...]** BLC Enabled	
BIA Control	**VBIOS Default** Disabled Level 1 Level 2 Level 3 Level 4 Level 5	Auto: GMCH use VBT defaults. Level n: Enabled with selected Aggressiveness Level.
Spread Spectrum Clock	**Disabled** Enabled	

Continued

Function	Selection	Description
TV Standard	**VBIOS Default** NTSC_M NTSC_J NTSC_433 PAL_B PAL_G PAL_D PAL_H PAL_I PAL_K PAL_M PAL_N PAL_Nc SECAM_L SECAM_B SECAM_D SECAM_G SECAM_H SECAM_K 1080i59 1080i60 720p59 720p60 1080i50 1080p50 720p59 720p60 720p50 480p60 480p59 480i60 480i59 720p60 720p59 1080p60 1080p59 1080i60 1080i59	Select the ability to configure a TV Format.

9.5.7 Advanced - Intel TXT (LT) Configuration



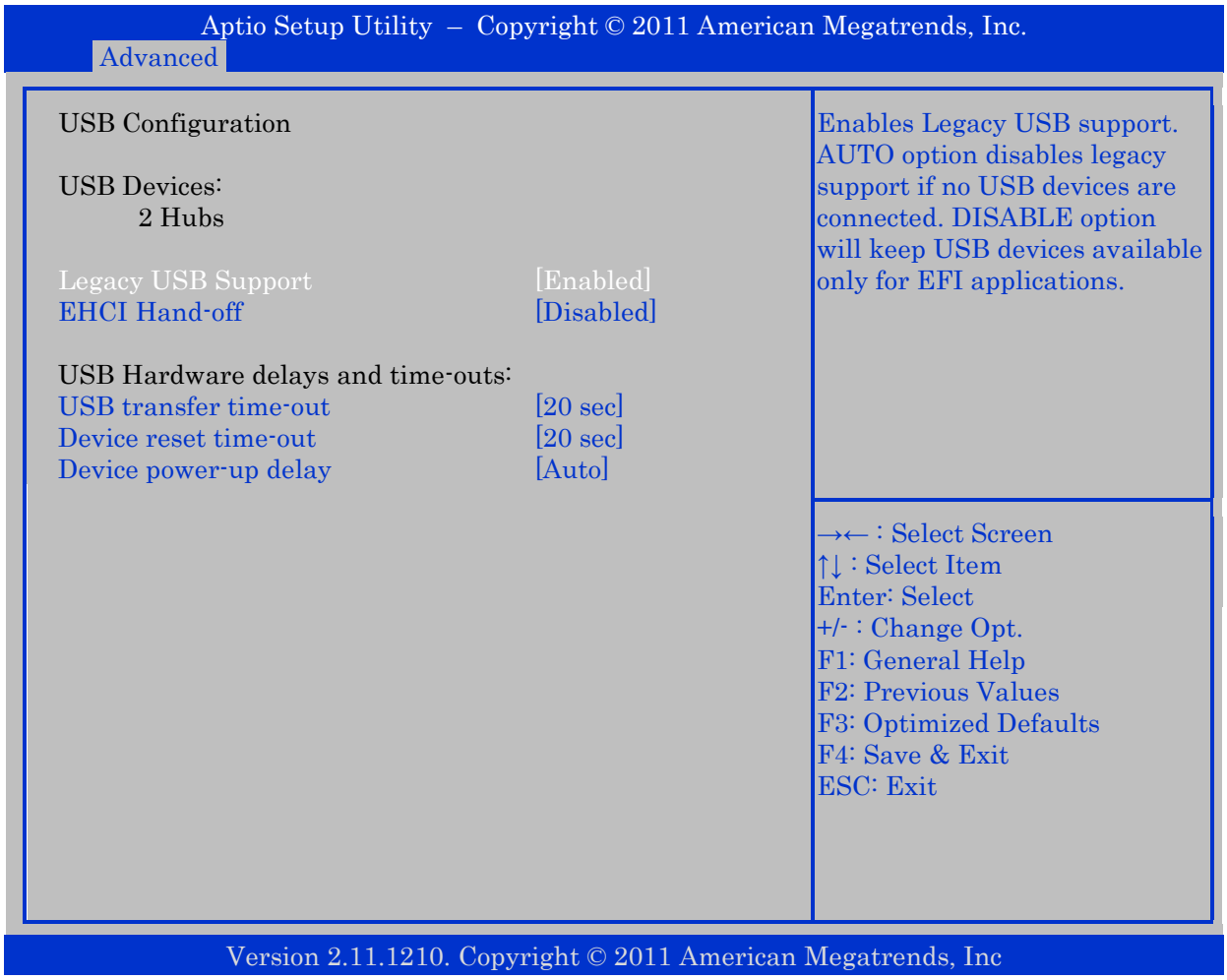
SMX (Intel Secure Mode Extension) instructions are enabled if supported by the CPU, so no BIOS settings are present.

VT (Intel Virtualization Technology) is enabled/disabled in the menu: *Advanced* > *CPU Configuration*.

VT-d can be enabled/disabled in the menu: *Chipset* > *System Agent (SA) Configuration.*

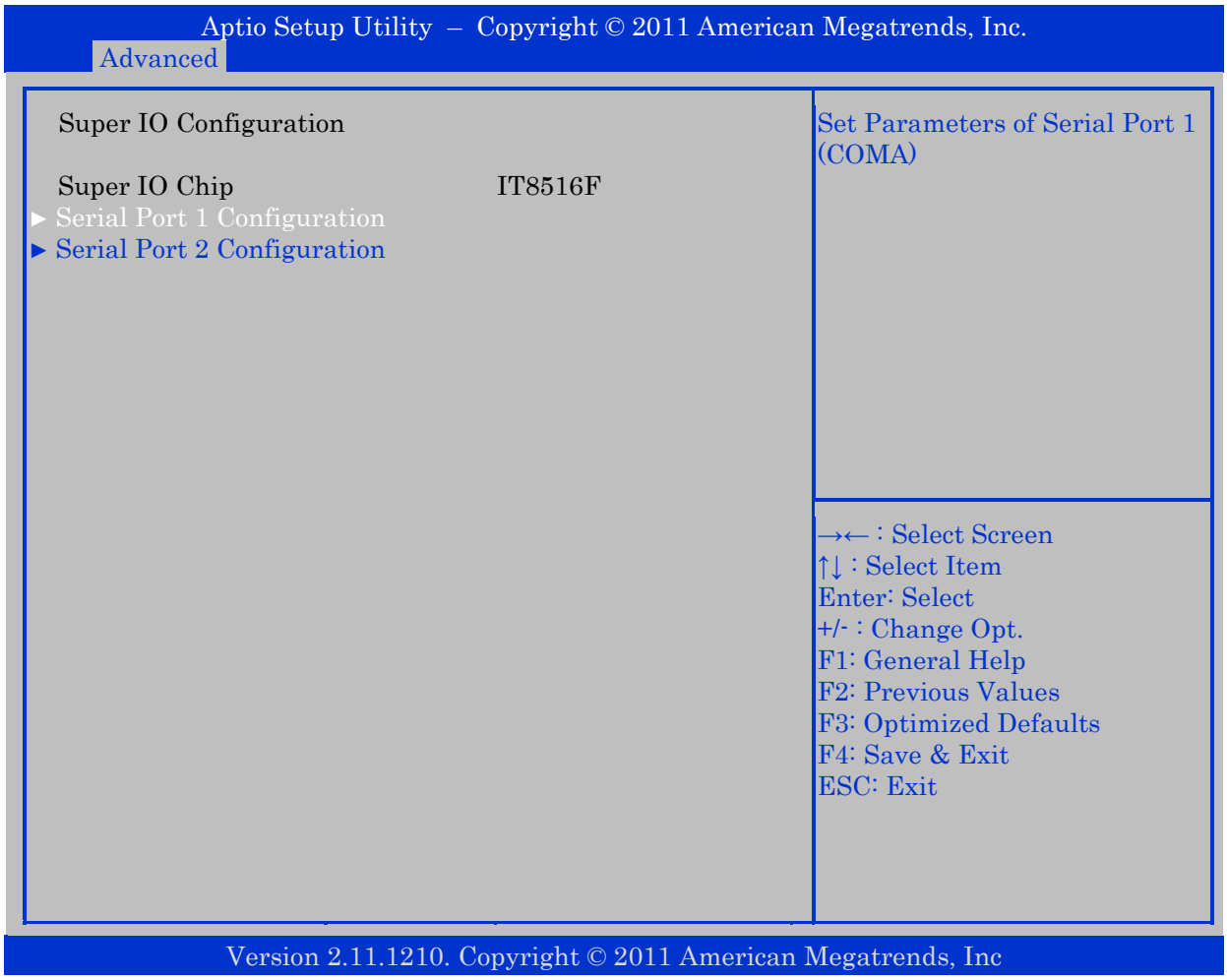
Function	Selection	Description
Intel TXT support	**Disabled** Enabled	Enables or Disables Intel ® TXT (LT) support.

9.5.8 Advanced - USB Configuration



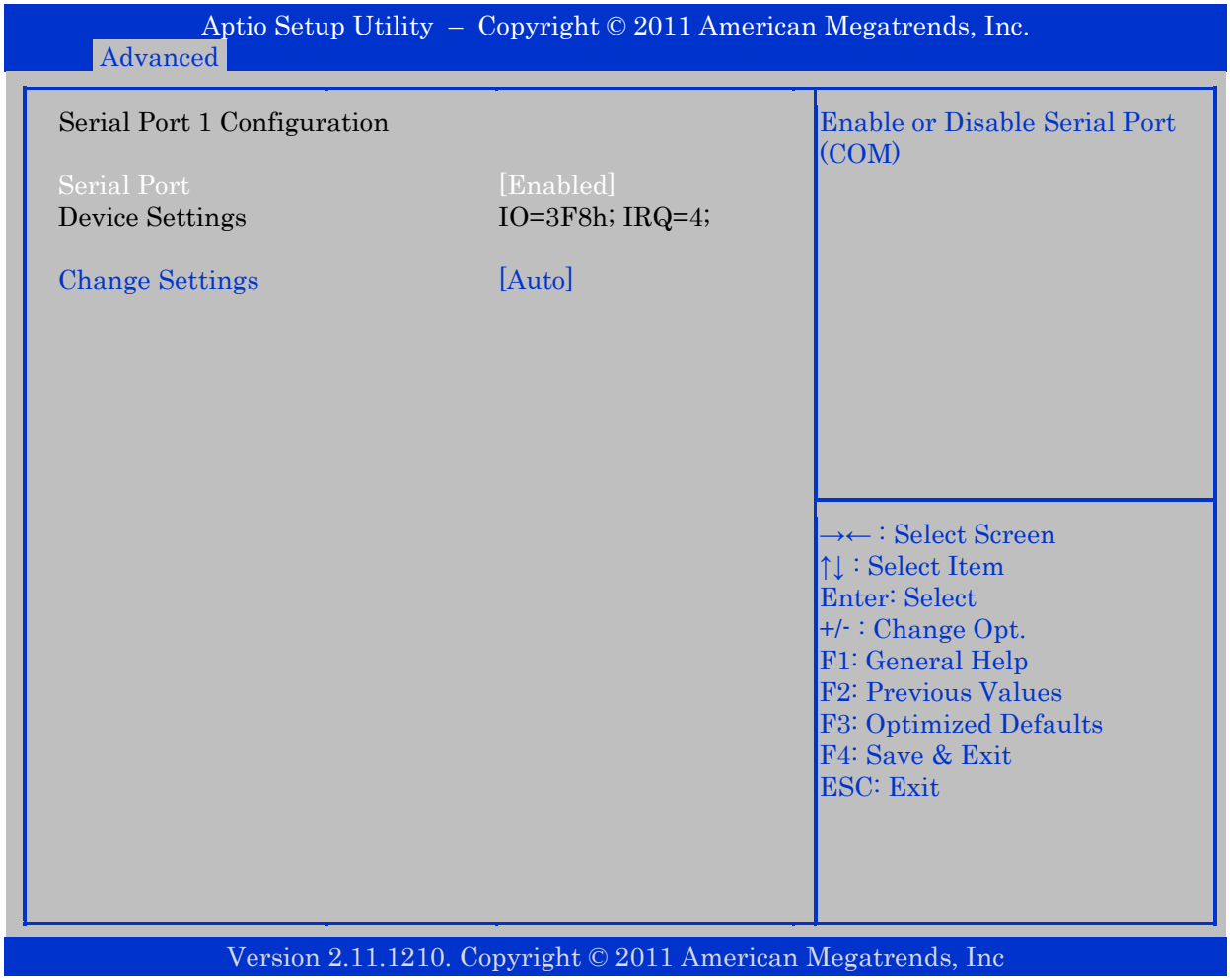
Function	Selection	Description
Legacy USB Support	**Enabled** Disabled Auto	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
EHCI Hand-off	**Disabled** Enabled	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	**Auto** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

9.5.9 Advanced - Super IO Configuration (IT8516F)



The 2 submenus are shown and described on the following pages.

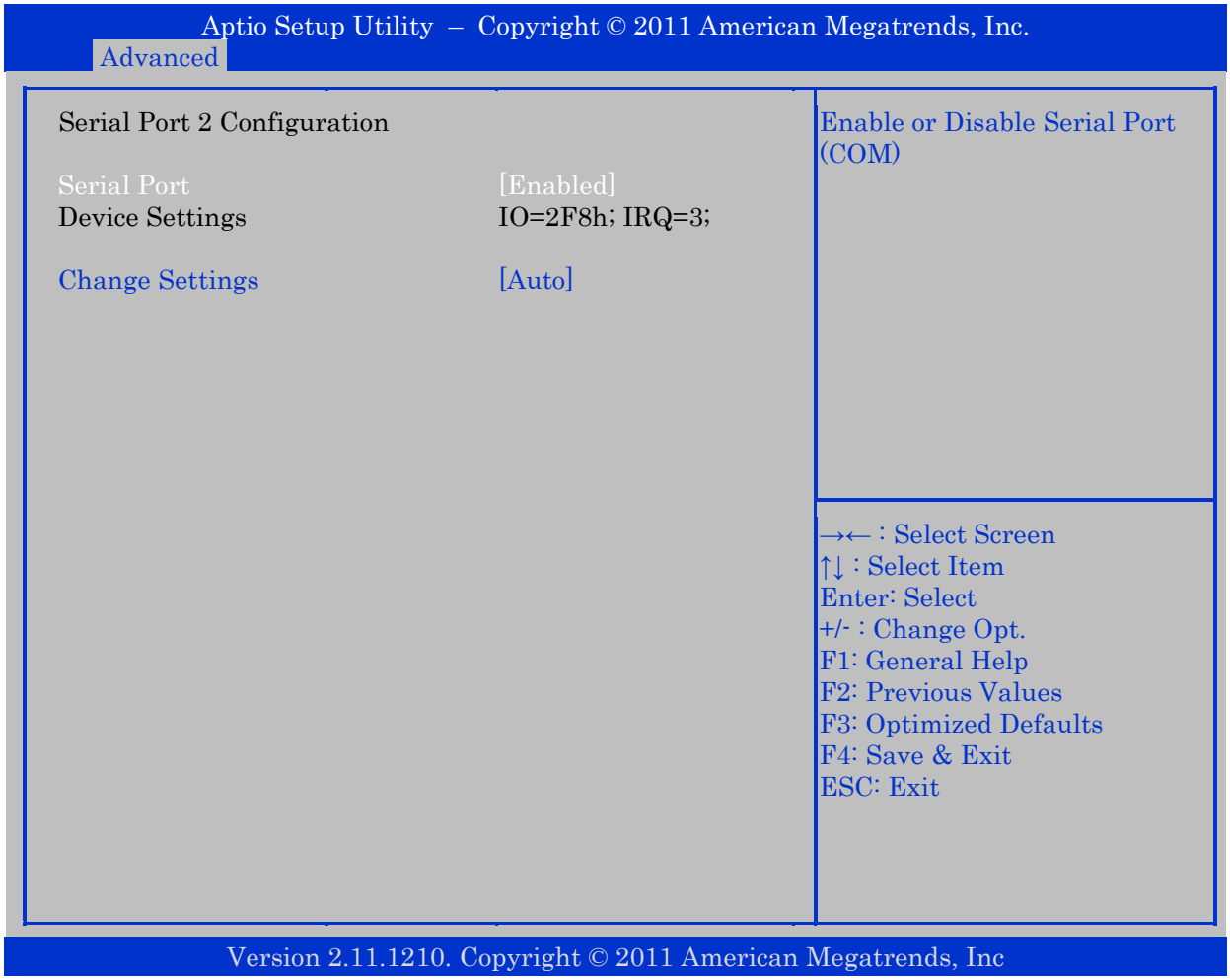
9.5.9.1 Serial Port 1 Configuration



Function	Selection	Description
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Change Settings Note1	**Auto** IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.

Note1: only if Serial Port = Enabled

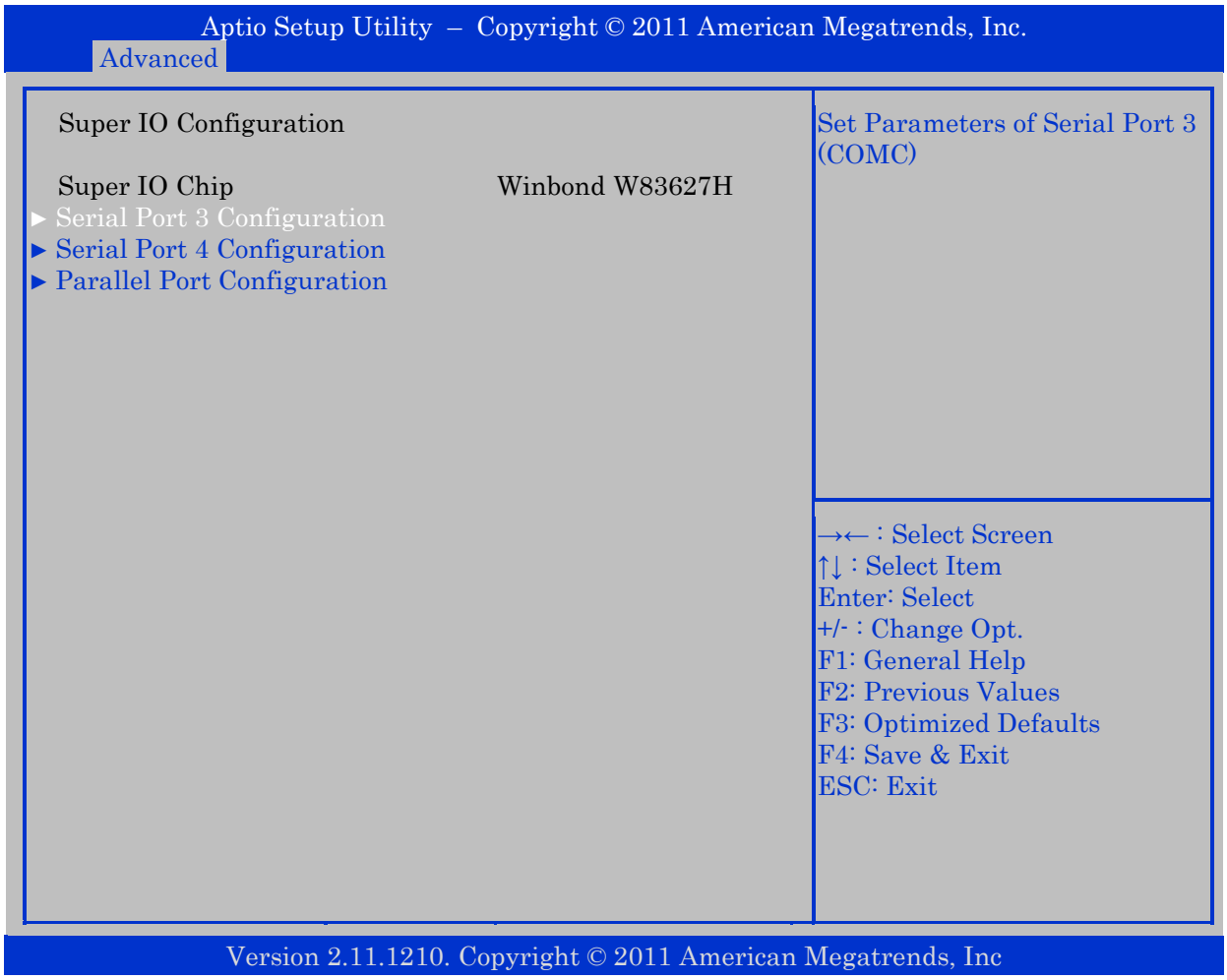
9.5.9.2 Serial Port 2 Configuration



Function	Selection	Description
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Change Settings Note1	**Auto** IO=2F8h; IRQ=3; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.

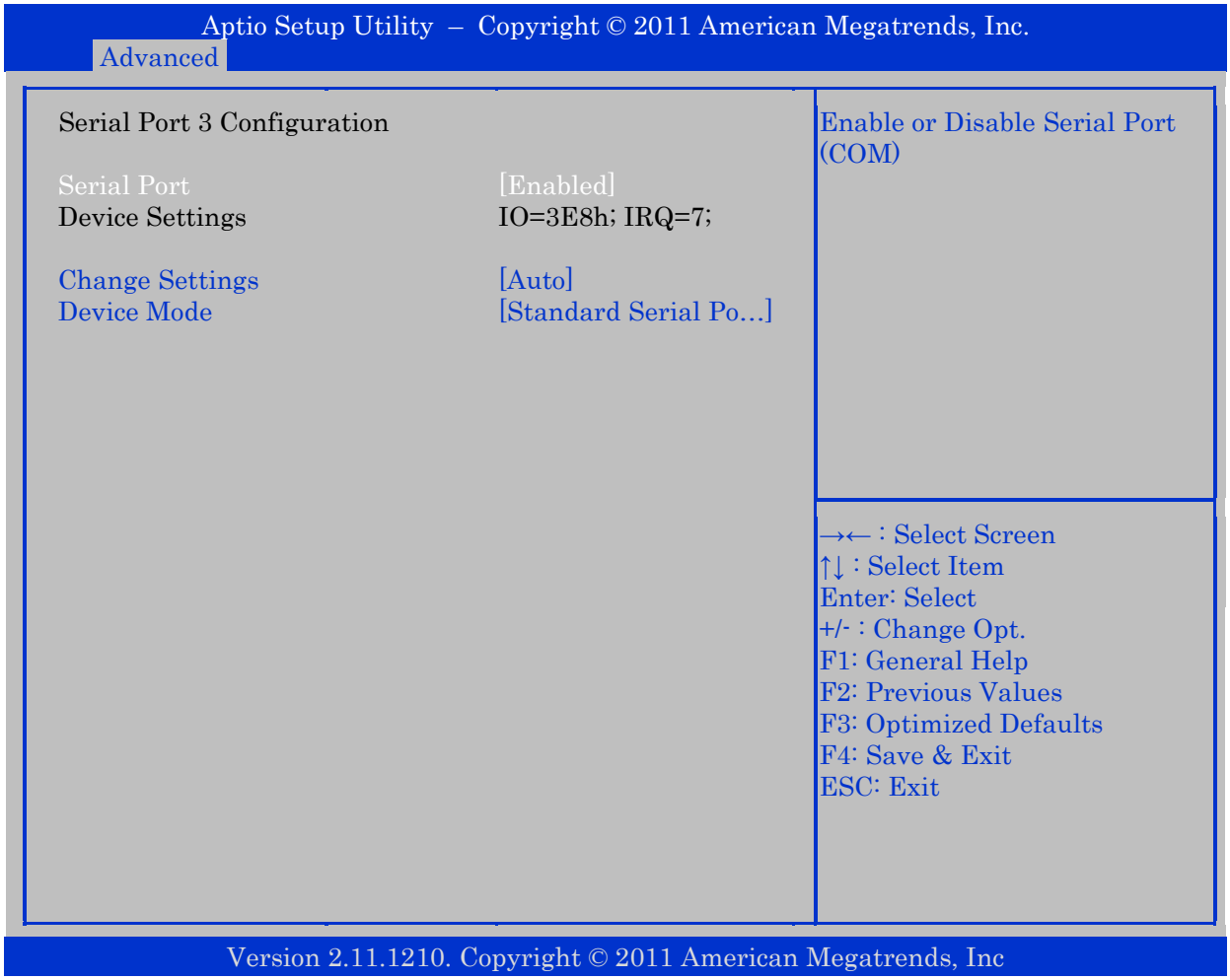
Note1: only if Serial Port = Enabled

9.5.10 Advanced - Super IO Configuration (W83627H)



The 3 submenus are shown and described on the following pages.

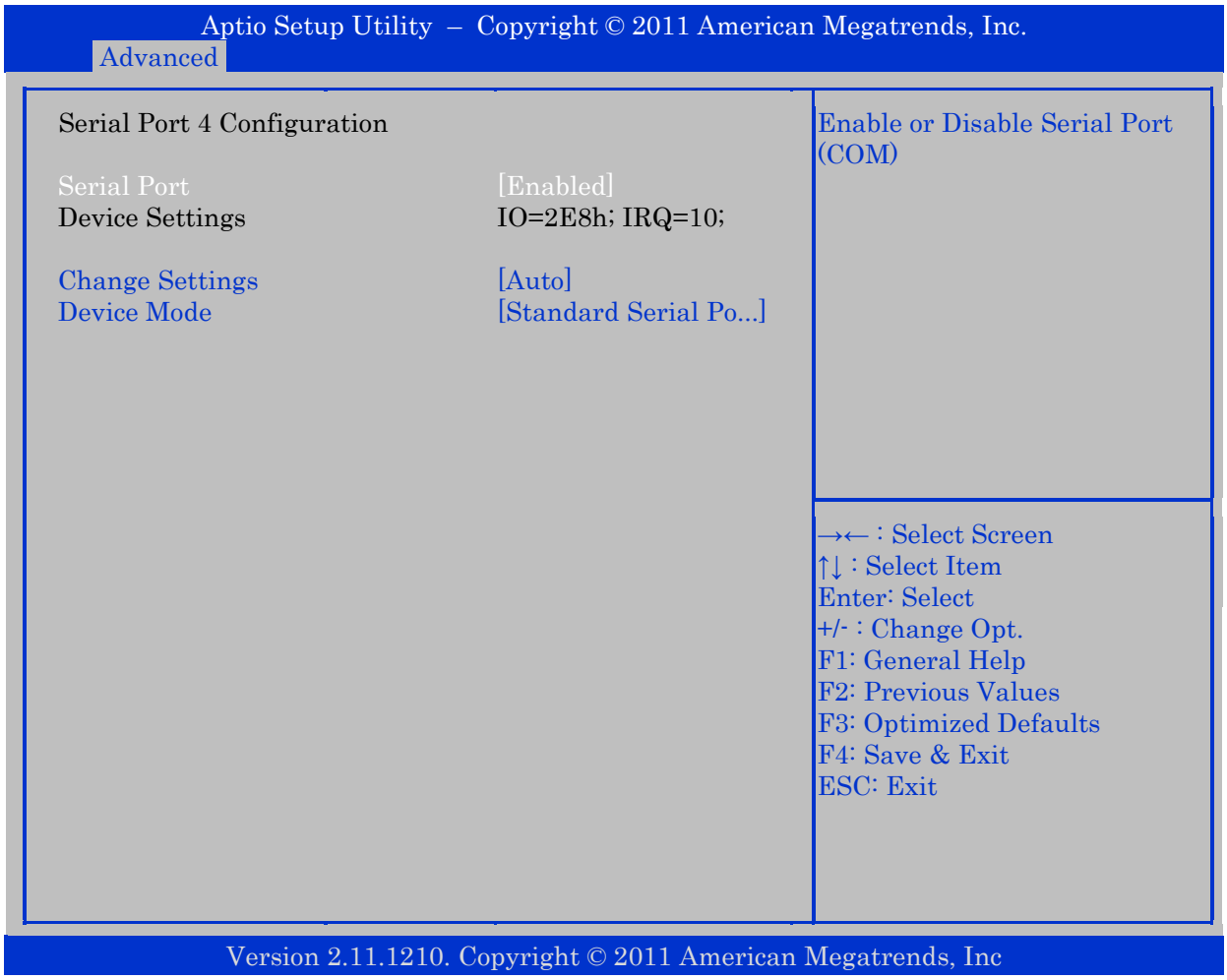
9.5.10.1 Serial Port 3 Configuration



Function	Selection	Description
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Change Settings Note1	**Auto** IO=3E8h; IRQ=7; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.
Device Mode Note1	**Standard Serial Port Mode** IrDA 1.0 (HP SIR) Mode ASKIR Mode	Change the Serial Port mode. Select <High Speed> or <Normal mode> mode.

Note1: only if Serial Port = Enabled

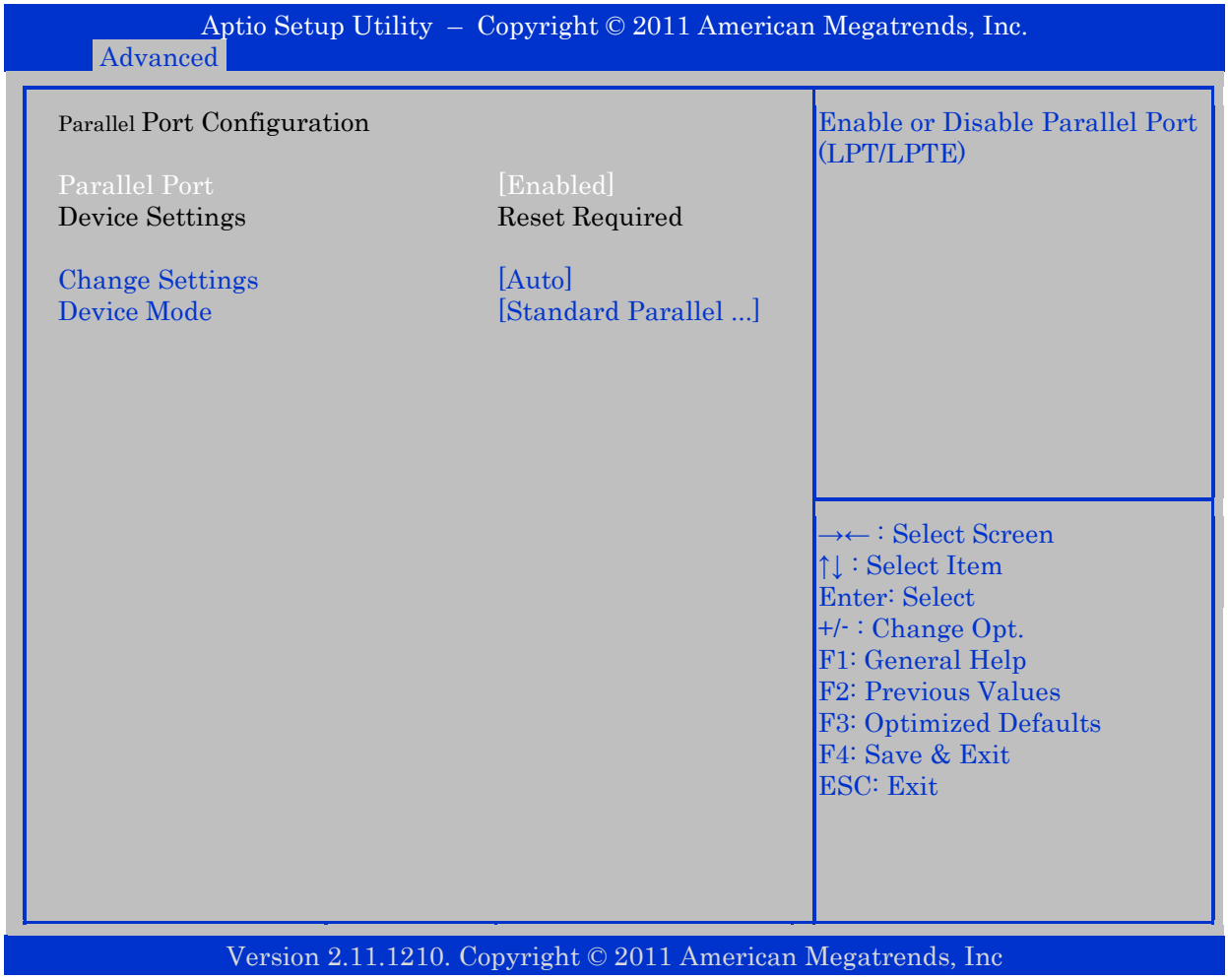
9.5.10.2 Serial Port 4 Configuration



Function	Selection	Description
Serial Port	Disabled **Enabled**	Enable or Disable Serial Port (COM)
Change Settings Note1	**Auto** IO=2E8h; IRQ=10; IO=3F8h; IRQ=3,4,5,6,7,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for Super IO device.
Device Mode Note1	**Standard Serial Port Mode** IrDA 1.0 (HP SIR) Mode ASKIR Mode	Change the Serial Port mode. Select <High Speed> or <Normal mode> mode.

Note1: only if Serial Port = Enabled

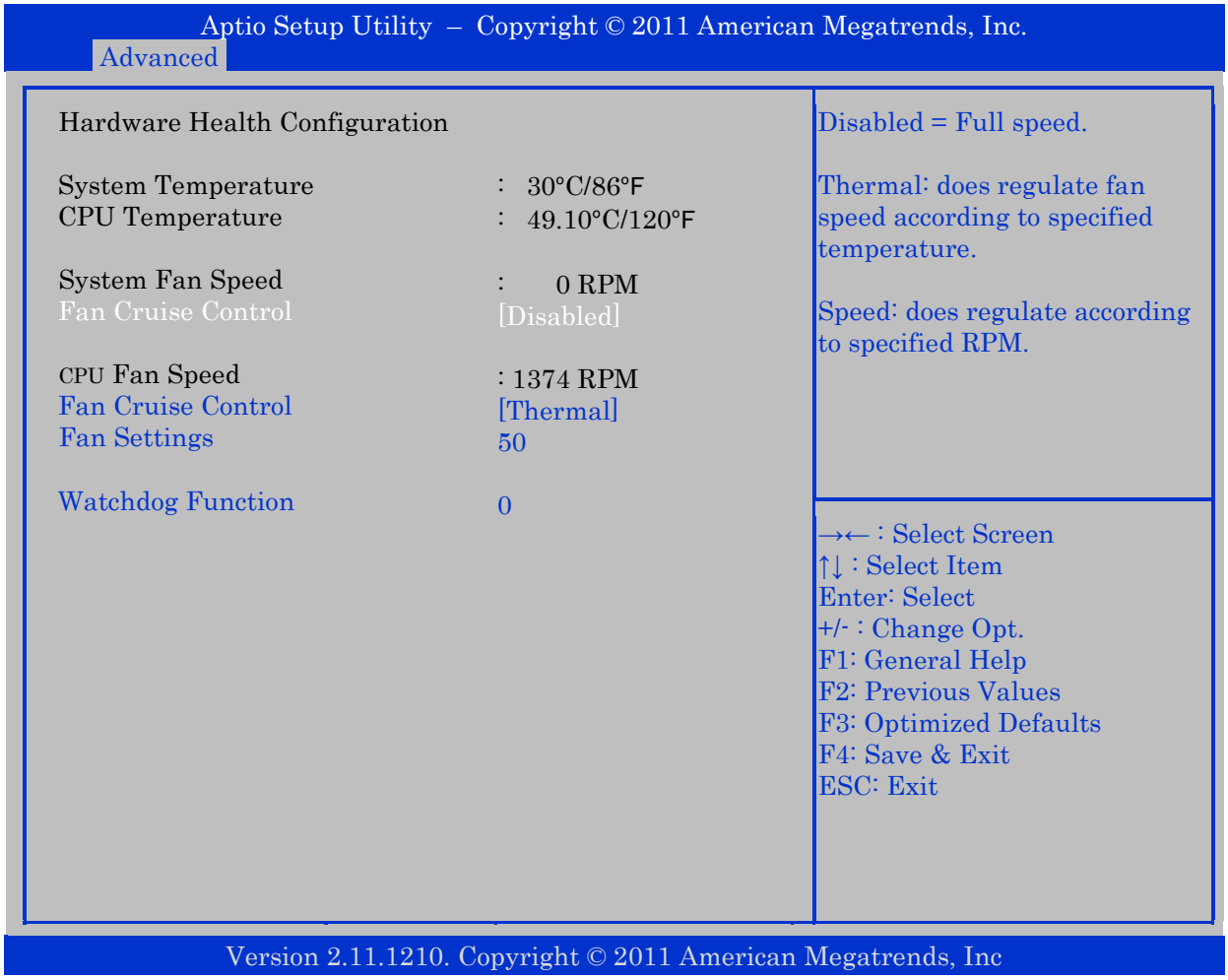
9.5.10.3 Parallel Port Configuration



Function	Selection	Description
Parallel Port	Disabled **Enabled**	Enable or Disable Parallel Port (LPT/LPTE)
Change Settings Note1	**Auto** IO=378h; IRQ=5; IO=378h; IRQ=7,10,11,12; IO=278h; IRQ=5,6,7,10,11,12; IO=3BCh; IRQ=5,6,7,10,11,12; IO=378h; IO=278h; IO=3BCh;	Select an optimal setting for Super IO device.
Device Mode Note1	**Standard Parsllel Port Mode** EPP Mode ECP Mode EPP Mode & ECP Mode	Change the Printer Port mode.

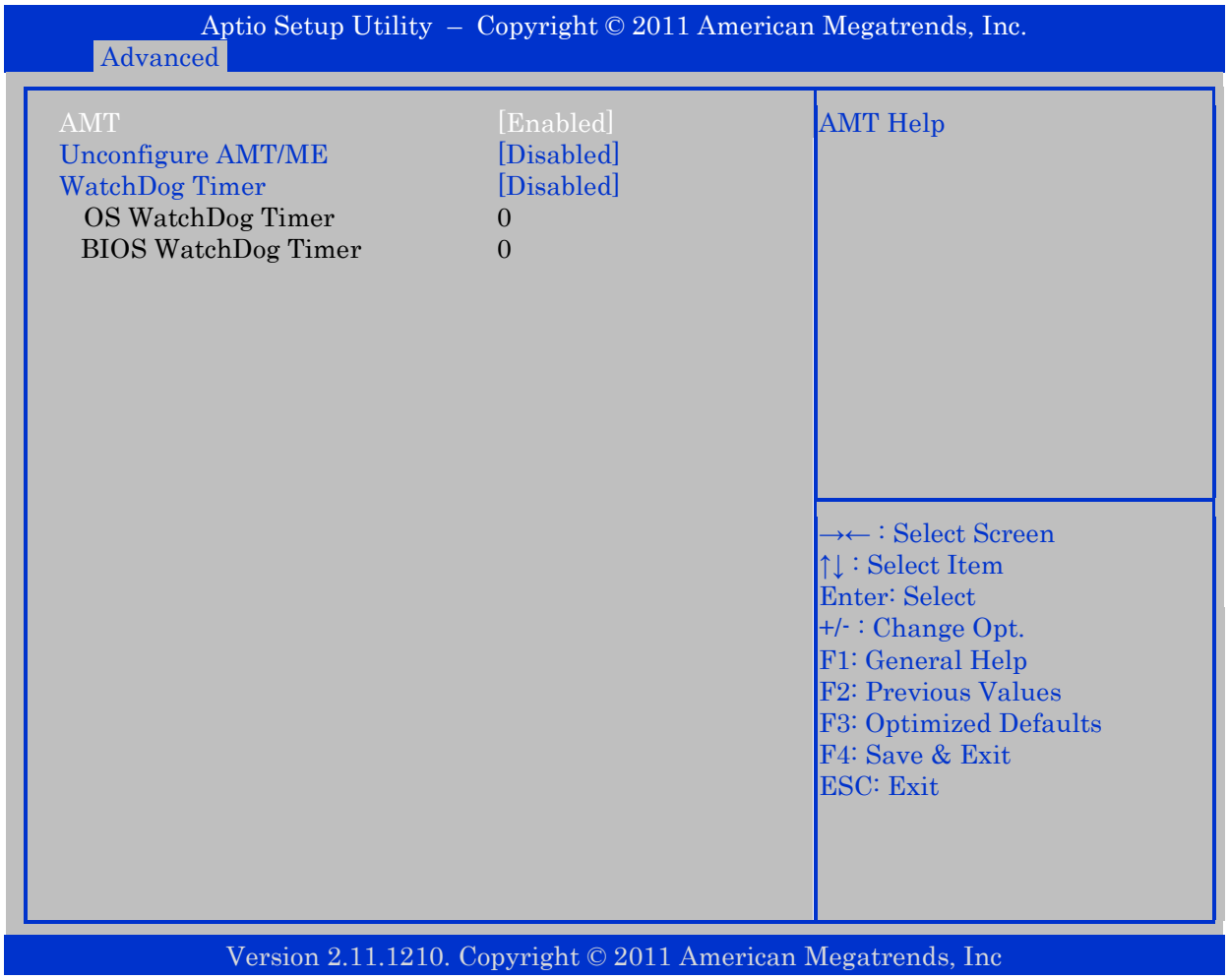
Note1: only if Parallel Port = Enabled

9.5.11 Advanced - Hardware Health Configuration



Function	Selection	Description
Fan Cruise Control	**Disabled** Speed	Disabled = Full speed. Speed: does regulate according to specified RPM.
Fan Cruise Control	**Disabled** Thermal Speed	Disabled = Full speed. Thermal: does regulate fan speed according to specified temperature. Speed: does regulate according to specified RPM.
Fan Settings	30 – 90 (note1) 1000 – 9999 (note2)	
Watchdog Function	0 - 255 (note3)	0 = Disabled. Enter the service interval in seconds before system will reset. Refer to manual how to reload the timer.

9.5.12 Advanced - AMT Configuration

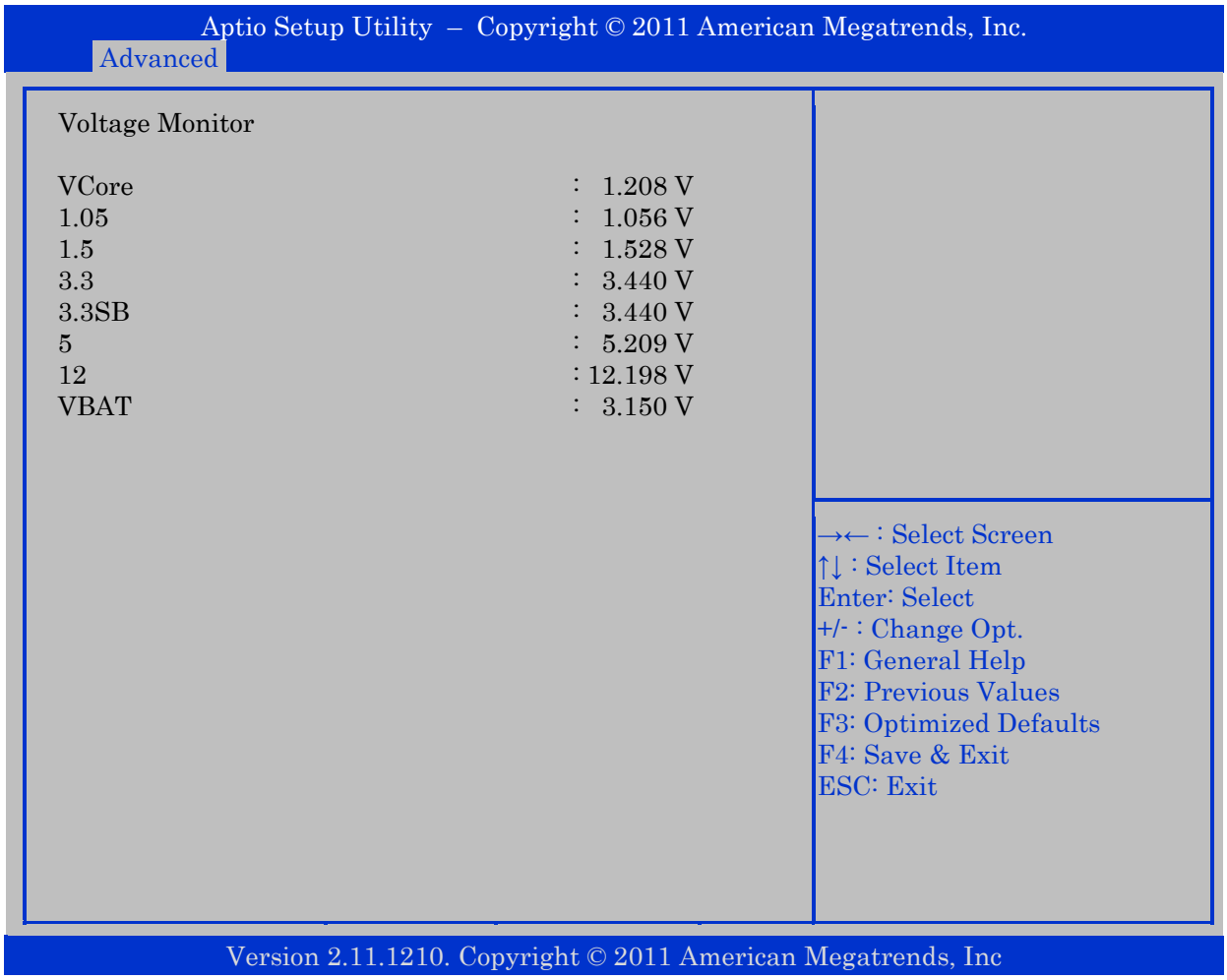


Function	Selection	Description
AMT	Disabled **Enabled**	AMT Help
Unconfigure AMT/ME (Note1)	**Disabled** Enabled	Perform AMT/ME unconfigure without password operation.
WatchDog Timer	**Disabled** Enabled	Enable/Disable WatchDog Timer.
OS WatchDog Timer	0 - 65535 (Note2)	Set OS watchdog timer.
BIOS WatchDog Timer	0 - 65535 (Note2)	Set BIOS watchdog Timer.

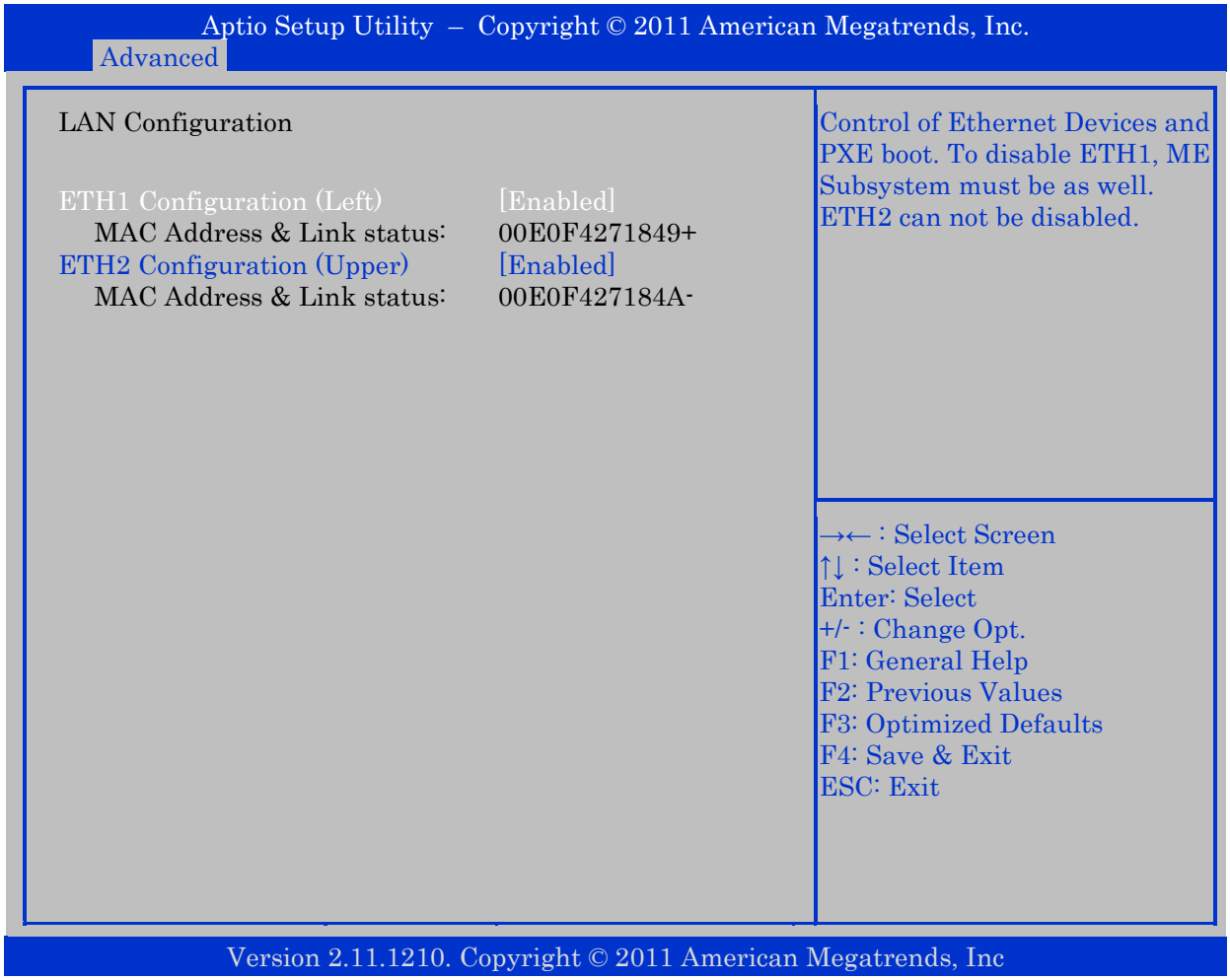
Note1: Only if AMT = Enabled.

Note2: To enter number use digit keys and/or +/- keys.

9.5.13 Advanced - Voltage Monitor

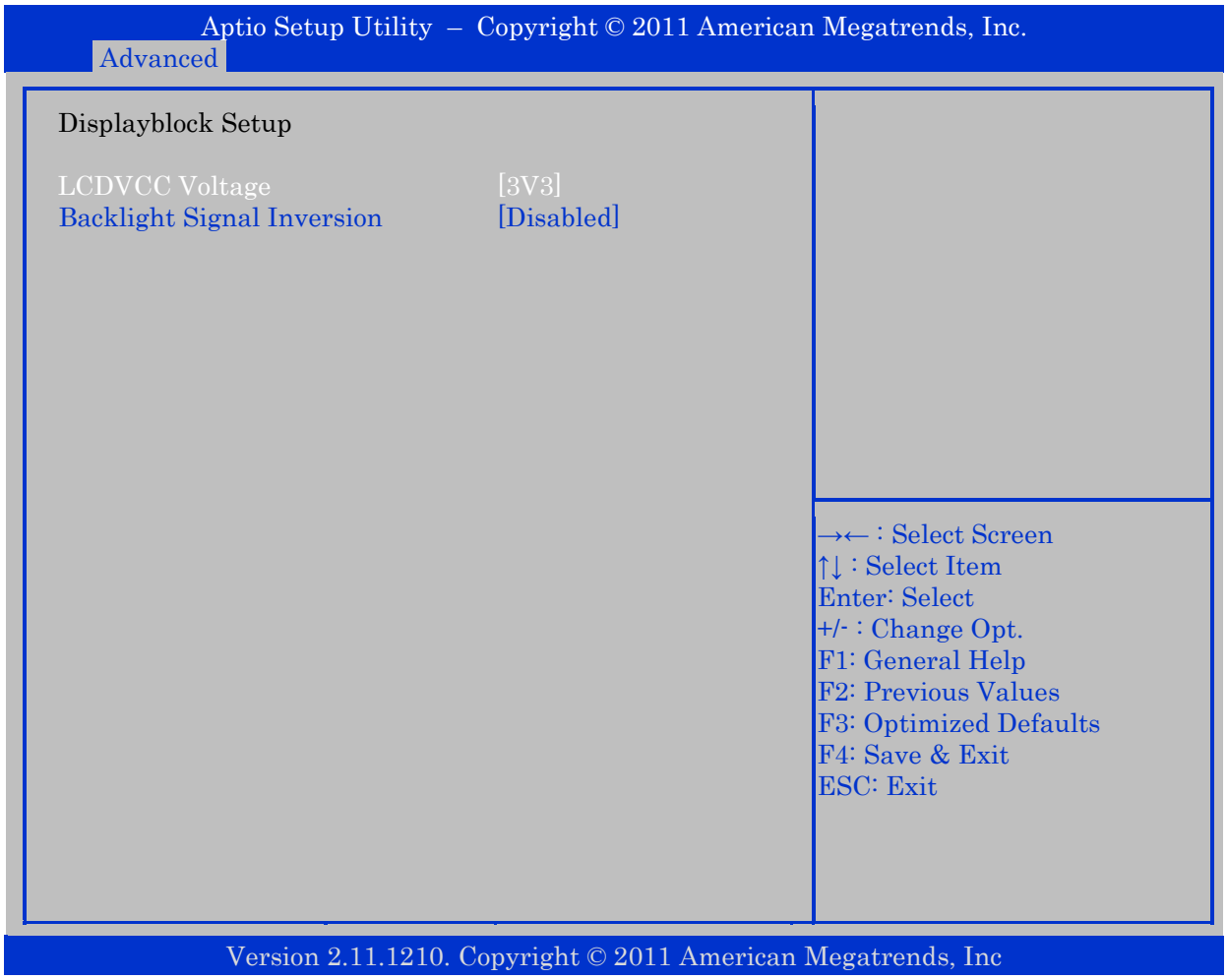


9.5.14 Advanced - LAN Configuration



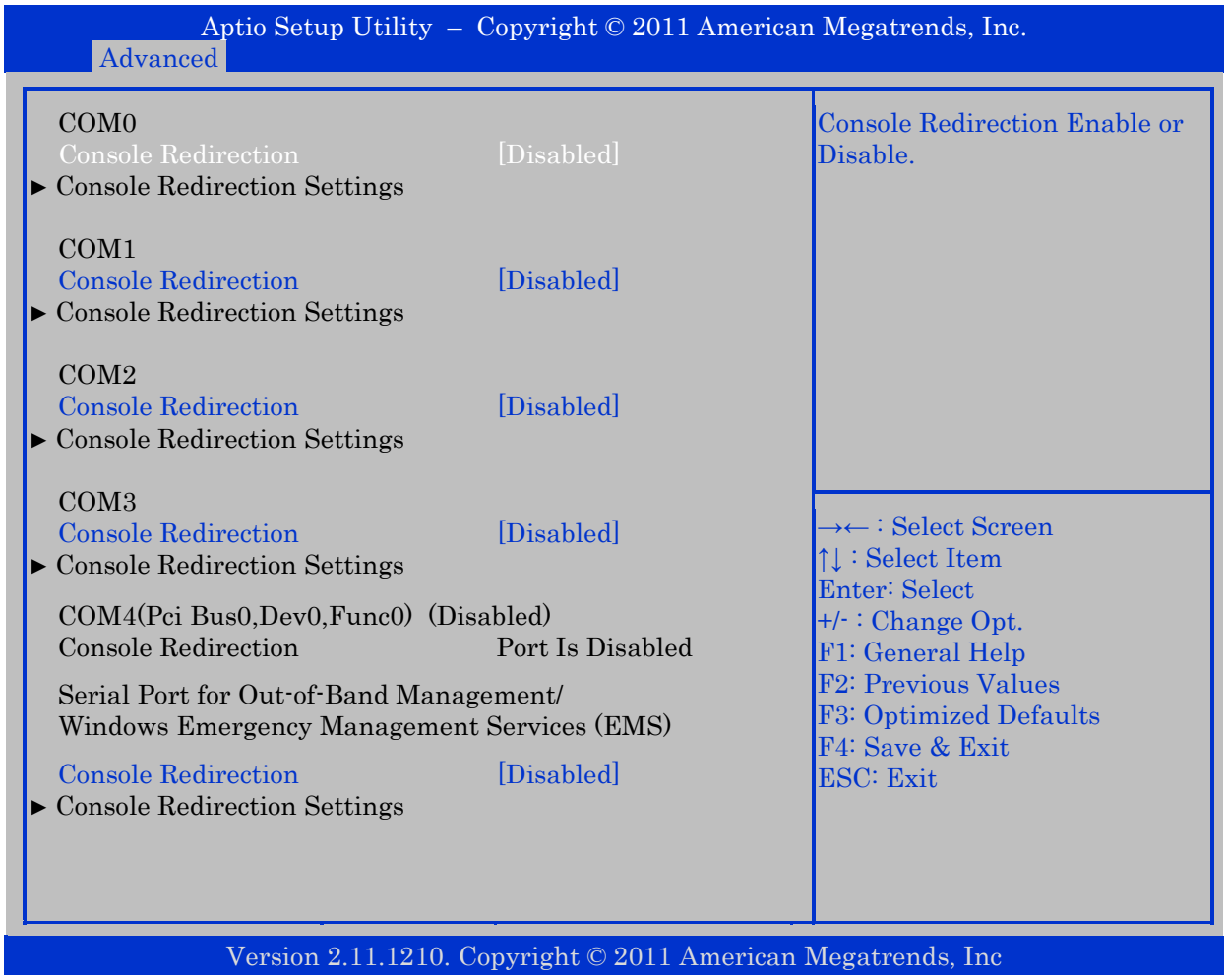
Function	Selection	Description
ETH1 Configuration (Left)	Disabled **Enabled** With PXE boot	Control of Ethernet Devices and PXE boot. To disable ETH1, ME Subsystem must be as well. ETH2 can not be disabled.
ETH2 Configuration (Upper)	**Enabled** With PXE boot	Control of Ethernet Devices and PXE boot. To disable ETH2, ME Subsystem must be as well. ETH2 can not be disabled.

9.5.15 Advanced - Displayblock Setup



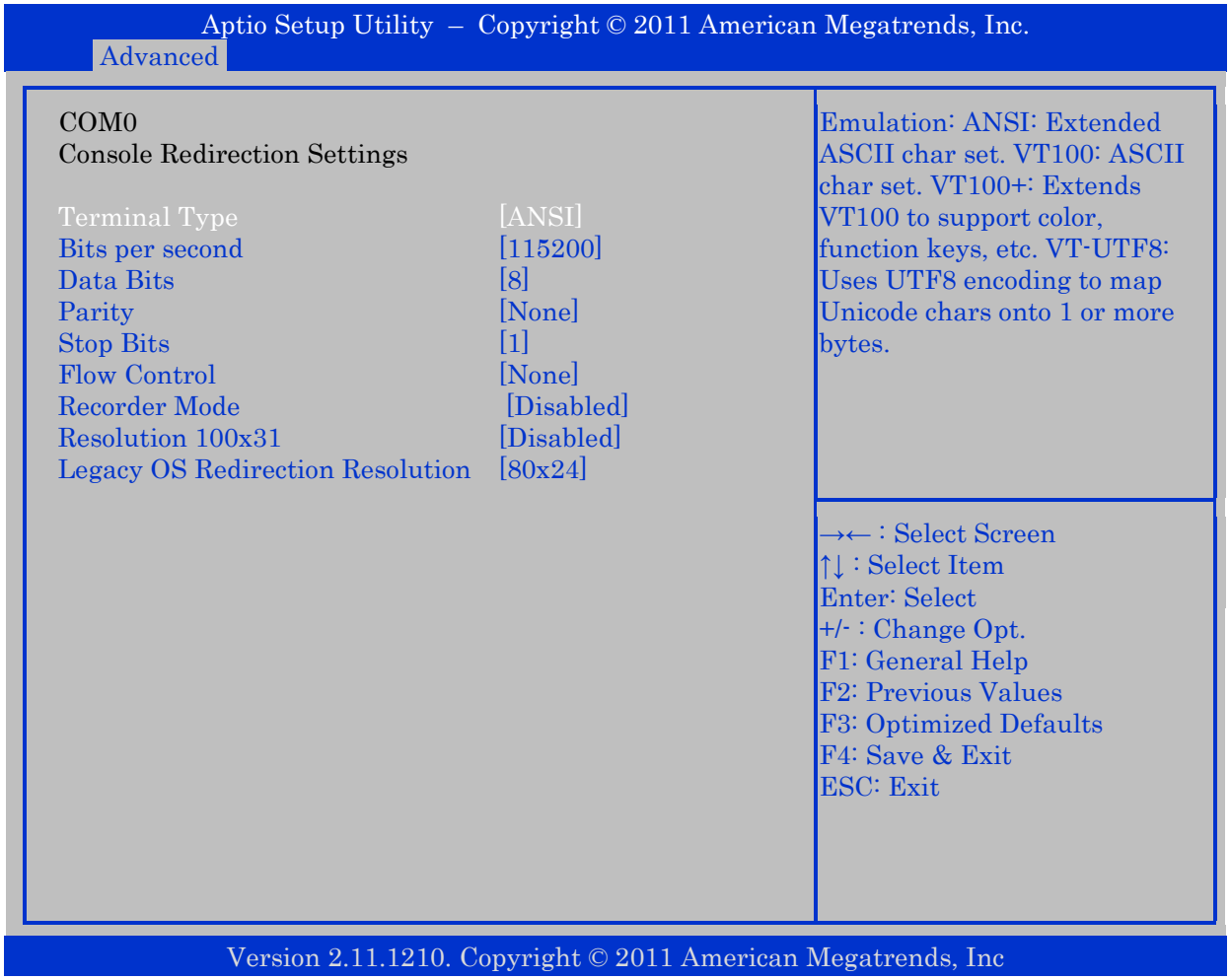
Function	Selection	Description
LCDVCC Voltage	**3V3** 5V	Set the LVDS Display Panel voltage to either 3.3V or 5V.
Backlight Signal Inversion	**Disabled** Enabled	Select Disabled if BKLTEN# signal (available in the LVDS connector), shall behave normally: active low to enable backlight. Select Enabled if BKLTEN# signal shall behave inversed: active high to enable backlight.

9.5.16 Advanced - Serial Port Console Redirection



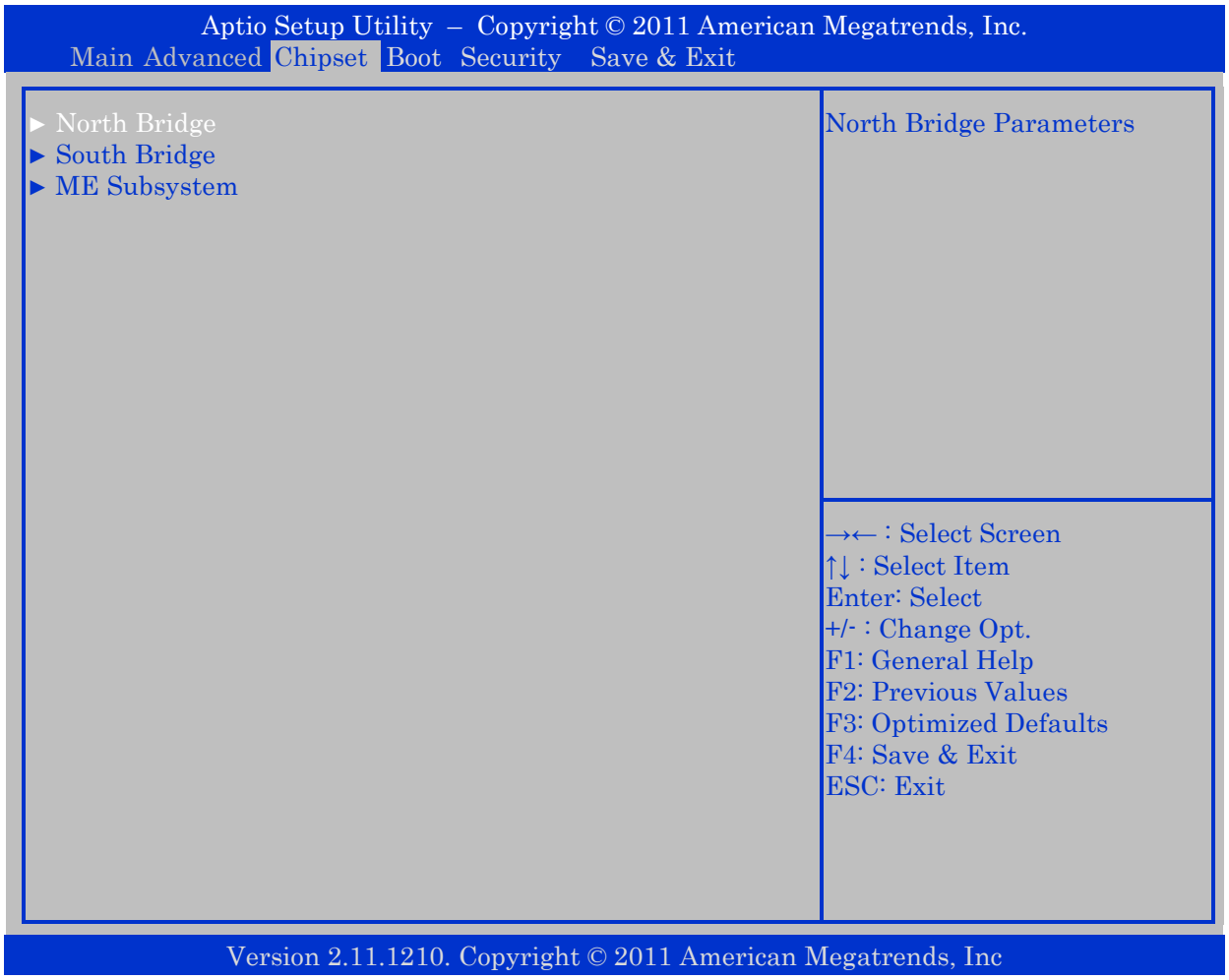
9.5.16.1 Console Redirection Settings

The “Console Redirection Settings” Menus are only available if related “Console Redirection” is Enabled. A different menu is available for Serial Port for Out-of-Band Management, se next page.

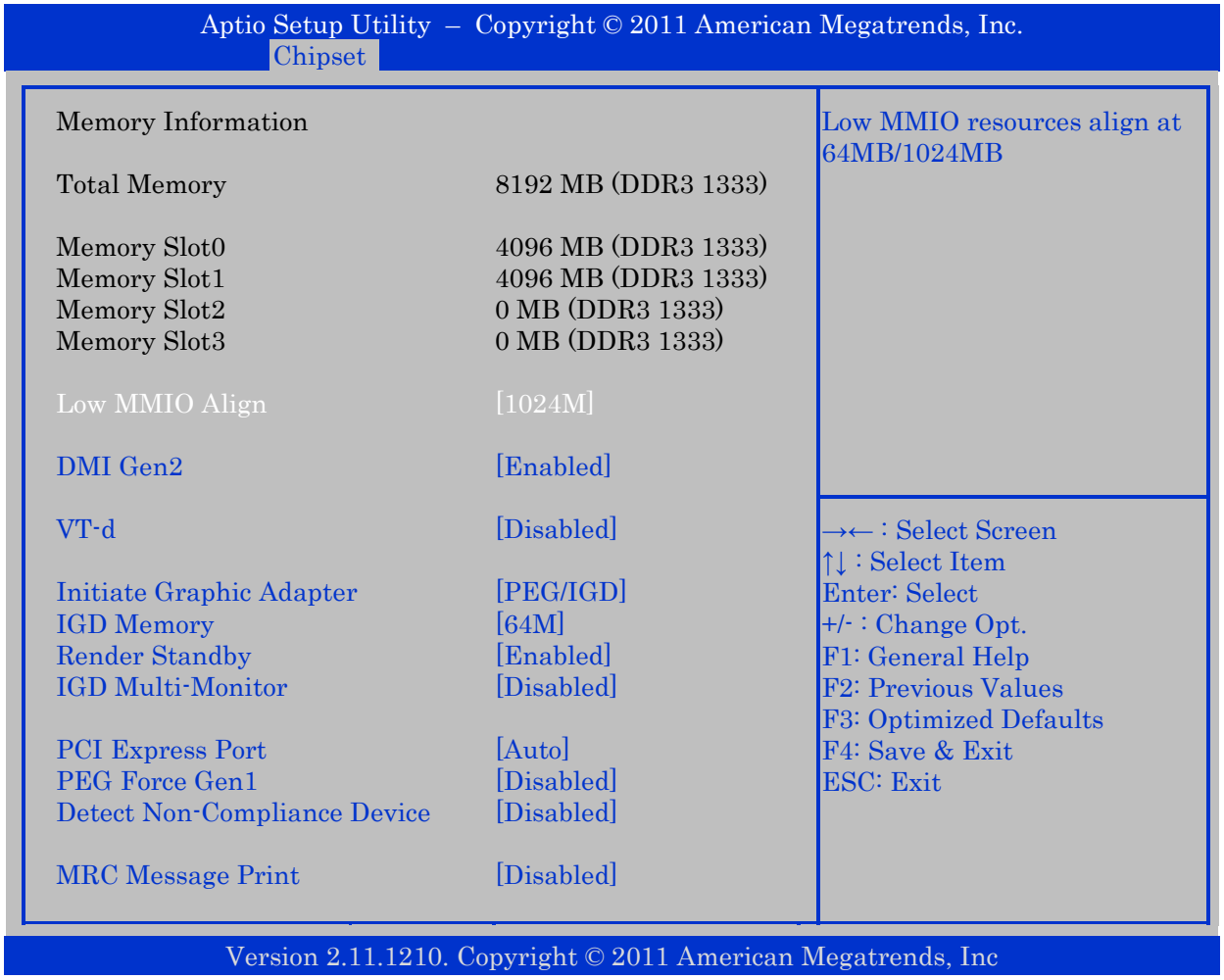


Function	Selection	Description
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 **115200**	Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7, **8**	Data Bits
Parity	**None** Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if the num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: parity bit is always 0. Mark/Space do not allow error detection.
Stop Bits	**1** 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	**None** Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a ´stop´ signal can be sent to stop the data flow. Once the buffers are empty, a ´start 'signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Recorder Mode	**Disabled** Enabled	On this mode enabled only text will be send. This is to capture Terminal data.
Resolution 100x31	**Disabled** Enabled	Enables or disables extended terminal resolution.
Legacy OS Redirection Resolution	**80x24** 80x25	On Legacy OS, the Number of Rows and Columns supported redirection.

9.6 Chipset

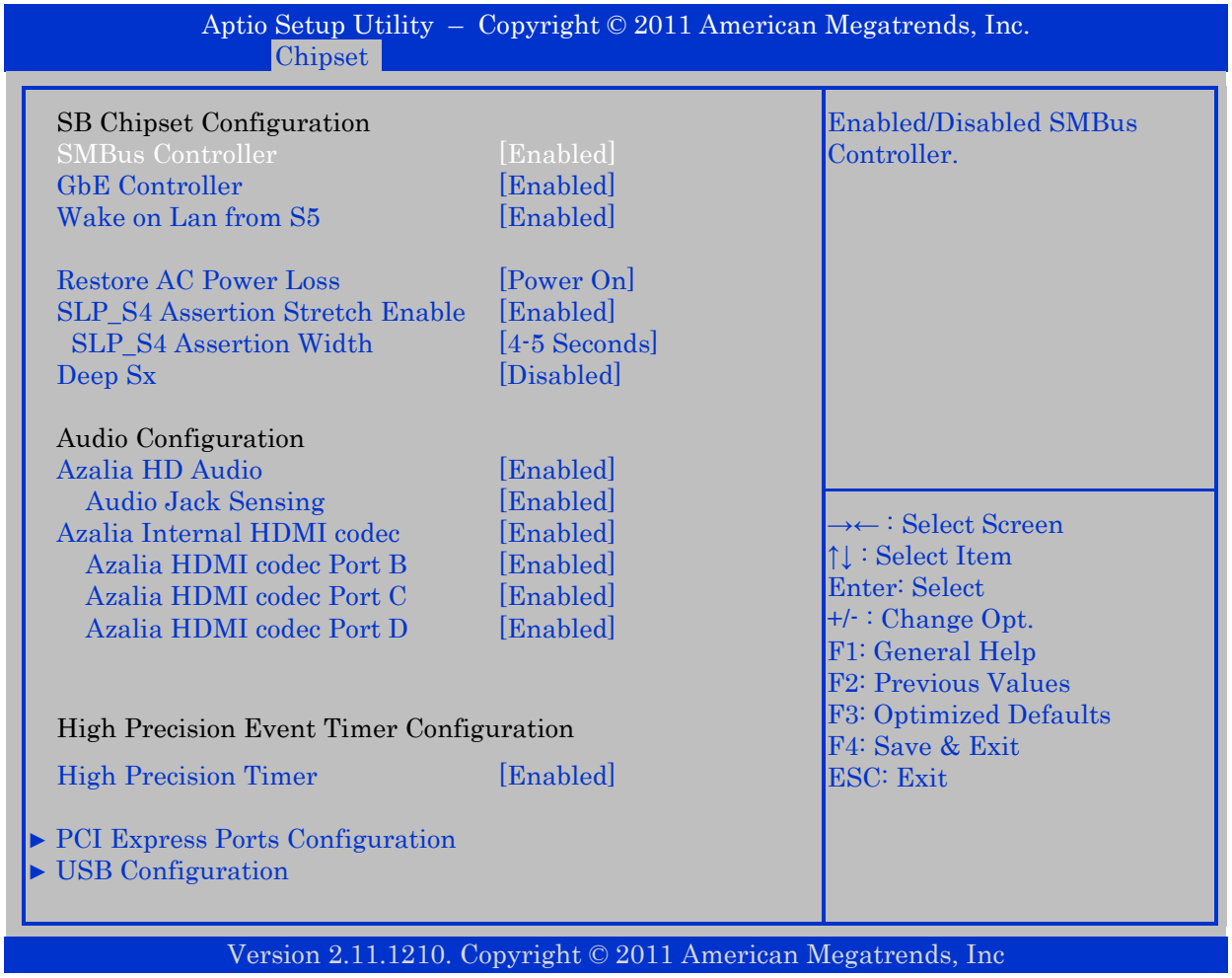

Aptio Setup Utility – Copyright © 2011 American Megatrends, Inc.
Main Advanced Chipset Boot Security Save & Exit
► North Bridge
► South Bridge
► ME Subsystem
North Bridge Parameters
→← : Select Screen
↑↓ : Select Item
Enter: Select
+/- : Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright © 2011 American Megatrends, Inc

9.6.1 North Bridge



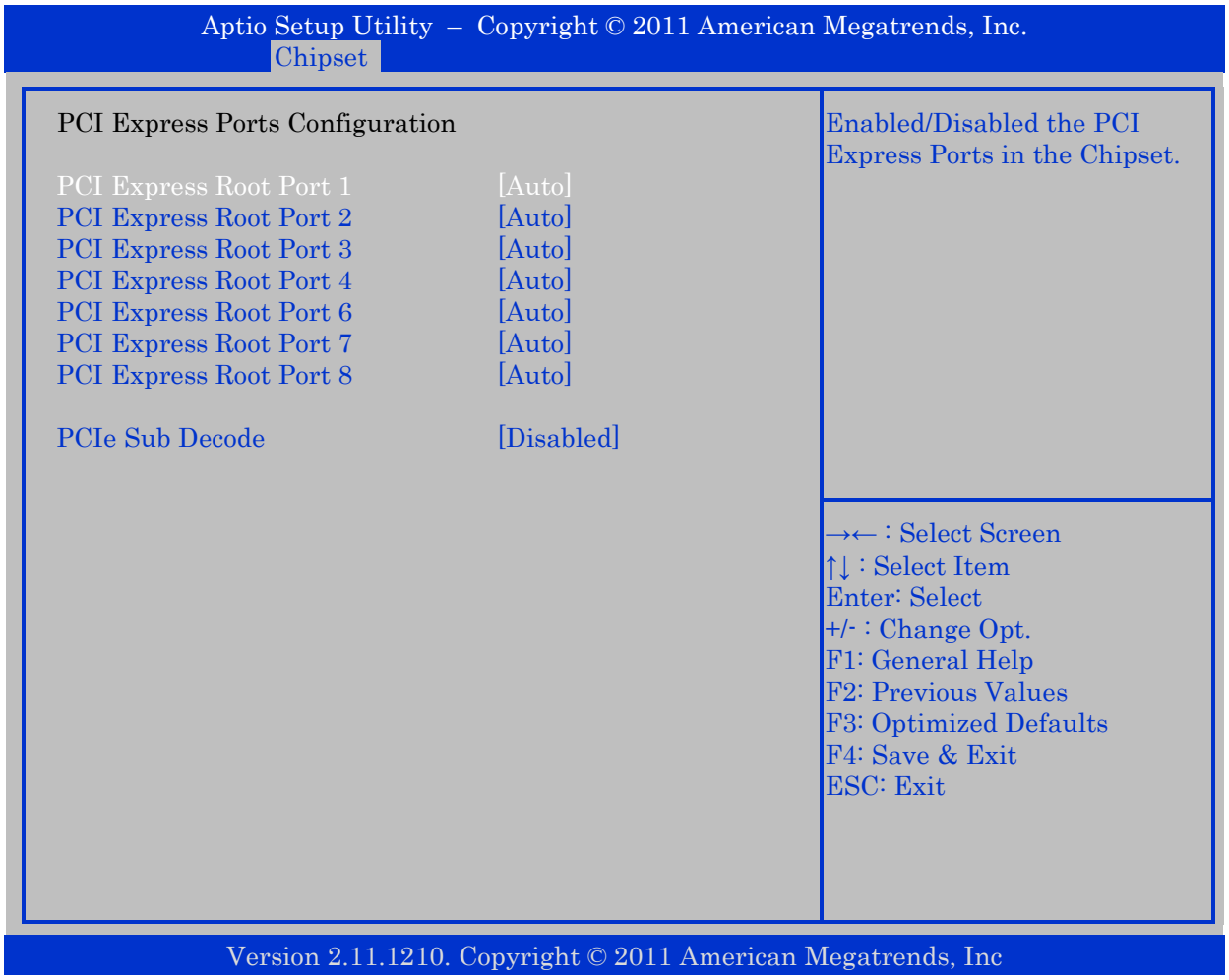
Function	Selection	Description
Low MMIO Align	64M **1024M**	Low MMIO resources align at 64MB/1024MB
DMI Gen2	Disabled **Enabled**	DMI Gen2 Enabled/Disabled
VT-d	**Disabled** Enabled	VT-d Enabled/Disabled
Initiate Graphic Adapter	IGD PCI/IGD PCI/PEG **PEG/IGD** PEG/PCI	Select which graphics controller to use as the promary boot device.
IGD Memory	Disabled, 32M, **64M**, 96M,128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M	IGD Share Memory Size
Render Standby	Disabled **Enabled**	Enabled/Disabled Render Standby by Internal Graphics Device.
IGD Multi-Monitor	**Disabled** Enabled	Enabled/Disabled IGD Multi-Monitor by Internal Graphics Device.
PCI Express Port	Disabled Enabled **Auto**	PCI Express
PEG Force Gen1	**Disabled** Enabled	PCI Express Port Force Gen1
Detect Non-Compliance Device	**Disabled** Enabled	Detect Non-Compliance PCI Express Device in PEG
MRC Message Print	**Disabled** Enabled	Print Memory initialize message.

9.6.2 South Bridge



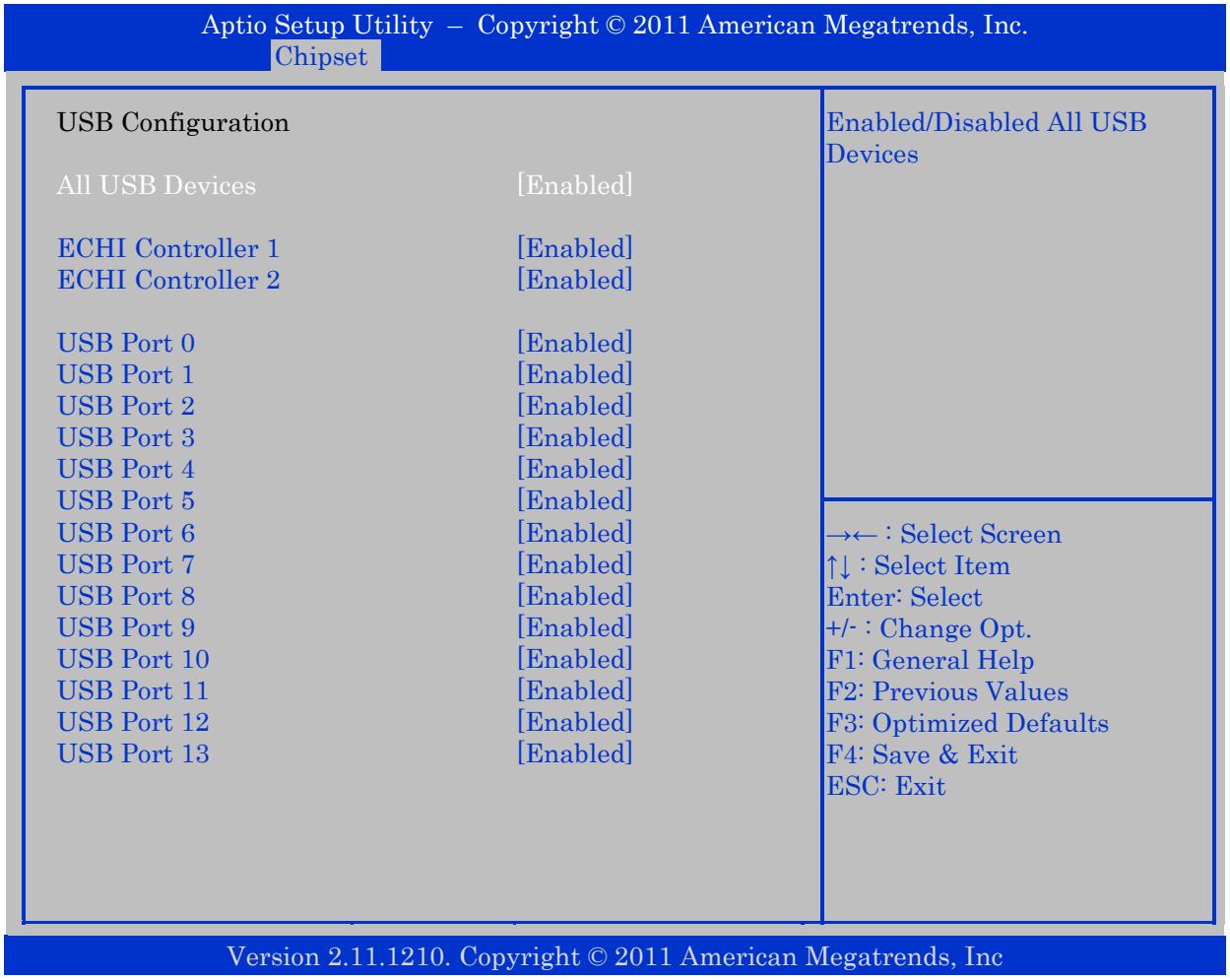
Function	Selection	Description
SMBus Controller	Disabled **Enabled**	Enabled/Disabled SMBus Controller.
GbE Controller	Disabled **Enabled**	Enabled/Disabled GbE Controller.
Wake on Lan from S5	Disabled **Enabled**	Enabled/Disabled GbE Control PME in S5.
Restore AC Power Loss	Power Off **Power On** Last State	Specify what state to go to when power is re-applied after a power failure (G3 state).
SLP_S4 Assertion Stretch Enable	Disabled **Enabled**	Enabled/Disabled SLP_S4# Assertion Stretch.
SLP_S4 Assertion Width	1-2 Seconds 2-3 Seconds 3-4 Seconds **4-5 Seconds**	Select a minimum assertion width of the SLP_S4# signal.
Deep Sx	**Disabled** Enabled in S5(Battery) Enabled in S5 Enabled in S4 and S5(Battery) Enabled in S4 and S5	Deep Sx configuration. NOTE: Mobile platforms support Deep S4/S5 in DC only and Desktop platforms support Deep S4/S5 in AC only.
Azalia HD Audio	Disabled **Enabled**	Enabled/Disabled Azalia HD Audio
Audio Jack Sensing	Disabled **Enabled**	Enabled: The insertions of audio jacks are auto determined. Disabled: Driver assumes that all jacks are inserted (useful when using the Audio pinrow)
Azalia Internal HDMI codec	Disabled **Enabled**	Enabled/Disabled internal HDMI codec for Azalia.
Azalia HDMI codec PortB	Disabled **Enabled**	Enabled/Disabled internal HDMI codec for Azalia.
Azalia HDMI codec PortC	Disabled **Enabled**	Enabled/Disabled internal HDMI codec for Azalia.
Azalia HDMI codec PortD	Disabled **Enabled**	Enabled/Disabled internal HDMI codec for Azalia.
High Precision Timer	Disabled **Enabled**	Enabled/Disabled High Precision Event Timer

9.6.2.1 PCI Express Ports Configuration



Function	Selection	Description
PCI Express Root Port #(1-8)	Disabled Enabled **Auto**	Enabled/Disabled the PCI Express Ports in the Chipset.
PCIe Sub Decode	**Disabled** Enabled	Enabled/Disabled PCIe Sub Decode Port. (This option is available when Subtractive Decode Agent Enable (PCHTrap9[14]) = '1b')

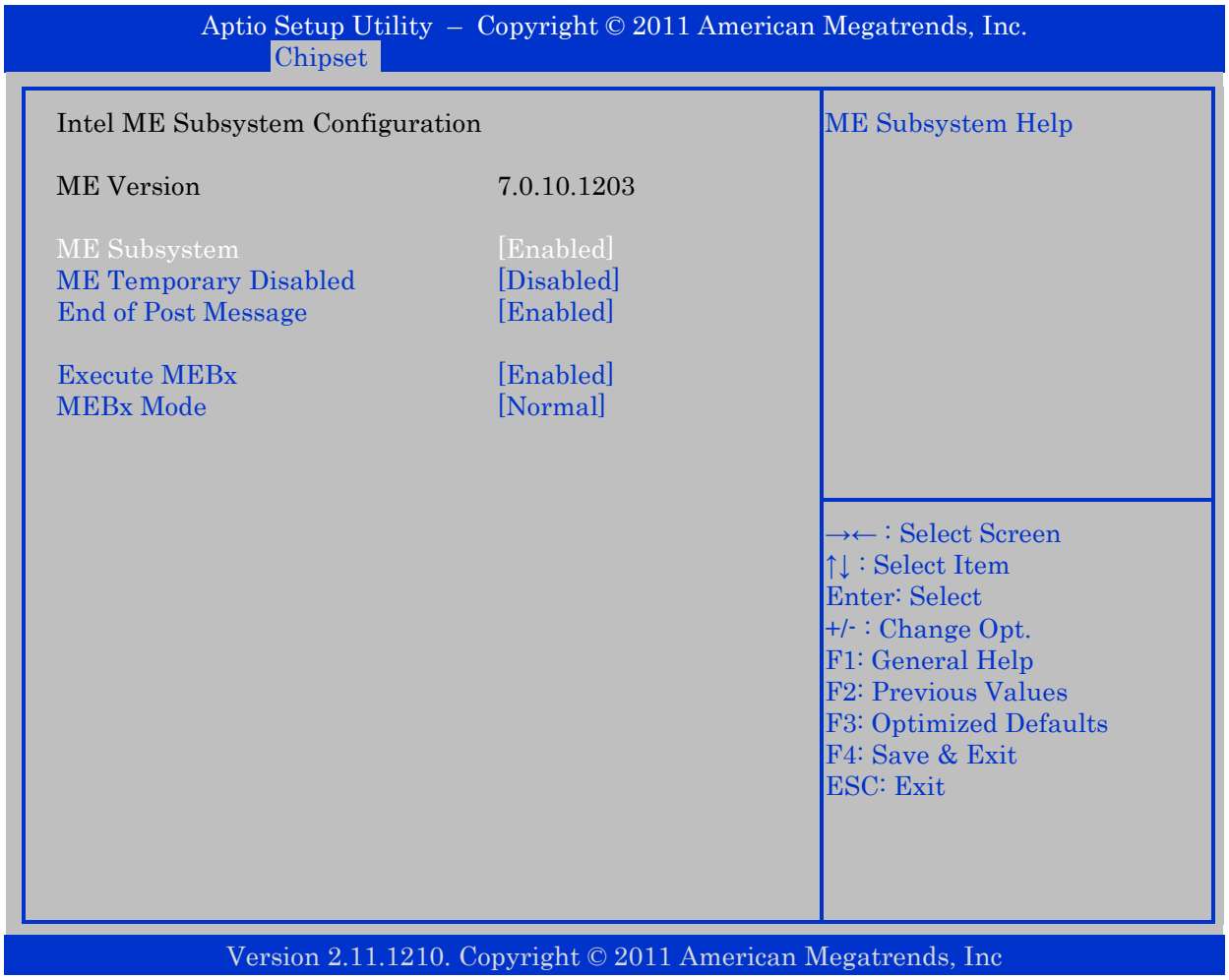
9.6.2.2 USB Configuration



Function	Selection	Description
All USB Devices	Disabled **Enabled**	Enabled/Disabled All USB Devices
ECHI Controller 1	Disabled **Enabled**	Enabled/Disabled USB 2.0 (EHCI) Support.
ECHI Controller 2	Disabled **Enabled**	Enabled/Disabled USB 2.0 (EHCI) Support.
USB Port #(0-13) (Note1)	Disabled **Enabled**	Enables/Disabled USB port.

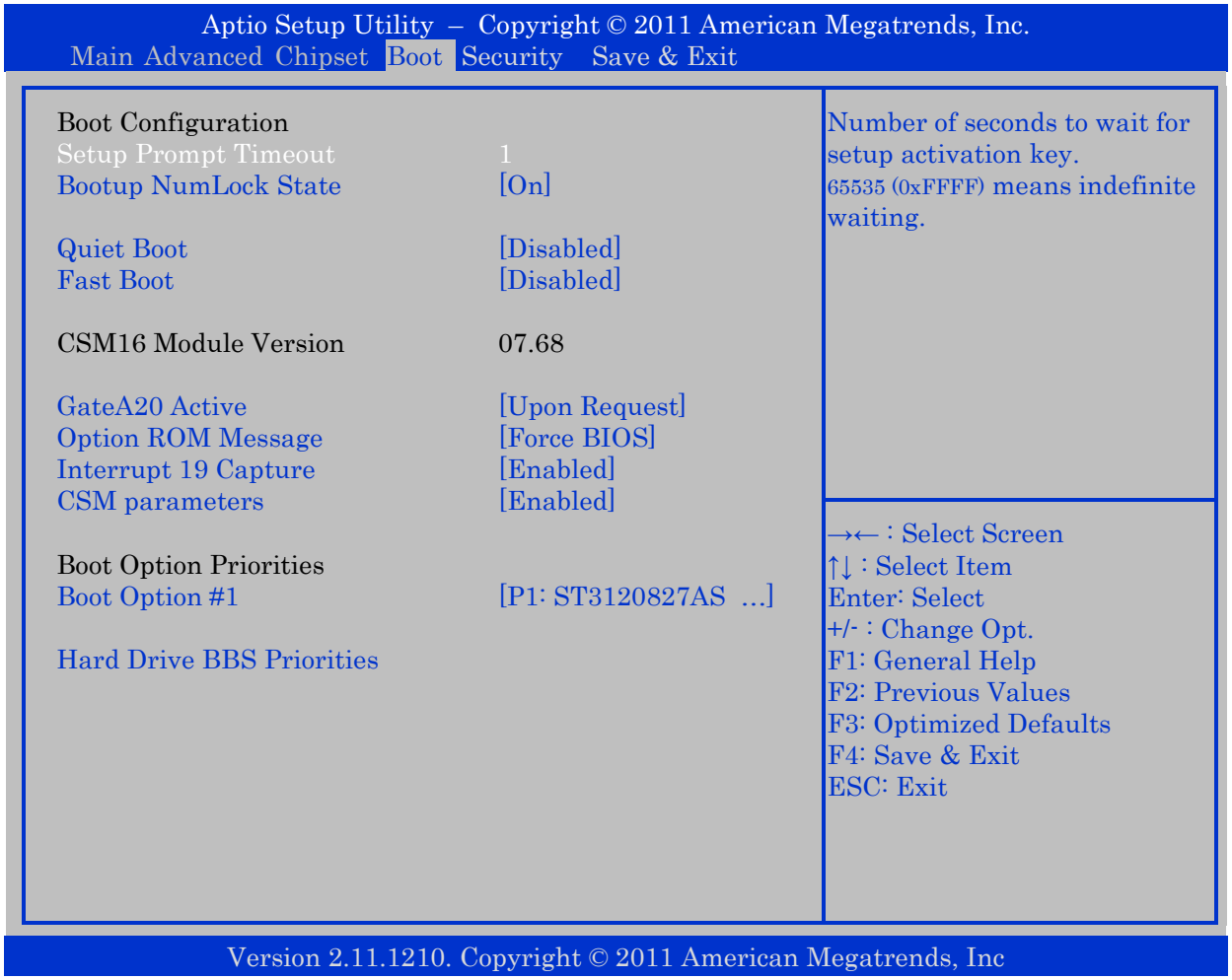
Note1: Only visible if “All USB Devices” is Enabled.

9.6.3 ME Subsystem



Function	Selection	Description
ME Subsystem	Disabled **Enabled**	ME Subsystem Help
ME Temporary Disabled	**Disabled** Enabled	ME Temporary Disabled Help
End of Post Message	Disabled **Enabled**	End of Post Message Help
Execute MEBx	Disabled **Enabled**	Execute MEBx Help
MEBx Mode	**Normal** Hidden Ctrl + P Enter MEBx Setup	MEBx Mode Help

9.7 Boot

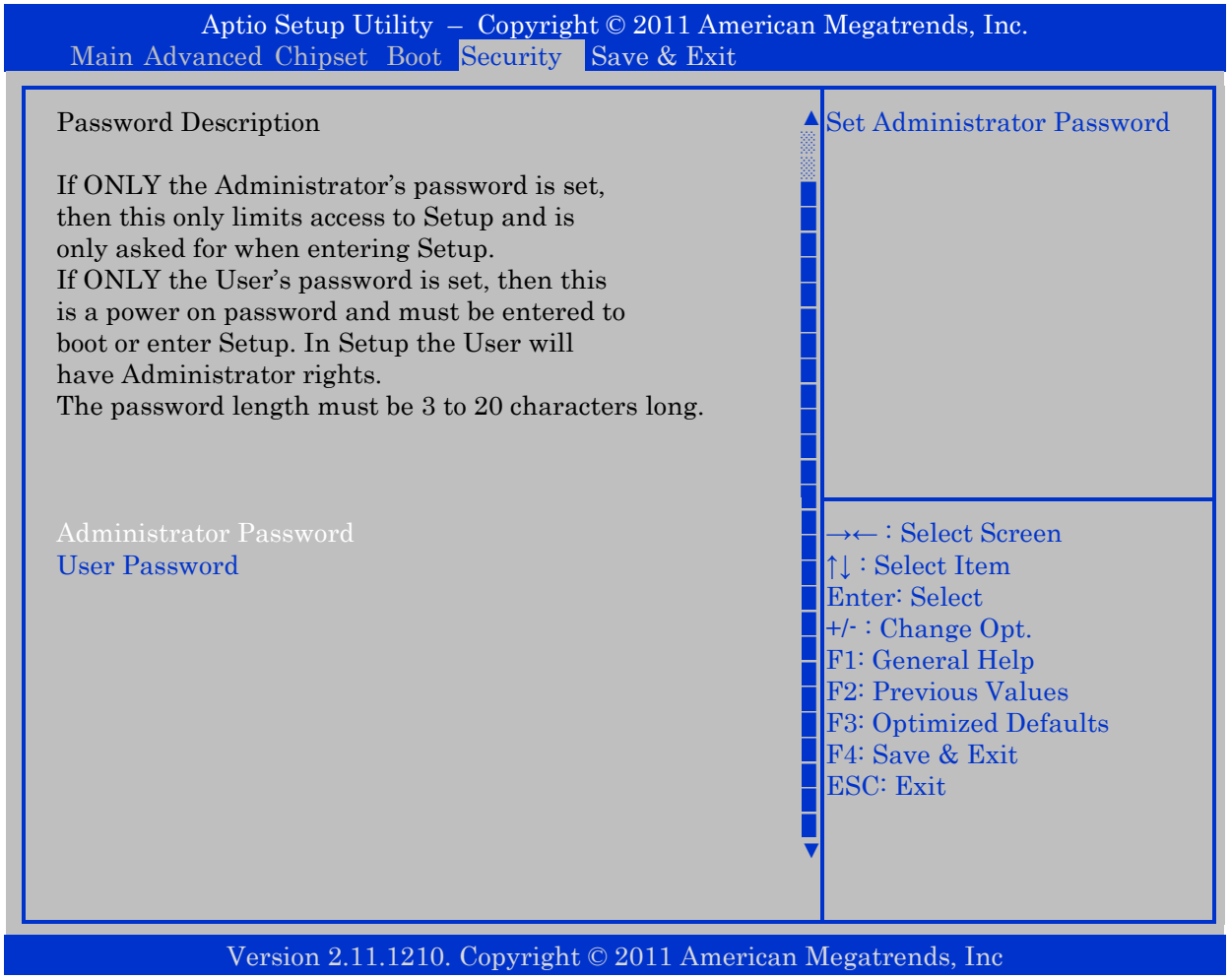


Note: When pressing <F7> while booting it is possible manually to select boot device.

Function	Selection	Description
Setup Prompt Timeout	**1**, 2 - 65535 (Note)	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	**On** Off	Select the Keyboard Numlock state.
Quit Boot	**Disabled** Enabled	Enables or disables Quiet Boot option.
Fast Boot	**Disabled** Enabled	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
GateA20 Active	**Upon Request** Always	Upon Request: GA20 can be disabled using BIOS services. Always: do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
Option ROM Message	**Force BIOS** Keep Current	Set display mode for Option ROM.
Interrupt 19 Capture	Disabled **Enabled**	Enabled: Allows Option ROMs to trap Int 19
Boot Option #1	(list of bootable devices)	Sets the system boot order.

Note: To enter number use digit keys and/or +/- keys.

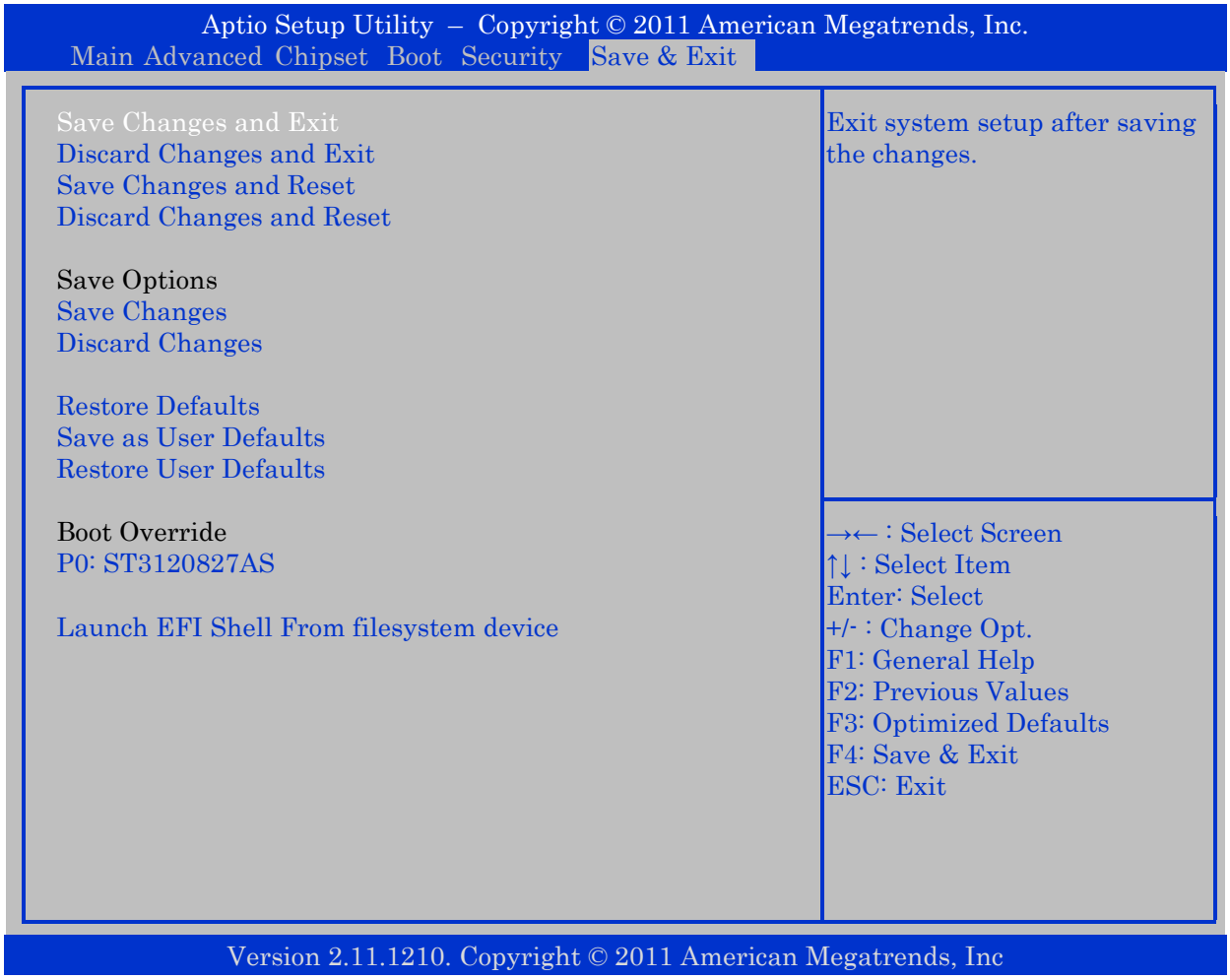
9.8 Security



Function	Selection	Description
Administrator Password	(See Password description above)	Set Administrator Password
User Password	(See Password description above)	Set User Password

9.9 Save & Exit

This Menu is special; having no “selections” for each function, or in other words, the function is the same as the selection.



Function	Description
Save Changes and Exit	Exit system setup after saving the changes.
Discard Changes and Exit	Exit system setup without saving any changes.
Save Changes and Reset	Reset the system after saving the changes.
Discard Changes and Reset	Reset the system without saving any changes.
Save Changes	Save Changes done so far to any of the setup options.
Discard Changes	Discard Changes done so far to any of the setup options.
Restore Defaults	Restore/Load Default values for all the setup options.
Save as User Defaults	Save the Changes done so far as User Defaults.
Restore User Defaults	Restore the User Defaults to all the setup options.
(possible list of boot devices)	Selection table of bootable devices. When selected system will boot on selected device. (See note below)
Launch EFI Shell From filesystem device	Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

Note: When pressing <F7> while booting it is possible manually to select boot device.

10 AMI BIOS Beep Codes

It is normal for Kontron AMI UEFI BIOS to generate some beeps after POST has passed successfully:
The first beep indicates that POST has successfully passed.
Then a number of beeps indicate the number of attached USB devices.
And finally a special long beep indicates that AMI boot is completed.
Note: The long beep starting as a normal beep but is changing to higher frequency.

If POST has found a problem, then the normal behaviour (described above) is changed:

Boot Block Beep Codes:

Number of Beeps	Description
1	Insert diskette in floppy drive A:
2	'AMIBOOT.ROM' file not found in root directory of diskette in A:
3	Base Memory error
4	Flash Programming successful
5	Floppy read error
6	Keyboard controller BAT command failed
7	No Flash EPROM detected
8	Floppy controller failure
9	Boot Block BIOS checksum error
10	Flash Erase error
11	Flash Program error
12	'AMIBOOT.ROM' file size error
13	BIOS ROM image mismatch (file layout does not match image present in flash device)

POST BIOS Beep Codes:

Number of Beeps	Description
1	Memory refresh timer error.
2	Parity error in base memory (first 64KB block)
3	Base memory read/write test error
4	Motherboard timer not operational
5	Processor error
6	8042 Gate A20 test error (cannot switch to protected mode)
7	General exception error (processor exception interrupt error)
8	Display memory error (system video adapter)
9	AMIBIOS ROM checksum error
10	CMOS shutdown register read/write error
11	Cache memory test failed

Troubleshooting POST BIOS Beep Codes:

Number of Beeps	Troubleshooting Action
1, 2 or 3	Reset the memory, or replace with known good modules.
4-7, 9-11	Fatal error indicating a serious problem with the system. Consult your system manufacturer. Before declaring the motherboard beyond "all hope", eliminate the possibility of interference due to a malfunctioning add-in card. Remove all expansion cards, except the video adapter. • If beep codes are generated when all other expansion cards are absent, consult your system manufacturer's technical support. • If beep codes are not generated when all other expansion cards are absent, one of the add-in cards is causing the malfunction. Insert the cards back into the system one at a time until the problem happens again. This will reveal the malfunctioning card.
8	If the system video adapter is an add-in card, replace or reset the video adapter. If the video adapter is an integrated part of the system board, the board may be faulty.

11 OS Setup

Use the Setup.exe files for all relevant drivers. The drivers can be found on KTQ67 Driver CD or they can be downloaded from the homepage http://www.kontron.com/