# » Kontron User's Guide «
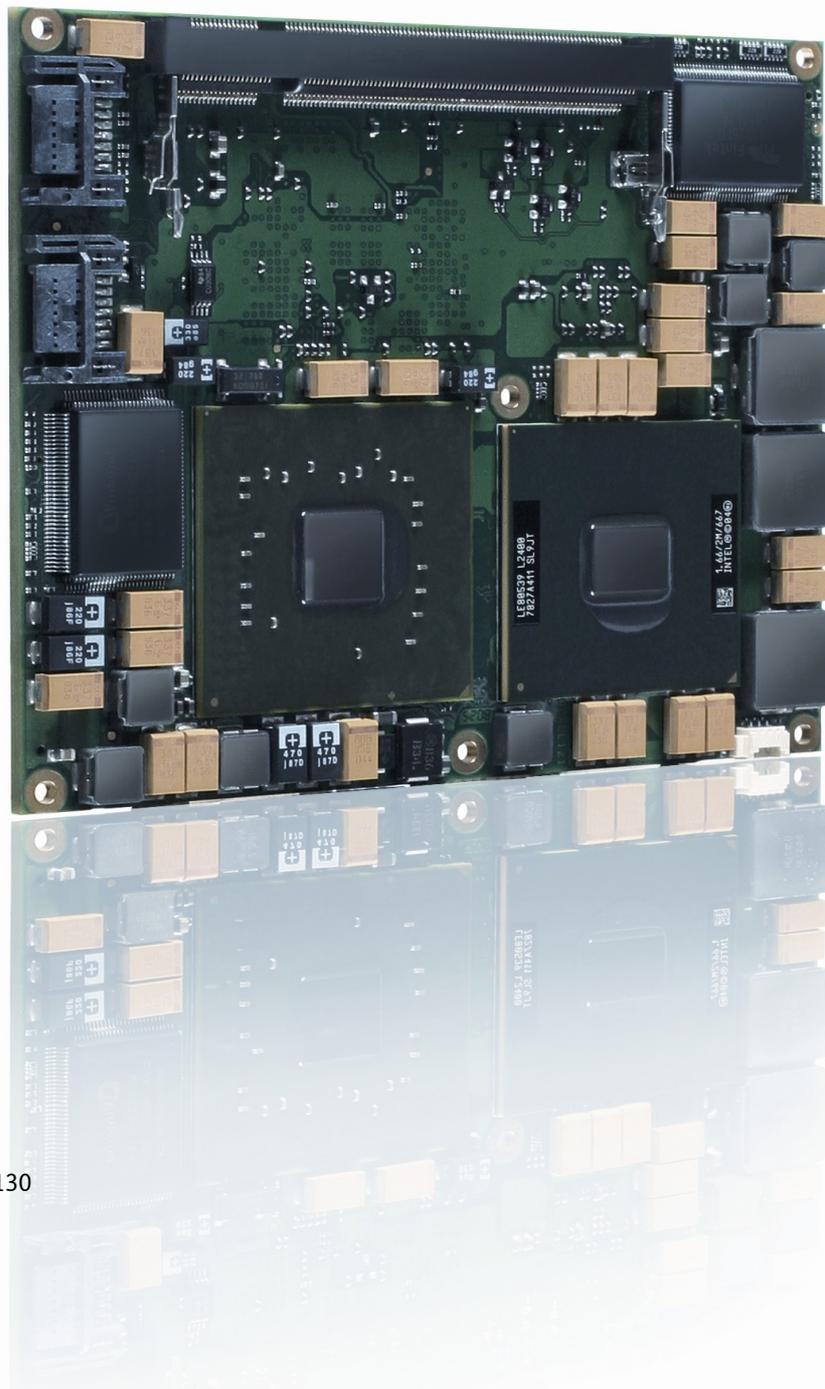
## ETX®-CD
Document Revision 130

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# 1   User Information

## 1.1     About This Document

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Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

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Kontron Europe GmbH will not be responsible for any defects or damages to other products not supplied by Kontron Europe GmbH that are caused by a faulty Kontron Europe GmbH product.

## 1.6    Technical Support

Technicians and engineers from Kontron Europe GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Please consult our Web site at http://www.kontron.com/support for the latest product documentation, utilities, drivers and support contacts. Consult our customer section http://emdcustomersection.kontron.com for the latest BIOS downloads, Product Change Notifications, Board Support Packages, DemoImages, 3D drawings and additional tools and software. In any case you can always contact your board supplier for technical support.

# 2  Introduction

## 2.1  Product Description

Based on the ETX® standard, Kontron's ETX®-CD, powered by a variety of Intel Pentium core duo processors, is a next-generation embedded module that brings advanced technology to tomorrow's applications, as well as continuing today's legacy devices. Built around serial differential signaling technologies, ETX®-CD modules incorporate the following interfaces into a 95 x 114 small form factor embedded module:

> » PCI

> » 2x Serial ATA (SATA)

> » 1x Parallel ATA (IDE)

> » USB

> » 2x Serial Port (COM)

> » 1x Parallel Port (LPT) shared with Floppy

> » LVDS, SDVO, VGA

> » 10/100 MB Ethernet

> » ISA bus

> » Audio

> » Advanced Configuration and Power Interface (ACPI)

The ETX®-CD is built around the Intel Core Duo processors that use the Yonah and Merom Core and the Mobile Intel 945GME Express chipset, which is the first mobile platform to offer PCI Express functionality with extended life cycle support. These modules feature the most current desktop features such as USB, SATA, and PCI buses. The ETX®-CD delivers up to 2GHz performance and up to 2GB DDR2 RAM. For applications that require advanced real-time video capabilities, the ETX®-CD has integrated graphics based on the Intel® Graphics Media Accelerator 900 architecture. The ETX®-CD supports 4 PCI 32-bit PCI devices. A 10/100 megabits per second Ethernet port provides fast connectivity to LAN/WAN and 4x USB interface provides fast and sufficient interfaces for external peripherals. ETX®-CD modules also provide the following interfaces that are always located in the same physical position on each board: PCI32, USB, serial ATA (SATA), parallel ATA (PATA), LVDS Multi Media ports, as well as an ACPI (Advanced Configuration and Power Interface) for optimized power management are available on the board. Six mounting holes on the board provide secure mounting to allow the module increased shock and vibration resistance.

## 2.2  ETX® Documtentation

This product manual serves as one of three principal references for an ETX® design. It documents the specifications and features of ETX®-CD. The other two references, which are available from the Kontron Europe GmbH Web site, include:

> » The ETX® Specification defines the ETX® module form factor, pinout, and signals.

> » The ETX® Design Guide serves as a general guide for baseboard design, with a focus on maximum flexibility to accommodate a wide range of ETX® modules.

> Some of the information contained within this product manual applies only to certain product revisions (CE: xxx). If certain information applies to specific product revisions (CE: xxx) it will be stated. Please check the product revision of your module to see if this information is applicable.

## 2.3    ETX® Benefits

Embedded technology extended (ETX) modules are very compact (114 x 95 mm), highly integrated computers. All ETX® modules feature a standardized form factor and a standardized connector layout that carry a specified set of signals. This standardization allows designers to create a single-system baseboard that can accept present and future ETX® modules. ETX® modules include common personal computer (PC) peripheral functions such as:

» Graphics

» Parallel, Serial, and USB ports

» Keyboard/mouse

» Ethernet

» Sound

» IDE (and SATA)

The baseboard designer can optimize exactly how each of these functions implements physically. Designers can place connectors precisely where needed for the application on a baseboard designed to optimally fit a system's packaging. Peripheral PCI or ISA buses can be implemented directly on the baseboard rather than on mechanically unwieldy expansion cards. The ability to build a system on a single baseboard using the computer as one plug-in component simplifies packaging, eliminates cabling, and significantly reduces system-level cost. A single baseboard design can use a range of ETX® modules. This flexibility can differentiate products at various price/performance points, or to design future proof systems that have a builtin upgrade path. The modularity of an ETX® solution also ensures against obsolescence as computer technology evolves. A properly designed ETX® baseboard can work with several successive generations of ETX® modules. An ETX® baseboard design has many advantages of a custom, computer-board design but delivers better obsolescence protection, greatly reduced engineering effort, and faster time to market.

# 3    Specification

## 3.1    Modules & Accessories

The Computer-on-Module ETX®-CD (MCAL) based on Intel's Napa platform is available in different variants to cover the demand of different performance, price and power:

### Commercial grade modules (0°C to 60°C operating)

| Product Number | Product Name | Processor | Chipset and Features |
|---|---|---|---|
| 18030-0000-11-4 | ETX-CD 1.06GHz C423 | Intel® Celeron® M ULV 423 | Intel® 945GME, ICH7M |
| 18030-0000-12-5 | ETX-CD 1.2GHz U2500 | Intel® Core™ Duo U2500 | Intel® 945GME, ICH7M |
| 18030-0000-15-6 | ETX-CD 1.5GHz L7400 | Intel® Core™ 2 Duo L7400 | Intel® 945GME, ICH7M |
| 18030-0000-17-5 | ETX-CD 1.66GHz L2400 | Intel® Core™ Duo L2400 | Intel® 945GME, ICH7M |
| 18030-0000-19-4 | ETX-CD 1.86GHz C440 | Intel® Celeron® M ULV 423 | Intel® 945GME, ICH7M |

### Extended Temperature modules (-25°C to 75°C operating)

| Product Number | Product Name | Processor | Chipset and Features |
|---|---|---|---|
| 18030-0000-17-5EXT | ETX-CD 1.66GHz E1 | Intel® Core™ Duo L2400 | Intel® 945GME, ICH7M |
| 18030-0000-11-4EXT | ETX-CD 1.06GHz C423 E1 | Intel® Celeron® M ULV 423 | Intel® 945GME, ICH7M |

### Documentation is also valid for following End-of-Live (EOL) variants:

| Product Number | Product Name | Processor | Chipset and Features |
|---|---|---|---|
| 18030-0000-11-1 | ETX-CD 1.06GHz | Intel® Celeron® M ULV 423 | Intel® 945GM, ICH7M |
| 18030-0000-11-1EXT | ETX-CD 1.06GHz E1 | Intel® Celeron® M ULV 423 | Intel® 945GM, ICH7M |
| 18030-0000-12-2 | ETX-CD 1.2GHz | Intel® Core™ Duo U2500 | Intel® 945GM, ICH7M |
| 18030-0000-15-3 | ETX-CD 1.5GHz | Intel® Core™ 2 Duo L7400 | Intel® 945GM, ICH7M |
| 18030-0000-17-2 | ETX-CD 1.66GHz | Intel® Core™ Duo L2400 | Intel® 945GM, ICH7M |
| 18030-0000-17-2EXT | ETX-CD 1.66GHz E1 | Intel® Core™ Duo L2400 | Intel® 945GM, ICH7M |

### Accessories

| Product Number | Product Name |
|---|---|
| 18010-0000-00-0 | ETX® Eval (ADA8) |
| 18028-0000-00-0 | ETX® miniBaseboard (ADAB) |
| 97011-5120-08-0 | DDR2-800 SODIMM / 512MB |
| 97011-1024-08-0 | DDR2-800 SODIMM / 1GB |
| 97011-2048-08-0 | DDR2-800 SODIMM / 2GB |
| 97011-5120-08-2 | DDR2-800 SODIMM / 512MB E2 (industrial temperature) |
| 97011-1024-08-2 | DDR2-800 SODIMM / 1GB E2 (industrial temperature) |
| 97011-2048-08-2 | DDR2-800 SODIMM / 2GB E2 (industrial temperature) |
| 18030-0000-99-0 | ETX®-CD, Heatspreader, threaded |
| 18030-0000-99-1 | ETX®-CD, Heatspreader, through hole |
| 18030-0000-99-0C01 | ETX®-CD, Passive Cooling Solution, threaded |
| 18030-0000-99-0C02 | ETX®-CD, Active Cooling Solution, threaded |
| 96006-0000-00-4 | ADA-ETX-CD-FC4 (SDVO FFC45 to 2xDVI Adaptor) |
| 96006-0000-00-5 | ADA-SDVOB-FC5 (SDVO FFC45 to 1xDVI Adaptor) |
| 96006-0000-00-6 | ADA-SDVOB-LVDS (SDVO FFC45 to LVDS Adaptor) |
| 9-5000-0352 | ADA-LVDS-DVI 18bit (LVDS to DVI converter) |
| 9-5000-0353 | ADA-LVDS-DVI 24bit (LVDS to DVI converter) |
| 96079-0000-00-0 | KAB-HSP 200mm (Cable adapter to connect FAN to module) |
| 96079-0000-00-2 | KAB-HSP 40mm (Cable adapter to connect FAN to module) |

# 3.2    Functional Specification

## Processor

The Intel® Core™ Duo / Celeron® (Yonah / Merom) CPU supports:

> » Intel® Hyper-Threading Technology (HTT)

> » Enhanced Intel SpeedStep® Technology (EIST)

> » Thermal Monitoring Technologies

> » Idle States (C-States)

> » Execute Disable Bit

| Processor | # of Cores | Lithography | Core | Core Clock | L2 Cache | VT-x | HT | Intel® 64 | EIST | Max TDP |
|---|---|---|---|---|---|---|---|---|---|---|
| Intel® Celeron® M ULV 423 | 1 | 65nm | Yonah | 1066 MHz | 1MB | No | No | No | No | 5.5W |
| Intel® Celeron® M 440 | 1 | 65nm | Yonah | 1866 MHz | 1MB | No | No | No | No | 27W |
| Intel® Core™ Duo U2500 | 2 | 65nm | Yonah | 1200 MHz | 2MB | Yes | No | No | Yes | 9W |
| Intel® Core™ Duo L2400 | 2 | 65nm | Yonah | 1666 MHz | 2MB | Yes | No | No | Yes | 15W |
| Intel® Core™ 2 Duo L7400 | 2 | 65nm | Merom | 1500 MHz | 4MB | Yes | No | No | Yes | 17W |

## Chipset

| Chipset | Graphic Outputs |
|---|---|
| 82945GM | VGA, SDVO, LVDS, TVout |
| 82945GME | VGA, SDVO, LVDS |

## Memory

| Sockets | 1x DDR2 SO-DIMM |
|---|---|
| Memory Type | DDR2-533, DDR2-667 |
| Maximum Size | 2GB |
| Technology | Single Channel |

## Graphics Core

The integrated Intel® GMA950 (Gen3.5) supports:

| Graphics Core Render Clock | 250 MHz |
|---|---|
| Execution Units / Pixel Pipelines | 4 |
| Max Graphics Memory | 256MB |
| GFX Memory Bandwidth (GB/s) | 10.7 |
| GFX Memory Technology | DVMT 3.0 |
| API (DirectX/OpenGL) | 9.0c / 1.4 |
| Shader Model | 3.0 (SW) / 2.0 |
| Hardware accelerated Video | - |
| Independent/Simultaneous Displays | 2 |

## Display Interfaces

| CRT max Resolution | 2048x1536 |
|---|---|
| TV out: | YES |
| Digital Display: | SDVOB and SDVOC (onboard FFC45) |

## LVDS

| LVDS Bits/Pixel | 1x18, 2x18 |
|---|---|
| LVDS Bits/Pixel with dithering | 1x24 and 2x24 |
| LVDS max Resolution: | 1600x1200 |
| PWM Backlight Control: | - |

## Chipset & IOH

| # of USB: | 4x USB 1.1/2.0 |
|---|---|
| USB onboard Connector: | - |
| Audio: | Crystal CS4299 / Via VT1612 AC97 Audio |
| PCI Bus: | PCI Rev 2.3 (33MHz/3.3V) |
| ISA Bus: | LPC2ISA Fintek F85226FG |
| SuperI/O Controller | Winbond 83627HFJ LPC-I/O |
| COM Ports: | 2x RS232 |
| IrDA Support: | IrDA 1.0 (SIR) or ASK-IrDA (COM2) |
| LPT Support: | EPP, ECP, bi-dir. |
| Max TDP: | 7W + 3.3W |

## Storage

| Primary IDE: | PATA 100 |
|---|---|
| Secondary IDE: | - |
| SATA onboard connector: | 2x SATA 1.5Gb/s |
| SATA features: | NCQ, HotPlug, Staggered Spinup |
| SATA RAID support: | - |
| onboard SSD: | - |
| onboard CF Card: | - |

## Onboard devices

| Audio | Crystal CS4299 / Via VT1612 AC97 Audio |
|---|---|
| Trusted Platform Module | STMicro ST19WP18 optional |

## Ethernet

The Intel 82562GZ ethernet supports:

» Jumbo Frames

» Time Sync Protocol Indicator

» WOL (Wake On LAN)

» PXE (Preboot eXecution Environment)

## Kontron Features

| I2C/SMB support: | YES/YES |
|---|---|
| M.A.R.S. support | YES |
| Embedded API | JIDA16 / JIDA32 |
| JIDA32 Applications / K-Station | YES, K-Station 1 w/o BIOS modification |
| Custom BIOS Settings / Flash Backup | - |
| Watchdog support | YES |

## Power Features

| ACPI | ACPI 1.0b / 2.0 |
|---|---|
| S-States | S0, S1, S3, S4, S5 |
| Graphic States | D0, D3 |
| Misc Power Management | DPST 2.0 |

## Power Consumption and Performance

| Full Load Power Consumption | 19 - 40W |
|---|---|
| Kontron Performance Index | 1387-3296 |
| Kontron Performance/Watt | 71 - 103 |

Detailed Power Consumption measurements in all states and bechmarks for CPU, Graphics and Memory performance are available in Application Note KEMAP054 at EMD Customer Section.

## Supported Operating Systems

The ETX®-CD currently supports:

» Microsoft Windows XP x86

» Microsoft Windows 7 x86

» Microsoft Windows CE 6.0

» Microsoft Windows XP embedded

» Linux

» WindRiver VxWorks

## 3.3 Block Diagram
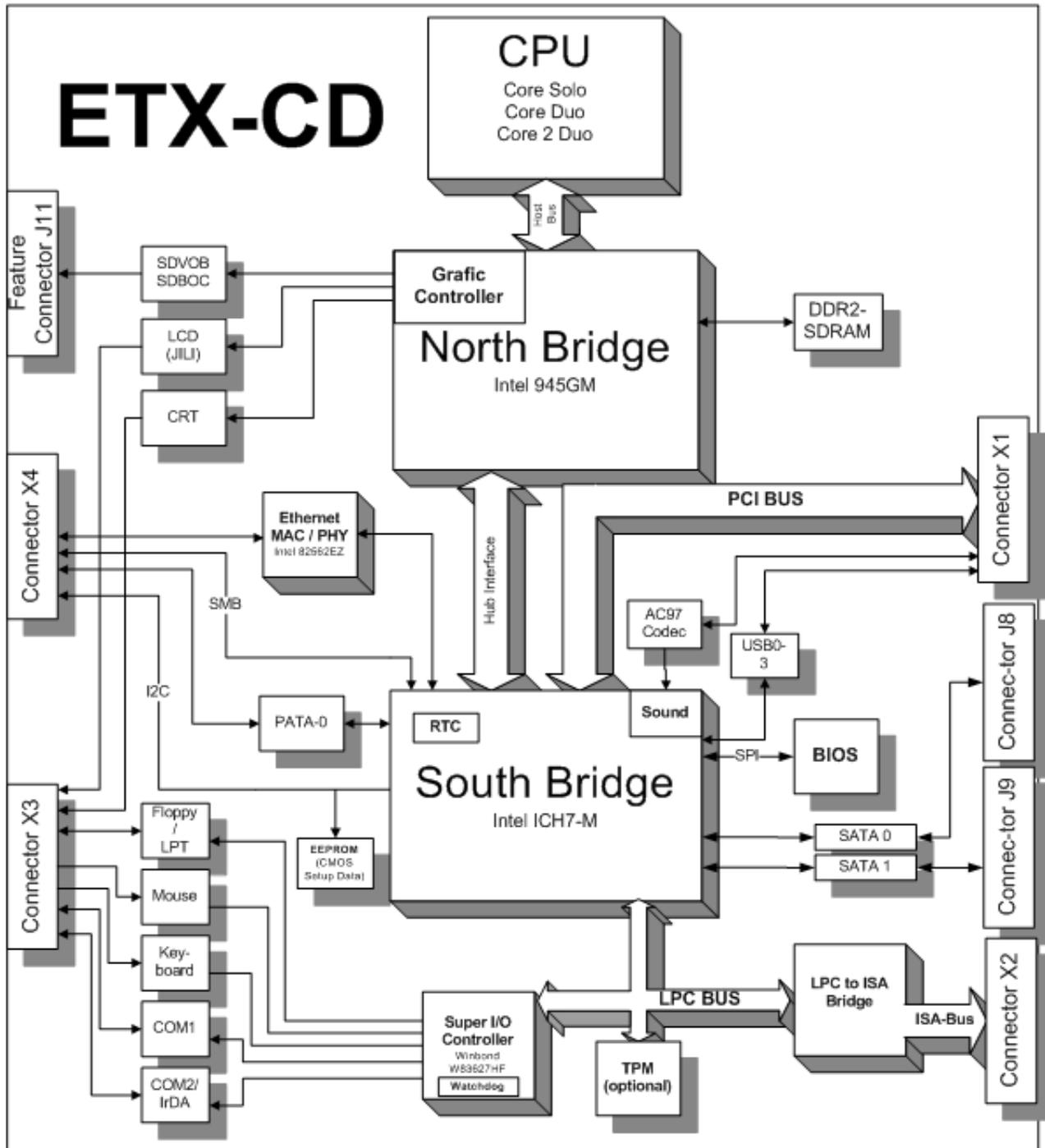
## 3.4    Electrical Specification

### 3.4.1    Supply Voltage

Following supply voltage is specified at the ETX® connector:

| Supply Voltage: | 5V +/- 5% |
|---|---|
| 5V_Stb: | 5V DC +/- 5% |

### 3.4.2    Power Supply Rise Time

» The input voltages shall rise from ≤10% of nominal to within the regulation ranges within 0.1ms to 20ms.

» There must be a smooth and continuous ramp of each DC input voltage from 10% to 90% of its final set-point following the ATX specification

### 3.4.3    Supply Voltage Ripple

» Maximum 100 mV peak to peak 0 – 20 MHz

### 3.4.4    Power Consumption

The maximum Power Consumption of the different ETX®-CD modules is 19 - 40W (100% CPU load; 90°C CPU temperature). Further details with measurements and TDP values of the single variants can be found in our customer section. Information there is available after registration.

## 3.5    Environmental Specification

### 3.5.1    Temperature Specification

| General Kontron Specification | Operating | Non-operating |
|---|---|---|
| Commercial grade | 0°C to +60°C | -30°C to +85°C |
| Extended Temperature(E1) | -25°C to +75°C | -30°C to +85°C |
| Industrial grade by Screening (XT) | -40°C to +85°C | -40°C to +85°C |
| Industrial grade by Design (E2) | -40°C to +85°C | -40°C to +85°C |

> Please see chapter Product Specification for available variants for extended or industrial temperate grade

**With Kontron heatspreader plate assembly**

The operating temperature defines two requirements:

» the maximum ambient temperature with ambient being the air surrounding the module.

» the maximum measurable temperature on any spot on the heatspreader's surface

**Without Kontron heatspreader plate assembly**

The operating temperature is the maximum measurable temperature on any spot on the module's surface.

### 3.5.2    Humidity

» 93% relative Humidity at 40°C, non-condensing (according to IEC 60068-2-78)

## 3.6    Standards and Certifications

### RoHS

The **ETX®-CD** is compliant to the directive 2002/95/EC on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.

### CE marking

The **ETX®-CD** is CE marked according to Low Voltage Directive 2006/95/EC – Test standard EN60950

### Component Recognition UL 60950-1

The **ETX®** form factor Computer-on-Modules are Recognized by Underwriters Laboratories Inc. Representative samples of this component have been evaluated by UL and meet applicable UL requirements.

UL Listings:

» NWGQ2.E304278

» NWGQ8.E304278

### WEEE Directive

WEEE Directive 2002/96/EC is not applicable for Computer-on-Modules.

### Conformal Coating

Conformal Coating is available for Kontron Computer-on-Modules and for validated SO-DIMM memory modules. Please contact your local sales or support for further details.

## Shock & Vibration

The **ETX®** form factor Computer-on-Modules successfully passed shock and vibration tests according to

» IEC/EN 60068-2-6 (Non operating Vibration, sinusoidal, 10Hz-4000Hz, +/-0.15mm, 2g)

» IEC/EN 60068-2-27 (Non operating Shock Test, half-sinusoidal, 11ms, 15g)

## EMC

Validated in Kontron reference housing for EMC the **ETX®-CD** follows the requirements for electromagnetic compatibility standards

» EN55022

## 3.7    MTBF

The following MTBF (Mean Time Before Failure) values were calculated using a combination of manufacturer's test data, if the data was available, and the Telcordia (Bellcore) issue 2 calculation for the remaining parts.

 The calculation methode used is "Bellcore Method 1 Case 1" in a ground benign, controlled environment (GB,GC). This particular method takes into account varying temperature and stress data and the system is assumed to have not been burned in.

 Other environmental stresses (extreme altitude, vibration, salt water exposure, etc) lower MTBF values.

System MTBF (hours)**: 109418 @ 40°C**

> Fans usually shipped with Kontron Europe GmbH products have 50,000-hour typical operating life. The above estimates assume no fan, but a passive heat sinking arrangement Estimated RTC battery life (as opposed to battery failures) is not accounted for in the above figures and need to be considered for separately. Battery life depends on both temperature and operating conditions. When the Kontron unit has external power; the only battery drain is from leakage paths.

## 3.8 Mechanical Specification

» 95.0 mm x 114.0 mm

» Hight approx. 12mm (0.4")

> note  CAD drawings are available at EMD CustomerSection

## 3.9 Module Drillhole Dimension
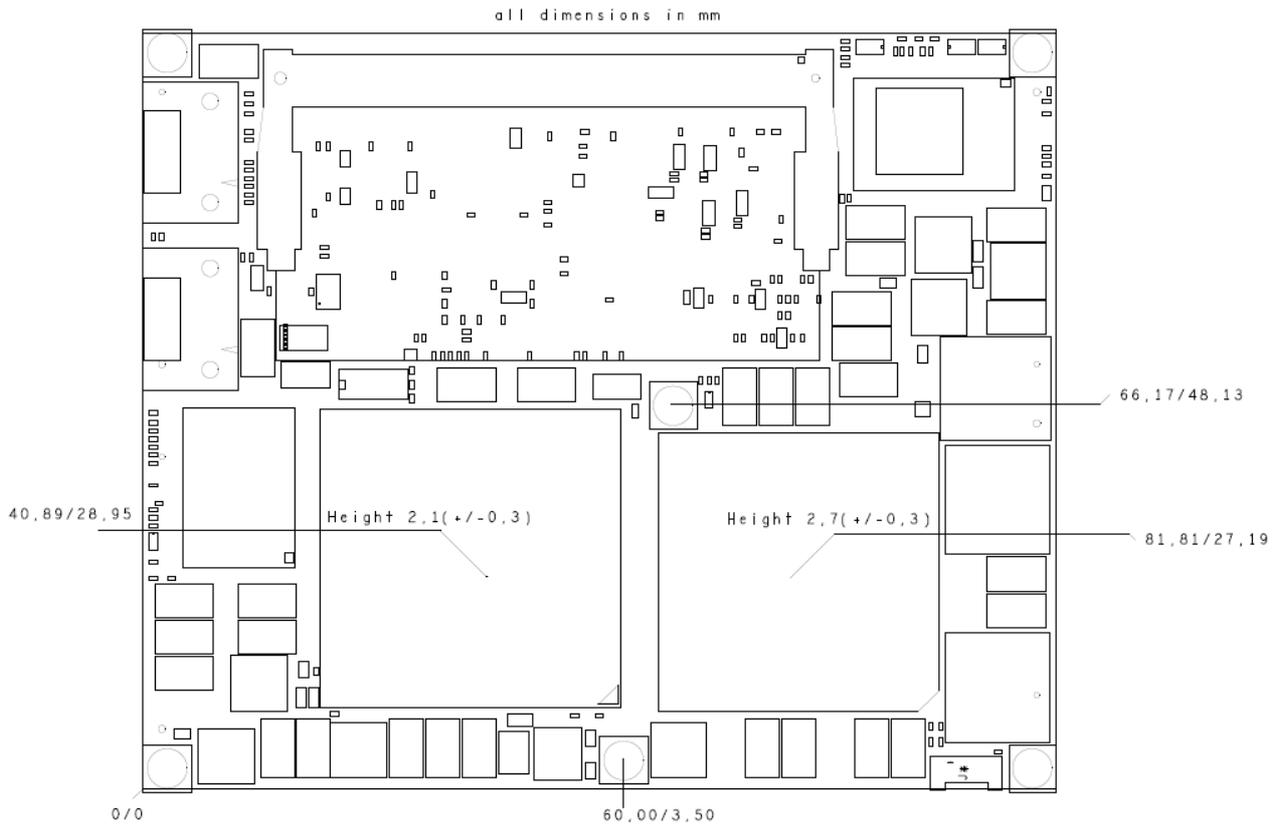


> note  The not shown drill holes match with the ETX® specification.

> note  The maximum height of electrical components on the bottom side of the module is specified with 2.0mm in the ETX@ specification. On the ETX@-CD the Southbridge is soldered on the bottom side and Intel specified the ICH7 with 2.28mm ± 0.21mm

## 3.10　Thermal Management

A heatspreader plate assembly is available from Kontron Europe GmbH for the ETX®-CD. The heatspreader plate on top of this assembly is NOT a heat sink. It works as a ETX®-standard thermal interface to use with a heat sink or other cooling device.

External cooling must be provided to maintain the heatspreader plate at proper operating temperatures. Under worst-case conditions, the cooling mechanism must maintain an ambient air and heatspreader plate temperature of 60° C or less.

The aluminum slugs and thermal pads on the underside of the heatspreader assembly implement thermal interfaces between the heatspreader plate and the major heat-generating components on the ETX®-CD. About 80 percent of the power dissipated within the module is conducted to the heatspreader plate and can be removed by the cooling solution.

You can use many thermal-management solutions with the heatspreader plates, including active and passive approaches. The optimum cooling solution varies, depending on the ETX® application and environmental conditions. Please see the ETX® Design Guide for further information on thermal management.

## 3.11　Heatspreader

Documentation and CAD drawings of ETX®-CD heatspreader and cooling solutions is provided at http://emdcustomersection.kontron.com.

## 3.12   Onboard Fan Connector

This section describes how to connect a fan to the connector located directly on the ETX®-CD. With certain BIOS-settings it is possible to control the fan depending on the Active Trip Point temperature. The fan switches on/off depending on the adjusted Active Trip Point temperature. In order for this feature to function properly an ACPI compliant OS is necessary.

> The ETX® CD can not control the revolutions per minute (R.P.M) of the fan.

**Location and Pinout of Fan Connector**
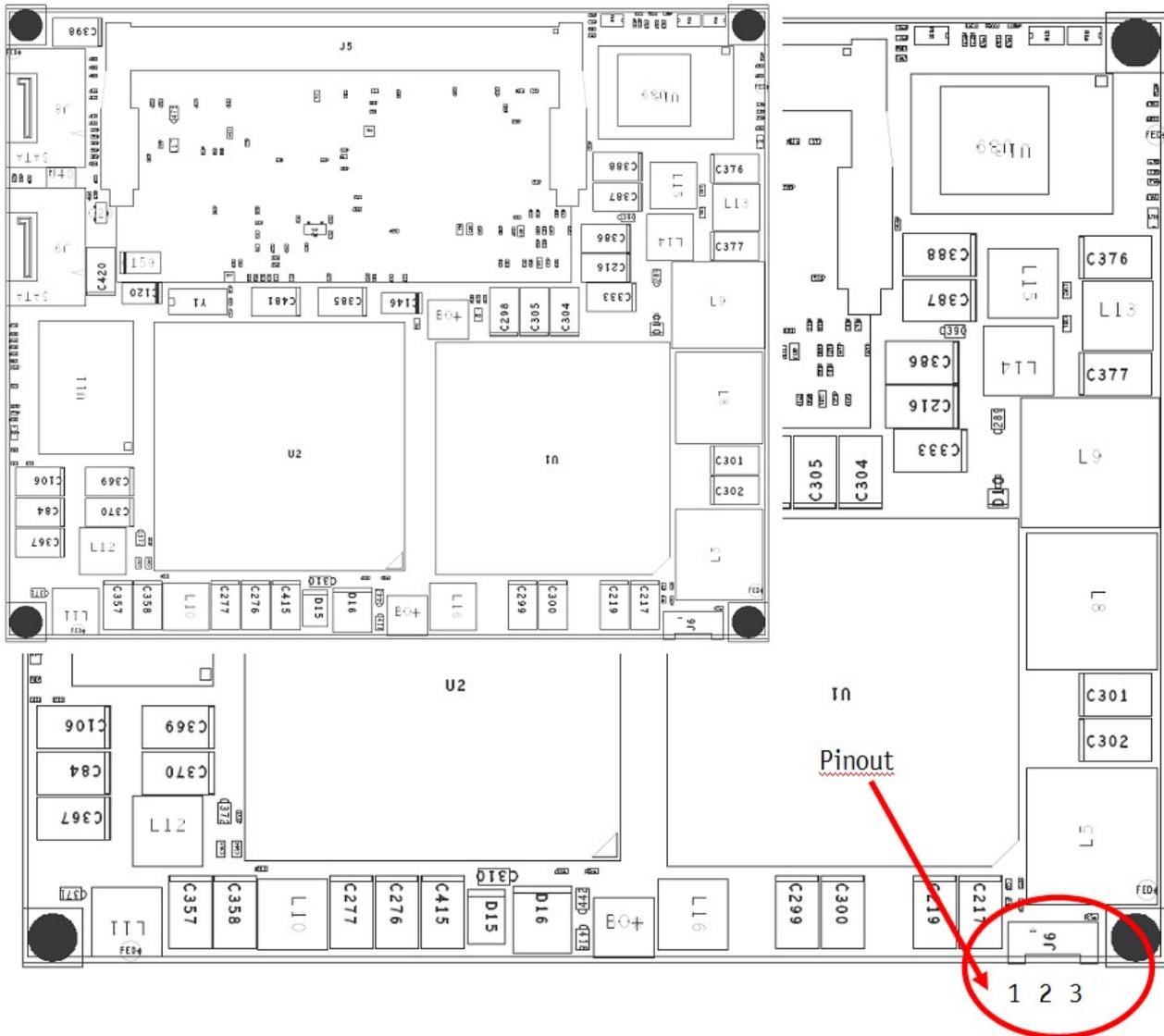
The onboard fan connector (J6) can be found near the northbridge at the corner of the module.

Connector J1 has following specification:

> » Part number (Molex) J8: 53261-0390
>
> » Mates with: 51021-0300
>
> » Crimp terminals: 50079-8100

The Pin assignement is:

> » Pin1: Tacho
>
> » Pin2: VCC
>
> » Pin3: GND

**BIOS Settings for Fan Control**

The fan can be controlled via the BIOS Settings "Power → Thermal Control"

```
             Phoenix TrustedCore(tm) Setup Utility
                                        Power

          CPU Thermal Control                     Item Specific Help

     Thermal Control Circuit:    [TM1 and TM2]    Setting this bit enables
     PROCHOT# Enable:            [Enabled]        the thermal control
                                                  circuit (TCC) portion
     DTS Enable:                 [Enabled]        of the Thermal Monitor
                                                  feature of the CPU.
     Active Trip Point:          [55  C]
     Passive Cooling Trip Point: [Disabled]       Intel(r) Thermal Monitor
     Critical Trip Point:        [POR]            TM1 = 50% duty cycle
                                                  TM2 = Geyserville III




     F1   Help   ↑↓  Select Item   -/+   Change Values   F9   Setup Defaults
     Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Active Trip Point | Disabled<br>15 C<br>23 C<br>…<br>55 C<br>63 C<br>…<br>119 C | This value controls the temperature of the ACPI active trip point - the point in which the OS will turn on the CPU fan (connector on PCB). If DTS is enabled only values below 97°C are valid. |

### 3.12.1 Electrical Characteristics

Vcc = 5 V Imax (continuous) = 0,68 A Imax (pulsed) = 2 A Sense (Tacho-pulse) = 4 Pulses per turn
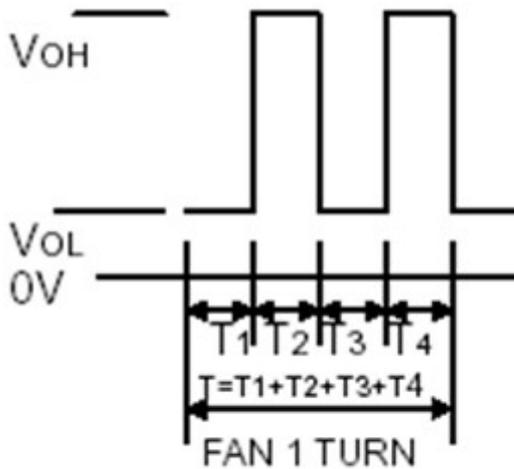


$$T=T_1+T_2+T_3+T_4=60/N \text{ (SEC)} \qquad N : \text{FAN SPEED (r.p.m)}$$

> note
>
> The 5 V output is not short circuit proof. The user has to ensure that the circuit is protected externally, for example by a fuse on the backplane.

> note
>
> To connect a standard FAN with 3pin connector to the module please use adaptor cable KAB-HSP 200mm (96079-0000-00-0) or KAB-HSP 40mm (96079-0000-00-2)

# 4 Features and Interfaces

## 4.1 LPC

The Low Pin Count (LPC) Interface signals are connected to the LPC Bus bridge located in the CPU or chipset. The LPC low speed interface can be used for peripheral circuits such as an external Super I/O Controller, which typically combines legacy-device support into a single IC. The implementation of this subsystem complies with the COM Express® Specification. Implementation information is provided in the COM Express® Design Guide maintained by PICMG. Please refer to the official PICMG documentation for additional information.

The LPC bus does not support DMA (Direct Memory Access) and a clock buffer is required when more than one device is used on LPC. This leads to limitations for ISA bus and SIO (standard I/O´s like Floppy or LPT interfaces) implementations.

All Kontron COM Express® Computer-on-Modules imply BIOS support for following external baseboard LPC Super I/O controller features for the **Winbond/Nuvoton 5V 83627HF/G and 3.3V 83627DHG-P:**

| 83627HF/G | Phoenix BIOS | AMI CORE8 | AMI Aptio |
|-----------|--------------|-----------|-----------|
| PS/2 | YES | YES | YES |
| COM1/COM2 | YES | YES | YES |
| LPT | YES | YES | YES |
| HWM | YES | YES | NO |
| Floppy | NO | NO | NO |
| GPIO | NO | NO | NO |
| 83627DHG-P | Phoenix BIOS | AMI CORE8 | AMI Aptio |
| PS/2 | YES | YES | YES |
| COM1/COM2 | YES | YES | YES |
| LPT | YES | YES | YES |
| HWM | NO | NO | NO |
| Floppy | NO | NO | NO |
| GPIO | NO | NO | NO |

Features marked as not supported do not exclude OS support (e.g. HWM can be accessed via SMB). For any other LPC Super I/O additional BIOS implementations are necessary. Please contact your local sales or support for further details.

## 4.2    M.A.R.S.

The Smart Battery implementation for Kontron Computer-on-Modules called **M**obile **A**pplication for **R**echargeable **S**ystems is a BIOS extension for external Smart Battery Manager or Charger. It includes support for SMBus charger/selector (e.g. Linear Technology LTC1760 Dual Smart Battery System Manager) and provides ACPI compatibility to report battery information to the Operating System.

Reserved SM-Bus addresses for Smart Battery Solutions on the carrier:

| 8-bit Address | 7-bit Address | Device |
|---|---|---|
| 12h | 0x09 | SMART_CHARGER |
| 14h | 0x0A | SMART_SELECTOR |
| 16h | 0x0B | SMART_BATTERY |

## 4.3    JIDA16 and JIDA32

JIDA16 (JUMPtec® Intelligent Device Architecture) is a BIOS interface which allows programs running in Real Mode operating systems (i.e. MS DOS) to call certain functions implemented in the BIOS. These functions can be used to get module information, make settings and access the I2C Bus and the Watchdog unit. JIDA16 functions are INT 15h BIOS calls which are only available in 16 Bit Real Mode operating systems.

For 32bit operating systems (i.e. WindowsXP, Windows 7, Windows CE, VxWorks, Linux) a different JIDA implementation called JIDA32 is implemented. The same common driver for all JIDA32 capable modules talks to the JIDA32 part in the BIOS, which is hardware dependent to interact with the hardware.

Please refer to EMD Customer Section for detailed documentation, JIDA utilities and Libraries for DOS, Windows, Linux, VxWorks or QNX.

**Usage of JIDA16 and JIDA32**
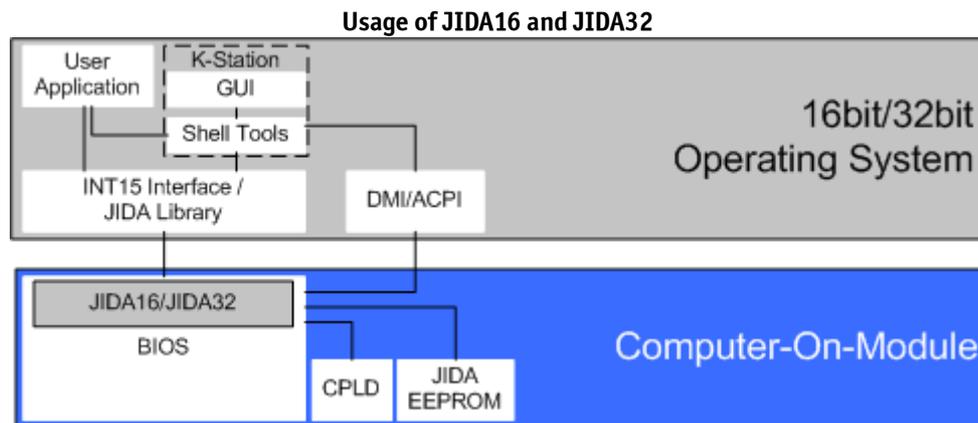
## 4.4    K-Station 1

Based on the JIDA32 interface users can implement advanced board functionality in their application. As an example utility Kontron provides K-Station for most 32bit Windows Operating Systems. K-Station 1 is a summary of command line utilities (Shell Tools) for easy access to JIDA32 BIOS implementations. Second part of K-Station is a JAVA based example GUI which gives a view an all available features using the Shell Tools.

Following K-Station Shell Tools are available:

» KSystemSummary.exe (System Information)

» KGenInfo.exe (Module Information)

» KCPUPerf.exe (CPU Throttling control)

» KHWMon.exe (Hardware Monitoring)

» KI2CBus.exe (I2C and SMBus access)

» KIOPort.exe (GPIO control)

» KStorage.exe (JIDA EEPROM access to user bytes)

» KVGATool.exe (LVDS Backlight control)

» KWDog.exe (Watchdog control)

» KAMIMod.exe (AMICore8 BIOS Modification with Bootlogo or Usercode …)

» KFlash.exe (AMICore8 BIOS Update)

The full K-Station package, the stand-alone Shell Tools with drivers, example batch files and documentation is available on EMD Customer Section for free.

## 4.5    GPIO - General Purpose Input and Output

The offers 4 General Purpose Input (GPI) pins and 4 General Purpose Output (GPO) pins. On a 3.3V level digital in- and outputs are available.

| Signal | Pin | Description |
|--------|-----|-------------|
| GPI0 | A54 | General Purpose Input 0 |
| GPI1 | A63 | General Purpose Input 1 |
| GPI2 | A67 | General Purpose Input 2 |
| GPI3 | A85 | General Purpose Input 3 |
| GPO0 | A93 | General Purpose Output 0 |
| GPO1 | B54 | General Purpose Output 1 |
| GPO2 | B57 | General Purpose Output 2 |
| GPO3 | B63 | General Purpose Output 3 |

### Configuration



The GPI and GPO pins can be configured via JIDA32/K-Station. Please refer to the JIDA32/K-Station manual in the driver download packet on our customer section.

> To enable GPIO functionality, modules with HW revision CE 1.x.x must be reworked. Contact your local sales or support for further information. On modules with HW revision CE 4.x.x and BIOS R115 or newer GPIO/SDIO can be switched via BIOS setup option
>
> The General Purpose Inputs and Outputs are not applicable to drive applications faster than 2ms. It's recommended to use data transfer rates only up to 1 kHz.
>
> General Purpose Outputs are high impedance until first write access

There is one IO Port controlled via onboard CPLD (1 Byte, Port 0) available and the 4 Inputs and 4 Outputs are fixed in direction. To access the GPIOs use the JIDA32 interface. You can write to a General Purpose Output with the upper half byte. To read a General purpose Input use the lower half byte.

| Bit of GPIO Port0 | Function | COM Express Pin |
|-------------------|----------|-----------------|
| 0 | GPI0 | A54 |
| 1 | GPI1 | A63 |
| 2 | GPI2 | A67 |
| 3 | GPI3 | A85 |
| 4 | GPO0 | A93 |
| 5 | GPO1 | B54 |
| 6 | GPO2 | B57 |
| 7 | GPO3 | B63 |

## 4.6　Watchdog Timer

You can configure the Watchdog Timer (WDT) in BIOS setup to start after a set amount of time after power-on boot. The WDT can also be controlled by the JIDA32 Library API. The application software should strobe the WDT to prevent its timeout. Upon timeout, the WDT resets and restarts the system. This provides a way to recover from program crashes or lockups.

### Configuration

You can program the timeout period for the watchdog timer in two ranges:

> » 1-second increments from 1 to 255 seconds

> » 1-minute increments from 1 to 255 minutes

Contact Kontron Embedded Modules technical support for information on programming and operating the WDT.

## 4.7    Speedstep Technology

The Intel® processors offers the Intel® Enhanced SpeedStep™ technology that automatically switches between maximum performance mode and battery-optimized mode, depending on the needs of the application being run. It let you customize high performance computing on your applications. When powered by a battery or running in idle mode, the processor drops to lower frequencies (by changing the CPU ratios) and voltage, conserving battery life while maintaining a high level of performance. The frequency is set back automatically to the high frequency, allowing you to customize performance.

In order to use the Intel® Enhanced SpeedStep™ technology the operating system must support SpeedStep™ technology.

By disabling the SpeedStep feature in the BIOS, manual control/modification of CPU performance is possible. Setup the CPU Performance State in the BIOS Setup or use 3rd party software to control CPU Performance States.

## 4.8    C-States

New generation platforms include power saving features like SuperLFM, EIST (P-States) or C-States in O/S idle mode.

Activated C-States are able to dramatically decrease power consumption in idle mode by reducing the Core Voltage or switching of parts of the CPU Core, the Core Clocks or the CPU Cache.

Following C-States are defined:

| C-State | Description | Function |
|---------|-------------|----------|
| C0 | Operating | CPU fully turned on |
| C1 | Halt State | Stops CPU main internal clocks via software |
| C1E | Enhanced Halt | Similar to C1, additionally reduces CPU voltage |
| C2 | Stop Grant | Stops CPU internal and external clocks via hardware |
| C2E | Extended Stop Grant | Similar to C2, additionally reduces CPU voltage |
| C3 | Deep Sleep | Stops all CPU internal and external clocks |
| C3E | Extended Stop Grant | Similar to C3, additionally reduces CPU voltage |
| C4 | Deeper Sleep | Reduces CPU voltage |
| C4E | Enhanced Deeper Sleep | Reduces CPU voltage even more and turns off the memory cache |
| C6 | Deep Power Down | Reduces the CPU internal voltage to any value, including 0V |
| C7 | Deep Power Down | Similar to C6, additionally LLC (LastLevelCache) is switched off |

C-States are usually enabled by default for low power consumption, but active C-States my influence performance sensitive applications or real-time systems.

> » Active C6-State may influence data transfer on external Serial Ports

> » Active C7-State may cause lower CPU and Graphics performance

It's recommended to disable C-States / Enhanced C-States in BIOS Setup if any problems occur.

## 4.9    ACPI Suspend Modes and Resume Events

The ETX®-CD supports the S3 state (=Save to Ram). S4 (=Save to Disk) is not supported by the BIOS (S4_BIOS) but S4_OS is supported by the following operating systems:

» Windows XP

» Windows Vista

» Windows 7

**The following events resume the system from S3:**

» USB Keyboard (1)

» USB Mouse (1)

» Power Button

» WakeOnLan (2)

**The following events resume the system from S4:**

» Power Button

» WakeOnLan (2)

**The following events resume the system from S5:**

» Power Button

» WakeOnLan (2)

> (1) OS must support wake up via USB devices and baseboard must power the USB Port with StBy-Voltage
>
> (2) WakeOnLan must be enabled in BIOS setup and driver options

## 4.10   ISA Bus Limitation

Memory accesses are not supported on the ISA bus. I/O accesses are only supported if they fall into one of the 4 generic decode ranges provided by the chipset. If a plugin ISA card is using registers in I/O space, this address range has to be enabled explicitely using the decode range and size setup items provided under the menu "Advanced" → "Advanced Chipset Control" → "ISA Options".

 The following devices may also consume a generic decode range which can no longer be used for plugin cards. "Advanced" → "I/O device Configuration" → "SIO Options"

» "External SIO": SIO2 config space, if this range is released (item set to disabled), none of the devices in the external SIO will work

» Serial Port C/D: consumes one range if either one or both COMs are enabled

» External LPT: Consumes one range if enabled

"Advanced" → "Hardware Monitor"

» "Hardware Monitor": consumes one range if enabled, disable if you don't require HWM support.

> the BIOS doesn't check the range and size values set in the ISA Options menu. Ensure that theses values do not conflict with other legacy and PCI I/O resources. Resource conflicts may render the board inoperable.
>
> If the number of generic decode ranges is exhausted, a conflict marker will be displayed

# 5 System Resources

## 5.1 Interrupt Request (IRQ) Lines

In 8259 PIC mode:

| IRQ # | Used For | Available | Comment |
|---|---|---|---|
| 0 | Timer0 | No | |
| 1 | Keyboard | No | |
| 2 | Slave 8259 | No | |
| 3 | COM2 | No | Note (1) |
| 4 | COM1 | No | Note (1) |
| 5 | LPT2 | Yes | Note (2) |
| 6 | Floppy Drive Controller | No | Note (1) |
| 7 | LPT1 | No | Note (1) |
| 8 | RTC | No | |
| 9 | SCI | No | |
| 10 | COM3 | Yes | Note (2) |
| 11 | COM4 | Yes | Note (2) |
| 12 | PS/2 Mouse | No | Note (1) |
| 13 | FPU | No | |
| 14 | IDE0 | No | Note (1) |
| 15 | SATA | No | Note (3) |

> 1 If the "Used For" device is disabled in setup, the corresponding interrupt is available for other devices.
>
> 2 Unavailable if baseboard is equipped with an I/O controller SMC FDC37C669, and the device is enabled in setup.
>
> 3 Unavailable in SATA legacy mode. It cannot be used for PCI, but for ISA bus, when SATA is in enhanced mode.

In APIC mode:

| IRQ # | Used For | Available | Available for PCI | Comment |
|-------|----------|-----------|-------------------|---------|
| 0 | Timer0 | No | No | |
| 1 | Keyboard | No | No | |
| 2 | Slave 8259 | No | No | |
| 3 | COM2 | No | Yes | Note (1) |
| 4 | COM1 | No | Yes | Note (1) |
| 5 | PCI/LPT2 | Yes | Yes | Note (2) |
| 6 | Floppy Drive Controller | No | Yes | Note (1) |
| 7 | LPT1 | No | Yes | Note (1) |
| 8 | RTC | No | No | |
| 9 | SCI | No | No | System Control Interrupt (3) |
| 10 | COM3 | Yes | Yes | Note (2) |
| 11 | COM4 | Yes | Yes | Note (2) |
| 12 | PS/2 Mouse | No | Yes | Note (1) |
| 13 | FPU | No | No | |
| 14 | IDE0 | No | No | |
| 15 | SATA | No | No | Note (3) |
| 16 | PIRQ[A] | For PCI | | PCI IRQ line 1 + USB UHCI controller #0 + Graphics controller |
| 17 | PIRQ[B] | For PCI | | PCI IRQ line 2 + AC97 Audio controller + USB UHCI controller #1 |
| 18 | PIRQ[C] | For PCI | | PCI IRQ line 3 + USB UHCI controller #2 + Native IDE |
| 19 | PIRQ[D] | For PCI | | PCI IRQ line 4 + USB UHCI controller #3 |
| 20 | PIRQ[E] | No | | Lan Controller |
| 21 | PIRQ[F] | No | | |
| 22 | PIRQ[G] | No | | |
| 23 | PIRQ[H] | No | | USB EHCI controller |

1 If the "Used For" device is disabled in setup, the corresponding interrupt is available for other devices.

2 Unavailable if baseboard is equipped with an I/O controller SMC FDC37C669, and the device is enabled in setup.

3 Unavailable in SATA legacy mode. It cannot be used for PCI, but for ISA bus, when SATA is in enhanced mode.

The ETX®-CD is always booting in PIC mode. This might lead to the fact, that there are no interrupts for PCI devices available when all onboard and SuperI/O interfaces are enabled. Then the system stops without booting. The only solution is to deactivate interfaces.

## 5.2 Direct Memory Access (DMA) Channels

| DMA # | Used for | Available | Comment |
|---|---|---|---|
| 0 | | Yes | |
| 1 | | Yes | |
| 2 | FDC | No | If the "used-for" device is disabled in setup, the corresponding DMA channel is available for other devices. |
| 3 | LPT | Yes | Unavailable if LPT is used in ECP mode. |
| 4 | Cascade | No | |
| 5 | | Yes | |
| 6 | | Yes | |
| 7 | | Yes | |

## 5.3 Memory Area

| Upper Memory | Used for | Available | Comment |
|---|---|---|---|
| C0000h – CFFFFh | VGA BIOS | No | |
| D0000h – DDFFFh | | Yes | shadow RAM (ISA bus restriction) |
| DE000h – DFFFFh | USB registers | No | |
| E0000h – FFFFFh | System BIOS | No | |

## 5.4 I/O Address Map

The I/O-port addresses of the ETX®-CD are functionally identical with a standard PC/AT. The following I/O ports are additionally used:

| I/O Address | Used for | Available | Comment |
|---|---|---|---|
| 220-227h | COM3 | | Available if external I/O controller not used. |
| 228-22Fh | COM4 | | Available if external I/O controller not used. |
| 2F8-2FFh | COM1 | No | Available if device is disabled in setup |
| 370-371h | Configuration space for SMC controller | No | Available if external I/O controller not used. |
| 3F8-3FFh | COM2 | No | Available if device is disabled in setup |
| 1000h > | PCI | No | I/O ports 1000h and above might be allocated by PCI devices or onboard hardware. |

## 5.5 Inter-IC (I2C) Bus

| I2C Address | Used For | Available | Comment | JIDA-Bus-Nr. |
|---|---|---|---|---|
| A0h | JIDA-EEPROM | No | EEPROM for CMOS data. | 0 |
| A2h | JIDA-EEPROM | No | | 0 |
| B0h | WD-PIC | No | Reserved for internal use. | 0 |

## 5.6 System Management (SM) Bus

Following SM bus addresses are reserved.

| SM Bus Address | SM Device | Comment | JIDA-Bus-Nr. |
|---|---|---|---|
| 10h | SMB Host | Do not use under any circumstances. | 1 |
| 12h | SMART_CHARGER | Not to be used with any SM bus device except a charger | 1 |
| 14h | SMART_SELECTOR | Not to be used with any SM bus device except a selector | 1 |
| 16h | SMART_BATTERY | Not to be used with any SM bus device except a battery | 1 |
| A0h | SPD | SDRAM EEPROM | 1 |
| D2h | Clock generator | Do not use under any circumstances. | 1 |
| D4h | Clock generator | Do not use under any circumstances. | 1 |

## 5.7 JILI-I2C Bus

| I2C Address | Used For | Available | Comment | JIDA-Bus-Nr. |
|---|---|---|---|---|
| A0h | JILI-EEPROM | No | EEPROM for JILI-Data | 2 |
| 62h | Brightness control | No | MAX536262 | 2 |

# 6 ETX® Connectors

The pinouts for ETX® Interface Connectors X1, X2, X3, and X4 are documented for convenient reference. Please see the ETX® Specification and ETX® Design Guide for detailed, design-level information.

## 6.1 Connector Locations



IDE Port
Ethernet
Power Good/Reset Input
ATX PS Control
Speaker
Battery
I2C-Bus
SM-Bus

ISA Bus

X4

X2

VGA
LVDS (JILI)
Serial Ports
PS/2 Keyboard/Mouse
IRDA
Parallel Port
Floppy
TV-out

PCI Bus
USB
Audio
Serial IRQ
3.3 V for external use
(max. 500 mA)

X3

X1

Feature Connector J11

SDVO          Fan-connector

top view
(connectors only)

side view
(connectors only)
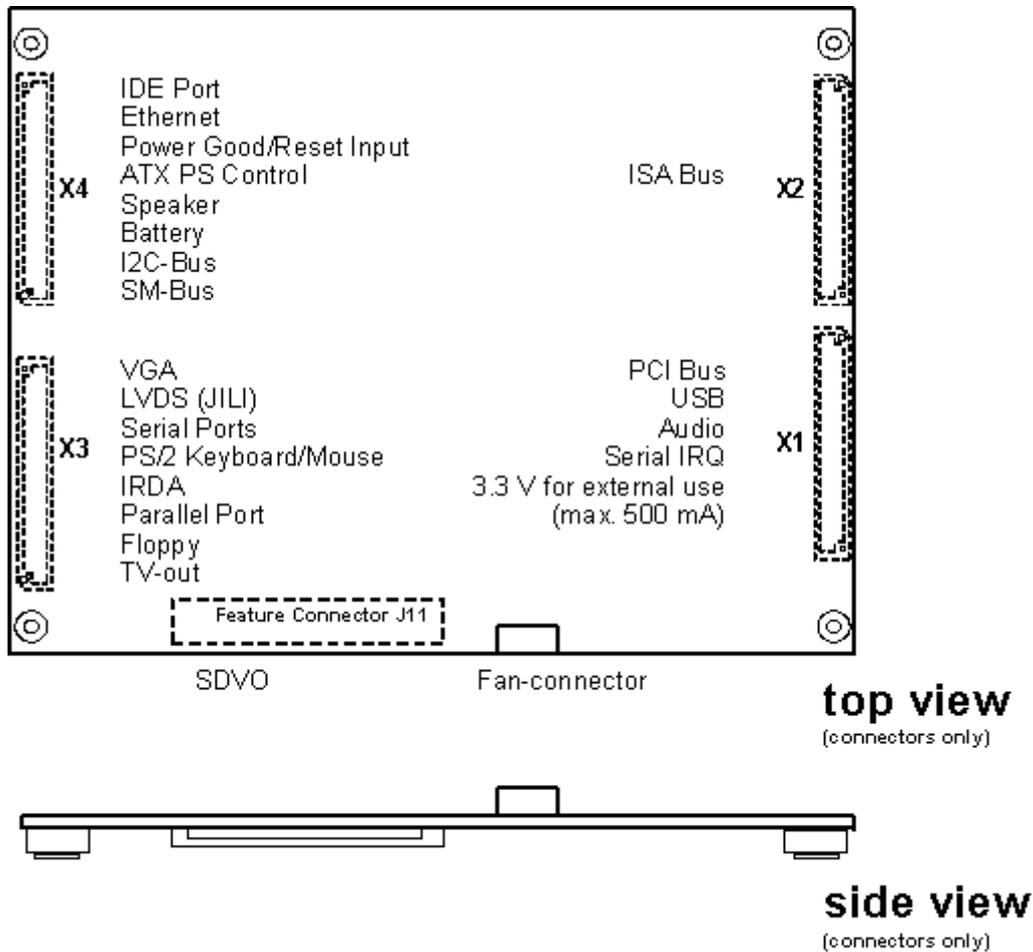
## 6.2 General Signal Description

| Term | Description |
|------|-------------|
| IO-3,3 | Bi-directional 3,3 V IO-Signal |
| IO-5 | Bi-directional 5 V IO-Signal |
| I-3,3 | 3,3 V Input |
| I-5 | 5 V Input |
| O-3,3 | 3,3 V Output |
| O-5 | 5 V Output |
| PU | Pull-Up Resistor |
| PD | Pull-Down Resistor |
| PWR | Power Connection |
| Nc | Not Connected / Reserved |

## 6.3 Connector X1 (PCI bus, USB, Audio)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| 1 | GND | 2 | GND | 51 | VCC * | 52 | VCC * |
| 3 | PCICLK3 | 4 | PCICLK4 | 53 | PAR | 54 | SERR# |
| 5 | GND | 6 | GND | 55 | GPERR# | 56 | RESERVED |
| 7 | PCICLK1 | 8 | PCICLK2 | 57 | PME# | 58 | USB2# |
| 9 | REQ3# | 10 | GNT3# | 59 | LOCK# | 60 | DEVSEL# |
| 11 | GNT2# | 12 | 3V | 61 | TRDY# | 62 | USB3# |
| 13 | REQ2# | 14 | GNT1# | 63 | IRDY# | 64 | STOP# |
| 15 | REQ1# | 16 | 3V | 65 | FRAME# | 66 | USB2 |
| 17 | GNT0# | 18 | RESERVED | 67 | GND | 68 | GND |
| 19 | VCC * | 20 | VCC * | 69 | AD16 | 70 | CBE2# |
| 21 | SERIRQ | 22 | REQ0# | 71 | AD17 | 72 | USB3 |
| 23 | AD0 | 24 | 3V | 73 | AD19 | 74 | AD18 |
| 25 | AD1 | 26 | AD2 | 75 | AD20 | 76 | USB0# |
| 27 | AD4 | 28 | AD3 | 77 | AD22 | 78 | AD21 |
| 29 | AD6 | 30 | AD5 | 79 | AD23 | 80 | USB1# |
| 31 | CBE0# | 32 | AD7 | 81 | AD24 | 82 | CBE3# |
| 33 | AD8 | 34 | AD9 | 83 | VCC * | 84 | VCC * |
| 35 | GND | 36 | GND | 85 | AD25 | 86 | AD26 |
| 37 | AD10 | 38 | AUXAL | 87 | AD28 | 88 | USB0 |
| 39 | AD11 | 40 | MIC | 89 | AD27 | 90 | AD29 |
| 41 | AD12 | 42 | AUXAR | 91 | AD30 | 92 | USB1 |
| 43 | AD13 | 44 | ASVCC | 93 | PCIRST# | 94 | AD31 |
| 45 | AD14 | 46 | SNDL | 95 | INTC# | 96 | INTD# |
| 47 | AD15 | 48 | ASGND | 97 | INTA# | 98 | INTB# |
| 49 | CBE1# | 50 | SNDR | 99 | GND | 100 | GND |

* To protect external power lines of peripheral devices, make sure that:

- the wires have the right diameter to withstand the maximum available current

- the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950

## 6.3.1 Connector X1 Signal Levels

| Pin | Signal | Description | Type | Termination | Comment |
|---|---|---|---|---|---|
| 1 | GND | Ground | PWR | - | - |
| 2 | GND | Ground | PWR | - | - |
| 3 | PCICLK3 | PCI Clock Slot 3 | O-3,3 | - | - |
| 4 | PCICLK4 | PCI Clock Slot 4 | O-3,3 | - | - |
| 5 | GND | Ground | PWR | - | - |
| 6 | GND | Ground | PWR | - | - |
| 7 | PCICLK1 | PCI Clock Slot 1 | O-3,3 | - | - |
| 8 | PCICLK2 | PCI Clock Slot 2 | O-3,3 | - | - |
| 9 | REQ3# | PCI Bus Request 3 | I-3,3 | PU 8k2 3.3V | 8k2 Ohm Resistors |
| 10 | GNT3# | PCI Bus Grant 3 | O-3,3 | - | - |
| 11 | GNT2# | PCI Bus Grant 2 | O-3,3 | - | - |
| 12 | 3V | Power +3,3V | PWR | - | - |
| 13 | REQ2# | PCI Bus Request 2 | I-3,3 | PU 8k2 3.3V | 8k2 Ohm Resistors |
| 14 | GNT1# | PCI Bus Grant 1 | O-3,3 | - | - |
| 15 | REQ1# | PCI Bus Request 1 | I-3,3 | PU 8k2 3.3V | 8k2 Ohm Resistors |
| 16 | 3V | Power +3,3V | PWR | - | - |
| 17 | GNT0# | PCI Bus Grant 0 | O-3,3 | - | - |
| 18 | nc | - | nc | - | Reserved |
| 19 | VCC | Power +5V | PWR | - | - |
| 20 | VCC | Power +5V | PWR | - | - |
| 21 | SERIRQ | Serial Interrupt Reqest | IO-3,3 | - | 12mA Source sink |
| 22 | REQ0# | PCI Bus Request 0 | I-3,3 | PU 8k2 3.3V | 8k2 Ohm Resistors |
| 23 | AD0 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 24 | 3V | Power +3,3V | PWR | - | - |
| 25 | AD1 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 26 | AD2 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 27 | AD4 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 28 | AD3 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 29 | AD6 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 30 | AD5 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 31 | CBE0# | PCI Bus Command and Byte enables 0 | IO-3,3 | - | - |
| 32 | AD7 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 33 | AD8 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 34 | AD9 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 35 | GND | Ground | PWR | - | - |
| 36 | GND | Ground | PWR | - | - |
| 37 | AD10 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 38 | AUXAL | Auxiliary Line Input Left | I | PD 4k7 ASGND | 1:2 bleeder |
| 39 | AD11 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 40 | MIC | Microphone Input | I | - | - |
| 41 | AD12 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 42 | AUXAR | Auxiliary Line Input Right | I | PD 4k7 ASGND | 1:2 bleeder |
| 43 | AD13 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 44 | ASVCC | Analog Supply of Sound Controller | O-5 | - | - |
| 45 | AD14 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 46 | SNDL | Audio Out Left | O | - | - |
| 47 | AD15 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 48 | ASGND | Analog Ground of Sound Controller | P | - | - |
| 49 | CBE1# | PCI Bus Command and Byte enables 1 | IO-3,3 | - | - |
| 50 | SNDR | Audio Out Right | O | - | - |
| 51 | VCC | Power +5V | PWR | - | - |
| 52 | VCC | Power +5V | PWR | - | - |
| 53 | PAR | PCI Bus Parity | IO-3,3 | - | - |
| 54 | SERR# | PCI Bus System Error | IO-3,3 | PU 8k2 3,3V | - |
| 55 | GPERR# | PCI Bus Grant Error | IO-3,3 | PU 8k2 3,3V | - |
| 56 | nc | - | nc | - | Reserved |
| 57 | PME# | PCI Power Management Event | IO-3,3 | - | int. PU 20k 3,3V |
| 58 | USB2# | USB Data- , Port2 | IO-3,3 | - | int. PD 15k in ICH7 |
| 59 | LOCK# | PCI Bus Lock | IO-3,3 | PU 8k2 3,3V | - |
| 60 | DEVSEL# | PCI Bus Device Select | IO-3,3 | PU 8k2 3,3V | - |
| 61 | TRDY# | PCI Bus Target Ready | IO-3,3 | PU 8k2 3,3V | - |
| 62 | USB3# | USB Data- , Port3 | IO-3,3 | - | int. PD 15k in ICH7 |
| 63 | IRDY# | PCI Bus Initiator Ready | IO-3,3 | PU 8k2 3,3V | - |
| 64 | STOP# | PCI Bus Stop IO-3,3 | PU 8k2 | 3,3V | - |

| 65 | FRAME# | PCI Bus Cycle Frame | IO-3,3 | PU 8k2 3,3V | - |
|---|---|---|---|---|---|
| 66 | USB2 | USB Data+ , Port2 | IO-3,3 | - | int. PD 15k in ICH7 |
| 67 | GND | Ground | PWR | - | - |
| 68 | GND | Ground | PWR | - | - |
| 69 | AD16 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 70 | CBE2# | PCI Bus Command and Byte enables 2 | IO-3,3 | - | - |
| 71 | AD17 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 72 | USB3 | USB Data+ , Port3 | IO-3,3 | - | int. PD 15k in ICH7 |
| 73 | AD19 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 74 | AD18 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 75 | AD20 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 76 | USB0# | USB Data- , Port0 | IO-3,3 | - | int. PD 15k in ICH7 |
| 77 | AD22 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 78 | AD21 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 79 | AD23 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 80 | USB1# | USB Data- , Port1 | IO-3,3 | - | int. PD 15k in ICH7 |
| 81 | AD24 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 82 | CBE3# | PCI Command and Byte enables 3 | IO-3,3 | - | - |
| 83 | VCC | Power +5V | PWR | - | - |
| 84 | VCC | Power +5V | PWR | - | - |
| 85 | AD25 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 86 | AD26 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 87 | AD28 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 88 | USB0 | USB Data+ , Port0 | IO-3,3 | - | int. PD 15k in ICH7 |
| 89 | AD27 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 90 | AD29 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 91 | AD30 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 92 | USB1 | USB Data+ , Port1 | IO-3,3 | - | int. PD 15k in ICH7 |
| 93 | PCIRST# | PCI Bus Reset | O-3,3 | - | - |
| 94 | AD31 | PCI Adress & Data Bus line | IO-3,3 | - | - |
| 95 | INTC# | PCI BUS Interrupt Request C | I-3,3 | PU 8k2 3,3V | - |
| 96 | INTD# | PCI BUS Interrupt Request D | I-3,3 | PU 8k2 3,3V | - |
| 97 | INTA# | PCI BUS Interrupt Request A | I-3,3 | PU 8k2 3,3V | - |
| 98 | INTB# | PCI BUS Interrupt Request B | I-3,3 | PU 8k2 3,3V | - |
| 99 | GND | Ground | PWR | - | - |
| 100 | GND | Ground | PWR | - | - |

> **note**
>
> The termination resistors in this table are already mounted on the ETX® board. Please refer to the design guide for information about additional termination resistors.

## 6.3.2    Connector X1 Signal Description

**PCI Bus**

The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

**USB**

Three USB host controllers (two 1.1 UHCI and one EHCI high-speed 2.0 controller) are on the Intel® 82801GB south bridge device. The USB controllers comply with both versions 1.1 and 2.0 of the USB standard and are backward compatible. The three controllers implement a root hub, which have two USB ports each.

Configuration

The USB controllers are PCI bus devices. The BIOS allocates required system resources during configuration of the PCI bus.

**Audio**

The ETX®-CD PCI audio controller is integrated in the Intel® 82801GB southbridge. The audio codec is compatible with AC97.

Configuration

The audio controller is a PCI bus device. The BIOS allocates required system resources during configuration of the PCI device.

**Serial IRQ**

The serial IRQ pin offers a standardized interface to link interrupt request lines to a single wire.

Configuration

The serial IRQ machine is in "Continuous Mode" per default and can be changed in the BIOS setup, the frame size is 21 frames and the start frame pulse width is 4 clocks.

**3.3V Power Supply for External Components**

The ETX®-CD offers the ability to connect external 3.3V devices to the onboard-generated supply voltage. Pin 12 and Pin 16 of Connector X1 are used to connect to the +3.3V ±5% power supply. The maximum external load is 500mA. Contact Kontron Embedded Systems Technical Support for help with this feature.

> Do not connect 3.3 V pins to external 3.3 V supply.

For additional information, refer to the ETX® Design Guide, I2C application notes, and JIDA specifications, all of which are available on the Kontron Embedded Systems Web site.

## 6.4 Connector X2 (ISA Bus)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|-----|--------|-----|--------|
| 1 | GND | 2 | GND | 51 | VCC * | 52 | VCC 1) |
| 3 | SD14 | 4 | SD15 | 53 | SA6 | 54 | IRQ5 |
| 5 | SD13 | 6 | MASTER# | 55 | SA7 | 56 | IRQ6 |
| 7 | SD12 | 8 | DREQ7 | 57 | SA8 | 58 | IRQ7 |
| 9 | SD11 | 10 | DACK7# | 59 | SA9 | 60 | SYSCLK |
| 11 | SD10 | 12 | DREQ6 | 61 | SA10 | 62 | REFSH# |
| 13 | SD9 | 14 | DACK6# | 63 | SA11 | 64 | DREQ1 |
| 15 | SD8 | 16 | DREQ5 | 65 | SA12 | 66 | DACK1# |
| 17 | MEMW# | 18 | DACK5# | 67 | GND | 68 | GND |
| 19 | MEMR# | 20 | DREQ0 | 69 | SA13 | 70 | DREQ3 |
| 21 | LA17 | 22 | DACK0# | 71 | SA14 | 72 | DACK3# |
| 23 | LA18 | 24 | IRQ14 | 73 | SA15 | 74 | IOR# |
| 25 | LA19 | 26 | IRQ15 | 75 | SA16 | 76 | IOW# |
| 27 | LA20 | 28 | IRQ12 | 77 | SA18 | 78 | SA17 |
| 29 | LA21 | 30 | IRQ11 | 79 | SA19 | 80 | SMEMR# |
| 31 | LA22 | 32 | IRQ10 | 81 | IOCHRDY | 82 | AEN |
| 33 | LA23 | 34 | IO16# | 83 | VCC * | 84 | VCC * |
| 35 | GND | 36 | GND | 85 | SD0 | 86 | SMEMW# |
| 37 | SBHE# | 38 | M16# | 87 | SD2 | 88 | SD1 |
| 39 | SA0 | 40 | OSC | 89 | SD3 | 90 | NOWS# |
| 41 | SA1 | 42 | BALE | 91 | DREQ2 | 92 | SD4 |
| 43 | SA2 | 44 | TC | 93 | SD5 | 94 | IRQ9 2) |
| 45 | SA3 | 46 | DACK2# | 95 | SD6 | 96 | SD7 |
| 47 | SA4 | 48 | IRQ3 | 97 | IOCHK# | 98 | RSTDRV |
| 49 | SA5 | 50 | IRQ4 | 99 | GND | 100 | GND |

> 1) To protect external power lines of peripheral devices, make sure that:
>
> - The wires have the right diameter to withstand the maximum available current.
>
> - The enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950
>
> 2) IRQ9 is used for SCI in ACPI mode. Do not use for legacy ISA devices.

## 6.4.1 Connector X2 Signal Levels

| Pin | Signal | Description | Type | Termination | Comment |
|-----|--------|-------------|------|-------------|---------|
| 1 | GND | Ground | PWR | - | - |
| 2 | GND | Ground | PWR | - | - |
| 3 | SD14 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 4 | SD15 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 5 | SD13 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 6 | MASTER# | ISA 16-Bit Master | I-5 | PU 330R 5V | - |
| 7 | SD12 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 8 | DREQ7 | ISA DMA Request 7 | I-5 | PD 8k2 | - |
| 9 | SD11 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 10 | DACK7# | ISA DMA Acknowledge 7 | IO-5 | - | 24mA source cap. |
| 11 | SD10 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 12 | DREQ6 | ISA DMA Request 6 | I-5 | PD 8k2 | - |
| 13 | SD9 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 14 | DACK6# | ISA DMA Acknowledge 6 | IO-5 | - | 24mA source cap. |
| 15 | SD8 | ISA Data Bus | IO-5 | PU 8k2 5V | - |
| 16 | DREQ5 | ISA DMA Request 5 | I-5 | PD 8k2 | - |
| 17 | MEMW# | ISA Memory Write | IO-5 | PU 8k2 5V | - |
| 18 | DACK5# | ISA DMA Acknowledge 5 | IO-5 | - | 24mA source cap. |
| 19 | MEMR# | ISA Memory Read | IO-5 | PU 8k2 5V | - |
| 20 | DREQ0 | ISA DMA Request 0 | I-5 | PD 8k2 | - |
| 21 | LA17 | ISA Adress Bus (SA17) | O-5 | - | - |
| 22 | DACK0# | ISA DMA Acknowledge 0 | IO-5 | - | 24mA source cap. |
| 23 | LA18 | ISA Adress Bus (SA18) | O-5 | - | - |
| 24 | IRQ14 | ISA Interrupt Request 14 / ROM Chip Select | IO-5 | PU 8k2 5V | - |
| 25 | LA19 | ISA Adress Bus (SA19) | O-5 | - | - |
| 26 | IRQ15 | ISA Interrupt Request 15 | I-5 | PU 8k2 5V | - |
| 27 | LA20 | ISA Latchable Adress Bus | O-5 | - | - |
| 28 | IRQ12 | ISA Interrupt Request 12 | I-5 | PU 8k2 5V | - |
| 29 | LA21 | ISA Latchable Adress Bus | O-5 | - | - |
| 30 | IRQ11 | ISA Interrupt Request 11 | I-5 | PU 8k2 5V | - |
| 31 | LA22 | ISA Latchable Adress Bus | O-5 | - | - |
| 32 | IRQ10 | ISA Interrupt Request 10 | I-5 | PU 8k2 5V | - |
| 33 | LA23 | ISA Latchable Adress Bus | O-5 | - | - |
| 34 | IO16# | ISA 16-Bit I/O Access | I-5 | PU 330R 5V | - |
| 35 | GND | Ground | PWR | - | - |
| 36 | GND | Ground | PWR | - | - |
| 37 | SBHE# | ISA System Byte High Enable | IO-5 | - | - |
| 38 | M16# | ISA 16-Bit Memory Access | IO-5 | PU 330R 5V | - |
| 39 | SA0 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 40 | OSC | ISA Oscillator (CLK_ISA14#) | O-3,3 | - | - |
| 41 | SA1 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 42 | BALE | ISA Buffer Adress Latch Enable | IO-5 | - | - |
| 43 | SA2 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 44 | TC | ISA Terminal Count | IO-5 | - | - |
| 45 | SA3 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 46 | DACK2# | ISA DMA Acknowledge 2 | IO-5 | - | - |
| 47 | SA4 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 48 | IRQ3 | ISA Interrupt Request 3 | I-5 | PU 8k2 5V | - |
| 49 | SA5 | ISA Adress Bus | O-5 | PU 8k2 5V | - |
| 50 | IRQ4 | ISA Interrupt Request 4 | I-5 | PU 8k2 5V | - |
| 51 | VCC | Power +5V | PWR | - | - |
| 52 | VCC | Power +5V | PWR | - | - |
| 53 | SA6 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 54 | IRQ5 | ISA Interrupt Request 5 | I-3,3 | PU 8k2 5V | - |
| 55 | SA7 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 56 | IRQ6 | ISA Interrupt Request 6 | I-3,3 | PU 8k2 5V | - |
| 57 | SA8 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 58 | IRQ7 | ISA Interrupt Request 7 | I-3,3 | PU 8k2 5V | - |
| 59 | SA9 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 60 | SYSCLK | ISA Bus Clock (CLK_SYS_ISA) | O-3,3 | - | - |
| 61 | SA10 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 62 | REFSH# | ISA System Refresh Control | IO-3,3 | PU 1k 5V | - |
| 63 | SA11 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 64 | DREQ1 | ISA DMA Request 1 | I-3,3 | PD 8k2 | - |

| 65 | SA12 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
|---|---|---|---|---|---|
| 66 | DACK1# | ISA DMA Acknowledge 1 | IO-3,3 | - | - |
| 67 | GND | Ground | PWR | - | - |
| 68 | GND | Ground | PWR | - | - |
| 69 | SA13 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 70 | DREQ3 | ISA DMA Request 3 | I-3,3 | PD 8k2 | - |
| 71 | SA14 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 72 | DACK3# | ISA DMA Acknowledge 3 | IO-3,3 | - | - |
| 73 | SA15 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 74 | IOR# | ISA I/O Read | IO-3,3 | PU 8k2 5V | - |
| 75 | SA16 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 76 | IOW# | ISA I/O Write | IO-3,3 | PU 8k2 5V | - |
| 77 | SA18 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 78 | SA17 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 79 | SA19 | ISA Adress Bus | O-3,3 | PU 8k2 5V | - |
| 80 | SMEMR# | ISA System Memory Read | IO-3,3 | PU 8k2 5V | - |
| 81 | IOCHRDY | ISA I/O Channel Ready | IO-3,3 | PU 1k 5V | - |
| 82 | AEN | ISA Adress Enable | IO-3,3 | - | - |
| 83 | VCC | Power +5V | PWR | - | - |
| 84 | VCC | Power +5V | PWR | - | - |
| 85 | SD0 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 86 | SMEMW# | ISA System Memory Write | IO-3,3 | PU 8k2 5V | - |
| 87 | SD2 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 88 | SD1 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 89 | SD3 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 90 | NOWS# | ISA No Wait Staits | I-3,3 | PU 8k2 5V | - |
| 91 | DREQ2 | ISA DMA Request 2 | I-3,3 | PD 8k2 | - |
| 92 | SD4 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 93 | SD5 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 94 | IRQ9 | ISA Interrupt Request 9 | I-3,3 | PU 8k2 5V | - |
| 95 | SD6 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 96 | SD7 | ISA Data Bus | IO-3,3 | PU 8k2 5V | - |
| 97 | IOCHK# | ISA I/O Channel Check | I-3,3 | PU 8k2 5V | - |
| 98 | RSTDRV | ISA Reset | O-3,3 | - | - |
| 99 | GND | Ground | PWR | - | - |
| 100 | GND | Ground | PWR | - | - |

The termination resistors in this table are already mounted on the ETX® board. Please refer to the design guide for information about additional termination resistors.

### 6.4.2    Connector X2 Signal Description

**ISA Bus**

The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Restrictions:

Memory Transfer: According to the used LPC 2 ISA solution only memory transfer in the Firmware HUB memory range and with Firmware HUB commands is possible. The Firmware HUB range is from FED4:0000 to FED4:0FFF

I/O Transfer: Only two generic decoding ranges are available which can be selected in the BIOS setup with a maximum size of 256 Byte. This works of course only, when there are no other devices connected to that I/O ports in that range. It can be that there is only one decoding range available, when there are the COM and/or parallel ports of an external SuperI/O controller used.

Signal level: The signal level of the used Fintec controller is 3,3V, 5V tolerant. To achieve the 5V level, most of the signals are pulled up to 5V.

## 6.5    Connector X3 (VGA, LCD, Video, COM1 and COM2, LPT/Floppy, Mouse, Keyboard)

**Flat-Panel Interfaces**

ETX®-CD modules can implement an LVDS flat-panel interface called JUMPtec Intelligent LVDS Interface (JILI). These modules do not implement a parallel digital flat-panel interface called JUMPtec Intelligent Digital Interface (JIDI).

**LVDS Interface Pinout (JILI)**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | GND | 2 | GND |
| 3 | R | 4 | B |
| 5 | HSY | 6 | G |
| 7 | VSY | 8 | DDCK |
| 9 | DETECT# 2) | 10 | DDDA |
| 11 | LCDD016 | 12 | LCDD018 |
| 13 | LCDD017 | 14 | LCDD019 |
| 15 | GND | 16 | GND |
| 17 | LCDD013 | 18 | LCDD015 |
| 19 | LCDD012 | 20 | LCDD014 |
| 21 | GND | 22 | GND |
| 23 | LCDD08 | 24 | LCDD011 |
| 25 | LCDD09 | 26 | LCDD010 |
| 27 | GND | 28 | GND |
| 29 | LCDD04 | 30 | LCDD07 |
| 31 | LCDD05 | 32 | LCDD06 |
| 33 | GND | 34 | GND |
| 35 | LCDD01 | 36 | LCDD03 |
| 37 | LCDD00 | 38 | LCDD02 |
| 39 | VCC 1) | 40 | VCC 1) |
| 41 | JILI_DAT | 42 | LTGIO0 2) |
| 43 | JILI_CLK | 44 | BLON# |
| 45 | BIASON 2) | 46 | DIGON |
| 47 | COMP 2) | 48 | Y 2) |
| 49 | SYNC 2) | 50 | C 2) |

> 1) To protect external power lines of peripheral devices, make sure that:
>
> - the wires have the right diameter to withstand the maximum available current

- the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950.

2) This signal is not supported on the ETX®-CD.

## Parallel Port / Floppy Interfaces

You can configure ETX®-CD's parallel port interfaces as conventional PC parallel ports or as an interface for a floppy-disk drive. You can select the operating mode in the BIOS settings and by a hardware mode-select pin.

If Pin X3-51 (LPT/FLPY#) is grounded at boot time, the floppy support mode is selected. If the pin is left floating or is held high, parallel-port mode is selected. The mode selection is determined at boot time. It cannot be changed until the next boot cycle.

| Parallel Port Mode Pinout | | | | Floppy Support Mode Pinout | | | |
|---|---|---|---|---|---|---|---|
| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
| 51 | LPT/FLPY# | 52 | RESERVED | 51 | LPT/FLPY# | 52 | RESERVED |
| 53 | VCC * | 54 | GND | 53 | VCC * | 54 | GND |
| 55 | STB# | 56 | AFD# | 55 | RESERVED | 56 | DENSEL |
| 57 | RESERVED | 58 | PD7 | 57 | RESERVED | 58 | RESERVED |
| 59 | IRRX | 60 | ERR# | 59 | IRRX | 60 | HDSEL# |
| 61 | IRTX | 62 | PD6 | 61 | IRTX | 62 | RESERVED |
| 63 | RXD2 | 64 | INIT# | 63 | RXD2 | 64 | DIR# |
| 65 | GND | 66 | GND | 65 | GND | 66 | GND |
| 67 | RTS2# | 68 | PD5 | 67 | RTS2# | 68 | RESERVED |
| 69 | DTR2# | 70 | SLIN# | 69 | DTR2# | 70 | STEP# |
| 71 | DCD2# | 72 | PD4 | 71 | DCD2# | 72 | DSKCHG# |
| 73 | DSR2# | 74 | PD3 | 73 | DSR2# | 74 | RDATA# |
| 75 | CTS2# | 76 | PD2 | 75 | CTS2# | 76 | WP# |
| 77 | TXD2 | 78 | PD1 | 77 | TXD2 | 78 | TRK0# |
| 79 | RI2# | 80 | PD0 | 79 | RI2# | 80 | INDEX# |
| 81 | VCC * | 82 | VCC* | 81 | VCC * | 82 | VCC * |
| 83 | RXD1 | 84 | ACK# | 83 | RXD1 | 84 | DRV |
| 85 | RTS1# | 86 | BUSY | 85 | RTS1# | 86 | MOT |
| 87 | DTR1# | 88 | PE | 87 | DTR1# | 88 | WDATA# |
| 89 | DCD1# | 90 | SLCT# | 89 | DCD1# | 90 | WGATE# |
| 91 | DSR1# | 92 | MSCLK | 91 | DSR1# | 92 | MSCLK |
| 93 | CTS1# | 94 | MSDAT | 93 | CTS1# | 94 | MSDAT |
| 95 | TXD1 | 96 | KBCLK | 95 | TXD1 | 96 | KBCLK |
| 97 | RI1# | 98 | KBDAT | 97 | RI1# | 98 | KBDAT |
| 99 | GND | 100 | GND | 99 | GND | 100 | GND |

*To protect external power lines of peripheral devices, make sure that:

- the wires have the right diameter to withstand the maximum available current

- the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950

## 6.5.1  Connector X3 (Signal Levels)

| Pin | Signal | Description | Type | Termination | Comment |
|---|---|---|---|---|---|
| 1 | GND | Ground | PWR | - | - |
| 2 | GND | Ground | PWR | - | - |
| 3 | R | Analog Video Out RGB - Red Channel | O | - | - |
| 4 | B | Analog Video Out RGB - Blue Channel | O | - | - |
| 5 | HSY | Horizontal Synchronization Pulse | O-3,3 | - | - |
| 6 | G | Analog Video Out RGB - Green Channel | O | - | - |
| 7 | VSY | Vertical Synchronization Pulse | O-3,3 | - | - |
| 8 | DDCK | Display Data Channel Clock | IO-5 | PU 2k2 5V | - |
| 9 | DETECT# | Panel Hot-Plug Detection | nc | - | not supported |
| 10 | DDDA | Display Data Channel Data | IO-5 | PU 2k2 5V | - |
| 11 | LCDD016 | LVDS Channel Data | O | - | - |
| 12 | LCDD018 | LVDS Channel Data | O | - | - |
| 13 | LCDD017 | LVDS Channel Data | O | - | - |
| 14 | LCDD019 | LVDS Channel Data | O | - | - |
| 15 | GND | Ground | PWR | - | - |
| 16 | GND | Ground | PWR | - | - |
| 17 | LCDD013 | LVDS Channel Data | O | - | - |
| 18 | LCDD015 | LVDS Channel Data | O | - | - |
| 19 | LCDD012 | LVDS Channel Data | O | - | - |
| 20 | LCDD014 | LVDS Channel Data | O | - | - |
| 21 | GND | Ground | PWR | - | - |
| 22 | GND | Ground | PWR | - | - |
| 23 | LCDD08 | LVDS Channel Data | O | - | - |
| 24 | LCDD011 | LVDS Channel Data | O | - | - |
| 25 | LCDD09 | LVDS Channel Data | O | - | - |
| 26 | LCDD010 | LVDS Channel Data | O | - | - |
| 27 | GND | Ground | PWR | - | - |
| 28 | GND | Ground | PWR | - | - |
| 29 | LCDD04 | LVDS Channel Data | O | - | - |
| 30 | LCDD07 | LVDS Channel Data | O | - | - |
| 31 | LCDD05 | LVDS Channel Data | O | - | - |
| 32 | LCDD06 | LVDS Channel Data | O | - | - |
| 33 | GND | Ground | PWR | - | - |
| 34 | GND | Ground | PWR | - | - |
| 35 | LCDD01 | LVDS Channel Data | O | - | - |
| 36 | LCDD03 | LVDS Channel Data | O | - | - |
| 37 | LCDD00 | LVDS Channel Data | O | - | - |
| 38 | LCDD02 | LVDS Channel Data | O | - | - |
| 39 | VCC | Power +5V | PWR | - | - |
| 40 | VCC | Power +5V | PWR | - | - |
| 41 | JILI_DAT | JILI I2C Data Signal | IO-3,3 | PU 2k2 3,3V | - |
| 42 | LTGIO0 | PWM Brightness control for LCD | O-3,3 | - | - |
| 43 | JILI_CLK | JILI I2C Clock Signal | IO-3,3 | PU 2k2 3,3V | - |
| 44 | BLON# | Display Backlight On | O-3,3 | - | - |
| 45 | BIASON | Display Contrast | nc | - | not supported |
| 46 | DIGON | Display Power On | O-3,3 | - | - |
| 47 | COMP | Composite Video / SCART Blue | O | - | - |
| 48 | Y | S-Video Luminance / SCART Red | O | - | - |
| 49 | SYNC | - | nc | - | Not supported |
| 50 | C | S-Video Chrominance / SCART Green | O | - | - |
| 51 | LPT / FLPY# | LPT / Floppy Interface Configuration Input | I-5 | PU 4k7 5V | High: LPT, Low: Floppy |
| 52 | nc | - | nc | - | Reserved |
| 53 | VCC | Power +5V | PWR | - | - |
| 54 | GND | Ground | PWR | - | - |
| 55 | STB# / nc | LPT Strobe Signal | O-5 | - | - |
| 56 | AFD# / DENSEL | LPT Automatic Feed / Floppy Density Select | O-5 | - | - |
| 57 | nc | - | nc | - | Reserved |
| 58 | PD7 / nc | LPT Data Bus D7 | IO-5 | - | - |
| 59 | IRRX | Infrared Receive | I-5 | - | - |
| 60 | ERR# / HDSEL# | LPT Error / Floppy Head Select | IO-5 | - | - |
| 61 | IRTX | Infrared Transmit | O-5 | - | - |
| 62 | PD6 / nc | LPT Data Bus D6 | IO-5 | - | - |
| 63 | RXD2 | Data Receive COM2 | I-5 | PU 100k 5V | - |
| 64 | INIT# / DIR# | LPT Initiate / Floppy Direction | O-5 | - | - |

| 65 | GND | Ground | PWR | - | - |
|---|---|---|---|---|---|
| 66 | GND | Ground | PWR | - | - |
| 67 | RTS2# | Request to Send COM2 | O-5 | PU 100k 5V | - |
| 68 | PD5 / nc | LPT Data Bus D5 | IO-5 | - | - |
| 69 | DTR2# | Data Terminal Ready COM2 | O-5 | PU 100k 5V | - |
| 70 | SLIN# / STEP# | LPT Select / Floppy Motor Step | O-5 | - | - |
| 71 | DCD2# | Data Carrier Detect COM2 | I-5 | PU 100k 5V | - |
| 72 | PD4 / DSKCHG# | LPT Data Bus D4 / Floppy Disk Change | IO-5 | - | - |
| 73 | DSR2# | Data Set Ready COM2 | I-5 | PU 100k 5V | - |
| 74 | PD3 / RDATA# | LPT Data Bus D3 / Floppy Raw Data Read | IO-5 | - | - |
| 75 | CTS2# | Clear to Send COM2 | I-5 | PU 100k 5V | - |
| 76 | PD2 / WP# | LPT Data Bus D2 / Floppy Write Protect Signal | IO-5 | - | - |
| 77 | TXD2 | Data Transmit COM2 | O-5 | PU 100k 5V | Bootstrap PU 4k7 5V |
| 78 | PD1 / TRK0# | LPT Data Bus D1 / Floppy Track Signal | IO-5 | - | - |
| 79 | RI2# | Ring Indicator COM2 | I-5 | PU 100k 5V | - |
| 80 | PD0 / INDEX# | LPT Data Bus D0 / Floppy Index Signal | IO-5 | - | - |
| 81 | VCC | Power +5V | PWR | - | - |
| 82 | VCC | Power +5V | PWR | - | - |
| 83 | RXD1 | Data Receive COM1 | I-5 | PU 100k 5V | - |
| 84 | ACK# / DRV | LPT Acknowledge / Floppy Drive Select | IO-5 | - | - |
| 85 | RTS1# | Request to Send COM1 | O-5 | PU 100k 5V | Bootstrap PU 4k7 5V (open) |
| 86 | BUSY / MOT | LPT Busy / Floppy Motor Select | IO-5 | - | - |
| 87 | DTR1# | Data Terminal Ready COM1 | O-5 | PU 100k 5V | Bootstrap PU 4k7 5V |
| 88 | PE / WDATA# | LPT Paper Empty / Floppy Raw Write Data | IO-5 | - | - |
| 89 | DCD1# | Data Carrier Detect COM1 | I-5 | PU 100k 5V | - |
| 90 | SLCT#/WGATE# | LPT Power On / Floppy Write Enable | IO-5 | - | - |
| 91 | DSR1# | Data Set Ready COM1 | I-5 | PU 100k 5V | - |
| 92 | MSCLK | Mouse Clock | O-5 | PU 4k7 5V | - |
| 93 | CTS1# | Clear to Send COM1 | I-5 | PU 100k 5V | - |
| 94 | MSDAT | Mouse Data | IO-5 | PU 4k7 5V | - |
| 95 | TXD1 | Data Transmit COM1 | O-5 | PU 100k 5V | Bootstrap PU 4k7 5V |
| 96 | KBCLK | Keyboard Clock | O-5 | PU 4k7 5V | - |
| 97 | RI1# | Ring Indicator COM1 | I-5 | PU 100k 5V | - |
| 98 | KBDAT | Keyboard Data | IO-5 | PU 4k7 5V | - |
| 99 | GND | Ground | PWR | - | - |
| 100 | GND | Ground | PWR | - | - |

The termination resistors in this table are already mounted on the ETX® board. Please refer to the design guide for information about additional termination resistors.

## 6.5.2    Connector X3 Signal Description

**VGA Output**

**LVDS Flat Panel Interface (JILI)**

The user interface for flat panels is the JUMPtec Intelligent LVDS Interface (JILI). The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

**Digital Flat Panel Interface (JIDI)**

The ETX®-CD does not support the JUMPtec Intelligent Digital Interface (JIDI).

**Serial Ports (1 and 2)**

The ETX®-CD supports two serial interfaces (TTL). You can use COM2 for IrDA SIR operation. This feature is implemented in the super I/O device, which is a Winbond 83627HF. The implementation of the serial interface complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Configuration:

The serial-communication interface uses I/O and IRQ resources. The resources are allocated by the BIOS during POST configuration and are set to be compatible with common PC/AT settings. Use the BIOS setup to change some parameters that relate to the serial-communication interface.

**PS/2 Keyboard**

The implementation of the keyboard interface complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Configuration:

The keyboard uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings. Use the BIOS setup to change some keyboard-related parameters.

**PS/2 Mouse**

The implementation of the mouse interface complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Configuration:

The mouse uses I/O and IRQ resources. The BIOS allocates the resources during POST configuration. The resources are set to be compatible with common PC/AT settings. You can change some mouse-related parameters from the BIOS setup.

**IrDA**

The ETX®-CD is capable of IrDA SIR operation. This feature is implemented in the Winbond 83627HF. Contact Kontron Embedded Systems for help with this feature.

**Parallel Port**

The parallel-communication interface shares signals with the floppy-disk interface. The implementation of this parallel port complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Configuration:

The parallel-communication interface uses I/O, IRQ, and DMA resources. The resources are allocated by the BIOS during POST configuration and are set to be compatible with common PC/AT settings. You can change some parameters of the parallel-communication interface through the BIOS setup.

**Floppy**

The floppy-disk interface shares signals with the parallel-communication interface. The floppy interface is limited to one drive (drive_1). A standard floppy cable has two connectors for floppy drives. One connector has a non-twisted cable leading to it, the other has a twisted cable leading to it. When using the floppy interface you must connect the floppy drive to the connector (drive_1) that has the non-twisted cable leading to it.

The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

Configuration: The floppy-disk controller uses I/O, IRQ, and direct memory access (DMA) resources. These resources are allocated by BIOS during POST configuration and are compatible with common PC/AT settings. You can change some parameters of the parallel-communication interface through the BIOS setup.

## 6.6    Connector X4 Subsystems

### 6.6.1    Connector X4 (IDE 1, IDE 2, Ethernet, Miscellaneous)

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| 1 | GND | 2 | GND | 51 | SIDE_IOW# 2) | 52 | PIDE_IOR# |
| 3 | 5V_SB | 4 | PWGIN | 53 | SIDE_DRQ 2) | 54 | PIDE_IOW# |
| 5 | PS_ON | 6 | SPEAKER | 55 | SIDE_D15 2) | 56 | PIDE_DRQ |
| 7 | PWRBTN# | 8 | BATT | 57 | SIDE_D0 2) | 58 | PIDE_D15 |
| 9 | KBINH# | 10 | LILED# | 59 | SIDE_D14 2) | 60 | PIDE_D0 |
| 11 | RSMRST# | 12 | ACTLED# | 61 | SIDE_D1 2) | 62 | PIDE_D14 |
| 13 | ROMKBCS# 2) | 14 | SPEEDLED# | 63 | SIDE_D13 2) | 64 | PIDE_D1 |
| 15 | EXT_PRG 2) | 16 | I2CLK | 65 | GND | 66 | GND |
| 17 | VCC 1) | 18 | VCC 1) | 67 | SIDE_D2 2) | 68 | PIDE_D13 |
| 19 | OVCR# | 20 | GPCS# 2) | 69 | SIDE_D12 2) | 70 | PIDE_D2 |
| 21 | EXTSMI# | 22 | I2DAT | 71 | SIDE_D3 2) | 72 | PIDE_D12 |
| 23 | SMBCLK | 24 | SMBDATA | 73 | SIDE_D11 2) | 74 | PIDE_D3 |
| 25 | SIDE_CS3# 2) | 26 | RESERVED | 75 | SIDE_D4 2) | 76 | PIDE_D11 |
| 27 | SIDE_CS1# 2) | 28 | DASP_S 2) | 77 | SIDE_D10 2) | 78 | PIDE_D4 |
| 29 | SIDE_A2 2) | 30 | PIDE_CS3# | 79 | SIDE_D5 2) | 80 | PIDE_D10 |
| 31 | SIDE_A0 2) | 32 | PIDE_CS1# | 81 | VCC | 82 | VCC 1) |
| 33 | GND | 34 | GND | 83 | SIDE_D9 2) | 84 | PIDE_D5 |
| 35 | PDIAG_S 2) | 36 | PIDE_A2 | 85 | SIDE_D6 2) | 86 | PIDE_D9 |
| 37 | SIDE_A1 2) | 38 | PIDE_A0 | 87 | SIDE_D8 2) | 88 | PIDE_D6 |
| 39 | SIDE_INTRQ 2) | 40 | PIDE_A1 | 89 | RESERVED | 90 | RESERVED |
| 41 | RESERVED | 42 | RESERVED | 91 | RXD# | 92 | PIDE_D8 |
| 43 | SIDE_AK# 2) | 44 | PIDE_INTRQ | 93 | RXD | 94 | SIDE_D7 |
| 45 | SIDE_RDY 2) | 46 | PIDE_AK# | 95 | TXD# | 96 | PIDE_D7 |
| 47 | SIDE_IOR# 2) | 48 | PIDE_RDY | 97 | TXD | 98 | HDRST# |
| 49 | VCC 1) | 50 | VCC 1) | 99 | GND | 100 | GND |

1) To protect external power lines of peripheral devices, make sure that:

- the wires have the right diameter to withstand the maximum available current

- the enclosure of the peripheral device fulfils the fire-protection requirements of IEC/EN60950

2) This signal is not supported on the ETX®-CD.

## 6.6.2   Connector X4 (Signal Levels)

| Pin | Signal | Description | Type | Termination | Comment |
|-----|--------|-------------|------|-------------|---------|
| 1 | GND | Ground | PWR | - | - |
| 2 | GND | Ground | PWR | - | - |
| 3 | 5V_SB | Supply of internal suspend Circuit | I | - | - |
| 4 | PWGIN | Power Good / Reset Input | I-3,3 | PU 10k 3,3V_SB | - |
| 5 | PS_ON | Power Supply On | O-3,3 | PU 10k 3,3V | - |
| 6 | SPEAKER | Speaker Output | O-3,3 | - | int. PD 20k ( ICH7-M) |
| 7 | PWRBTN# | Power Button | I-3,3 | PU 4k7 3,3V | - |
| 8 | BATT | Battery Supply | I | - | - |
| 9 | KBINH | Keyboard Inhibit Control Input | I-5 | - | - |
| 10 | LILED | Ethernet Link LED | O-3,3 | - | - |
| 11 | RSMRST# | Resume Reset | nc | PU 10k 3,3V | Not supported |
| 12 | ACTLED | Ethernet Activity LED | O-3,3 | - | - |
| 13 | ROMKBCS# | - | nc | - | not supported |
| 14 | SPEEDLED | Ethernet Speed LED | O-3,3 | - | on at 100Mb/s |
| 15 | EXT_PRG | - | nc | - | not supported |
| 16 | I2CLK | I2C Bus Clock | O-5 | PU 2k2 5V | - |
| 17 | VCC | Power +5V | PWR | - | - |
| 18 | VCC | Power +5V | PWR | - | - |
| 19 | OVCR# | Over Current Detect for USB | I-3,3 | PU 10k 3,3V | - |
| 20 | GPCS# | - | nc | - | not supported |
| 21 | EXTSMI# | System Management Interrupt Input | I-3,3 | PU 10k 3,3V | - |
| 22 | I2DAT | I2C Bus Data | IO-5 | PU 2k2 5V | - |
| 23 | SMBCLK | SM Bus Clock | O-3,3 | PU 2k2 3,3V | - |
| 24 | SMBDATA | SM Bus Data | IO-3,3 | PU 2k2 3,3V | - |
| 25 | SIDE_CS3# | - | nc | - | not supported |
| 26 | SMBALRT# | SMB Alert | I-3,3 | PU 2k2 3,3V | - |
| 27 | SIDE_CS1# | - | nc | - | - |
| 28 | DASP_S | - | nc | - | not supported |
| 29 | SIDE_A2 | - | nc | - | - |
| 30 | PIDE_CS3# | Primary IDE Chip Select Channel 1 | O-3,3 | - | - |
| 31 | SIDE_A0 | - | nc | - | - |
| 32 | PIDE_CS1# | Primary IDE Chip Select Channel 0 | O-3,3 | - | - |
| 33 | GND | Ground | PWR | - | - |
| 34 | GND | Ground | PWR | - | - |
| 35 | PDIAG_S | - | nc | - | - |
| 36 | PIDE_A2 | Primary IDE Adress Bus | O-3,3 | - | - |
| 37 | SIDE_A1 | - | nc | - | - |
| 38 | PIDE_A0 | Primary IDE Adress Bus | O-3,3 | - | - |
| 39 | SIDE_INTRQ | - | nc | - | - |
| 40 | PIDE_A1 | Primary IDE Adress Bus | O-3,3 | - | - |
| 41 | PM_BATLOW# | Battery Low | I-3,3 | PU 8k2 3,3V | - |
| 42 | GPE1# | General Purpose Power Event 1 | I-3,3 | PU 10k 3,3V | GPIO13 on ICH7-M |
| 43 | SIDE_AK# | - | nc | - | - |
| 44 | PIDE_INTRQ | Primary IDE Interrupt Reqeuest | I-3,3 | PU 8k2 3,3V | - |
| 45 | SIDE_RDY | - | nc | - | - |
| 46 | PIDE_AK# | Primary IDE DMA Acknowledge | O-3,3 | - | - |
| 47 | SIDE_IOR# | - | nc | - | - |
| 48 | PIDE_RDY | Primary IDE Ready | I-3,3 | PU 4k7,3V | - |
| 49 | VCC | Power +5V | PWR | - | - |
| 50 | VCC | Power +5V | PWR | - | - |
| 51 | SIDE_IOW# | - | nc | - | - |
| 52 | PIDE_IOR# | Primary IDE IO Read | O-3,3 | - | - |
| 53 | SIDE_DRQ | - | nc | - | - |
| 54 | PIDE_IOW# | Primary IDE IO Write | O-3,3 | - | - |
| 55 | SIDE_D15 | - | nc | - | - |
| 56 | PIDE_DRQ | Primary IDE DMA Request | I-3,3 | PU 11k5 3,3V | - |
| 57 | SIDE_D0 | - | nc | - | - |
| 58 | PIDE_D15 | Primary IDE Data Bus | IO | - | - |
| 59 | SIDE_D14 | - | nc | - | - |
| 60 | PIDE_D0 | Primary IDE Data Bus | IO | - | - |
| 61 | SIDE_D1 | - | nc | - | - |
| 62 | PIDE_D14 | Primary IDE Data Bus | IO | - | - |
| 63 | SIDE_D13 | - | nc | - | - |
| 64 | PIDE_D1 | Primary IDE Data Bus | IO | - | - |

| 65 | GND | Ground | PWR | - | - |
|---|---|---|---|---|---|
| 66 | GND | Ground | PWR | - | - |
| 67 | SIDE_D2 | - | nc | - | - |
| 68 | PIDE_D13 | Primary IDE Data Bus | IO | - | - |
| 69 | SIDE_D12 | - | nc | - | - |
| 70 | PIDE_D2 | Primary IDE Data Bus | IO | - | - |
| 71 | SIDE_D3 | - | nc | - | - |
| 72 | PIDE_D12 | Primary IDE Data Bus | IO | - | - |
| 73 | SIDE_D11 | - | nc | - | - |
| 74 | PIDE_D3 | Primary IDE Data Bus | IO | - | - |
| 75 | SIDE_D4 | - | nc | - | - |
| 76 | PIDE_D11 | Primary IDE Data Bus | IO | - | - |
| 77 | SIDE_D10 | - | nc | - | - |
| 78 | PIDE_D4 | Primary IDE Data Bus | IO | - | - |
| 79 | SIDE_D5 | - | nc | - | - |
| 80 | PIDE_D10 | Primary IDE Data Bus | IO | - | - |
| 81 | VCC | Power +5V | PWR | - | - |
| 82 | VCC | Power +5V | PWR | - | - |
| 83 | SIDE_D9 | - | nc | - | - |
| 84 | PIDE_D5 | Primary IDE Data Bus | IO | - | - |
| 85 | SIDE_D6 | - | nc | - | - |
| 86 | PIDE_D9 | Primary IDE Data Bus | IO | - | - |
| 87 | SIDE_D8 | - | nc | - | - |
| 88 | PIDE_D6 | Primary IDE Data Bus | IO | - | - |
| 89 | GPE2# | General Purpose Power Event 1 | I-3,3 | PU 8k2 3,3V | RI of ICH7 |
| 90 | CBLID_P# | 80-conductor IDE cable Channel 0 | I-3,3 | PD 10k | - |
| 91 | RXD# | Ethernet Receive Differential Signal ( RXD-) | I | - | 121R between RXD+/- |
| 92 | PIDE_D8 | Primary IDE Data Bus | IO | - | - |
| 93 | RXD | Ethernet Receive Differential Signal ( RXD+) | I | - | 121R between RXD+/- |
| 94 | SIDE_D7 | - | nc | - | - |
| 95 | TXD# | Ethernet Transmit Differential Signal (TXD-) | O | - | 100R/C10p between TXD+/- |
| 96 | PIDE_D7 | Primary IDE Data Bus | IO | - | int. PD 11k5 ICH7-M |
| 97 | TXD | Ethernet Transmit Differential Signal (TXD+) | O | - | 100R/C10p between TXD+/- |
| 98 | HDRST# | Hard Drive Reset | O-5 | - | - |
| 99 | GND | Ground | PWR | - | - |
| 100 | GND | Ground | PWR | - | - |

The termination resistors in this table are already mounted on the ETX® board. Please refer to the design guide for information about additional termination resistors.

## 6.6.3   Connector X4 Signal Description

**IDE Ports**

The IDE host adapter is capable of DMA-133 operation and supports only one single IDE channel which is connected to the primary channel of the ETX® connector X4. Per default it is set to DMA-33, to achieve the best compatibility to most baseboard implementations. Implementation information is provided in the ETX® Design Guide. Refer to those documents for additional information.

Configuration: The IDE host adapter is a PCI bus device. It is configured by the BIOS during PCI device configuration. You can disable it in setup. Resources used by the primary IDE host adapter are compatible with the PC/AT.

> PHOENIX BIOS will not recognize a Slave device on an IDE port if there is no Master device connected to the same IDE port. Implementation and limitation information is provided in the ETX® Design Guide from document revision 2.1. Refer to the documentation for additional information.

**Ethernet**

The Ethernet interface is based on the Intel® 82562 Fast Ethernet PCI controller. This 32-bit PCI controller is a fully integrated 10/100BASE-TX LAN solution. The Ethernet interface requires an external transformer. See the ETX® Design Guide for suggestions on transformer selection.

Configuration: The Ethernet interface is a PCI device. The BIOS setup automatically configures it during configuration of the PCI device.

> Implementation and limitation information is provided in the ETX® Design Guide. Please refer to the documentation for additional information.

**Power Control**

*Power Good / Reset Input:*

The ETX®-CD provides an external input for a power-good signal or a manual- reset pushbutton. The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

**Power Management**

*ATX PS Control:*

The ETX®-CD can control the main power output of an ATX-style power supply. The implementation of this subsystem complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

*External SMI Interrupt*

Contact Kontron Embedded Modules GmbH technical support for information on this feature.

**Miscellaneous Circuits**

*Speaker*

The implementation of the speaker output complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

*Battery*

The implementation of the battery input complies with the ETX® Specification. Implementation information is provided in the ETX® Design Guide. Refer to the documentation for additional information.

In compliance with EN60950, there are at least two current-limiting devices (resistor and diode) between the battery and the consuming component.

*I2C Bus*

The I2C Bus is implemented by using general purpose I/O. You also can access the I2C Bus via JUMPtec's Intelligent Device Architecture (JIDA) BIOS functions. For additional information, refer to the ETX® Design Guide, I2C application notes and JIDA specifications which are available at the Kontron Web site.

*SM Bus*

System Management (SM) bus signals are connected to the SM bus controller, which is located in the southbridge (Intel 82801GBM) device. For more information about the SM bus, please see the System Management (SM) Bus section in the Appendix A: System Resources chapter.

## 6.7    Feature Connector J11

### 6.7.1    SDVO Output

The ETX®-CD Serial Digital Video Out port is integrated in the Intel® 945GM northbridge. It has the following features:

» Serial Digital Video Out Port (SDVOB & SDVOC) support

» Two 12-bit channels

» The SDVO B/C ports can drive a variety of SDVO devices (TV-Out Encoders, TMDS and LVDS transmitters, etc.)

### 6.7.2    SDVO Connector and Flat Foil Cable

Connector and flat foil cable information for the SDVO connector (J11) located on the bottom side.

Flat Foil Cable

» YOUNGSHIN MCAB45x150B05

» 45pos,150 mm length, 0.5mm pitch, both ends opposite sides

Connector

» Hirose - FH12-45S-0.5SH

» 0.50mm (.020") Pitch FFC/FPC Connector, Horizontal Right Angle, SMT, 45 Circuits

### 6.7.3    Pinout Feature Connector J11

| Pin | Pin on J11 | Description |
|-----|------------|-------------|
| 1 | GND1 | Ground |
| 2 | SDVOC_CLKN | Channel C; Clock negative |
| 3 | SDVOC_CLKN | Channel C; Clock positive |
| 4 | GND2 | Ground |
| 5 | SDVOC_GREENN | Channel C; Green negative |
| 6 | SDVOC_GREENP | Channel C; Green positive |
| 7 | GND3 | Ground |
| 8 | SDVOB_CLKN | Channel B; Clock negative |
| 9 | SDVOB_CLKN | Channel B; Clock positive |
| 10 | GND4 | Ground |
| 11 | SDVOB_GREENN | Channel B; Green negative |
| 12 | SDVOB_GREENP | Channel B; Green positive |
| 13 | GND5 | Ground |
| 14 | SDVOC_INTN | Channel C; Interrupt negative |
| 15 | SDVOC_INTP | Channel C; Interrupt positive |
| 16 | GND6 | Ground |
| 17 | SDVOB_INTN | Channel B; Interrupt negative |
| 18 | SDVOB_INTP | Channel B; Interrupt positive |
| 19 | GND7 | Ground |
| 20 | SDVOC_BLUEN | Channel C; Blue negative |
| 21 | SDVOC_BLUEP | Channel C; Blue positive |
| 22 | GND8 | Ground |
| 23 | SDVOC_REDN | Channel C; Red negative |
| 24 | SDVOC_REDP | Channel C; Red positive |
| 25 | GND9 | Ground |
| 26 | SDVOB_BLUEN | Channel B; Blue negative |
| 27 | SDVOB_BLUEP | Channel B; Blue positive |
| 28 | GND10 | Ground |
| 29 | SDVOB_REDN | Channel B; Red negative |
| 30 | SDVOB_REDP | Channel B; Red positive |
| 31 | GND11 | Ground |
| 32 | SDVO_FLDSTALLN | Field Stall negative |
| 33 | SDVO_FLDSTALLP | Field Stall positive |
| 34 | GND12 | Ground |

| 35 | SDVO_TVCLKINN | TV Clock Input negative |
|----|----------------|-------------------------|
| 36 | SDVO_TVCLKINP | TV Clock Input positive |
| 37 | GND13 | Ground |
| 38 | SDVO_CTRCLK | I2C based control signal for SDVO devices; clock |
| 39 | SDVO_CTRLDATA | I2C based control signal for SDVO devices; data |
| 40 | RESET# | Reset signal |
| 41 | VCC | 5V power |
| 42 | VCC | 5V power |
| 43 | VCC | 5V power |
| 44 | Reserved | nc |
| 45 | Reserved | nc |

# 7 BIOS Operation

The module is equipped with a Phoenix BIOS, which is located in an onboard Flash device. You can update the BIOS using a Flash utility..

## 7.1 Determining the BIOS Version

The Phoenix BIOS version is displayed in the main menu of the setup utility.

```
Phoenix TrustedCore™ NB
 Copyright 1985-2006 Phoenix Technologies Ltd.
 All Rights Reserved
 Kontron(R) BIOS Version <MCALRXXX>
```

The PhoenixBIOS Setup Utility changes system behavior by modifying the BIOS configuration. The setup program uses a number of menus to make changes and turn features on or off.

> Selecting incorrect values may cause system boot failure. Load setup default values to recover by pressing <F9>. It might also be necessary to use the "reset configuration data" option in the BIOS setup and set it to "yes". In certain circumstances this may also help to recover from system boot failure or a resource conflict.

### 7.1.1 Start Phoenix BIOS Setup Utility

To start the PhoenixBIOS setup utility, press <F2> when the following string appears during bootup.

```
 Press <F2> to enter Setup
```

The Main Menu then appears. The Setup Screen is composed of several sections:

| Setup Screen | Location | Function |
|---|---|---|
| Menu Bar | Top | Lists and selects all top level menus. |
| Legend Bar | Right side Bottom | Lists setup navigation keys. |
| Item Specific Help Window | Right side Top | Help for selected item. |
| Menu Window | Left Center | Selection fields for current menu. |
| General Help Window | Overlay (Center) | Help for selected menu. |

## Menu Bar

The menu bar at the top of the window lists different menus. Use the left/right arrow keys to make a selection.

## Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The table below describes the legend keys and their alternates.

| Key | Function |
|---|---|
| <F1> or <ALT-H> | General Help window. |
| <Esc> | Exit menu. |
| ← or → Arrow key | Select a menu. |
| ↑ or ↓ Arrow key | Select fields in current menu. |
| <Home> or <End> | Move cursor to top or bottom of current window. |
| <PgUp> or <PgDn> | Move cursor to next or previous page. |
| <F5> or ↔ | Select previous value for the current field. |
| <F6> or <+> or <Space> | Select next value for the current field. |
| <F9> | Load the optimized default configuration. |
| <F10> | Save and exit. |
| <Enter> | Execute command or select submenu. |
| <ALT-R> | Refresh Screen. |

## Selecting an Item

Use the ↑ or ↓ key to move the cursor to the field you want. Then use the + and – keys to select a value for that field. The Save Value commands in the Exit menu save the values displayed in all the menus.

## Displaying Submenus

Use the ← or → key to move the cursor to the submenu you want. Then press <Enter>. A pointer (►) marks all submenus.

## Item Specific Help Window

The Help window on the right side of each menu displays the Help text for the selected item. It updates as you move the cursor to each field.

## General Help Window

Pressing <F1> or <ALT-F1> on a menu brings up the General Help window that describes the legend keys and their alternates. Press <Esc> to exit the General Help window.

## 7.2 BIOS Setup Menu

### 7.2.1 Info Screen

```
                  Phoenix TrustedCore(tm) Setup Utility
  Info       Main      Advanced      Security      Power      Boot      Exit


  Bios Version          MCALR118
  BIOS Date             09/28/09

  Board Name            MCAL
  Board Class           CPU
  Serial Number         ZMD0M0159
  Hardware Revision     03.00
  Manufacturing Date    02/01/2008

  Boot Counter          0243

  CPU Type              Intel(R) Core(TM) Duo CPU      L2400  @ 1.66GHz
  CPU Speed             1600 MHz
  Microcode:            (0x00)

  System Memory         633 KB
  Extended Memory       514048 KB
  Cache Ram             2048 KB

  F1   Help   ↑↓   Select Item   -/+    Change Values   F9    Setup Defaults
  Esc  Exit   ↔    Select Menu   Enter  Select ▶ Sub-Menu  F10   Save and Exit
```

## 7.2.2    Main Menu

```
          Phoenix TrustedCore<tm> Setup Utility
  Info      Main     Advanced    Security    Power     Boot     Exit

                                                    Item Specific Help
     System Time:            [01:48:13]
     System Date:            [03/01/2007]           <Tab>, <Shift-Tab>, or
                                                    <Enter> selects field.
     Legacy Diskette A:      [Disabled]
     Legacy Diskette B:      [Disabled]

  ▶ IDE Channel 0 Master     [None]
  ▶ IDE Channel 0 Slave      [None]
  ▶ SATA Port 1              [None]
  ▶ SATA Port 2              [None]

     SMART Device Monitoring: [Enabled]




  F1   Help   ↑↓  Select Item   -/+    Change Values   F9    Setup Defaults
  Esc  Exit   ←→  Select Menu   Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| System Time | [hh:mm:ss] | <Tab>, <Shift-Tab>, or <Enter> selects field |
| System Date | [mm-dd-yyyy] | <Tab>, <Shift-Tab>, or <Enter> selects field |
| Legacy Diskette A | **Disabled**<br>360 kB<br>1.2 MB<br>720 kB<br>1.44 / 1.25 MB<br>2.88 MB | Selects floppy type. Note that 1.25 MB references a 1024 byte sector Japanese media format. The 1.25 MB MB diskette requires a 3-Mode floppy-disk drive. |
| Legacy Diskette B | **Disabled**<br>360 kB<br>1.2 MB<br>720 kB<br>1.44 / 1.25 MB<br>2.88 MB | Selects floppy type. Note that 1.25 MB references a 1024 byte sector Japanese media format. The 1.25 MB MB diskette requires a 3-Mode floppy-disk drive. |
| SMART Device Monitoring | **Enabled**<br>Disabled | IDE Failure Prediction |

## IDE Channels Submenu

```
          Phoenix TrustedCore(tm) Setup Utility
       Main

    IDE Channel 0 Master   [Primary Master ]           Item Specific Help

   Type:                    [User]                 User = you enter
                                                   parameters of hard-disk
   Multi-Sector Transfers:  [Disabled]             drive installed at this
   LBA Mode Control:        [Disabled]             connection.
   32 Bit I/O:              [Disabled]             Auto = autotypes
   Transfer Mode:           [Standard]             hard-disk drive
   Ultra DMA Mode:          [Disabled]             installed here.
                                                   CD-ROM = a CD-ROM drive
                                                   is installed here.
                                                   ATAPI Removable =
                                                   removable disk drive is
                                                   installed here.

   F1   Help   ↑↓  Select Item   -/+   Change Values   F9   Setup Defaults
   Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
| --- | --- | --- |
| Type | User<br>**Auto**<br>none<br>ATAPI Removable<br>CD-ROM<br>IDE Removable<br>Other ATAPI | Selects the type of the IDE Devices connected to the system |
| Multi-Sector Transfers | Disabled<br>2 Sectors<br>4 Sectors<br>8 Sectors<br>16 Sectors | Specify the number of sectors per block for multiple sector transfers |
| LBA Mode Control | Disabled<br>Enabled | Enabled LBA causes Logical Block Addressing to be used in place of Cylinders, Heads _Sectors. |
| 32 Bit I/O | **Disabled**<br>Enabled | This setting enables or disables 32 bit data transfers. |
| Transfer Mode | Auto<br>Fast PIO 1<br>Fast PIO 2<br>Fast PIO 3<br>Fast PIO 4<br>FPIO 3 / DMA 1<br>FPIO 4 / DMA 2 | (Selects the method for moving data to/from the drive. Autotype the drive to select the optimum transfer mode. |
| Ultra DMA Mode | Disabled<br>Mode 0<br>Mode 1<br>Mode 2<br>Mode 3<br>Mode 4<br>Mode 5 | Selects the Ultra DMA mode used for moving data to/from the drive. Autotype the drive to select the optimum transfer mode. |

### 7.2.3 Advanced

```
            Phoenix TrustedCore(tm) Setup Utility
   Info      Main    Advanced    Security    Power    Boot    Exit

                                              Item Specific Help
                    Setup Warning
    Setting items on this menu to incorrect
    values may cause your system to malfunction.    These items control
                                                    various CPU parameters.
  ▶ CPU Control
  ▶ Advanced Chipset Control
  ▶ PCI/PNP Configuration
  ▶ Cache Memory
  ▶ I/O Device Configuration
  ▶ Console Redirection
  ▶ Keyboard Features
  ▶ Hardware Monitor
  ▶ Watchdog Settings
  ▶ Display Control
  ▶ Miscellaneous



   F1   Help   ↑↓   Select Item   -/+    Change Values   F9   Setup Defaults
   Esc  Exit   ↔    Select Menu   Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

## CPU Control

```
              Phoenix TrustedCore(tm) Setup Utility
              Advanced

          Merom CPU Control                      Item Specific Help

   Core Multi-Processing:          [Enabled]     Determines whether the
   Processor Power Management:      [GV3 Only]    2nd core is enabled.

   Intel(R) Virtualization Technology [Enabled]  Disabled = 2nd core
   Set Max Ext CPUID = 3              [Disabled]    is disabled.

                                                  Enabled = 2nd core
                                                    is enabled.




   F1   Help   ↑↓  Select Item   -/+   Change Values   F9   Setup Defaults
   Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Core Multi-Processing | **Enabled**<br>Disabled | Enables and disables the 2nd CPU core |
| Processor Power Management | **Enabled**<br>GV3 only<br>C-states only<br>Disabled | Selects the processor power management |
| Intel® Virtualization Technology | **Enabled**<br>Disabled | When enabled a virtual machine can utilize the additional hardware virtualization capabilities. |
| Set Max Ext CPUID = 3 | Enabled<br>**Disabled** | Set Max CPUID extended function value to 3 |

> **note**
>
> When a Pentium M C423 is in used, then GV3 is not possible and C-States only is the default setting of Processor Power Management

## Advanced Chipset Control

```
                Phoenix TrustedCore(tm) Setup Utility
                 Advanced

        Advanced Chipset Control                    Item Specific Help

   ▶ Chipset control                          These items control
   ▶ Integrated Video                         various parameters
   ▶ ISA Options                              of the MCH and the
                                              ICH.








   F1    Help  ↑↓  Select Item   -/+    Change Values   F9   Setup Defaults
   Esc   Exit  ←→  Select Menu   Enter  Select ▶ Sub-Menu F10  Save and Exit
```

## Chipset Control

```
            Phoenix TrustedCore(tm) Setup Utility
     Advanced

            Chipset control                      Item Specific Help

   Memory Throttling:        [Disabled]          Controls throttling
                                                 and bandwidth limiting
   Clock generator:          [Default]           for the GMCH.

   PCI Clock Run:            [Disabled]
   Serial IRQ Quiet Mode:    [Disabled]

   Pop Up Mode Enable:       [Enabled]
    Pop Down Mode Enable:    [Enabled]

   Port 80h Cycles:          [PCI Bus]
   MC Cycles:                [PCI Bus]



  F1    Help   ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
  Esc   Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Memory Throttling | Enabled<br>**Disabled** | Controls throttling and bandwidth limiting for the 945 GME |
| Clock generator | **Default**<br>Program | "Program" allows to enable/disable manual change of Spread Spectrum and FSB |
| PCI Clock Run | Enabled<br>**Disabled** | If Enabled the Clock Run logic will stop the PCI clocks |
| Serial IRQ Quiet Mode | Enabled<br>**Disabled** | Enabled: Quiet Mode for SIRQ<br>Disabled: Continuous Mode for SIRQ<br>Must be enabled for PCI Clock Run enabled |
| Pop Up Mode Enable | **Enabled**<br>Disabled | Enables/disables C2 and not C0 change when a PCI busmaster event appears |
| Pop Down Mode Enable | **Enabled**<br>Disabled | Must be switched on when Pop Up Mode is enabled |
| Port 80 h Cycles | LPC Bus<br>**PCI Bus** | Controls where the port 80 cycles are sent |
| MC Cycles | LPC Bus<br>**PCI Bus** | Controls where the port 62h/66h cycles to the microcontroller are sent |

## Integrated Video

```
          Phoenix TrustedCore(tm) Setup Utility
              Advanced

              Integrated Video                          Item Specific Help


    IGD - Device 2:                 [Auto]         Enable or Disable
    IGD - Device 2, Function 1:     [Auto]         the Internal Graphics
                                                   Device by setting item
    DVMT 3.0 Mode:                  [DVMT]         to the desired value.
    Pre-Allocated Memory Size:      [8MB]
    Total Graphics Memory:          [128MB]
    DVMT Graphics Memory:           120MB










    F1   Help    ↑↓  Select Item  -/+    Change Values   F9    Setup Defaults
    Esc  Exit    ←→  Select Menu  Enter  Select ▶ Sub-Menu F10  Save and Exit
```
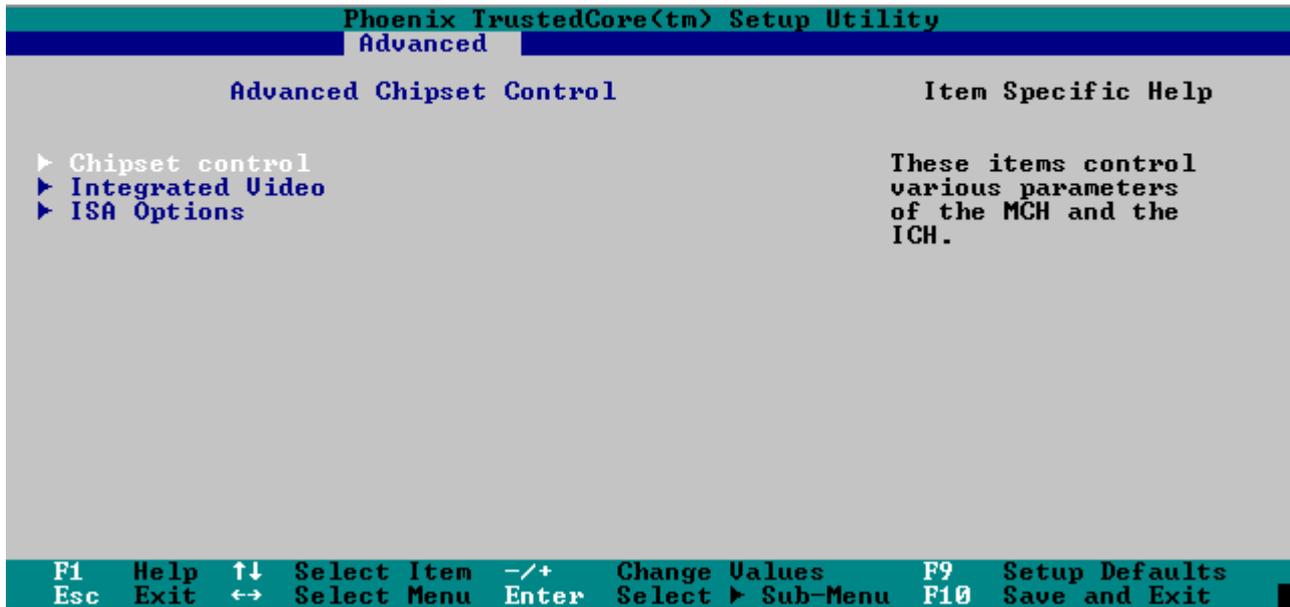
| Feature | Option | Description |
|---|---|---|
| IGD - Device 2 | **Auto** <br> Disabled | - |
| IGD - Device 2, Function 1 | **Auto** <br> Disabled | - |
| DVMT 3.0 Mode | Fixed <br> **DVMT** <br> Combo | Selectes the mode of the DMBT graphic memory allocation |
| Pre-Allocated Memory Size | 1 MB <br> **8 MB** | Sets the size of the pre-allocated graphics memory |
| Total Graphics Memory | **64MB** <br> 128MB <br> maxDVMT | Sets the size of the totals possible graphics memory |

## ISA Options

```
              Phoenix TrustedCore(tm) Setup Utility
                        Advanced

                ISA Options                        Item Specific Help

     ISA Bridge           [Enabled]               Enable/disable the
                                                  ISA bus.
     8  Bit I/O recovery  [3.5 SYSCLK]
     16 Bit I/O recovery  [3.5 SYSCLK]
     Fast Mode            [Disabled]
     16Bit Workaround     [Enabled]

     Decode Range 1 Base  [   0h]
     Decode Range 1 Size  [Disabled]
     Decode Range 2 Base  [   0h]
     Decode Range 2 Size  [Disabled]




     F1  Help   ↑↓  Select Item   -/+  Change Values   F9   Setup Defaults
     Esc Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| ISA Bridge | **Enabled**<br>Disabled | Enables/disables the ISA bridge |
| 8 Bit I/O recovery | **3.5 SYSCLK**<br>4.5 SYSCLK<br>…<br>10.5 SYSCLK | Sets the 8 Bit I/O recovery time |
| 16 Bit I/O recovery | **3.5 SYSCLK**<br>4.5 SYSCLK<br>…<br>10.5 SYSCLK | Sets the 16 Bit I/O recovery time |
| Fast Mode | Enabled<br>**Disabled** | Enables/disables fast mode (SYSCLK=PCICLK) |
| 16Bit Workaround | **Enabled** \Disabled | Enable/disable a workaround which is necessary for some 16 bit ISA devices |
| Decode Range 1 Base | [0h- FFFFh] | Select I/O Base address for generic decode range |
| Decode Range 1 Size | **Disabled**<br>4<br>8<br>16<br>…<br>256 | Select generic decode range size in bytes |
| Decode Range 2 Base | [0h- FFFFh] | Select I/O Base address for generic decode range |
| Decode Range 2 Size | **Disabled**<br>4<br>8<br>16<br>…<br>256 | Select generic decode range size in bytes |

## PCI/PNP Configuration

```
          Phoenix TrustedCore(tm) Setup Utility
              Advanced

        PCI/PNP Configuration                         Item Specific Help

    PNP OS installed:                 [Other]      Select the operating
    Reset Configuration Data:         [No]         system installed
                                                   on your system which
    PCI IRQ line 1:                   [Auto Select]  you will use most
    PCI IRQ line 2:                   [Auto Select]  commonly.
    PCI IRQ line 3:                   [Auto Select]
    PCI IRQ line 4:                   [Auto Select]  Note: An incorrect
    PCI IRQ line 5:                   [Auto Select]  setting can cause
    PCI IRQ line 6:                   [Auto Select]  some operating
    PCI IRQ line 7:                   [Auto Select]  systems to display
    PCI IRQ line 8:                   [Auto Select]  unexpected behavior.

  ▶ PCI/PNP ISA IRQ Resource Exclusion



    F1   Help  ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
    Esc  Exit  ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| PNP OS installed | **Other**<br>Win95<br>Win98<br>WinMe<br>Win2000<br>WinXP | Selects the most used OS |
| Reset Configuration Data | **No**<br>Yes | "Yes" will clear the ESCD |
| PCI IRQ line 1 to 8 | **Auto Select**<br>3<br>4<br>5<br>7<br>10<br>11<br>12 | PCI devices can use hardware interrupts (IRQs). It can also be auto selected |

## PCI/PNP ISA IRQ Resource Exclusion

```
                  Phoenix TrustedCore(tm) Setup Utility
                  Advanced

        PCI/PNP ISA IRQ Resource Exclusion              Item Specific Help

      IRQ 3:     [Available]                        Reserves the specified
      IRQ 4:     [Available]                        IRQ for use by legacy
      IRQ 5:     [Available]                        ISA devices
      IRQ 7:     [Available]
      IRQ 9:     [Available]
      IRQ 10:    [Available]
      IRQ 11:    [Available]




    F1   Help   ↑↓  Select Item   -/+    Change Values   F9   Setup Defaults
    Esc  Exit   ←→  Select Menu   Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| IRQ 3, 4, 5, 7, 9, 10, 11 | **Available**<br>Reserved | - |

## Cache Memory

```
            Phoenix TrustedCore(tm) Setup Utility
          Advanced

             Cache Memory                           Item Specific Help

    Memory Cache:                  [Enabled]        Sets the state of the
    Cache System BIOS area:        [Write Protect]  memory cache.
    Cache Video BIOS area:         [Write Protect]
    Cache Base 0-512k:             [Write Back]
    Cache Base 512k-640k:          [Write Back]
    Cache Extended Memory Area:    [Write Back]
    Cache A000 - AFFF:             [Disabled]
    Cache B000 - BFFF:             [Disabled]
    Cache C800 - CBFF:             [Write Protect]
    Cache CC00 - CFFF:             [Write Protect]
    Cache D000 - D3FF:             [Disabled]
    Cache D400 - D7FF:             [Disabled]
    Cache D800 - DBFF:             [Disabled]
    Cache DC00 - DFFF:             [Disabled]
    Cache E000 - E3FF:             [Write Protect]
    Cache E400 - E7FF:             [Write Protect]
    Cache E800 - EBFF:             [Write Protect]
    Cache EC00 - EFFF:             [Write Protect]


  F1   Help   ↑↓   Select Item   -/+    Change Values    F9   Setup Defaults
  Esc  Exit   ←→   Select Menu   Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Memory Cache | **Enabled**<br>Disabled | Enables/disables the memory cache system |
| Cache System / Video BIOS area | **Write Protect**<br>uncached | Cache setting for System BIOS area |
| Cache Base 0-512k<br>Cache Base 512k-640k<br>Cache Extended Memory Area | Uncached<br>Write Through<br>Write Protect \Write Back | Uncached = Disabled: This block is not cached at all<br>USWC Caching: Uncached Speculative Write Combined<br>Write Through: Writes are cached and send to main memory at once<br>Write Protect: Writes are ignored<br>Write Back: Writes are cached, but not sent to main memory until necessary |
| Cache A000 - AFFF<br>Cache B000 - BFFF | **Disabled**<br>USWC Caching<br>Write Through<br>Write Protect<br>Write Back | - |
| Cache C800 - CBFF<br>Cache CC00 - CFFF | Disabled<br>Write Through<br>**Write Protect**<br>Write Back | - |
| Cache D000 - D3FF<br>Cache D400 - D7FF<br>Cache D800 - DBFF<br>Cache DC00 - DFFF | **Disabled**<br>Write Through<br>Write Protect<br>Write Back | - |
| Cache E000 - E3FF<br>Cache E400 - E7FF<br>Cache E800 - EBFF<br>Cache EC00 - EFFF | Disabled<br>Write Through<br>**Write Protect**<br>Write Back | - |

## I/O Device Configuration

```
            Phoenix TrustedCore(tm) Setup Utility
                        Advanced

            I/O Device Configuration              Item Specific Help


     Parallel ATA:              [Enabled]         Enable the PATA
     Primary IDE UDMA66/100:    [Enabled]
     Serial ATA:                [Enabled]
     SATA Controller Mode Option: [Enhanced]
     AHCI Configuration:        [Disabled]
     Disable Vacant Ports:      [Disabled]

     HD Audio device:           [Auto]
     AC97 Audio:                [Auto]
     AC97 Modem:                [Disabled]

   ▶ LAN Options
   ▶ SIO Options
   ▶ USB Ports



     F1   Help   ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
     Esc  Exit   ←→  Select Menu    Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Parallel ATA | **Enabled** <br> Disabled | Enables/disables the PATA |
| Primary IDE UDMA66/100 | **Enabled** <br> Disabled | Enables/disables UDMA 66/100 modes |
| Serial ATA | **Enabled** <br> Disabled | Enables/disables SATA |
| SATA Controller Mode Option | Compatible <br> **Enhanced** | Compatible: SATA/PATA devices are driven in legacy mode <br> Enhanced mode: SATA/PATA devices are driven in native mode |
| AHCI Configuration | **Enabled** <br> Disabled | Enables/disables the Advanced Host Controller Interface |
| Disable Vacant Ports | **Disabled** <br> Enabled | Controls automatic disabling of vacant SATA ports |
| HD Audio device | Disabled <br> **Auto** | Enables/disables the audio interface <br> Auto: only enabled when present |
| AC97 Audio | Disabled <br> **Auto** | Enables/disables AC97 Audio feature |
| AC97 Modem | Disabled <br> **Auto** | Enables/disables AC97 Modem feature |

## LAN Options

```
          Phoenix TrustedCore(tm) Setup Utility
              Advanced

              LAN Options                              Item Specific Help


                                                       Enable/Disable the
      LAN MAC address :      00:E0:4B:17:17:A7         LAN controller on
      LAN Controller #1:     [Enabled]                 the CPU module.
      Onboard LAN PXE ROM:   [Disabled]
      Enable WOL             [Disabled]











   F1   Help   ↑↓  Select Item   -/+    Change Values   F9   Setup Defaults
   Esc  Exit   ←→  Select Menu    Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
| --- | --- | --- |
| LAN Controller #1 | **Enabled**<br>Disabled | Enables/disables the PATA |
| Onboard LAN PXE ROM | Enabled<br>**Disabled** | Enables/disables the LAN PXE boot ROM |
| Enable WOL | Enabled<br>**Disabled** | Enables/disables Wake on LAN |

## Super I/O Controller Options

```
           Phoenix TrustedCore(tm) Setup Utility
            Advanced

             SIO Options                          Item Specific Help

                                              Configures the onboard
                                              LPT controller.
   Onboard LPT:            [Disabled]
   Serial port A:          [Enabled]          [Disabled]
      Base I/O address:    [3F8]                 No configuration
      Interrupt:           [IRQ 4]
   Serial port B:          [Enabled]          [Enabled]
      Mode:                [Normal]              User configuration
      Base I/O address:    [2F8]
      Interrupt:           [IRQ 3]            [Auto]
                                                 BIOS or OS chooses
   External FDC:           [Disabled]            configuration
   Serial port C:          [Disabled]
   Serial port D:          [Disabled]
   External LPT:           [Disabled]



   F1    Help    ↑↓   Select Item   -/+    Change Values      F9    Setup Defaults
   Esc   Exit    ←→   Select Menu   Enter  Select ▶ Sub-Menu  F10   Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Onboard LPT | Auto<br>Enabled<br>**Disabled** | Enables/disables the Parallel Port |
| Serial Port A | **Enabled**<br>Disabled<br>Auto | Enables/disables serial port A; Auto: will be initialized when detected |
| Base I/O address | **3F8**<br>2F8 | Base I/O address of COM port A |
| Interrupt | IRQ3<br>**IRQ4** | Selects interrupt of COM port A |
| Serial Port B | **Enabled**<br>Disabled<br>Auto | Enables/disables serial port A; Auto: will be initialized when detected |
| Mode | **Normal**<br>IR<br>ASK-IR | Sets the mode for COM port B |
| Base I/O address | 3F8<br>**2F8** | Base I/O address of COM port B |
| Interrupt | **IRQ3**<br>IRQ4 | Selects interrupt of COM port B |
| External FDC | **Disabled**<br>Auto | Enables/disables external Floppy Disk Controller |
| Serial Port C | **Disabled**<br>Auto | Enables/disables external COM port C |
| Serial Port D | **Disabled**<br>Auto | Enables/disables external COM port D |
| External LPT | **Disabled**<br>Auto | Enables/disables external Parallel Port |

## USB ports

```
              Phoenix TrustedCore(tm) Setup Utility
                    Advanced

              USB Ports                              Item Specific Help

    USB Controller:            [Enabled]         Controls USB ports 1,
    USB UHCI Ports 1, 2 and 3: [Enabled]         2 and 3 with two
                                                 connectors each.
    USB EHCI:                  [Enabled]         On ETX boards, this
                                                 item only controls
    Legacy USB Support:        [Enabled]         port 1 as port 2 and
    EHCI Legacy Support:       [Enabled]         3 are not available
                                                 and are disabled
                                                 always.




    F1   Help   ↑↓  Select Item  -/+   Change Values   F9   Setup Defaults
    Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| USB Controller | **Enabled**<br>Disabled | Enables/disables the USB controller |
| USB UHCI Ports 1, 2 and 3 | **Enabled**<br>Disabled | Controls USB ports 1, 2 and 3 with two connectors each. |
| USB EHCI | **Enabled**<br>Disabled | Enables/disables USB 2.0 support |
| Legacy USB Support | **Enabled**<br>Disabled | Enables/disables USB legacy support |
| EHCI Legacy Support | **Enabled**<br>Disabled | Enables/disables USB legacy support in USB 2.0 mode |

## Console Redirection

```
            Phoenix TrustedCore(tm) Setup Utility
                    Advanced

          Console  Redirection                    Item Specific Help

      Console    [JRC, Auto]                   Select the console
                                               redirection port and
                                               method.

                                               N/A means that the
                                               corresponding port
                                               is disabled.

   F1   Help   ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
   Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Console | Disabled<br>UCR COM A<br>UCR COM B<br>UCR COM C<br>UCR COM D<br>**JRC, Auto** | Controls the serial console redirection. N/A |

## Keyboard Features

```
              Phoenix TrustedCore(tm) Setup Utility
                     Advanced

           Keyboard Features                       Item Specific Help

   NumLock:                      [On]              Selects Power-on state
   Key Click:                    [Disabled]        for NumLock
   Keyboard auto-repeat rate:    [30/sec]
   Keyboard auto-repeat delay:   [1/2 sec]












   F1    Help   ↑↓   Select Item   -/+    Change Values    F9    Setup Defaults
   Esc   Exit   ←→   Select Menu    Enter  Select ▶ Sub-Menu F10   Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| NumLock | Auto<br>**On**<br>Off | Selects Power-on state for NumLock |
| Key Click | **Disabled**<br>Enabled | Enables Key Click |
| Keyboard auto-repeat rate | **30/sec**<br>26.7/sec<br>21.8/sec<br>18.5/sec<br>13.3/sec<br>10/sec<br>6/sec<br>2/sec | Selects key repeat rate |
| Keyboard auto-repeat delay | ¼ sec<br>**½ sec**<br>¾ sec<br>1 sec | Selects delay before key repeat |

## Hardware Monitor

```
          Phoenix TrustedCore(tm) Setup Utility
          Advanced

               Hardware Monitor                        Item Specific Help

     Hardware Monitor         [Enabled]            Enable/disable the
                                                   Hardware monitor.
     VCC 3.3V Voltage  =       3.32V               Disable the device
     VCC 5.0V Voltage  =       5.02V               to free up resources
     CPU Core Voltage  =       0.94V               on the ISA bus.
      Battery Voltage  =       3.21V
                                                   Note: Changes will
     CPU #0 Temperature =    +31 C/+88 F           take effect only
     CPU #1 Temperature =    +19 C/+66 F           after a reboot.
                                                   If set to disabled,
     CPU Fan Speed     =      No Function          all values except
     Edges/Revolution:       [ 2]                  CPU temperature
                                                   are invalid.



     F1   Help   ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
     Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Hardware Monitor | **Enabled**<br>Disabled | Controls the Hardware Monitor |
| Edges/Revolution | [] | Select the number of ticks the fan generates in one revolution to display the fan speed correctly |

## Wachdog Settings

```
                 Phoenix TrustedCore(tm) Setup Utility
                Advanced

                 Watchdog Settings                    Item Specific Help

       Mode:         [Reset]                          Watchdog action
       Timeout:      [  30sec]
       Delay:        [  30sec]




    F1    Help    ↑↓  Select Item   -/+   Change Values   F9    Setup Defaults
    Esc   Exit    ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---------|--------|-------------|
| Mode | **Disabled**<br>Reset<br>NMI | Watchdog action |
| Timeout | 1sec<br>5sec<br>10sec<br>**30sec**<br>1min<br>5.5min<br>10.5min<br>30.5min | Max. trigger periode |
| Delay | 1sec<br>5sec<br>10sec<br>**30sec**<br>1min<br>5.5min<br>10.5min<br>30.5min | Time until watchdog timer starts to count |

## Display Control

```
            Phoenix TrustedCore(tm) Setup Utility
              Advanced

              Display Control                        Item Specific Help


    Display Mode:          [CRT+LFP]
    JDA Revision:          1.6
    Flat Panel Type:       [Auto]
    Flat Panel Scaling:    [Stretched]









    F1    Help    ↑↓   Select Item   -/+    Change Values   F9    Setup Defaults
    Esc   Exit    ↔    Select Menu   Enter  Select ▶ Sub-Menu  F10   Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Display Mode | CRT only<br>LFP only<br>**CRT + LFP**<br>LFP + EFP | CRT: Cathode Ray Tube<br>LFP: LVDS flat panel (JILI)<br>EFP: Embedded flat panel (sDVO) |
| Flat Panel Type | VGA 1×18<br>SVGA 1×18<br>XGA 1×18<br>XGA 1×24<br>SXGA 2×18<br>SXGA 2×24<br>UXGA 2×18<br>Enter PAID<br>Enter FPID<br>**Auto** | Select [Auto] for JILI or one of the predefined LCD's Use [Enter PAID] or [Enter FPID] to manually enter panel adapter ID or flat panel ID. |
| Flat Panel Scaling | Centered<br>**Stretched** | - |

## Miscellaneous Settings

```
        Phoenix TrustedCore(tm) Setup Utility
        Advanced

           Miscellaneous                        Item Specific Help

    Summary screen:         [Disabled]      Display system
    Dark Boot:              [Disabled]      configuration on boot
    Dark Boot Logo:         [0]
    Halt On Errors:         [No]
    QuickBoot Mode:         [Enabled]
    Extended Memory Testing: [Just zero it]
    Floppy check:           [Disabled]
    PS/2 Mouse:             [Auto Detect]
    Large Disk Access Mode: [DOS]
    Create UUID             [Disabled]




    F1   Help   ↑↓  Select Item  -/+   Change Values   F9   Setup Defaults
    Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
| --- | --- | --- |
| Summary Screen | **Disabled**<br>Extended | Display system configuration at boot |
| Dark Boot | **Disabled**<br>Enabled | Prevent diagnostic screen output during boot |
| Dark Boot Logo | **0**<br>1 | Use -/+ to select the Dark Boot logo<br>0 – Vendor Logo<br>1 – Blank screen |
| Halt On Errors | **No**<br>Yes | Determines if errors cause the system to halt |
| QuickBoot Mode | Disabled<br>**Enabled** | Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system. |
| Extended Memory Testing | Normal<br>**Just zero it**<br>None | Determines which type of tests will be performed on extended memory (above 1MB). |
| Floppy check | **Disabled**<br>Enabled | Disables/Enables the floppy check during boot |
| PS/2 Mouse | Disabled<br>Enabled<br>**Autodetect** | Controls the usage of the PS/2 mouse |
| Large Disk Access Mode | other<br>**DOS** | Selects the access mode for large disks. When unix systems are used, please select "other" |
| Create UUID | **Disabled**<br>Enabled | When enabled a new UUID will be generated during POST if the UUID in the BIOS flash is invalid |

## 7.2.4    Security

```
                  Phoenix TrustedCore(tm) Setup Utility
    Info      Main      Advanced     Security    Power      Boot      Exit

                                                  Item Specific Help

    Supervisor Password Is:    Clear

    Set Supervisor Password:   [Enter]           Supervisor Password
                                                 controls access to the
    Clear All Passwords        [Enter]           setup utility.

    Password on boot:          [Disabled]
    Fixed disk boot sector:    [Normal]




    F1   Help   ↑↓  Select Item   -/+   Change Values   F9   Setup Defaults
    Esc  Exit   ↔   Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Set Supervisor Password | [a..z;0..9;+-#...] | Allows to set Supervisor Password |
| Clear All Passwords | - | Clear Supervisor and Administrative Password |
| Password on boot | **Disabled**<br>Enabled | Enables/Disables password for boot process |
| Fixed Disk boot sector | **Normal**<br>Write Protect | Enables/Disables Write protection of boot sector to protect against viruses |

## 7.2.5 Power

```
           Phoenix TrustedCore(tm) Setup Utility
   Info      Main    Advanced    Security    Power    Boot     Exit

                                            Item Specific Help
   Enable ACPI:                [Yes]
                                            En/Disable ACPI BIOS
  ▶ CPU Thermal Control                     (Advance Configuration
                                            and Power Interface)
   Enable ACPI _Sx state:      [S3]
   Special S3 state:           [S3hot]

   After Power Failure:        [Power On]

   FACP - RTC S4 Flag Value:   [Enabled]
   Resume On Time:             [Off]
   Resume Time:                [00:00:00]

   M.A.R.S.                    [Disabled]
   Lid switch                  [Disabled]

   Power button legacy function:  [Disabled]


   F1   Help   ↑↓  Select Item   -/+   Change Values    F9   Setup Defaults
   Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit  ▮
```

| Feature | Option | Description |
|---|---|---|
| Enable ACPI | No<br>**Yes** | En/Disable ACPI BIOS (Advance Configuration and Power Interface) |
| Enable ACPI _Sx state | None<br>S1<br>**S3**<br>S1+S3 | This option allows to selectively enable Sx standby states for ACPI OS. Choosing 'None' will force the OS to have only S4 and S5 states. |
| Special S3 State | **S3hot**<br>S3cold | Controlles if the 5V VCC is switched off (S3cold) during S3 or stays on (S3hot) |
| After Power Failure | **Stay Off**<br>Last State<br>Power On | Sets the mode of operation if an AC/Power Loss occurs. The two modes are: \Enabled restores the previous power state before loss occurred,<br>Disabled keep the power off until the power button is pressed. The Disabled choice turns off Resume on Modem Ring. |
| FACP – RTC S4 Flag Value | Disabled<br>**Enabled** | Valid only for ACPI. Control the value for the RTC S4 Flag in the FACP Table |
| Resume On Time | On<br>**OFF** | Disables/Enables the Resume On Time Feature |
| Resume Time | [XX:XX:XX] | Sets the Time for the Rsume On Time Feature |
| M.A.R.S. | **Disabled**<br>Enabled | Disables/Enables the support for the SMART battery control system M.A.R.S |
| Lid switch | **Disabled**<br>Enabled | Controls the usage of the GPE2# signal als Lid switch event |
| Power button legacy function | **Disabled**<br>Enabled | Controls the power button function in DOS |

## CPU Thermal Control

```
            Phoenix TrustedCore(tm) Setup Utility
                                Power

          CPU Thermal Control                    Item Specific Help

     Thermal Control Circuit:    [TM1 and TM2]    Setting this bit enables
     PROCHOT# Enable:            [Enabled]        the thermal control
                                                  circuit (TCC) portion
     DTS Enable:                 [Enabled]        of the Thermal Monitor
                                                  feature of the CPU.
     Active Trip Point:          [55  C]
     Passive Cooling Trip Point: [Disabled]       Intel(r) Thermal Monitor
     Critical Trip Point:        [POR]            TM1 = 50% duty cycle
                                                  TM2 = Geyserville III




     F1   Help   ↑↓  Select Item  -/+   Change Values   F9   Setup Defaults
     Esc  Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu F10  Save and Exit
```

| Feature | Option | Description |
|---|---|---|
| Thermal Control Circuit | Disabled<br>TM1<br>TM2<br>**TM1 and TM2** | Sets the mode of the Thermal Control Circuit |
| PROCHOT# Enable | **Enabled**<br>Disabled | This function engages the Thermal Control Circuit when enabled |
| DTS Enable | **Enabled**<br>Disabled | Controls the DTS function of the processor |
| Active Trip Point | Disabled<br>15 C<br>23 C<br>...<br>**55 C**<br>63 C<br>...<br>119 C | This value controls the temperature of the ACPI active trip point - the point in which the OS will turn on the CPU fan (connector on PCB). If DTS is enabled only values below 97°C are valid. |
| Passive Cooling Trip Point | **Disabled**<br>15 C<br>23 C<br>...<br>119 C | This value controls the temperature of the ACPI passive cooling trip point - the point in which the OS will start to throttle the CPU, either by TM1 or TM2. If DTS is enabled only values below 97°C are valid. |
| Critical Trip Point | **POR**<br>15 C<br>23 C<br>...<br>119 C<br>127 C | This value controls the temperature of the ACPI critical trip point - the point in which the OS will shut down the system.<br>POR means 100°C for all Intel processors. |

**Passive Cooling**
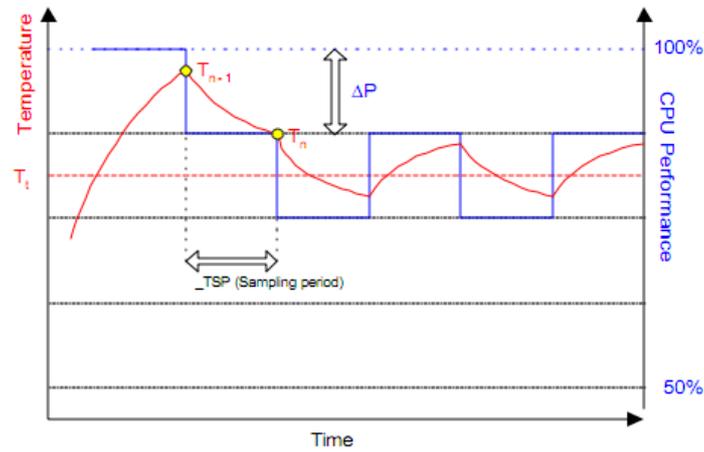


The ACPI OS assesses the optimum CPU performance change necessary to lower the temperature using the following equation

$$?P[\%] = TC1(Tn-Tn-1) + TC2(Tn-Tt)$$

?P is the performance delta, Tt is the target temperature = passive cooling trip point. The two coefficients TC1 and TC2 and the sampling period TSP are hardware dependent constants the end user must supply. It's up to the end user to set the cooling preference of the system by setting the appropriate trip points in the BIOS setup.

> See chapter 12 of the ACPI specification ([www.acpi.info](http://www.acpi.info)) for more details

## 7.2.6 Boot

```
              Phoenix TrustedCore(tm) Setup Utility
   Info      Main      Advanced      Security      Power      Boot      Exit

                                             Item Specific Help
   Boot priority order:
     1:  IDE 0:
     2:  IDE 1:                       Keys used to view or
     3:  IDE 2:                       configure devices:
     4:  IDE 3:                       Up and Down arrows
     5:  IDE CD:                      select a device.
     6:  USB KEY: STF Flash Drive-(USB 1.1)(R/F)F   <+> and <-> moves
     7:  USB CDROM:                   the device up or down.
     8:  PCI BEV:                     <f> and <r> specifies
   Excluded from boot order:          the device fixed or
     :  IDE 4:                        removable.
     :  IDE 5:                        <x> exclude or include
     :  USB FDC:                      the device to boot.
     :  USB HDD:                      <Shift + 1> enables or
     :  USB ZIP:                      disables a device.
     :  USB LS120:                    <1 - 4> Loads default
     :  PCI SCSI:                  ▼  boot sequence.


   F1   Help   ↑↓  Select Item   -/+   Change Values   F9   Setup Defaults
   Esc  Exit   ↔   Select Menu  Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

| Feature | Option | Descprition |
|---|---|---|
| Boot priority order | 1:USB Key<br>2:USB CDROM<br>3:IDE CE<br>4:IDE 0<br>5:IDE 1<br>6:IDE 2<br>7:IDE 3<br>8: | Keys used to view or configure devices:<br>Up and Down arrows select a device.<br><+> and ↔ moves the device up or down.<br><f> and <r> specifies the device fixed or removable.<br><x> exclude or include the device to boot.<br> <Shift + 1> enables or disables a device.<br><1 – 4> Loads default boot sequence. |
| Excluded from boot order | IDE 4<br>IDE5<br>USB FDC<br>USB HDD<br>USB ZIP<br>USB LS120<br>PCI SCSI | - |

## 7.2.7 Exit Menu

```
                Phoenix TrustedCore(tm) Setup Utility
   Info        Main      Advanced     Security     Power      Boot      Exit

                                               Item Specific Help
      Exit Saving Changes
      Exit Discarding Changes                  Exit System Setup and
      Load Setup Defaults                      save your changes to
      Discard Changes                          CMOS.
      Save Changes




   F1    Help    ↑↓   Select Item   -/+    Change Values    F9    Setup Defaults
   Esc   Exit    ←→   Select Menu    Enter  Execute Command  F10   Save and Exit
```

| Feature | Description |
|---|---|
| Exit Saving Changes | Exit System Setup and save your changes to CMOS. |
| Exit Discarding Changes | Exit utility without saving Setup data to CMOS. |
| Load Optimized Defaults | Load customer specific default values |
| Load Setup Defaults | Load default values for all SETUP items |
| Discard Changes | Load previous values from CMOS for all SETUP items |
| Save Changes | Save Setup Data to CMOS |

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