

► Kontron User's Guide



► ETXexpress® 690

Document Revision 111

All not approved entries are **marked**.

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Table of Contents

1	User Information	6
1.1	About This Document	6
1.2	Copyright Notice	6
1.3	Trademarks	6
1.4	Standards	6
1.5	Warranty	6
1.6	Technical Support.....	7
2	Introduction	8
2.1	ETXexpress®-690	8
2.2	ETXexpress®-690 Module Overview	9
2.3	Understanding ETXexpress® functionality.....	9
2.4	ETXexpress® Documentation	10
2.5	ETXexpress® Benefits.....	10
3	Specifications	12
3.1	Functional Specifications	12
3.1.1	Block Diagram	15
3.2	Mechanical Specifications	15
3.3	Electrical Specifications.....	15
3.3.1	Supply Current (Windows XP SP2)	16
3.3.2	CMOS Batter Power Consumption	17
3.4	Environmental Specifications	18
3.4.1	Temperature.....	18
3.4.2	Humidity	18
3.5	MTBF.....	19
4	Connector Pinouts	20
4.1	Connector Location	20
4.2	Pinout Tables.....	21
4.3	Connector X1A	22
4.4	Connector X1B.....	26
4.5	Signal Description	30
4.5.1	PCIexpress x1 lanes	30
4.5.2	USB	30
4.5.3	SATA.....	30
4.5.4	Audio.....	30
4.5.5	Serial IRQ	30
4.5.6	VGA Output	30
4.5.7	LVDS Flat Panel Interface (JILI).....	31

4.5.8	Digital Flat Panel Interface (JIDI)	31
4.5.9	Ethernet.....	31
4.5.10	Power Control.....	31
4.5.11	Power Management	32
4.5.12	Miscellaneous Circuits	32
4.5.13	PCIexpress Graphics.....	33
4.5.14	PCI Bus.....	33
4.5.15	IDE Port.....	33
4.5.16	DVI Output.....	33
5	Special Features	34
5.1	Watchdog Timer	34
5.2	General Purpose Input and Output	34
6	Important Information.....	36
6.1	Cooling Solution	36
6.2	Limitation.....	36
6.2.1	Express Card Support	36
6.2.2	SDVO	36
6.2.3	AC'97	36
6.2.4	SATA hot plug	36
6.2.5	WOL from S3.....	36
6.2.6	USB data throughput	36
7	Design Considerations.....	37
7.1	Thermal Management.....	37
7.2	Heatspreader Dimensions	38
7.3	ETXexpress@-690 onboard fan connector	39
7.3.1	Location and pin-out of fan connector.....	39
7.3.2	BIOS settings for fan control	40
7.3.3	Electrical Characteristics.....	40
8	System Ressources	42
8.1	Interrupt Request (IRQ) Lines	42
8.2	Direct Memory Access (DMA) Channels.....	43
8.3	Memory Area	43
8.4	I/O Address Map	44
8.5	Inter-IC (I2C) Bus.....	44
8.6	System Management (SM) Bus	44
8.7	JILI-I2C Bus	45
9	BIOS Operation	46

9.1	Determining the BIOS Version.....	46
9.2	Setup Guide	46
9.2.1	Start AMI® BIOS Setup Utility.....	46
10	BIOS Setup Menus.....	48
10.1	Main Menu	48
10.2	Advanced Menu.....	48
10.2.1	CPU Configuration Menu	49
10.2.2	IDE Configuration Menu.....	50
10.2.3	Legacy Devices Menu.....	52
10.2.4	ACPI Configuration Menu	53
10.2.5	Event Log Configuration Menu	56
10.2.6	Devices Menu	57
10.2.7	Miscellaneous Menu.....	64
10.2.8	Watchdog Menu	64
10.2.9	MPS Configuration.....	65
10.2.10	Smbios Configuration.....	66
10.2.11	Remote Access Configuration.....	66
10.3	PCIPnP Menu	67
10.4	Boot Menu	69
10.4.1	Boot Setting Configuration Menu	69
10.5	Security Menu.....	70
10.6	HWMonitor Menu.....	71
10.7	Exit Menu	72
11	Appendix A: JIDA Standard	73
11.1	JIDA Information	73
12	Appendix B: Architecture Information	74
12.1	Buses.....	74
12.1.1	ISA, Standard PS/2 – Connectors.....	74
12.1.2	PCI/104.....	74
12.2	General PC Architecture	74
12.3	Ports.....	75
12.3.1	RS-232 Serial	75
12.3.2	Serial ATA	75
12.3.3	USB	75
12.4	Programming	75
13	Appendix C: Document Revision History.....	77

1 User Information

1.1 About This Document

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1.4 Standards

Kontron Embedded Modules GmbH is certified to ISO 9000 standards.

1.5 Warranty

This Kontron Embedded Modules GmbH product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules GmbH will at its discretion decide to repair or replace defective products.

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

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

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

1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules 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. In any case you can always contact your board supplier for technical support.

2 Introduction

2.1 ETXexpress®-690

Based on the COM Express standard, Kontron's ETXexpress®-690, powered by a variety of AMD®'s Turion® and Sempron® 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, ETXexpress®-690 modules incorporate the following interfaces into 95 x 125 small form factor embedded module:

- PCI Express, which provides a high performance I/O infrastructure with transfer rates starting at 2.5 Giga transfers per second over a x1 PCI Express lane
- PCI
- Serial ATA (SATA II)
- USB 2.0
- LVDS
- High Definition Audio
- Advanced Configuration and Power Interface (ACPI) for optimized power management

The ETXexpress®-690 is built around the AMD® Turion® and Sempron® processor and the AMD® M690E chipset. These modules feature the most current desktop features such as USB 2.0, SATA, and PCI Express buses.

The ETXexpress®-690 delivers up to 4GB DDR2 RAM. For applications that require advanced real-time video capabilities, the ETXexpress®-690 has integrated graphics with 2D, 3D and Motion Video Acceleration and also supports PCI Express graphics.

Fast communications are possible courtesy of a Gigabit Ethernet port.

The ETXexpress®-690 supports 3 PCI Express x1 Lanes and PCI Express cards as well as established hardware solutions based on current buses such as 32-bit PCI. A Gigabit Ethernet port provides fast connectivity to LAN/WAN and 8 USB 2.0 ports provide fast and sufficient interfaces for external peripherals.

ETXexpress®-690 modules also provide the following interfaces that are always located in the same physical position on each board:

PCI-express, 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. Six mounting holes on the board provide secure mounting to allow the module increased shock and vibration resistance.

2.2 ETXexpress®-690 Module Overview

The international COM Express standard defines two new form factor sizes: Basic and Extended. The primary difference between the Basic and Extended size is a larger board size and thermal envelope in the Extended size. The ETXexpress®-690 follows the basic form factor.

Five module Pin-out Type definitions exist for Basic and Extended modules. Pin-out Types 1-5 apply to Basic and Extended module form factors. Pin-out Types 1-5 offer different functionalities. For a complete explanation of the features of each of the Pin-out Types 1-5, please see the COMexpress Specification.

The ETXexpress®-690 uses the Pin-out Type 2 architecture, which includes PCI and IDE interfaces. These modules either use onboard graphics capabilities or may use 8 PEG lanes to connect to an external video controller. In case of onboard graphics, PEG pins may be alternatively used for DVI ports.

Pin-out Type 2 features include:

- Dual 220 pin connectors (Primary Connector: Rows A-B and Secondary Connector: Rows C-D, 440 pins total)
- 32-bit PCI interface
- IDE port (to support legacy ATA devices)
- Up to 6 PCI Express general purpose lanes
- One, x16 PCI Express Graphics (PEG) slot
- Up to 8 USB 2.0 ports; 4 shared over-current lines
- Up to 4 Serial ATA ports
- Dual 24-bit LVDS channels
- Analog VGA
- High Definition Audio and AC '97 digital audio interface (external CODEC)
- Single Ethernet interface with integrated PHY
- +12V primary power supply input, +5V standby and 3.3V RTC power supplies

2.3 Understanding ETXexpress® functionality

All Kontron ETXexpress® modules contain two connectors; each of it has two rows. The primary connector has two rows called Row A and Row B. The secondary connector has two rows called Row C and Row D.

The primary connector (Row A and Row B) feature the following legacy-free functionality:

- Ethernet
- Serial ATA (SATA)
- USB 2.0
- LVDS/VGA and dual display video
- High Definition Audio
- LPC (low pin count) Bus
- PCI Express

The secondary connector (Row C and Row D) provides support for the following buses and I/O:

- PCI Express Graphics
- PCI
- IDE

2.4 ETXexpress® Documentation

This product manual serves as one of three principal references for an ETXexpress® design. It documents the specifications and features of ETXexpress®-690. The other two references, which are available from your Kontron Support or from PICMG®, include:

- The COMexpress Specification defines the ETXexpress® module form factor, pinout, and signals.
- The ETXexpress® Component SBC™ Design Guide serves as a general guide for baseboard design, with a focus on maximum flexibility to accommodate a wide range of ETXexpress® modules.

Note: 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.

2.5 ETXexpress® Benefits

Embedded technology extended express (ETXexpress) modules are very compact (125 x 95 mm, 12mm thick), highly integrated computers. All ETXexpress® modules feature a standardized form factor and a standardized connector layout that carry a specified set of signals. Each ETXexpress® module is based on connector type 2 of the COMexpress specification. This standardization allows designers to create a single-system baseboard that can accept present and future ETXexpress® modules.

ETXexpress® modules include common personal computer (PC) peripheral functions such as:

- Graphics
- USB ports
- 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.

A peripheral PCI bus 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 ETXexpress® modules. This flexibility can differentiate products at various price/performance points, or to design future proof systems that have a built-in upgrade path. The modularity of an ETXexpress® solution also ensures against obsolescence as

computer technology evolves. A properly designed ETXexpress® baseboard can work with several successive generations of ETXexpress® modules.

An ETXexpress® 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 Specifications

3.1 Functional Specifications

Processor

- AMD® Turion™ or Sempron™ processor

Bus

- Up to 800 MHz CPU bus (depends on used processor)
- Up to 800 MHz memory bus (depends on the used processor)

Processor features

- support for SSE, SSE2, SSE3, MMX™, 3DNow!™ technology, and legacy x86 instructions
- AMD64 Technology
- HyperTransport™ Technology to I/O Devices
- AMD PowerNow!™ technology

Processor cache L2

- 128kB or 256kB (Sempron™)
- Up to 1 MB (Turion™)

Chipset

- AMD® M690E
- AMD® SB600

Memory

- Dual channel 200-pin DDR2-SO-DIMM which allows up to 4GB RAM

PCI Express Graphics (PEG): AMD® M690E

- One 8-lane PCI Express port for external PCI Express based graphics card

PCI Express: AMD® M690E

- 3 PCI Express x1 lanes

PCI 32: AMD® SB600

- Parallel PCI Bus 32 bit 33 MHz according to PCI 2.3

IDE: AMD® SB600

- Single PATA channel support
- Supports PIO, Multi-Word DMA and Ultra-DMA 33/66/100/133 modes
- 32x32 byte buffers on each channel

Serial ATA: AMD® SB600

- 4 Channels Serial ATA
- Support for 3.0 Gbit/s (SATA II)
- Support for RAID0, RAID1 and RAID10
- Support for AHCI (NCQ, Hot Plug, Port Multiplier with up to 4 RAID devices)

Universal Serial Bus: AMD® SB600

- 8 USB 1.1/2.0 ports (OHCI and EHCI)
- USB legacy keyboard support
- USB floppy, CD-ROM, Hard drive, and memory stick boot support

Gigabit Ethernet: Intel® 82574L

- Fully compatible with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab

Onboard video graphics array (VGA): AMD® M690E

- Based on ATI X1200 Avivo
- Maximum resolutions supported by the VGA output for different refresh rates are:
- 2048x1536 @85Hz (pixel clock at 388.5MHz) for 4:3 format
- 2560x1440 @75Hz (pixel clock at 397.25MHz) for 16:9 format
- 2456x1536 @60Hz (pixel clock at 320MHz) for 16:10 format
- Highly optimized 128bit 2D Acceleration engine
- Full DirectX 9.0 support 3D Acceleration
- Cathode Ray Tube interface (VGA)
- Low Voltage Differential Signaling (LVDS)
- DVI Signals (multiplexed with PEG signals)

- Dual independent display support

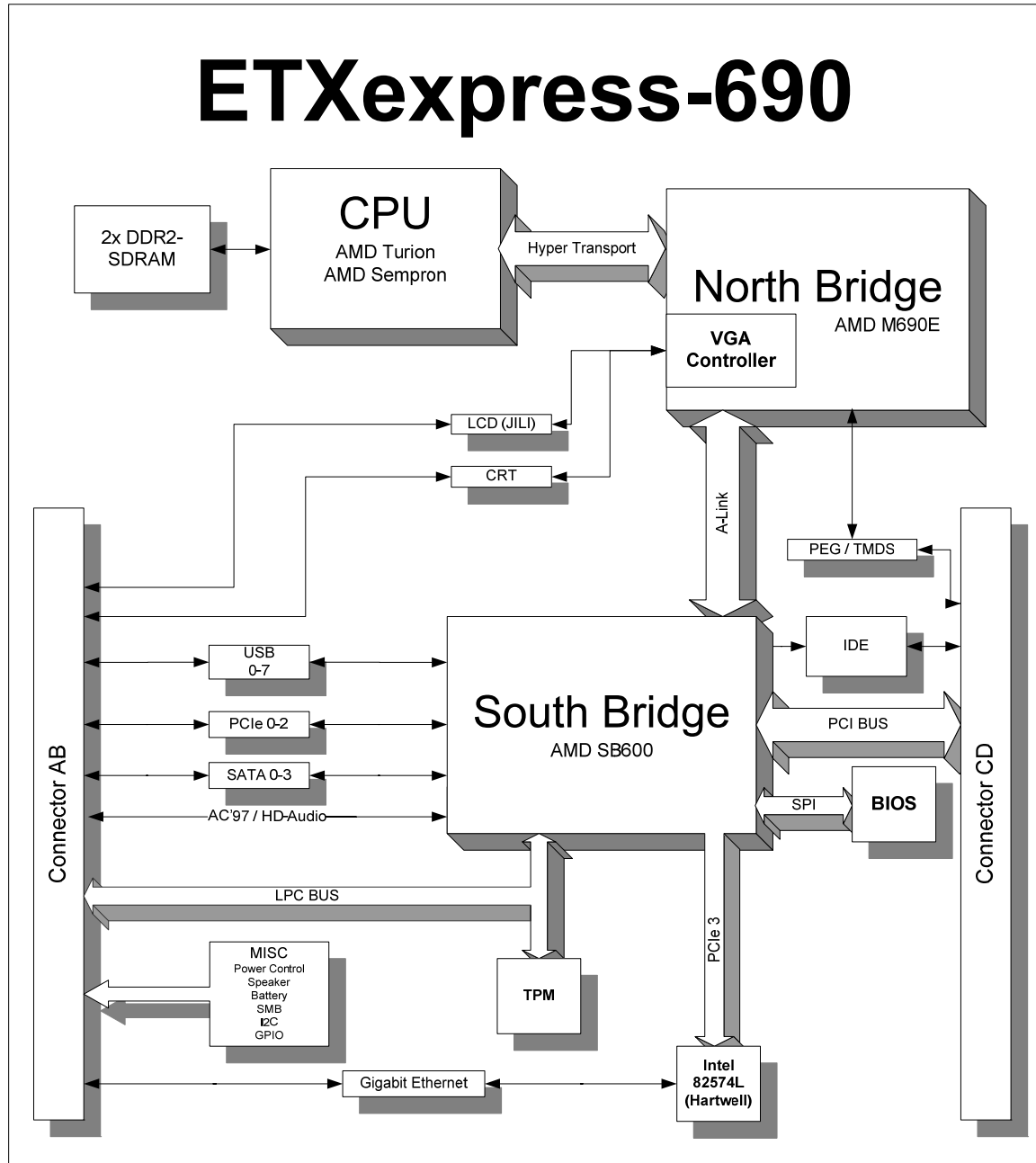
AC '97 (Audio): AMD® SB600

- Supports for both audio and modem codecs
- Compliant with AC'97 codec REV. 2.3
- 6/8 channel support on audio codec
- Supports SPDIF output

HD Audio

- 4 independent output streams
- 4 independent input streams
- Up to 16 channels of audio output streams
- Up to 192kHz sample rate
- Up to 32bit per sample
- MSI capability
- 64bit capability for MSI
- 64bit capability for DMA bus master
- Unified Audio Architecture (UAA) compatible
- HD Audio registers can be anywhere located in the 64bit address space

3.1.1 Block Diagram



3.2 Mechanical Specifications

Dimensions

- 95.0 mm x 125.0 mm
- Height approx. 12 mm (0.4")

3.3 Electrical Specifications

Supply Voltage

- 8.5V DC to 18V DC widerange input

Supply Voltage Ripple

- Maximum 100 mV peak to peak 0 – 20 MHz

3.3.1 Supply Current (Windows XP SP2)

The tested boards were mounted on a Kontron Evaluation Board (Article number: 38100-0000-00-0), a mouse and a keyboard were connected. The Power-consumption tests were executed during Windows XP SP2 by using a tool to stress the CPU (100 % load). The power measurements values were acquired after 15 min full load and a stable CPU die temperature. To ensure a stable die temperature a corresponding heatsink was used to hold the temperature under the critical trip point.

All boards were equipped with DDR2 SDRAM. The Modules were tested using maximum CPU frequency.

Processor / board revision	MHz	RAM MB	Full Load			Idle		
			[A]12V	[A]5V_SB	[W]	[A]12V	[A]5V_SB	[W]
Turion TL62	2x2100	1024	3,59	0,06	43,38	1,25	0,06	15,30
Turion TL52	2x1600	1024	3,11	0,07	37,66	1,02	0,07	12,53
Semp. 3500+	1800	1024	2,47	0,07	29,98	1,11	0,07	13,66
Semp. 2100+	1000	1024	1,31	0,07	16,07	0,84	0,06	10,38

Processor / board revision	MHz	RAM MB	Idle with Speedstep			Standby S1		
			[A]12V	[A]5V_SB	[W]	[A]12V	[A]5V_SB	[W]
Turion TL62	2x2100	1024	0,87	0,06	10,77	1,10	0,08	13,59
Turion TL52	2x1600	1024	0,80	0,07	9,98	0,92	0,08	11,48
Semp. 3500+	1800	1024	0,88	0,06	10,86	0,87	0,08	10,84
Semp. 2100+	1000	1024	np	np	np	0,82	0,08	10,20

Processor / board revision	MHz	RAM MB	S3hot			S3cold		
			[A]12V	[A]5V_SB	[W]	[A]12V	[A]5V_SB	[W]
Turion TL62	2x2100	1024	np	np	np	0,00	0,20	1,01
Turion TL52	2x1600	1024	np	np	np	0,00	0,21	1,03
Semp. 3500+	1800	1024	np	np	np	0,00	0,22	1,08
Semp. 2100+	1000	1024	np	np	np	0,00	0,21	1,04

Processor / board revision	MHz	RAM MB	Soft Off S5					
			[A]12V	[A]5V_SB	[W]			
Turion TL62	2x2100	1024	0,00	0,15	0,74			
Turion TL52	2x1600	1024	0,00	0,15	0,75			
Semp. 3500+	1800	1024	0,00	0,15	0,74			
Semp. 2100+	1000	1024	0,00	0,15	0,74			

Note: S3 cold will drive all the power supply for memory refreshing and chip supply through the 5V_SB line. Therefore up to 2A of current is specified for the connectors and should be in mind when the power supply is dimensioned. The board works also without a 5V_SB line but not the ACPI states S3 and S5.

Note: It is difficult to test for all possible applications on the market. There may be an application that draws more power from the CPU than the measured values in the table above. This should be taken into consideration if you are on the board of the thermal specification. If this is the case improvements to your thermal solution are recommended.

3.3.2 CMOS Batter Power Consumption

Voltage Range	Quiescent Current
2.0 V – 3.6 V	1.82 μ A @ 3.0 V

CMOS battery power consumption was measured with an ETXexpress®-690 module on a standard Kontron ETXexpress® evaluation board. The system was turned off and the battery was removed from the evaluation board. Do not use these values to calculate the CMOS battery lifetime.

3.4 Environmental Specifications

3.4.1 Temperature

With Kontron Embedded Modules heat-spreader plate assembly

Operating:

- Ambient temperature: 0°C to 60°C
- Maximum heatspreader-plate temperature: 0°C to 60°C

Non-operating: -30°C to 85°C

Note: The maximum operating temperature with the heatspreader plate is the maximum measurable temperature on any spot on the heatspreader's surface. You must maintain the temperature according to the above specification.

Without Kontron Embedded Modules heat-spreader plate assembly

Operating:

- Maximum operating temperature: 0°C to 60°C

Non operating: -30 to +85 °C

Note: The maximum operating temperature is the maximum measurable temperature on any spot on a module's surface. You must maintain the temperature according to the above specification.

3.4.2 Humidity

- Operating: 10% to 90% (non condensing)
- Non operating: 5% to 95% (non condensing)

3.5 MTBF

The following MTBF (Mean Time Between Failure) values were calculated using a combination of manufacturer's test data, if the data was available, and a Bellcore calculation for the remaining parts. The Bellcore calculation used is "Method 1 Case 1". In that particular method the components are assumed to be operating at a 50 % stress level in a 40° C ambient environment and the system is assumed to have not been burned in. Manufacturer's data has been used wherever possible. The manufacturer's data, when used, is specified at 50° C, so in that sense the following results are slightly conservative. The MTBF values shown below are for a 40° C in an office or telecommunications environment. Higher temperatures and other environmental stresses (extreme altitude, vibration, salt water exposure, etc.) lower MTBF values.

System MTBF (hours) : tbd

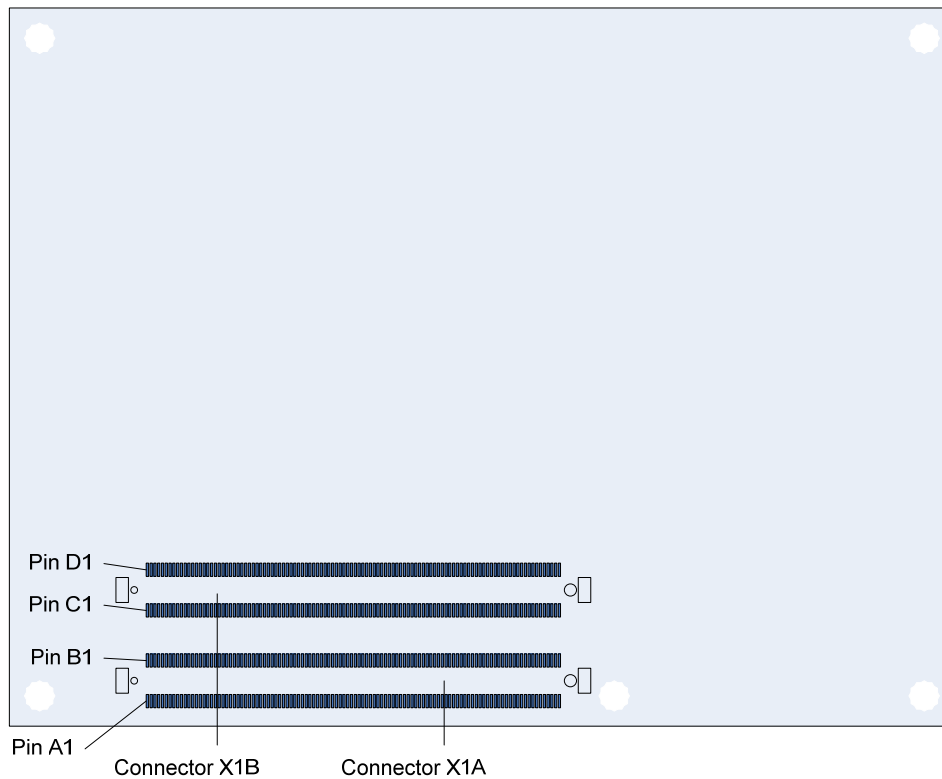
Notes: Fans usually shipped with Kontron Embedded Modules GmbH products have 50,000-hour typical operating life. The above estimates assume no fan, but a passive heat sinking arrangement. Estimated RTC battery life (as opposed to battery failures) is not accounted for in the above figures and need to 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.

4 Connector Pinouts

4.1 Connector Location

There are 2 connectors on the basic sized module. Connector X1A and Connector X1B are shown in the following drawing. It is a top layer view and the connectors are seen "through" the PCB.

Each connector consists of 2 connector rows. Connector X1A has rows A and B and connector X1B has rows C and D.



4.2 Pinout Tables

I	Differential Pair Input
IO-2,5	Bi-directional 2,5 V IO-Signal
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/OD	Bi-directional Input/Output Open Drain
I-5T	3,3 V Input (5 V Tolerance)
O	Output (different power level)
OA	Output Analog
OD	Output Open Drain
O-2,5	2,5 V Output
O-3,3	3,3 V Output
O-5	5 V Output
DP	Differential Pair Input/Output
DP-I	Differential Pair Input
DP-O	Differential Pair Output
PU	Pull-Up Resistor
PD	Pull-Down Resistor
PWR	Power Connection
Nc	Not Connected / Reserved

Notes: 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

4.3 Connector X1A

Connector X1A (Signal Levels A1-A55)

Pin A1-A55

[LAN | Power | USB | SATA | PCIe | AUDIO]

Pin	Signal	Description	Type	Termination	Comment
A1	GND	Power Ground	PWR	-	-
A2	GBE0_MDI3-	GBE_MDIN3 Ethernet Receive Data -	DP-I	-	-
A3	GBE0_MDI3+	GBE_MDIP3 Ethernet Receive Data +	DP-I	-	-
A4	GBE0_LINK100#	GBE_LINK100# Ethernet Speed LED	OD	-	Low at 100Mb/s
A5	GBE0_LINK1000#	GBE_LINK1000# Ethernet Speed LED	OD	-	Low at 1000Mb/s
A6	GBE0_MDI2-	GBE_MDIN2 Ethernet Receive Data -	DP-I	-	-
A7	GBE0_MDI2+	GBE_MDIP2 Ethernet Receive Data +	DP-I	-	-
A8	GBE0_LINK#	GBE_LINK# LAN Link LED	OD	-	-
A9	GBE0_MDI1-	GBE_MDIN1 Ethernet Receive Data -	DP-I	-	-
A10	GBE0_MDI1+	GBE_MDIP1 Ethernet Receive Data +	DP-I	-	-
A11	GND	Power Ground	PWR	-	-
A12	GBE0_MDI0-	GBE_MDIN0 Ethernet Transmit Data -	DP-0	-	-
A13	GBE0_MDI0+	GBE_MDIP0 Ethernet Transmit Data +	DP-0	-	-
A14	GBE0_CTREF	GBE_CTREF	0	PU 1k 1,9V (S5)	-
A15	SUS_S3#	PM_SLP_S3_EXT#	0-3,3	-	-
A16	SATA0_TX+	SATA_TXP0 SATA 0 Transmit Data +	DP-0	-	-
A17	SATA0_TX-	SATA_TXN0 SATA 0 Transmit Data -	DP-0	-	-
A18	SUS_S4#	PM_SLP_S4_EXT#	0-3,3	-	= SUS_S5#
A19	SATA0_RX+	SATA_RXP0 SATA 0 Receive Data +	DP-I	-	-
A20	SATA0_RX-	SATA_RXN0 SATA 0 Receive Data -	DP-I	-	-
A21	GND	Power Ground	PWR	-	-
A22	SATA2_TX+	SATA_TXP2 SATA 2 Transmit Data +	DP-0	-	-
A23	SATA2_TX-	SATA_TXN2 SATA 2 Transmit Data -	DP-0	-	-
A24	SUS_S5#	PM_SLP_S5_EXT#	0-3,3	-	-
A25	SATA2_RX+	SATA_RXP2 SATA 2 Receive Data +	DP-0	-	-
A26	SATA2_RX-	SATA_RXN2 SATA 2 Receive Data -	DP-0	-	-
A27	BATLOW#	BATLOW# Battery Low	I-3,3	PU 10k 3,3V (S5)	-
A28	ATA_ACT#	ATA_ACT# SATA and ATA Activity	OD	PU 10k 3,3V (S0)	-
A29	AC_SYNC	AC97_HDA_SYNC	0-3,3	-	int. PD 10k (AC'97)
A30	AC_RST#	AC97_HDA_RST#	0-3,3	-	OD with PU 10k (AC'97)
A31	GND	Power Ground	PWR	-	-
A32	AC_BITCLK	AC_BITCLK	I-5T/ 0-3,3	-	int. PD 10k (AC'97)/0-3,3 (HDA)
A33	AC_SDOUT	AC97_HDA_SDOUT	0-3,3	-	int. PD 10k (AC'97)
A34	BIOS_DISABLE#	BIOS_DISABLE#	I-3,3	PU 11k 3,3V (S0)	-
A35	THRMTRIP#	CPU_THERMTRIP#	I/0-3,3	PU 10k 3,3V (S5)	-
A36	USB6-	USB6N USB Data - Port6	DP	PD 15k	int. PD 15k in SB600
A37	USB6+	USB6P USB Data + Port6	DP	PD 15k	int. PD 15k in SB600
A38	USB_6_7_OC#	USB_67_OC# USB OverCurrent Port 6/7	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
A39	USB4-	USB4N USB Data - Port4	DP	PD 15k	int. PD 15k in SB600
A40	USB4+	USB4P USB Data + Port4	DP	PD 15k	int. PD 15k in SB600
A41	GND	Power Ground	PWR	-	-
A42	USB2-	USB2N USB Data - Port2	DP	PD 15k	int. PD 15k in SB600
A43	USB2+	USB2P USB Data + Port2	DP	PD 15k	int. PD 15k in SB600
A44	USB_2_3_OC#	USB_23_OC# USB OverCurrent Port 2/3	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
A45	USB0-	USB0N USB Data - Port0	DP	PD 15k	int. PD 15k in SB600
A46	USB0+	USB0P USB Data + Port0	DP	PD 15k	int. PD 15k in SB600
A47	VCC_RTC	V_BAT	PWR	-	-
A48	EXCDO_PERST#	EXCDO_RST# card reset	0-3,3	-	-
A49	EXCDO_CPPE#	EXCDO_CPPE# capable c. request	I-3,3	-	-
A50	LPC_SERIRQ	LPC_SERIRQ Serial Interrupt Request	I/0-3,3	PU 8k2 3,3V (S0)	int. PU 8k2 in SB600
A51	GND	Power Ground	PWR	-	-
A52	PCIEX5+	n.c.	Nc	-	-
A53	PCIEX5-	n.c.	Nc	-	-
A54	GPIO	ETXE_GPIO General Purpose Input 0	I-3,3	PU 10k 3,3V (S0)	-
A55	PCIEX4+	n.c.	Nc	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1A (Signal Levels A56-A110)

Pin A56-A110

[Power | LVDS | PCIe]

Pin	Signal	Description	Type	Termination	Comment
A56	PCIE_TX4-	n.c.	Nc	-	-
A57	GND	Power Ground	PWR	-	-
A58	PCIE_TX3+	PCIE_TXP3_E PCI Express lane 3 +	Nc	-	-
A59	PCIE_TX3-	PCIE_TXN3_E PCI Express lane 3 -	Nc	-	-
A60	GND	Power Ground	PWR	-	-
A61	PCIE_TX2+	PCIE_TXP2 PCI Express lane 2 +	DP-0	-	-
A62	PCIE_TX2-	PCIE_TXN2 PCI Express lane 2 -	DP-0	-	-
A63	GPI1	ETXE_GPI1 General Purpose Input 1	I-3,3	PU 10k 3,3V (S0)	-
A64	PCIE_TX1+	PCIE_TXP1 PCI Express lane 1 +	DP-0	-	-
A65	PCIE_TX1-	PCIE_TXN1 PCI Express lane 1 -	DP-0	-	-
A66	GND	Power Ground	PWR	-	-
A67	GPI2	ETXE_GPI2 General Purpose Input 2	I-3,3	PU 10k 3,3V (S0)	-
A68	PCIE_TX0+	PCIE_TXP0 PCI Express lane 0 +	DP-0	-	-
A69	PCIE_TX0-	PCIE_TXN0 PCI Express lane 0 -	DP-0	-	-
A70	GND	Power Ground	PWR	-	-
A71	LVDS_A0+	LVDS_TXL0P LVDS Channel A Data0+	DP-0	-	-
A72	LVDS_A0-	LVDS_TXL0N LVDS Channel A Data0-	DP-0	-	-
A73	LVDS_A1+	LVDS_TXL1P LVDS Channel A Data1+	DP-0	-	-
A74	LVDS_A1-	LVDS_TXL1N LVDS Channel A Data1-	DP-0	-	-
A75	LVDS_A2+	LVDS_TXL2P LVDS Channel A Data2+	DP-0	-	-
A76	LVDS_A2-	LVDS_TXL2N LVDS Channel A Data2 -	DP-0	-	-
A77	LVDS_VDD_EN	LVDS_VDD_EN LVDS Panel Power Control	O-3,3	PD 2k2	-
A78	LVDS_A3+	LVDS_TXL3P LVDS Channel A Data3+	DP-0	-	-
A79	LVDS_A3-	LVDS_TXL3N LVDS Channel A Data3-	DP-0	-	-
A80	GND	Power Ground	PWR	-	-
A81	LVDS_A_CLK+	LVDS_TXLCKP LVDS Channel A Clock+	DP-0	-	-
A82	LVDS_A_CLK-	LVDS_TXLCKN LVDS Channel A Clock-	DP-0	-	-
A83	LVDS_I2C_CLK	LVDS_DDC_CLK JILI I2C Clock	O-3,3	PU 39k 3,3V (S0)	-
A84	LVDS_I2C_DAT	LVDS_DDC_DATA JILI I2C Data	I/O-3,3	PU 39k 3,3V (S0)	-
A85	GPI3	ETXE_GPI3 General Purpose Input 3	I-3,3	PU 10k 3,3V (S0)	-
A86	KBD_RST#	KBD_RST# Keyboard Reset	I-3,3	PU 8k2 3,3V (S0)	int. PU 8k2 in SB600
A87	KBD_A20GATE	KBD_A20GATE	I-3,3	PU 8k2 3,3V (S0)	int. PU 8k2 in SB600
A88	PCIE0_CLK_REF+	CLK_CON_PCIE_P	DP-0	-	-
A89	PCIE0_CLK_REF-	CLK_CON_PCIE_N	DP-0	-	-
A90	GND	Power Ground	PWR	-	-
A91	RSVD	n.c.	Nc	-	-
A92	RSVD	n.c.	Nc	-	-
A93	GPO0	ETXE_GPO0 General Purpose Output 0	O-3,3	PD 10k	-
A94	RSVD	n.c.	Nc	-	-
A95	RSVD	n.c.	Nc	-	-
A96	GND	Power Ground	PWR	-	-
A97	VCC_12V	12V VCC	PWR	-	-
A98	VCC_12V	12V VCC	PWR	-	-
A99	VCC_12V	12V VCC	PWR	-	-
A100	GND	Power Ground	PWR	-	-
A101	VCC_12V	12V VCC	PWR	-	-
A102	VCC_12V	12V VCC	PWR	-	-
A103	VCC_12V	12V VCC	PWR	-	-
A104	VCC_12V	12V VCC	PWR	-	-
A105	VCC_12V	12V VCC	PWR	-	-
A106	VCC_12V	12V VCC	PWR	-	-
A107	VCC_12V	12V VCC	PWR	-	-
A108	VCC_12V	12V VCC	PWR	-	-
A109	VCC_12V	12V VCC	PWR	-	-
A110	GND	Power Ground	PWR	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1A (Signal Levels B1-B55)

Pin B1-B55

[LAN | Power | USB | SATA | PCIe | AUDIO | LPC]

Pin	Signal	Description	Type	Termination	Comment
B1	GND	Power Ground	PWR	-	-
B2	GBE0_ACT	GBE_ACT# Ethernet Activity LED	OD	-	-
B3	LPC_FRAME#	LPC_FRAME# LPC Frame Indicator	0-3,3	-	-
B4	LPC_AD0	LPC_AD0 LPC Address & DATA Bus	I/O-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B5	LPC_AD1	LPC_AD1 LPC Address & DATA Bus	I/O-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B6	LPC_AD2	LPC_AD2 LPC Address & DATA Bus	I/O-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B7	LPC_AD3	LPC_AD3 LPC Address & DATA Bus	I/O-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B8	LPC_DRQ0#	LPC_DRQ0# LPC Request 0	I-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B9	LPC_DRQ1#	LPC_DRQ1# LPC Request 1	I-3,3	PU 15k 3,3V (S0)	int. PU in SB600
B10	LPC_CLK	CLK_33M_LPC	0-3,3	-	-
B11	GND	Power Ground	PWR	-	-
B12	PWRBTN#	Power Button	I-3,3	PU 1k 3,3V (S0)	-
B13	SMB_CLK	SMB_CLK_EXT SMBUS Clock	I/O-3,3	PU 2k2 3,3V (S0)	-
B14	SMB_DAT	SMB_DATA_EXT SMBUS Data	I/O-3,3	PU 2k2 3,3V (S0)	-
B15	SMB_ALERT#	SMB_ALERT#	I-3,3	PU 10k 3,3V (S5)	int. PU in SB600
B16	SATA1_TX+	SATA_TXP1	DP-0	-	-
B17	SATA1_TX-	SATA_TXN1	DP-0	-	-
B18	SUS_STAT#	PM_SUS_STAT#	OD	PU 4k7 3,3V (S5)	-
B19	SATA1_RX+	SATA_RXP1	DP-I	-	-
B20	SATA1_RX-	SATA_RXN1	DP-I	-	-
B21	GND	Power Ground	PWR	-	-
B22	SATA3_TX+	SATA_TXP3	DP-0	-	-
B23	SATA3_TX-	SATA_TXN3	DP-0	-	-
B24	PWR_OK	ETX_PWR_OK Power OK	I-3,3	-	-
B25	SATA3_RX+	SATA_RXP3	DP-I	-	-
B26	SATA3_RX-	SATA_RXN3	DP-I	-	-
B27	WDT	WDT Watch Dog Timer	0-3,3	-	-
B28	AC_SDIN2	AC97_HDA_SDIN2 AC'97 Serial Input Data 2	I-3,3	-	int. PD 50k in SB600
B29	AC_SDIN1	AC97_HDA_SDIN1 AC'97 Serial Input Data 1	I-3,3	-	int. PD 50k in SB600
B30	AC_SDINO	AC97_HDA_SDINO AC'97 Serial Input Data 0	I-3,3	-	int. PD 50k in SB600
B31	GND	Power Ground	PWR	-	-
B32	SPKR	SPKR Speaker	0-3,3	PU 10k 3,3V (S0)	int. PU 10k in SB600
B33	I2C_CLK	I2C_CLK	0-3,3	PU 2k2 3,3V (S5)	-
B34	I2C_DAT	I2C_DATA	I/O-3,3	PU 2k2 3,3V (S5)	-
B35	THRM#	PM_THRM_ETX# Over Temperature	I-3,3	PU 10k 3,3V (S0)	-
B36	USB7-	USB7N USB Data - Port7	DP	PD 15k	int. PD 15k in SB600
B37	USB7+	USB7P USB Data + Port7	DP	PD 15k	int. PD 15k in SB600
B38	USB_4_5_OC#	USB_45_OC# USB OverCurrent Port 4/5	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
B39	USB5-	USB5N USB Data- Port5	DP	PD 15k	int. PD 15k in SB600
B40	USB5+	USB5P USB Data+ Port5	DP	PD 15k	int. PD 15k in SB600
B41	GND	Power Ground	PWR	-	-
B42	USB3-	USB3N USB Data- Port3	DP	PD 15k	int. PD 15k in SB600
B43	USB3+	USB3P USB Data+ Port3	DP	PD 15k	int. PD 15k in SB600
B44	USB_0_1_OC#	USB_01_OC# USB OverCurrent Port 0/1	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
B45	USB1-	USB1N USB Data- Port1	DP	PD 15k	int. PD 15k in SB600
B46	USB1+	USB1P USB Data+ Port1	DP	PD 15k	int. PD 15k in SB600
B47	EXCD1_PERST#	EXCD1_RST# Express Card Support [1] card	0-3,3	-	-
B48	EXCD1_CPPE#	EXCD1_CPPE# Express Card Support [1]	I-3,3	-	-
B49	SYS_RESET#	ETX_SYS_RESET# Reset Input	I-3,3	PU 10k 3,3V (S5)	-
B50	CB_RESET#	CB_RESET# PCI Bus Reset	0-3,3	-	-
B51	GND	Power Ground	PWR	-	-
B52	PCIe_RX5+	n.c.	Nc	-	-
B53	PCIe_RX5-	n.c.	Nc	-	-
B54	GP01	ETXE_GP01 General Purpose Output 1	0-3,3	PD 10k	-
B55	PCIe_RX4+	n.c.	Nc	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1A (Signal Levels B56-B110)

Pin B56-B110

[Power | PCIe | LVDS | VGA]

Pin	Signal	Description	Type	Termination	Comment
B56	PCIE_RX4-	n.c.	Nc	-	-
B57	GP02	ETXE_GP02 General Purpose Output 2	0-3,3	PD 10k	-
B58	PCIE_RX3+	PCIE_RXP3_E PCI Express lane 3 + Recieve	Nc	-	-
B59	PCIE_RX3-	PCIE_RXN3_E PCI Express lane 3 - Recieve	Nc	-	-
B60	GND	Power Ground	PWR	-	-
B61	PCIE_RX2+	PCIE_RXP2 PCI Express lane 2 + Recieve	DP-I	-	-
B62	PCIE_RX2-	PCIE_RXN2 PCI Express lane 2 - Recieve	DP-I	-	-
B63	GP03	ETXE_GP03 General Purpose Output 3	0-3,3	PD 10k	-
B64	PCIE_RX1+	PCIE_RXP1 PCI Express lane 1 + Recieve	DP-I	-	-
B65	PCIE_RX1-	PCIE_RXN1 PCI Express lane 1 - Recieve	DP-I	-	-
B66	WAKE0#	PM_WAKE0#	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
B67	WAKE1#	WAKE1#	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
B68	PCIE_RX0+	PCIE_RXN1 PCI Express lane 0 + Recieve	DP-I	-	-
B69	PCIE_RX0-	PCIE_RXN1 PCI Express lane 0 - Recieve	DP-I	-	-
B70	GND	Power Ground	PWR	-	-
B71	LVDS_B0+	LVDS_TXU0P LVDS Channel B Data0+	DP-0	-	-
B72	LVDS_B0-	LVDS_TXU0N LVDS Channel B Data0-	DP-0	-	-
B73	LVDS_B1+	LVDS_TXU1P LVDS Channel B Data1+	DP-0	-	-
B74	LVDS_B1-	LVDS_TXU1N LVDS Channel B Data1-	DP-0	-	-
B75	LVDS_B2+	LVDS_TXU2P LVDS Channel B Data2+	DP-0	-	-
B76	LVDS_B2-	LVDS_TXU2N LVDS Channel B Data2 -	DP-0	-	-
B77	LVDS_B3+	LVDS_TXU3P LVDS_YBP2 LVDS Channel B	DP-0	-	-
B78	LVDS_B3-	LVDS_TXU3N LVDS Channel B Data3 -	DP-0	-	-
B79	LVDS_BKLT_EN	LVDS_BKLT_EN Panel Backlight ON	0-3,3	PD 2k2	-
B80	GND	Power Ground	PWR	-	-
B81	LVDS_B_CLK+	LVDS_TXUCKP LVDS Channel B Clock+	DP-0	-	-
B82	LVDS_B_CLK-	LVDS_TXUCKN LVDS Channel B Clock-	DP-0	-	-
B83	LVDS_BKLT_CTRL	LVDS_BKLT_CTRL Backlight Brightness Contr	0-3,3	PD 2k2	-
B84	VCC_5V_SBY	V_IN_5.0_S5 5V Standby	PWR	-	-
B85	VCC_5V_SBY	V_IN_5.0_S5 5V Standby	PWR	-	-
B86	VCC_5V_SBY	V_IN_5.0_S5 5V Standby	PWR	-	-
B87	VCC_5V_SBY	V_IN_5.0_S5 5V Standby	PWR	-	-
B88	RSVD	n.c.	Nc	-	-
B89	VGA_RED	CRT_RED Analog Video RGB-RED	OA	-	-
B90	GND	Power Ground	PWR	-	-
B91	VGA_GRN	CRT_GREEN Analog Video RGB-GREEN	OA	-	-
B92	VGA_BLU	CRT_BLUE Analog Video RGB-BLUE	OA	-	-
B93	VGA_HSYNC	CRT_HSYNC Analog Video H-Sync	0-3,3	-	-
B94	VGA_VSYNC	CRT_VSYNC Analog Video V-Sync	0-3,3	-	-
B95	VGA_I2C_CLK	CRT_DDC_CLK Display Data Channel Clock	0-5	PU 6k8 5V (S0)	Reverse current blocked (diode)
B96	VGA_I2C_DAT	CRT_DDC_DATA Display Data Channel Data	I/0-5	PU 6k8 5V (S0)	Reverse current blocked (diode)
B97	TV_DAC_A	TV_COMP Composite CVBS	Nc	-	-
B98	TV_DAC_B	TV_Y TV Luminance Signal	Nc	-	-
B99	TV_DAC_C	TV_C TV Chrominance Signal	Nc	-	-
B100	GND	Power Ground	PWR	-	-
B101	VCC_12V	12V VCC	PWR	-	-
B102	VCC_12V	12V VCC	PWR	-	-
B103	VCC_12V	12V VCC	PWR	-	-
B104	VCC_12V	12V VCC	PWR	-	-
B105	VCC_12V	12V VCC	PWR	-	-
B106	VCC_12V	12V VCC	PWR	-	-
B107	VCC_12V	12V VCC	PWR	-	-
B108	VCC_12V	12V VCC	PWR	-	-
B109	VCC_12V	12V VCC	PWR	-	-
B110	GND	Power Ground	PWR	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

4.4 Connector X1B

Connector X1B (Signal Levels C1-C55)

Pin A1-A55

[LAN | Power | PCI | SATA | PCIe | AUDIO]

Pin	Signal	Description	Type	Termination	Comment
C1	GND	Power Ground	PWR	-	-
C2	IDE_D7	IDE_D7 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C3	IDE_D6	IDE_D6 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C4	IDE_D3	IDE_D3 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C5	IDE_D15	IDE_D15 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C6	IDE_D8	IDE_D8 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C7	IDE_D9	IDE_D9 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C8	IDE_D2	IDE_D2 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C9	IDE_D13	IDE_D13 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C10	IDE_D1	IDE_D1 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C11	GND	Power Ground	PWR	-	-
C12	IDE_D14	IDE_D14 IDE Data Bus	I/O-3,3	-	I is 5V tol.
C13	IDE_IORDY	IDE_IORDY IDE Ready	I-5T	PU 4k7 3,3V (S0)	int. PU 4k7 in SB600
C14	IDE_IOR#	IDE_IOR# IDE IO Read	O-3,3	-	-
C15	PCI_PME#	PCI_PME# PCI Power Management Event	I-3,3	PU 10k 3,3V (S5)	int. PU 10k in SB600
C16	PCI_GNT2#	PCI_GNT2# PCI Bus Grant 2	O-3,3	-	-
C17	PCI_REQ2#	PCI Bus Request 2	I-5T	PU 15k 3,3V (S0)	int. PU 15 in SB600
C18	PCI_GNT1#	PCI_GNT1# PCI Bus Grant 1	O-3,3	-	-
C19	PCI_REQ1#	PCI Bus Request 1	I-5T	PU 15k 3,3V (S0)	int. PU 15 in SB600
C20	PCI_GNT0#	PCI_GNT0# PCI Bus Grant 0	O-3,3	-	-
C21	GND	Power Ground	PWR	-	-
C22	PCI_REQ0#	PCI Bus Request 0	I-5T	PU 15k 3,3V (S0)	int. PU 15 in SB600
C23	PCI_RESET#	PCI_RESET_EXT# PCI Bus Reset	O-3,3	PD 8k25	-
C24	PCI_AD0	PCI_AD0 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C25	PCI_AD2	PCI_AD2 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C26	PCI_AD4	PCI_AD4 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C27	PCI_AD6	PCI_AD6 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C28	PCI_AD8	PCI_AD8 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C29	PCI_AD10	PCI_AD10 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C30	PCI_AD12	PCI_AD12 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C31	GND	Power Ground	PWR	-	-
C32	PCI_AD14	PCI_AD14 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C33	PCI_C/BE1#	PCI_C/BE1# PCI Bus Command and Byte enables 1	I/O-3,3	-	I is 5V tol.
C34	PCI_PERR#	PCI_PERR# PCI Bus Grant Error	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. PU 8k2 3,3V
C35	PCI_LOCK#	PCI_LOCK# PCI Bus Lock	I/O	PU 8k2 3,3V (S0)	I is 5V tol. PU 8k2 3,3V
C36	PCI_DEVSEL#	PCI_DEVSEL# PCI Bus Device Select	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. PU 8k2 3,3V
C37	PCI_IRDY#	PCI_IRDY# PCI Bus Initiator Ready	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. PU 8k2 3,3V
C38	PCI_C/BE2#	PCI_C/BE2# PCI Bus Command and Byte enables 2	I/O-3,3	-	I is 5V tol.
C39	PCI_AD17	PCI_AD17 PCI Address & Data Bus line	I/O-3,3	-	-
C40	PCI_AD19	PCI_AD19 PCI Address & Data Bus line	I/O-3,3	-	-
C41	GND	Power Ground	PWR	-	-
C42	PCI_AD21	PCI_AD21 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
C43	PCI_AD23	PCI_AD23 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in
C44	PCI_C/BE3#	PCI_C/BE3# PCI Bus Command and Byte enables 3	I/O-3,3	-	I is 5V tol.
C45	PCI_AD25	PCI_AD25 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in
C46	PCI_AD27	PCI_AD27 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in
C47	PCI_AD29	PCI_AD29 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in
C48	PCI_AD31	PCI_AD31 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in
C49	PCI_IRQA#	PCI_IRQA# PCI Bus Interrupt Request A	I-5T	PU 8k2 3,3V (S0)	-
C50	PCI_IRQB#	PCI_IRQB# PCI Bus Interrupt Request B	I-5T	PU 8k2 3,3V (S0)	-
C51	GND	Power Ground	PWR	-	-
C52	PEG_RX0+	PEG_RX0_P PCIexpress Graphics Receive + (0)	DP-I	-	-
C53	PEG_RX0-	PEG_RX0_N PCIexpress Graphics Receive - (0)	DP-I	-	-
C54	TYPE0#	n.c.	Nc	-	-
C55	PEG_RX1+	PEG_RX1_P PCIexpress Graphics Receive + (1)	DP-I	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1B (Signal Levels C56-C110)

Pin C56-C110

[Power | LVDS | PCIe]

Pin	Signal	Description	Type	Termination	Comment
C56	PEG_RX1-	PEG_RX1_N PCIexpress Graphics Recieve - (1)	DP-I	-	-
C57	TYPE1#	n.c.	nc	-	-
C58	PEG_RX2+	PEG_RX2_P PCIexpress Graphics Recieve + (2)	DP-I	-	-
C59	PEG_RX2-	PEG_RX2_N PCIexpress Graphics Recieve - (2)	DP-I	-	-
C60	GND	Power Ground	PWR	-	-
C61	PEG_RX3+	PEG_RX3_P PCIexpress Graphics Recieve + (3)	DP-I	-	-
C62	PEG_RX3-	PEG_RX3_N PCIexpress Graphics Recieve - (3)	DP-I	-	-
C63	RSVD	n.c.	nc	-	-
C64	RSVD	n.c.	nc	-	-
C65	PEG_RX4+	PEG_RX4_P PCIexpress Graphics Recieve + (4)	DP-I	-	-
C66	PEG_RX4-	PEG_RX4_N PCIexpress Graphics Recieve - (4)	DP-I	-	-
C67	RSVD	n.c.	nc	-	-
C68	PEG_RX5+	PEG_RX5_P PCIexpress Graphics Recieve + (5)	DP-I	-	-
C69	PEG_RX5-	PEG_RX5_N PCIexpress Graphics Recieve - (5)	DP-I	-	-
C70	GND	Power Ground	PWR	-	-
C71	PEG_RX6+	PEG_RX6_P PCIexpress Graphics Recieve + (6)	DP-I	-	-
C72	PEG_RX6-	PEG_RX6_N PCIexpress Graphics Recieve - (6)	DP-I	-	-
C73	SDVO_DATA	TMDS_DDC_DATA	I/O-3,3V	PU 39k 3,3V (S0)	-
C74	PEG_RX7+	PEG_RX7_P PCIexpress Graphics Recieve + (7)	DP-I	-	-
C75	PEG_RX7-	PEG_RX7_N PCIexpress Graphics Recieve - (7)	DP-I	-	-
C76	GND	Power Ground	PWR	-	-
C77	RSVD	n.c.	Nc	-	-
C78	PEG_RX8+	n.c.	Nc	-	-
C79	PEG_RX8-	n.c.	Nc	-	-
C80	GND	Power Ground	PWR	-	-
C81	PEG_RX9+	n.c.	Nc	-	-
C82	PEG_RX9-	n.c.	Nc	-	-
C83	RSVD	n.c.	Nc	-	-
C84	GND	Power Ground	PWR	-	-
C85	PEG_RX10+	n.c.	Nc	-	-
C86	PEG_RX10-	n.c.	Nc	-	-
C87	GND	Power Ground	PWR	-	-
C88	PEG_RX11+	n.c.	Nc	-	-
C89	PEG_RX11-	n.c.	Nc	-	-
C90	GND	Power Ground	PWR	-	-
C91	PEG_RX12+	n.c.	Nc	-	-
C92	PEG_RX12-	n.c.	Nc	-	-
C93	GND	Power Ground	PWR	-	-
C94	PEG_RX13+	n.c.	Nc	-	-
C95	PEG_RX13-	n.c.	Nc	-	-
C96	GND	Power Ground	PWR	-	-
C97	RSVD	n.c.	Nc	-	-
C98	PEG_RX14+	n.c.	Nc	-	-
C99	PEG_RX14-	n.c.	Nc	-	-
C100	GND	Power Ground	PWR	-	-
C101	PEG_RX15+	n.c.	Nc	-	-
C102	PEG_RX15-	n.c.	Nc	-	-
C103	GND	Power Ground	PWR	-	-
C104	VCC_12V	12V VCC	PWR	-	-
C105	VCC_12V	12V VCC	PWR	-	-
C106	VCC_12V	12V VCC	PWR	-	-
C107	VCC_12V	12V VCC	PWR	-	-
C108	VCC_12V	12V VCC	PWR	-	-
C109	VCC_12V	12V VCC	PWR	-	-
C110	GND	Power Ground	PWR	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1B (Signal Levels D1-D55)

Pin D1-D55

[IDE | Power | PCI | PCIe]

Pin	Signal	Description	Type	Termination	Comment
D1	GND	Power Ground	PWR	-	-
D2	IDE_D5	IDE_D5 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D3	IDE_D10	IDE_D10 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D4	IDE_D11	IDE_D11 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D5	IDE_D12	IDE_D12 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D6	IDE_D4	IDE_D4 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D7	IDE_D0	IDE_D0 IDE Data Bus	I/O-3,3	-	I is 5V tol.
D8	IDE_REQ	IDE_REQ IDE Data Bus	I/O-3,3	PU 5k6 3,3V (S0)	I is 5V tol. int. PU 5k6 in SB600
D9	IDE_IOW#	IDE_IOW# IDE IO Write	0-3,3	-	-
D10	IDE_ACK#	IDE_ACK# IDE DMA Acknowledge	0-3,3	-	-
D11	GND	Power Ground	PWR	-	-
D12	IDE_IRQ	IDE_IRQ IDE Interrupt Request	I-5T	PD 10k	int. PD 10k in SB600
D13	IDE_A0	IDE_A0 IDE Address Bus	0-3,3	-	-
D14	IDE_A1	IDE_A1 IDE Address Bus	0-3,3	-	-
D15	IDE_A2	IDE_A2 IDE Address Bus	0-3,3	-	-
D16	IDE_CS1#	IDE_CS1# IDE Chip Select Channel 0	0-3,3	-	-
D17	IDE_CS3#	IDE_CS3# IDE Chip Select Channel 1	0-3,3	-	-
D18	IDE_RESET#	IDE_RESET# IDE Hard Drive Reset	0-3,3	-	-
D19	PCI_GNT3#	PCI_GNT3# PCI Bus Grant 3	0-3,3	-	-
D20	PCI_REQ3#	PCI Bus Request 0	I-5T	PU 15k 3,3V (S0)	int. PU 15k in SB600
D21	GND	Power Ground	PWR	-	-
D22	PCI_AD1	PCI_AD1 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D23	PCI_AD3	PCI_AD3 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D24	PCI_AD5	PCI_AD5 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D25	PCI_AD7	PCI_AD7 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D26	PCI_C/BE0#	PCI_C/BE0# PCI Bus Command and Byte	I/O-3,3	-	I is 5V tol.
D27	PCI_AD9	PCI_AD9 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D28	PCI_AD11	PCI_AD11 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D29	PCI_AD13	PCI_AD13 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D30	PCI_AD15	PCI_AD15 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D31	GND	Power Ground	PWR	-	-
D32	PCI_PAR	PCI_PAR PCI Bus Parity	I/O-3,3	-	I is 5V tol.
D33	PCI_SERR#	PCI_SERR# PCI Bus System Error	I/OD-3,3	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D34	PCI_STOP#	PCI_STOP# PCI Bus Stop	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D35	PCI_TRDY#	PCI_TRDY# PCI Bus Target Ready	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D36	PCI_FRAME#	PCI_FRAME# PCI Bus Cycle Frame	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D37	PCI_AD16	PCI_AD16 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D38	PCI_AD18	PCI_AD18 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D39	PCI_AD20	PCI_AD20 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D40	PCI_AD22	PCI_AD22 PCI Address & Data Bus line	I/O-3,3	-	I is 5V tol.
D41	GND	Power Ground	PWR	-	-
D42	PCI_AD24	PCI_AD24 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in SB600
D43	PCI_AD26	PCI_AD26 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in SB600
D44	PCI_AD28	PCI_AD28 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in SB600
D45	PCI_AD30	PCI_AD30 PCI Address & Data Bus line	I/O-3,3	PU 15k 3,3V (S0)	I is 5V tol. int. PU 15k in SB600
D46	PCI_IRQC#	PCI_IRQC# PCI Bus Interrupt Request C	I-5T	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D47	PCI_IRQD#	PCI_IRQD# PCI Bus Interrupt Request D	I-5T	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D48	PCI_CLKRUN#	PCI_CLKRUN# PCI Clock Run	I/O-3,3	PU 8k2 3,3V (S0)	I is 5V tol. int. PU 8k2 in SB600
D49	PCI_M66EN	n.c.	Nc	-	-
D50	PCI_CLK	CLK_33M_PCI_EXT PCI Clock	0-3,3	-	-
D51	GND	Power Ground	PWR	-	-
D52	PEG_TX0+	PEG_TX0_(TMDS_TX2)_P PCIexpress Graphics	DP-0	-	-
D53	PEG_TX0-	PEG_TX0_(TMDS_TX2)_N PCIexpress Graphics	DP-0	-	-
D54	PEG_LANE_RV#	PEG_LANE_RV# PCIexpress Graphics Lane	I	PU 1k 3,3V (S5)	-
D55	PEG_TX1+	PEG_TX1_(TMDS_TX1)_P PCIexpress Graphics	DP-0	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

Connector X1B (Signal Levels D56-D110)

Pin D56-D110

[IDE | Power | PCIe | LVDS]

Pin	Signal	Description	Type	Termination	Comment
D56	PEG_TX1-	PEG_TX1_(TMDS_TX1)_N PCIe Express Graphics	DP-0	-	-
D57	TYPE2#	n.c.	Nc	-	-
D58	PEG_TX2+	PEG_TX2_(TMDS_TX0)_P PCIe Express Graphics	DP-0	-	-
D59	PEG_TX2-	PEG_TX2_(TMDS_TX0)_N PCIe Express Graphics	DP-0	-	-
D60	GND	Power Ground	PWR	-	-
D61	PEG_TX3+	PEG_TX3_(TMDS_TXC)_P PCIe Express Graphics	DP-0	-	-
D62	PEG_TX3-	PEG_TX3_(TMDS_TXC)_N PCIe Express Graphics	DP-0	-	-
D63	RSVD	n.c.	Nc	-	-
D64	RSVD	n.c.	Nc	-	-
D65	PEG_TX4+	PEG_TX4_(TMDS_TX5)_P PCIe Express	DP-0	-	-
D66	PEG_TX4-	PEG_TX4_(TMDS_TX5)_N PCIe Express	DP-0	-	-
D67	GND	Power Ground	PWR	-	-
D68	PEG_TX5+	PEG_TX5_(TMDS_TX4)_P PCIe Express	DP-0	-	-
D69	PEG_TX5-	PEG_TX5_(TMDS_TX4)_N PCIe Express	DP-0	-	-
D70	GND	Power Ground	PWR	-	-
D71	PEG_TX6+	PEG_TX6_(TMDS_TX3)_P PCIe Express	DP-0	-	-
D72	PEG_TX6-	PEG_TX6_(TMDS_TX3)_N PCIe Express	DP-0	-	-
D73	SDVO_CLK	TMDS_DDC_CLK	0-3,3	PU 39k 3,3V (S0)	-
D74	PEG_TX7+	PEG_TX7_P PCIe Express Graphics Transmit +	DP-0	-	-
D75	PEG_TX7-	PEG_TX7_N PCIe Express Graphics Transmit -	DP-0	-	-
D76	GND	Power Ground	PWR	-	-
D77	IDE_CBLID#	IDE_CBLID# IDE Primary ATA Detect	I-5T	PD 10k	-
D78	PEG_TX8+	n.c.	Nc	-	-
D79	PEG_TX8-	n.c.	Nc	-	-
D80	GND	Power Ground	PWR	-	-
D81	PEG_TX9+	n.c.	Nc	-	-
D82	PEG_TX9-	TMDS_HPD	I	-	-
D83	RSVD	n.c.	nc	-	-
D84	GND	Power Ground	PWR	-	-
D85	PEG_TX10+	n.c.	Nc	-	-
D86	PEG_TX10-	n.c.	Nc	-	-
D87	GND	Power Ground	PWR	-	-
D88	PEG_TX11+	n.c.	Nc	-	-
D89	PEG_TX11-	n.c.	Nc	-	-
D90	GND	Power Ground	PWR	-	-
D91	PEG_TX12+	n.c.	Nc	-	-
D92	PEG_TX12-	n.c.	Nc	-	-
D93	GND	Power Ground	PWR	-	-
D94	PEG_TX13+	n.c.	Nc	-	-
D95	PEG_TX13-	n.c.	Nc	-	-
D96	GND	Power Ground	PWR	-	-
D97	PEG_ENABLE#	PCI Express Graphics Enable	I-3,3	PU 10k 3,3V (S5)	-
D98	PEG_TX14+	n.c.	Nc	-	-
D99	PEG_TX14-	n.c.	Nc	-	-
D100	GND	Power Ground	PWR	-	-
D101	PEG_TX15+	n.c.	Nc	-	-
D102	PEG_TX15-	n.c.	Nc	-	-
D103	GND	Power Ground	PWR	-	-
D104	VCC_12V	12V VCC	PWR	-	-
D105	VCC_12V	12V VCC	PWR	-	-
D106	VCC_12V	12V VCC	PWR	-	-
D107	VCC_12V	12V VCC	PWR	-	-
D108	VCC_12V	12V VCC	PWR	-	-
D109	VCC_12V	12V VCC	PWR	-	-
D110	GND	Power Ground	PWR	-	-

Note: The termination resistors in this table are already mounted on the ETXexpress® board. Refer to the design guide for information about additional termination resistors.

4.5 Signal Description

4.5.1 PCIexpress x1 lanes

The PCI express x1 lanes is a fast connection interface for many different system devices, such as network controllers, I/O controllers or express card devices. The implementation of this subsystem complies with the ETXexpress® / COMexpress Specification. Implementation information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.2 USB

10 USB host controllers (EHCI high-speed 2.0 controller) are on the AMD® M690E north bridge device. The USB controllers comply with both versions 1.1 and 2.0 of the USB standard and are backward compatible. 8 USB ports are available on the COMexpress connector

Configuration

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

4.5.3 SATA

The AMD® SB600 south bridge device offers the possibility to connect 4 SATA Harddisks according SATA with 150 MB/s per channel or SATA II with 300 MB/s per channel in AHCI mode.

Configuration

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

4.5.4 Audio

The ETXexpress®-690 AC'97/HDA audio controller is integrated in the AMD® SB600 Southbridge.

Configuration

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

4.5.5 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"

4.5.6 VGA Output

The ETXexpress®-690 graphics subsystem is integrated in the AMD® M690E northbridge. It has the following features:

- Supports LVDS, CRT and DVI (shared with PEG)
- 2D graphics engine
- 3D graphics engine
- Video acceleration engine
- Bits/Pixels supported on LCD: 1x18 bit, 2x18 bit, 1x24 bit, 2x24 bit

Configuration

The graphics controller requires the following resources:

- An IRQ
- Several I/O addresses
- Memory-address blocks in high memory

The BIOS allocates the resources during AGP configuration. Many resources are set for compatibility with industry-standard settings.

4.5.7 LVDS Flat Panel Interface (JILI)

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

4.5.8 Digital Flat Panel Interface (JIDI)

The ETXexpress®-690 does not support the JUMPtect Intelligent Digital Interface (JIDI).

4.5.9 Ethernet

The Ethernet interface is based on the Intel® 82574L Gigabit Ethernet PCIexpress controller. This PCIexpress controller is a fully integrated 10/100/1000BASE-TX LAN solution.

The Ethernet interface requires an external transformer. See the ETXexpress® Design Guide for suggestions on transformer selection.

Configuration

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

Note: Implementation and limitation information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.10 Power Control

Power Good / Reset Input

The ETXexpress®-690 provides an external input for a power-good signal or a manual- reset pushbutton. The implementation of this subsystem complies with the ETXexpress® Specification. Implementation

information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.11 Power Management

ATX PS Control

The ETXexpress®-690 can control the main power output of an ATX-style power supply. The implementation of this subsystem complies with the ETXexpress® Specification. Implementation information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.12 Miscellaneous Circuits

Speaker

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

Battery

The implementation of the battery input complies with the ETXexpress® Specification. Implementation information is provided in the ETXexpress® 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 ETXexpress® 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 AMD® SB600 south bridge device. For more information about the SM bus, please see the System Management (SM) Bus section in the Appendix A: System Resources chapter.

LPC Bus

The Low Pin Count Interface signals are connected to the LPC Bus bridge, which is located in the AMD® SB600. The LPC low speed interface can be used for peripheral circuits such as an external Super I/O Controller, which typically combine legacy-device support into a single IC. The implementation of this subsystem complies with the ETXexpress® Specification. Implementation information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.13 PCIexpress Graphics

The PCI express Graphics interface allows the connection of high performance graphics chips on a high bandwidth interface. The ETXexpress®-690 module allows the connection of 8 PCIexpress lanes on this interface.

Implementation information is provided in the ETXexpress® Design Guide. Refer to the documentation for additional information.

4.5.14 PCI Bus

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

4.5.15 IDE Port

The IDE host adapter is capable of DMA-33/66/100/133 operation. The implementation of this subsystem complies with the ETXexpress® Specification. Implementation information is provided in the ETXexpress® 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 IDE host adapter are compatible with the PC/AT.

4.5.16 DVI Output

The ETXexpress®-690 Digital Visual Interface port is integrated in the AMD® M690E northbridge. It has the following features:

- Share it's pins with the PEG interface
- Single-link DVI: 1600x1200 @60Hz with pixel clock at 162 MHz and standard timings; 1920x1200 @60Hz with pixel clock at 154MHz and reduced blanking timings.
- Dual-link DVI: 2560x1600 @60Hz, with pixel clock at 268 MHz (DVI clock at 134 MHz).
- HDMI: 1080i, with pixel clock at 74MHz.

Configuration

The DVI output can be enabled by the BIOS setup. The menu can be found in:

Advanced -> Devices -> Display Configuration -> Boot Display Device

When set to DFP the DVI output is already available during boot.

5 Special Features

5.1 Watchdog Timer

This feature is implemented in the watchdog PIC 12C509A from Microchip®. 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 (Refer to Appendix F: JIDA Standard). 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:

- 0.4s
- 1s
- 5s
- 10s
- 30s
- 1:00 min
- 5:00 min
- 10:00 min

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

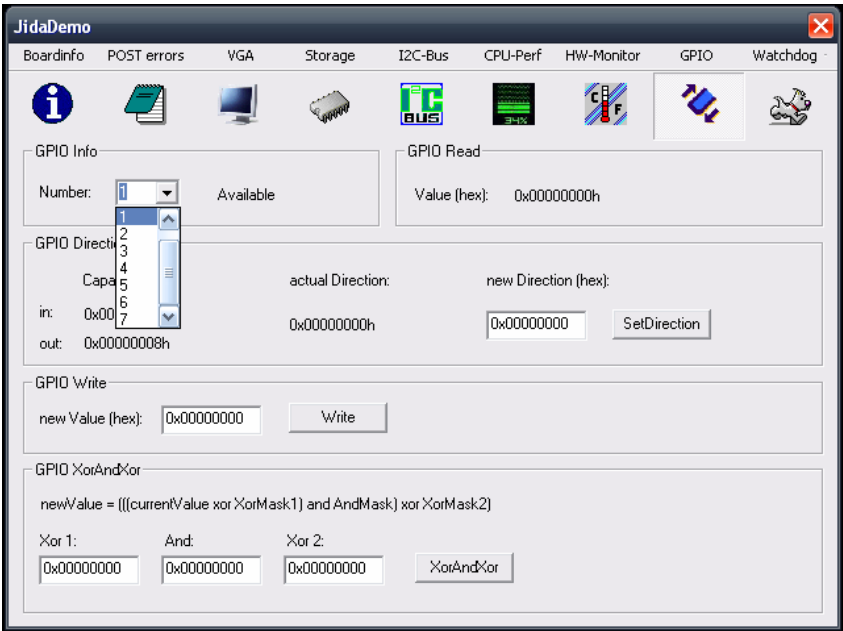
5.2 General Purpose Input and Output

ETXexpress®-690 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. Please refer to the JIDA32 manual in the driver download packet on our website.



6 Important Information

6.1 Cooling Solution

With introduction of higher frequency CPUs into the embedded market the need to design more efficient cooling solutions is now a necessity. These higher frequency CPUs generate much more heat, which must be removed from the application. One solution that has become more common in the embedded market is the use of heat pipes when designing a cooling solution. Kontron Embedded Modules has designed some cooling solutions that utilize heat pipes in order to perform some tests. Although Kontron Embedded Modules designed these cooling solutions strictly for test purposes, and not as a standard ETXexpress® cooling solution, the knowledge gained from these tests is being made available to customers in the form of an application note called PM_Thermal_Guidelines_E1xx.pdf. This application note should be used as a guideline to help evaluate potential thermal designs. It can be found on Kontron's web site at www.kontron.com in the Tech Support section.

6.2 Limitation

6.2.1 Express Card Support

There is currently no support for Express Card implemented

6.2.2 SDVO

The board does not support the SDVO interface, but offers as an alternative DVI shared with the PEG signals.

6.2.3 AC'97

AC'97 codec on ETXexpress Evaluation Board (Brownsville) is not supported due to driver incompatibility.

6.2.4 SATA hot plug

Hot plug functionality on SATA interface is not supported on ETXexpress®-690.

6.2.5 WOL from S3

Wake on LAN from ACPI state S3 is not supported on ETXexpress®-690.

6.2.6 USB data throughput

The USB data throughput might be significantly lower than on other Kontron products with chipsets from other vendors.

7 Design Considerations

7.1 Thermal Management

A heat-spreader plate assembly is available from Kontron Embedded Modules for the ETXexpress®-690. The heat-spreader plate on top of this assembly is NOT a heat sink. It works as an ETXexpress®-standard thermal interface to use with a heat sink or other cooling device.

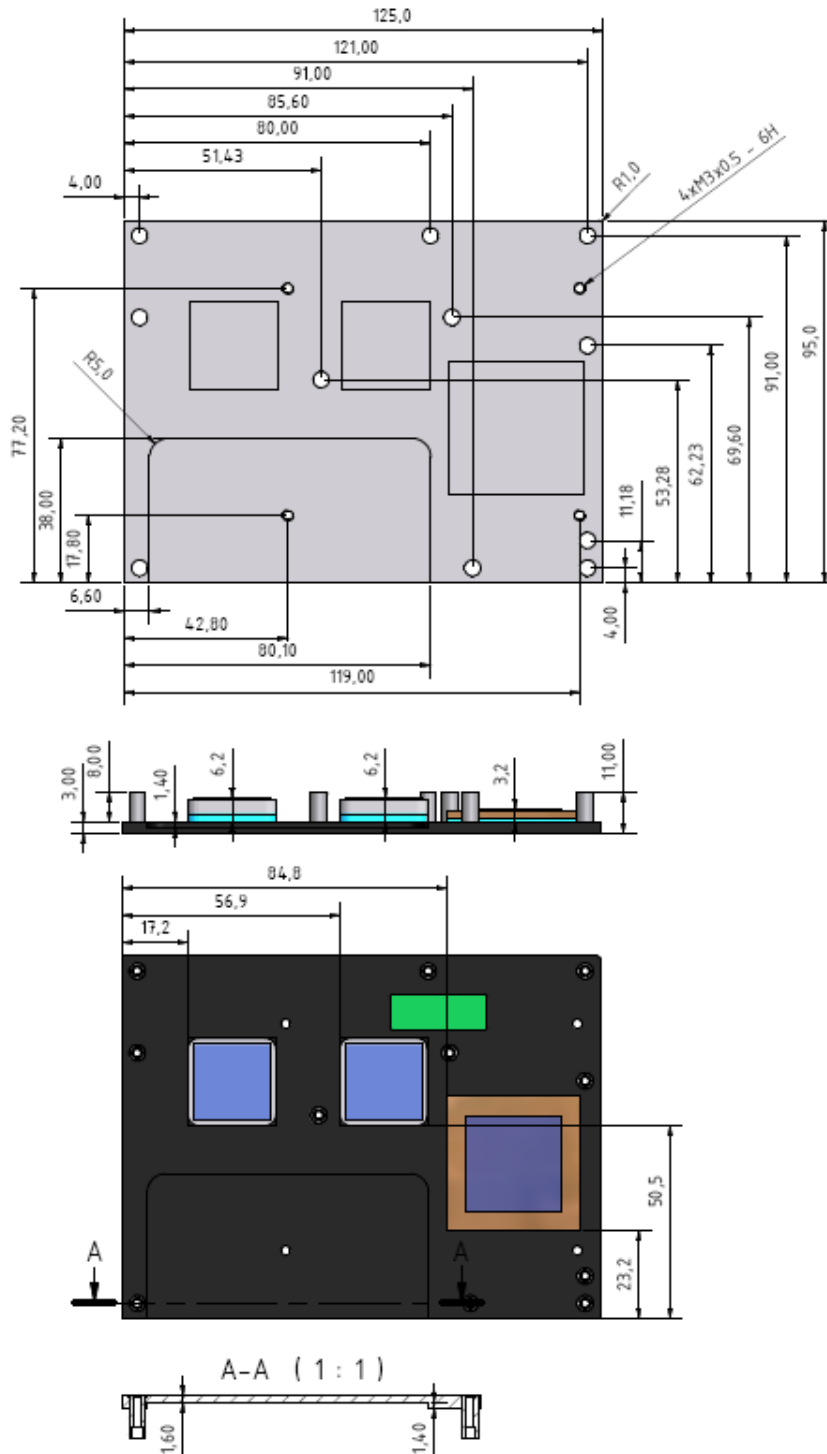
External cooling must be provided to maintain the heat-spreader plate at proper operating temperatures. Under worst-case conditions, the cooling mechanism must maintain an ambient air and heat-spreader plate temperature of 60° C or less.

The aluminum slugs and thermal pads on the underside of the heat-spreader assembly implement thermal interfaces between the heat spreader plate and the major heat-generating components on the ETXexpress®-690. About 80 percent of the power dissipated within the module is conducted to the heatspreader plate and can be removed by the cooling solution.

For 2100MHz modules, the heat dissipated into the plate ranges from 40 to 50 watts. Design a cooling solution to dissipate the heat load on a heat-spreader plate at a minimum of 50 watts to accommodate all ETXexpress®-690 modules.

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

7.2 Heatspreader Dimensions

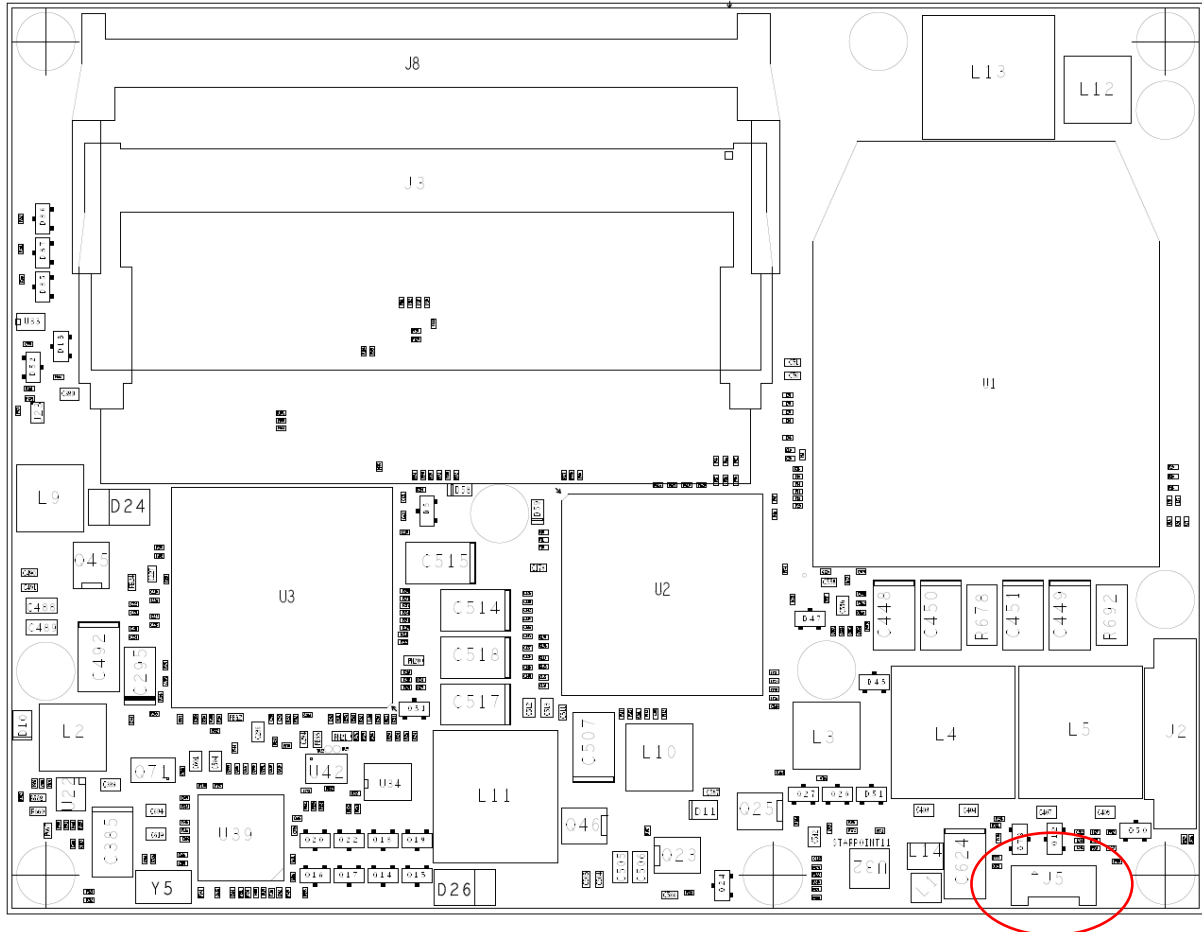


There are 2 articles available:

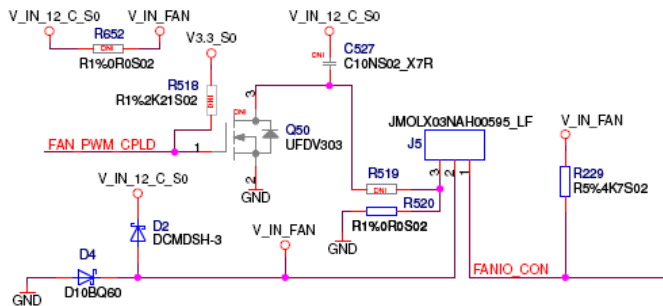
- 38007-0000-99-0 Heatspreader for ETXexpress®-690 with threaded holes for bottom mounting
- 38007-0000-99-1 with through hole bolts for top mounting

7.3 ETXexpress@-690 onboard fan connector

7.3.1 Location and pin-out of fan connector



The onboard fan connector (J5) can be found in the corner opposite of the memory socket and it is connected onboard according to following schematic:



7.3.2 BIOS settings for fan control

BIOS SETUP UTILITY		
Main	Advanced	PCIPnP
Boot	Security	HWMonitor
Exit		
HWMonitor H/W Health Function [Enabled] PWM 1 Mode Setting [Auto Fan Mode] PWM 1 Ramp Rate [37.5sec] Min PWM 1 Duty Cycle [130] Absolute Temperature 1 Set [075] Low Temperature 1 Limit [045] Temperature 1 Range [2 °C] Pulses/Rev [2] Fan Voltage [5V] CPU Temperature :39°C/102°F Internal Temperature :45°C/113°F Northbridge Temperature :48°C/118°F Fan1 Speed : N/A		
Enables Hardware Health Monitoring Device. ← Select Screen ↑↓ Select Item +− Change Option F1 General Help F10 Save and Exit ESC Exit		
v02.61 <C>Copyright 1985-2006, American Megatrends, Inc.		

Feature	Option	Description
H/W Health Function	Disabled Enabled	Install or change the Supervisor Password
PWM 1 Mode Setting	Auto Fan Mode Fan Always on Full Fan Disable Mode Fan Manually Mode	PWM Configuration Mode Setting
PWM 1 Ramp Rate	Timeslot 1 Timeslot 2 ... Timeslot 24 Timeslot 48	If enable, limits the amount of change in the PWM duty cycle over a specified period
Min PWM 1 Duty Cycle	[130]	Min 0; Max 255
Absolute Temperature 1 Set	[075]	0 – 127°C
Low Temperature 1 Limit	[045]	0 – 127°C
Temperature 1 Range	2 °C 2.5°C 3.33°C 4 °C ... 80°C	The range numbers will be used to calculate the slope of the PWM ramp up.
Pulses / Rev	[2]	1-4; describes the pulses per revolution of the connected fan
Fan Voltage	5V 12V	Select CPU Fan voltage. If you are uncertain, select 5V to prevent damage to fan and board

7.3.3 Electrical Characteristics

VCC_in_FANCON = VCC of board, limited to 12V

Imax = 0,40 A

Note: The VCC_in_FANCON output is not short circuit proof. If necessary the user has to ensure that the circuit is protected externally, for example by a fuse on the backplane.

8 System Ressources

8.1 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	Note (3)
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	IDE1	No	Note (1)

Note: 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 Advanced Configuration and Power Interface (ACPI) mode. Used as System Control Interrupt (SCI) in ACPI mode.

In APIC 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	PCI/LPT2	Yes	Note (2)
6	Floppy Drive Controller	No	Note (1)
7	LPT1	No	Note (1)
8	RTC	No	
9	SCI	No	System Control Interrupt (3)
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	IDE1	No	Note (1)
16	LNKA	For PCI	OHCI 1
17	LNKB	For PCI	OHCI 2, 4, Audio
18	LNKC	For PCI	OHCI 3, 5, Video
19	LNKD	For PCI	Onboard NIC, EHCI
20	LNKE	For PCI	PCI Slot 0
21	LNKF	For PCI	PCI Slot 1
22	LNKG	For PCI	PCI Slot 2 + SATA
23	LNKH	For PCI	PCI Slot 3

Note: 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 Winbond W83627, and the device is enabled in setup.

8.2 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	

8.3 Memory Area

Upper Memory	Used for	Available	Comment
C0000h – CFFFFh	VGA BIOS	No	Depends on size of video BIOS

D0000h – DFFFFh		Yes	
E0000h – FFFFFh	System BIOS	No	

8.4 I/O Address Map

The I/O-port addresses of the ETXexpress®-690 are functionally identical with a standard PC/AT.

The following I/O ports are used in addition:

I/O Address	Used for	Available	Comment
800h-87Fh	PM-I/O	No	
A00h-A01h	HW Monitor	No	
B00h-B0Fh	SMBUS	No	
C00h/C01h/C14h /C50h- C52h/C6Fh	Chipset	No	
CD0h-CD7h	PM-IO	No	
1000h >	PCI	No	I/O ports 1000h and above might be allocated by PCI devices or onboard hardware.

8.5 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

8.6 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
54h	Winbond on eval board	Not available when used with ETX-evalboard	1
90h	Winbond on eval board	Not available when used with ETX-evalboard	1
92h	Winbond on eval board	Not available when used with ETX-evalboard	1
A0h	SPD	SDRAM EEPROM	1
D2h	RAM Clock generator	Do not use under any circumstances.	1
DCh	Clock generator	Do not use under any circumstances.	1

Note: The standard ETXexpress®-690 Power management BIOS does support MARS (**M**obile **A**pplication platform for **R**echargeable **S**ystems).

8.7 JILI-I2C Bus

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

9 BIOS Operation

The module is equipped with AMI® BIOS, which is located in an onboard SPI serial flash memory. You can update the BIOS using a Flash utility.

9.1 Determining the BIOS Version

To determine the AMI® BIOS version, immediately press the Pause key on your keyboard as soon as you see the following text display in the upper left corner of your screen:

```
AMIBIOS © 2006 American Megatrends, Inc.
BIOS Date: 06/16/08 10:52:49 Ver: 08.00.14
Kontron® BIOS Version <C690RXXX>
© Copyright 2002-2008 Kontron Embedded Modules GmbH
```

9.2 Setup Guide

The AMIBIOS 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.

Note: Selecting incorrect values may cause system boot failure. Load setup default values to recover by pressing <F9>.

9.2.1 Start AMI® BIOS Setup Utility

To start the AMI® BIOS setup utility, press when the following string appears during bootup.

Press to enter Setup

The Info 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.
<F9>	Load the optimal default configuration values for this menu.
<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.

10 BIOS Setup Menus

10.1 Main Menu

BIOS SETUP UTILITY		
Main	Advanced	PCIPnP
System Overview AMIBIOS Version : 08.00.14 Build Date: 10/21/08 ID : C690A115 Processor AMD Turion(tm) 64 X2 Mobile Technology TL-52 Speed : 800MHz Count : 2 System Memory Size : 448MB System Time [01:40:13] System Date [Fri 09/05/2008]		
Use [ENTER], [TAB] or [SHIFT-TAB] to select a field. Use [+] or [-] to configure system Time. ← Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit		
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Feature	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

10.2 Advanced Menu

BIOS SETUP UTILITY		
Main	Advanced	PCIPnP
Advanced Settings WARNING: Setting wrong values in below sections may cause system to malfunction. ▶ CPU Configuration ▶ IDE Configuration ▶ Legacy Devices ▶ ACPI Configuration ▶ Event Log Configuration ▶ Devices ▶ Miscellaneous ▶ Watchdog ▶ MPS Configuration ▶ Smbios Configuration ▶ Remote Access Configuration		
Configure CPU. ← Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit		
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10.2.1 CPU Configuration Menu

BIOS SETUP UTILITY		
Advanced		
CPU Configuration Module Version: 13.14 AGESA Version: 02.08.11 Physical Count: 1 Logical Count : 2 AMD Turion(tm) 64 X2 Mobile Technology TL-52 Revision: F2 Cache L1: 256KB Cache L2: 1024KB Speed : 800MHz Current FSB Multiplier: 4x Maximum FSB Multiplier: 8x Able to Change Freq. : Yes uCode Patch Level : 0x62 GART Error Reporting [Disabled] Microcode Update [Enabled] Secure Virtual Machine Mode [Enabled] Runtime Legacy PSB [Enabled] ACPI 2.0 Objects [Enabled] Maximum Frequency During POST [Disabled]_		This option should remain disabled for the normal operation. The driver developer may enable it for testing purpose. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.		

Feature	Option	Description
GART Error Reporting	Disabled Enabled	This option should be remain disabled for normal operation. The driver developer may enable it for testing purpose.
Microcode Update	Disabled Enabled	Specify the number of sectors per block for multiple sector transfers
Secure Virtual Machine Mode	Disabled Enabled	Enable/Disable Secure Virtual machine Mode (SVM)
Runtime Legacy PSB	Disabled Enabled	Enable/Disable the generation of Power State Block for use of PowerNow™ driver in a single core system
ACPI 2.0 Objects	Disabled Enabled	Enable/Disable the generation of ACPI PPC, PSS and PCT objects
Maximum Frequency During POST	Disabled Enabled	If disabled, the CPU will be transitioned to its minimum P-state.

10.2.2 IDE Configuration Menu

BIOS SETUP UTILITY		
Advanced		
IDE Configuration OnBoard PCI IDE Controller [Primary] ▶ Primary IDE Master : [Not Detected] ▶ Primary IDE Slave : [Not Detected] ▶ Third IDE Master : [Hard Disk] ▶ Third IDE Slave : [Not Detected] ▶ Fourth IDE Master : [Not Detected] ▶ Fourth IDE Slave : [Not Detected] Hard Disk Write Protect [Disabled] IDE Detect Time Out (Sec) [35] ATA(PI) 80Pin Cable Detection [Host & Device] OnChip SATA Channel [Enabled] OnChip SATA Type [Native IDE]_		DISABLED: disables the integrated IDE Controller. PRIMARY: enables only the Primary IDE Controller. SECONDARY: enables only the Secondary IDE Controller. BOTH: enables both IDE Controllers. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
v02.61 <C>Copyright 1985-2006, American Megatrends, Inc.		

Feature	Option	Description
Onboard PCI IDE Controller	Primary Disabled	Disabled: Disables the integrated IDE controller; Primary: enables only the primary IDE controller
Hard Disk Write Protect	Disabled Enabled	Disable/Enabled device write protection. This will be effective only if device is accessed through BIOS (only IDE, no SATA)
IDE Detect Time Out (Sec)	0 ... 35	Select the time out value for detecting ATA/ATAPI device(s)
ATA(PI) 80Pin Cable Detection	Host & Device Host Device	Select the mechanism for detecting 80Pin ATA(PI) Cable.
OnChip SATA Channel	Disabled Enabled	Enable/Disable the onboard SATA controller
OnChip SATA Type	Native IDE RAID AHCI Legacy IDE IDE -> AHCI Other Storage	Selects

IDE Detection Menu

BIOS SETUP UTILITY	
Advanced	
Primary IDE Master Device : Not Detected Type [AUTO] LBA/Large Mode [AUTO] Block <Multi-Sector Transfer> [AUTO] PIO Mode [AUTO] DMA Mode [AUTO] S.M.A.R.T. [AUTO] 32Bit Data Transfer [Enabled]_	Select the type of device connected to the system. ← Select Screen ↑↓ Select Item +– Change Option F1 General Help F10 Save and Exit ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.	

Feature	Option	Description
Type	Not Installed Auto CD/DVD ARMD	Select the type of device connected to the system.
LBA/Large Mode	Disabled AUTO	Disable: Disables LBA Mode Auto: Enables LBA Mode if the device supports it and the device is not already formatted with LBA mode disabled
Block (Multi-Sector Transfer)	Disabled AUTO	Disabled: Data transfer is one sector / time Auto: Data transfer is multiple sector / time if the device supports it
PIO Mode	Auto 1 2 3 4	Selects PIO Mode
DMA Mode	Auto SWDMA MWDMA UDMA	Selects the DMA mode
S.M.A.R.T	Auto Disabled Enabled	Self-Monitoring, Analysis and Reporting Technology
32Bit Data Transfer	Disabled Enabled	Enable/Disable 32-bit Data Transfer

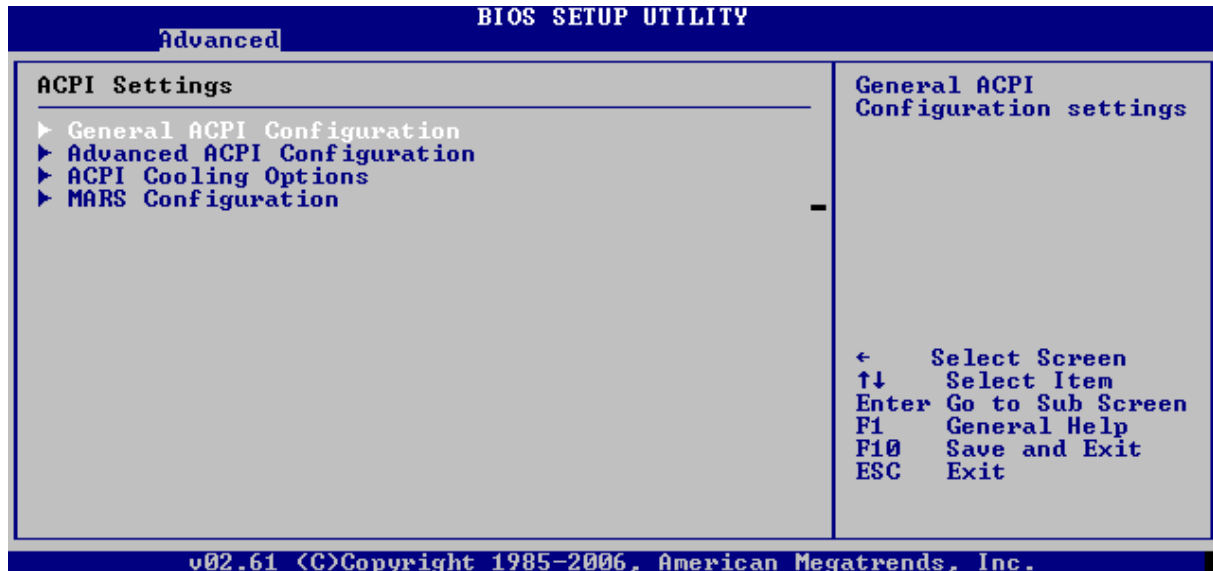
10.2.3 Legacy Devices Menu

This menu only appears when there is a LPC Winbond 83627 SuperI/O connected.

Advanced		BIOS SETUP UTILITY
Configure Win627 Super IO Chipset		Allows BIOS to Select Serial Port1 Base Addresses.
Serial Port1 Address	[3F8/IRQ4]	
Serial Port2 Address	[2F8/IRQ3]	
Parallel Port Address	[378]	
Parallel Port Mode	[SPP]	
Parallel Port IRQ	[IRQ7]	
		← Select Screen ↑↓ Select Item + - Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
Serial Port1 Address	Disabled 3F8/IRQ4 (2F8/IRQ3) 3E8/IRQ4 2E8/IRQ3	Allows to select serial port 1 base address and interrupt.
Serial Port2 Address	Disabled (3F8/IRQ4) 2F8/IRQ3 3E8/IRQ4 2E8/IRQ3	Allows to select serial port 2 base address and interrupt.
Parallel Port Address	Disabled 378 278 3BC	Allows BIOS to select parallel port base address
Parallel Port Mode	SPP Bi-Directional ECP EPP+SPP ECP+EPP	Allows BIOS to select parallel port mode
Parallel Port IRQ	IRQ5 IRQ7	Allows BIOS to select parallel port IRQ

10.2.4 ACPI Configuration Menu



General ACPI Configuration



Feature	Option	Description
Suspend mode	S1 (POS) S3 (STR) Auto	Selects the ACPI state used for System Suspend
Repost Video on S3 Resume	No Yes	Determines whether to invoke VGA BIOS post on S3/STR resume.
C1E Support	Disabled Enabled	Enable/Disable Enhanced C-States

Advanced ACPI Configuration

BIOS SETUP UTILITY		
Advanced		
Advanced ACPI Configuration		Enable RSDP pointers to 64-bit Fixed System Description Tables. Newer ACPI versions have some additional features. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
ACPI Version Features	[ACPI v1.0]	
ACPI APIC support	[Enabled]	
AMI OEMB table	[Enabled]	
Headless mode	[Disabled]	
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Feature	Option	Description
ACPI Version Features	ACPI v1.0 ACPI v2.0 ACPI v3.0	Selects the version of ACPI
ACPI APIC support	Enabled Disabled	Includes ACPI APIC table pointer to RSDT pointer list
AMI OEMB table	Enabled Disabled	Include OEMB table pointer to R(X)SDT pointer list
Headless mode	Disabled Enabled	Enable/Disable Headless operation mode through ACPI

ACPI Cooling Options

BIOS SETUP UTILITY		
Advanced		
ACPI Cooling Options		ACPI Active Trip Point - the point in which the OS will turn the CPU Fan on. Note: ACPI active cooling requires the Fan to be set to "Manual Mode" ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
Active Trip Point:	[45°C]	
Passive Trip Point:	[80°C]	
Passive TC1 Value:	[1]	
Passive TC2 Value:	[5]	
Passive TSP Value:	[6]	
Critical Trip Point:	[95°C]	
HTC temperature threshold	[94°C]	
HTC throttle value:	[25%]	
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Feature	Option	Description
Active Trip Point:	Disabled 40°C 45°C ...	The point in which the OS will turn the CPU Fan on. Note: ACPI active cooling requires the Fan to be set to "Manual Mode"

	110°C	
Passive Trip Point:	Disabled 40°C ... 80°C ... 110°C	This value controls the temperature of the ACPI Passive Trip Point – the point in which the OS will begin throttling the CPU
Passive TC1 Value:	1 ... 16	This value sets the TC1 value for the ACPI Passive Cooling Formula.
Passive TC2 Value:	1 ... 5 ... 16	This value sets the TC2 value for the ACPI Passive Cooling Formula
Passive TSP Value:	2 4 6 8 ... 30	Thermal Sample Period Value for the ACPI Passive Cooling Formula. It represents in seconds how often the OS will read the temperature when Passive Cooling is active.
Critical Trip Point:	40°C 45°C ... 95°C	ACPI Critical Trip Point – the point in which the OS will shut off the system
HTC temperature threshold	Disabled 54°C 60°C 64°C ... 90°C 94°C	Configure AMD Hardware Temperature Control. Automatically the CPU with the given value if the selected temperature has been reached. Should be between passive and critical temperature.
HTC throttle value:	Minimum 25% 50% 75%	Select the percentage the CPU clock is on the if HTC is active.

MARS Configuration

Advanced

BIOS SETUP UTILITY

MARS

[Disabled]

MARS <Mobile Application platform for Rechargeable Systems> Configuration

← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit

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Feature	Option	Description
MARS	Disabled Enabled	Disable/Enable the MARS reference system support

10.2.5 Event Log Configuration Menu

Advanced

BIOS SETUP UTILITY

Event Logging details

View Event Log
Mark all events as read
Clear Event Log

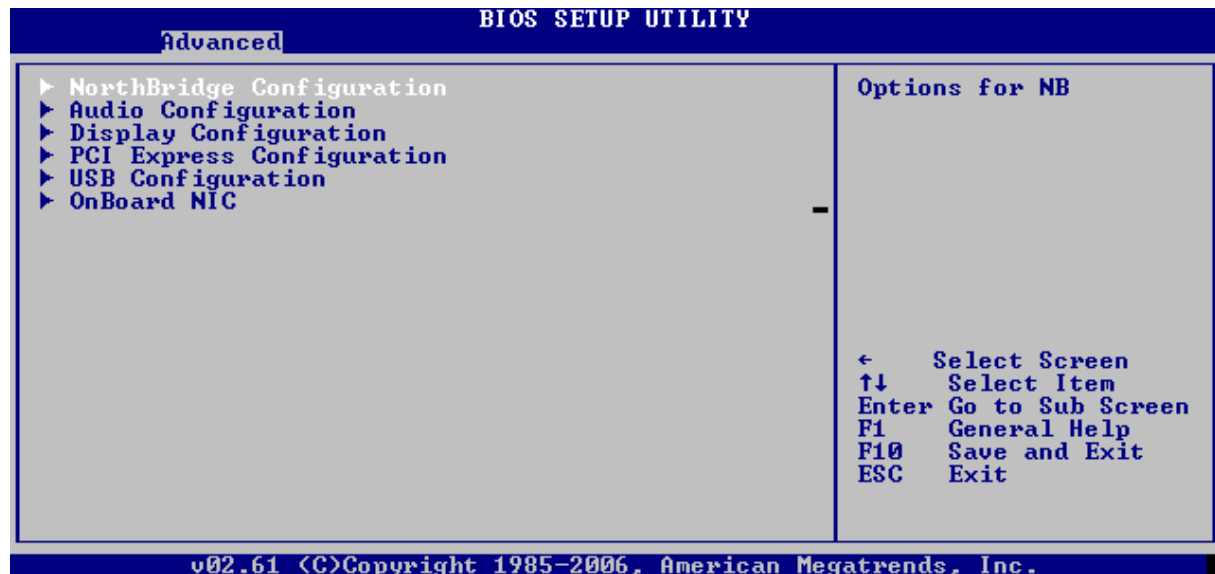
View all unread events on the Event Log.

← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit

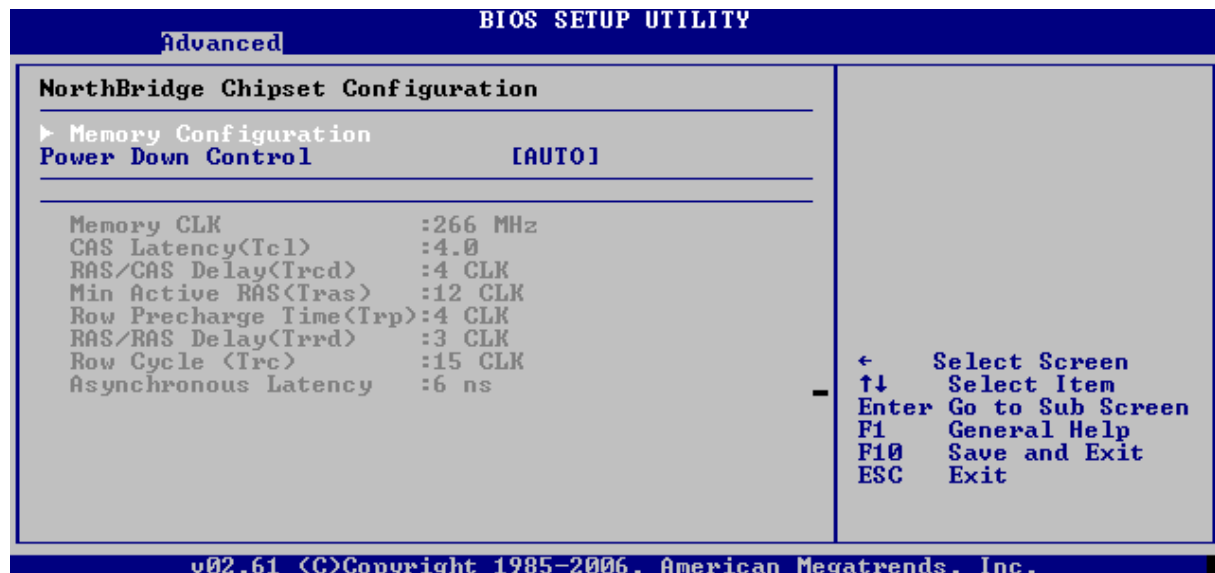
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Feature	Option	Description
View Event Log		View all unread events on the Event Log
Mark all events as read		Mark all unread event as read
Clear Event Log		Discard all events in the Event Log

10.2.6 Devices Menu



Northbridge Configuration Menu



Feature	Option	Description
Power Down Control	AUTO Disabled	Allow DIMMs to enter power down mode by deasserting the clock enable signal when DIMMs are not in use

Memory Configuration

BIOS SETUP UTILITY		
Advanced		
Memory Configuration Memclock Mode [AUTO] MCT Timing Mode [AUTO] Bank Interleaving [AUTO] Enable Clock to All DIMMs [Disabled] MemClk Tristate C3/AltVID [Disabled] DQS Signal Training Control [Enabled] Memory Hole Remapping [Enabled]_		Select the DRAM Frequency programming method. If Auto, the DRAM speed will be based on SPDs. If Limit, the DRAM speed will not exceed the specified value. If Manual, the the DRAM s specified will be programmed regardless ← Select Screen ↑↓ Select Item +− Change Option F1 General Help F10 Save and Exit ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.		
Feature	Option	Description
Memclock Mode	AUTO Limit Manual	Select the DRAM Frequency programming method. If Auto, the DRAM speed will be based on SPDs. If Limit, the DRAM speed will not exceed the specified value. If Manual, the DRAM speed specified will be programmed regardless
MCT Timing Mode	AUTO Manual	If Auto, the SPD timings will be used if Manual, Latency and other timings can be changed manually. WARNING: Changing values to no supported ones might lead to a not booting board.
Bank Interleaving	AUTO Disabled	Enable Bank Memory Interleaving. If AUTO the memory will be checked if it executes 64 or 128 bits mode.
Enable Clock to All DIMMs	Disabled Enabled	Enable Unused Clocks to DIMMs even in Memory Slots not being populated
MemClk Tristate C3/ALTVID	Disabled Enabled	Enable/Disable MemClk Tri-Stating during C3 and Alt VID
DQS Signal Training Control	Disabled Enabled	Turning this off will require custom memory timings programming. Training will be automatically disabled if CS Sparings is enabled
Memory Hole Remapping	Disabled Enabled	Enabled Memory Remapping Around Memory Hole

Audio Configuration Menu

Onchip Audio Configuration		
Advanced		
Southbridge Audio Configuration		Options
HD Audio Azalia Device	[AUTO]	AUTO
HD Onboard PIN Config	[Enabled]	Disabled
Azalia Front Panel	[AUTO]	Enabled
SDIN0 Pin Config	[Azalia]	
SDIN1 Pin Config	[Azalia]	
SDIN2 Pin Config	[Azalia]	
SDIN3 Pin Config	[Azalia]	
AC97 Audio Device	[AUTO]	
MC97 Modem Device	[AUTO]	
Northbridge Audio Configuration		
NB HD Audio Configuration	[Disabled]	
		← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
HD Audio Azalia Device	AUTO Disabled Enabled	Controls the general Azalia Device Enumeration
HD Onboard PIN Config	Enabled Disabled	
Azalia Front Panel	AUTO Disabled	
SDIN0 Pin Config	Azalia AC97 GPIO	Controls the SDIN0 Pin Configuration
SDIN1 Pin Config	Azalia AC97 GPIO	Controls the SDIN1 Pin Configuration
SDIN2 Pin Config	Azalia AC97 GPIO	Controls the SDIN2 Pin Configuration
SDIN3 Pin Config	Azalia AC97 GPIO	Controls the SDIN3 Pin Configuration
AC97 Audio Device	AUTO Disabled	Enables automatically (AUTO) or disables AC97 Audio Devices
AC97 Modem Device	AUTO Disabled	Enables automatically (AUTO) or disables AC97 MODEM Devices
NB HD Audio Configuration	Disabled Enabled	

Display Configuration Menu

Advanced Display Configuration		
Display Configuration		Options
Internal Graphics Mode	[UMA]	Disabled
UMA Frame Buffer Size	[AUTO]	UMA
Current UMA Size	[64MB]	
Graphics Clock Mode	[Sync]	
GFX Engine Clock	[400]	
Surround View	[Disabled]	
Primary Video Controller	[PCIe/IGFX/PCI]	
Boot Display Device	[AUTO]	
Flat Panel Type	[AUTO]	
Local Flat Panel Scaling	[Stretched]	
Backlight Brightness	[128]	
TMDS Support	[AUTO]	
Video BIOS: 010.055.000.048.026056.014		
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Feature	Option	Description
Internal Graphics Mode	UMA Disabled	Disables or Enables Internal Graphics Mode
UMA Frame Buffer Size	AUTO 32MB 64MB 128MB 256MB 512MB 1024MB	Set Size for UMA Frame Buffer
Graphics Clock Mode	SYNC Async	
GFX Engine Clock	[400]	Enter Value between 200 and 500
Primary Video Controller	PCIe/IGFX/PCI PCI/PCIe/IGFX IGFX/PCIe/PCI	Enter order of primary Video Controller initialization. PCIe: PCIexpress, PCI: PCI, IGFX internal graphic engine
Boot Display Device	AUTO LCD Only CRT Only DFP Only CRT and LCD LCD and DFP CRT and DFP CRT Force(Auto)	Controls the Boot Display Option; LCD: LVDS interface CRT: CRT interface DFP: DVI interface
Flat Panel Type	AUTO VGA 640x480 1x18 SVGA 800x600 1x18 XGA 1024x768 1x18 XGA 1024x768 1x24 SXGA 1280x1024 2x18 SXGA 1280x1024 2x24 UXGA 1600x1200 2x18 UXGA 1600x1200 2x24 SXGA 1280x1024 2x24 LDI PAID FPID	Selects the resolution on the LVDS interface

Local Flat Panel Scaling	Stretched Centered	
Backlight Brightness	[128]	Controls the Backlight Brightness, Please enter value from 0 to 255
TMDS Support	AUTO Enabled Disabled	Change the enumeration on the DFP (DVI interface)

PCI Express Configuration Menu

Advanced PCI Express Configuration		
PCI Express Configuration		Options
PCIE GFX0 Link Width	[AUTO]	AUTO
PCIE GFX Overclocking	[Disabled]	x1
NB-SB PCIE Link ASPM	[Disabled]	x2
GFX PCIE Link ASPM	[Disabled]	x4
GPP PCIE Link ASPM	[Disabled]	x8
GFX0 Slot Power Limit, W	[75]	
GPP Slots Power Limit, W	[25]	
		← Select Screen
		↑↓ Select Item
		+− Change Option
		F1 General Help
		F10 Save and Exit
		ESC Exit
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Feature	Option	Description
PCIE GFX0 Link Width	AUTO	Selects the Link Width on the PEG interface
	X1	
	X2	
	X4	
	X8	
PCIE GFX Overclocking	Disabled	
	Enabled	
NB_SB PCIE Link ASPM	Disabled	
	L0	
	L1	
	L0 & L1	
GFX PCIE Link ASPM	Disabled	
	L0	
	L1	
	L0 & L1	
GPP PCIE Link ASPM	Disabled	
	L0	
	L1	
	L0 & L1	
GFX0 Slot Power Limit, W	[75]	0-255
GPP Slots Power Limit, W	[25]	0-255

USB Configuration Menu

BIOS SETUP UTILITY	
Advanced	
USB Configuration Module Version - 2.24.3-13.4 USB Devices Enabled : 1 Keyboard, 1 Drive USB 1.1 OHCI Controllers [Enabled] USB 2.0 EHCI Controller [Enabled] Legacy USB Support [Enabled] Port 64/60 Emulation [Enabled] USB 2.0 Controller Mode [FullSpeed] BIOS EHCI Hand-Off [Enabled] ► USB Mass Storage Device Configuration	Options Disabled Enabled ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
USB 1.1 OHCI Controllers	AUTO	Selects the Link Width on the PEG interface
	X1	
	X2	
	X4	
	X8	
USB 2.0 EHCI Controller	Disabled	
	Enabled	
Legacy USB Support	Disabled	
	L0	
	L1	
	L0 & L1	
Port 64/60 Emulation	Disabled	
	L0	
	L1	
	L0 & L1	
USB 2.0 Controller Mode	Disabled	
	L0	
	L1	
	L0 & L1	
BIOS EHCI Hand-Off	[75]	0-255
GPP Slots Power Limit, W	[25]	0-255

USB Mass Storage Device Configuration

BIOS SETUP UTILITY		
Advanced		
USB Mass Storage Device Configuration USB Mass Storage Reset Delay [20 Sec] Device #1 STF Flash Drive Emulation Type [Auto]_		Number of seconds POST waits for the USB mass storage device after start unit command. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
USB Mass Storage Reset Delay	10 Sec	Number of seconds POST waits for the USB mass storage device after start unit command
	20 Sec	
	30 Sec	
	40 Sec	
Emulation Type	Auto	If Auto, USB devices less than 530MB will be emulated as Floppy and remaining as hard drive. Forced FDD option can be used to force a HDD formatted drive to boot as FDD.
	Floppy	
	Forced FDD	
	Had Disk	
	CDROM	

OnBoard NIC Menu

Onboard LAN device configuration		
Advanced		
Onboard LAN device configuration OnBoard NIC [Enable] Onboard NIC OPRM [Disabled]_		Options Enable Disabled ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
OnBoard NIC	Enable Disable	Enable/Disable the onboard Network Interface Card (LAN)
Onboard NIC OPRM	Enable Disable	Enable/Disable the onboard LAN option ROM to allow LAN boot functions.

10.2.7 Miscellaneous Menu

Advanced

BIOS SETUP UTILITY

Miscellaneous settings

After AC Power loss
Standby Voltage
Spread Spectrum

[Power on]
[Auto]
[ALL Clk]

Select behaviour after AC power loss:

Stay off
Power on
Last state

← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit

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Feature	Option	Description
After AC Power loss	Power on Stay off Last state	Select behavior after AC power loss
Standby Voltage	AUTO 5V Standby	Select which voltage is used for standby power. AUTO: Try 12V first, fallback to 5V
Spread Spectrum	Disabled SRC Clk CPUHT Clk All Clk	

10.2.8 Watchdog Menu

Advanced

BIOS SETUP UTILITY

Configure Watchdog Parameters

Mode

[Disabled]

Options

Disabled
Reset
NMI

← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit

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Feature	Option	Description
Mode	Disabled Reset NMI	Enables/Disables the watchdog function
Delay	Disabled 1s 5s ... 30:00 min	Selects the time when the watchdog counter starts
Timeout	0.4s 1s 5s 10s ... 10:00m	Selects the time in which the watchdog must be triggered

10.2.9 MPS Configuration

BIOS SETUP UTILITY		
Advanced		
MPS Configuration MPS Revision [1.4]		Select MPS Revision. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.		
Feature	Option	Description
MPS Revision	1.1 1.4	Selects the MPS Revision

10.2.10 Smbios Configuration

Smbios Configuration Screen	
Advanced	
Smbios Configuration	
Smbios SMI Support	[Enabled]
SMBIOS SMI Wrapper support for PnP Func 50h-54h	
← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit	
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Feature	Option	Description
Smbios SMI support	Disabled Enabled	Disable/Enable Smbios SMI support

10.2.11 Remote Access Configuration

BIOS SETUP UTILITY	
Advanced	
Configure Remote Access type and parameters	
Remote Access	[Disabled]
Disabled Enabled	
← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit	
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Feature	Option	Description
Remote Access	Disabled Enabled	Enables/Disables the Remote Access Function

10.3 PCIPnP Menu

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	HWMonitor	Exit
Advanced PCI/PnP Settings WARNING: Setting wrong values in below sections may cause system to malfunction.			Clear NURAM during System Boot.			
Clear NURAM [No] Plug & Play O/S [No] PCI Latency Timer [64] Allocate IRQ to PCI UGA [Yes] Palette Snooping [Disabled] PCI IDE BusMaster [Enabled] OffBoard PCI IDE Card [AUTO]			← Select Screen ↑↓ Select Item +− Change Option F1 General Help F10 Save and Exit ESC Exit			
IRQ3 [Available] IRQ4 [Available] IRQ5 [Available] IRQ7 [Available] IRQ9 [Available] IRQ10 [Available] IRQ11 [Available] IRQ14 [Available] IRQ15 [Available]						
DMA Channel 0 [Available] DMA Channel 1 [Available] DMA Channel 3 [Available] DMA Channel 5 [Available] DMA Channel 6 [Available] DMA Channel 7 [Available]						
Reserved Memory Size [Disabled]						
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Feature	Option	Description
Clear NVRAM	No Yes	Clear NVRAM during System Boot
Plug & Play O/S	No Yes	No: BIOS configures all periphery Yes: OS configures PnP devices
PCI Latency Timer	32 64 ... 248	Value in units of PCI clocks for PCI device latency timer register
Allocate IRQ to PCI VGA	No Yes	YES: Assigns IRQ to PCI VGA card if card requires IRQ NO: No IRQ will be assigned
Palette Snooping	Disabled Enabled	If enabled informs PCI devices if an ISA graphics device is installed
PCI IDE BusMaster	Disabled Enabled	If enabled: BIOS uses PCI busmastering for reading / writing to IDE drives
OffBoard PCI IDE Card	AUTO PCI Slot1 ... PCI Slot6	Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card. AUTO: Works for most of PCI IDE cards
IRQ3	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ4	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ5	Available	Available: IRQ is available for PnP devices

	Reserved	Reserved: IRQ is reserved for use by Legacy devices
IRQ7	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ9	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ10	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ11	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ14	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
IRQ15	Available Reserved	Available: IRQ is available for PnP devices Reserved: IRQ is reserved for use by Legacy devices
DMA Channel 0	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
DMA Channel 1	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
DMA Channel 3	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
DMA Channel 5	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
DMA Channel 6	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
DMA Channel 7	Available Reserved	Available: DMA channel is available for PnP devices Reserved: DMA channel is reserved for use by Legacy devices
Reserved Memory Size	Disabled 16k 32k 64k	Size of memory block to reserve for legacy ISA devices

10.4 Boot Menu

BIOS SETUP UTILITY		
Main	Advanced	PCIPnP
Boot	Security	HWMonitor
Exit		
Boot Settings ► Boot Settings Configuration 1st Boot Device [USB:STF Flash Driv] 2nd Boot Device [SATA:3M-HDS728080P] 3rd Boot Device [SCSI Card]		Configure Settings during System Boot. ← Select Screen ↑↓ Select Item Enter Go to Sub Screen F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
1 st Boot Device	One available Boot Device Next Boot Device ... Disabled	Specifies the boot sequence from the available devices
2 nd Boot Device	One available Boot Device Next Boot Device ... Disabled	No: BIOS configures all periphery Yes: OS configures P&P devices

10.4.1 Boot Setting Configuration Menu

BIOS SETUP UTILITY		
	Boot	
Boot Settings Configuration Quick Boot [Enabled] Quiet Boot [Disabled] AddOn ROM Display Mode [Force BIOS] Bootup Num-Lock [ON] PS/2 Mouse Support [AUTO] Wait For 'F1' If Error [Enabled] Hit 'DEL' Message Display [Enabled] Interrupt 19 Capture [Disabled]		Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system. ← Select Screen ↑↓ Select Item +− Change Option F1 General Help F10 Save and Exit ESC Exit
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Feature	Option	Description
Quick Boot	Enabled Disabled	Allow BIOS to skip certain tests while booting. This increases the time during boot
Quiet Boot	Disabled	Disabled: Displays normal POST messages

	Enabled	Enabled: Displays OEM Logo
AddOn ROM Display Mode	Force BIOS Keep Current	Set display mode for Option ROM
Bootup Num-Lock	ON Off	Select Power-on state for Numlock
PS/2 Mouse Support	AUTO Disabled Enabled	Selects support for PS/2 mouse
Wait for “F1” If Error	Enabled Disabled	Wait for F1 key to be pressed if error occurs.
Hit “Del” Message Display	Enabled Disabled	Displays “Press DEL to run Setup” in POST
Interrupt 19 Capture	Disabled Enabled	Enabled: Allows option ROMs to trap interrupt 19

10.5 Security Menu

BIOS SETUP UTILITY							
Main	Advanced	PCIPnP	Boot	<u>S</u> ecurity	HwMonitor	Exit	
Security Settings						Install or Change the password.	
Supervisor Password :Not Installed							
User Password :Not Installed							
Change Supervisor Password							
Change User Password							
Boot Sector Virus Protection [Disabled]							
						← Select Screen ↑↓ Select Item Enter Change F1 General Help F10 Save and Exit ESC Exit	
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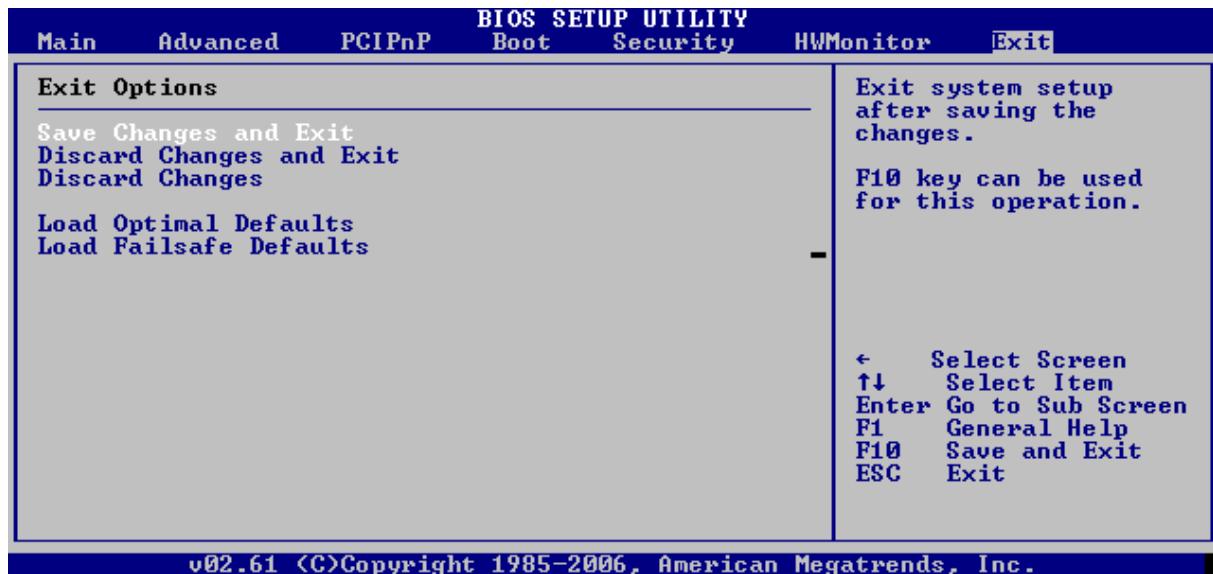
Feature	Option	Description
Change Supervisor Password		Install or change the Supervisor Password
Change User Password		Install or change the User Password
Boot Sector Virus Protection	Disabled Enabled	Enable/Disable Boot Sector Virus Protection

10.6 HWMonitor Menu

BIOS SETUP UTILITY		
Main	Advanced	PCIPnP
Boot	Security	HWMonitor
Exit		
HWMonitor H/W Health Function [Enabled] PWM 1 Mode Setting [Auto Fan Mode] PWM 1 Ramp Rate [37.5sec] Min PWM 1 Duty Cycle [130] Absolute Temperature 1 Set [075] Low Temperature 1 Limit [045] Temperature 1 Range [2 °C] Pulses/Rev [2] Fan Voltage [5V] CPU Temperature :39°C/102°F Internal Temperature :45°C/113°F Northbridge Temperature :48°C/118°F Fan1 Speed : N/A		
Enables Hardware Health Monitoring Device. ← Select Screen ↑↓ Select Item +- Change Option F1 General Help F10 Save and Exit ESC Exit		
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Feature	Option	Description
H/W Health Function	Disabled Enabled	Install or change the Supervisor Password
PWM 1 Mode Setting	Auto Fan Mode Fan Always on Full Fan Disable Mode Fan Manually Mode	PWM Configuration Mode Setting
PWM 1 Ramp Rate	Timeslot 1 Timeslot 2 ... Timeslot 24 Timeslot 48	If enable, limits the amount of change in the PWM duty cycle over a specified period
Min PWM 1 Duty Cycle	[130]	Min 0; Max 255
Absolute Temperature 1 Set	[075]	0 – 127°C
Low Temperature 1 Limit	[045]	0 – 127°C
Temperature 1 Range	2 °C 2.5°C 3.33°C 4 °C ... 80°C	The range numbers will be used to calculate the slope of the PWM ramp up.
Pulses / Rev	[2]	1-4; describes the pulses per revolution of the connected fan
Fan Voltage	5V 12V	Select CPU Fan voltage. If you are uncertain, select 5V to prevent damage to fan and board

10.7 Exit Menu



Feature	Option	Description
Save Changes and Exit		Exit system setup after saving the changes. "F10" can be used for this operation.
Discard Changes and Exit		Exit system without saving any changes. "ESC" can be used for this operation.
Discard Changes		Discards changes done so far. "F7" can be used for this operation.
Load Optimal Defaults		Load Optimal Default values for all setup questions. "F9" key can be used for this operation.
Load Failsafe Defaults		Load Failsafe Default values for all setup questions. "F8" key can be used for this operation.

11 Appendix A: JIDA Standard

Every board with an on-board BIOS extension supports the following function calls, which supply information about the board. Jumptec Intelligent Device Architecture (JIDA) functions are called via Interrupt 15h. Functions include:

- AH=Eah
- AL=function number
- DX=4648h (security word)
- CL=board number (starting with 1)

The interrupt returns a CL $\neq$ 0 if a board with the number specified in CL does not exist. CL will equal 0 if the board number exists. In this case, the content of DX determines if the operation was successful. DX=6B6Fh indicates success; other values indicate an error.

11.1 JIDA Information

To obtain information about boards that follow the JIDA standard, use the following procedure.

- Call Get BIOS ID with CL=1. The name of the first device installed will be returned. If you see the result Board exists (CL=0), increment CL, and call Get BIOS ID again.
- Repeat until you see Board not present (CL $\neq$ 0). You now know the names of all boards within your system that follow the JIDA standard.
- You can find out more information about a specific board by calling the appropriate inquiry function with the board's number in CL.

Note: Association between board and board number may change because of configuration changes. Do not rely on any association between board and board number. Always use the procedure described above to determine the association between board and board number.

Refer to the JIDA manual in the jidai1xx.zip folder, which is available from the Kontron Embedded Modules GmbH Web site, for further information on implementing and using JIDA calls with C sample code.

12 Appendix B: Architecture Information

The following sources of information can help you better understand PC architecture.

12.1 Buses

12.1.1 ISA, Standard PS/2 – Connectors

- AT Bus Design: Eight and Sixteen-Bit ISA, E-ISA and EISA Design, Edward Solari, Annabooks, 1990, ISBN 0-929392-08-6
- AT IBM Technical Reference Vol 1&2, 1985
- ISA & EISA Theory and Operation, Edward Solari, Annabooks, 1992, ISBN 0929392159
- ISA Bus Specifications and Application Notes, Jan. 30, 1990, Intel
- ISA System Architecture, Third Edition, Tom Shanley and Don Anderson, Addison-Wesley Publishing Company, 1995, ISBN 0-201-40996-8
- Personal Computer Bus Standard P996, Draft D2.00, Jan. 18, 1990, IEEE Inc
- Technical Reference Guide, Extended Industry Standard Architecture Expansion Bus, Compaq 1989

12.1.2 PCI/104

- Embedded PC 104 Consortium
- The consortium provides information about PC/104 and PC/104-Plus technology. You can search for information about the consortium on the Web.
- PCI SIG
- The PCI-SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI-SIG. You can search for information about the SIG on the Web.
- PCI & PCI-X Hardware and Software Architecture & Design, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- PCI System Architecture, Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

12.2 General PC Architecture

- Embedded PCs, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)
- Hardware Bible, Winn L. Rosch, SAMS, 1997, 0-672-30954-8
- Interfacing to the IBM Personal Computer, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9

- The PC Handbook: For Engineers, Programmers, and Other Serious PC Users, Sixth Edition, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

12.3 Ports

12.3.1 RS-232 Serial

- EIA-232-E standard
- The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer. You can search for information about the standard on the Web.
- RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3
- National Semiconductor
The Interface Data Book includes application notes. Type "232" as search criteria to obtain a list of application notes. You can search for information about the data book on National Semiconductor's Web site.

12.3.2 Serial ATA

- Serial AT Attachment (ATA) Working Group. This X3T10 standard defines an integrated bus interface between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system. You can search for information about the working group on the Web. We recommend you also search the Web for information on 4.2 I/O cable, if you use hard disks in a DMA3 or PIO4 mode.

12.3.3 USB

- USB Specification.
- USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. You can search for information about the standard on the Web.

12.4 Programming

- C Programmer's Guide to Serial Communications, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0
- Programmer's Guide to the EGA, VGA, and Super VGA Cards, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4

- The Programmer's PC Sourcebook, Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X
- Undocumented PC, A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas, Frank van GILLuwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

13 Appendix C: Document Revision History

Revision	Date	Edited by	Changes
0.2_pre	30.06.08	UMA	Created preliminary manual.
110	22.10.08	UMA	Changed chapter 1.6, added power consumption, added BIOS chapter, added resource list, added info for watchdog timer, updated limitations, added onboard fan description,
111	10.12.08	UMA	Removed TVout