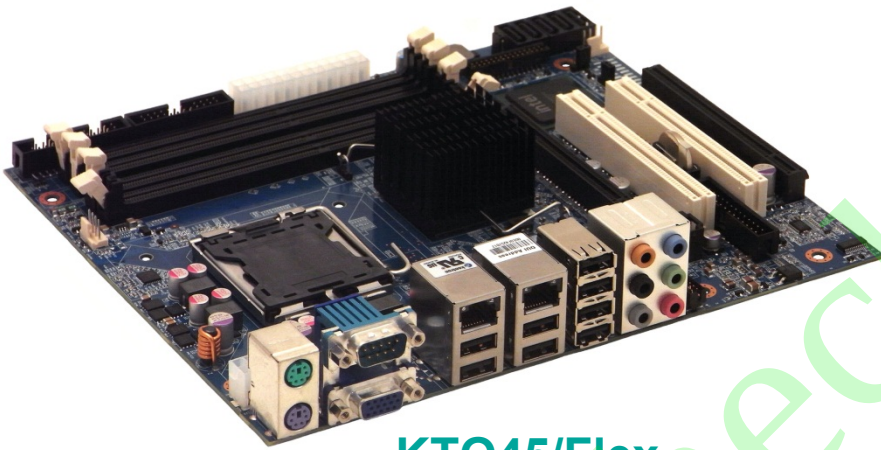
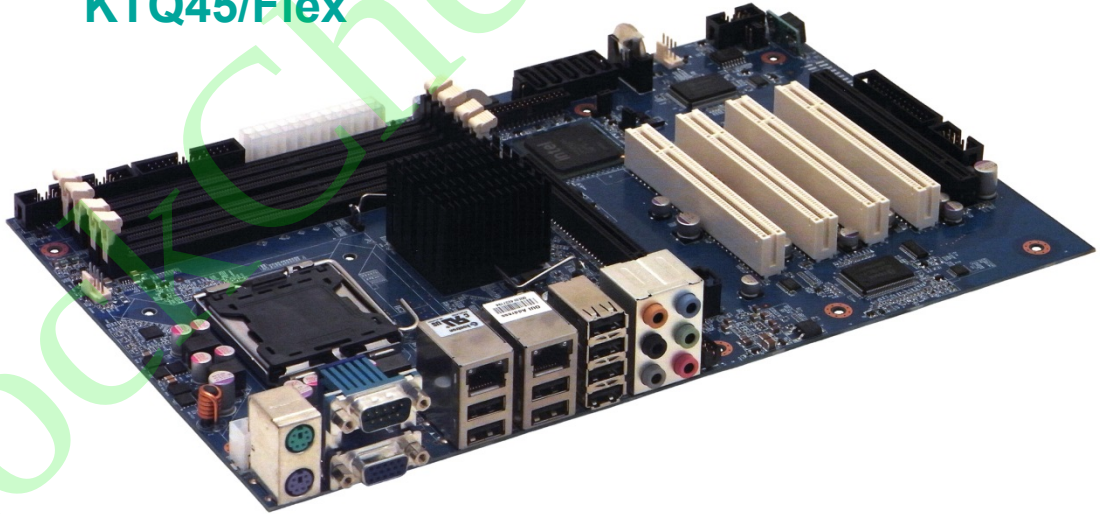


# » Kontron User's Guide «



**KTQ45/Flex**



**KTQ45/ATXE**

## **KTQ45 Users Guide**

KTD-00782-I

## Document revision history.

| Rev. | Date                       | By      | Comment                                                                                                                                                                                                           |
|------|----------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I    | Oct. 31 <sup>st</sup> 2013 | MLA     | Added System Sensor position to pictures. Battery Type no. replaced. Added warning using PCIe Riser. Added more info on BIOS "USB Function". Added BIOS feature "Low RPM Fan Range".                              |
| H    | July 14 <sup>th</sup> 2011 | MLA     | Corrected version of the Standard 60950-1. Page 71 correction. Added BIOS setting "C1E Support" and "Intel VT-d". New pictures.                                                                                   |
| G    | Dec. 23 <sup>rd</sup> 2010 | MLA     | Corrected maximum RAM support. Note for using 820982 corrected. ADD2-CRT support added. Chapter 2.4 corrections. Added note for using both Onboard Graphics and PCIe card. Added note about using SATA converter. |
| F    | Feb. 25 <sup>th</sup> 2010 | MLA     | Added note on Memory Remap Feature. ATX+12V pinning corrected. Chapter 2.5 updated. Other minor corrections.                                                                                                      |
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| D    | Nov. 17 <sup>th</sup> 2009 | MLA     | Added/corrected info about ETHER1/ETHER2. RAM PN corrected.                                                                                                                                                       |
| C    | Oct. 12 <sup>th</sup> 2009 | MLA     | Memory Map corrected. JP8 info on page 36 corrected. Added "mounting the board to chassis". PCIe x4 standard 1.1 added.                                                                                           |
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| A    | Aug. 21 <sup>st</sup> 2009 | MLA     | Layout improvements. Minor additions.                                                                                                                                                                             |
| 0    | July 9 <sup>th</sup> 2009  | JSE/MLA | Initial release                                                                                                                                                                                                   |

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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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## Introduction

This manual describes the KTQ45/Flex and KTQ45/ATXE boards made by KONTRON Technology A/S. The boards will also be denoted KTQ45 family if no differentiation is required.

The KTQ45 boards supports the Intel® Core™2 Quad processor Q9000 series, the Intel® Core™2 Duo processor E8000 and E7000 series with a maximum TDP of 95W. These processors belong to the Intel Yorkfield and Wolfdale families.

| KTQ45 family differences | Format | PCI | RS232 | RS485 |
|--------------------------|--------|-----|-------|-------|
| KTQ45/Flex               | Flex   | 2   | 2     | 0     |
| KTQ45/ATXE               | ATX    | 4   | 3     | 1     |

Use of this Users Guide implies a basic knowledge of PC-AT hard- and software. This manual is focused on describing the KTQ45 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 by the user in the CMOS setup menus. Except for the CMOS Clear jumper (JBAT1), ME Jumper (JBAT2), SPI jumper (JP6), Interface BIOS jumper (JP3 and JP5), RS485 mode selection jumper (KTQ45/ATXE only) (JP7&JP9).

# 1 Installation procedure

## 1.1 Installing the board

To get the board running, follow these steps. In some cases the board shipped from KONTRON Technology has DDR3 DRAM mounted. In this case Step 2 can be skipped.

### 1. Turn off the power supply

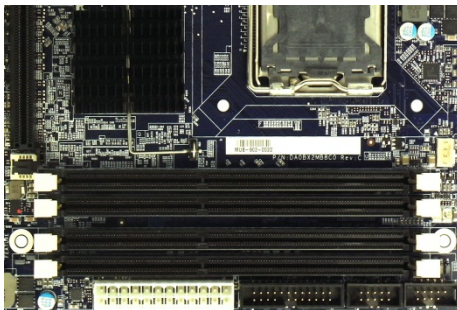


**Warning:** Turn off PSU (Power Supply Unit) completely (no mains power connected to the PSU) or leave the Power Connectors unconnected while configuring the board. Otherwise components (RAM, LAN cards etc.) might get damaged. Do not use PSU's without 3.3V monitoring watchdog, which is standard feature in ATX PSU's. Running the board without 3.3V connected will damage the board after a few minutes.

### 2. Insert the DDR3 DIMM 240pin DRAM module(s)

Be careful to push it in the slot(s) before locking the tabs. For a list of approved DDR3 DIMM modules contact your Distributor or FAE.

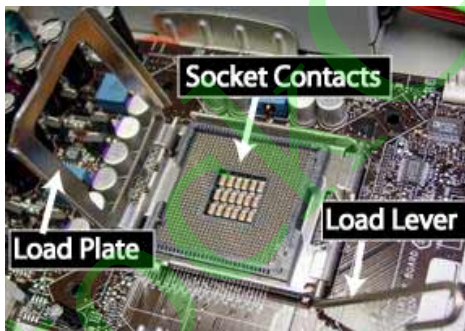
DDR3-800/1066 DIMM 240pin DRAM modules (PC3-6400/PC3-8500) are supported.



**NOTE:** Regardless of the Memory configuration used, DDR3 SLOT 1 (J1) must always be populated.

### 3. Install the processor

The CPU is keyed and will only mount in the CPU socket in one way. Use the handle to open/ close the CPU socket. The Intel® Core™2 Quad, Intel® Core™2 Duo in the LGA775 package are supported, refer to supported processor overview for details.



**Do NOT touch socket contacts**

#### Opening the socket:

Apply pressure to the corner with right hand thumb while opening/closing the load lever, otherwise lever can bounce back like a "mouse trap" and WILL cause bent contacts (when loaded)

1. Disengage Load Lever by depressing down and out on the hook to clear retention tab
2. Rotate Load Lever to fully open position at approximately 135°
3. Rotate Load Plate to fully open position at approximately 100°

#### Remove Socket Protective Cover

With left hand index finger and thumb to support the load plate edge, engage protective cover finger tab with right hand thumb and peel the cover from LGA775 Socket while pressing on center of protective cover to assist in removal.

Set protective cover aside. Always put cover back on if the processor is removed from the socket.



**IMPORTANT:** For return goods (RMA): warranty is void if returned without Protective cover.

**Visually inspect protective cover for damage**

If damage observed, replace the cover.

**Note:** After cover removal, make sure socket load plate and contacts are free of foreign material. Debris may be removed with compressed air.

**Note:** Removing protective cover after CPU insertion will compromise the ability to visually inspect socket.

**Processor Installation**

Locate Connection 1 indicator and the two orientation key notches.

Grasp the processor with thumb and index finger. (Grasp the edges without the orientation notches.)

The socket has cutouts for your fingers to fit into.

Carefully place the package into the socket body using a purely vertical motion. (Tilting the processor into place or shifting it into place on the socket can damage the sensitive socket contacts.)

CAUTION: Recommend not to use a Vacuum Pen for installation.

Verify that package is within the socket body and properly mated to the orientation keys

Close the socket by:

- A. Close the Load Plate
- B. While pressing down lightly on Load Plate, engage the Load Lever.
- C. Secure Load Lever with Load Plate tab under retention tab of Load Lever

**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 CRT monitor must be connected in order to change CMOS settings. When using bootable SATA disk, then connect to SATA0 or SATA2 or select in BIOS "ATA/IDE Configuration" = Enhanced.

**6. Connect Power supply**

Connect power supply to the board by the ATX/ BTPWR and 4-pin ATX connectors. For board to operate connection of both the ATX/BTX and 4-pin ATX (12V) connectors are required.

**7. Turn on the power on the ATX/ BTX power supply****8. 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 FRONTPLN connector (see Connector description). A "normally open" switch can be connected via the FRONTPLN connector.

**9. 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 Clr-CMOS jumper (with/without power) for ~1 minute. This will also disable any Secure CMOS setup on the board. Alternatively, turn off power and remove the battery for 1 minute, but be careful to orientate the battery correctly when reinserted.

**10. 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 mounting hole / cause short circuit.

## 1.2 Requirement according to IEC60950

Users of KTQ45 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:

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

## 2 System specification

### 2.1 Component main data

The table below summarizes the features of the KTQ45/Flex and KTQ45/ATXE embedded motherboards.

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Form factor</b> | KTQ45/Flex: Flex-ATX (190,5 millimetres by 228,6 millimetres)<br>KTQ45/ATXE: Embedded-ATX (190,5 millimetres by 304,80millimeters)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Processor</b>   | <ul style="list-style-type: none"> <li>Support for Supports Intel® Core™2 Quad processor Q9000 series, Supports Intel® Core™2 Duo processor E8000 and E7000 in LGA775 package with up to 1333MHz system bus and 3/6/12MB internal cache.</li> <li>Support for Yorkfield (45 nanometre) and Wolfdale (45 nanometre) family processors.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Memory</b>      | <ul style="list-style-type: none"> <li>4 pieces DDR3 DIMM 240pin DRAM sockets.</li> <li>Dual channel interleaved mode support.</li> <li>Support for DDR 800/1066MHz (PC3-6400/PC3-8500)</li> <li>Support system memory from 512MB and up to 16GB. Less than 4GB displayed in System Properties using 32bit OS.<br/>(Shared Video Memory/PCI resources is withdrawn).</li> <li>ECC not supported</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Chipset</b>     | Intel Q45+ICH10DO Chipset consisting of: <ul style="list-style-type: none"> <li>Intel® AC82Q45 Graphics Memory Controller Hub (GMCH)</li> <li>Intel® ICH10DO I/O Controller Hub</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Security</b>    | <ul style="list-style-type: none"> <li>Intel® Integrated TPM 1.2 support</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Management</b>  | <ul style="list-style-type: none"> <li>Intel® Active Management Technology (Intel® AMT) 5.0</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Video</b>       | <ul style="list-style-type: none"> <li>Intel® GMA 4500 graphics engine</li> <li>Dynamic Video Memory Technology (DVMT 5.0), allowing up to 384MB dynamically allocated Video Memory (System memory is allocated when it is needed).</li> <li>Analogue Display Support CRT, 350-MHz, 24 bit integrated RAMDAC with support for analogue monitors up to 2048 x 1536 @ 75 Hz</li> <li>Native Display port and DVI support. The digital ports are multiplexed on to the PEG interface using passive PEG card (Accessory).</li> <li>Serial Digital Video Out (SDVO) ports (2 channels) for additional CRT, LVDS panel, DVI, TV-Out and/or HDMI support via Advanced Digital Display 2 (ADD2) cards or Media Expansion Cards.</li> <li>Dual independent pipe support, Mirror and Dual independent display support<br/>Dual Monitor support with combinations of SDVO port devices and onboard CRT</li> </ul> |
| <b>Audio</b>       | Audio, 7.1 Channel High Definition Audio Codec using the VIA 1708B codec <ul style="list-style-type: none"> <li>Line-out</li> <li>Line-in</li> <li>Surround output: SIDE, LFE, CEN, BACK and FRONT</li> <li>Microphone: MIC1</li> <li>CDROM in</li> <li>SPDIF Interface</li> <li>Onboard speaker</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

(Continues)

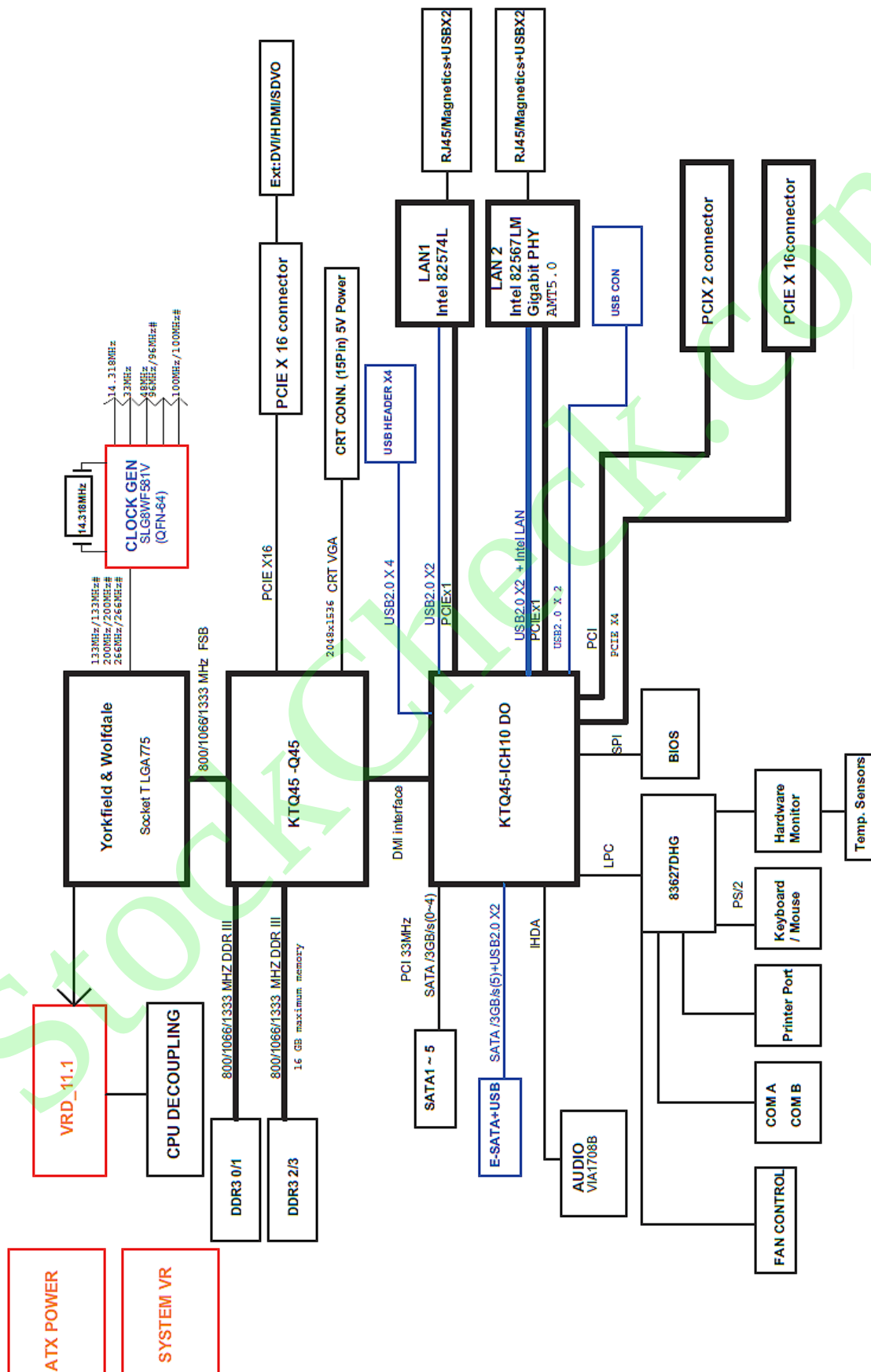
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I/O Control</b>                | Winbond W83627DHG LPC Bus I/O Controller                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Peripheral interfaces</b>      | <ul style="list-style-type: none"> <li>• Eight USB 2.0 ports on I/O area</li> <li>• Four USB 2.0 ports on internal pinrows</li> <li>• Two Serial ports (RS232) KTQ45/Flex, Four Serials ports 3x(RS323), 1x(RS485) (Galvanic isolated) with full duplex support on KTQ45/ATXE</li> <li>• One Parallel port, SPP/EPP/ECP</li> <li>• Five Serial ATA-300 IDE interfaces with RAID 0/1/5/10 support</li> <li>• PS/2 keyboard and mouse ports</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>LAN Support</b>                | <ul style="list-style-type: none"> <li>• 1x 10/100/1000Mbps/s using NIC Intel® Boazman-LM WG82567LM (ETHER1) (connected to ICH10DO Integrated GbE MAC supporting AMT 5.0)</li> <li>• 1x 10/100/1000Mbps/s using NIC Intel® Hartwell 82574L (ETHER2)</li> <li>• PXE netboot supported. Wake On LAN (WOL) supported.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>BIOS</b>                       | <ul style="list-style-type: none"> <li>• Kontron Technology / AMI BIOS (core version)</li> <li>• Support for Advanced Configuration and Power Interface (ACPI 3.0), Plug and Play <ul style="list-style-type: none"> <li>◦ Suspend To Ram</li> <li>◦ Suspend To Disk</li> <li>◦ Intel Speed Step</li> </ul> </li> <li>• Secure CMOS/ OEM Setup Defaults</li> <li>• "Always On" BIOS power setting</li> <li>• RAID Support (RAID modes 0, 1, 5 and 10) (for Linux O/S only RAID 0 and 1)</li> </ul>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Expansion Capabilities</b>     | <ul style="list-style-type: none"> <li>• PCI Bus routed to PCI slot(s) (PCI Local Bus Specification Revision 2.3) <ul style="list-style-type: none"> <li>◦ KTQ45/Flex: 2 slots PCI 2.3, 32 bits, 33 MHz, 5V compliant</li> <li>◦ KTQ45/ATXE: 4 slots PCI 2.3, 32 bits, 33 MHz, 5V compliant</li> </ul> </li> <li>• PCI-Express bus routed to PCI Express slot(s) (PCI Express 2.0) <ul style="list-style-type: none"> <li>◦ KTQ45/Flex and KTQ45/ATXE: <ul style="list-style-type: none"> <li>1 slot PCI-Express x16 (PCI Express 2.0)</li> <li>1 slot PCI-Express x4 (PCI Express 1.1)</li> </ul> </li> </ul> </li> <li>• SMBus routed to FEATURE, PCI slot, PCI Express</li> <li>• LPC Bus routed to TPM connector</li> <li>• DDC Bus routed to CRT connector</li> <li>• 8 x GPIOs (General Purpose I/Os) routed to FEATURE connector</li> </ul> |
| <b>Hardware Monitor Subsystem</b> | <ul style="list-style-type: none"> <li>• Smart Fan control system, support Thermal® and Speed® cruise for three onboard Fan control connectors: FAN_CPU, FAN_SYS and FEATURE</li> <li>• Three thermal inputs: CPU die temperature, System temperature and External temperature input routed to FEATURE connector. (Precision +/- 3°C)</li> <li>• Voltage monitoring</li> <li>• Intrusion detect input</li> <li>• SMI violations (BIOS) on HW monitor not supported. Supported by API (Windows).</li> </ul>                                                                                                                                                                                                                                                                                                                                         |
| <b>Operating Systems Support</b>  | <ul style="list-style-type: none"> <li>• WinXP</li> <li>• WinVista</li> <li>• Linux: Red Hat 5 U2, SuSe 10 SP2 (limitations may apply)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

(Continues)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Environmental Conditions</b> | <p><b>Operating:</b><br/>0°C – 55°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. Note: KTQ45 operating temperature range is 0°C – 60°C (forced cooling) but CPU cooling limitations typically lowers the maximum temperature to 55°C.</p> <p>10% - 90% relative humidity (non-condensing)</p> <p><b>Storage:</b><br/>-20°C – 70°C<br/>5% - 95% relative humidity (non-condensing)</p> <p><b>Electro Static Discharge (ESD) / Radiated Emissions (EMI):</b><br/>All Peripheral interfaces intended for connection to external equipment are ESD/ EMI protected.<br/>EN 61000-4-2:2000 ESD Immunity<br/>EN55022:1998 class B Generic Emission Standard.</p> <p><b>Safety:</b><br/>IEC 60950-1: 2005, 2<sup>nd</sup> edition<br/>UL 60950-1<br/>CSA C22.2 No. 60950-1<br/>Product Category: Information Technology Equipment Including Electrical Business Equipment<br/>Product Category CCN: NWGQ2, NWGQ8<br/>File number: E194252</p> <p><b>Theoretical MTBF:</b><br/>449.463 / 226.855 hours @ 40°C / 60°C for the KTQ45/Flex<br/>352.559 / 174.306 hours @ 40°C / 60°C for the KTQ45/ATXE</p> <p><b>Restriction of Hazardous Substances (RoHS):</b><br/>All boards in the KTQ45 family are RoHS compliant.</p> <p><b>Capacitor utilization:</b><br/>No Tantalum capacitors on board<br/>Only Japanese brand Solid capacitors rated for 100degrees Celsius used on board</p> |
| <b>Battery</b>                  | <p>Exchangeable 3.0V Lithium battery for onboard Real Time Clock and CMOS RAM.<br/>Manufacturer Panasonic / Part-number CR-2032L/BN, CR2032N/BN or CR-2032L/BE.<br/>Approximate 4-5 years retention.<br/>Current draw is 5-6µA when PSU is disconnected.</p> <p><b>CAUTION:</b> 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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 2.2 System overview

The block diagram below shows the architecture and main components of the KTQ45 boards. The two key components on the board are the Intel® Q45 and Intel® ICH10DO Chipsets. Components shown shaded are optional depending on board type (KTQ45/Flex and ATXE) and variants of the board.



## 2.3 Processor Support Table

The KTQ45/Flex and ATXE are designed to support the following LGA775 processors:

**Intel® Core™ 2 Quad Processor**

**Intel® Core™ 2 Quad Mobile Processor**

**Intel® Core™ 2 Duo Processor**

**Intel® Pentium® Processor (2 cores)**

**Intel® Celeron®**

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

Failed CPU's are indicated by **red** text.

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

| Processor Brand                  | Clock Speed [GHz] | Bus Speed [MHz] | Cache [MB] | CPU Number     | sSpec no.    | Thermal Guideline [Watt] |
|----------------------------------|-------------------|-----------------|------------|----------------|--------------|--------------------------|
| Intel® Core™ 2 Quad (Yorkfield)  | <b>3.00</b>       | <b>1333</b>     | <b>12</b>  | <b>Q9650 *</b> | <b>SLB8W</b> | <b>95</b>                |
|                                  | 2.83              | 1333            | 12         | Q9550          |              | 95                       |
|                                  | <b>2.83</b>       | <b>1333</b>     | <b>12</b>  | <b>Q9550S</b>  |              | <b>86.5</b>              |
|                                  | 2.66              | 1333            | 12         | Q9450          | SLAWR        | 95                       |
|                                  | <b>2.66</b>       | <b>1333</b>     | <b>6</b>   | <b>Q9400 *</b> | <b>SLB6B</b> | <b>95</b>                |
|                                  | 2.66              | 1333            | 6          | Q9400S         |              | 65                       |
|                                  | 2.50              | 1333            | 6          | Q9300          |              | 95                       |
|                                  | 2.66              | 1333            | 4          | Q8400          |              | 95                       |
|                                  | 2.66              | 1333            | 4          | Q8400S         |              | 65                       |
|                                  | 2.50              | 1333            | 4          | Q8300          |              | 95                       |
|                                  | 2.33              | 1333            | 4          | Q8200          |              | 95                       |
|                                  | 2.33              | 1333            | 4          | Q8200S         |              | 65                       |
| Intel® Core™ 2 Quad (Kentsfield) | 2.66              | 1066            | 8          | Q6700          |              | 105                      |
|                                  | 2.40              | 1066            | 8          | Q6600          |              | 105                      |
| Intel® Core™ 2 Duo (Wolfdale)    | 3.33              | 1333            | 6          | E8600          |              | 65                       |
|                                  | 3.16              | 1333            | 6          | E8500          |              | 65                       |
|                                  | 3.00              | 1333            | 6          | E8400          | SLAPL        | 65                       |
|                                  | <b>3.00</b>       | <b>1333</b>     | <b>6</b>   | <b>E8400 *</b> | <b>SLB9J</b> | <b>65</b>                |
|                                  | 2.83              | 1333            | 6          | E8300          |              | 65                       |
|                                  | 2.66              | 1333            | 6          | E8200          |              | 65                       |
|                                  | 2.66              | 1333            | 6          | E8190          |              | 65                       |
|                                  | 3.06              | 1066            | 3          | E7600          |              | 65                       |
|                                  | 2.93              | 1066            | 3          | E7500          |              | 65                       |
|                                  | <b>2.93</b>       | <b>1066</b>     | <b>2</b>   | <b>E6500</b>   | <b>SLGUM</b> | <b>65</b>                |
|                                  | <b>2.80</b>       | <b>1066</b>     | <b>3</b>   | <b>E7400</b>   | <b>SLGW3</b> | <b>65</b>                |
|                                  | 2.80              | 1066            | 2          | E6300          | SLGU9        | 65                       |
|                                  | 2.70              | 800             | 2          | E5400          |              | 65                       |
|                                  | 2.66              | 1066            | 3          | E7300          |              | 65                       |
|                                  | <b>2.60</b>       | <b>800</b>      | <b>2</b>   | <b>E5300</b>   | <b>SLGTL</b> | <b>65</b>                |
|                                  | 2.50              | 800             | 2          | E5200          |              | 65                       |
|                                  | 2.53              | 1066            | 3          | E7200          |              | 65                       |

(Continues)

| Processor Brand                    | Clock Speed [GHz] | Bus Speed [MHz] | Cache [MB] | CPU Number | sSpec no. | Thermal Guideline [Watt] |
|------------------------------------|-------------------|-----------------|------------|------------|-----------|--------------------------|
| Intel® Core™ 2 Duo (Conroe)        | 3.00              | 1333            | 4          | E6850      |           | 65                       |
|                                    | 2.66              | 1333            | 4          | E6750      |           | 65                       |
|                                    | 2.66              | 1333            | 4          | E6700      |           | 65                       |
|                                    | 2.60              | 800             | 2          | E4700      |           | 65                       |
|                                    | 2.40              | 1066            | 4          | E6600      |           | 65                       |
|                                    | 2.33              | 1066            | 4          | E6550      |           | 65                       |
|                                    | 2.33              | 1066            | 4          | E6540      |           | 65                       |
|                                    | 2.13              | 1066            | 4          | E6420      |           | 65                       |
|                                    | 2.13              | 1066            | 2          | E6400 *    | SLA97     | 65                       |
|                                    | 1.86              | 1066            | 4          | E6320      |           | 65                       |
|                                    | 1.86              | 1066            | 2          | E6300      | SL9TA     | 65                       |
|                                    | 2.40              | 800             | 2          | E4600      |           | 65                       |
|                                    | 2.20              | 800             | 2          | E4500      |           | 65                       |
|                                    | 2.00              | 800             | 2          | E4400      |           | 65                       |
|                                    | 1.80              | 800             | 2          | E4300      | SL9TB     | 65                       |
|                                    | 1.80              | 800             | 2          | E4300 *    | SLA99     | 65                       |
| Intel® Pentium® (2 Cores) (Conroe) | 2.40              | 800             | 1          | E2220      |           | 65                       |
|                                    | 2.20              | 800             | 1          | E2200      |           | 65                       |
|                                    | 2.00              | 800             | 1          | E2180      |           | 65                       |
|                                    | 1.80              | 800             | 1          | E2160 *    | SLA8Z     | 65                       |
|                                    | 1.60              | 800             | 1          | E2140      |           | 65                       |
| Intel® Celeron® (Conroe)           | 2.40              | 800             | 0.5        | E1600      |           | 65                       |
|                                    | 2.20              | 800             | 0.5        | E1500 *    | SLAQZ     | 65                       |
|                                    | 2.20              | 800             | 0.5        | 450        |           | 35                       |
|                                    | 2.00              | 800             | 0.5        | 440 *      | SL9XL     | 35                       |
|                                    | 2.00              | 800             | 0.5        | E1400      |           | 65                       |
|                                    | 1.80              | 800             | 0.5        | 430        |           | 35                       |
|                                    | 1.60              | 800             | 0.5        | 420        |           | 35                       |
|                                    | 1.60              | 800             | 0.5        | E1200      |           | 65                       |

## 2.4 System Memory support

The KTQ45 boards have four onboard DDR3 DIMM sockets and support the following memory features:

DDR3-800/1066 DIMM 240pin DRAM modules (PC3-6400/PC3-8500)

- 1.5V (only) 240-pin DDR3 SDRAM DIMMs with gold-plated contacts
- DDR3-800 (PC3-6400), DDR3-1066 (PC3-8500) SDRAM DIMMs
- DDR3-800/1066 DIMM with SPD timings supported
- Unbuffered, single-sided x8/x16 or double-sided x8/x16 DIMMs
- 16 GB (4 x 4GB) maximum total system memory using 64-bit OS. (Shared Video Memory is withdrawn).
- 4 GB maximum total system memory using 32-bit OS. ~3GB is displayed in System Properties. (Shared Video Memory is withdrawn).
- Minimum total system memory: 512 MB
- Non-ECC DIMMs
- Serial Presence Detect

The installed DDR3 SDRAM 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 800 memory is used with an 800 MHz system bus frequency processor, the memory clock will operate at 400 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 800  | PC3-6400    | 800                            | 800                                  | 400                                    | 6400                      |
| DDR3 800  | PC3-6400    | 800                            | 1066                                 | 400                                    | 6400                      |
| DDR3 800  | PC3-6400    | 800                            | 1333                                 | 400                                    | 6400                      |
| DDR3 1066 | PC3-8500    | 1066                           | 800                                  | 400                                    | 6400                      |
| DDR3 1066 | PC3-8500    | 1066                           | 1066                                 | 533                                    | 8533                      |
| DDR3 1066 | PC3-8500    | 1066                           | 1333                                 | 533                                    | 8533                      |

**Notes:** Kontron offers the following memory modules:

- P/N 1028-6891, DDR3-RAM, **1GB**, 240p, 800MHZ, PC3-8500, DIMM
- P/N 1028-6892, DDR3-RAM, **2GB**, 240p, 800MHZ, PC3-8500, DIMM
- Faster RAM like PC3-10600 can be used but will run at lower speed.

### Memory Configurations

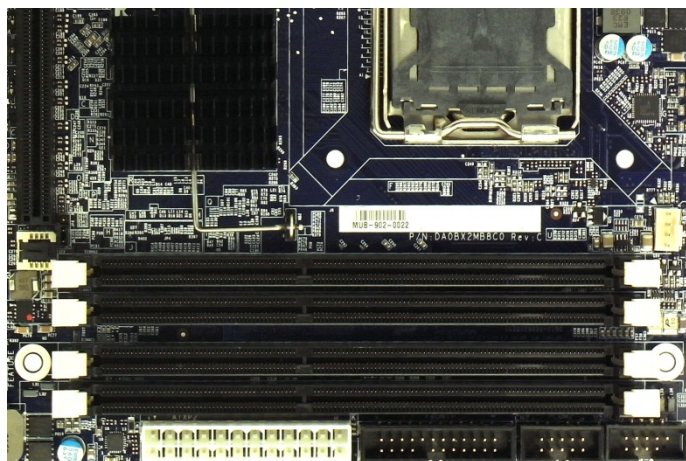
The KTQ45 boards support the following three types of memory organization:

1. Dual channel (Interleaved) mode. This mode offers the highest throughput. Dual channel mode is enabled when the installed memory capacities of both DIMM channels are equal. Technology and device width can vary from one channel to the other but the installed memory capacity for each channel must be equal. If different speed DIMMs are used between channels, the slowest memory timing will be used.

2. Single channel (Asymmetric) mode. This mode is equivalent to single channel bandwidth operation. This mode is used when only a single DIMM is installed or the memory capacities of channel A is bigger than of channel B. Technology and device width can vary from one channel to the other. If different speed DIMMs are used between channels, the slowest memory timing will be used.

3. Flex mode. This mode provides the most flexible performance characteristics and is used if both channels are populated and at the same time the memory capacities of channel A is smaller than of channel B.

Channel B will be divided into two parts. One part of channel B is used together with channel A and mapped to dual channel operation. The second part of channel B is mapped to single channel operation.



- ← Channel A, DDR3 DIMMA1 (SLOT 1)
- ← Channel A, DDR3 DIMMB1 (SLOT 2)
- ← Channel B, DDR3 DIMMC1 (SLOT 3)
- ← Channel B, DDR2 DIMMD1 (SLOT 4)

#### Note:

Regardless of the memory configuration Dual Channel, Single Channel or Flex, the DIMMA1 **must** always be populated. This is a requirement of the Intel® Management Engine.

The below tables shows examples of possible Memory slot configurations for the support of the various Memory modes.

#### Dual Channel Interleaved Mode Configurations

| Channel A            |                      | Channel B            |                      |
|----------------------|----------------------|----------------------|----------------------|
| DDR3 DIMMA1 (SLOT 1) | DDR3 DIMMB1 (SLOT 2) | DDR3 DIMMC1 (SLOT 3) | DDR3 DIMMD1 (SLOT 4) |
| 2 GB                 |                      | 2 GB                 |                      |
| 1 GB                 | 1 GB                 | 2 GB                 |                      |
| 1 GB                 | 2 GB                 | 1 GB                 | 2 GB                 |

In these examples the combined capacity of the two DIMMs in Channel A equals the combined capacity of the two DIMMs in Channel B.

#### Single Channel Asymmetric Mode Configurations

| Channel A            |                      | Channel B            |                      |
|----------------------|----------------------|----------------------|----------------------|
| DDR3 DIMMA1 (SLOT 1) | DDR3 DIMMB1 (SLOT 2) | DDR3 DIMMC1 (SLOT 3) | DDR3 DIMMD1 (SLOT 4) |
| 2 GB                 |                      |                      |                      |
| 1 GB                 | 2 GB                 | 2 GB                 |                      |

In these examples the combined capacity of the two DIMMs in Channel A does not equal the capacity of the DIMMs in Channel B.

#### Dual Channel Flex Mode Configurations

| Channel A            |                      | Channel B            |                      |
|----------------------|----------------------|----------------------|----------------------|
| DDR3 DIMMA1 (SLOT 1) | DDR3 DIMMB1 (SLOT 2) | DDR3 DIMMC1 (SLOT 3) | DDR3 DIMMD1 (SLOT 4) |
| 1 GB                 |                      | 2 GB                 |                      |

The 1 GB DIMM in the Channel A, DIMM 0 socket and the lower 1 GB of the DIMM in the Channel B, DIMM 0 socket operate together in dual channel mode. The remaining (upper) 1 GB of the DIMM in Channel B operates in single channel mode.

## 2.5 KTQ45 Graphics Subsystem

The KTQ45 boards use the Intel Q45 chipset for the graphical control. This chipset contains two separate, mutually exclusive graphics options. Either the GMA 4500 graphics controller (contained within the AC82Q45 GMCH) is used, or a PCI Express x16 add-in card can be used. When a PCI Expressx16 add-in card is installed, the GMA 4500 graphics controller is disabled.

### 2.5.1 Intel® GMA 4500

Features of the Intel GMA (Graphic Media Accelerator) 4500 graphics controller includes:

- High quality graphics engine supporting
  - DX10\* and OpenGL\* 2.0 compliant
  - Core frequency of 400 MHz
  - 1.6 GP/s pixel rate
  - High-Quality 3D Setup and Render Engine
  - High-Quality Texture Engine
  - 3D Graphics Rendering Enhancements
  - 2D Graphics
  - Video Overlay
  - Multiple Overlay Functionality
- Analogue Display (CRT)
  - 350 MHz Integrated 24-bit RAMDAC
  - Up to 2048x1536 @ 75 Hz refresh
  - Hardware Colour Cursor Support
  - DDC2B Compliant Interface
- Multiplexed PCIe x16, SDVO and TMDS.
  - PCIe x16 supports also PCIe Graphics card. Using PCIe Graphics card in combination with onboard graphics (VGA) is possible if BIOS setting *Initial Graphics Adaptor = IGD*. In this case onboard graphic will be Primary desktop and PCIe Graphics will be extended desktop. Note that PCIe Graphics driver shall be installed before the Intel Graphics driver
  - SDVO (Serial Digital Video Out) ports (2 channels single mode) for additional ADD2 (Advanced Digital Display 2) cards supporting second CRT monitor or Dual LVDS (Low Voltage Differential Signalling) panels or DVI (Digital Visual Interface) panels.
  - TMDS (Transition Minimized Differential Signalling) (2 channels) for additional, HDMI (High-Definition Multimedia Interface) support with HDCP (High-bandwidth Digital Content Protection) and HD Audio, DVI support, or DP (DisplayPort) support with 8/10 bit colours in WQXGA (2560x1600 pixels) and HDCP.
  - DVI, HDMI and DP support Hot-Plug.
  - 200 MHz dot clock on each 12-bit interface
  - Dual independent display options with digital display
- Dynamic Video Memory Technology (DVMT 5.0) support up to 352 MB



**Warning:** It is not recommended to use any PCIe Riser card in combination with PCIe Graphics card. Such combination does not comply with PCI Express 2.0 standard with the risk of generating instability.

### 2.5.2 DVMT 5.0 support

DVMT (Dynamic Video Memory Technology driven by OS driver) enables enhanced graphics and memory performance through highly efficient memory utilization. DVMT ensures the most efficient use of available system memory for maximum 2-D/3-D graphics performance. Up to 352 MB of system memory can be allocated to DVMT on systems that have 512 MB or more of total system memory installed. DVMT returns system memory back to the operating system when the additional system memory is no longer required by the graphics subsystem.

DVMT will always use a minimal fixed portion of system physical memory (as set in the BIOS Setup) for compatibility with legacy applications. An example of this would be when using VGA graphics under DOS. Once loaded, the operating system and graphics drivers allocate additional system memory to the graphics buffer as needed for performing graphics functions.

### 2.5.3 ADD2 card support

The KTQ45 board routes two multiplexed SDVO ports that are each capable of driving up to a 200 MHz pixel clock to the PCI Express x16 connector. The SDVO ports can be paired for a dual channel configuration to support up to a 400 MHz pixel clock. When an ADD2 (Advanced Digital Display) card is detected, the Intel GMA 4500 graphics controller is enabled and the PCI Express x16 connector is configured for SDVO mode. SDVO mode enables the SDVO ports to be accessed by the ADD2 card. An ADD2 card can either be configured to support simultaneous display with the primary VGA display or can be configured to support dual independent display as an extended desktop configuration with different colour depths and resolutions.

ADD2 cards can be designed to support the following configurations:

- TV-Out (composite video)
- TMDS for DVI 1.0
- LVDS
- Single device operating in dual channel mode
- VGA output
- HDTV output
- HDMI support (when used with the HD Audio Link)

Currently available Kontron ADD2 cards

- P/N 820953, ADD2-LVDS
- P/N 820950, ADD2-Dual LVDS
- P/N 820951, ADD2-Dual Internal DVI
- P/N 820952, ADD2-Dual DVI
- P/N 820954, ADD2-CRT

Please visit the Kontron website ([www.kontron.com](http://www.kontron.com)) for details.

### 2.5.4 PCIe Passive Graphic card support

The KTQ45 board routes two TMDS ports that are each capable of driving up to a 200 MHz pixel clock to the PCI Express x16 connector. When a TMDS card is detected, the Intel GMA 4500 graphics controller is enabled and the PCI Express x16 connector is configured for TMDS mode. A TMDS card can either be configured to support simultaneous display with the primary VGA display or can be configured to support dual independent display as an extended desktop configuration with different colour depths and resolutions.

PCIe Passive Graphic cards can be designed to support the following configurations:

- TMDS for DVI 1.0
- Display Port
- HDMI support

Currently available Kontron PCIe Passive Graphic cards:

- P/N 820977, KT-PCIe-DVI-HDMI-I, (HDMI, and DVI with TMDS option).

Please visit the Kontron website ([www.kontron.com](http://www.kontron.com)) for details.

## 2.6 Power Consumption

In order to ensure safe operation of the board, the ATX power supply must monitor the supply voltage and shut down if the supplies are out of range – refer to the hardware manual for actual power specification.

The KTQ45/Flex board is powered through the ATX connector and the additional 12V separate supply for CPU as specified in the ATX specification; besides this the power supplied to the board must be within the ATX specification.

The requirements to the supply voltages are as follows:

| Supply | Min    | Max    | Note                                                                                                                                                                 |
|--------|--------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VCC3.3 | 3.168V | 3.432V | Should be $\pm 4\%$ for compliance with the ATX specification                                                                                                        |
| VCC    | 4.75V  | 5.25V  | Should be $\pm 5\%$ 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 $\pm 5\%$ for compliance with the ATX specification                                                                                                        |
| -12V   | -13.2V | -10.8V | Should be $\pm 10\%$ for compliance with the ATX specification                                                                                                       |
| -5V    | -5.50V | -4.5V  | Not required for the KTQ45 boards                                                                                                                                    |
| 5VSB   | 4.75V  | 5.25V  | Should be $\pm 5\%$ for compliance with the ATX specification                                                                                                        |

### Static Power Consumption

The power consumption of the KTQ45/ATXu Board is measured under:

- 1- DOS, idle, mean
- 2- WindowsXP, Running 3DMARK 2001 & 2 x CPU BURN, mean
- 3- S1, mean
- 4- S3, mean
- 5- S4, mean

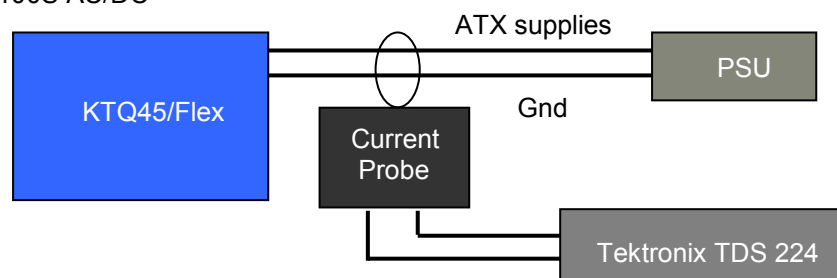
### Test system configuration

### Test system configuration

The following items were used in the test setup:

1. KTQ45/Flex board mounted w/ 3.00GHz (E8400) Core Duo & 1GB Samsung 1Rx8 PC3-10600U-09-00-A0 1,5V DDR3 Ram
2. 12V active cooler
3. PS/2 keyboard & mouse (Mouse: Genius Netscroll+ Keyboard:ACK-595)
4. CRT (Nokia 477Pro)
5. HD (Seagate Barracuda 7200.10 160 GB)
6. ATX PSU (OCZ-420ADJ)
7. Tektronix TDS 224, P6345 probes
8. Fluke Current Probe 80i-100S AC/DC

### Test setup



**Note:** The Power consumption of CRT, HD and Fan is not included.

| DOS Idle, Mean, No external load |              |                   |
|----------------------------------|--------------|-------------------|
| Supply                           | Current draw | Power consumption |
| +12V                             | 1.59A        | 19.08W            |
| +5V                              | 1.39A        | 6.95W             |
| +3V3                             | 1.28A        | 4.224W            |
| -12V                             | -            | 0W                |
| 5VSB                             | -            | 0W                |
| Total                            |              | 30.254W           |

| Windows XP, mean<br>3DMARK2001 (Game 1 – Car Chase test ) & 2 x CPUBURN |              |                   |
|-------------------------------------------------------------------------|--------------|-------------------|
| Supply                                                                  | Current draw | Power consumption |
| +12V                                                                    | 3.16A        | 37.92W            |
| +5V                                                                     | 1.55A        | 7.75W             |
| +3V3                                                                    | 2.8A         | 9.24W             |
| -12V                                                                    | 0.00A        | 0W                |
| 5VSB                                                                    | 0.00A        | 0W                |
| Total                                                                   |              | 54.91W            |

| S1 Mode, Mean, No external load |              |                   |
|---------------------------------|--------------|-------------------|
| Supply                          | Current draw | Power consumption |
| +12V                            | 0.76A        | 9.12W             |
| +5V                             | 1.11A        | 5.55W             |
| +3V3                            | 1.14A        | 3.762W            |
| -12V                            | 0.00A        | 0W                |
| 5VSB                            | 0.00A        | 0W                |
| Total                           |              | 18.432W           |

| S3 Mode, Mean, No external load |              |                   |
|---------------------------------|--------------|-------------------|
| Supply                          | Current draw | Power consumption |
| +12V                            | 0.00A        | 0W                |
| +5V                             | 0.00A        | 0W                |
| +3V3                            | 0.00A        | 0W                |
| -12V                            | 0.00A        | 0W                |
| 5VSB                            | 0.21A        | 1.05W             |
| Total                           |              | 1.05W             |

| S4 Mode, Mean, No external load |              |                   |
|---------------------------------|--------------|-------------------|
| Supply                          | Current draw | Power consumption |
| +12V                            | 0.00A        | 0W                |
| +5V                             | 0.00A        | 0W                |
| +3V3                            | 0.00A        | 0W                |
| -12V                            | 0.00A        | 0W                |
| 5VSB                            | 0.21A        | 1.05W             |
| Total                           |              | 1.05W             |

### 3 Connector Definitions

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

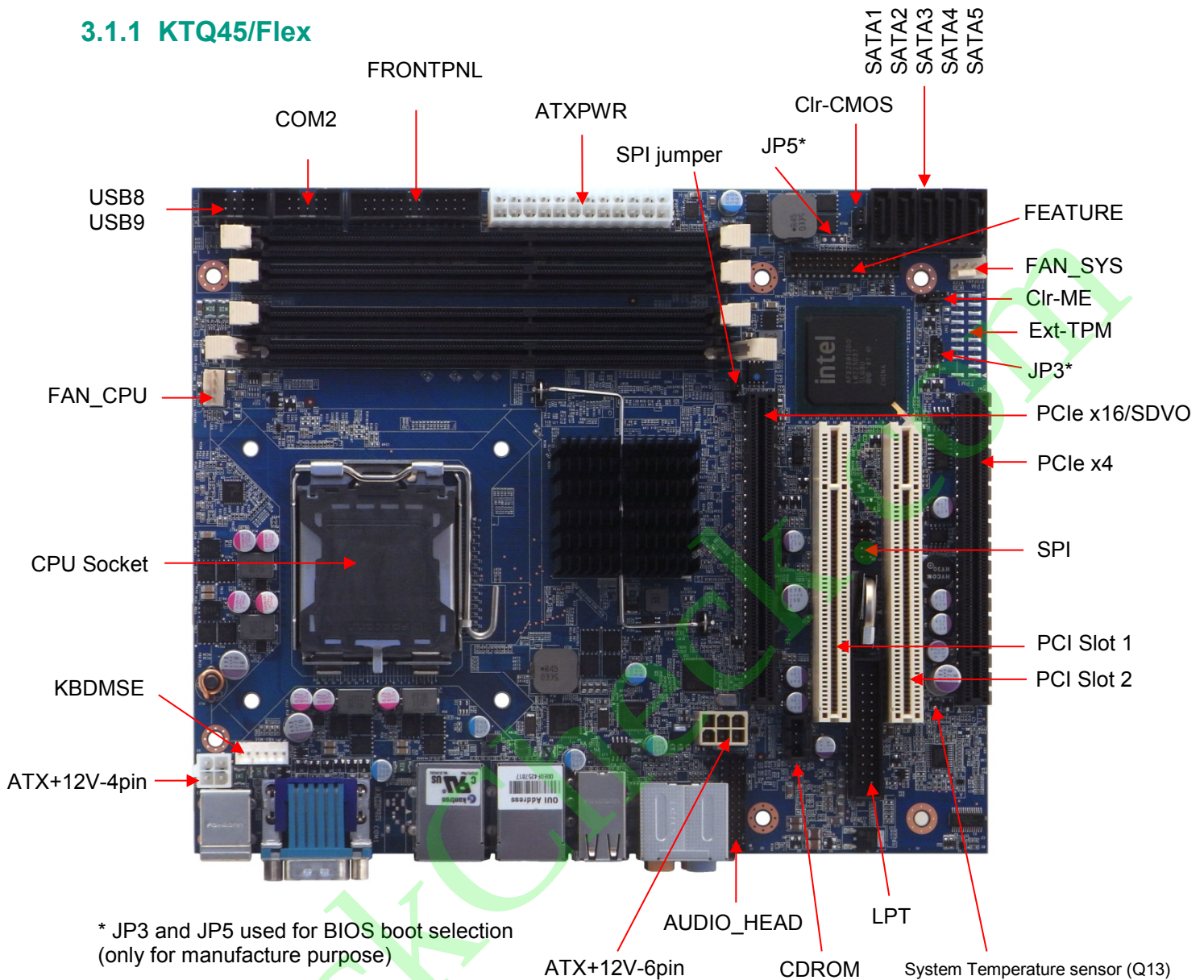
The connector definitions follow the following notation:

| 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.<br>AO: Analogue Output.<br>I: Input, TTL compatible if nothing else stated.<br>IO: Input / Output. TTL compatible if nothing else stated.<br>IOT: Bi-directional tristate IO pin.<br>IS: Schmitt-trigger input, TTL compatible.<br>IOC: Input / open-collector Output, TTL compatible.<br>NC: Pin not connected.<br>O: Output, TTL compatible.<br>OC: Output, open-collector or open-drain, TTL compatible.<br>OT: Output with tri-state capability, TTL compatible.<br>LVDS: Low Voltage Differential Signal.<br>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).<br>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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

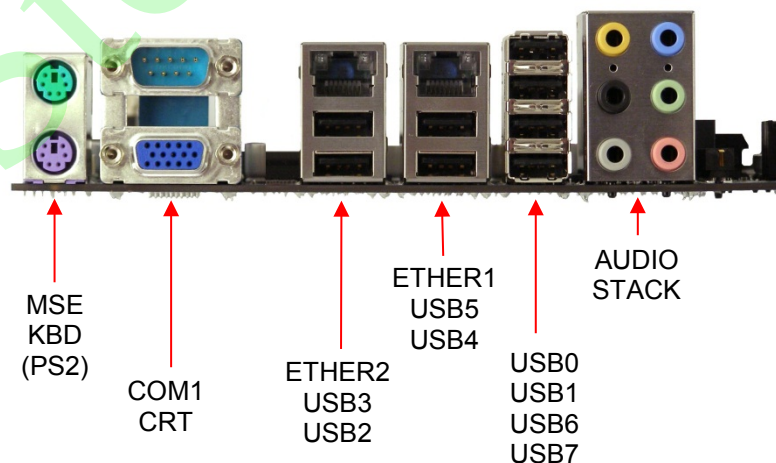
The abbreviation *TBD* is used for specifications which are not available yet or which are not sufficiently specified by the component vendors.

### 3.1 Connector layout

#### 3.1.1 KTQ45/Flex

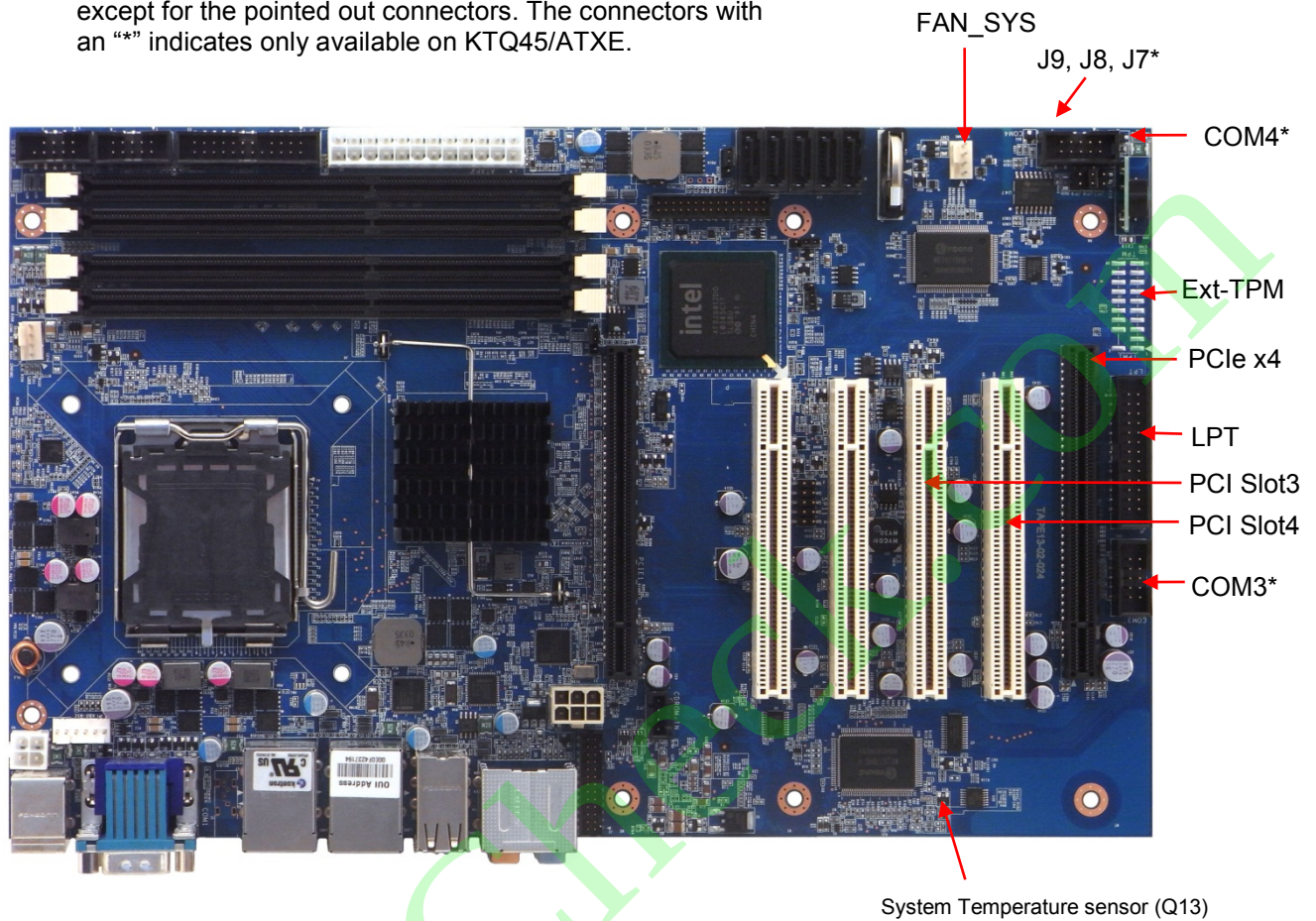


#### 3.1.2 KTQ45 - IO Bracket area



### 3.1.3 KTQ45/ATXE

Connectors are at the same location as on KTQ45/Flex, except for the pointed out connectors. The connectors with an "\*" indicates only available on KTQ45/ATXE.



## 3.2 Power Connector (ATXPWR)

The KTQ45 boards are designed to be supplied from a standard ATX or BTX power supply.

ATX/ BTX Power Connector:

| 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 | PS_ON# | 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 onboard.

Note: Use of BTX supply not required for operation, but may be required to drive high-power PCIe cards.

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-6pin Power Connector (same net as +12V in ATX/BTX Power connector):

| Note | Type | Signal | PIN |   | Signal | Type | Note |
|------|------|--------|-----|---|--------|------|------|
| 1    | PWR  | +12V   | 3   | 6 | GND    | PWR  |      |
| 1    | PWR  | +12V   | 2   | 5 | GND    | PWR  |      |
|      | PWR  | +12V   | 1   | 4 | GND    | PWR  |      |

ATX+12V-4pin Power Connector:

| 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 the KTQ45 boards.

| Signal | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P_OK   | <p>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 under voltage 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 under voltage 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 <i>ATX12V Power Supply Design Guide</i>.</p> <p>It is strongly recommended to use an ATX or BTX supply with the KTQ45 boards, in order to implement the supervision of the 5V and 3V3 supplies. These supplies are not supervised onboard the KTQ45 boards.</p> |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 3.3 Keyboard and Mouse connectors

Attachment of a keyboard or PS/2 mouse adapter can be done through the stacked PS/2 mouse and keyboard connector (MSE & KBD).

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.

#### 3.3.1 MINI-DIN Keyboard and Mouse Connector (KBD)

| Note | Pull U/D | Ioh/Iol | Type | Signal  | PIN | Signal | Type   | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|---------|-----|--------|--------|---------|----------|------|
|      | -        | -       | -    | NC      | 6   | 5      | MSCLK  | IOC     | TBD      | 2K7  |
|      | -        | -       | PWR  | 5V/SB5V | 4   | 3      | GND    | PWR     | -        | -    |
|      | -        | -       | -    | NC      | 2   | 1      | MSDAT  | IOC     | TBD      | 2K7  |
|      | -        | -       | -    | NC      | 6   | 5      | KBDCLK | IOC     | TBD      | 2K7  |
|      | -        | -       | PWR  | 5V/SB5V | 4   | 3      | GND    | PWR     | -        | -    |
|      | -        | -       | -    | NC      | 2   | 1      | KBDDAT | IOC     | TBD      | 2K7  |

Signal Description – Keyboard & and mouse Connector (MSE & KBD), see below.

#### 3.3.2 Keyboard and Mouse pinrow Connector (KBDMSE)

| PIN | Signal  | Type | Ioh/Iol | Pull U/D | Note |
|-----|---------|------|---------|----------|------|
| 1   | KBDCLK  | IOC  | TBD     | 2K7      |      |
| 2   | KBDDAT  | IOC  | TBD     | 2K7      |      |
| 3   | MSCLK   | IOC  | TBD     | 2K7      |      |
| 4   | MSDAT   | IOC  | TBD     | 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.     |
| KBDCLK | 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. |

### 3.4 Display connector

The KTQ45 board family provides onboard Analogue CRT interface. Additionally the KTQ45 boards provides support for ADD2 cards through the onboard PCI Express x16 connector, with extension capability for support of DVI, LVDS, VGA, HDMI/UDI, TV-Out, etc.

If a PCI Express x16 Graphics add-in card is used, the onboard Graphics controller (GMA 4500) is disabled.

#### 3.4.1 CRT Connector (CRT)

| 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  |

Signal Description - CRT Connector:

| Pin | Signal | Description                                                                              |
|-----|--------|------------------------------------------------------------------------------------------|
| 1   | RED    | Analogue output carrying the red colour signal to the CRT. For 75 Ohm cable impedance.   |
| 2   | GREEN  | Analogue output carrying the green colour signal to the CRT. For 75 Ohm cable impedance. |
| 3   | BLUE   | Analogue output carrying the blue colour signal to the CRT. For 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.    |

### 3.5 PCI-Express connectors

The KTQ45 board supports one 16-lane (x16) PCI Express port and one 4-lane PCI Express (x16) port.

**The 16-lane (x16) PCI Express 2.0** port can be used for external PCI Express graphics card. It is located nearest the CPU.

Supports PCI Express GEN1 frequency of 1.25 GHz (supports 2.5 Gbit/s in each direction, 500 MB/s totally). Maximum theoretical bandwidth using 16 lanes is 8 GB/s.

Supports PCI Express GEN2 frequency of 2.5 GHz (supports 5.0 Gbit/s in each direction, 1000 MB/s totally). Maximum theoretical bandwidth using 16 lanes is 16 GB/s.

The PCI Express (x16) interface is multiplexed with the SDVO ports.

**The 4-lane (x4) PCI Express 1.1** port is mechanically a x16 port and electrically a x4 port. It is located farthest away from CPU.

#### 3.5.1 PCI-Express x16/SDVO Connector (PCIe x16/SDVO)

| 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[15]/SDVOB_RED    | B14 A14 | PCIE_x16 CLK#              |      |      |
|      |      | PEG_TXN[15]/SDVOB_RED#   | B15 A15 | GND                        |      |      |
|      |      | GND                      | B16 A16 | PEG_RXP[15]/SDVO_TVCLKIN   |      |      |
|      |      | SDVO_CTRLCLK             | B17 A17 | PEG_RXN[15]/SDVO_TVCLKIN#  |      |      |
|      |      | GND                      | B18 A18 | GND                        |      |      |
|      |      | PEG_TXP[14]/SDVOB_GREEN  | B19 A19 | NC                         |      |      |
|      |      | PEG_TXN[14]/SDVOB_GREEN# | B20 A20 | GND                        |      |      |
|      |      | GND                      | B21 A21 | PEG_RXP[14]/SDVOB_INT      |      |      |
|      |      | GND                      | B22 A22 | PEG_RXN[14]/SDVOB_INT#     |      |      |
|      |      | PEG_TXP[13]/SDVOB_BLUE   | B23 A23 | GND                        |      |      |
|      |      | PEG_TXN[13]/SDVOB_BLUE#  | B24 A24 | GND                        |      |      |
|      |      | GND                      | B25 A25 | PEG_RXP[13]/SDVO_FLDSTALL  |      |      |
|      |      | GND                      | B26 A26 | PEG_RXN[13]/SDVO_FLDSTALL# |      |      |
|      |      | PEG_TXP[12]/SDVOB_CLKP   | B27 A27 | GND                        |      |      |
|      |      | PEG_TXN[12]/SDVOB_CLKN   | B28 A28 | GND                        |      |      |
|      |      | GND                      | B29 A29 | PEG_RXP[12]                |      |      |
|      |      | NC                       | B30 A30 | PEG_RXN[12]                |      |      |
|      |      | SDVO_CTRLDATA            | B31 A31 | GND                        |      |      |
|      |      | GND                      | B32 A32 | NC                         |      |      |
|      |      | PEG_TXP[11]/SDVOC_RED    | B33 A33 | NC                         |      |      |
|      |      | PEG_TXN[11]/SDVOC_RED#   | B34 A34 | GND                        |      |      |
|      |      | GND                      | B35 A35 | PEG_RXP[11]                |      |      |
|      |      | GND                      | B36 A36 | PEG_RXN[11]                |      |      |
|      |      | PEG_TXP[10]/SDVOC_GREEN  | B37 A37 | GND                        |      |      |
|      |      | PEG_TXN[10]/SDVOC_GREEN# | B38 A38 | GND                        |      |      |
|      |      | GND                      | B39 A39 | PEG_RXP[10]/SDVOC_INT      |      |      |
|      |      | GND                      | B40 A40 | PEG_RXN[10]/SDVOC_INT#     |      |      |
|      |      | PEG_TXP[9]/SDVOC_BLUE    | B41 A41 | GND                        |      |      |
|      |      | PEG_TXN[9]/SDVOC_BLUE#   | B42 A42 | GND                        |      |      |
|      |      | GND                      | B43 A43 | PEG_RXP[9]                 |      |      |
|      |      | GND                      | B44 A44 | PEG_RXN[9]                 |      |      |
|      |      | PEG_TXP[8]/SDVOC_CLKN    | B45 A45 | GND                        |      |      |

|  |                       |     |     |            |  |  |
|--|-----------------------|-----|-----|------------|--|--|
|  | PEG_TXN[8]/SDVOC_CLKP | B46 | A46 | GND        |  |  |
|  | GND                   | B47 | A47 | PEG_RXP[8] |  |  |
|  | PRSNT#2               | B48 | A48 | PEG_RXN[8] |  |  |
|  | GND                   | B49 | A49 | GND        |  |  |
|  | PEG_TXP[7]            | B50 | A50 | NC         |  |  |
|  | PEG_TXN[7]            | B51 | A51 | GND        |  |  |
|  | GND                   | B52 | A52 | PEG_RXP[7] |  |  |
|  | GND                   | B53 | A53 | PEG_RXN[7] |  |  |
|  | PEG_TXP[6]            | B54 | A54 | GND        |  |  |
|  | PEG_TXN[6]            | B55 | A55 | GND        |  |  |
|  | GND                   | B56 | A56 | PEG_RXP[6] |  |  |
|  | GND                   | B57 | A57 | PEG_RXN[6] |  |  |
|  | PEG_TXP[5]            | B58 | A58 | GND        |  |  |
|  | PEG_TXN[5]            | B59 | A59 | GND        |  |  |
|  | GND                   | B60 | A60 | PEG_RXP[5] |  |  |
|  | GND                   | B61 | A61 | PEG_RXN[5] |  |  |
|  | PEG_TXP[4]            | B62 | A62 | GND        |  |  |
|  | PEG_TXN[4]            | B63 | A63 | GND        |  |  |
|  | GND                   | B64 | A64 | PEG_RXP[4] |  |  |
|  | GND                   | B65 | A65 | PEG_RXN[4] |  |  |
|  | PEG_TXP[3]            | B66 | A66 | GND        |  |  |
|  | PEG_TXN[3]            | B67 | A67 | GND        |  |  |
|  | GND                   | B68 | A68 | PEG_RXP[3] |  |  |
|  | GND                   | B69 | A69 | PEG_RXN[3] |  |  |
|  | PEG_TXP[2]            | B70 | A70 | GND        |  |  |
|  | PEG_TXN[2]            | B71 | A71 | GND        |  |  |
|  | GND                   | B72 | A72 | PEG_RXP[2] |  |  |
|  | GND                   | B73 | A73 | PEG_RXN[2] |  |  |
|  | PEG_TXP[1]            | B74 | A74 | GND        |  |  |
|  | PEG_TXN[1]            | B75 | A75 | GND        |  |  |
|  | GND                   | B76 | A76 | PEG_RXP[1] |  |  |
|  | GND                   | B77 | A77 | PEG_RXN[1] |  |  |
|  | PEG_TXP[0]            | B78 | A78 | GND        |  |  |
|  | PEG_TXN[0]            | B79 | A79 | GND        |  |  |
|  | GND                   | B80 | A80 | PEG_RXP[0] |  |  |
|  | NC                    | B81 | A81 | PEG_RXN[0] |  |  |
|  | NC                    | B82 | A82 | GND        |  |  |

### 3.5.2 PCI-Express x4 Connector (PCIe x4)

| 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_x4 CLK  |      |      |
|      |      | PCIE_TXP[1] | B14 A14 | PCIE_x4 CLK# |      |      |
|      |      | PCIE_TXN[1] | B15 A15 | GND          |      |      |
|      |      | GND         | B16 A16 | PCIE_RXP[1]  |      |      |
|      |      | NC          | B17 A17 | PCIE_RXN[1]  |      |      |
|      |      | GND         | B18 A18 | GND          |      |      |
|      |      | PCIE_TXP[2] | B19 A19 | NC           |      |      |
|      |      | PCIE_TXN[2] | B20 A20 | GND          |      |      |
|      |      | GND         | B21 A21 | PCIE_RXP[2]  |      |      |
|      |      | GND         | B22 A22 | PCIE_RXN[2]  |      |      |
|      |      | PCIE_TXP[3] | B23 A23 | GND          |      |      |
|      |      | PCIE_TXN[3] | B24 A24 | GND          |      |      |
|      |      | GND         | B25 A25 | PCIE_RXP[3]  |      |      |
|      |      | GND         | B26 A26 | PCIE_RXN[3]  |      |      |
|      |      | PCIE_TXP[4] | B27 A27 | GND          |      |      |
|      |      | PCIE_TXN[4] | B28 A28 | GND          |      |      |

|  |  |     |     |     |             |  |  |
|--|--|-----|-----|-----|-------------|--|--|
|  |  | GND | B29 | A29 | PCIE_RXP[4] |  |  |
|  |  | NC  | B30 | A30 | PCIE_RXN[4] |  |  |
|  |  | NC  | B31 | A31 | GND         |  |  |
|  |  | GND | B32 | A32 | NC          |  |  |
|  |  | NC  | B33 | A33 | NC          |  |  |
|  |  | NC  | B34 | A34 | GND         |  |  |
|  |  | GND | B35 | A35 | NC          |  |  |
|  |  | GND | B36 | A36 | NC          |  |  |
|  |  | NC  | B37 | A37 | GND         |  |  |
|  |  | NC  | B38 | A38 | GND         |  |  |
|  |  | GND | B39 | A39 | NC          |  |  |
|  |  | GND | B40 | A40 | NC          |  |  |
|  |  | NC  | B41 | A41 | GND         |  |  |
|  |  | NC  | B42 | A42 | GND         |  |  |
|  |  | GND | B43 | A43 | NC          |  |  |
|  |  | GND | B44 | A44 | NC          |  |  |
|  |  | NC  | B45 | A45 | GND         |  |  |
|  |  | NC  | B46 | A46 | GND         |  |  |
|  |  | GND | B47 | A47 | NC          |  |  |
|  |  | NC  | B48 | A48 | NC          |  |  |
|  |  | GND | B49 | A49 | GND         |  |  |
|  |  | NC  | B50 | A50 | NC          |  |  |
|  |  | NC  | B51 | A51 | GND         |  |  |
|  |  | GND | B52 | A52 | NC          |  |  |
|  |  | GND | B53 | A53 | NC          |  |  |
|  |  | NC  | B54 | A54 | GND         |  |  |
|  |  | NC  | B55 | A55 | GND         |  |  |
|  |  | GND | B56 | A56 | NC          |  |  |
|  |  | GND | B57 | A57 | NC          |  |  |
|  |  | NC  | B58 | A58 | GND         |  |  |
|  |  | NC  | B59 | A59 | GND         |  |  |
|  |  | GND | B60 | A60 | NC          |  |  |
|  |  | GND | B61 | A61 | NC          |  |  |
|  |  | NC  | B62 | A62 | GND         |  |  |
|  |  | NC  | B63 | A63 | GND         |  |  |
|  |  | GND | B64 | A64 | NC          |  |  |
|  |  | GND | B65 | A65 | NC          |  |  |
|  |  | NC  | B66 | A66 | GND         |  |  |
|  |  | NC  | B67 | A67 | GND         |  |  |
|  |  | GND | B68 | A68 | NC          |  |  |
|  |  | GND | B69 | A69 | NC          |  |  |
|  |  | NC  | B70 | A70 | GND         |  |  |
|  |  | NC  | B71 | A71 | GND         |  |  |
|  |  | GND | B72 | A72 | NC          |  |  |
|  |  | GND | B73 | A73 | NC          |  |  |
|  |  | NC  | B74 | A74 | GND         |  |  |
|  |  | NC  | B75 | A75 | GND         |  |  |
|  |  | GND | B76 | A76 | NC          |  |  |
|  |  | GND | B77 | A77 | NC          |  |  |
|  |  | NC  | B78 | A78 | GND         |  |  |
|  |  | NC  | B79 | A79 | GND         |  |  |
|  |  | GND | B80 | A80 | NC          |  |  |
|  |  | NC  | B81 | A81 | NC          |  |  |
|  |  | NC  | B82 | A82 | GND         |  |  |

### 3.6 Serial ATA Hard Disk interface

The KTQ45 boards have an integrated SATA Host controller that supports independent DMA operation on six ports and data transfer rates of up to 3.0Gb/s (300MB/s). The SATA controller supports AHCI mode and has integrated RAID functionality with support for RAID modes 0, 1, 5 and 10 (Linux O/S only support for RAID 0 and 1).

The board provides five Serial ATA (SATA) connectors which support one device per connector. The ICH10DO Serial ATA controller offers six independent Serial ATA ports with a theoretical maximum transfer rate of 3 Gbit/sec per port. One device can be installed on each port for a maximum of six Serial ATA devices. A point-to-point interface is used for host to device connections, unlike Parallel ATA IDE which supports a master/slave configuration and two devices per channel.

For compatibility, the underlying Serial ATA functionality is transparent to the operating system. The Serial ATA controller can operate in both legacy and native modes. In legacy mode, standard IDE I/O and IRQ resources are assigned (IRQ 14 and 15). In Native mode, standard PCI Conventional bus resource steering is used. Native mode is the preferred mode for configurations using the Windows XP and Windows Vista operating systems.

The KTQ45 supports the following RAID (Redundant Array of Independent Drives) levels:

- RAID 0 - data striping
- RAID 1 - data mirroring
- RAID 0+1 (or RAID 10) - data striping and mirroring
- RAID 5 - distributed parity

Limitations depending on Target Operating System apply.

**Note:** On the KTQ45 there is no parallel ATA or CF interface, but on the market it's possible to find different SATA converters to support CF etc.

In case CF card shall be used as hot plug device then it is recommended to use USB to CF adapter. (SATA to CF adapter doesn't support hot plug).

#### 3.6.1 SATA Hard Disk Connector (SATA1, SATA2, SATA3, SATA4, SATA5)

**SATA:**

| 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 Serial ATA hard disk interface are the following:

| Signal                 | Description                               |
|------------------------|-------------------------------------------|
| SATA* RX+<br>SATA* RX- | Host transmitter differential signal pair |
| SATA* TX+<br>SATA* TX- | Host receiver differential signal pair    |

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

### 3.7 Printer Port Connector (LPT)

The signal definition in standard printer port mode is as follows:

| Note | Pull U/D | Ioh/Iol | Type  | Signal | PIN   | Signal | Type  | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|-------|--------|-------|--------|-------|---------|----------|------|
|      | 2K2      | (24)/24 | OC(O) | STB#   | 1 2   | AFD#   | OC(O) | (24)/24 | 2K2      |      |
|      | 2K2      | 24/24   | IO    | PD0    | 3 4   | ERR#   | I     | -       | 2K2      |      |
|      | 2K2      | 24/24   | IO    | PD1    | 5 6   | INIT#  | OC(O) | (24)/24 | 2K2      |      |
|      | 2K2      | 24/24   | IO    | PD2    | 7 8   | SLIN#  | OC(O) | (24)/24 | 2K2      |      |
|      | 2K2      | 24/24   | IO    | PD3    | 9 10  | GND    | PWR   | -       | -        |      |
|      | 2K2      | 24/24   | IO    | PD4    | 11 12 | GND    | PWR   | -       | -        |      |
|      | 2K2      | 24/24   | IO    | PD5    | 13 14 | GND    | PWR   | -       | -        |      |
|      | 2K2      | 24/24   | IO    | PD6    | 15 16 | GND    | PWR   | -       | -        |      |
|      | 2K2      | 24/24   | IO    | PD7    | 17 18 | GND    | PWR   | -       | -        |      |
|      | 2K2      | -       | I     | ACK#   | 19 20 | GND    | PWR   | -       | -        |      |
|      | 2K2      | -       | I     | BUSY   | 21 22 | GND    | PWR   | -       | -        |      |
|      | 2K2      | -       | I     | PE     | 23 24 | GND    | PWR   | -       | -        |      |
|      | 2K2      | -       | I     | SLCT   | 25 26 | GND    | PWR   | -       | -        |      |

The definition of the signals in standard Centronics mode (SPP) with a printer attached is as follows:

| Signal | Description                                                                                                            |
|--------|------------------------------------------------------------------------------------------------------------------------|
| PD7..0 | Parallel data bus from PC board to printer. The data lines are able to operate in PS/2 compatible bi-directional mode. |
| SLIN#  | Signal to select the printer sent from CPU board to printer.                                                           |
| SLCT   | Signal from printer to indicate that the printer is selected.                                                          |
| STB#   | This signal indicates to the printer that data at PD7..0 are valid.                                                    |
| BUSY   | Signal from printer indicating that the printer cannot accept further data.                                            |
| ACK#   | Signal from printer indicating that the printer has received the data and is ready to accept further data.             |
| INIT#  | This active low output initializes (resets) the printer.                                                               |
| AFD#   | This active low output causes the printer to add a line feed after each line printed.                                  |
| ERR#   | Signal from printer indicating that an error has been detected.                                                        |
| PE#    | Signal from printer indicating that the printer is out of paper.                                                       |

The printer port additionally supports operation in the EPP and ECP mode.

### 3.8 Serial Ports

Two RS232 serial ports are available on the KTQ45/Flex.

Three RS232 serial ports and one RS485 port are available on the KTQ45/ATXE.

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

| Signal | Description                                                                                                                                                                                             |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TxD    | Transmitted Data, sends serial 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 serial data from the communications link.                                                                                                                                       |
| DTR    | Data Terminal Ready, indicates to the modem or data set that the on-board UART is ready to establish a communication link.                                                                              |
| DSR    | Data Set Ready, indicates that the modem or data set is ready to establish a communications link.                                                                                                       |
| RTS    | Request To Send, indicates to the modem or data set 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 connector pinout for each operation mode is defined in the following sections.

#### 3.8.1 COM1 Connectors

COM1 is RS232 port available in the IO Bracket area. 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   |        |      |         |          |      |

### 3.8.2 COM2 and COM3 Header Connectors

COM3 is only available on the KTQ45/ATXE.

The pinout of Serial ports COM2 and COM3 is as follows:

| Note | Pull U/D | loh/loi | Type | Signal | PIN  | Signal | Type | loh/loi | Pull U/D | 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 and COM3 5V supply is fused with individual 1.1A resettable fuses for each connector.

A DB9 adapter (ribbon cable) is available for connecting the COM ports to I/O front panel.

### 3.8.3 COM4 Header Connectors

COM4 is RS485 (galvanic isolated). COM4 is only available on the KTQ45/ATXE.

The pinout of Serial ports COM4 is as follows:

| Note  | Pull U/D | loh/loi | Type | Signal  | PIN  | Signal  | Type | loh/loi | Pull U/D | Note |
|-------|----------|---------|------|---------|------|---------|------|---------|----------|------|
| 3,5   |          | -       | I    | RxD+    | 1 2  | 5V_iso  | PWR  | -       | -        | 1    |
| 2,3,5 |          | -       | I    | RxD -   | 3 4  | 5V_iso  | PWR  | -       | -        |      |
| 2,4,5 | -        |         | O    | TxD-    | 5 6  | GND_iso | PWR  | -       | -        |      |
| 4,5   | -        |         | O    | TxD+    | 7 8  | GND_iso | PWR  | -       | -        |      |
|       | -        | -       | PWR  | GND_iso | 9 10 | GND_iso | PWR  | -       | -        |      |

**Note 1:** The COM4 header 5V\_iso supply is fused with a 1.1A resettable fuse. The power source connected to this net is delivered by internally galvanic isolated PSU used to power onboard RS485 driver. The maximum allowed current to drawn on this net must not exceed 50mA if used.

**Warning:** Do not attempt to connect external power source to this net any attempt might damage the board.

**Note 2:** RTS signal control the output drivers.

**Note 3:** 120R termination resistor between signal RxD+ and RxD- is connected on the board.

**Note 4:** 120R termination resistor between signal TxD+ and TxD- is connected on the board.

**Note 5:** RxD and TxD pairs can be connected to each other for 2 wire / Half-Duplex transmission line. This can be configured on the board by adding Jumper JP7 and JP9. The transmitter termination resistor can be disabled by removing Jumper JP8.

If using Kontron PN 821016 or PN 821017 as DB9 adapter (ribbon cable) then the pinout is as follows:

| Note | Pull U/D | loh/loi | Type | Signal  | PIN | Signal  | Type | loh/loi | Pull U/D | Note |
|------|----------|---------|------|---------|-----|---------|------|---------|----------|------|
|      | -        | -       | PWR  | GND_iso | 5   |         |      |         |          |      |
|      |          |         |      |         | 9   | GND_iso | PWR  | -       | -        |      |
|      | -        | -       | O    | TxD+    | 4   |         |      |         |          |      |
|      |          |         |      |         | 8   | GND_iso | PWR  | -       | -        |      |
|      | -        | -       | O    | TxD-    | 3   |         |      |         |          |      |
|      |          |         |      |         | 7   | 5V_iso  | PWR  | -       | -        |      |
|      | -        | -       | I    | RxD -   | 2   |         |      |         |          |      |
|      |          |         |      |         | 6   | 5V_iso  | PWR  | -       | -        |      |
|      | -        | -       | I    | RxD+    | 1   |         |      |         |          |      |

### 3.9 Ethernet Connectors

The KTQ45 boards supports 2 channels of 10/100/1000Mb Ethernet one based on Intel® Boazman-LM WG82567LM Gigabit PHY with AMT 5.0 support (ETHER1) and the other based on Intel® Hartwell 82574L PCI Express controller (ETHER2).

In order to achieve the specified performance of the Ethernet port, Category 5 twisted pair cables must be used with 10/100MB and 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.<br>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.<br>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.<br>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.<br>In MDI crossover mode, this pair acts as the BI_DC+/- pair.                                                                                                          |

**Note:** MDI = Media Dependent Interface.

#### 3.9.1 Ethernet Connectors 1 and 2 (ETHER1 and ETHER2)

Ethernet connector 1 (positioned to the right) is mounted together with USB Ports 4 and 5.

Ethernet connector 2 (positioned to the left) is mounted together with USB Ports 2 and 3.

The pinout of the RJ45 connector 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 |      |         |      |

**Note:** Do not use PCB silkscreen to identify the position of ETHER1/ETHER2. Silkscreen might indicate LAN1 and LAN2 in opposite order.

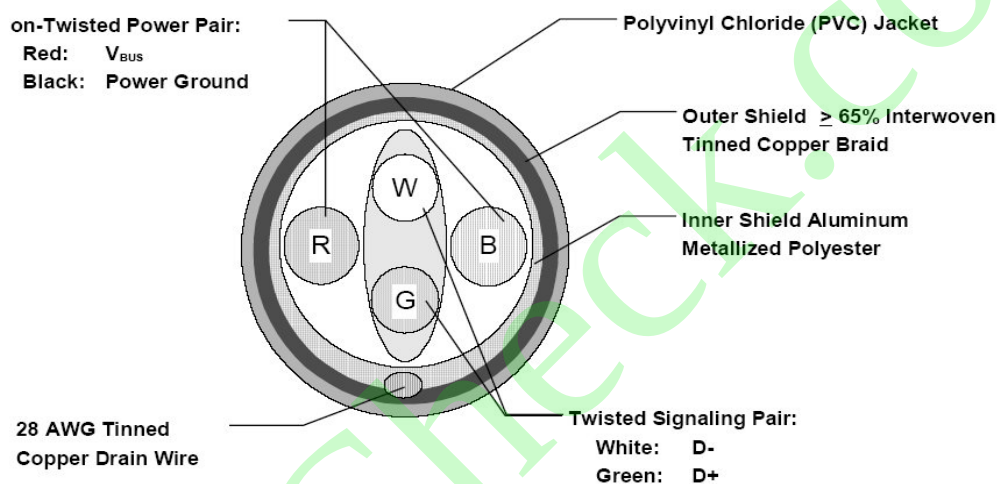
### 3.10 USB Connectors (USB)

The KTQ45 board contains two Enhanced Host Controller Interface (EHCI) host controllers that support USB 2.0 allowing data transfers up to 480Mb/s. The KTQ45 boards also contains Six Universal Host Controller Interface (UHCI Revision 1.1) controllers that support USB full-speed and low-speed signalling. The KTQ45 board supports a total of twelve USB 2.0 ports. All twelve ports are high-speed, full-speed, and low-speed capable and USB Legacy mode is supported.

Over-current detection on all twelve USB ports is supported.

USB Port 2 and 3 are supplied on the combined ETHER2, USB2, and USB3 connector.  
 USB Port 4 and 5 are supplied on the combined ETHER1, USB4, and USB5 connector.  
 USB Port 0, 1, 6 and 7 are supplied on the combined USB0, USB1, USB6, USB7 connector.  
 USB Port 8 and 9 are supplied on the USB8 USB9 on the internal USBC1 connector.  
 USB Ports 10 and 11 are supplied on the internal FRONTPNL connector; please refer to the FRONTPNL connector section for the pin-out.

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



#### 3.10.1 USB Connector 2/3 (USB2/3)

USB Ports 2 and 3 are mounted together with ETHER2 Ethernet port.

| Note | Pull U/D | Ioh/Iol | Type | Signal  | PIN     | Signal | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|---------|---------|--------|------|---------|----------|------|
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB3-   |         | USB3+  | IO   | 0.25/2  | /15K     |      |
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB2-   |         | USB2+  | IO   | 0.25/2  | /15K     |      |

**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-<br>USB3+ USB3- | Differential pair works as Data/Address/Command Bus.                                                                                                                  |
| 5V/SB5V                    | 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. |

### 3.10.2 USB Connector 4/5 (USB4/5)

USB Ports 4 and 5 are mounted together with ETHER1 Ethernet port.

| Note | Pull U/D | Ioh/Iol | Type | Signal  | PIN     | Signal | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|---------|---------|--------|------|---------|----------|------|
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB5-   |         | USB5+  | IO   | 0.25/2  | /15K     |      |
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB4-   |         | USB4+  | IO   | 0.25/2  | /15K     |      |

**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-<br>USB5+ USB5- | Differential pair works as Data/Address/Command Bus.                                                                                                                  |
| 5V/SB5V                    | 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. |

### 3.10.3 USB Connector 0/1/6/7 (USB0/1/6/7)

USB Ports 0, 1, 6 and 7 are available on the combined USB0, USB1, USB6, USB7 connector.

| Note | Pull U/D | Ioh/Iol | Type | Signal  | PIN     | Signal | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|---------|---------|--------|------|---------|----------|------|
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB0-   |         | USB0+  | IO   | 0.25/2  | /15K     |      |
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB1-   |         | USB1+  | IO   | 0.25/2  | /15K     |      |
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB6-   |         | USB6+  | IO   | 0.25/2  | /15K     |      |
| 1    | -        | -       | PWR  | 5V/SB5V | 1 2 3 4 | GND    | PWR  | -       | -        |      |
|      | /15K     | 0.25/2  | IO   | USB7-   |         | USB7+  | IO   | 0.25/2  | /15K     |      |

**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-<br>USB1+ USB1-<br>USB6+ USB6-<br>USB7+ USB7- | 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 1.1A fuses, one covering USB0 and USB1, and another covering USB6 and USB7. |

### 3.10.4 USB Connector 8/9 (USB8/9)

USB Ports 8 and 9 are supplied on the internal USBC1 pinrow connector.

| Note | Pull U/D | Ioh/Iol | Type | Signal  | PIN  | Signal  | Type | Ioh/Iol | Pull U/D | 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  | -       |          |      |
|      | -        | -       |      | KEY     | 9 10 | NC      |      | -       | -        |      |

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

| Signal                     | Description                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB8+ USB8-<br>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 1.1A fuse covering both USB ports. |

### 3.10.5 USB Connector 10/11 (USB10/11)

See Frontpanel Connector (FRONTPNL) description.

### 3.11 Audio Connectors

The onboard 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.

#### 3.11.1 Audio Speakers, Line-In, Line-Out and Microphone

Audio Speakers, Line-in, Line-out and Microphone are available in the stacked audio jack connector. Below is shown audio stack configuration when configured for 8-channel audio.

| 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).        |      |
| 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). |      |
| MIC1        | MIC Input 1                               |      |
| LINE1-IN    | Line in 1 signals                         |      |

| 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 |

### 3.11.2 CDROM Audio Input (CDROM)

CD-ROM audio input may be connected to this connector. It may also be used as a secondary line-in signal.

| PIN | Signal   | Type | Ioh/Iol | Pull U/D | 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 use for the Left and Right channels is not a worldwide accepted standard. Some CDROM cable kits expect reverse pin order.

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

### 3.11.3 Audio Header (AUDIO\_HEAD)

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

| Signal      | Description                               | Note |
|-------------|-------------------------------------------|------|
| 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-IN    | Line in 1 signals                         |      |
| F-SPDIF-IN  | S/PDIF Input                              |      |
| F-SPDIF-OUT | S/PDIF Output                             |      |
| AAGND       | Audio Analogue ground                     |      |

### 3.12 Fan Connector (FAN\_CPU)

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 supports connection of 3-pin FAN, but it is recommended to use the 4-pin type for optimized FAN speed control. The 3- or 4-pin mode is set in the BIOS setup menu.

#### 4-pin Mode:

| PIN | Signal  | Type | loh/loi | 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. Onboard 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 | loh/loi | 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. Onboard is a pull-up resistor 4K7 to +12V. The signal has to be pulsed, typically twice per rotation. |
| 12V    | +12V supply for fan, can be turned on/off or modulated (PWM) by the chipset. A maximum of 2000mA can be supplied from this pin.                                                                                             |
| GND    | Power Supply GND signal                                                                                                                                                                                                     |

### 3.13 Clear CMOS Jumper (Clr-CMOS /JBAT1)

The Clr-CMOS Jumper is used to clear the CMOS content.

Jumper in Clear CMOS position  (only for 1 minute)

Jumper normal position  <-- pin 1

SATA1 connector

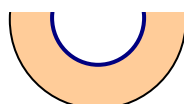
To clear all CMOS settings, including Password protection, move the Clr-CMOS jumper to pin 2-3 for 1 minute (Works with or without power connected to the system).

**WARNING:** Don't leave the jumper in Clear CMOS position, otherwise without power connected to the system the battery will fully depleted within a few weeks.

### 3.14 The Clear ME register Jumper (Clr-ME / JBAT2)

The Clr-ME Jumper (named JBAT2) is used to clear the manageability register. To clear the register both JBAT1 and JBAT2 should be in position 2&3 at the same time.

(Mounting hole in front of SATA connectors)



Jumper in normal position  <-- pin 1

Jumper in Clear ME Registers  (only for 1 minute)

**WARNING:** Don't leave the jumper in Clear CMOS position, otherwise without power connected to the system the battery will fully depleted within a few weeks.

### 3.15 The SPI Jumper (SPI-Jumper / JP6)

The SPI selection jumper is used to switch between onboard SPI and external SPI device.

**Note:** The SPI device holds the BIOS contents and should not be removed from its default position unless a pre-programmed SPI device is connected to the SPI1 connector.

Jumper in normal position  <-- pin 1

Jumper in Clear ME Registers 

(PCIe x16 / SDVO connectors)

### 3.16 Interface BIOS Jumpers (JP3 and JP5))

The Interface BIOS jumper (JP3 and JP5) are not to be removed from their default position, doing so will make the board non bootable. These jumpers are for manufacture purpose only.

JP3 shall be in position 1-2 (against PCI connectors)

JP5 shall be in position 1-2 (against SATA connectors)

### 3.17 TPM Connector (TPM)

This connector is unsupported.

| Note | Pull U/D | Ioh/Iol | Type | Signal     | PIN   | Signal     | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|------------|-------|------------|------|---------|----------|------|
|      | -        | -       | PWR  | LPC CLK    | 1 2   | GND        |      |         |          |      |
|      | -        | -       | PWR  | LPC FRAME# | 3     | KEY        |      |         |          |      |
|      |          |         |      | LPC RST#   | 5 6   | +5V        |      |         |          |      |
|      |          |         |      | LPC AD3    | 7 8   | LPC AD2    |      |         |          |      |
|      |          |         |      | +3V3       | 9 10  | LPC AD1    |      |         |          |      |
|      |          |         |      | LPC AD0    | 11 12 | GND        |      |         |          |      |
|      |          |         |      | SMB_CLK    | 13 14 | SMB_DATA   |      |         |          |      |
|      |          |         |      | SB3V3      | 15 16 | LPC SERIRQ |      |         |          |      |
|      |          |         |      | GND        | 17 18 | CLKRUN#    |      |         |          |      |
|      |          |         |      | SUS_STAT#  | 19 20 | NC         |      |         |          |      |

### 3.18 SPI Connector (SPI)

| Note | Pull U/D | Ioh/Iol | Type | Signal   | PIN  | Signal | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|----------|------|--------|------|---------|----------|------|
|      |          |         |      | SPI_CLK  | 1 2  | SB3V3  | PWR  | -       | -        |      |
|      | -        | -       | -    | NC       | 3 4  | BOOT0  | IO   | -       | -        |      |
|      | 10K/     |         |      | SPI_CS2# | 5 6  | BOOT1  | IO   | -       | -        |      |
|      | 10K/     |         |      | SPI_MOSI | 7 8  | MFG    |      | -       | -        |      |
|      | 10K/     |         |      | SPI_MISO | 9 10 | GND    | PWR  | -       | -        |      |

### 3.19 Front Panel Connector (FRONTPNL)

| Note | Pull U/D | loh/loI | Type | Signal      | PIN   | Signal      | Type | loh/loI | Pull U/D | Note |
|------|----------|---------|------|-------------|-------|-------------|------|---------|----------|------|
|      |          |         |      | USB10/11_5V | 1 2   | USB10/11_5V |      |         |          |      |
|      |          |         |      | USB1-       | 3 4   | USB3-       |      |         |          |      |
|      |          |         |      | USB1+       | 5 6   | USB3+       |      |         |          |      |
|      | -        | -       | PWR  | GND         | 7 8   | GND         | PWR  | -       | -        |      |
|      | -        | -       | -    | NC          | 9 10  | LINE2-IN-L  | -    | -       | -        |      |
|      | -        | -       | PWR  | +5V         | 11 12 | +5V         | PWR  | -       | -        |      |
|      |          |         | OC   | HD_LED      | 13 14 | SUS_LED     |      |         |          |      |
|      | -        | -       | PWR  | GND         | 15 16 | PWRBTN_IN#  |      |         |          |      |
|      |          |         |      | RSTIN#      | 17 18 | GND         | PWR  | -       | -        |      |
|      |          |         |      | SB3V3       | 19 20 | LINE2-IN-R  | -    | -       | -        |      |
|      |          |         |      | AGND        | 21 22 | AGND        |      |         |          |      |
|      |          |         |      | MIC2-L      | 23 24 | MIC2-R      |      |         |          |      |

| Signal         | Description                                                                                                                                                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB10/11_5V    | 5V supply for external devices. SB5V is supplied during powerdown to allow wakeup on USB device activity. Protected by resettable 1.1A fuse covering both USB ports. |
| USB1+<br>USB1- | Universal Serial Bus Port 1 Differentials: Bus Data/Address/Command Bus.                                                                                             |
| USB3+<br>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.                                                                  |
| HD_LED         | Hard Disk Activity LED (active low signal). Output is via 475Ω to OC.                                                                                                |
| SUS_LED        | Suspend Mode LED (active high signal). Output is via 475Ω.                                                                                                           |
| 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-IN       | Line in 2 signals                                                                                                                                                    |
| MIC2           | MIC2-L and MIC2-R is second stereo microphone input.                                                                                                                 |
| SB3V3          | Standby 3.3V voltage                                                                                                                                                 |
| AGND           | Analogue Ground for Audio                                                                                                                                            |

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

### 3.20 Feature Connector (FEATURE)

| Note | Pull U/D | Ioh/Iol | Type | Signal      | PIN   | Signal   | Type | Ioh/Iol | Pull U/D | Note |
|------|----------|---------|------|-------------|-------|----------|------|---------|----------|------|
| 2    | 2M/      | -       | I    | INTRUDER#   | 1 2   | GND      | PWR  | -       | -        |      |
|      |          |         |      | EXT_ISAIRQ# | 3 4   | EXT_SMI# | I    |         | 4K7/     | 3    |
|      |          |         |      | PWR_OK      | 5 6   | SB5V     | PWR  | -       | -        |      |
|      | -        | -       | PWR  | SB3V3       | 7 8   | EXT_BAT  | PWR  | -       | -        |      |
|      | -        | -       | PWR  | +5V         | 9 10  | GND      | PWR  | -       | -        |      |
| 1    | 4K7/     | /12mA   | IOT  | GPIO0       | 11 12 | GPIO1    | IOT  | /12mA   | 4K7/     | 1    |
| 1    | 4K7/     | /12mA   | IOT  | GPIO2       | 13 14 | GPIO3    | IOT  | /12mA   | 4K7/     | 1    |
| 1    | 4K7/     | /12mA   | IOT  | GPIO4       | 15 16 | GPIO5    | IOT  | /12mA   | 4K7/     | 1    |
| 1    | 4K7/     | /12mA   | IOT  | GPIO6       | 17 18 | GPIO7    | IOT  | /12mA   | 4K7/     | 1    |
|      | -        | -       | PWR  | GND         | 19 20 | FAN3OUT  | O    |         | 4K7/     | 3    |
|      |          |         |      | FAN3IN      | 21 22 | +12V     | PWR  | -       | -        |      |
|      |          |         |      | TEMP3IN     | 23 24 | VREF     |      |         |          |      |
|      | -        | -       | PWR  | GND         | 25 26 | IRRX     |      |         |          |      |
|      |          |         |      | IRTX        | 27 28 | GND      | PWR  | -       | -        |      |
| 1    | 4K7/     |         |      | SMBC        | 29 30 | SMBD     |      |         | 4K7/     | 1    |

#### Notes:

1. Pull-up to +3V3Dual (+3V3 or SB3V3).
2. Pull-up to onboard Battery.
3. Pull-up to +3V3.

| Signal      | Description                                                                                                                                                                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| INTRUDER#   | INTRUDER, may be 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.                                                                                       |
| EXT_ISAIRQ# | EXTernal ISA IRQ, (active low input) can activate standard AT-Bus IRQ-interrupt.                                                                                                                                                                                   |
| EXT_SMI#    | External SMI, (active low input) signal can activate SMI interrupt.                                                                                                                                                                                                |
| PWR_OK      | PoWeR OK, signal is high if no power failures are detected.                                                                                                                                                                                                        |
| SB5V        | StandBy +5V supply.                                                                                                                                                                                                                                                |
| SB3V3       | Max. load is 0.75A (1.5A < 1 sec.)                                                                                                                                                                                                                                 |
| 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 10). The external battery is protected against charging and can be used with or without the onboard battery installed. |
| +5V         | Max. load is 0.75A (1.5A < 1 sec.)                                                                                                                                                                                                                                 |
| GPIO0..7    | General Purpose Inputs / Output. These Signals may be controlled or monitored through the use of the KT-API-V2 (Application Programming Interface).                                                                                                                |
| FAN3OUT     | FAN 3 speed control OUTput. This 3.3V PWM signal can be used as Fan control voltage (0–3.3V DC in 128 steps) via a Fan Driver Circuit (not included) to program Fan voltage. For more info, see W83627 datasheet. Default PMW output is 127 (100% = 3.3V).         |
| FAN3IN      | FAN3 Input. 0V to +3V3 amplitude Fan 3 tachometer input.                                                                                                                                                                                                           |
| +12V        | Max. load is 0.75A (1.5A < 1 sec.)                                                                                                                                                                                                                                 |
| TEMP3IN     | Temperature sensor 3 input. (Recommended: Transistor 2N3904, having emitter connected to GND (pin 25), collector and basis shorted and connected to pin 23. Further a resistor 30K/1% shall be connected between pin 23 - 24. (Precision +/- 3°C).                 |
| VREF        | Voltage REference, reference voltage to be used with TEMP3IN input.                                                                                                                                                                                                |
| IRRX        | IR Receive input (IrDA 1.0, SIR up to 1.152K bps)                                                                                                                                                                                                                  |
| IRTX        | IR Transmit output (IrDA 1.0, SIR up to 1.152K bps)                                                                                                                                                                                                                |
| SMBC        | SMBus Clock signal                                                                                                                                                                                                                                                 |
| SMBD        | SMBus Data signal                                                                                                                                                                                                                                                  |

### 3.21 PCI Slot Connector (PCI Slot)

| Note               | Type | Signal    | Terminal<br>S C |     | Signal                | Type | Note |
|--------------------|------|-----------|-----------------|-----|-----------------------|------|------|
|                    | PWR  | -12V      | F01             | E01 | TRST#                 | O    |      |
|                    | O    | TCK       | F02             | E02 | +12V                  | PWR  |      |
|                    | PWR  | GND       | F03             | E03 | TMS                   | O    |      |
|                    | 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  |      |
|                    | I    | REQ2#     | F09             | E09 | CLKC                  | O    |      |
|                    | I    | REQ3#     | F10             | E10 | +5V (I/O)             | PWR  |      |
|                    | OT   | GNT2#     | F11             | E11 | CLKD                  | O    |      |
|                    | PWR  | GND       | F12             | E12 | GND                   | PWR  |      |
|                    | PWR  | GND       | F13             | E13 | GND                   | PWR  |      |
|                    | O    | CLKA      | 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 | REQ1#                 | 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  |      |
| <b>SOLDER SIDE</b> |      |           |                 |     | <b>COMPONENT SIDE</b> |      |      |
|                    | 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             | E56 | 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  |      |

### 3.21.1 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 rising edge of CLK and all other timing parameters are defined with respect to this edge. PCI operates at 33MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

(Continues)

**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.<br>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 51signaling 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. |

**3.21.2 KTQ45 PCI IRQ & INT routing**

| Board type | Slot | IDSEL | INTA       | INTB       | INTC       | INTD       |
|------------|------|-------|------------|------------|------------|------------|
| KTQ45/Flex | 1    | AD16  | INT_PIRQ#A | INT_PIRQ#B | INT_PIRQ#C | INT_PIRQ#D |
|            | 2    | AD17  | INT_PIRQ#B | INT_PIRQ#G | INT_PIRQ#H | INT_PIRQ#E |
| KTQ45/ATXE | 1    | AD16  | INT_PIRQ#A | INT_PIRQ#B | INT_PIRQ#C | INT_PIRQ#D |
|            | 2    | AD17  | INT_PIRQ#B | INT_PIRQ#G | INT_PIRQ#H | INT_PIRQ#E |
|            | 3    | AD18  | INT_PIRQ#G | INT_PIRQ#H | INT_PIRQ#E | INT_PIRQ#F |
|            | 4    | AD19  | INT_PIRQ#H | INT_PIRQ#E | INT_PIRQ#F | INT_PIRQ#G |

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=AD30, INT\_PIRQ#F, INT\_PIRQ#G, INT\_PIRQ#H, INT\_PIRQ#E. 820982 PCI Riser shall be plugged into Slot #1.

## 4 Onboard connectors and Mating connectors

| Connector    | Onboard Connectors |               | Mating Connectors |                       |
|--------------|--------------------|---------------|-------------------|-----------------------|
|              | 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            |
| CDROM        | Foxconn            | HF1104E       | Molex             | 50-57-9404            |
|              | Molex              | 70543-0038    |                   |                       |
| SATA         | Hon Hai            | LD1807V-S52T  | Molex             | 67489-8005            |
|              |                    |               | Kontron           | KT 821035 (cable kit) |
| ATXPWR       | Molex              | 43045-1201    | Molex             | 43025-1200            |
| ATX+12V-4pin | Molex              | 22-23-2041    | Molex             | 22-01-2046            |
| ATX+12V-6pin | Molex              | 22-23-2041    | Molex             | 22-01-2046            |
| COM2, 3, 4   | Wuerth             | 61201020621   | Molex             | 90635-1103            |
|              |                    |               | Kontron           | KT 821016 (cable kit) |
|              |                    |               | Kontron           | KT 821017 (cable kit) |
| USB8/9       | Pinrex             | 512-90-10GBB2 | Kontron           | KT 821401 (cable kit) |
| USB10/11*    | (FRONTPNL)         | -             | Kontron           | KT 821401 (cable kit) |
| PRINTER      | Foxconn            | HL2213F       | Molex             | 90635-1263            |
|              |                    |               | Kontron           | KT 821031 (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      | Molex              | 87831-3020    | Molex             | 51110-3051            |
|              |                    |               | Kontron           | KT 821041 (cable kit) |

\* USB10/USB11 is located in FRONTPNL connector. Depending on application the KT821401 can be used.

**Note:** Only one connector will be mentioned for each type of onboard 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, PCIe, PCI, CF, Ethernet and USB are not included in the list.

## 5 System Resources

### 5.1 Memory Map

| Address (hex) |          | Size       | Description                                               |
|---------------|----------|------------|-----------------------------------------------------------|
| 00000000      | 0009FFFF | 655360     | System board                                              |
| 000A0000      | 000BFFFF | 131072     | PCI-bus                                                   |
| 000A0000      | 000BFFFF | 131072     | Intel(R) Q45/Q43 Express Chipset                          |
| 000C0000      | 000CFFFF | 65536      | System board                                              |
| 000D0000      | 000DFFFF | 65536      | PCI-bus                                                   |
| 000E0000      | 000FFFFF | 131072     | System board                                              |
| 00100000      | CDDFFFFF | 3452960768 | System board                                              |
| CDE00000      | DFFFFFFF | 304087040  | PCI-bus                                                   |
| D0000000      | DFFFFFFF | 268435456  | Intel(R) Q45/Q43 Express Chipset                          |
| E0000000      | EFFFFFFF | 268435456  | Motherboard resources                                     |
| F0000000      | FED8FFFF | 249102336  | PCI-bus                                                   |
| FE400000      | FE7FFFFF | 4194304    | Intel(R) Q45/Q43 Express Chipset                          |
| FEAC0000      | FEADFFFF | 131072     | Intel(R) 82567LM-3 Gigabit Network Connection             |
| FEAF0000      | FEAF3FFF | 16384      | Microsoft UAA-bus driver for High Definition Audio        |
| FEAF4000      | FEAF43FF | 1024       | Intel(R) ICH10 Family USB Enhanced Host Controller - 3A6A |
| FEAF6000      | FEAF63FF | 1024       | Intel(R) ICH10 Family USB Enhanced Host Controller - 3A6C |
| FEAF8000      | FEAF8FFF | 4096       | Intel(R) 82567LM-3 Gigabit Network Connection             |
| FEAFB800      | FEAFB8FF | 256        | Intel(R) ICH10 Family SMBus Controller - 3A60             |
| FEAFBC00      | FEAFBC0F | 16         | Intel(R) Management Engine Interface                      |
| FEB00000      | FEBFFFFF | 1048576    | Intel(R) ICH10 Family PCI Express Root Port 5 - 3A78      |
| FEBDC000      | FEBDFFFF | 16384      | Intel(R) 82574L Gigabit Network Connection                |
| FEBE0000      | FEBFFFFF | 131072     | Intel(R) 82574L Gigabit Network Connection                |
| FEC00000      | FEC0FFFF | 4096       | Motherboard resources                                     |
| FED14000      | FED19FFF | 24576      | System board                                              |
| FED1C000      | FED1FFFF | 16384      | Motherboard resources                                     |
| FED20000      | FED3FFFF | 131072     | Motherboard resources                                     |
| FED40000      | FED8FFFF | 327680     | Motherboard resources                                     |
| FED90000      | FED93FFF | 16384      | System board                                              |
| FED90000      | FFFFFFFF | 19333120   | System board                                              |
| FEE00000      | FEE0FFFF | 4096       | Motherboard resources                                     |
| FFB00000      | FFBFFFFF | 1048576    | Intel(R) 82802 Firmware-hub unit                          |
| FFC00000      | FFEFFFFF | 3145728    | Motherboard resources                                     |
| FFF00000      | FFFFFFFF | 1048576    | Intel(R) 82802 Firmware-hub unit                          |

## 5.2 PCI Devices

| Bus # | Device # | Function # | Vendor ID | Device ID | Chip          | Device Function                    |
|-------|----------|------------|-----------|-----------|---------------|------------------------------------|
| 0     | 25       | 0          | 8086      | 10DE      | 82567LM-3     | Gigabit Network Connection         |
| 2     | 0        | 0          | 8086      | 10D3      | 82574L        | Gigabit Network Connection         |
| 0     | 30       | 0          | 8086      | 244E      | 82801JB ICH10 | I/O Controller Hub 10              |
| 0     | 31       | 5          | 8086      | 3A06      | 82801JB ICH10 | 2-port SATA Controller             |
| 0     | 31       | 2          | 8086      | 3A00      | 82801JB ICH10 | 4-port SATA Controller             |
| 0     | 27       | 0          | 8086      | 3A6E      | 82801JB ICH10 | High Definition Audio Controller   |
| 0     | 28       | 0          | 8086      | 3A70      | 82801JB ICH10 | PCI Express Root Port 1            |
| 0     | 28       | 4          | 8086      | 3A78      | 82801JB ICH10 | PCI Express Root Port 5            |
| 0     | 31       | 3          | 8086      | 3A60      | 82801JB ICH10 | SMBus Controller                   |
| 0     | 26       | 0          | 8086      | 3A67      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 26       | 1          | 8086      | 3A68      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 26       | 2          | 8086      | 3A69      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 29       | 0          | 8086      | 3A64      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 29       | 1          | 8086      | 3A65      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 29       | 2          | 8086      | 3A66      | 82801JB ICH10 | USB Universal Host Controller      |
| 0     | 26       | 7          | 8086      | 3A6C      | 82801JB ICH10 | USB2 Enhanced Host Controller      |
| 0     | 29       | 7          | 8086      | 3A6A      | 82801JB ICH10 | USB2 Enhanced Host Controller      |
| 0     | 31       | 0          | 8086      | 3A14      | 82801JB ICH10 | LPC Bridge                         |
| 0     | 3        | 0          | 8086      | 2E14      | Q45 Chipset   | Host Embedded Controller Interface |
| 0     | 2        | 0          | 8086      | 2E12      | Q45 Chipset   | Integrated Graphics 0              |
| 0     | 0        | 0          | 8086      | 2E10      | Q45 Chipset   | Memory Controller Hub              |

### 5.3 Interrupt Usage

[illegible]

## 5.4 IO Map

| Address range (hex) |      | Size  | Description                                                         |
|---------------------|------|-------|---------------------------------------------------------------------|
| 0                   | 000F | 16    | DMA-controller                                                      |
| 0                   | 0CF7 | 3320  | PCI-bus                                                             |
| 10                  | 001F | 16    | Motherboard resources                                               |
| 20                  | 21   | 2     | Programmable interrupt controller                                   |
| 22                  | 003F | 30    | Motherboard resources                                               |
| 40                  | 43   | 4     | System timer                                                        |
| 44                  | 005F | 28    | Motherboard resources                                               |
| 60                  | 60   | 1     | Standard keyboard                                                   |
| 61                  | 61   | 1     | System Speaker                                                      |
| 62                  | 63   | 2     | Motherboard resources                                               |
| 64                  | 64   | 1     | Standard keyboard                                                   |
| 65                  | 006F | 11    | Motherboard resources                                               |
| 70                  | 71   | 2     | System CMOS/Real time clock                                         |
| 72                  | 007F | 14    | Motherboard resources                                               |
| 80                  | 80   | 1     | Motherboard resources                                               |
| 81                  | 83   | 3     | DMA-controller                                                      |
| 84                  | 86   | 3     | Motherboard resources                                               |
| 87                  | 87   | 1     | DMA-controller                                                      |
| 88                  | 88   | 1     | Motherboard resources                                               |
| 89                  | 008B | 3     | DMA-controller                                                      |
| 008C                | 008E | 3     | Motherboard resources                                               |
| 008F                | 008F | 1     | DMA-controller                                                      |
| 90                  | 009F | 16    | Motherboard resources                                               |
| 00A0                | 00A1 | 2     | Programmable interrupt controller                                   |
| 00A2                | 00BF | 30    | Motherboard resources                                               |
| 00C0                | 00DF | 32    | DMA-controller                                                      |
| E0                  | 00EF | 16    | Motherboard resources                                               |
| 00F0                | 00FF | 16    | Numerical Data Processor                                            |
| 170                 | 177  | 8     | Secondary IDE-channel                                               |
| 01F0                | 01F7 | 8     | Primary IDE-channel                                                 |
| 274                 | 277  | 4     | ISAPNP read data port                                               |
| 279                 | 279  | 1     | ISAPNP read data port                                               |
| 02F8                | 02FF | 8     | Communications port (COM2)                                          |
| 376                 | 376  | 1     | Secondary IDE-channel                                               |
| 378                 | 037F | 8     | Printer Port (LPT1)                                                 |
| 03B0                | 03BB | 12    | Intel(R) Q45/Q43 Express Chipset                                    |
| 03C0                | 03DF | 32    | Intel(R) Q45/Q43 Express Chipset                                    |
| 03F6                | 03F6 | 1     | Primary IDE-channel                                                 |
| 03F8                | 03FF | 8     | Communications port (COM1)                                          |
| 400                 | 041F | 32    | Intel(R) ICH10 Family SMBus Controller - 3A60                       |
| 04D0                | 04D1 | 2     | Motherboard resources                                               |
| 500                 | 057F | 128   | Motherboard resources                                               |
| 800                 | 087F | 128   | Motherboard resources                                               |
| 0A00                | 0A0F | 16    | Motherboard resources                                               |
| 0A10                | 0A1F | 16    | Motherboard resources                                               |
| 0A79                | 0A79 | 1     | ISAPNP read data port                                               |
| 0D00                | FFFF | 62208 | PCI-bus                                                             |
| BC00                | BC0F | 16    | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| C000                | C00F | 16    | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| C080                | C083 | 4     | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| C400                | C407 | 8     | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| C480                | C483 | 4     | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| C800                | C807 | 8     | Intel(R) ICH10 Family 2 port Serial ATA Storage Controller 2 - 3A06 |
| CC00                | CC1F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A66          |
| D000                | D01F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A65          |
| D080                | D09F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A64          |
| D400                | D41F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A69          |
| D480                | D49F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A68          |
| D800                | D81F | 32    | Intel(R) ICH10 Family USB Universal Host Controller - 3A67          |
| D880                | D89F | 32    | Intel(R) 82567LM-3 Gigabit Network Connection                       |
| DC00                | DC07 | 8     | Intel(R) Q45/Q43 Express Chipset                                    |
| E000                | EEEE | 4096  | Intel(R) ICH10 Family PCI Express Root Port 5 - 3A78                |
| EC00                | EC1F | 32    | Intel(R) 82574L Gigabit Network Connection                          |
| FF90                | FF9F | 16    | Intel(R) ICH10 Family 4 port Serial ATA Storage Controller 1 - 3A00 |
| FFA0                | FFAF | 16    | Intel(R) ICH10 Family 4 port Serial ATA Storage Controller 1 - 3A00 |

## 6 Overview of BIOS Features

This section details specific BIOS features for the KTQ45 board.

The KTQ45 board is based on the AMI BIOS core version 8.10 with Kontron BIOS extensions.

### 6.1 System Management BIOS (SMBIOS/DMI)

SMBIOS is a Desktop Management Interface (DMI) compliant method for managing computers in a managed network.

The main component of SMBIOS is the Management Information Format (MIF) database, which contains information about the computing system and its components. Using SMBIOS, a system administrator can obtain the system types, capabilities, operational status, and installation dates for system components.

The MIF database defines the data and provides the method for accessing this information. The BIOS enables applications such as third-party management software to use SMBIOS.

The BIOS stores and reports the following SMBIOS information:

- BIOS data, such as the BIOS revision level
- Fixed-system data, such as peripherals, serial numbers, and asset tags
- Resource data, such as memory size, cache size, and processor speed
- Dynamic data, such as event detection and error logging

Non-Plug and Play operating systems, such as Windows NT\*, require an additional interface for obtaining the SMBIOS information. The BIOS supports an SMBIOS table interface for such operating systems. Using this support, an SMBIOS service-level application running on a non-Plug and Play operating system can obtain the SMBIOS information.

### 6.2 Legacy USB Support

Legacy USB support enables USB devices such as keyboards, mice, and hubs to be used even when the operating system's USB drivers are not yet available. Legacy USB support is used to access the BIOS Setup program, and to install an operating system that supports USB. By default, Legacy USB support is Enabled.

Legacy USB support operates as follows:

1. When you apply power to the computer, legacy support is disabled.
2. POST begins.
3. Legacy USB support is enabled by the BIOS allowing you to use a USB keyboard to enter and configure the BIOS Setup program and the maintenance menu.
4. POST completes.
5. The operating system loads. While the operating system is loading, USB keyboards and mice are recognized and may be used to configure the operating system. (Keyboards and mice are not recognized during this period if Legacy USB support is Disabled in the BIOS Setup.)
6. After the operating system loads the USB drivers, all legacy and non-legacy USB devices are recognized by the operating system, and Legacy USB support from the BIOS is no longer used.

To install an operating system that supports USB, verify that Legacy USB support in the BIOS Setup program is set to Enabled and follow the operating system's installation instructions.

### 6.3 BIOS Update

The BIOS can be updated using Kontron utility called bf.exe, which are available on the Kontron Web site. The utility supports DOS and Windows environment. Before updating the BIOS, AMT related restrictions must be followed. Do not attempts to ignore below steps as it might result in corrupted BIOS.

Before updating the BIOS below steps must be followed:

- Make sure that AMT technology is disabled under the menu: Advanced, Intel AMT Configuration, Intel AMT Support.
- Make sure not populate DIMM into SLOT 1 socket (DIMM socket closest to the CPU) The 3 remaining DIMM sockets can be freely used without restrictions.

## BIOS Configuration/Setup

### 6.4 Introduction

The BIOS Setup is used to view and configure BIOS settings for the KTQ45 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 Menu bar looks like this:

#### BIOS SETUP UTILITY

Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

The available keys for the Menu screens are:

Select Menu: <←> or <→>  
 Select Item: <↑> or <↓>  
 Select Field: <Tab>  
 Change Field: <+> or <->  
 Help: <F1>  
 Save and Exit: <F10>  
 Exits the Menu: <Esc>

Please note that in the following the different BIOS Features will be described as having some options. These options will be selected automatically when loading either Failsafe Defaults or Optimal Defaults. The Default options will be indicated by the option in **bold**, but please notice that when Failsafe Defaults are loaded a few of the options, marked with “\*”, are now the default option.

### 6.5 Main Menu

#### BIOS SETUP UTILITY

Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

##### System Overview

##### AMIBIOS

Version : 08.00.15  
 Build Date: 10/30/12  
 ID : KTQ45015  
 PCB ID : B1  
 Serial # : 00793263  
 Part # : 62210000

##### Processor

Intel® Core™ 2 CPU Q9600 @ 3.0GHz  
 Speed : 3000MHz

##### System Memory

Size : 3294MB

System Time [16:33:13]  
 System Date [Thu 10/31/2013]

Use [ENTER], [TAB] or [SHIFT-TAB] to select a field.

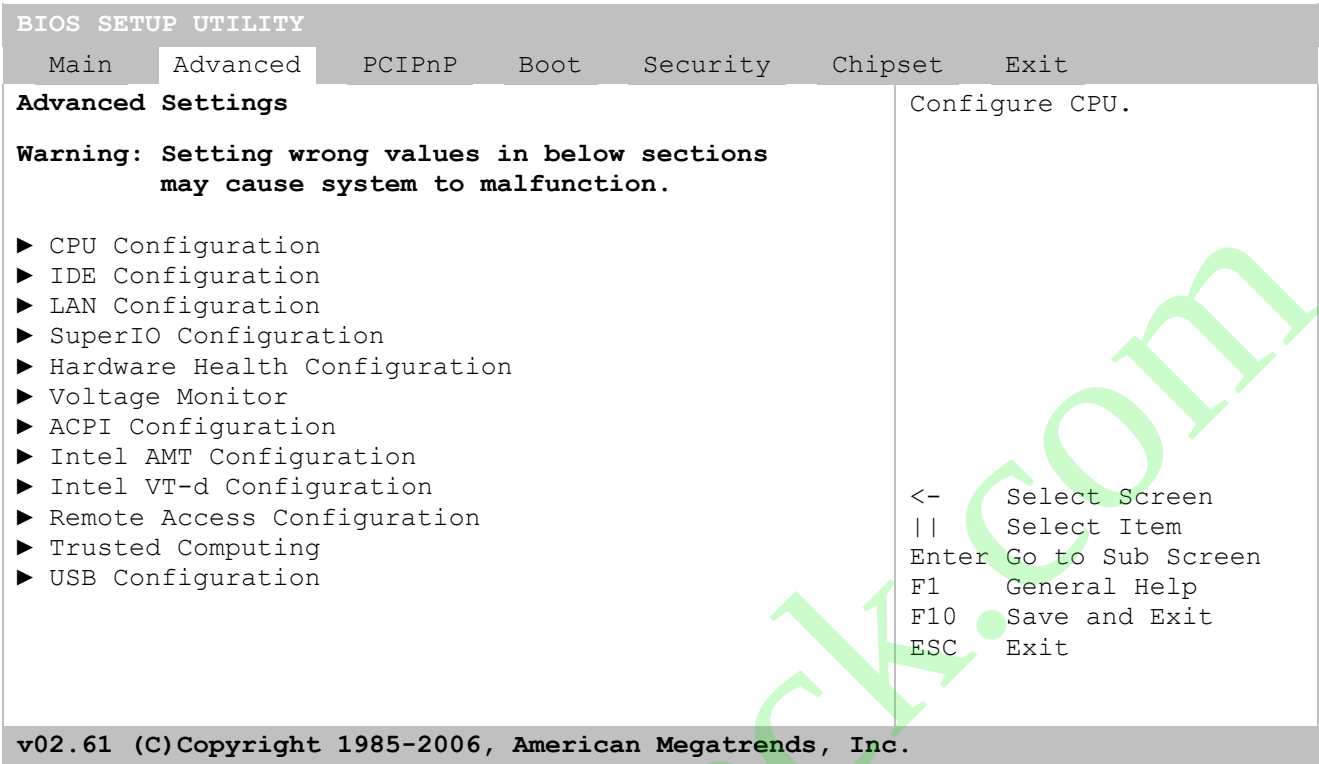
Use [+] or [-] to configure system Time.

<-> Select Screen  
 || Select Item  
 +- Change Field  
 Tab Select Field  
 F1 General Help  
 F10 Save and Exit  
 ESC Exit

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

## 6.6 Advanced Menu



## 6.6.1 Advanced settings – CPU Configuration

| BIOS SETUP UTILITY                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                               |
| <b>CPU Configure</b><br>Module Version: 3F.14<br><br>Manufacturer: Intel<br>Intel® Core™2 CPU Q9650 @ 3.0Ghz<br>Frequency : 3.00Ghz<br>FSB Speed : 1332Mhz<br>Cache L1 : 128 KB<br>Cache L2 : 12288 KB<br>Ratio Actual Value:9<br><br>C1E Support [Enabled]<br>Max CPUID Value Limit [Disabled]<br>Execute-Disable Bit Capability [Enabled]<br>Core Multi-Processing [Enabled]<br>PECI [Enabled]<br>Intel® SpeedStep™ tech [Enabled]<br>Intel® C-STATE tech [Enabled] | Disabled for WindowsXP<br><br><br><br><br><br><br><br><br><br><br><-> Select Screen<br>   Select Item<br>+- Change Option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
| v02.61 (C) Copyright 1985-2006, American Megatrends, Inc.                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                               |

| Feature                        | Options                     | Description                                                                           |
|--------------------------------|-----------------------------|---------------------------------------------------------------------------------------|
| C1E Support                    | Disabled<br><b>Enabled</b>  | If disabled and if "Intel® C-STATE tech" is disabled then CPU always runs full speed. |
| Max CPUID Value Limit          | <b>Disabled</b><br>Enabled  | Disabled for WindowsXP                                                                |
| Execute-Disable Bit Capability | Disabled<br><b>Enabled</b>  | When disabled, force the XD feature flag to always return 0.                          |
| Core Multi-Processing          | Disabled<br><b>Enabled</b>  | When disabled, disable one execution core of each CPU die.                            |
| PECI                           | Disabled<br><b>Enabled</b>  | When enabled, enables Peci interface.                                                 |
| Intel® SpeedStep™ tech         | Disabled*<br><b>Enabled</b> | Disabled: Disable GV3<br>Enabled: Enable GV3                                          |
| Intel® C-STATE tech            | Disabled*<br><b>Enabled</b> | CState enabled: CPU idle is set to C2 C3 C4 State                                     |

## 6.6.2 Advanced settings – IDE Configuration

| BIOS SETUP UTILITY                                        |                  |                   |
|-----------------------------------------------------------|------------------|-------------------|
| Advanced                                                  |                  |                   |
| <b>IDE Configuration</b>                                  |                  | Options           |
| <b>Mirrored IDER Configuration</b>                        | [Disabled]       | Disabled          |
| Configure SATA#1 as                                       | [SATA]           | Compatible        |
|                                                           |                  | Enhanced          |
| ▶ Primary IDE Master                                      | : [Hard Disk]    |                   |
| ▶ Primary IDE Slave                                       | : [Not Detected] |                   |
| ▶ Secondary IDE Master                                    | : [Not Detected] |                   |
| ▶ Secondary IDE Slave                                     | : [Not Detected] |                   |
| ▶ Third IDE Master                                        | : [Not Detected] |                   |
| Hard Disk Write Protect                                   | [Disabled]       |                   |
| IDE Detect Time Out (Sec)                                 | [35]             | <- Select Screen  |
|                                                           |                  | Select Item       |
|                                                           |                  | + - change option |
| Sata BIOS Extension                                       | [Enabled]        | F1 General Help   |
| ▶ AHCI Configuration                                      |                  | F10 Save and Exit |
|                                                           |                  | ESC Exit          |
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| Feature             | Options                     | Description          |
|---------------------|-----------------------------|----------------------|
| Configure SATA#1 as | <b>SATA</b><br>RAID<br>AHCI | SATA<br>RAID<br>AHCI |

| Feature                   | Options                                           | Description                                                                                            |
|---------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Hard Disk Write Protect   | <b>Disabled</b><br>Enabled                        | Disable/Enable device write protection. This will be effective only if device is accessed through BIOS |
| IDE Detect Time Out (Sec) | 0<br>5<br>10<br>15<br>20<br>25<br>30<br><b>35</b> | Select the timeout value for detecting ATA/ATAPI device(s)                                             |
| Sata BIOS Extension       | Disabled<br><b>Enabled</b>                        | Disabled<br>Enabled                                                                                    |

| BIOS SETUP UTILITY                                        |                  |                                                                                                            |
|-----------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------|
| Advanced                                                  |                  |                                                                                                            |
| <b>Primary IDE Master</b>                                 |                  | Select the type of devices connected to the system                                                         |
| Device                                                    | :Hard Disk       |                                                                                                            |
| Vendor                                                    | :ST340014A       |                                                                                                            |
| Size                                                      | :40.0GB          |                                                                                                            |
| LBA Mode                                                  | :Supported       |                                                                                                            |
| Block Mode                                                | :16Sectors       |                                                                                                            |
| PIO Mode                                                  | :4               |                                                                                                            |
| Async DMA                                                 | :MultiWord DMA-2 |                                                                                                            |
| Ultra DMA                                                 | :Ultra DMA-5     |                                                                                                            |
| S.M.A.R.T.                                                | :Supported       |                                                                                                            |
| Type                                                      | [Auto]           |                                                                                                            |
| LBA/Large Mode                                            | [Auto]           |                                                                                                            |
| Block (Multi-Sector Transfer)                             | [Auto]           |                                                                                                            |
| PIO Mode                                                  | [Auto]           |                                                                                                            |
| DMA Mode                                                  | [Auto]           |                                                                                                            |
| S.M.A.R.T.                                                | [Auto]           |                                                                                                            |
| 32Bit Data Transfer                                       | [Enabled]        |                                                                                                            |
|                                                           |                  | <- Select Screen<br>   Select Item<br>+- Change Option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature                       | Options                                                                                                                                | Description                                                                                                                                                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                          | Not Installed<br><b>Auto</b><br>CD/DVD<br>ARMD                                                                                         | Select the type of device installed                                                                                                                                                                                                                                    |
| LBA/Large Mode                | Disabled<br><b>Auto</b>                                                                                                                | Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads, and Sectors.                                                                                                                                                                     |
| Block (Multi-Sector Transfer) | Disabled<br><b>Auto</b>                                                                                                                | Select if the device should run in Block mode                                                                                                                                                                                                                          |
| PIO Mode                      | <b>Auto</b><br>0<br>1<br>2<br>3<br>4                                                                                                   | Selects the method for transferring the data between the hard disk and system memory. The Setup menu only lists those options supported by the drive and platform.                                                                                                     |
| DMA Mode                      | <b>Auto</b><br>SWDMA0<br>SWDMA1<br>SWDMA2<br>MWDMA0<br>MWDMA1<br>MWDMA2<br>UDMA0<br>UDMA1<br>UDMA2<br>UDMA3<br>UDMA4<br>UDMA5<br>UDMA6 | Selects the Ultra DMA mode used for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.<br><br><b>Note: To use UDMA Mode 2, 3, 4, 5 and 6 with a device, the harddisk cable used MUST be UDMA66/100 cable (80-conductor cable).</b> |
| S.M.A.R.T.                    | <b>Auto</b><br>Disabled<br>Enabled                                                                                                     | Select if the Device should be monitoring itself (Self-Monitoring, Analysis and Reporting Technology System)                                                                                                                                                           |
| 32Bit Data Transfer           | Disabled*<br><b>Enabled</b>                                                                                                            | Select if the Device should be using 32Bit data Transfer                                                                                                                                                                                                               |

| BIOS SETUP UTILITY                                                                                                                                      |                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Advanced                                                                                                                                                |                                                                                                            |
| <b>AHCI Settings</b>                                                                                                                                    | Enables for supporting                                                                                     |
| AHCI BIOS Support [Enabled]                                                                                                                             |                                                                                                            |
| ▶ AHCI Port0 [Not Detected]<br>▶ AHCI Port1 [Not Detected]<br>▶ AHCI Port2 [Not Detected]<br>▶ AHCI Port3 [Not Detected]<br>▶ AHCI Port4 [Not Detected] | <- Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
| v02.61 (C) Copyright 1985-2006, American Megatrends, Inc.                                                                                               |                                                                                                            |

| Feature           | Options             | Description            |
|-------------------|---------------------|------------------------|
| AHCI BIOS Support | Disabled<br>Enabled | Enabled for Supporting |

| BIOS SETUP UTILITY                                                                                              |                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Advanced                                                                                                        |                                                                                                            |
| <b>AHCI Port0</b>                                                                                               | Select the type of device connected to the system.                                                         |
| Device :Hard Disk<br>Vendor :WDC WD800AAJS-00PSA0<br>SIZE :80GB<br>▶ SATA Port0 [AUTO]<br>▶ S.M.A.R.T [Enabled] | <- Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
| v02.61 (C) Copyright 1985-2006, American Megatrends, Inc.                                                       |                                                                                                            |

| Feature    | Options               | Description                                                               |
|------------|-----------------------|---------------------------------------------------------------------------|
| SATA Port0 | Auto<br>Not Installed | Select the type of device connected to the system.                        |
| S.M.A.R.T  | Enabled<br>Disabled   | S.M.A.R.T. stands for Self-Monitoring, Analysis and Reporting Technology. |

6.6.3 Advanced settings – LAN Configuration

BIOS SETUP UTILITY

Advanced

LAN Configuration

ETH1 Configuration (Right) [Enabled]  
MAC Address & Link status : 00E0F41E24A4 +  
ETH2 Configuration (Left) [Enabled]  
MAC Address & Link status : 00E0F41E24A5 -

Control of Ethernet  
Devices and PXE boot

<- Select Screen  
|| Select Item  
+- change option  
F1 General Help  
F10 Save and Exit  
ESC Exit

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| Feature            | Options                                         | Description                                     |
|--------------------|-------------------------------------------------|-------------------------------------------------|
| ETH1 Configuration | Disabled<br><b>Enabled</b><br>With RPL/PXE boot | Disable/enable LAN or enabled with RPL/PXE boot |

| Feature            | Options                                         | Description                                     |
|--------------------|-------------------------------------------------|-------------------------------------------------|
| ETH2 Configuration | Disabled<br><b>Enabled</b><br>With RPL/PXE boot | Disable/enable LAN or enabled with RPL/PXE boot |

- Notes:
1. The “+” and “-” (to the right of the MAC address) indicates if link is established or not.
  2. ETH1 (and only ETH1) can be used for AMT.

## 6.6.4 Advanced settings – Configure Win627DHG Super IO Chipset

| BIOS SETUP UTILITY                                       |            |                                                                                                            |
|----------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------|
|                                                          | Advanced   |                                                                                                            |
| <b>Configure Win627DHG Super IO Chipset</b>              |            | Allows BIOS to Select Serial Port1 Base Addresses.                                                         |
| Serial Port1 Address                                     | [3F8/IRQ4] |                                                                                                            |
| Serial Port2 Address                                     | [2F8/IRQ3] |                                                                                                            |
| Serial Port2 Mode                                        | [Normal]   |                                                                                                            |
| Parallel Port Address                                    | [378]      |                                                                                                            |
| Parallel Port Mode                                       | [Normal]   |                                                                                                            |
| Parallel Port IRQ                                        | [IRQ7]     |                                                                                                            |
| Serial Port3 Address                                     | [Disabled] |                                                                                                            |
| RS485 Port Address                                       | [Disabled] |                                                                                                            |
|                                                          |            | <- Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature                              | Options                                                         | Description                                                                                                         |
|--------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Serial Port1 Address                 | Disabled<br><b>3F8/IRQ4</b><br>2F8/IRQ3<br>3E8/IRQ4<br>2E8/IRQ3 | Select the BASE I/O address and IRQ.<br><br>(The available options depend on the setup for the other Serial Ports). |
| Serial Port2 Address                 | Disabled<br>3F8/IRQ4<br><b>2F8/IRQ3</b><br>3E8/IRQ4<br>2E8/IRQ3 | Select the BASE I/O address and IRQ.<br><br>(The available options depend on the setup for the other Serial Ports). |
| Serial Port2 Mode                    | <b>Normal</b><br>IrDA<br>ASK IR                                 | Select Mode for Serial Port2                                                                                        |
| If IrDA or ASK IR:<br>IR Duplex Mode | Full Duplex<br><b>Half Duplex</b>                               | IrDA communication selection                                                                                        |
| Parallel Port Address                | Disabled *<br><b>378</b><br>278<br>3BC                          | Select the I/O address for the Parallel Port.                                                                       |
| Parallel Port Mode                   | <b>Normal</b><br>Bi-Directional<br>ECP<br>EPP<br>ECP & EEP      | Select the mode of operation for the Parallel Port                                                                  |
| If ECP Mode:<br>ECP Mode DMA Channel | DMA0<br>DMA1<br><b>DMA3</b>                                     | Select a DMA channel in ECP mode of operation                                                                       |
| If EPP mode:<br>EPP Version          | <b>1.9</b><br>1.7                                               | Select version of EPP in the EPP mode of operation                                                                  |
| Parallel Port IRQ                    | IRQ5<br><b>IRQ7</b>                                             | Select a IRQ for the Parallel Port                                                                                  |

(Continues)

| Feature              | Options                                     | Description                                                                                                                      |
|----------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Serial Port3 Address | <b>Disabled</b><br>3F8<br>2F8<br>3E8<br>2E8 | Allows BIOS to select Serial Port3 Base Addresses<br><br>(The available options depend on the setup for the other Serial Ports). |
| Serial Port3 IRQ     | IRQ3<br>IRQ4<br>IRQ10<br><b>IRQ11</b>       | Allows BIOS to select Serial Port3 IRQ.<br><br>(The available options depend on the setup for the other Serial Ports).           |
| RS485 Port Address   | <b>Disabled</b><br>3F8<br>2F8<br>3E8<br>2E8 | Allows BIOS to select Serial Port4 Base Addresses<br><br>(The available options depend on the setup for the other Serial Ports). |
| RS485 Port IRQ       | IRQ3<br>IRQ4<br><b>IRQ10</b><br>IRQ11       | Allows BIOS to select Serial Port4 IRQ.<br><br>(The available options depend on the setup for the other Serial Ports).           |

## 6.6.5 Advanced settings – Hardware Health Configuration

| BIOS SETUP UTILITY                                        |              |                                                                     |
|-----------------------------------------------------------|--------------|---------------------------------------------------------------------|
| Advanced                                                  |              |                                                                     |
| <b>Hardware Health Configuration</b>                      |              | Disable = Full Speed                                                |
| System Temperature                                        | :48°C/118°F  | Thermal: Does regulate fan speed according to specified temperature |
| CPU Temperature                                           | :56°C/132°F  |                                                                     |
| VTIN Temperature                                          | :N/A         |                                                                     |
| SYS FAN Speed                                             | :Fail        | Speed: Does regulate according to specified RPM                     |
| Fan Cruise Control                                        | [Disable]    |                                                                     |
| Fan Type                                                  | [4 Wire]     |                                                                     |
| CPU FAN Speed                                             | :2537 RPM    |                                                                     |
| Fan Cruise Control                                        | [Thermal]    |                                                                     |
| Fan Setting                                               | [45°C/113°F] |                                                                     |
| Fan Type                                                  | [4 Wire]     |                                                                     |
| AUXFAN Speed                                              | :2164        |                                                                     |
| Fan Cruise Control                                        | [Speed]      |                                                                     |
| Fan Setting                                               | [2177 RPM]   |                                                                     |
| Fan Step Time                                             | [2]          | <- Select Screen<br>   Select Item<br>+- change option              |
| Low RPM Fan Range                                         | [Disabled]   |                                                                     |
| Watchdog Function                                         | [Disabled]   |                                                                     |
|                                                           |              | F1 General Help<br>F10 Save and Exit<br>ESC Exit                    |
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| Feature            | Options                                                                                         | Description                                                                                                                                                                                                  |
|--------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fan Cruise Control | <b>Disabled</b><br>Thermal<br>Speed                                                             | Select how the Fan shall operate.<br><br>When set to Thermal, the Fan will start to run at the CPU die temperature set below.<br><br>When set to Speed, the Fan will run at the fixed speed set below.       |
| Fan Settings       | 1406-5625 RPM<br>30°-60°C                                                                       | The fan can operate in Thermal mode or in a fixed fan speed mode                                                                                                                                             |
| Fan Type           | <b>4 wire</b><br>3 wire                                                                         | Select the electrical interface for the fan:<br><br>3 Wire = PWM output to fan power line. RPM reading and speed regulation at lower speed might be poor.<br><br>4 Wire = 12VDC always PWM on control signal |
| Fan Step Time      | 0, 1, <b>2</b> , 3, 4, 5, 6, 7                                                                  | Fan regulation delay. (0 is fast and 7 is slow)                                                                                                                                                              |
| Low RPM Fan Range  | <b>Disabled</b><br>Enabled                                                                      | Enabled: Down to 500 RPM is possible. Note that if Speed setting is used then set the speed to the double of the requested RPM.                                                                              |
| Watchdog           | <b>Disabled</b><br>15 seconds<br>30 seconds<br>1 minute<br>2 minutes<br>5 minutes<br>10 minutes | To be serviced via API.                                                                                                                                                                                      |

**Note:** The AUXFAN is available via Feature Connector.

6.6.6 Advanced settings – Voltage Monitor

BIOS SETUP UTILITY

Advanced

Voltage Monitor

Requested Core CPU :1.25000 V

CPU Vccp :1.240 V

AVCC :3.248 V

3VCC :3.248 V

P12V :11.800 V

-12Vin :Good

P5V :5.016 V

DDR1V5 :1.528 V

P1V5 :1.544 V

VSB :3.264 V

VBAT :3.072 V

<- Select Screen

|| Select Item

+ - change option

F1 General Help

F10 Save and Exit

ESC Exit

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## 6.6.7 Advanced settings – ACPI Settings

| BIOS SETUP UTILITY                                                                                                                                                                       |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Advanced                                                                                                                                                                                 |             |
| <b>ACPI Settings</b>                                                                                                                                                                     |             |
| Suspend mode                                                                                                                                                                             | [S3 (STR)]  |
| Repost Video on S3 Resume                                                                                                                                                                | [No]        |
| ACPI Version Features                                                                                                                                                                    | [ACPI v1.0] |
| PS/2 Kbd/Mouse S4/S5 Wake                                                                                                                                                                | [Disabled]  |
| Keyboard Wake Hotkey                                                                                                                                                                     | [Any key]   |
| USB Device Wakeup From S3/S4                                                                                                                                                             | [Enabled]   |
| <p>Select the ACPI state used for System Suspend.</p> <p>&lt;-&gt; Select Screen<br/>    Select Item<br/> +- change option<br/> F1 General Help<br/> F10 Save and Exit<br/> ESC Exit</p> |             |
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| Feature                      | Options                                                | Description                                                                                                       |
|------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Suspend mode                 | S1 (POS)<br><b>S3 (STR)</b>                            | Select the ACPI state used for System Suspend                                                                     |
| Repost Video on S3 Resume    | <b>No</b><br>Yes                                       | Determines whether to invoke VGA BIOS post on S3/STR resume                                                       |
| ACPI Version Features        | <b>ACPI v1.0</b><br>ACPI v2.0<br>ACPI v3.0             | Enabled RSDP pointers to 64-bit Fixed System Description Table. Di ACPI version has some.                         |
| PS/2 Kbd/Mouse S4/S5 Wake    | <b>Disabled</b><br>Enabled                             | Enabled: The System can also be waked from S4 or S5.<br>Disabled: PS/2 Kbd or Mouse can still wake system from S3 |
| Keyboard Wake Hotkey         | <b>Any key</b><br>"Space"<br>"Enter"<br>"Sleep button" | Any key<br>"Space"<br>"Enter"<br>"Sleep button"                                                                   |
| USB Device Wakeup from S3/S4 | Disabled<br><b>Enabled</b>                             | Enabled/Disable USB Device Wakeup From S3/S4.                                                                     |

## 6.6.8 Advanced settings – Intel AMT Configuration

| BIOS SETUP UTILITY                                        |            |                                                                                                             |
|-----------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------|
| Advanced                                                  |            |                                                                                                             |
| <b>Configuration Intel AMT Parameters</b>                 |            | <b>Options</b>                                                                                              |
| Intel AMT Support                                         | [Enabled]  | Disabled                                                                                                    |
| Force IDER                                                | [Disabled] | Enabled                                                                                                     |
| Force SOL                                                 | [Disabled] |                                                                                                             |
| Unconfigure AMT/ME                                        | [Disabled] |                                                                                                             |
| Active Remote Assistance                                  | [Disabled] |                                                                                                             |
|                                                           |            | <-> Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature            | Options                                                                                | Description                                                                            |
|--------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Intel AMT Support  | Disabled<br>Enabled                                                                    | Disabled<br>Enabled                                                                    |
| Force IDER         | Disabled<br>IDER Pri. Master<br>IDER Pri. Slave<br>IDER Sec. Master<br>IDER Pri. Slave | Disabled<br>IDER Pri. Master<br>IDER Pri. Slave<br>IDER Sec. Master<br>IDER Pri. Slave |
| Force SOL          | Disabled<br>Enabled                                                                    |                                                                                        |
| Unconfigure AMT/ME | Disabled<br>Enabled                                                                    | Disabled<br>Enabled                                                                    |

6.6.9 Advanced settings – Intel VT-d Configuration

BIOS SETUP UTILITY

Advanced

Intel VT-d Configuration

Intel VT-d [Disabled]

Options  
Disabled  
Enabled  
  
<-> Select Screen  
|| Select Item  
+- change option  
F1 General Help  
F10 Save and Exit  
ESC Exit

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| Feature    | Options             | Description         |
|------------|---------------------|---------------------|
| Intel VT-d | Disabled<br>Enabled | Disabled<br>Enabled |

## 6.6.10 Advanced settings – Remote Access Configuration

| BIOS SETUP UTILITY                                                                                                                            |                |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Advanced                                                                                                                                      |                |
| <b>Configure Remote Access type and parameters</b>                                                                                            |                |
| Remote Access                                                                                                                                 | [Enabled]      |
| Serial port number                                                                                                                            | [COM1]         |
| Base Address, IRQ                                                                                                                             | [3F8h, 4]      |
| Serial Port Mode                                                                                                                              | [115200 8,n,1] |
| Flow Control                                                                                                                                  | [None]         |
| Redirection After BIOS POST                                                                                                                   | [Always]       |
| Terminal Type                                                                                                                                 | [ANSI]         |
| VT-UTF8 Combo Key Support                                                                                                                     | [Enabled]      |
| Sredir Memory Display Delay                                                                                                                   | [No Delay]     |
| Select Remote Access type.<br><br><-> Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |                |
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| Feature                     | Options                                                                        | Description                                                                                                                                                                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remote Access               | <b>Disabled</b><br>Enabled                                                     | When Enabled then a remote PC can via one of the serial ports behave like a TTY terminal, so that keyboard and monitor (in a terminal window) is emulated by the remote PC. As remote PC terminal program the Windows Hyperterminal can be used. |
| Serial port number          | <b>COM1</b><br>COM2                                                            | Setup which comport that should be used for communication                                                                                                                                                                                        |
| Serial Port Mode            | <b>115200 8 n 1</b><br>57600 8 n 1<br>38400 8 n 1<br>19200 8 n 1<br>9600 8 n 1 | Select the serial port speed                                                                                                                                                                                                                     |
| Flow Control                | <b>None</b><br>Hardware<br>Software                                            | Select Flow Control for serial port                                                                                                                                                                                                              |
| Redirection After BIOS POST | Disabled<br>Boot Loader<br><b>Always</b>                                       | How long shall the BIOS send the picture over the serial port                                                                                                                                                                                    |
| Terminal Type               | <b>ANSI</b><br>VT100<br>VT-UTF8                                                | Select the target terminal type                                                                                                                                                                                                                  |
| VT.UTF8 Combo Key Support   | <b>Enabled</b><br>Disabled                                                     | Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals                                                                                                                                                                                  |
| Sredir Memory Display Delay | <b>No Delay</b><br>Delay 1 Sec<br>Delay 2 Sec<br>Delay 4 Sec                   | Gives the delay in seconds to display memory information                                                                                                                                                                                         |

### 6.6.11 Advanced settings – Trusted Support

| BIOS SETUP UTILITY                                       |                |                                                                                                             |
|----------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------|
|                                                          | Advanced       |                                                                                                             |
| <b>Trusted Computing</b>                                 |                | Enables/Disable TPM TCG (Tpm 1.1/1.2) Support in Bios                                                       |
| TCG/TPM Support                                          | [Yes]          |                                                                                                             |
| Execute TPM Command                                      | [Don't change] |                                                                                                             |
| TPM Enabled/Disabled Status                              | [No State]     |                                                                                                             |
| TPM Owner Status                                         | [No State]     |                                                                                                             |
|                                                          |                | <-> Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature             | Options                             | Description                                          |
|---------------------|-------------------------------------|------------------------------------------------------|
| TCG/TPM Support     | No<br>Yes                           | Enables/Disable TPM TCG (TPM 1.1/1.2) Support.       |
| Execute TPM Command | Don't change<br>Disabled<br>Enabled | Enable(Activate)/ Disable(Deactivate) Command to TPM |

## 6.6.12 Advanced settings – USB Configuration

| BIOS SETUP UTILITY                                                                                                                                                                                                           |                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advanced                                                                                                                                                                                                                     |                                                                                                                                                                                                                          |
| <b>USB Configuration</b><br><br>Module Version - 2.24.5-13.4<br><br>USB Devices Enabled :<br>1 Drive<br><br>Legacy USB Support [Enabled]<br>USB 2.0 Controller Mode [HiSpeed]<br><br>► USB Mass Storage Device Configuration | Enables support for legacy USB. AUTO option disables if no USB Devices are connected.<br><br><br><br><br><br><-> Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature                 | Options                            | Description                                                                                                                                                                                                  |
|-------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Legacy USB Support      | Disabled<br><b>Enabled</b><br>Auto | Support for legacy USB Keyboard                                                                                                                                                                              |
| USB 2.0 Controller Mode | FullSpeed*<br><b>HiSpeed</b>       | Configure the USB 2.0 controller in HiSpeed (480Mbps) or FullSpeed (12Mbps).<br><br>Note: This feature is not available when Failsafe Defaults are loaded, because USB2.0 controller is disabled as default. |

### 6.6.13 Advanced settings – USB Mass Storage Device Configuration

| BIOS SETUP UTILITY                                                                                          |                                                                                        |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Advanced                                                                                                    |                                                                                        |
| <b>USB Mass Storage Device Configuration</b>                                                                |                                                                                        |
| USB Mass Storage Reset Delay [20 Sec]                                                                       | Number of seconds POST waits for the USB mass storage device after start unit command. |
| Device #1 JetFlash TS256MJF2L                                                                               |                                                                                        |
| Emulation Type [Auto]                                                                                       |                                                                                        |
| <-> Select Screen<br>   Select Item<br>+- change option<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |                                                                                        |
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| Feature                      | Options                                                   | Description                                                                                                                                                                               |
|------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB Mass Storage Reset Delay | 10 Sec<br><b>20 Sec</b><br>30 Sec<br>40 Sec               | Number of seconds POST waits for the USB mass storage device after start unit command.                                                                                                    |
| Emulation Type               | <b>Auto</b><br>Floppy<br>Forced FDD<br>Hard Disk<br>CDROM | If Auto, USB devices less than 530MB will be emulated as Floppy and remaining as hard drive. Forced FDD option can be used to force a HDD formatted drive to boot as FDD (Ex. ZIP drive). |

## 6.7 PCIPnp Menu

| BIOS SETUP UTILITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Main                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Advanced |
| <div> <div> PCIPnP Boot Security Chipset Exit </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
| <div> <div> <b>Advanced PCI/PnP Settings</b> </div> <div> <b>Warning: Setting wrong values in below sections<br/>May cause system to malfunction.</b> </div> <div> Allocate IRQ to PCI VGA [Yes]<br/> Palette Snooping [Disabled] </div> </div> <div> Yes: Assigns IRQ to PCI<br/> VGA card if card<br/> requests IRQ.<br/> No: Does not assign IRQ<br/> to PCI VGA card even if<br/> card requests an IRQ </div> <div> &lt;-&gt; Select Screen<br/>    Select Item<br/> +- change option<br/> F1 General Help<br/> F10 Save and Exit<br/> ESC Exit </div> |          |
| v02.61 (C) Copyright 1985-2006, American Megatrends, Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |

| Feature                 | Options                    | Description                                                                                                                    |
|-------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Allocate IRQ to PCI VGA | <b>Yes</b><br>No           | Yes: Assigns IRQ to PCI VGA card if card requests IRQ.<br>No: Does not assign IRQ to PCI VGA card even if card requests an IRQ |
| Palette Snooping        | <b>Disabled</b><br>Enabled | Enabled: informs the PCI devices that an ISA graphics device is installed in the system so the card will function correctly.   |

6.8 Boot Menu

BIOS SETUP UTILITY

MainAdvancedPCIPnPBootSecurityChipsetExit

Boot Settings

► Boot Settings Configuration

► Boot Device Priority

Configure Settings during System Boot.

<-> Select Screen

|| Select Item

Enter Go to Sub Screen

F1 General Help

F10 Save and Exit

ESC Exit

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## 6.8.1 Boot – Boot Settings Configuration

| BIOS SETUP UTILITY                                        |              |                                                                                 |
|-----------------------------------------------------------|--------------|---------------------------------------------------------------------------------|
|                                                           |              | Boot                                                                            |
| <b>Boot Settings Configuration</b>                        |              | Allows BIOS to skip certain tests while booting in order to decrease boot time. |
| Quick Boot                                                | [Enabled]    |                                                                                 |
| Quiet Boot                                                | [Disabled]   |                                                                                 |
| AddOn ROM Display Mode                                    | [Force BIOS] |                                                                                 |
| Bootup Num-Lock                                           | [On]         | <-> Select Screen                                                               |
| PS/2 Mouse Support                                        | [Auto]       | Select Item                                                                     |
| Wait for 'F1' If Error                                    | [Enabled]    | Enter Go to Sub Screen                                                          |
| Hit 'DEL' Message Display                                 | [Enabled]    | F1 General Help                                                                 |
| Interrupt 19 Capture                                      | [Disabled]   | F10 Save and Exit                                                               |
| Force boot Device                                         | [Disabled]   | ESC Exit                                                                        |
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| Feature                           | Options                                                                                                                                                                                                                                                  | Description                                                                                                                                             |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Quick Boot                        | <b>Enabled</b><br>Disabled                                                                                                                                                                                                                               | Allows BIOS to skip certain tests while booting in order to decrease boot time.                                                                         |
| Quiet Boot                        | <b>Disabled</b><br>Enabled<br>Black Screen<br>White Screen                                                                                                                                                                                               | Disabled: Displays normal POST messages.<br>Enabled: Displays OEM Logo (no POST messages).<br>Black Screen: No picture.<br>White Screen: White picture. |
| AddOn ROM Display Mode            | <b>Force BIOS</b><br>Keep current                                                                                                                                                                                                                        | Set display mode for Option ROM.                                                                                                                        |
| Bootup Num-Lock                   | Off<br><b>On</b>                                                                                                                                                                                                                                         | Select Power-on state for numlock                                                                                                                       |
| PS/2 Mouse Support                | Disabled<br>Enabled<br><b>Auto</b>                                                                                                                                                                                                                       | Select support for PS/2 Mouse.                                                                                                                          |
| Wait for 'F1' If Error (see note) | Disabled<br><b>Enabled</b>                                                                                                                                                                                                                               | Wait for F1 key to be pressed if error occurs.                                                                                                          |
| Hit 'DEL' Message Display         | Disabled<br><b>Enabled</b>                                                                                                                                                                                                                               | Displays "Press DEL to run Setup" in POST.                                                                                                              |
| Interrupt 19 Capture              | <b>Disabled</b><br>Enabled                                                                                                                                                                                                                               | Enabled: Allows option ROMs to trap interrupt 19                                                                                                        |
| Force boot Device                 | <b>Disabled</b><br>Primary IDE Master<br>Primary IDE Slave<br>Secondary IDE Master<br>Secondary IDE Slave<br>Third IDE Master<br>Third IDE Slave<br>5 <sup>th</sup> IDE Master<br>6 <sup>th</sup> IDE Master<br>RAID<br>Any Harddrive (Above)<br>Network | Overrides current boot setting. Device must be in the boot priority menu, though. If the device fails to boot, the system will NOT try other devices.   |

**Note:** List of errors:

<INS> Pressed  
Timer Error  
Interrupt Controller-1 error  
Keyboard/Interface Error  
Halt on Invalid Time/Date  
NVRAM Bad

Primary Master Hard Disk Error  
S.M.A.R.T HDD Error  
Cache Memory Error  
DMA Controller Error  
Resource Conflict  
Static Resource Conflict

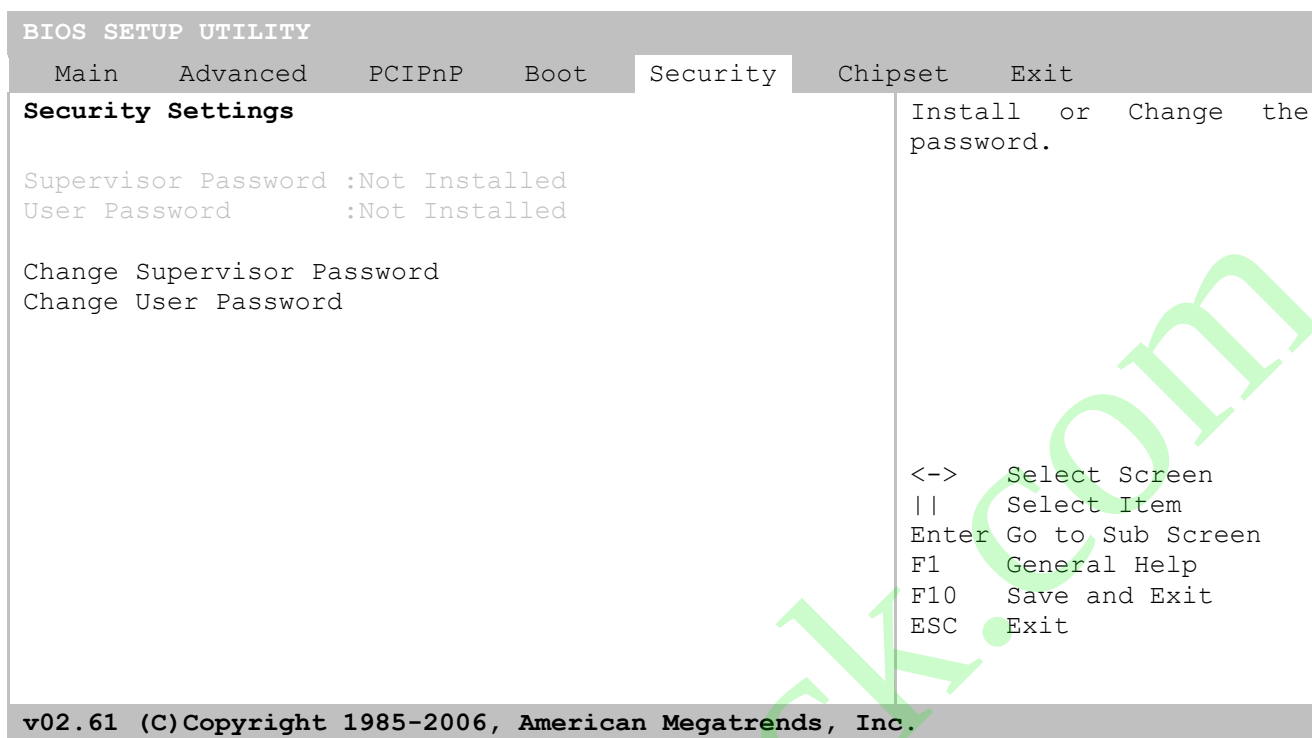
PCI I/O conflict  
PCI ROM conflict  
PCI IRQ conflict  
PCI IRQ routing table error

6.8.2 Boot – Boot Device Priority

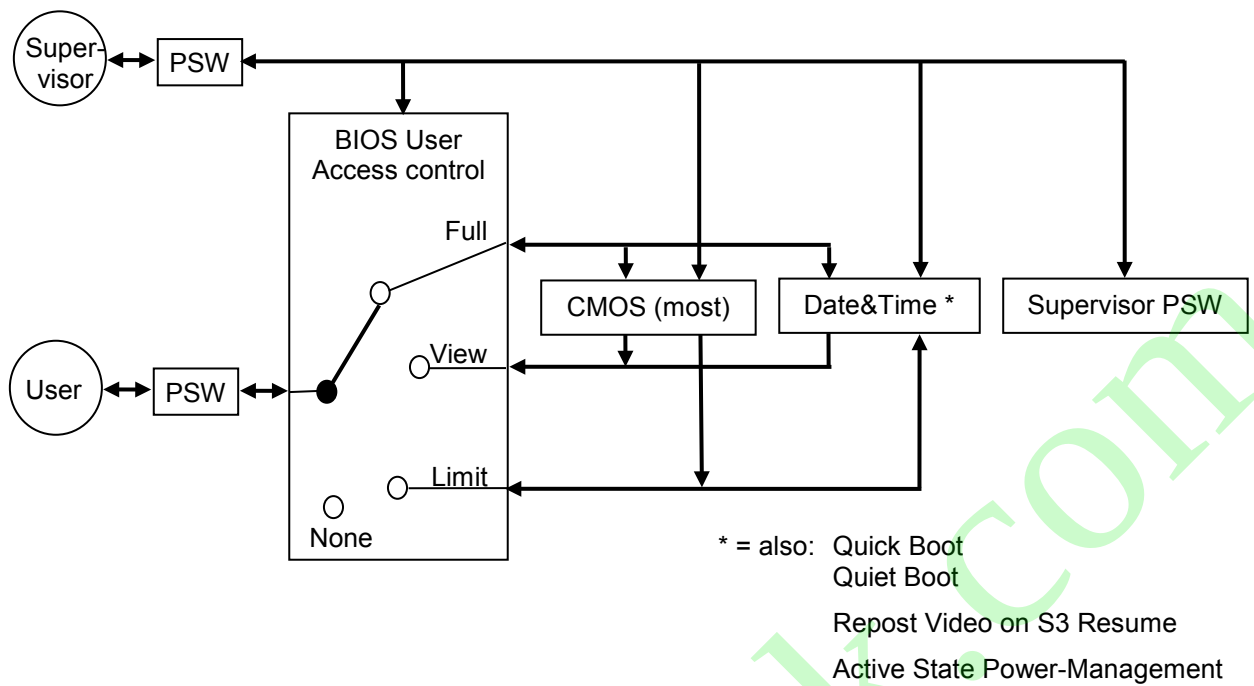
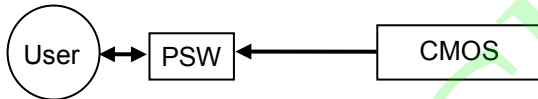
| BIOS SETUP UTILITY                                        |                  |                                                                                                                   |
|-----------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------|
|                                                           |                  | Boot                                                                                                              |
| <b>Boot Device Priority</b>                               |                  | Specifies the boot sequence from the available devices.                                                           |
| 1st Boot Device                                           | [ESS-ST380811AS] | A device enclosed in parenthesis has been disabled in the corresponding type menu.                                |
|                                                           |                  | <-> Select Screen<br>   Select Item<br>Enter Go to Sub Screen<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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**Note:** When pressing <F11> while booting it is possible manually to select boot device.

## 6.9 Security Menu



| Feature                    | Options                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Change Supervisor Password | Password                                                | When not cleared the advanced Supervisor Password protection system is enabled (see below diagram). Hereafter setting can only be accessed when entering BIOS as Supervisor.                                                                                                                                                                                                                                                   |
| User Access Level          | <b>Full Access</b><br>View Only<br>Limited<br>No Access | Only visible if Supervisor Password is installed.<br>Full Access: User can change all BIOS settings.<br>View Only: User can only read BIOS settings.<br>Limited: User can only read settings except: Date & Time, Quick Boot, Quiet Boot, Repost Video on S3 Resume, Active State Power-Management and Remote Access.<br>No Access: User cannot enter BIOS, but if Password Check = Always then User password will allow boot. |
| Change User Password       | Password                                                | Change the User Password                                                                                                                                                                                                                                                                                                                                                                                                       |
| Password Check             | <b>Setup</b><br>Always                                  | Only visible if Password is installed.<br>Setup: Protects only BIOS settings.<br>Always: Protects both BIOS settings and Boot.                                                                                                                                                                                                                                                                                                 |

Supervisor Password protection (setup Supervisor before User)User Password protection only (no Supervisor Password used)

6.10 Chipset Menu

BIOS SETUP UTILITY

MainAdvancedPCIPnPBootSecurityChipsetExit

Advanced Chipset Settings

Warning: Setting wrong values in below sections may cause system to malfunction.

▶ North Bridge Configuration

▶ South Bridge Configuration

▶ ME Subsystem Configuration

▶ VE Subsystem Configuration

▶ Spread spectrum control

Configures North Bridge features.

<-> Select Screen

|| Select Item

Enter Go to Sub Screen

F1 General Help

F10 Save and Exit

ESC Exit

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## 6.10.1 Advanced Chipset Settings – North Bridge Chipset Configuration

BIOS SETUP UTILITY
Chipset

**North Bridge Chipset Configuration**

Memory Remap Feature [Disabled]  
     PCI MMIO Allocation: 4GB to 4428MB

Memory Hole [Disabled]

Initial Graphics Adaptor [PEG/PCI]  
   IGD Graphics Mode Select [Enabled, 32MB]

PEG Port Configuration

► Video Function Configuration

ENABLE: Allow remapping of overlapped PCI memory above the total physical memory.

Disable: Do not allow remapping of memory

<-> Select Screen  
   || Select Item  
   Enter Go to Sub Screen  
   F1 General Help  
   F10 Save and Exit  
   ESC Exit

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| Feature                                  | Options                                                             | Description                                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Memory Remap Feature<br>(See note below) | <b>Disabled</b><br>Enabled                                          | ENABLE: Allow remapping of overlapped PCI memory above the total physical memory.<br><br>Disable: Do not allow remapping of memory. |
| Memory Hole                              | <b>Disabled</b><br>15MB-16MB                                        | <b>Disabled</b><br>15MB-16MB                                                                                                        |
| Initial Graphics Adaptor                 | IGD<br>PCI/IGD<br>PCI/PEG<br>PEG/IGD<br><b>PEG/PCI</b>              | Select which graphics controller to use as the primary boot device.                                                                 |
| IGD Graphics Mode Select                 | Disabled<br><b>Enabled, 32MB</b><br>Enabled, 64MB<br>Enabled, 128MB | Select the amount of system memory used by the Integrated Graphic Device.                                                           |

### Notes:

Memory Remap Feature should be Enabled when using 64bit OS and has effect if using more than 4GB of memory. If using 32bit OS and more than 3GB (max 4GB) then up to ½ GB might be lost if Memory Remap Feature is Enabled, so in general it is recommended to Disable the Memory Remap Feature when 32 bit OS is used.

Using PCIe Graphics card in combination with onboard graphics (VGA) is possible if BIOS setting *Initial Graphics Adaptor* = IGD. In this case onboard graphic will be Primary desktop and PCIe Graphics will be extended desktop. Note that PCIe Graphics driver shall be installed before the Intel Graphics driver.

### 6.10.2 Advanced Chipset ... – North Br. ... – Video Function Configuration

| BIOS SETUP UTILITY                  |                 | Chipset                |
|-------------------------------------|-----------------|------------------------|
| <b>Video Function Configuration</b> |                 | Options                |
| DVMT Mode Select                    | [DVMT Mode]     | Fixed Mode             |
| DVMT/FIXED Memory                   | [256MB]         | DVMT Mode              |
| Flat Panel Type                     | [Type 3]        |                        |
| Backlight Control Support           | [VBIOS-Default] |                        |
| BIA Control                         | [VBIOS-Default] |                        |
| TV Standard                         | [VBIOS-Default] |                        |
| Spread Spectrum                     | [Disabled]      |                        |
| Boot Display Preferences            | [Auto]          |                        |
|                                     |                 | <-> Select Screen      |
|                                     |                 | Select Item            |
|                                     |                 | Enter Go to Sub Screen |
|                                     |                 | F1 General Help        |
|                                     |                 | F10 Save and Exit      |
|                                     |                 | ESC Exit               |

| Feature                   | Options                                                                                                                                                                                                                                                          | Description                                                                                                                                                                                                                                               |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DVMT Mode Select          | Fixed Mode<br><b>DVMT Mode</b>                                                                                                                                                                                                                                   | Fixed Mode<br>DVMT Mode                                                                                                                                                                                                                                   |
| DVMT/FIXED Memory         | 128MB<br><b>256MB</b><br>Maximum DVMT                                                                                                                                                                                                                            | This setting is only                                                                                                                                                                                                                                      |
| Flat Panel Type           | Type 1, 2, <b>3</b> , 4 ...16                                                                                                                                                                                                                                    | Type 1,2,3 to 16                                                                                                                                                                                                                                          |
| Backlight Control Support | <b>VBIOS-Default</b><br>Both BLC & BIA Disabled<br>BLC Enabled                                                                                                                                                                                                   | VBIOS-Default<br>Both BLC & BIA Disabled<br>BLC Enabled.                                                                                                                                                                                                  |
| BIA Control               | <b>VBIOS-Default</b><br>BIA Disabled<br>BIA Enabled at Level1<br>BIA Enabled at Level2<br>BIA Enabled at Level3<br>BIA Enabled at Level4<br>BIA Enabled at Level5                                                                                                | VBIOS-Default<br>BIA Disabled<br>BIA Enabled at Level1<br>BIA Enabled at Level2<br>BIA Enabled at Level3<br>BIA Enabled at Level4<br>BIA Enabled at Level5                                                                                                |
| TV Standard               | <b>VBIOS-Default</b><br>NTSC<br>PAL<br>SECAM<br>SMPTE240M<br>ITU-R television<br>SMPTE295M<br>SMPTE296M<br>EIA-770.2<br>EIA-770.3                                                                                                                                | VBIOS-Default<br>NTSC<br>PAL<br>SECAM<br>SMPTE240M<br>ITU-R television<br>SMPTE295M<br>SMPTE296M<br>EIA-770.2<br>EIA-770.3                                                                                                                                |
| Spread Spectrum           | <b>Disabled</b><br>Enabled                                                                                                                                                                                                                                       | Disabled<br>Enabled                                                                                                                                                                                                                                       |
| Boot Display Preferences  | <b>Auto</b><br>PORT-0: CRT<br>PORT-1: LVDS<br>PORT-2: S/DVO-B<br>PORT-2: S/DVO-C<br>CRT + LVDS<br>CRT + S/DVO-B<br>CRT + S/DVO-C<br>LVDS + S/DVO-B<br>LVDS + S/DVO-C<br>S/DVO-B + S/DVO-C<br>Port-4: TV<br>TV + CRT<br>TV + LVDS<br>TV + S/DVO-B<br>TV + S/DVO-C | Auto<br>PORT-0: CRT<br>PORT-1: LVDS<br>PORT-2: S/DVO-B<br>PORT-2: S/DVO-C<br>CRT + LVDS<br>CRT + S/DVO-B<br>CRT + S/DVO-C<br>LVDS + S/DVO-B<br>LVDS + S/DVO-C<br>S/DVO-B + S/DVO-C<br>Port-4: TV<br>TV + CRT<br>TV + LVDS<br>TV + S/DVO-B<br>TV + S/DVO-C |

### 6.10.3 Advanced Chipset Settings – South Bridge Chipset Configuration

| BIOS SETUP UTILITY                                       |                 | Chipset                                                                                                           |
|----------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------|
| <b>South Bridge Chipset Configuration</b>                |                 | Disabled<br>2 USB Ports<br>4 USB Ports<br>6 USB Ports<br>8 USB Ports<br>10 USB Ports<br>12 USB Ports              |
| USB Functions                                            | [8 USB Ports]   |                                                                                                                   |
| USB Port Configure                                       | [6x6 USB Ports] |                                                                                                                   |
| USB 2.0 Controller                                       | [Enabled]       |                                                                                                                   |
| HDA Controller                                           | [Enabled]       |                                                                                                                   |
| Audio Jack Sensing                                       | [Auto]          |                                                                                                                   |
| SMBUS Controller                                         | [Enabled]       |                                                                                                                   |
| Restore on AC Power Loss                                 | [Power on]      | <-> Select Screen<br>   Select Item<br>Enter Go to Sub Screen<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature                  | Options                                                                                              | Description                                                                                                                                                                                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB Functions            | Disabled<br>2 USB Ports<br>4 USB Ports<br>6 USB Ports<br>8 USB Ports<br>10 USB Ports<br>12 USB Ports | Disabled<br>2 USB Ports (USB0/1 enabled)<br>4 USB Ports (USB0/1/2/3 enabled)<br>6 USB Ports (USB0/1/2/3/4/5 enabled)<br>8 USB Ports (USB0/1/2/3/4/5/10/11 enabled)<br>10 USB Ports (USB0/1/2/3/4/5//6/7/10/11 enabled)<br>12 USB Ports (all USB ports enabled) |
| USB Port Configure       | 6x6 USB Ports<br>8x4 USB Ports                                                                       | 6x6 USB Ports<br>8x4 USB Ports                                                                                                                                                                                                                                 |
| USB 2.0 Controller       | Disabled<br>Enabled                                                                                  | If above function "USB Function" = 10 or 12 USB Ports then USB 2.0 Controller is always enabled                                                                                                                                                                |
| HDA Controller           | Disabled<br>Enabled                                                                                  | Disabled<br>Enabled                                                                                                                                                                                                                                            |
| Audio Jack Sensing       | Auto<br>Disabled                                                                                     | Auto: The insertion of audio jacks is auto determined.<br>Disabled: Driver assumes that all jacks are inserted (useful when using Audio pinrow)                                                                                                                |
| SMBUS Controller         | Enabled<br>Disabled                                                                                  | Disabled<br>Enabled                                                                                                                                                                                                                                            |
| Restore on AC Power Loss | Power Off<br>Power On<br>Last State                                                                  | Power Off<br>Power On<br>Last State                                                                                                                                                                                                                            |

## 6.10.4 Advanced Chipset Settings – ME Subsystem Configuration

| BIOS SETUP UTILITY                                        |            | Chipset                                                                                                           |
|-----------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------|
| <b>ME Subsystem Configuration</b>                         |            | Disabled<br>Enabled                                                                                               |
| BootBlock HECI Message                                    | [Enabled]  |                                                                                                                   |
| HECI Message                                              | [Enabled]  |                                                                                                                   |
| End of Post S5 HECI Message                               | [Enabled]  |                                                                                                                   |
| <b>ME HECI configuration</b>                              |            |                                                                                                                   |
| ME-HECI                                                   | [Enabled]  |                                                                                                                   |
| ME-IDER                                                   | [Disabled] |                                                                                                                   |
| ME-KT                                                     | [Disabled] |                                                                                                                   |
|                                                           |            | <-> Select Screen<br>   Select Item<br>Enter Go to Sub Screen<br>F1 General Help<br>F10 Save and Exit<br>ESC Exit |
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| Feature                     | Options                    | Description                |
|-----------------------------|----------------------------|----------------------------|
| BootBlock HECI Message      | Disabled<br><b>Enabled</b> | <b>Disabled</b><br>Enabled |
| HECI Message                | Disabled<br><b>Enabled</b> | <b>Disabled</b><br>Enabled |
| End of Post S5 HECI Message | Disabled<br><b>Enabled</b> | Disabled<br>Enabled        |
| ME HECI                     | Disabled<br><b>Enabled</b> | Disabled<br>Enabled        |
| ME-IDER                     | <b>Disabled</b><br>Enabled | Disabled<br>Enabled        |
| ME-KT                       | <b>Disabled</b><br>Enabled | Disabled<br>Enabled        |

6.10.5      **Advanced Chipset Settings – VE Subsystem Configuration**

BIOS SETUP UTILITY

Chipset

**VE Subsystem Configuration**

VE-VECI [Disabled]

Unhide All Physical HC [Enabled]

Enabled/Disable VECI Messaging

<-> Select Screen

|| Select Item

Enter Go to Sub Screen

F1 General Help

F10 Save and Exit

ESC Exit

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| Feature                | Options         | Description |
|------------------------|-----------------|-------------|
| VE-VECI                | <b>Disabled</b> | Disabled    |
|                        | Enabled         | Enabled     |
| Unhide All Physical HC | Disabled        | Disabled    |
|                        | <b>Enabled</b>  | Enabled     |

6.10.6      **Advanced Chipset Settings – Spread Spectrum Control**

BIOS SETUP UTILITY

Chipset

**Clock Synthesizer Setting**

PLL1 spread [Disabled]

CLK & 27M\_SS spread [Disabled]

Options

Disabled

Enabled

<-> Select Screen

|| Select Item

Enter Go to Sub Screen

F1 General Help

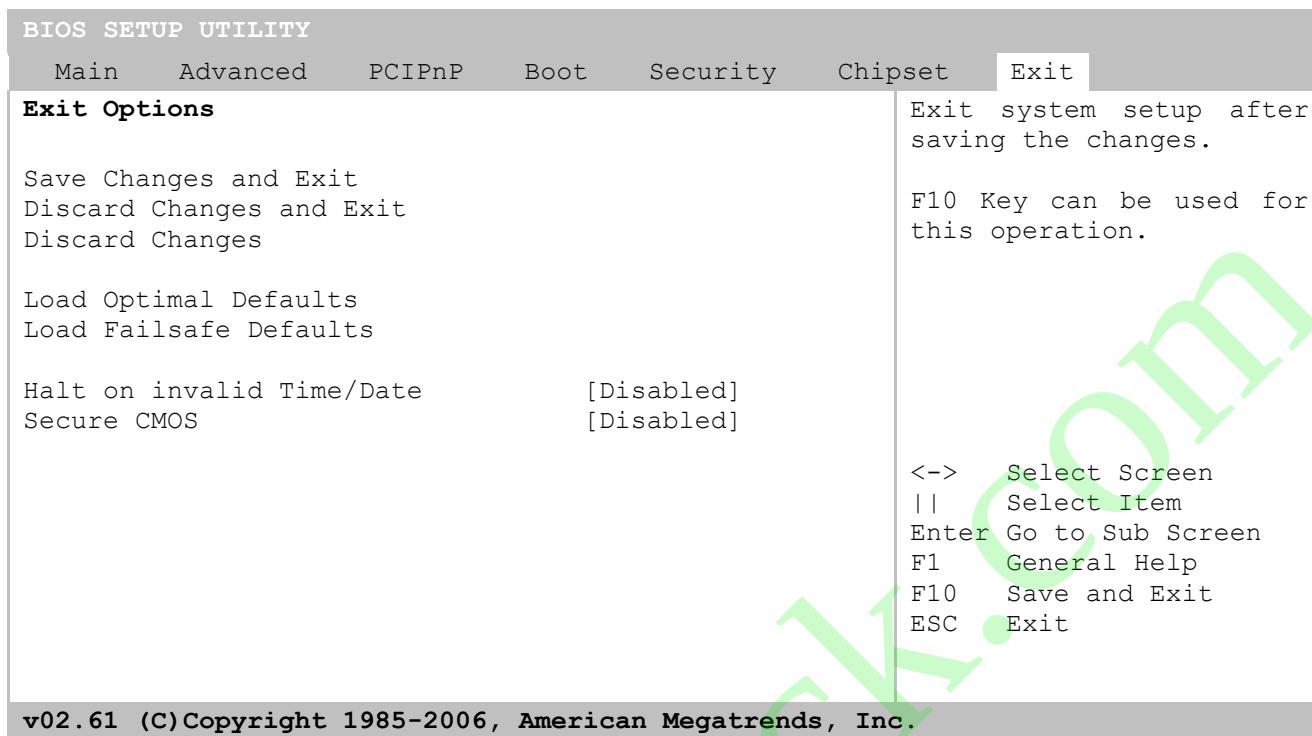
F10 Save and Exit

ESC Exit

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| Feature             | Options         | Description |
|---------------------|-----------------|-------------|
| PLL1 spread         | <b>Disabled</b> | Disabled    |
|                     | Enabled         | Enabled     |
| CLK & 27M_SS spread | <b>Disabled</b> | Disabled    |
|                     | Enabled         | Enabled     |

## 6.11 Exit Menu



| Feature                   | Options                    | Description                                                                                                       |
|---------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------|
| Save Changes and Exit     | Ok<br>Cancel               | Exit system setup after saving the changes                                                                        |
| Discard Changes and Exit  | Ok<br>Cancel               | Exit system setup without saving any changes                                                                      |
| Discard Changes           | Ok<br>Cancel               | Discards changes done so far to any of the setup questions                                                        |
| Load Optimal Defaults     | Ok<br>Cancel               | Load Optimal Default values for all the setup questions                                                           |
| Load Failsafe Defaults    | Ok<br>Cancel               | Load Failsafe Default values for all the setup questions                                                          |
| Halt on invalid Time/Date | Enabled<br><b>Disabled</b> | Enabled: System halt if incorrect Date & Time.                                                                    |
| Secure CMOS               | Enabled<br><b>Disabled</b> | Enable will store current CMOS in non volatile ram. (For protection of CMOS data in case of battery failure etc.) |

## 7 AMI BIOS Beep Codes

### 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       | <p>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.</p> <ul style="list-style-type: none"> <li>If beep codes are generated when all other expansion cards are absent, consult your system manufacturer's technical support.</li> <li>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.</li> </ul> |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 8 OS Setup

Use the Setup.exe files for all relevant drivers. The drivers can be found on KTQ45 Driver CD or they can be downloaded from the homepage <http://www.kontron.com/>

## 9 Warranty

KONTRON Technology warrants its products to be free from defects in material and workmanship during the warranty period. If a product proves to be defective in material or workmanship during the warranty period, KONTRON Technology will, at its sole option, repair or replace the product with a similar product. Replacement Product or parts may include remanufactured or refurbished parts or components.

### **The warranty does not cover:**

1. Damage, deterioration or malfunction resulting from:
  - A. Accident, misuse, neglect, fire, water, lightning, or other acts of nature, unauthorized product modification, or failure to follow instructions supplied with the product.
  - B. Repair or attempted repair by anyone not authorized by KONTRON Technology.
  - C. Causes external to the product, such as electric power fluctuations or failure.
  - D. Normal wear and tear.
  - E. Any other causes which does not relate to a product defect.
2. Removal, installation, and set-up service charges.

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2. ANY OTHER DAMAGES, WHETHER INCIDENTAL, CONSEQUENTIAL OR OTHERWISE.
3. ANY CLAIM AGAINST THE CUSTOMER BY ANY OTHER PARTY.