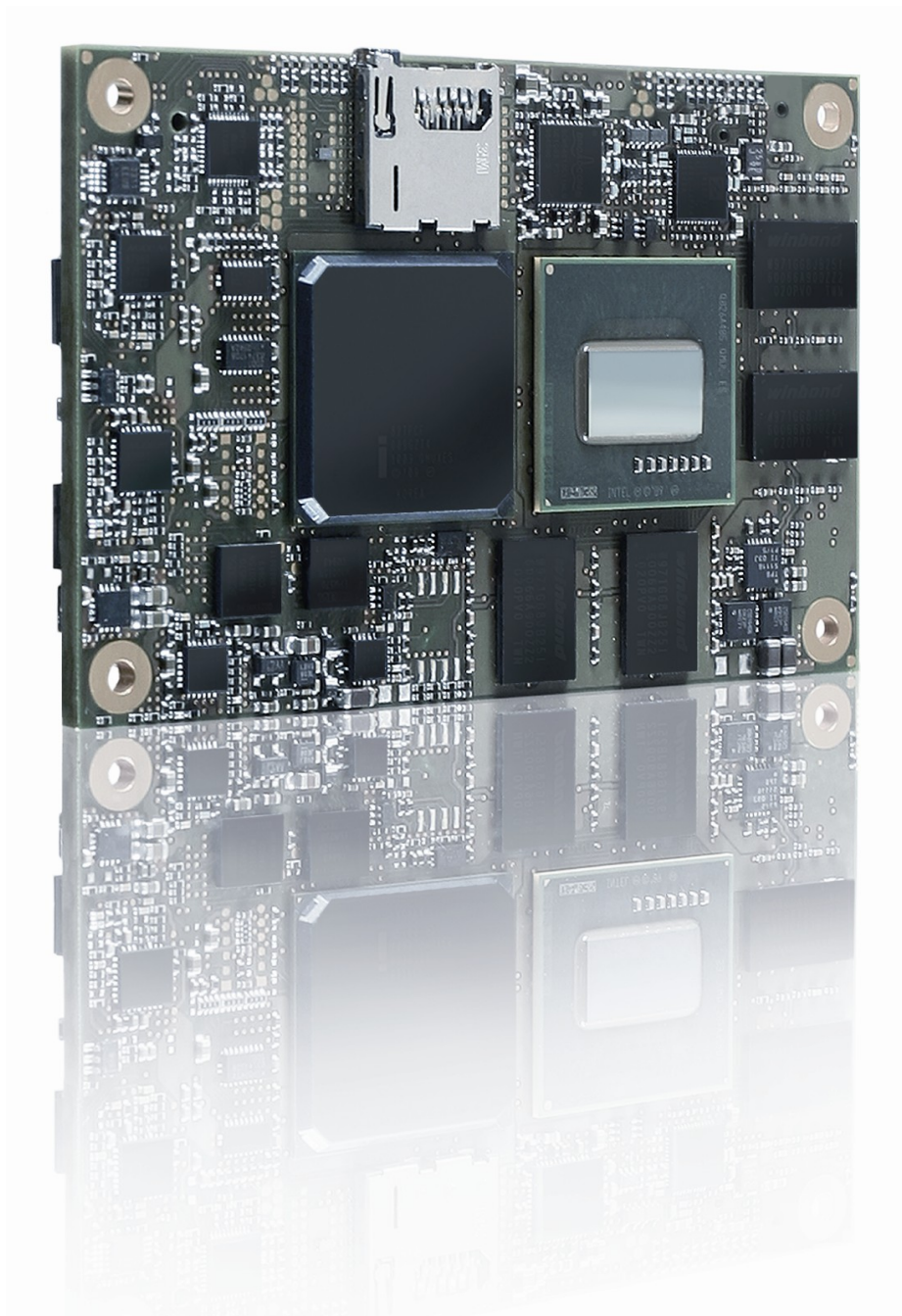


» Kontron User's Guide «



nanoETXexpress-TT

Document Revision 0.04

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1 User Information

1.1 About This Document

This document provides information about products from Kontron Embedded Modules GmbH and/or its subsidiaries. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within is supplied "as-is" and is subject to change without notice.

For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

1.2 Copyright Notice

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1.3 Trademarks

The following lists the trademarks of components used in this board.

- » IBM, XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corp.
- » Microsoft is a registered trademark of Microsoft Corp.
- » Intel is a registered trademark of Intel Corp.
- » All other products and trademarks mentioned in this manual are trademarks of their respective owners.

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. Consult our customer section <http://emdcustomersection.kontron.com> for the latest BIOS downloads, Product Change Notifications and additional tools and software. In any case you can always contact your board supplier for technical support.

2 Introduction

2.1 Product Description

The nanoETXexpress COM family gains 4 new members broadening the scalability from 600MHz to 1.6GHz and throughout the industrial-grade temperature range. The COM Express™ module in the ultra format (55mm x 84 mm) featuring an Intel® Atom™ processor E6XX and is designed according to the new PICMG COM Express™ COM.0 R.2.0 pin-out Type 10 specification. The nanoETXexpress-TT family is the first in this form factor designed with industrial-grade components that are fully functional even at the extended temperature range (E2) from -40 to +85°C. With its memory onboard, a robust micro-SD Card socket or optional a SATA Flash memory it is ideal for use in harsh environments and thus complements the existing portfolio perfectly.

2.2 Naming clarification

COM Express® defines a Computer-On-Module, or COM, with all components necessary for a bootable host computer, packaged as a super component. Interfaces will provide a smooth transition path from legacy parallel interfaces to LVDS (Low Voltage Differential Signaling) interfaces. These include the PCI bus and parallel ATA as well as PCI Express and Serial ATA.

- » ETXexpress® modules are Kontron's COM Express® modules in basic form factor (125mm x 95mm)
- » microETXexpress® modules are Kontron's COM Express® modules in compact form factor (95mm x 95mm)
- » nanoETXexpress modules are Kontron's COM Express® modules in ultra form factor (55mm x 84mm)

2.3 Understanding COM Express® Functionality

All Kontron microETXexpress® and 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. On nanoETXexpress® modules only the primary connector Row A and Row B is used.

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 (Azalia)
- » LPC (low pin count) Bus
- » PCIexpress

2.4 COM Express® Documentation

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

- » The COM Express® Specification defines the COM Express® module form factor, pinout, and signals. This document is available from the PICMG website by filling out the order form.
- » The COM Express® Design Guide by PICMG serves as a general guide for baseboard design, with a focus on maximum flexibility to accommodate a wide range of COM Express® modules.



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

2.5 COM Express® Benefits

COM Express® modules are very compact, highly integrated computers. All Kontron COM Express® modules, like nanoETXexpress, microETXexpress® and ETXexpress®, feature a standardized form factor and a standardized connector layout that carry a specified set of signals. Each COM is based on the COM Express® specification. This standardization allows designers to create a single-system baseboard that can accept present and future COM Express® modules.

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

- » Graphics
- » USB ports
- » Ethernet
- » Sound
- » 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 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®, microETXexpress® and nanoETXexpress 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 a COM Express® solution also ensures against obsolescence as computer technology evolves. A properly designed COM Express® baseboard can work with several successive generations of COM Express® modules.

A COM Express® 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 Product Specification

3.1 Modules & Accessories

The COM Express® ultra sized Computer-on-Module nanoETXexpress-TT (NTC1) follows pin-out Type 10 and is compatible to PICMG specification COM.0 Rev 2.0. The nanoETXexpress-TT, based on Intel's Queens Bay platform, is available in different variants to cover the demand of different performance, price and power:

Industrial grade modules (-40°C to 85°C operating), nanoETXexpress-TTi

Product Number	Product Name	Processor	PCH and Features
34003-1040-16-1	nETXe-TTi E680T 1GB/4GB	Intel® Atom™ E680T	EG20T, 3xPCIe, 1GB DDR2, 4GB SATA SSD
34003-1040-13-1	nETXe-TTi E660T 1GB/4GB	Intel® Atom™ E660T	EG20T, 3xPCIe, 1GB DDR2, 4GB SATA SSD
34003-1040-10-1	nETXe-TTi E640T 1GB/4GB	Intel® Atom™ E640T	EG20T, 3xPCIe, 1GB DDR2, 4GB SATA SSD
34003-1000-16-1	nETXe-TTi E680T 1GB/mSD	Intel® Atom™ E680T	EG20T, 3xPCIe, 1GB DDR2, microSD socket
34003-1000-13-1	nETXe-TTi E660T 1GB/mSD	Intel® Atom™ E660T	EG20T, 3xPCIe, 1GB DDR2, microSD socket
34003-5100-13-1	nETXe-TTi E660T 512MB/mSD	Intel® Atom™ E660T	EG20T, 3xPCIe, 512MB DDR2, microSD socket
34003-5100-10-1	nETXe-TTi E640T 512MB/mSD	Intel® Atom™ E640T	EG20T, 3xPCIe, 512MB DDR2, microSD socket
34003-5100-06-1	nETXe-TTi E620T 512MB/mSD	Intel® Atom™ E620T	EG20T, 3xPCIe, 512MB DDR2, microSD socket

Commercial grade modules (0°C to 60°C operating), nanoETXexpress-TTc

Product Number	Product Name	Processor	PCH and Features
34004-1000-16-1	nETXe-TTc E680 1GB/mSD	Intel® Atom™ E680	EG20, 3xPCIe, 1GB DDR2, microSD socket
34004-5100-13-1	nETXe-TTc E660 512MB/mSD	Intel® Atom™ E660	EG20, 3xPCIe, 512MB DDR2, microSD socket
34004-5100-10-1	nETXe-TTc E640 512MB/mSD	Intel® Atom™ E640	EG20, 3xPCIe, 512MB DDR2, microSD socket
34004-5100-06-1	nETXe-TTc E620 512MB/mSD	Intel® Atom™ E620	EG20, 3xPCIe, 512MB DDR2, microSD socket

Possible memory and onboard Flash configurations 3400x-MMFF-xx-x:

- » MM = 51: 512MB DDR2 Memory (4 x 1Gb chips on bottom)
- » MM = 10: 1024MB DDR2 Memory (8 x 1Gb chips)
- » MM = 20: 2048MB DDR2 Memory (8 x 2Gb chips)
- » FF = 00: microSD Card onboard
- » FF = 20: 2GB onboard SATA SSD
- » FF = 40: 4GB onboard SATA SSD
- » FF = 80: 8GB onboard SATA SSD



Please contact your local sales for customized Memory/Flash combinations

Accessories

Product Number	Product Name
34101-0000-00-1	nanoETXexpress Evaluation Board Type 1 + Type 10
34100-0000-00-0 / S	nanoETXexpress-HMI Baseboard / Starterkit
34003-0000-99-0	nanoETXexpress-TT, Heatspreader, threaded
34003-0000-99-1	nanoETXexpress-TT, Heatspreader, through hole
34003-0000-99-2	nanoETXexpress-TT, Heatspreader, Slim Profile
34003-0000-99-0C01	nanoETXexpress-TT, Heatsink, passiv, threaded
96007-0000-00-1	ADA-LVDS-DVI 24bit (LVDS to DVI converter)
38019-0000-00-1	adapter nanoExpr connector (Stack adapter)

3.2 Functional Specification

Processor

The Intel® ATOM™ (Tunnel Creek) CPU family supports:

- » Intel® Hyper-Threading Technology
- » Intel® Virtualization Technology (VT-x)
- » Idle States
- » Enhanced Intel SpeedStep® Technology
- » Thermal Monitoring Technologies
- » Execute Disable Bit

CPU specifications

Processor	Cores / Threads	CPU Clock	L2 Cache	VT-x	HTT	EIST	Max TDP
Intel® Atom™ E620T/E620	1 / 2	600MHz	512KB	Yes	Yes	Yes	3.3W
Intel® Atom™ E640T/E640	1 / 2	1000MHz	512KB	Yes	Yes	Yes	3.3W
Intel® Atom™ E660T/E660	1 / 2	1300MHz	512KB	Yes	Yes	Yes	3.3W
Intel® Atom™ E680T/E680	1 / 2	1600MHz	512KB	Yes	Yes	Yes	4.5W

Memory

Sockets	memory down
Memory Type	DDR2-800
Maximum Size	up to 2GB
Technology	Single Channel (32bit)

Graphics Core

The integrated Intel® GMA 600 supports:

Graphics Core Render Clock	400MHz (E680/E660 CPU) / 320MHz (E640/E620 CPU)
Execution Units / Pixel Pipelines	4
Max Graphics Memory	tbd
GFX Memory Bandwidth (GB/s)	4.2
GFX Memory Technology	DVMT
API (DirectX/OpenGL)	9.0L / 2.1
Shader Model	3.0
Hardware accelerated Video	H.264,MPEG2/4,VC1,WMV9, DivX
Independent/Simultaneous Displays	2
Display Port	-
HDCP support	-
SDVO available via	DDI1

Monitor output

CRT max Resolution	-
TV out:	-

LVDS

LVDS Bits/Pixel	1x18 and 1x24
LVDS Bits/Pixel with dithering	-
LVDS max Resolution:	WXGA (1280x768, 80MHz)
PWM Backlight Control:	YES

Display Interfaces

Discrete Graphics	-
Digital Display Interface DDI1	SDVOB
Digital Display Interface DDI2	-
Digital Display Interface DDI3	-

PCH: EG20T (industrial Temp) / EG20 (commercial Temp)

The 90nm Intel Platform Controller Hub Topcliff supports:

- » PCI Express Revision 1.0
- » USB 2.0
- » USB Client
- » SDIO 2.0
- » SATA 3Gb/s

Storage

onboard SSD	2, 4, 8GB onboard SATA SSD
SD Card support	1x SD 2.0 shared with GPIO 1x onboard microSD-Card socket option
IDE Interface	-
Serial-ATA	2 x SATA 3Gb/s
SATA AHCI	AHCI 1.1 with NCQ and Port Multiplier
SATA RAID	-



When the optional SATA onboard drive is used only 1 SATA interface (SATA 0) is available

Connectivity

USB	6x USB 2.0
USB Client	1 x USB Client (COM #7)
PCI	-
PCI External Masters	-
PCI Express	3x PCIe x1
Max PCI Express	4x PCIe x1 without Topcliff
PCI Express x2/x4 configuration	-
Ethernet	10/100/1000 Mbit
Ethernet controller	Broadcom BCM54610

Ethernet

The Broadcom BCM54610 ethernet supports:

- » Jumbo packets up to 10KB
- » WOL (Wake On LAN)
- » PXE (Preboot eXecution Environment)

Misc Interfaces and Features

Audio	HD Audio
Onboard Hardware Monitor	WINBOND W83L771W or optional LM87
Trusted Platform Module	Infineon TPM 1.2 SLB9635TT optional
Miscellaneous	2 x UART / 1x CAN optional



Baseboards with AC'97 codec only are not supported.

Kontron Features

External I2C Bus	Fast I2C, MultiMaster capable
M.A.R.S. support	YES
Embedded API	PICMG EAPI / JIDA32
JIDA32 Applications / K-Station	without BIOS modification
Custom BIOS Settings / Flash Backup	YES
Watchdog support	Dual Staged

Additional features

- » All solid capacitors (POSCAP). No tantalum capacitors used.
- » Optimized RTC Battery monitoring to secure highest longevity
- » Real fast I2C with transfer rates up to 40kB/s.
- » Discharge logic on all onboard voltages for highest reliability

Power Features

Singly Supply Support	YES
Supply Voltage	4.75 - 14V
ACPI	ACPI 3.0
S-States	S0, S3, S4, S5
S5 Eco Mode	YES
Graphic States	-
Misc Power Management	DPST 3.2

Power Consumption and Performance

Full Load Power Consumption	5.8 - 6.3W
Kontron Performance Index	1118 - 1343
Kontron Performance/Watt	194 - 214



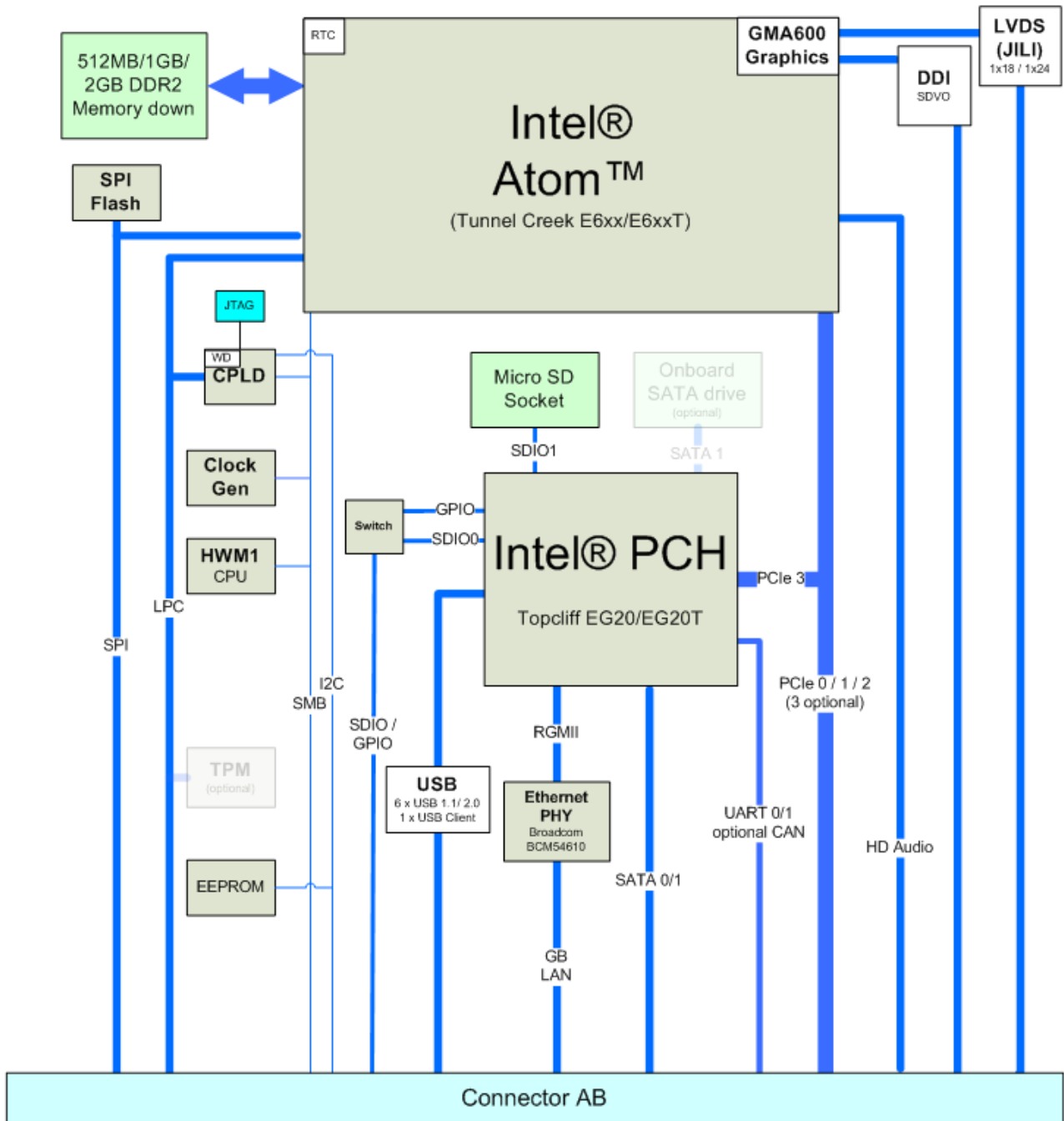
Detailed Power Consumption measurements in all states and bechmarks for CPU, Graphics and Memory performance are available in Application Note [KEMAP054](#) at [EMD Customer Section](#).

Supported Operating Systems

The nanoETXexpress-TT currently supports:

- » Microsoft Windows XP x86
- » Microsoft Windows 7 x86
- » Microsoft Windows Embedded Standard 7 (WES7)
- » Microsoft Windows embedded CE (CE 6.0)
- » Linux
- » WindRiver VxWorks

3.3 Block Diagram



3.4 Electrical Specification

3.4.1 Supply Voltage

Following supply voltage is specified at the COM Express® connector for commercial grade and industrial grade modules:

nominal Voltage:	4.75 - 14V
5V_Stb:	5V DC +/- 5%

Following supply voltage is specified at the COM Express® connector for extended temperature modules:

nominal Voltage:	12V DC +/- 5%
5V_Stb:	5V DC +/- 5%



5V Standby voltage is not mandatory for operation

3.4.2 Power Supply Rise Time

- » The input voltages shall rise from $\leq 10\%$ of nominal to within the regulation ranges within 0.1ms to 20ms.
- » There must be a smooth and continuous ramp of each DC input voltage from 10% to 90% of its final set-point following the ATX specification

3.4.3 Supply Voltage Ripple

- » Maximum 100 mV peak to peak 0 – 20 MHz

3.4.4 Power Consumption

The maximum Power Consumption of the different nanoETXexpress-TT modules is 5.8 - 6.3W (100% CPU load; 90°C CPU temperature). Further details with measurements and TDP values of the single variants can be found in our [customer section](#). Information there is available after registration.

3.5 Environmental Specification

3.5.1 Temperature

General Specification	Operating	Non-operating
Commercial grade	0 °C to +60 °C	-30 °C to +85 °C
Extended (E1)	-25 °C to +75 °C	-30 °C to +85 °C
Industrial grade (E2)	-40 °C to +85 °C	-40 °C to +85 °C



See available module variants in chapter Product Specification

With Kontron Embedded Modules GmbH heatspreader plate assembly

The operating temperature defines two requirements:

- » the maximum ambient temperature with ambient being the air surrounding the module.
- » the maximum measurable temperature on any spot on the heatspreader's surface

Without Kontron Embedded Modules GmbH heatspreader plate assembly

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

3.5.2 Humidity

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

3.6 Standards and Certifications

RoHS

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



CE marking

The **nanoETXexpress-TT** is CE marked according to Low Voltage Directive 2006/95/EC – Test standard EN60950



Component Recognition UL 60950-1

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

UL Listings:

» [NWGQ2.E304278](#)

» [NWGQ8.E304278](#)



WEEE Directive

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

Conformal Coating

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

Shock & Vibration

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

- » IEC/EN 60068-2-6 (Non operating Vibration, sinusoidal, 10Hz-4000Hz, +/-0.15mm, 2g)
- » IEC/EN 60068-2-27 (Non operating Shock Test, half-sinusoidal, 11ms, 15g)

EMC

Validated in Kontron reference housing for EMC the **nanoETXexpress-IT** follows the requirements for electromagnetic compatibility standards

- » EN55022

3.7 MTBF

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

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

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

System MTBF (hours): tbd



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.

3.8 Mechanical Specification

3.8.1 Module Dimension

» 55mm x 84mm ($\pm 0.2\text{mm}$)

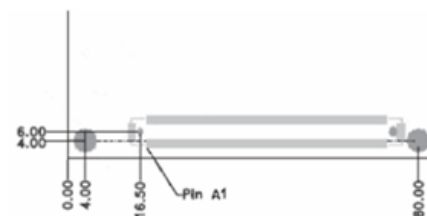
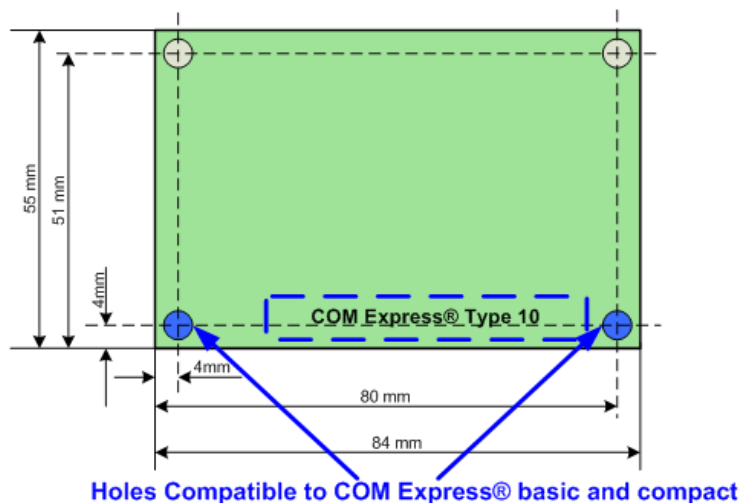
3.8.2 Height on Top

- » Maximum approx. 3.5mm (withouth printed circuit board)
- » Height is depending on (optional) CPU cooler / heat spreader

3.8.3 Height on Bottom

» Maximum approx. 3.5mm (without printed circuit board)

3.8.4 Mechanical Drawing



All dimensions are shown in millimeters. Tolerances should be $\pm 0.25\text{mm}$ [$\pm 0.010''$], unless otherwise noted. The tolerances on the module connector locating peg holes (dimensions [16.50, 6.00]) should be $\pm 0.10\text{mm}$ [$\pm 0.004''$]. The 220 pin module connector shall be mounted on the backside of the PCB and is seen "through" the board in this view. The 4 mounting holes shown in the drawing should use 6mm diameter pads and should have 2.7mm plated holes, for use with 2.5mm hardware. The pads should be tied to the PCB ground plane.



A complete Solid Works eDrawing package is or will be soon available at Kontron's [EMD Customer Section](#)

3.9 Thermal Management

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

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

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

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

3.10 Heatspreader

Documentation and CAD drawings of nanoETXexpress-TT heatspreader and cooling solutions is provided at <http://emdcustomersection.kontron.com>.

4 Features and Interfaces

4.1 S5 Eco Mode

Kontron's new high-efficient power-off state S5 Eco enables lowest power-consumption in soft-off state – less than 1 mA compared to the regular S5 state this means a reduction by at least factor 200!

In the „normal“ S5 mode the board is supplied by 5V_Stb and needs usually up to 300mA just to stay off. This mode allows to be switched on by power button, RTC event and WakeOnLan, even when it is not necessary. The new S5 Eco mode reduces the current tremendously.

The S5 Eco Mode can be enabled in BIOS Setup, when the BIOS supports this feature.

Following prerequisites and consequences occur when S5 Eco Mode is enabled

- » The power button must be pressed at least for 200ms to switch on.
- » Wake via Powerbutton only.
- » „Power On After Power Fail“/„State after G3“: only „stay off“ is possible

4.2 Power Control

Power Supply

The nanoETXexpress-TT has a wide range power input from 4.75 - 14V. The supply voltage is applied through the VCC pins (VCC) of the module connector.

Power Button (PWRBTN#)

The power button (Pin B12) is available through the module connector described in the pinout list. To start the module via Power Button the PWRBTN# signal must be at least 50ms ($50\text{ms} \leq t < 4\text{s}$) at low level (Power Button Event).

Pressing the power button for at least 4seconds will turn off power to the module (Power Button Override).

Power Good (PWR_OK)

The nanoETXexpress-TT provides an external input for a power-good signal (Pin B24). The implementation of this subsystem complies with the COM Express® Specification. PWR_OK is internally pulled up to 3.3V and must be high level to power on the module.

Reset Button (SYS_RESET#)

The reset button (Pin B49) is available through the module connector described in the pinout list. The module will stay in reset as long as SYS_RESET# is grounded.

4.3 LPC

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

The LPC bus does not support DMA (Direct Memory Access).

This leads to limitations for ISA bus and SIO (standard I/O's like Floppy or LPT interfaces) implementations. When more than one device is connected to the LPC bus a clock buffer is required!

4.4 Serial Peripheral Interface (SPI)

The Serial Peripheral Interface Bus or SPI bus is a synchronous serial data link standard named by Motorola that operates in full duplex mode. Devices communicate in master/slave mode where the master device initiates the data frame. Multiple slave devices are allowed with individual slave select (chip select) lines. Sometimes SPI is called a „four wire“ serial bus, contrasting with three, two, and one wire serial buses.



The SPI interface can only be used with a SPI flash device to boot from external BIOS on the baseboard.

4.5 SPI boot

The nanoETXexpress-TT supports boot from an external SPI Flash. It can be configured by pin A34 (BIOS_DIS#0) and pin B88 (BIOS_DIS1#) in following configuration:

BIOS_DIS#0	BIOS_DIS#1	Function
open	open	Boot on-module BIOS
GND	open	Boot baseboard LPC FWH
open	GND	Baseboard SPI = Boot Device 1, on-module SPI = Boot Device 2
GND	GND	Baseboard SPI = Boot Device 2, on-module SPI = Boot Device 1

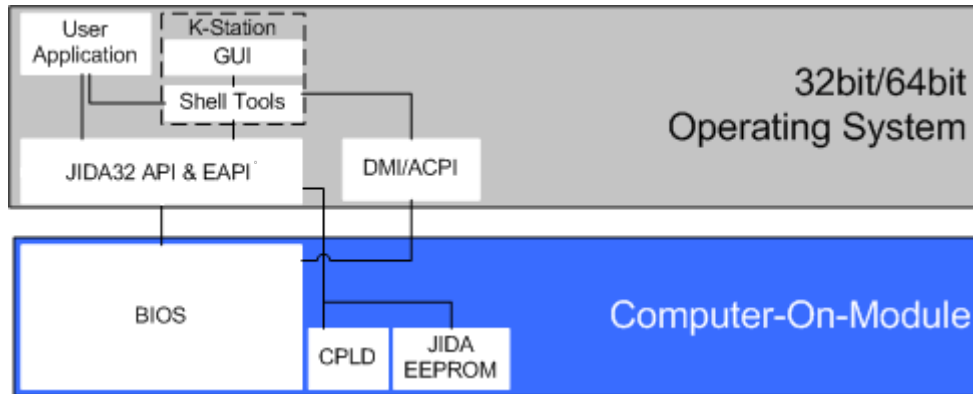


External SPI flashes may require external programming

4.6 JIDA32, EAPI and PLD Driver

The Kontron Board Driver for new generation modules is a replacement for former JIDA16/JIDA32 BIOS implementations. It consists of hardware drivers providing access to features like Watchdog, I2C Bus or GPIO implemented in the onboard Programmable Logic Device (CPLD). The Board Driver supports the official PICMG embedded API (EAPI) and for backwards compatibility the former used Kontron JIDA32 API. The driver and API is supported by 32bit and 64bit operating systems.

Please refer to [EMD Customer Section](#) for detailed documentation and Board Driver downloads.



Usage of Kontron Board Driver

The Kontron Board Driver featureset is similiar to JIDA32 except:

- » CPU Performance setting (manual Throttling)
- » I2C Backlight Control only, no PWM support

4.7 K-Station

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

Following K-Station Shell Tools are available:

- » KSystemSummary.exe (System Information)
- » KGenInfo.exe (Module Information)
- » KCPUPerf.exe (CPU Throttling control)
- » KHWMon.exe (Hardware Monitoring)
- » KI2CBus.exe (I2C and SMBus access)
- » KIOPort.exe (GPIO control)
- » KStorage.exe (JIDA EEPROM access to user bytes)
- » KVGATool.exe (LVDS Backlight control)
- » KWDog.exe (Watchdog control)
- » KAMIMod.exe (AMICore8 BIOS Modification with Bootlogo or Usercode ...)
- » KFlash.exe (AMICore8 BIOS Update)

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

4.8 API Ressources

4.8.1 I2C

BUS	Type	Constant
I2C 0	External	JIDA_I2C_TYPE_EXT_I2C
I2C 1	SMBus	JIDA_I2C_TYPE_SMB
I2C 2	CRT	JIDA_I2C_TYPE_CRT
I2C 3	LVDS/JILI	JIDA_I2C_TYPE_JILI
I2C 4	SDVO	JIDA_I2C_TYPE_VIDEO
I2C 5	SDVO Channel B DDC1	JIDA_I2C_TYPE_SDVOB_DDC1
I2C 6	SDVO Channel B DDC2	JIDA_I2C_TYPE_SDVOB_DDC2
I2C 7	SDVO Channel C DDC1	JIDA_I2C_TYPE_SDVOC_DDC1
I2C 8	SDVO Channel C DDC2	JIDA_I2C_TYPE_SDVOC_DDC2
I2C 9	Internal	JIDA_I2C_TYPE_PRIMARY

4.8.2 Storage

Device	Function
EEPROM 0	JIDA EEPROM Area1 with 128 Bytes (free to use)

4.8.3 GPIO

Port	Function
IO-Port 0	GPIO Port Bit 0-3: Input Bit 4-7: Output

4.8.4 Onboard Hardware Monitor

Sensor	Function
Temp 0	Chipset Temperature
Temp 1	CPU Temperature (measured with WINBOND W83L771W HWM)

4.8.5 SIO Winbond 83627DHGP

Sensor is only available if external carrier board SIO Windbond/Nuvoton 83627DHGP is present

Sensor	Function
Temp 2	Temp Sensor 1 (SYSTIN)
Temp 3	Temp Sensor 2 (CPUTIN)
Temp 4	Temp Sensor 3 (AUXTIN)
FAN 0	FAN Sensor 0 (SYSFANIN)
FAN 1	FAN Sensor 1 (CPUFANIN0)
FAN 2	FAN Sensor 2 (AUXFANIN0)
FAN 3	FAN Sensor 3 (SYSFANIN1)
Voltage 0	Voltage Sensor 0: VCore
Voltage 1	Voltage Sensor 1: VINO
Voltage 2	Voltage Sensor 2: AVCC
Voltage 3	Voltage Sensor 3: 3VCC
Voltage 4	Voltage Sensor 4: VIN1
Voltage 5	Voltage Sensor 5: VIN2
Voltage 6	Voltage Sensor 6: VIN3
Voltage 7	Voltage Sensor 7: 3VSB
Voltage 8	Voltage Sensor 8: VBAT

4.8.6 SIO Winbond 83627HG

Sensor is only available if external carrier board SIO Windbond/Nuvoton 83627HG is present

Sensor	Function
Temp 2	Temp Sensor 1 (SYSTIN)
Temp 3	Temp Sensor 2 (CPUTIN)
Temp 4	Temp Sensor 3 (AUXTIN)
FAN 0	FAN Sensor 0 (SYSFANIN)
FAN 1	FAN Sensor 1 (CPUFANIN0)
FAN 2	FAN Sensor 2 (AUXFANIN0)
FAN 3	FAN Sensor 3 (SYSFANIN1)
Voltage 0	Voltage Sensor 0: VCoreA
Voltage 1	Voltage Sensor 1: VCoreB
Voltage 2	Voltage Sensor 2: +3.3V VIN
Voltage 3	Voltage Sensor 3: +5V AVCC
Voltage 4	Voltage Sensor 4: +12V VIN
Voltage 5	Voltage Sensor 5: -12V VIN
Voltage 6	Voltage Sensor 6: -5V VIN
Voltage 7	Voltage Sensor 7: VSB
Voltage 8	Voltage Sensor 8: VBAT



The shown resource assignment is valid for Windows operating systems with standard API and hardware configuration only. There may be OS specific and customized assignments that differ from the tables shown in this chapter. Please have a look at the API documentation for additional information.

4.9 Dual Staged Watchdog Timer

Basics

A watchdog timer (or computer operating properly (COP) timer) is a computer hardware or software timer that triggers a system reset or other corrective action if the main program, due to some fault condition, such as a hang, neglects to regularly service the watchdog (writing a „service pulse“ to it, also referred to as „kicking the dog“, „petting the dog“, „feeding the watchdog“ or „triggering the watchdog“). The intention is to bring the system back from the nonresponsive state into normal operation.

The nanoETXexpress-TT offers a watchdog which works with two stages that can be programmed independently and used one by one.

Available Events

Reset:	A reset will restart the module and starts POST and operating system new.
NMI:	A non-maskable interrupt (NMI) is a computer processor interrupt that cannot be ignored by standard interrupt masking techniques in the system. It is typically used to signal attention for non-recoverable hardware errors.
Delay:	Might be necessary when an operating system must be started and the time for the first trigger pulse must be extended. (Only available in the first stage)
Cascade:	Does nothing, but enables the 2nd stage after the entered time-out.

WDT Signal

B27 on COM Express® Connector offers a signal that can be asserted when a watchdog timer has not been triggered within time. It can be configured to any of the 2 stages. Deassertion of the signal is automatically done after reset. If deassertion during runtime is necessary please ask your Kontron technical support for further help.

4.10 Speedstep Technology

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

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

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

4.11 C-States

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

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

Following C-States are defined:

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

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

- » Active C6-State may influence data transfer on external Serial Ports
- » Active C7-State may cause lower CPU and Graphics performance

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

4.12 Hyper Threading

Hyper Threading (officially termed Hyper Threading Technology or HTT) is an Intel®-proprietary technology used to improve parallelization of computations performed on PC's. Hyper-Threading works by duplicating certain sections of the processor—those that store the architectural state but not duplicating the main execution resources. This allows a Hyper-Threading equipped processor to pretend to be two „logical“ processors to the host operating system, allowing the operating system to schedule two threads or processes simultaneously. Hyper Threading Technology support always relies on the Operating System.

4.13 ACPI Suspend Modes and Resume Events

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

- » Windows XP
- » Windows Vista
- » Windows 7

The following events resume the system from S3:

- » USB Keyboard (1)
- » USB Mouse (1)
- » Power Button
- » WakeOnLan (2)

The following events resume the system from S4:

- » Power Button
- » WakeOnLan (2)

The following events resume the system from S5:

- » Power Button
- » WakeOnLan (2)



(1) OS must support wake up via USB devices and baseboard must power the USB Port with StBy-Voltage

(2) WakeOnLan must be enabled in BIOS setup and driver options

4.14 SDIO

The SD card standard is a standard for removable memory storages designed and licensed by the SD Card Association (<http://sdcard.org>). The card form factor, electrical interface, and protocol are all part of the SD Card specification. The Intel® Platform Controller Hub EG20/EG20T supports 2 SDIO interfaces. On nanoETXexpress-TT the first interface SDIO#0 is shared with the module GPIO signals. On modules without SATA SSD the second EG20/EG20T SDIO interface SDIO#1 is available via onboard microSD connector.

The integrated SD Host Controller conforms to SD Host Controller Standard Specification Ver. 1.0.

Features:

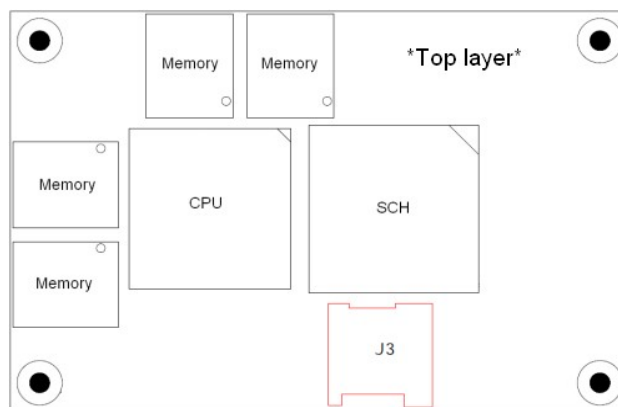
- » SDHC up to speed class 6
- » SDIO Card Specification Ver. 1.10
- » MMC System Specification Ver. 4.1
- » SD bus transfer mode
- » MMC transfer mode

SDIO interface on COM Express connector:

General purpose Input/output	SD card interface signals
GPIO	SLOT0_DATA0
GPI1	SLOT0_DATA1
GPI2	SLOT0_DATA2
GPI3	SLOT0_DATA3
GP00	SLOT0_CLK
GP01	SLOT0_CMD
GP02	SLOT0_WP
GP03	SLOT0_CD#

onboard microSD connector J3

Pin	Pin name	Signal
1	DAT2	SDIO1_DAT0
2	CD/DAT3	SDIO1_DAT3
3	CMD	SDIO1_CMD
4	VDD	3.3V S0
5	CLK	SDIO1_CLK
6	VSS2	GND
7	DAT0	SDIO1_DAT1
8	DAT1	SDIO1_DAT2
9	SWITCH1	SDIO1_CD#
10	SWITCH2	GND
11	SHIELD1	GND
12	SHIELD2	GND
13	SHIELD3	GND
14	SHIELD4	GND
15	SHIELD5	GND



- The SD_CMD line needs a pull-up resistor that can vary depending on the length of the electrical paths (typical from 10kOhm to 100kOhm)
- The maximum length for SDIO signals on the baseboard should be 80mm.

5 System Resources

5.1 Interrupt Request (IRQ) Lines

5.1.1 In 8259 PIC mode

IRQ #	Used For	Available	Comment
0	Timer0	No	-
1	Keyboard	No	-
2	Cascade	No	-
3	External SIO - COM2	Yes (No)	Note (1)
4	External SIO - COM1	Yes (No)	Note (1)
5	PCI	for PCI	Dynamic (BIOS default)
6	PCI	Yes (No)	Note (1)
7	External SIO - LPT1	for PCI	Dynamic (BIOS default)
8	RTC	No	-
9	ACPI	No	Note (2)
10	PCI	for PCI	Dynamic (BIOS default)
11	PCI	for PCI	Dynamic (BIOS default)
12	PS/2 Mouse	Yes (No)	Note (1)
13	FPU	No	-
14	PCI	for PCI	Dynamic (BIOS default)
15	PCI	for PCI	Dynamic (BIOS default)



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

2 Not available if ACPI is used

5.1.2 In APIC mode

IRQ #	Used For	Available	Comment
0	Timer0	No	-
1	Keyboard	No	-
2	Cascade	No	-
3	External SIO - COM2	Yes (No)	Note (1)
4	External SIO - COM1	Yes (No)	Note (1)
5	PCI	for PCI	Dynamic (BIOS default)
6	PCI	for PCI	Dynamic (BIOS default)
7	External SIO - LPT1	Yes (No)	Note (1)
8	RTC	No	
9	ACPI	No	Note (2)
10	PCI	for PCI	Dynamic (BIOS default)
11	PCI	for PCI	Dynamic (BIOS default)
12	PS/2 Mouse	Yes (No)	Note (1)
13	FPU	No	
14	PCI	for PCI	Dynamic (BIOS default)
15	PCI	for PCI	Dynamic (BIOS default)
16	PIRQ[A]	No	PCI IRQ line 1 + US15W graphics + USB UHCI Controller #1; Note(3)
17	PIRQ[B]	No	PCI IRQ line 2 + LAN Controller + USB UHCI Controller #2; Note(3)
18	PIRQ[C]	No	PCI IRQ line 3 + USB UHCI Controller #3; Note(3)
19	PIRQ[D]	No	PCI IRQ line 4 + USB UHCI Controller #4; Note(3)
20	PIRQ[E]	No	Note(3)
21	PIRQ[F]	No	Note(3)
22	PIRQ[G]	No	Note(3)
23	PIRQ[H]	No	Note(3)



- (1) If the “Used For” device is disabled in setup, the corresponding interrupt is available for other device.
- (2) Not available if ACPI is used
- (3) ACPI OS decides on particular IRQ usage

5.2 Memory Area

The first 640 kB of DRAM are used as main memory. Using DOS, you can address 1 MB of memory directly. Memory area above 1 MB (high memory, extended memory) is accessed under DOS via special drivers such as HIMEM.SYS and EMM386.EXE, which are part of the operating system. Please refer to the operating system documentation or special textbooks for information about HIMEM.SYS and EMM386.EXE. Other operating systems (Linux or Windows versions) allow you to address the full memory area directly.

Upper Memory	Used for	Available	Comment
A0000h – BFFFFh	VGA Memory	No	Mainly used by graphic controller
C0000h – CFFFFh	VGA BIOS	No	Used by onboard VGA ROM
D0000h – DFFFFh		Yes	Free for shadow RAM in standard configurations.
E0000h – FFFFFh	System BIOS	No	Fixed
E0000000h – F0000000h	PCIe Config Space	No	Fixed
FEC00000h–FEC00040h	IOxAPIC	No	Fixed
FED00000h FED003FFh	HPET	No	Fixed
FED04000 FED4BFFF	TPM	No	Fixed
FFC00000h – FFFFFFFFh	BIOS Flash	No	Fixed

5.3 I/O Address Map

The I/O-port addresses of the are functionally identical to a standard PC/AT. All addresses not mentioned in this table should be available. We recommend that you do not use I/O addresses below 0100h with additional hardware for compatibility reasons, even if available.

I/O Address	Used for	Available	Comment
0000 - 001F	System Ressources	No	Fixed
0020 - 003F	Interrupt Controller 1	No	Fixed
0040 - 005F	Timer, Counter	No	Fixed
0060 - 006F	Keyboard controller	No	Fixed
0070 - 007F	RTC and CMOS Registers	No	Fixed
0080	BIOS Postcode	No	Fixed
0084 - 008F	DMA Page Register	No	Fixed
0090 - 009F	System Control	No	Fixed
00A0 - 00BF	Interrupt Controller	No	Fixed
00E0 - 00EF	System Control	No	Fixed
00F0 - 00FF	Math Coprocessor	No	Fixed
03B0 - 03DF	VGA	No	Fixed
0400 - 043F	Chipset	No	Fixed
0480 - 04BF	Chipset	No	Fixed
04D0 - 04D1	Chipset	No	Fixed
0900 - 091F	Power Management	No	Fixed
09C0 - 09FF	GPE	No	Fixed
0A05 - 0A06	WB83627HG Hardware Monitor	No	Fixed if WB83627HG is in system
0A80 - 0A81	CPLD	No	Fixed
0CF8 - 0CFF	PCI Configuration	No	Fixed

5.4 Peripheral Component Interconnect (PCI) Devices

All devices follow the Peripheral Component Interconnect 2.3 (PCI 2.3) respectively the PCI Express Base 1.0a specification. The BIOS and OS control memory and I/O resources. Please see the PCI 2.3 specification for details.

PCI Device	B:D:F	PCI IRQ	Interface	Comment
Host Bridge	0:0:0	None	internal	Chipset (Tunnelcreek)
Video Controller	0:2:0	INTA	internal	Chipset (Tunnelcreek)
SDVO Controller	0:03:0	INTA	internal	Chipset (Tunnelcreek)

PCIe Port 0	0:23:0	INTA	internal	Chipset (Tunnelcreek)
PCIe Port #0 Slot	-	A/B/C/D	PCIe	Slot #1
PCIe Port 1	0:24:0	INTA	internal	Chipset (Tunnelcreek)
PCIe Port #1 Slot		B/C/D/A	PCIe	Slot #2
PCIe Port 2	0:25:0	INTA	internal	Chipset (Tunnelcreek)
PCIe Port #2 Slot	-	C/D/A/B	PCIe	Slot #3
PCIe Port 3	0:26:0	INTA	internal	Chipset (Tunnelcreek)
HDA Controller	0:27:0	INTA	internal	Chipset (Tunnelcreek)
LPC Bridge	0:31:0	-	internal	Chipset (Tunnelcreek)
PCIe-PORT	X:00:0	INTD	PCIe	Chipset (Topcliff)
Packet Hub	Y:00:0	-	PCIe	Chipset (Topcliff)
GbE	Y:00:1	INTD	PCIe	Chipset (Topcliff)
GPIO	Y:00:2	INTD	PCIe	Chipset (Topcliff)
OHCI00	Y:02:0	INTC	PCIe	Chipset (Topcliff)
OHCI01	Y:02:1	INTC	PCIe	Chipset (Topcliff)
OHCI02	Y:02:2	INTC	PCIe	Chipset (Topcliff)
EHCI0	Y:02:3	INTC	PCIe	Chipset (Topcliff)
USB Device	Y:02:4	INTC	PCIe	Chipset (Topcliff)
SDIO #0	Y:04:0	INTB	PCIe	Chipset (Topcliff)
SDIO #1	Y:04:1	INTB	PCIe	Chipset (Topcliff)
SATA II	Y:06:0	INTA	PCIe	Chipset (Topcliff)
OHCI10	Y:08:0	INTD	PCIe	Chipset (Topcliff)
OHCI11	Y:08:1	INTD	PCIe	Chipset (Topcliff)
OHCI12	Y:08:2	INTD	PCIe	Chipset (Topcliff)
EHCI1	Y:08:3	INTD	PCIe	Chipset (Topcliff)
DMA0	Y:10:0	INTC	PCIe	Chipset (Topcliff)
UART #0	Y:10:1	INTC	PCIe	Chipset (Topcliff)
UART #1	Y:10:2	INTC	PCIe	Chipset (Topcliff)
UART #2	Y:10:3	INTC	PCIe	Chipset (Topcliff)
UART #3	Y:10:4	INTC	PCIe	Chipset (Topcliff)
DMA1	Y:12:0	INTB	PCIe	Chipset (Topcliff)
SPI	Y:12:1	INTB	PCIe	Chipset (Topcliff)
I2C	Y:12:2	INTB	PCIe	Chipset (Topcliff)
CAN	Y:12:3	INTB	PCIe	Chipset (Topcliff)
IEEE1588 block	Y:12:4	INTB	PCIe	Chipset (Topcliff)

5.5 I2C Bus

I2C Address	Used For	Available	Comment
A0h	JIDA-EEPROM	No	Module EEPROM
AEh	FRU-EEPROM	No	Baseboard EEPROM



Do not access the digital potentiometer manually

5.6 JILI I2C Bus

I2C Address	Used For	Available	Comment
A0h	JILI-EEPROM	No	EEPROM for JILI Data

5.7 SDVO I2C Bus

I2C Address	Used For	Available	Comment
-	-	-	-

5.8 System Management (SM) Bus

Address	Device	Comment
12h	SMART_CHARGER	Not to be used with any SM bus device except a charger
14h	SMART_SELECTOR	Not to be used with any SM bus device except a selector or manager
16h	SMART_BATTERY	Not to be used with any SM bus device except a battery
98h	Winbond W83771W HWM	Do not use under any circumstances
A0h	SPD EEPROM	Do not use under any circumstances
D2h	Clock Generator	Do not use under any circumstances



A JIDA Bus No. like in former Modules cannot be provided because the EAPI driver implementation enumerates the I2C busses dynamically. Please follow the initialisation process like it is provided in the EAPI specification.

5.9 Pinout List

5.9.1 General Signal Description

Type	Description
I/O-3,3	Bi-directional 3,3 V IO-Signal
I/O-5T	Bi-dir. 3,3V I/O (5V Tolerance)
I/O-5	Bi-directional 5V I/O-Signal
I-3,3	3,3V Input
I/OD	Bi-directional Input/Output Open Drain
I-5T	3,3V Input (5V Tolerance)
OA	Output Analog
OD	Output Open Drain
O-1,8	1,8V Output
O-3,3	3,3V Output
O-5	5V Output
DP-I/O	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



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

5.9.2 Connector X1A Row A

Pin	Signal	Description	Type	Termination	Comment
A1	GND_1	Power Ground	PWR	-	-
A2	GBEO_MDI3-	Ethernet Receive Data-	DP-I	-	-
A3	GBEO_MDI3+	Ethernet Receive Data+	DP-I	-	-
A4	GBEO_LINK100#	Ethernet Speed LED 100Mbps	OD	-	-
A5	GBEO_LINK1000#	Ethernet Speed LED 1000Mbps	OD	-	-
A6	GBEO_MDI2-	Ethernet Receive Data-	DP-I	-	-
A7	GBEO_MDI2+	Ethernet Receive Data+	DP-I	-	-
A8	GBEO_LINK#	LAN Link LED	OD	-	-
A9	GBEO_MDI1-	Ethernet Receive Data-	DP-I	-	-
A10	GBEO_MDI1+	Ethernet Receive Data+	DP-I	-	-
A11	GND_2	Power Ground	PWR	-	-
A12	GBEO_MDIO-	Ethernet Transmit Data-	DP-0	-	-
A13	GBEO_MDIO+	Ethernet Transmit Data+	DP-0	-	-
A14	GBEO_CTREF	LAN Reference Voltage	0-3.3	100nF to GND	-
A15	SUS_S3#	Indicates Suspend to RAM state	0-3.3	-	CPLD I/O
A16	SATA0_TX+	SATA 0 Transmit Data+	DP-0	-	-
A17	SATA0_TX-	SATA 0 Transmit Data-	DP-0	-	-
A18	SUS_S4#	Indicates Suspend to Disk state; same as SUS_S5#	0-3.3	-	CPLD I/O
A19	SATA0_RX+	SATA 0 Receive Data+	DP-I	-	-
A20	SATA0_RX-	SATA 0 Receive Data-	DP-I	-	-
A21	GND_3	Power Ground	PWR	-	-
A22	RSVD	Not Connected	nc	-	-
A23	RSVD	Not Connected	nc	-	-
A24	SUS_S5#	Indicates Soft Off state; same function as SUS_S4#	0-3.3	-	CPLD I/O
A25	RSVD	Not Connected	nc	-	-
A26	RSVD	Not Connected	nc	-	-
A27	BATLOW#	Indicates low external battery (not implemented)	I-3.3	-	CPLD I/O
A28	ATA_ACT#	SATA Activity Indicator	OD	-	-
A29	HDA_SYNC	HD Audio SYNC	0-3.3	-	-
A30	HDA_RST#	HD Audio Reset	0-3.3	-	-
A31	GND_4	Power Ground	PWR	-	-
A32	HDA_CLK	HD Audio CLK	0-3.3	PD ~10k in TNC	24MHz
A33	HDA_SDOUT	HD Audio Data	0-3.3	-	-
A34	BIOS_DIS0#	Disable Module BIOS.Enable boot from a FWH on Baseboard	I-3.3	PU ~15k in CPLD 3.3V_S5	For ext.LPC FWH
A35	THRMTRIP#	CPU thermal shutdown indicator	0-3.3	PU 10k 3.3V_S0	-
A36	USB6-	USB Data- Port #6 (optional on Port 5)	DP-I/O	PD 12k in Topcliff	-
A37	USB6+	USB Data+ Port #6 (optional on Port 5)	DP-I/O	PD 12k in Topcliff	-
A38	USB_6_7_OC#	USB Over current Pair 4 / 5 / 6	I-3.3	PU 10k 3.3V_S5	-
A39	USB4-	USB Data- Port #4	DP-I/O	PD 12k in Topcliff	-
A40	USB4+	USB Data+ Port #4	DP-I/O	PD 12k in Topcliff	-
A41	GND_5	Power Ground	PWR	-	-
A42	USB2-	USB Data- Port #2	DP-I/O	PD 12k in Topcliff	-
A43	USB2+	USB Data+ Port #2	DP-I/O	PD 12k in Topcliff	-
A44	USB_2_3_OC#	USB Over current Pair 2 / 3	I-3.3	PU 10k 3.3V_S5	-
A45	USB0-	USB Data- Port #0	DP-I/O	PD 12k in Topcliff	-
A46	USB0+	USB Data+ Port #0	DP-I/O	PD 12k in Topcliff	-
A47	VCC_RTC	RTC Battery Supply +3V	PWR	-	-
A48	EXCD0_PERST#	PCI Express Card 0 Reset	0-3.3	no PU/PD allowed!	-
A49	EXCD0_CPPE#	PCI Express Card 0 Request	I-3.3	no PU/PD allowed!	-
A50	LPC_SERIRQ	LPC Serial Interrupt Request	IO-3.3	PU 10k 3.3V_S0	-
A51	GND_6	Power Ground	PWR	-	-
A52	RSVD	Not Connected	nc	-	-
A53	RSVD	Not Connected	nc	-	-
A54	SDIO_D0 / GPIO	SDIO#0 Data0 / General Purpose Input 0	I/O-3.3	PU 10k/100k to V3.3_S0	-
A55	RSVD	Not Connected	nc	-	-
A56	RSVD	Not Connected	nc	-	-
A57	GND_7	Power Ground	PWR	-	-
A58	PCIE_TX3+	PCIe lane #3 Transmit+ (Optional)	DP-0	PD ~50R(PU @ reset) in TNC	only available on no-TopCliff var.
A59	PCIE_TX3-	PCIe lane #3 Transmit- (Optional)	DP-0	PD ~50R in TNC	only available on no-TopCliff var.
A60	GND_8	Power Ground	PWR	-	-
A61	PCIE_TX2+	PCIe lane #2 Transmit+	DP-0	PD ~50R(PU @ reset) in TNC	-
A62	PCIE_TX2-	PCIe lane #2 Transmit-	DP-0	PD ~50R in TNC	-
A63	SDIO_D1 / GPIO1	SDIO#0 Data1 / General Purpose Input 1	I/O-3.3	PU 10k/100k to V3.3_S0	-
A64	PCIE_TX1+	PCIe lane #1 Transmit+	DP-0	PD ~50R(PU @ reset) in TNC	-
A65	PCIE_TX1-	PCIe lane #1 Transmit-	DP-0	PD ~50R in TNC	-

A66	GND_9	Power Ground	PWR	-	-
A67	SDIO_D2 / GPI2	SDIO#0 Data2 / General Purpose Input 2	I/O-3.3	PU 10k/100k to V3.3_S0	-
A68	PCIE_TX0+	PCIE lane #0 Transmit+	DP-0	PD ~50R(PU @ reset) in TNC	-
A69	PCIE_TX0-	PCIE lane #0 Transmit-	DP-0	PD ~50R in TNC	-
A70	GND_10	Power Ground	PWR	-	-
A71	LVDS_A0+	LVDS Channel A DAT0+	DP-0	-	-
A72	LVDS_A0-	LVDS Channel A DAT0-	DP-0	-	-
A73	LVDS_A1+	LVDS Channel A DAT1+	DP-0	-	-
A74	LVDS_A1-	LVDS Channel A DAT1-	DP-0	-	-
A75	LVDS_A2+	LVDS Channel A DAT2+	DP-0	-	-
A76	LVDS_A2-	LVDS Channel A DAT2-	DP-0	-	-
A77	LVDS_VDD_EN	LVDS Panel Power Control	O-3.3	buffered; forced LOW in S5/S3	-
A78	LVDS_A3+	LVDS Channel A DAT3+	DP-0	-	-
A79	LVDS_A3-	LVDS Channel A DAT3-	DP-0	-	-
A80	GND_11	Power Ground	PWR	-	-
A81	LVDS_A_CLK+	LVDS Channel A Clock+	DP-0	-	20-80MHz
A82	LVDS_A_CLK-	LVDS Channel A Clock-	DP-0	-	20-80MHz
A83	LVDS_I2C_CLK	LVDS I2C Clock (DDC)	IO-3.3	PU 10k 3.3V_S0	-
A84	LVDS_I2C_DAT	LVDS I2C Data (DDC)	IO-3.3	PU 10k 3.3V_S0	-
A85	SDIO_D3 / GPI3	SDIO# Data3 / General Purpose Input 3	I/O-3.3	PU 10k/100k to V3.3_S0	-
A86	RSVD	Not Connected	nc	-	-
A87	RSVD	Not Connected	nc	-	-
A88	PCIEO_CLK_REF+	PCIE Clock (positive)	DP-0	-	100MHz
A89	PCIEO_CLK_REF-	PCIE Clock (negative)	DP-0	-	100MHz
A90	GND_12	Power Ground	PWR	-	-
A91	SPI_POWER	Power supply for Carrier Board SPI	PWR	-	100mA (max.)
A92	SPI_MISO	Data in to Module from Carrier SPI	I-3.3	-	-
A93	SDIO_Clk / GP00	SDIO#0 Clock / General Purpose Output 0	O-3.3	- / PD 100k	24/48MHz / I/O
A94	SPI_CLK	Clock from Module to Carrier SPI	O-3.3	-	20MHz
A95	SPI_MOSI	Data out from Module to Carrier SPI	O-3.3	-	-
A96	TPM_PP	(TPM) Physical Presence pin	I-3.3	PD 4.7k	-
A97	TYPE10#	Indicates TYPE10# to carrier board	0	PD 4.7k	-
A98	SER0_TX	UART transmitter	O-3.3	-	14.5V tolerance
A99	SER0_RX	UART receiver	I-3.3	PU 47k / 10k 3.3V_S0	14.5V tolerance
A100	GND_14	Power Ground	PWR	-	-
A101	SER1_TX	UART transmitter / optional CAN-TX	O-3.3	-	14.5V / 3.3V tolerance
A102	SER1_RX	UART receiver / optional CAN-RX	I-3.3	PU 47k / 10k 3.3V_S0	14.5V / 3.3V tolerance
A103	LID#	LID button	nc	-	not supported
A104	VCC_12V_7	12V VCC	PWR	-	-
A105	VCC_12V_8	12V VCC	PWR	-	-
A106	VCC_12V_9	12V VCC	PWR	-	-
A107	VCC_12V_10	12V VCC	PWR	-	-
A108	VCC_12V_11	12V VCC	PWR	-	-
A109	VCC_12V_12	12V VCC	PWR	-	-
A110	GND_15	Power Ground	PWR	-	-

5.9.3 Connector X1A Row B

Pin	Signal	Description	Type	Termination	Comment
B1	GND_16	Power Ground	PWR	-	-
B2	GBEO_ACT#	Ethernet Activity LED	OD	-	-
B3	LPC_FRAME#	LPC Frame Indicator	O-3.3	-	-
B4	LPC_AD0	LPC Address / Data Bus	IO-3.3	PU 100k	-
B5	LPC_AD1	LPC Address / Data Bus	IO-3.3	PU 100k	-
B6	LPC_AD2	LPC Address / Data Bus	IO-3.3	PU 100k	-
B7	LPC_AD3	LPC Address / Data Bus	IO-3.3	PU 100k	-
B8	LPC_DRQ0#	Not Connected	nc	-	-
B9	LPC_DRQ1#	Not Connected	nc	-	-
B10	LPC_CLK	LPC Clock	O-3.3	-	up to 33MHz
B11	GND_17	Power Ground	PWR	-	-
B12	PWRBTN#	Power Button Input	I-3.3	PU 10k 3.3V_S5	active on falling edge
B13	SMB_CLK	SMBus Clock	O-3.3	PU 10k in S5 / 5k in S0 3.3V	-
B14	SMB_DAT	SMBus Data	IO-3.3	PU 10k in S5 / 5k in S0 3.3V	-
B15	SMB_ALERT#	SMBus Interrupt	IO-3.3	PU 10k 3.3V_S0	-
B16	SATA1_TX+	SATA 0 Transmit Data+	DP-0	-	-
B17	SATA1_TX-	SATA 0 Transmit Data-	DP-0	-	-
B18	SUS_STAT#	Indicates imminent suspend operation	O-3.3	-	CPLD I/O
B19	SATA1_RX+	SATA 0 Receive Data+	DP-I	-	-
B20	SATA1_RX-	SATA 0 Receive Data-	DP-I	-	-
B21	GND_18	Power Ground	PWR	-	-
B22	RSVD	Not Connected	nc	-	-
B23	RSVD	Not Connected	nc	-	-
B24	PWR_OK	Power OK from power supply	I-5T	PU 511k 3.3V_S5	CPLD I/O
B25	RSVD	Not Connected	nc	-	-
B26	RSVD	Not Connected	nc	-	-
B27	WDT	Indicator for Watchdog Timeout	O-3.3	-	CPLD I/O
B28	HDA_SDIN2	Not Connected	nc	-	not supported
B29	HDA_SDIN1	Audio Codec Serial Data in 1	I-3.3	PD ~10k in TNC	-
B30	HDA_SDIN0	Audio Codec Serial Data in 0	I-3.3	PD ~10k in TNC	-
B31	GND_19	Power Ground	PWR	-	-
B32	SPKR	Speaker Interface	O-3.3	-	-
B33	I2C_CK	General Purpose I2C Clock	IO-3.3	PU 2k2 3.3V_S5	CPLD I/O
B34	I2C_DAT	General Purpose I2C Data	IO-3.3	PU 2k2 3.3V_S5	CPLD I/O
B35	THRM#	Over Temperature Indicator	I-3.3	PU 10k 3.3V_S0	-
B36	USB7-	USB Data- Client (Client Mode)	DP-I/O	PD 12k in Topcliff	-
B37	USB7+	USB Data+ Client (Client Mode)	DP-I/O	PD 12k in Topcliff	-
B38	USB_4_5_OC#	USB Over current Pair 4 / 5 / 6	I-3.3	PU 10k 3.3V_S5	-
B39	USB5-	USB Data- Port #5 (n.a. if USB6 option is used)	DP-I/O	PD 12k in Topcliff	-
B40	USB5+	USB Data+ Port #5 (n.a. if USB6 option is used)	DP-I/O	PD 12k in Topcliff	-
B41	GND_20	Power Ground	PWR	-	-
B42	USB3-	USB Data- Port #3	DP-I/O	PD 12k in Topcliff	-
B43	USB3+	USB Data+ Port #3	DP-I/O	PD 12k in Topcliff	-
B44	USB_0_1_OC#	USB Over current Pair 0 / 1	I-3.3	PU 10k 3.3V_S5	-
B45	USB1-	USB Data- Port #0	DP-I/O	PD 12k in Topcliff	-
B46	USB1+	USB Data+ Port #0	DP-I/O	PD 12k in Topcliff	-
B47	EXCD1_PERST#	PCIe Express Card 1 Reset	O-3.3	-	no PU or PD allowed!
B48	EXCD1_CPPE#	PCIe Express Card 1 Request	I-3.3	-	-
B49	SYS_RESET#	Reset button input	I-3.3	PU 5k-25k 3.3_S5 in CPLD	-
B50	CB_RESET#	Carrier Board Reset	O-3.3	-	CPLD I/O
B51	GND_21	Power Ground	PWR	-	-
B52	RSVD	Not Connected	nc	-	-
B53	RSVD	Not Connected	nc	-	-
B54	SDIO_CMD / GP01	SDIO#0 Command / General Purpose Output 1	I/O-3.3	PU 75k V3.3V_S0 / PD 100k	-
B55	RSVD	Not Connected	nc	-	-
B56	RSVD	Not Connected	nc	-	-
B57	SDIO_WP / GP02	SDIO#0 Write Protection / General Purpose Output 2	I-3.3	PU 10k V3.3V_S0 / PD 100k	-
B58	PCIE_RX3+	PCIe lane #3 Receive+ (Optional)	DP-I	PD ~50R(PU @ reset) in TNC	only available on no-TopCliff var.
B59	PCIE_RX3-	PCIe lane #3 Receive- (Optional)	DP-I	PD ~50R(PU @ reset) in TNC	only available on no-TopCliff var.
B60	GND_22	Power Ground	PWR	-	-
B61	PCIE_RX2+	PCIe lane #2 Receive+	DP-I	PD ~50R(PU @ reset) in TNC	-
B62	PCIE_RX2-	PCIe lane #2 Receive-	DP-I	PD ~50R(PU @ reset) in TNC	-
B63	SDIO_CD# / GP03	SDIO#0 CardDetect / General Purpose Output 3	I-3.3	PU 10k V3.3V_S0 / PD 100k	-
B64	PCIE_RX1+	PCIe lane #1 Receive+	DP-I	PD ~50R(PU @ reset) in TNC	-
B65	PCIE_RX1-	PCIe lane #1 Receive-	DP-I	PD ~50R(PU @ reset) in TNC	-

B66	WAKE0#	PCI Express Wake Event	I-3.3	PU 1k 3.3V_S5	-
B67	WAKE1#	General Purpose Wake Event	I-3.3	PU 1k 3.3V_S5	-
B68	PCIE_RX0+	PCIe lane #0 Receive+	DP-I	PD ~50R(PU @ reset) in TNC	-
B69	PCIE_RX0-	PCIe lane #0 Receive-	DP-I	PD ~50R(PU @ reset) in TNC	-
B70	GND_23	Power Ground	PWR	-	-
B71	DDIO_PAIR0+	SDVOB_RED_P	DP-0	-	SDVO
B72	DDIO_PAIR0-	SDVOB_RED_N	DP-0	-	SDVO
B73	DDIO_PAIR1+	SDVOB_GREEN_P	DP-0	-	SDVO
B74	DDIO_PAIR1-	SDVOB_GREEN_N	DP-0	-	SDVO
B75	DDIO_PAIR2+	SDVOB_BLUE_P	DP-0	-	SDVO
B76	DDIO_PAIR2-	SDVOB_BLUE_N	DP-0	-	SDVO
B77	DDIO_PAIR4+	SDVOB_INT_P	DP-I	-	SDVO
B78	DDIO_PAIR4-	SDVOB_INT_N	DP-I	-	SDVO
B79	LVDS_BKLT_EN	Backlight Enable	0-3.3	buffered; forced LOW in S5/S3	-
B80	GND_24	Power Ground	PWR	-	-
B81	DDIO_PAIR3+	SDVOB_CLKIN_P	DP-0	100-200MHz	SDVO
B82	DDIO_PAIR3-	SDVOB_CLKIN_N	DP-0	100-200MHz	SDVO
B83	LVDS_BKLT_CTRL	Backlight Brightness Control	0-3.3	-	-
B84	VCC_5V_SBY	+5V Standby	PWR	-	-
B85	VCC_5V_SBY	+5V Standby	PWR	-	-
B86	VCC_5V_SBY	+5V Standby	PWR	-	-
B87	VCC_5V_SBY	+5V Standby	PWR	-	-
B88	BIOS_DIS1#	Disable Module BIOS.Enable boot from SPI on Baseboard	I-3.3	PU ~15k in CPLD 3.3V_S5	For ext.SPI
B89	DDIO_HPD	Not Connected	nc	-	not supported
B90	GND_25	Power Ground	PWR	-	-
B91	DDIO_PAIR5+	SDVOB_TVCLKIN_P	DP-I	100-200MHz	SDVO
B92	DDIO_PAIR5-	SDVOB_TVCLKIN_N	DP-I	100-200MHz	SDVO
B93	DDIO_PAIR6+	SDVO_STALLP	DP-I		SDVO
B94	DDIO_PAIR6-	SDVO_STALLN	DP-I		SDVO
B95	DDIO_DDC_AUX_SEL	nc / SDVOB_CTRLCLK (Optional)	nc	optional use by COMe Type1	-
B96	RSVD	nc / SDVOB_CTRLDATA(Optional)	nc	optional use by COMe Type1	-
B97	SPI_CS#	SPI Chipselect	0	3.3V_S5	-
B98	DDIO_AUX+	SDVOB_CTRLCLK	0	-	-
B99	DDIO_AUX-	SDVOB_CTRLDATA	I/O	-	-
B100	GND_26	Power Ground	PWR	-	-
B101	FAN_PWMOUT	Not connected	nc	-	not supported
B102	FAN_TACHIN	Not connected	nc	-	not supported
B103	SLEEP#	Not Connected	nc	-	-
B104	VCC_12V_16	12V VCC	PWR	-	-
B105	VCC_12V_17	12V VCC	PWR	-	-
B106	VCC_12V_18	12V VCC	PWR	-	-
B107	VCC_12V_19	12V VCC	PWR	-	-
B108	VCC_12V_20	12V VCC	PWR	-	-
B109	VCC_12V_21	12V VCC	PWR	-	-
B110	GND_27	Power Ground	PWR	-	-



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

6 BIOS Operation

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

6.1 Determining the BIOS Version

The AMI® Aptio version is displayed in the main menu of the setup utility.

- » BIOS Vendor: American Megatrends
- » Core Version: x.x.x.x
- » BIOS Date: mm/dd/yyyy hh:mm:ss
- » BIOS Version: NTC1RXXX

6.2 Setup Guide

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

Functional keystrokes in POST:

Key	Function
DEL	Enter Setup
F2	Enter Setup
F7	Boot Menu

6.2.1 Start AMI® Aptio Setup Utility

To start the AMI® BIOS setup utility, press or <F2> 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.

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
← 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.
+/-	Change Option
<Enter>	Execute command or select submenu.
<F1>	General Help window.
<F2>	Previous Values
<F3>	Load the optimized default configuration.
<F4>	Save and exit.
<Esc>	Exit menu.

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

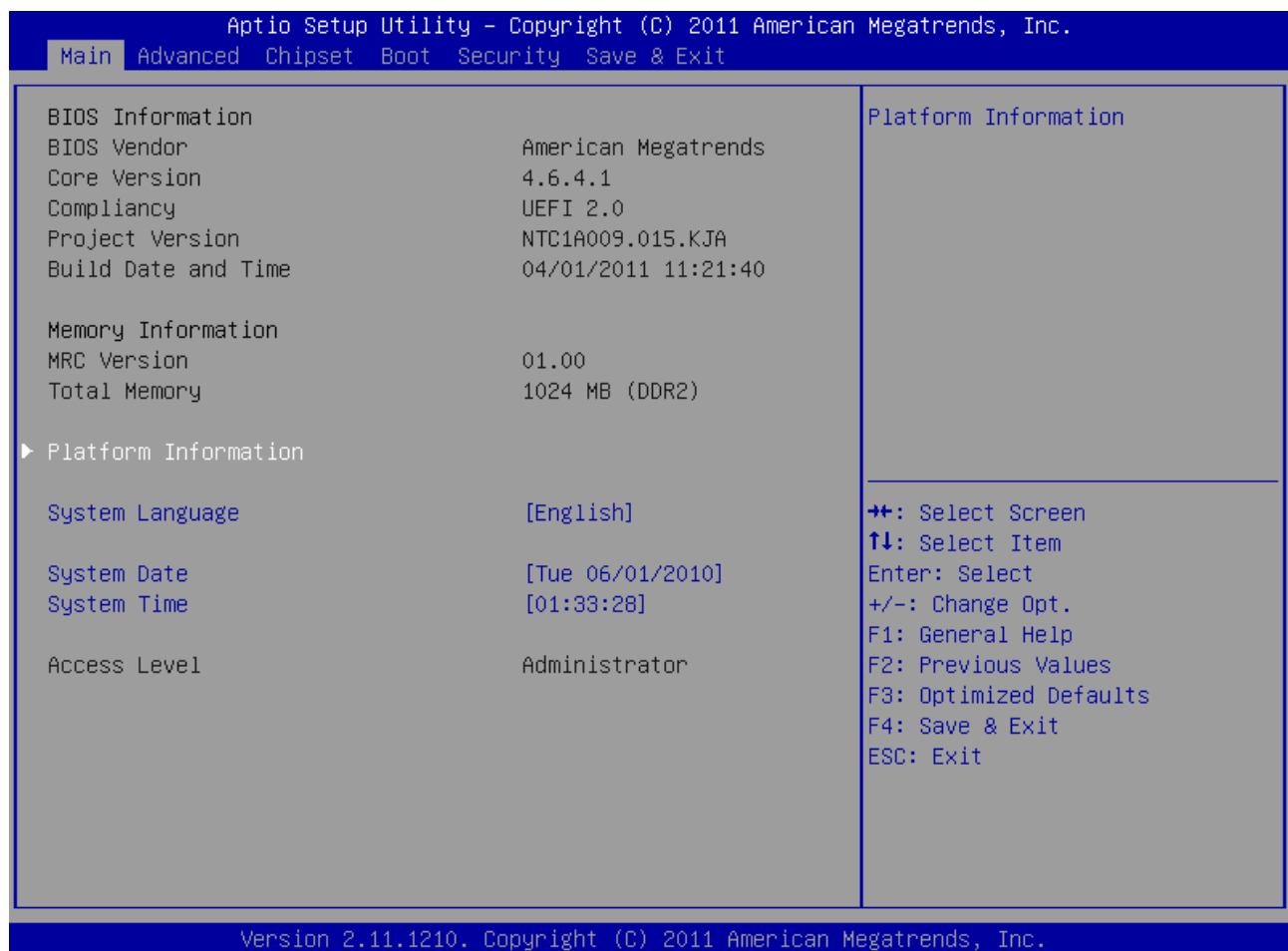
The Help window on the right side of each menu displays the Help text for the selected item. It updates as you move the cursor to each field.

General Help Window

Pressing <F1> 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.

6.3 BIOS Setup

6.3.1 Main



Feature	Options	Description
System Language	English	Choose the system default language
System Date	[mm/dd/yyyy]	Set the Date. Use 'Tab' to switch between Date elements
System Time	[hh:mm:ss]	Set the Time. Use 'Tab' to switch between Time elements

Platform Information

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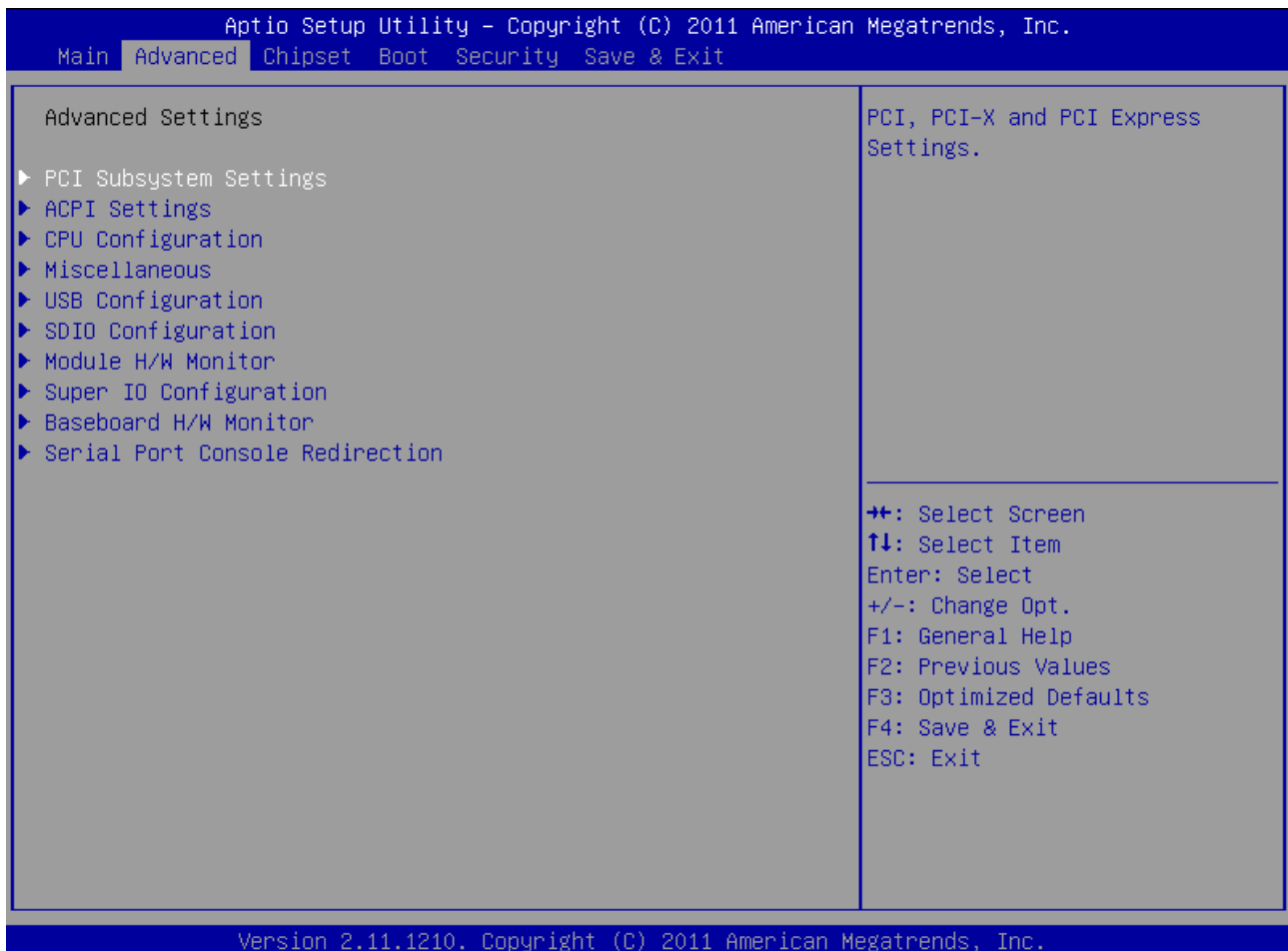
Main

Platform Information	
Tunnel Creek Version	01 (B0 Stepping)
Boot Counter	N/A
CPLD Rev	NTC1P121.00e (Debug)

→+: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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6.3.2 Advanced



6.3.3 PCI Subsystem Settings



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

PCI Express Settings

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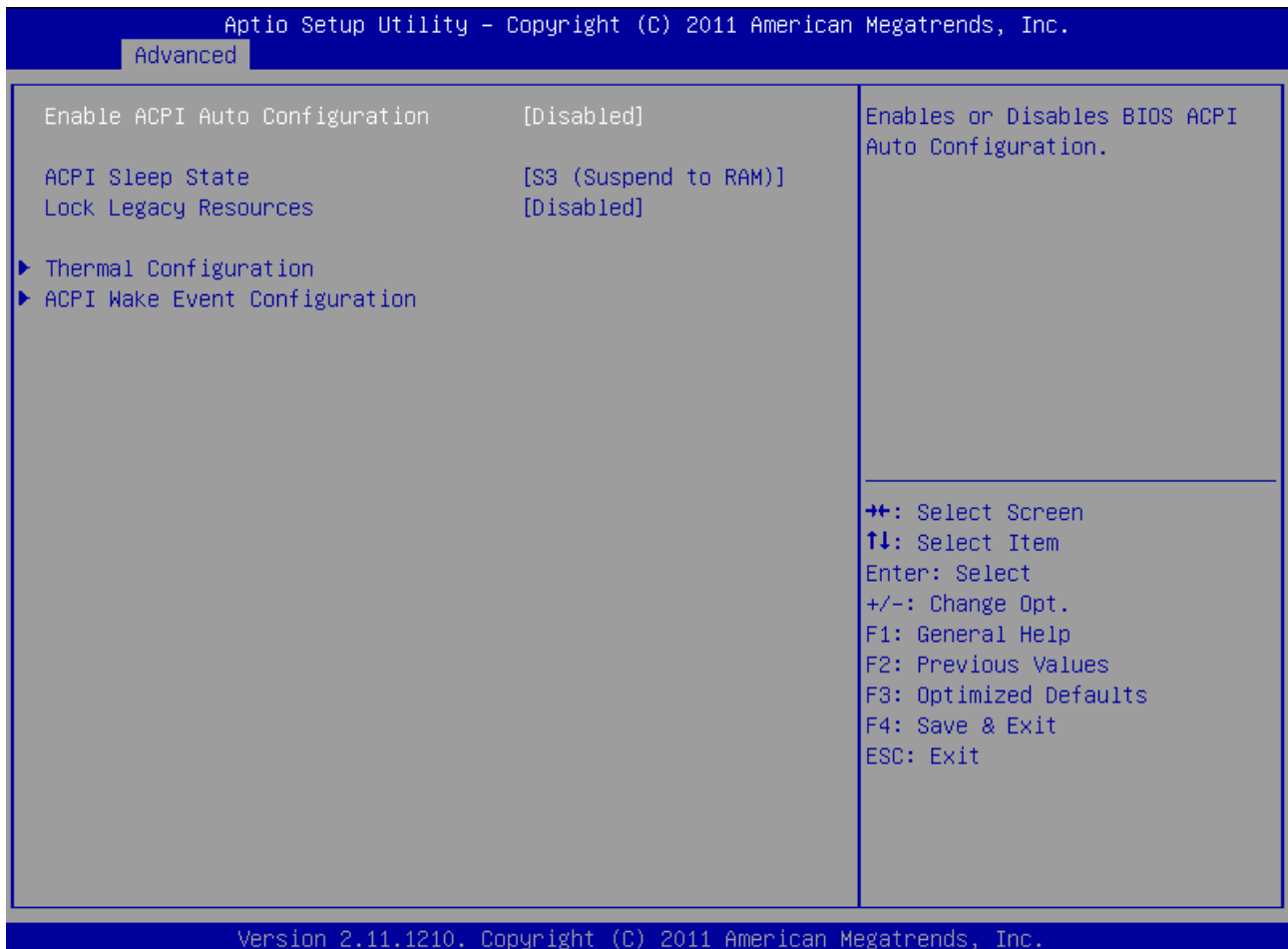
Advanced

PCI Express Device Register Settings		Enables or Disables PCI Express Device Relaxed Ordering.
Relaxed Ordering	[Disabled]	
Extended Tag	[Disabled]	
No Snoop	[Enabled]	
Maximum Payload	[Auto]	
Maximum Read Request	[Auto]	
PCI Express Link Register Settings		
ASPM Support	[Disabled]	
WARNING: Enabling ASPM may cause some PCI-E devices to fail		
Extended Synch	[Disabled]	
Link Training Retry	[5]	→← : Select Screen ↑↓ : Select Item Enter : Select +/- : Change Opt. F1 : General Help F2 : Previous Values F3 : Optimized Defaults F4 : Save & Exit ESC : Exit
Link Training Timeout (uS)	100	
Unpopulated Links	[Keep Link ON]	

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

ACPI Settings



Feature	Options	Description
Enable ACPI Auto Configuration	Disabled Enabled	Enables or Disables BIOS ACPI Auto Configuration
ACPI Sleep State	Suspend Disabled S3 (Str)	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed
Lock Legacy Resources	Disabled Enabled	Enables or Disables Lock of Legacy Resources

Thermal Configuration

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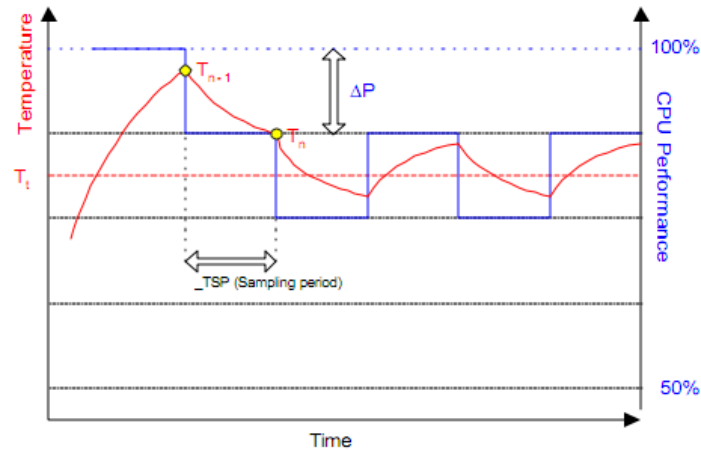
Advanced

Thermal Configuration		This value controls the temperature of the ACPI Critical Trip Point - the point in which the OS will shut the system off. NOTE: 100C is the Plan Of Record (POR) for all Intel mobile processors. →←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Critical Trip Point	[POR]	
Passive Trip Point	[70 C]	
Passive TC1 Value	1	
Passive TC2 Value	5	
Passive TSP Value	10	

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Feature	Options	Description
Critical Trip Point	POR 30°C ... 95°C	This value controls the temperature of the ACPI Critical Trip Point - the point in which the OS will shut the system off. Note: 100°C is the Plan Of Record (POR) for all Intel mobile processors
Passive Trip Point	Disabled 30°C ... 70°C ... 100°C	This value controls the temperature of the ACPI Passive Trip Point - the point in which the OS will begin throttling the processor
- Passive TC1 Value	1	This value sets the TC1 value for the ACPI Passive Cooling Formula. Range 1 - 16
- Passive TC2 Value	5	This value sets the TC2 value for the ACPI Passive Cooling Formula. Range 1 - 16
- Passive TSP Value	10	This item sets the TSP value for the ACPI Passive Cooling Formula. It represents in tenth of a second how often the OS will read the temperature when passive cooling is enabled. Range 2 - 32

Passive Cooling



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

$$\Delta P[\%] = TC1(T_n - T_{n-1}) + TC2(T_n - T_t)$$

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



See chapter 12 of the ACPI specification (www.acpi.info) for more details

ACPI Wake Event Configuration

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Advanced

ACPI Wake Event Configuration

Wake On Lan [Disable]

Wake On Ring [Disable]

Wake on GPIO0 [Disable]

Wake On GPIO1 [Disable]

Enable/Disable WOL

⇐: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

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Feature	Options	Description
Wake On Lan	Disable Enable	Enable / Disable WOL
Wake On Ring	Disable Enable	Enable / Disable WOR
Wake On GPIO0	Disable Enable	Enable / Disable GPIO0 wake
Wake On GPIO1	Disable Enable	Enable / Disable GPIO1 wake

CPU Configuration

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Advanced

CPU Configuration		Enable or Disable Intel(R) SpeedStep(tm)
Processor Type	Genuine Intel(R) CPU	
Processor Speed	1300 MHz	
System Bus Speed	400 MHz	
Ratio Status	13	
Processor Stepping	20661	
Microcode Revision	260	
L1 Cache RAM	56 k	
L2 Cache RAM	512 k	
Hyper-Threading	Supported	
EMT64	Supported	
Intel SpeedStep	[Enabled]	↔: Select Screen
Hyper-Threading	[Enabled]	↑↓: Select Item
Execute Disable Bit	[Enabled]	Enter: Select
Limit CPUID Maximum	[Disabled]	+/-: Change Opt.
Intel Virtualization Technology	[Disabled]	F1: General Help
TM support	[Enabled]	F2: Previous Values
C-States	[Enabled]	F3: Optimized Defaults
Enhanced C1	[Enabled]	F4: Save & Exit
Enhanced C2	[Enabled]	ESC: Exit
Enhanced C3	[Enabled]	
Enhanced C4	[Enabled]	

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Feature	Options	Description
Intel SpeedStep	Disabled Enabled	Enables/Disables the Intel Speedstep Technology (E)IST
Hyper-Threading	Disabled Enabled	Enables/Disables the Intel® Hyper Threading Technology HTT
Execute Disable Bit	Disabled Enabled	XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS
Limit CPUID Value Limit	Disabled Enabled	Disabled for Windows XP
Intel Virtualization Technology	Disabled Enabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology
TM support	Disabled Enabled	Enable CPU thermal management
C States	Disabled Enabled	Enable/Disable CPU Power Management. Allows CPU to to Idle States when it's not 100% utilized
Enhanced C1	Disabled Enabled	Enable or Disable Enhanced C1 State
Enhanced C2	Disabled Enabled	Enable or Disable Enhanced C2 State
Enhanced C3	Disabled Enabled	Enable or Disable Enhanced C3 State
Enhanced C4	Disabled Enabled	Enable or Disable Enhanced C4 State

Miscellaneous

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Advanced

Miscellaneous Configuration		Trusted Computing (TPM) settings
▶ Trusted Computing ▶ Clock Control ▶ Watchdog ▶ Smart Battery Configuration. ▶ JILI I2C - S5 Eco [Disabled] - Network OpROMs [Addon cards only] - Storage OpROMs [Onboard only]		
		⇐⇐: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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Feature	Options	Description
S5 Eco	Disabled Enabled	Reduce supply current in Soft Off State S5 to less than 1mA. If enabled, power button is the only wakeup source in S5. See chapter S5 Eco for more details
Network OpROMs	Disabled Onboard only Addon cards only Both	Enable or Disable Legacy Boot Option for Network Devices
Storage OpROMs	Disabled Onboard only Addon cards only Both	Enable or Disable Legacy Boot Option for Mass Storage Controllers

Trusted Computing

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Advanced		
TPM Configuration		Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required.
TPM SUPPORT	[Disable]	
Current TPM Status Information		
NO TPM Hardware		
		→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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Feature	Options	Description
TPM Support	Disabled Enabled	Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required
TPM State	Disabled Enabled	Turn TPM On/Off. NOTE: Your Computer will reboot to change State of TPM

Clock Control

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Advanced

Main PLL Configuration.
Spread Spectrum [Disabled]

Enabled/Disable Spread Spectrum

←→: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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Feature	Options	Description
Spread Spectrum	Disabled Enabled	Enable/Disable Spread Spectrum

Watchdog

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Advanced

Watchdog Configuration.		Enable automatic reload of watchdog timers on timeout.
Auto-reload	[Disabled]	
Global Lock	[Disabled]	
Stage 1 Mode	[Disabled]	

++: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

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Feature	Options	Description
Auto-reload	Disabled Enabled	Enable automatic reload of watchdog timers on timeout
Global Lock	Disabled Enabled	If set to enabled, all Watchdog registers (except WD_KICK) become read only until the board is reset
Stage 1 Mode	Disabled Reset Delay	Select Action for first Watchdog stage
- Assert WDT Signal	Disabled Enabled	Enable/Disable assertion of WDT signal to baseboard on stage timeout
- Stage 1 Timeout	1s 5s 10s 30s 1m 3m 10m 30m	Select Timeout value for first watchdog stage
Stage 2 Mode	Disabled Reset	Select Action for second Watchdog stage
- Assert WDT Signal	Disabled Enabled	Enable/Disable assertion of WDT signal to baseboard on stage timeout
- Stage 2 Timeout	1s 5s 10s 30s 1m 3m 10m 30m	Select Timeout value for second watchdog stage

Smart Battery Configuration

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Advanced

Smart Battery Configuration.

M.A.R.S. [Auto]

System Type N/A

Power Source N/A

Connected Batteries N/A

▶ Battery #1

▶ Battery #2

▶ Battery #3

▶ Battery #4

Configuration of M.A.R.S. Smart Battery System

↔: Select Screen

↑↓: Select Item

Enter: Select

+/-: Change Opt.

F1: General Help

F2: Previous Values

F3: Optimized Defaults

F4: Save & Exit

ESC: Exit

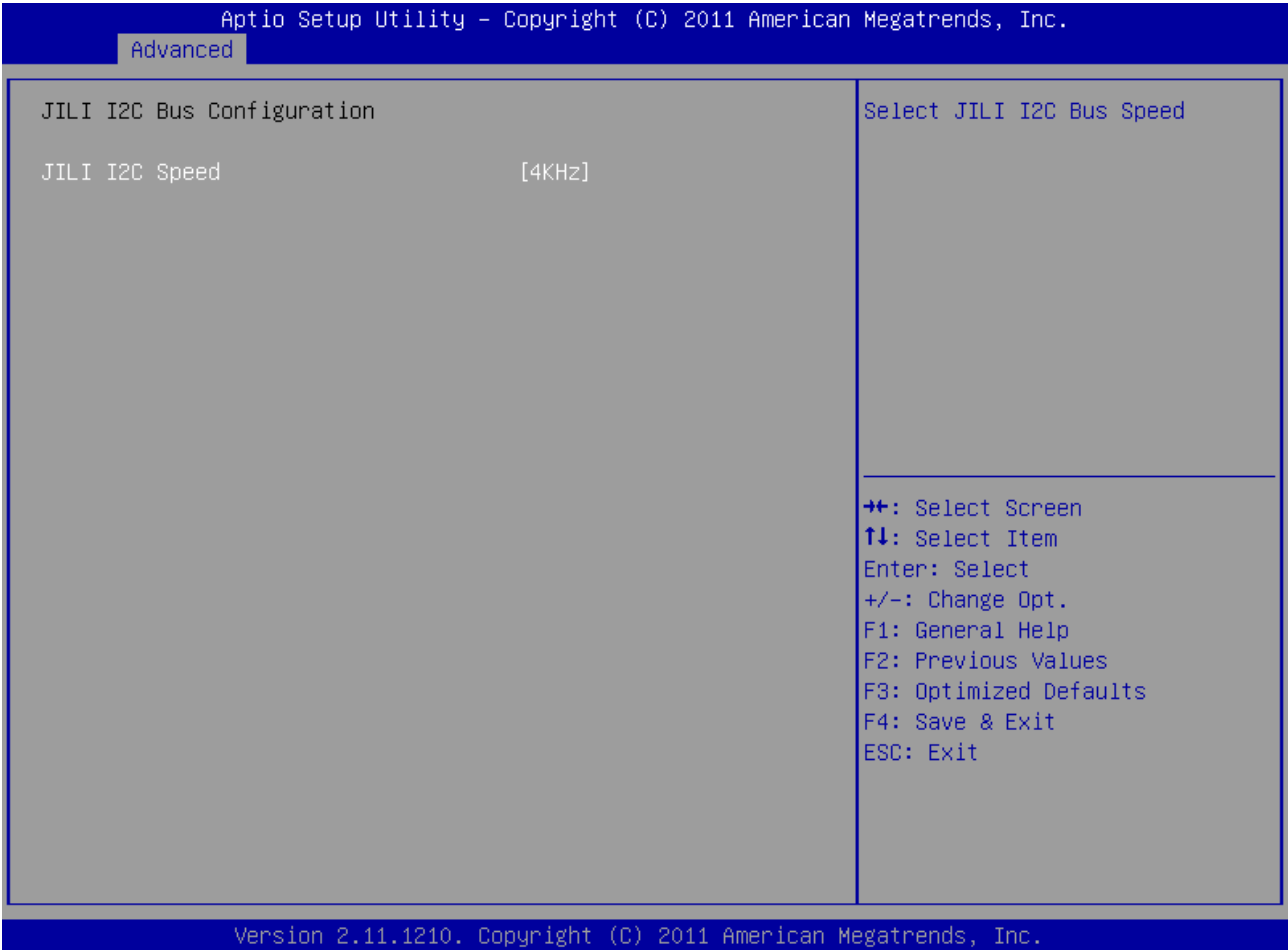
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Feature	Options	Description
M.A.R.S.	Disabled AUTO Charger Manager	Preset M.A.R.S. Smart Battery System mode. System must be restarted to reflect mode changes

Battery Information

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Advanced	
Battery #1	
State	: N/A
Manufacturer	: N/A
Serial Number	: N/A
Device Name	: N/A
Chemistry	: N/A
Rel. State of Charge	: N/A
Cycle Count	: N/A
Date Of Manufacturing	: N/A
Charge Time	: N/A
Discharge Time	: N/A
Temperature	: N/A
Device Capacity	: N/A
Last Full Capacity	: N/A
Battery Voltage	: N/A
Current On Terminals	: N/A
⬅➡: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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JILI I2C



Feature	Options	Description
JILI I2C Speed	1kHz 4kHz 12.5kHz 50kHz	Select Jili I2C Bus Speed

USB Configuration

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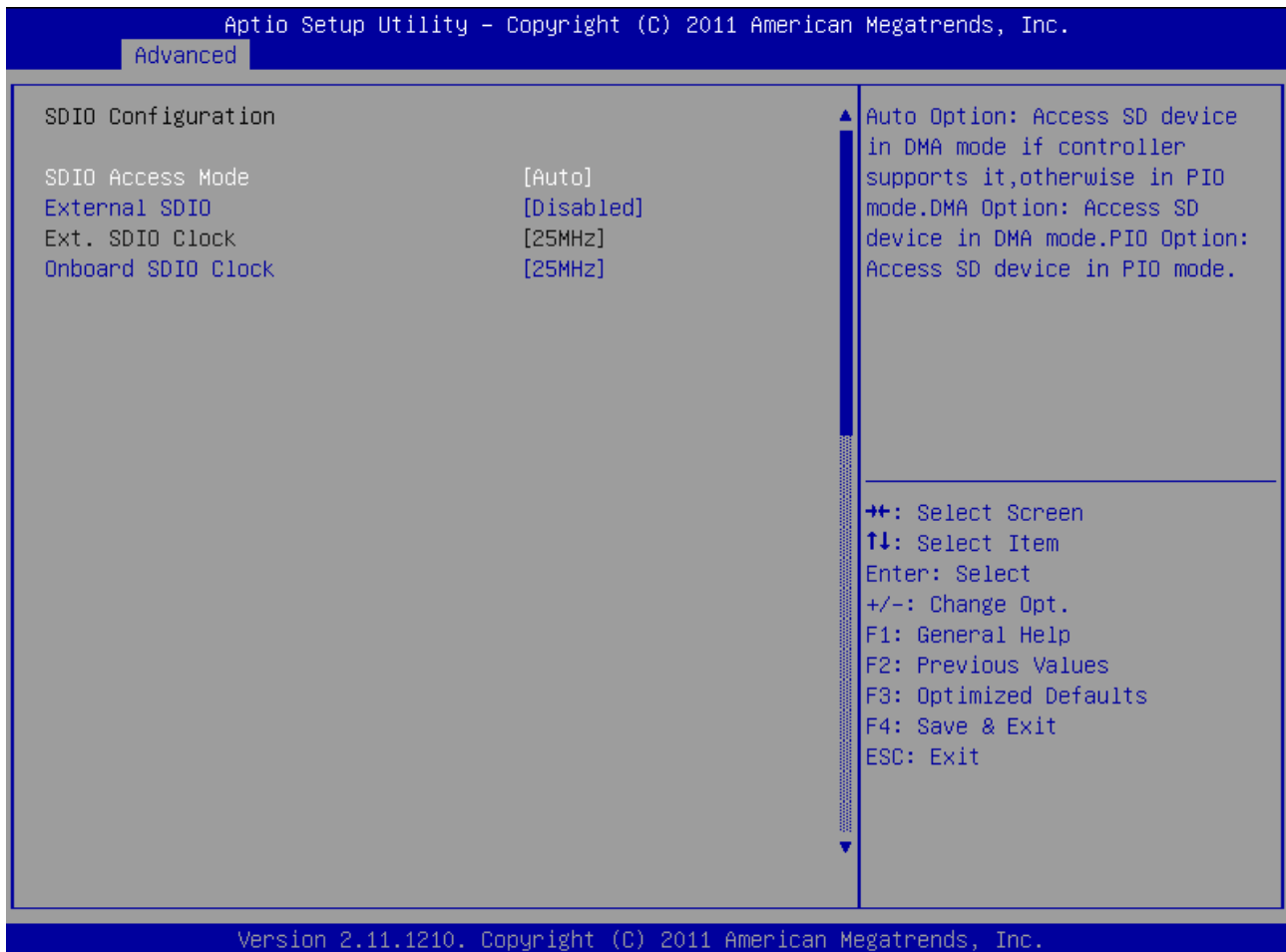
Advanced

USB Configuration USB Devices: 1 Drive, 1 Keyboard, 1 Mouse Legacy USB Support [Enabled] EHCI Hand-off [Enabled] USB Beep [Enabled] Device Reset timeout [20 sec] Mass Storage Devices: JetFlashTranscend 32GB 8.07 [Auto]	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications. →←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
--	---

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Feature	Options	Description
Legacy USB Support	Enabled Disabled AUTO	Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
EHCI Hand-off	Enabled Disabled	This is a workaround for OSes without EHCI hand-off Support. The EHCI ownership change should be claimed by EHCI driver
USB Beep	Enabled Disabled	Send speaker beep for device attach / detach
Device reset time-out	10sec 20sec 30sec 40sec	USB mass storage device Start Unit command time-out

SDIO Configuration



Feature	Options	Description
SDIO Access Mode	Auto DMA PIO	Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA Option: Access SD device in DMA mode, PIO Option: Access SD device in PIO mode
External SDIO	Disabled Enabled	Enable/Disable external SDIO slot on Acrrier board. If disabled, the SDIO pins for this Slot will be used as GPIOs
Ext. SDIO Clock	25MHz 12.5MHz 6.25MHz	Select the maximum allowable speed for the slot. Actual speed may be lower depending on controller capabilities
Onboard SDIO Clock	25MHz 12.5MHz 6.25MHz	Select the maximum allowable speed for the slot. Actual speed may be lower depending on controller capabilities

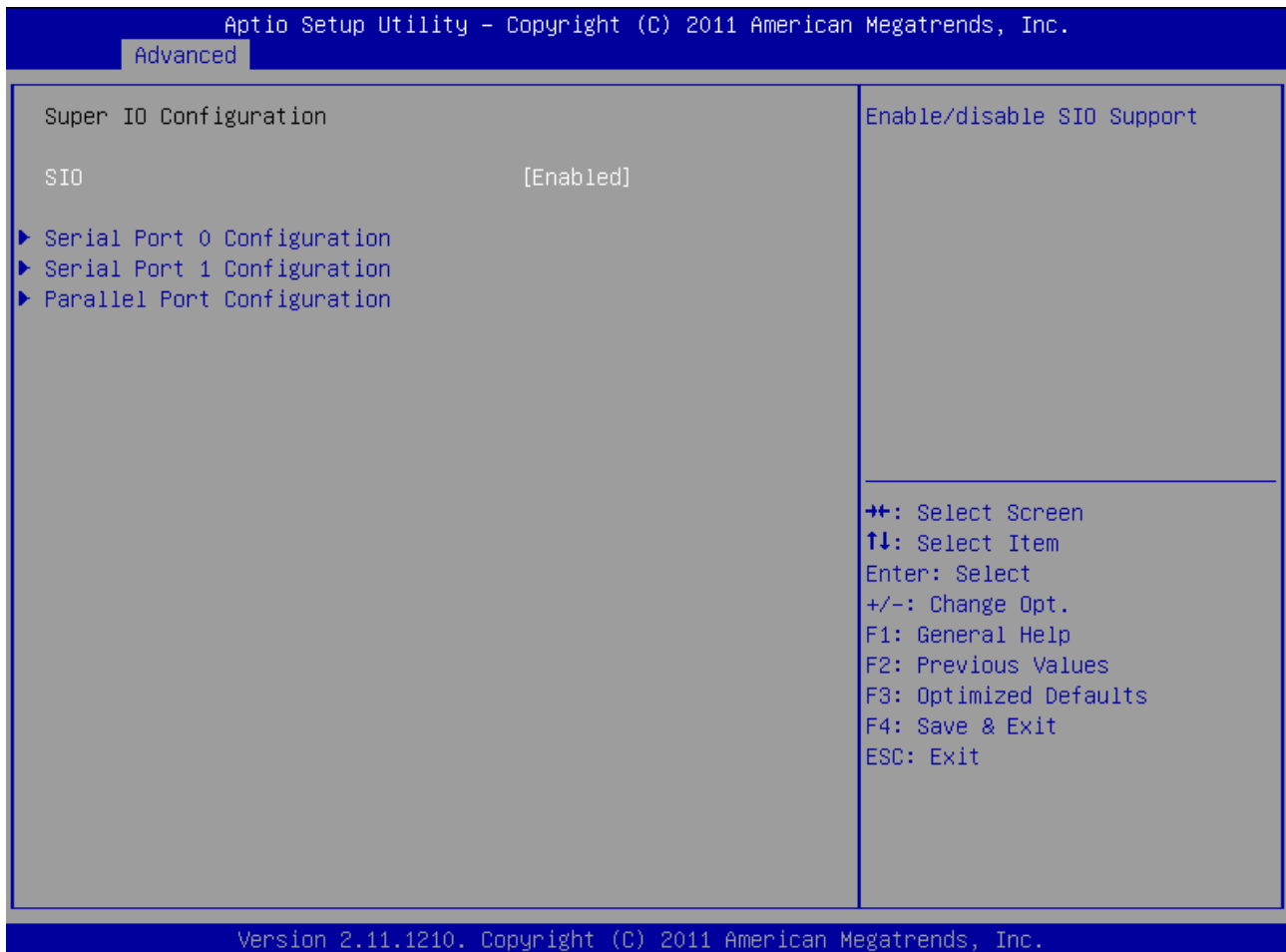
Module H/W Monitor



Hardware Monitor measurements and configuration for the onboard WINBOND W83L771W or optional LM87.

Feature	Value/Options	Description
Local Temperature	xx°C	Shows the internal temperature of onboard HWM
CPU Temperature	xx°C	Shows the measured temperature of the CPU Diode with onboard HWM

Super I/O Configuration



This setup option is available if a LPC SuperI/O Nuvoton 83627 is present on the baseboard. By default the nanoETXexpress-TT supports the legacy interfaces of a 5V 83627HF(J) or 3.3V 83627DHG-P on external LPC. The hardware monitor is not supported in setup.

Serial Port 0 Configuration

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Advanced

Serial Port 0 Configuration		Enable or Disable Serial Port (COM)
Serial Port	[Enabled]	
Device Settings	IO=3F8h; IRQ=4;	
Change Settings	[Auto]	
Device Mode	[Standard Serial Po...]	

++: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

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Feature	Options	Description
Serial Port	Disabled Enabled	Enable or Disable Serial Port (COM) 0
Change Settings	AUTO IO=3F8h; IRQ=4; IO=3F8h, IRQ=3,4,5,6,7,10,11,12; IO=2F8h, IRQ=3,4,5,6,7,10,11,12; IO=3E8h, IRQ=3,4,5,6,7,10,11,12; IO=2E8h, IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for SuperIO device.
Device Mode	Standard Serial Port Mode IrDA 1.0 (HP SIR) Mode ASKIR Mode	Change the Serial Port mode.

Serial Port 1 Configuration

Feature	Options	Description
Serial Port	Disabled Enabled	Enable or Disable Serial Port (COM) 1
Change Settings	AUTO IO=2F8h; IRQ=3; IO=3F8h, IRQ=3,4,5,6,7,10,11,12; IO=2F8h, IRQ=3,4,5,6,7,10,11,12; IO=3E8h, IRQ=3,4,5,6,7,10,11,12; IO=2E8h, IRQ=3,4,5,6,7,10,11,12;	Select an optimal setting for SuperIO device.
Device Mode	Standard Serial Port Mode IrDA 1.0 (HP SIR) Mode ASKIR Mode	Change the Serial Port mode.

Parallel Port Configuration

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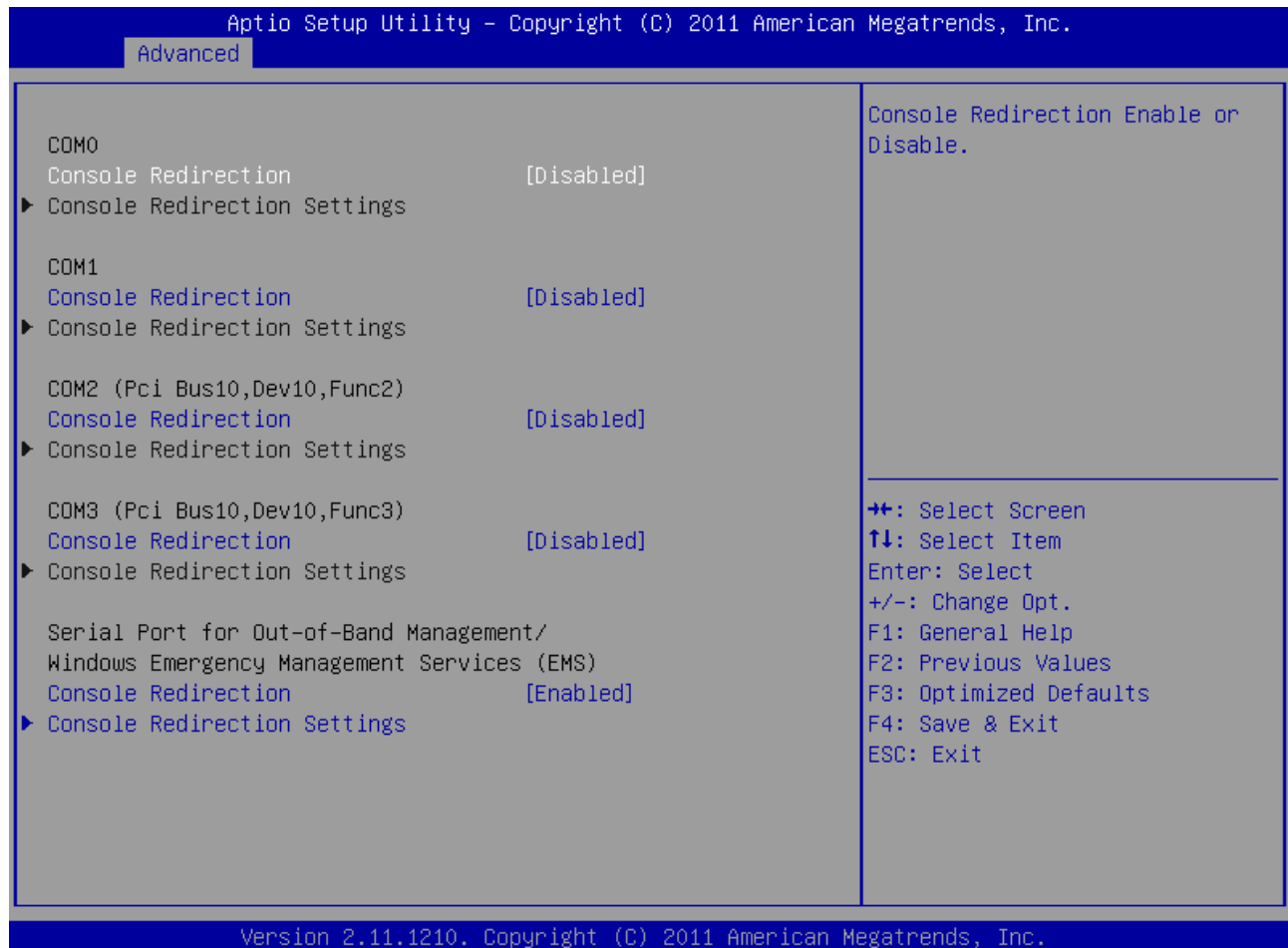
Advanced

Parallel Port Configuration		Enable or Disable Parallel Port (LPT/LPTE)
Parallel Port	[Enabled]	⇐+: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Device Settings	IO=378h; IRQ=5;	
Change Settings	[Auto]	
Device Mode	[Standard Parallel ...]	

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

Serial Port Console Redirection



Feature	Options	Description
Console Redirection	Disabled Enabled	Enable/Disable Serial Port COM0 Console Redirection
Console Redirection	Disabled Enabled	Enable/Disable Serial Port COM1 Console Redirection
Console Redirection	Disabled Enabled	Enable/Disable Serial Port COM2 Console Redirection
Console Redirection	Disabled Enabled	Enable/Disable Serial Port COM3 Console Redirection
Console Redirection	Disabled Enabled	Enable/Disable Serial Port for Out-of-Band Management / Windows EMS

COM0-3 Console Redirection Settings

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Advanced

COM1 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Terminal Type	[ANSI]	⇐⇐: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Bits per second	[115200]	
Data Bits	[8]	
Parity	[None]	
Stop Bits	[1]	
Flow Control	[None]	
Recorder Mode	[Disabled]	
Resolution 100x31	[Disabled]	
Legacy OS Redirection Resolution		[80x24]

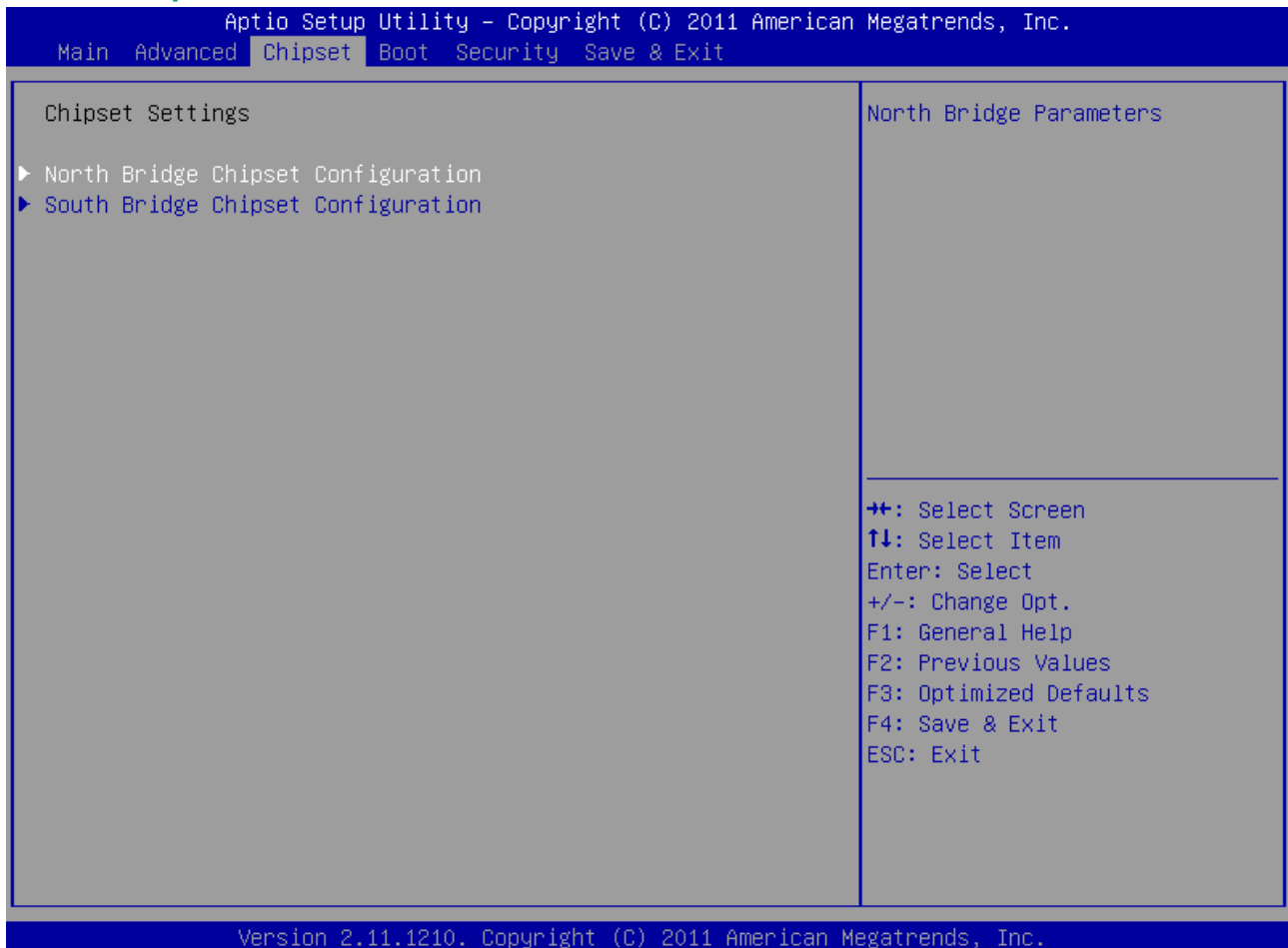
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Feature	Options	Description
Terminal Type	VT100 VT100+ VT_UTF8 ANSI	VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes ANSI: Extended ASCII char set.
Bits per second	9600 19200 38400 57600 115200	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds
Data Bits	7 8	Data Bits
Parity	None Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection.
Stop Bits	1 2	Stop Bits indicate the end of a serial data packet. (A Start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	None Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals
Recorder Mode	Disabled Enabled	With this mode enabled only text will be sent. This is to capture terminal data.
Resolution 100x31	Disabled Enabled	Enables or disables extended terminal resolution
Legacy OS Redirection Resolution	80x24 80x25	On Legacy OS, the Number of Rows and Columns supported redirection

Out-of-Band Management Port Console Redirection Settings

Feature	Options	Description
Out-of-Band Mgmt Port	COM0 COM1 COM2 (PCI Bus10,Dev10,Function2) COM3 (PCI Bus10,Dev10,Function3)	Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port
Terminal Type	VT100 VT100+ VT_UTF8 ANSI	VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes ANSI: Extended ASCII char set.
Bits per second	9600 19200 38400 57600 115200	Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds
Flow Control	None Hardware RTS/CTS Software Xon/Xoff	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals

6.3.4 Chipset



North Bridge Chipset Configuration

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Chipset

North Bridge Chipset Configuration		Select the amount of system memory used by the Integrated Graphics Device.
Memory Information		
MRC Version	01.00	
Total Memory	1024 MB (DDR2)	
vBIOS Version	1816	
IGD Mode Select	[Enabled, 8MB]	
MSAC Mode Select	[Enabled, 256MB]	
Video Driver	[EMGD VBIOS]	
Flat Panel Type	[AUTO]	
		⇐: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

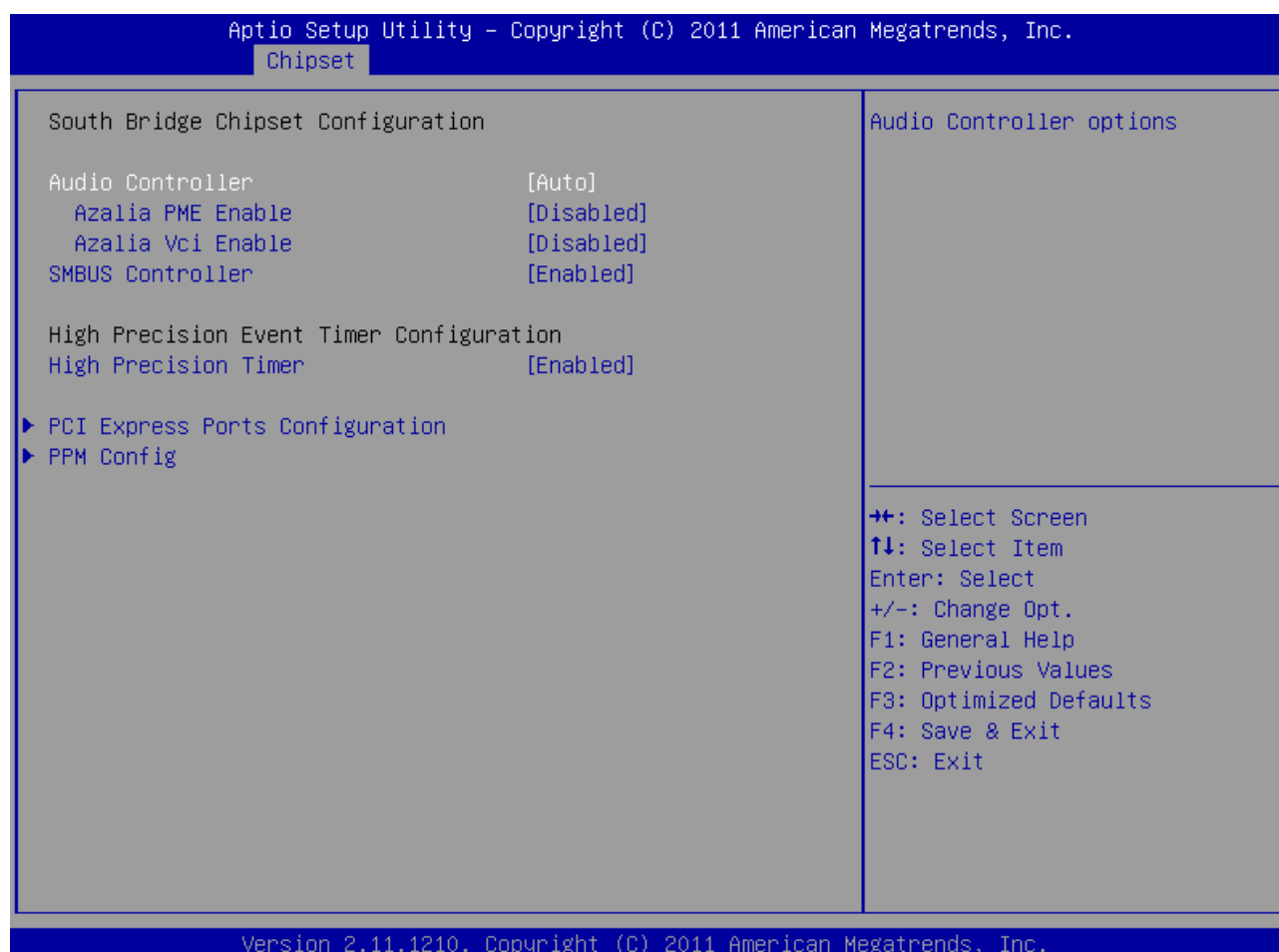
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Feature	Options	Description
IGD Mode Select	Disabled Enabled, 1MB Enabled, 4MB Enabled, 8MB Enabled, 16MB Enabled, 32MB Enabled, 48MB Enabled, 64MB	Select the amount of system memory used by the Integrated Graphics Device
MSAC Mode Select	Enabled, 512MB Enabled, 256MB Enabled, 128MB	Select the size of the graphics memory aperture and untrusted space. Used by the Integrated Graphics Device
Video Driver	EMGD VBIOS EMGD GOP	Select VBIOS if legacy support is required, GOP to speed up POST
Flat Panel Type	AUTO LVDS 800×600 18Bit	AUTO configuration supports SDVO. If no monitor attached, LVDS will be activated. Use VESA DisplayID to auto-configure LVDS Panels. Only 18Bit LVDS supported



24Bit LVDS support requires a different BIOS. Please contact your local sales or support for more details.

South Bridge Chipset Configuration



Feature	Options	Description
Audio Controller	Disabled Enabled Auto	Control Detection of the High definition audio (Azalia) device. Disabled = HDAudio will be unconditionally disabled. Enabled = HDAudio will be unconditionally enabled. Auto = HDAudio will be enabled if present, disabled otherwise
- Azalia PME Enable	Disabled Enabled	Enable/Disable Power Management capability of Audio Controller
- Azalia Vci Enable	Disabled Enabled	Enable/Disable Azalia Vci
SMBUS Controller	Disabled Enabled	SMBus Controller options
High Precision Timer	Disabled Enabled	Enable or Disable the High Precision Event Timer

PCI Express Ports Configuration PCI Express Root Port 0/1/2

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Chipset

PCI Express Root Port 0	[Enabled]	Control the PCI Express Root Port.
-------------------------	-----------	------------------------------------

⇐⇐: Select Screen
 ↑↓: Select Item
 Enter: Select
 +/-: Change Opt.
 F1: General Help
 F2: Previous Values
 F3: Optimized Defaults
 F4: Save & Exit
 ESC: Exit

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Feature	Options	Description
PCI Express Root Port	Disabled Enabled	Control the PCI Express Root Port

PPM Config

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Chipset

C-state POPUP	[Enabled]	Enable/Disable C-state POPUP
---------------	-----------	------------------------------

++: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit

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Feature	Options	Description
C-State POPUP	Disabled Enabled	Enable/Disable C-state POPUP

Boot Option Priority

By default, AMI APTIO uses following boot priority if at least one device of a group is connected:

- » Boot Option #1: Prio 1 Hard Disk
- » Boot Option #2: Built-in EFI Shell
- » Boot Option #3: Prio 1 HDD UEFI boot option
- » Boot Option #4: Prio 1 CD/DVD ROM Drive
- » Boot Option #5: Prio 1 Floppy UEFI boot option
- » Boot Option #6: Prio 1 Floppy Drive

HDD and CD/DVD-ROM group internal drive priority

The internal device priority for Hard Disks and Optical drives is:

- » 1. SATA #0/#1
- » 2. USB

6.3.6 Security

Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.	
Main Advanced Chipset Boot Security Save & Exit	
Password Description If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password must be 3 to 20 characters long. Administrator Password User Password	Set Administrator Password →←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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Feature	Options	Description
Administrator Password	-	Set the Administrator Password for Setup Access
User Password	-	Set User Password

6.3.7 Save & Exit



Feature	Options	Description
Save Changes and Exit	-	Exit system setup after saving the changes
Discard Changes and Exit	-	Exit system setup without saving any changes
Save Changes and Reset	-	Reset system after saving the changes
Discard Changes and Reset	-	Reset system without saving any changes
Save Options	-	Save changes made so far to any of the setup options
Discard Changes	-	Discard changes made so far to any of the setup options
Restore Defaults	-	Restore/Load Default values for all the setup options
Save as User Defaults	-	Save the changes made so far as User Defaults
Restore User Defaults	-	Restore the User Defaults to all the setup options
Boot Override	List of all boot options	Boot directly from selected device

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