nanoX-TCR
(Computer-on-Module)
Reference Manual

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REVISION HISTORY

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Audience

This manual provides reference only for computer design engineers, including but not limited to hardware and software designers and applications engineers. ADLINK Technology, Inc. assumes you are qualified to design and implement prototype computer equipment.

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Chapter 1 About This Manual

Purpose of this Manual

This manual is for designers of systems based on the nanoX-TCR (Computer-on-Module). This manual contains information that permits designers to create an embedded system based on specific design requirements.

Information provided in this reference manual includes:

- nanoX-TCR specifications
- Environmental requirements
- Major ICs and features implemented
- nanoX-TCR connector/pin numbers and definitions
- BIOS Setup information

Information not provided in this reference manual includes:

- Detailed chip specifications
- Internal component operation
- Internal registers or signal operations
- Bus or signal timing for industry-standard busses and signals

References

The following list of references may be helpful for you to complete your custom design successfully.

Specifications

- COM Express Specification Revision 2.0

  Web site: http://www.picmg.org/
- COM Express Carrier Design Guide 1.0

  Web site: http://www.picmg.org/pdf/PICMG_COMDG_100.pdf
- LPC Bus Specification, Revision 1.1, August, 2002

  Specification: http://www.intel.com/design/chipsets/industry/25128901.pdf
- PCIe Specification, Revision 1.0a, April 15, 2003

  Specification (for members): http://www.pcisig.com/home
- I^2C Bus Specification Version 2.1

  Specification: http://www.nxp.com/documents/other/39340011.pdf
- AMI BIOS Aptio TSE User's Guide

  Datasheet: http://www.ami.com/support/doc/AMI_TSE_User_Manual_PUB.pdf
- Bosch CAN specification version 2.0B

  Specification: http://www.can-cia.org/fileadmin/cia/specifications/CAN20B.pdf
- SATA Specification Version 2.6

  Web site: http://www.sata-io.org/

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Chip Specifications

- Intel® Corporation and the Atom™ E6XXT series CPU, used as integrated processor core and graphics memory hub

  Datasheet: http://download.intel.com/embedded/processor/datasheet/324208.pdf

- Intel Corporation and the EG20T chip, used as Platform Controller Hub (PCH)

  Datasheet: http://download.intel.com/embedded/chipsets/datasheet/324211.pdf

- National Semiconductor and the LM96163 chip, used as Temperature Sensor

  Datasheet: http://www.national.com/ds/LM/LM96163.pdf

- Intel Corporation and the 82574IT chip used as the Gigabit Ethernet controller

  Datasheet: http://download.intel.com/design/network/datashts/82574.pdf

- Atmel Corporation and the ATMEGA168V-10AU chip used as the board controller

  Datasheet: http://www.atmel.com/dyn/resources/prod_documents/2545S.pdf

NOTE	If you are unable to locate the datasheets using the links provided, search the internet to find the manufacturer's web site and locate the documents you need.

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Chapter 2 Product Overview

This introduction presents general information about the COM Express™ architecture and the nanoX-TCR Computer-on-Module (COM). After reading this chapter you should understand:

- COM Express Concept
- COM Express Architecture
- nanoX-TCR Product Description
- nanoX-TCR Major Components
- nanoX-TCR Connector Description
- nanoX-TCR Specifications

COM Express Concept

COM Express is an open industry standard defined specifically for COM boards. Its creation provides the ability to make a smooth transition from legacy parallel interfaces to the newest technologies based on serial buses available today. COM Express modules are available in the following form factors:

- Mini 84mm x 55mm
- Compact 95mm x 95mm
- Basic 125mm x 95mm
- Extended 155mm x 110mm

The COM Express specification 2.0 defines seven different pinout types.

Table 2-1. COM Express Pinout Types

Types	Connector Rows	PCI Express Lanes	PCI	IDE Channels	LAN ports
Type 1	A-B	Up to 6			1
Type 2	A-B C-D	Up to 22	32 bit	1	1
Type 3	A-B C-D	Up to 22	32 bit		3
Type 4	A-B C-D	Up to 32		1	1
Type 5	A-B C-D	Up to 32			3
Type 6	A-B C-D	Up to 24			1
Type 10	A-B	Up to 4			1

The nanoX-TCR utilizes the Mini form factor and the Type 10 pinout definition, featuring one high-performance COM Express connector that ensures stable data throughput. The single-connector interfaces of the Type 1 and Type 10 pinouts free systems completely from legacy signals while solving the space constraints of the Mini form factor. The Type 10 pinout provides additional flexibility for developers by freeing up pins reserved for SATA and PCIe for future technologies and using the second LVDS channel, VGA, and TV-Out pins to support SDVO (via DDI). The Type 10 pinout also supports the SPI interface, which was unavailable in previous COM Express revisions.

The COM board integrates all core components and is mounted onto an application specific baseboard. COM boards are legacy-free hardware designs (no Super I/O, PS/2 keyboard, and PS/2 mouse) and provide most of the functional requirements for any application. These functions include, but are not limited to a rich complement of contemporary, high-bandwidth serial interfaces such as PCI Express, Serial ATA, USB 2.0, and Gigabit Ethernet. The robust thermal and mechanical concept of the COM board, combined with extended power management capabilities, is perfectly suited for all applications.

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Baseboard designers can utilize as little or as many of the I/O interfaces as necessary. The baseboard can therefore provide all the interface connectors required to attach the system to the application specific peripherals. This versatility allows the designer to create a dense and optimized package, which results in a more reliable product while simplifying system integration. Most importantly, COM Express modules are scalable, which means once an application has been created, the ability to diversify the product range is possible through the use of different performance class modules. Simply unplug one module and replace it with another. No redesign is necessary.

COM Express Architecture

The COM Express specification was developed by the PCI Industrial Computer Manufacturing Group (PICMG) in close collaboration with many leading companies across the embedded industry in order to find an implementation solution to handle upcoming new high speed serial I/Os, processors, and chipsets. COM Express specifies four form factors, as well as seven different types of connector pinouts.

The four form factors are referred to as Mini, Compact, Basic, and Extended. The Mini form factor targets battery powered, mobile, and handheld system designs and features a footprint of just 84mm x 55mm. The Compact form factor is 95mm x 95mm, designed to match the requirements of small applications. The Basic module footprint is 125mm x 95mm and focuses on space-constrained, low power systems which typically do not contain more than one horizontal mounted SODIMM. The Extended footprint is slightly larger at 155mm x 110mm and supports up to two full-size, vertically mounted DIMM modules to accommodate larger memory configurations for high-performance CPUs, chipsets, and multiprocessor systems. The placement of the shielded 220-pin connectors and the mounting holes are identical between these four footprints.

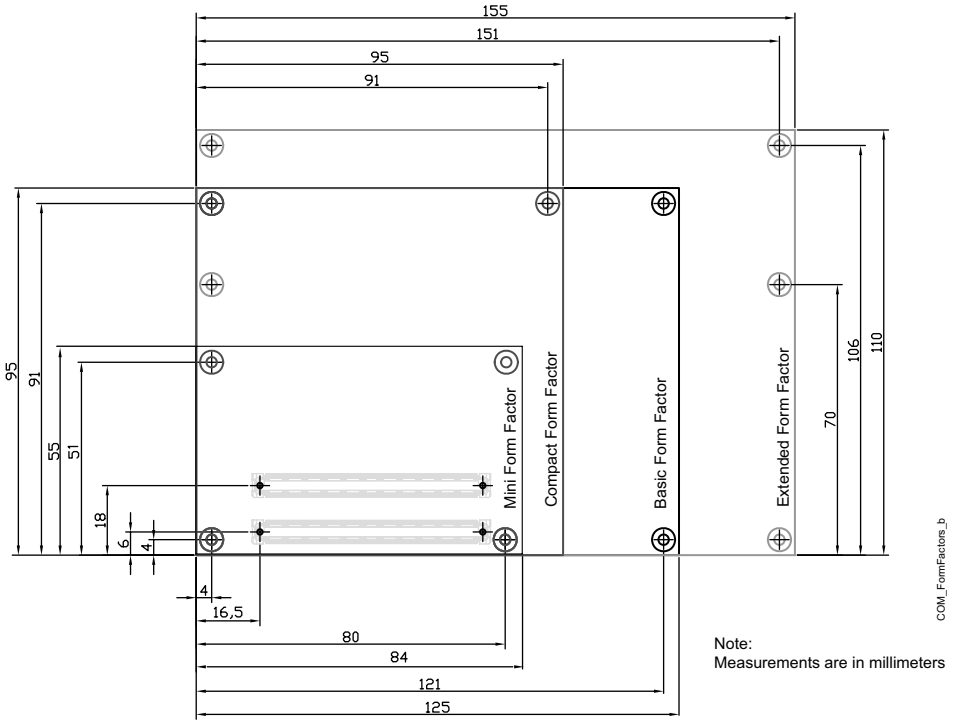


Figure 2-1. Mini, Compact, Basic and Extended Form Factors

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Product Description

The nanoX-TCR is an exceptionally high integration, high performance, rugged Intel® Atom™ E6XXT processor based system, compatible with the COM Express standard. This rugged and high quality module system contains all the component subsystems of an ATX motherboard plus the equivalent of several PCI Express expansion boards.

The Intel Atom E6XXT series CPUs integrate processor cores with Graphics and Memory Controller Hubs (GMCHs), providing low-power, high-performance processors, memory controllers for up to 2GB of on-board memory, and graphics controllers for LVDS and SDVO signals.

The Intel EG20T PCH (Platform Controller Hub) provides controllers for a range of common interfaces including six USB 2.0 ports and up to two SATA ports as well as embedded interfaces for CAN (optional), GPIO, and I2C. The nanoX-TCR provides an optional Solid State Drive through the SATA1 port and one Gigabit Ethernet interface through the Intel 82574IT Gigabit Ethernet controller chip (external magnetics required) using PCIe Port1 from the CPU. The PCIe Port0 connects the PCH to the CPU.

Expansion for additional system functions is possible on the nanoX-TCR through the PCIe and LPC expansion buses. The PCIe and LPC buses operate at clock speeds of 100MHz and 33MHz, respectively.

The nanoX-TCR is particularly well suited for either embedded or portable applications and meets the size, power consumption, temperature range, quality, and reliability demands of embedded system applications.

Module Features

- CPU
  - Provides Intel® Atom™ 600MHz (E620T), 1.3GHz (E660T), or 1.6GHz (E680T) Processor Cores and Graphics Memory Hubs
  - Provides internal 512-kB, 8-way L2 cache
  - Provides Enhanced Intel SpeedStep® Technology (EIST)
  - Supports Hyper-Threading Technology
  - Provides L2 Dynamic Cache Sizing
  - Supports 32-bit physical addresses and 48-bit linear addresses
  - Provides 3D graphics engine
  - Provides single-channel DDR2 memory controller
- Memory
  - Provides non-ECC, unbuffered memory
  - Provides up to 2 GB of +1.8V DDR2 soldered, on-board memory
  - Supports 32-bit data bus
  - Supports DDR2 800MHz memory
- Expansion Buses
  - PCIe between CPU/PCH and COM Express connector
  - LPC (Low Pin Count) for LPC devices
  - I^2C for fast mode I^2C devices
  - SMBus for expansion cards
  - CAN bus for devices on the baseboard

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- COM Express Interface
  - SATA Interface
    - Provides up to two SATA ports
    - Supports up to 3 Gb/s transfer speed
    - Supports Native Command Queuing for up to 32 entries
    - Provides Auto Activate for DMA
    - Supports Hot Plug features
  - HD Audio
    - Provides Intel HD Audio controller
    - Supports Audio Docking
    - Provides 32-bit sample depth
    - Supports sample rates up to 192kHz
  - USB Port Interface
    - Supports six EHCI USB 2.0 ports
    - Supports one USB Client port
    - Supports legacy OHCI USB 1.1 signals
    - Supports Per-Port-Disable
  - Ethernet Interface
    - Provides one fully independent Ethernet port
    - Provides integrated LEDs on each port (Link/Activity and Speed)
    - Provides one Intel 82574IT controller chip
    - Supports IEEE 802.3 10/100BaseT and 10/100/1000BaseT compatible physical layers
    - Supports Auto-negotiation for speed, duplex mode, and flow control
    - Supports full duplex or half-duplex mode
      -Full-duplex mode supports transmit and receive frames simultaneously
      -Supports IEEE 802.3x Flow control in full duplex mode
      -Half-duplex mode supports enhanced proprietary collision reduction mode
  - Video Interfaces (SDVO and LVDS)
    - Provide SDVO outputs
      -Resolutions up to 1280x1024 @ 85Hz
      -A variety of external display technologies such as DVI, TV-Out, and VGA
      -Maximum pixel clock rate up to 160MHz
    - Provide LVDS flat panel outputs
      -Resolutions up to 1280x768 @ 60Hz
      -Minimum pixel clock rate of 19.75MHz
      -Maximum pixel clock rate of 80MHz
      -Pixel color depths of 18 and 24 bits

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- CAN Interface (**Optional**)
  - Supports bit rate up to 1 Mbps
  - Supports 32 message objects

- Miscellaneous
  - Real Time Clock (RTC) with external battery
  - Watchdog Timer (WDT)
  - CPU Temperature Sensor
  - OEM Logo Screen (Splash)

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Block Diagram

Figure 2-2 shows the functional components of the module.

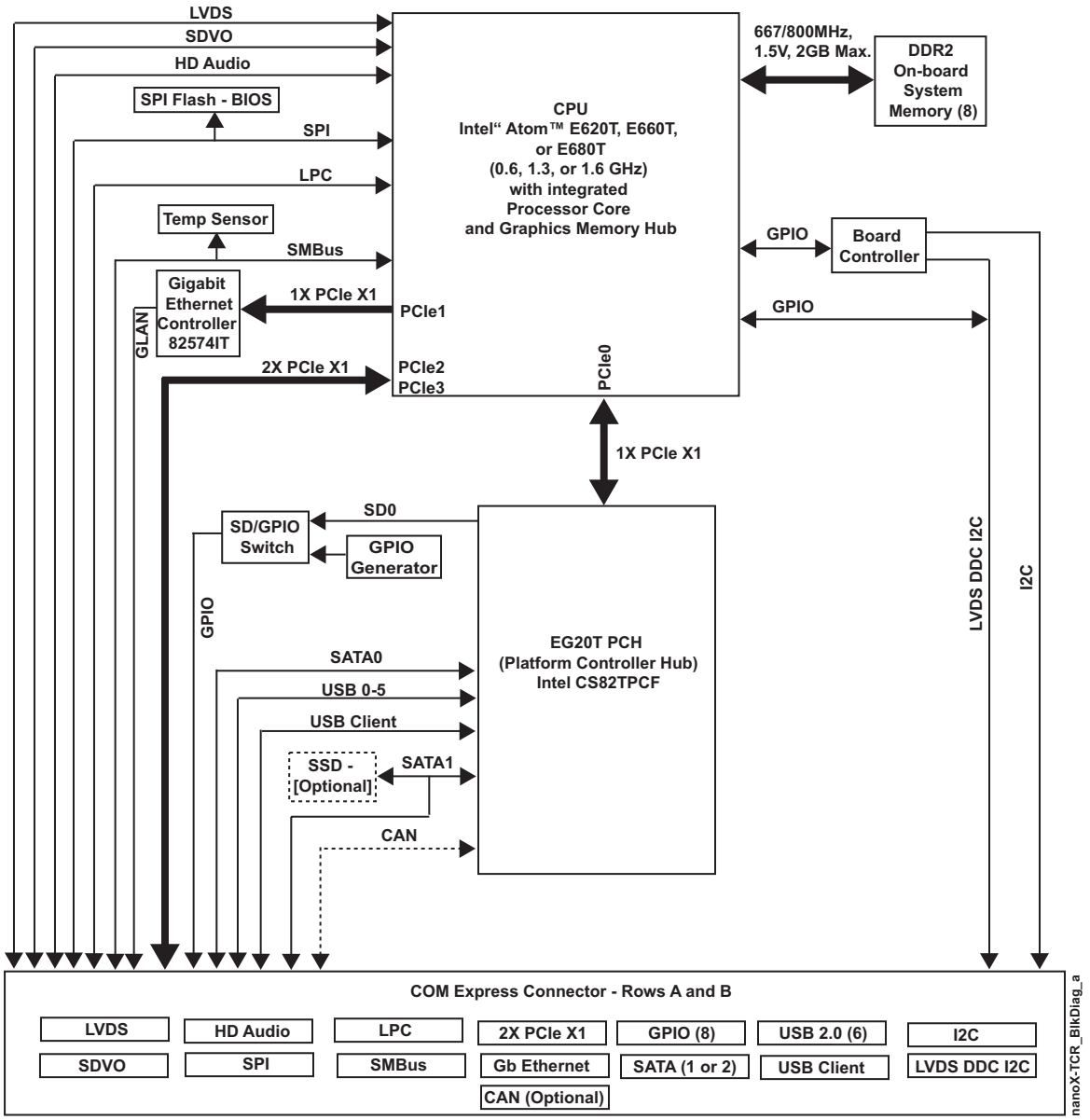


Figure 2-2. Functional Block Diagram

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Major Components (ICs)

Table 2-2 lists the major integrated circuits on the nanoX-TCR, including a brief description of each IC. Figures 2-3 and 2-4 show the locations of the major ICs.

Table 2-2. Major Integrated Circuit Descriptions and Functions

Chip Type	Mfg.	Model	Description	Function
CPU (U31)	Intel	Atom E620T, E660T, and E680T	600MHz, 1.3GHz, or 1.6GHz processor with 8-way L2 cache	Integrates Processor Core and Graphics Memory Hub
PCH (Platform Controller Hub [U42])	Intel	CS82TPCS (EG20CP PCH)	I/O hub providing Southbridge functions (standard I/O functions)	Provides I/O interfaces such as USB, SATA, and video
SSD (U3) - **Optional**	SiliconMotion	SM631GE	Industrial-grade soldered solid state storage module	Provides solid state storage through the SATA interface
GPIO Generator	Philips	PCA9535BS	Module providing 16 bits of GPIO expansion for I2C/SMBus applications	Provides additional digital control lines
SD/GPIO Switch (U5)	Pericom	PI5C3390QE	Multiplexer/ Demultiplexer providing switching function between SD and GPIO signals	Provides a zero-delay switch connection
Gigabit Ethernet Controller (U7)	Intel	82574IT	Gigabit Ethernet controller	Generates PCIe 10T/100TX/ 1000T Ethernet signals
Board Controller (U10)	Atmel	ATMEGA168V-10AU	Micro controller for board functions including I^2C, Watchdog Timer, and LVDS Display Data Channel (DDC)	Optimizes power consumption versus processor speed
Ethernet EEPROM (U19 - on bottom side [see Figure 2-4])	Atmel	AT25128B-SSHL	Three-Wire Serial EEPROM for Gigabit Ethernet Controller	Provides storage for MAC addresses, serial numbers, and pre-boot configuration data
Memory EEPROM (U27 - on bottom side [see Figure 2-4])	Atmel	AT24C02B	Two-Wire Serial EEPROM for SPD (Serial Presence Detect)	Provides storage for System Memory configuration data

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Table 2-2. Major Integrated Circuit Descriptions and Functions (Continued)

DDR2 Memory (U38, U39, U40, U41 - on bottom side [see Figure 2-4])	Micron	MT47H128M8CF-25E	On-board DDR2 System Memory	Provides high-speed data transfer
DDR2 Memory (U43, U44, U45, U46)	Micron	MT47H128M8CF-25E	On-board DDR2 System Memory	Provides high-speed data transfer
Temperature Sensor - CPU (U113 - on bottom side; see Figure 2-4])	National Semiconductor	LM96163	Remote diode digital temperature sensor	Measures its own temperature and the temperature of the CPU thermal diode and provides temperature correction with fan speed control.
Power Management IC (U115)	ROHM	BD9591MWV	Power Management Chipset	Supplies power to main system blocks
Power Regulator (U116 - on bottom side; see Figure 2-4])	ROHM	BD9595MUV	Power Regulator	Rectifies sudden change in power load from BD9591MWV

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Key:
U3 - SSD [Optional]
U5 - SD/GPIO Switch
U7 - Gigabit Ethernet Controller
U10 - Board Controller
U31 - CPU
U38 - DDR2 SDRAM
U39 - DDR2 SDRAM
U40 - DDR2 SDRAM
U41 - DDR2 SDRAM
U42 - PCH
U115 - Power Management (IC)

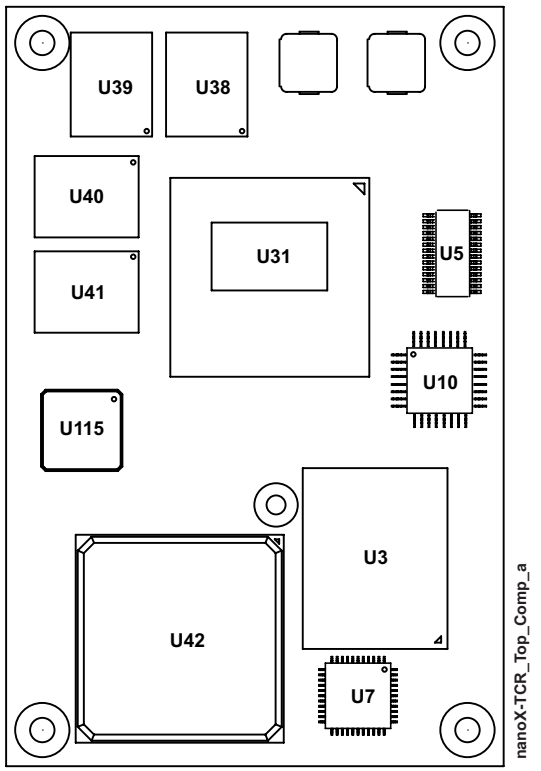


Figure 2-3. Component Locations (Top Side)

Key:
U19 - SPI Ethernet EEPROM
U27 - 2-Wire Serial EEPROM
U43 - DDR2 SDRAM
U44 - DDR2 SDRAM
U45 - DDR2 SDRAM
U46 - DDR2 SDRAM
U113 - Temperature Sensor
U116 - Power Regulator
CN2 - COM Express Type 10 Connector (see connector table)

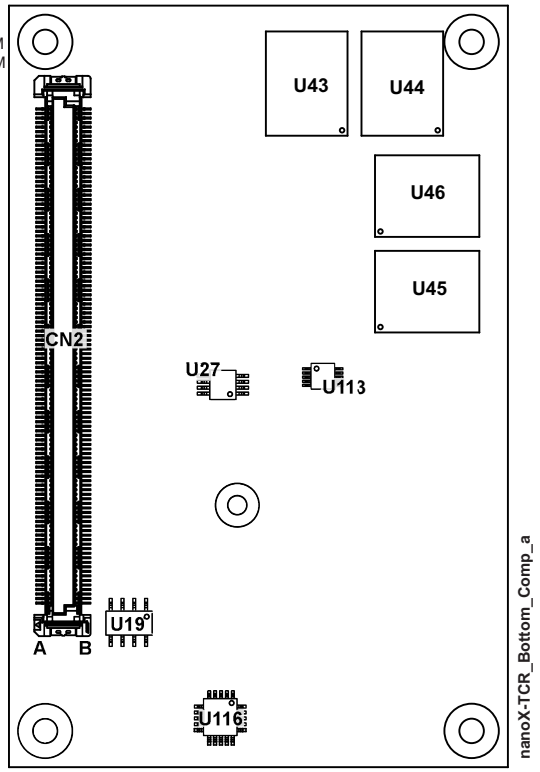


Figure 2-4. Component Locations (Bottom Side)

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Connector

Table 2-3 describes the COM Express connector (CN2) shown in Figure 2-5.

Table 2-3. Module Connector and Socket Descriptions

Connector #	Board Access	Description
CN2 – COM Express A-B	Bottom	220-pin connector for Northbridge Video and Southbridge I/O functions.

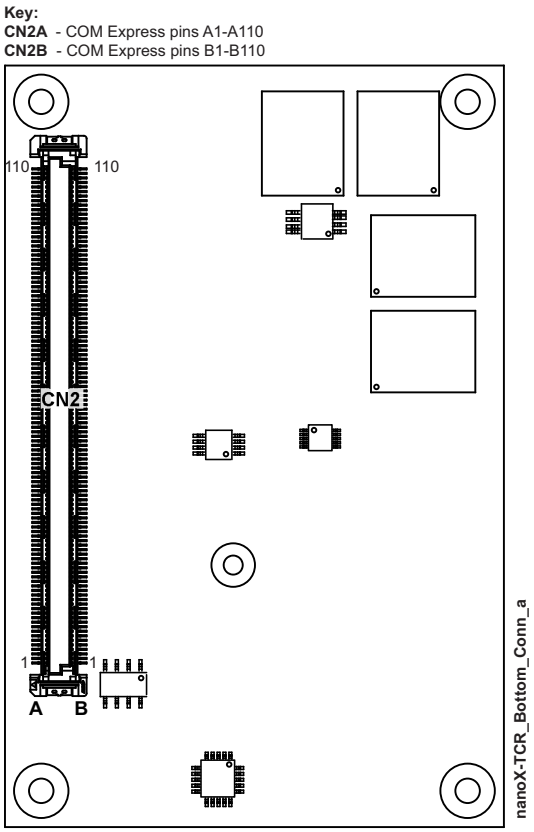


Figure 2-5. Connector Locations (Bottom Side)

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Specifications

Physical Specifications

Table 2-4 lists the physical dimensions of the module.

Table 2-4. Weight and Footprint Dimensions

Item	Dimension
Weight	0.04 kg (0.10 lb)
Height (overall)	3.10 mm (0.12 inches)
Board thickness	2.36 mm (0.093 inches)
Width	55.00 mm (2.17 inches)
Length	84.00 mm (3.31 inches)

NOTE Overall height is measured from the upper board surface to the highest permanent component on the upper board surface. This measurement does not include the cooling solution. The heights of the board with the cooling solutions are 15.00mm (0.43 inches) for the heatsink and 11.00mm (0.59 inches) for the heatspreader.
See Figure 2-7 on page 16 for an illustration of the cooling solution stack heights.

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Mechanical Specifications

The following figure provides mechanical dimensions of the nanoX-TCR. Figure 2-6 shows the top-side view of the board with measurements between mounting holes.

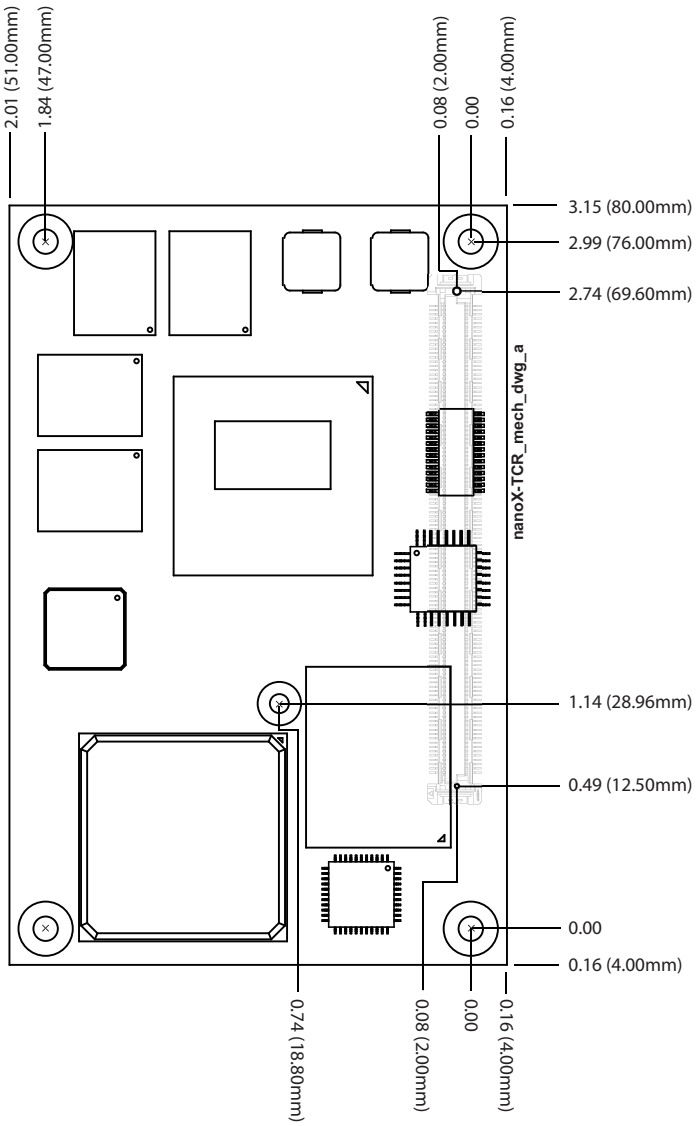


Figure 2-6. Mechanical Dimensions (Top Side)

NOTE	All dimensions are given in inches.

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Power Specifications

Table 2-5 provides the power requirements for the nanoX-TCR with 600MHz, 1.3GHz, and 1.6GHz CPUs and a 430 watt power supply.

Table 2-5. Power Supply Requirements

Parameter	600MHz E620T CPU	1.3GHz E660T CPU	1.6GHz E680T CPU
Input Type	+12V Regulated DC voltage	+12V Regulated DC voltage	+12V Regulated DC voltage
In-rush Voltage & Current	1.59A (19.00W)	1.57A (19.00W)	1.58A (19.00W)
Typical Idle Voltage & Current (Windows XP)	0.41A (5.00W)	0.50A (6.00W)	0.53A (6.00W)
BIT Voltage & Current	0.46A (6.00W)	0.57A (7.00W)	0.60A (7.00W)

Operating configurations:

- In-rush operating configuration includes 350W ATX power supply, 1GB on-board RAM, one LVDS video panel, one PS2 keyboard and mouse.
- Idle (Windows XP) operating configuration includes the in-rush running in BIOS setup.
- BIT = Burn-In-Test. Operating configuration includes the Idle configuration as well as one SATA device, and one 4GB SSD (on 1.6GHz CPU models).

Environmental Specifications

Table 2-6 provides the operating and storage temperature ranges required for this module.

Table 2-6. Environmental Requirements

Parameter	Conditions
Temperature	
Operating	–20° to +70°C (–4° to +158°F)
Extended (Optional)	–40° to +85°C (–40° to +185°F)
Storage	–55° to +85°C (–67° to +185°F)
Humidity	
Operating	5% to 90% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

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Thermal/Cooling Requirements

The nanoX-TCR is designed to operate at its maximum CPU speeds of 600MHz, 1.3GHz, and 1.6GHz and requires a thermal solution to cool the CPU, PCH, and voltage regulators. ADLINK offers one optional cooling solution as well as a heat spreader platform on which to build a cooling solution. (See Table 2-7 for descriptions of cooling options.)

> **NOTE** The overall system design must keep the ICs within their operating temperature specifications.

Table 2-7. ADLINK Optional Cooling Solutions

Cooling Solution	Description
Passive Heat Sink (without fan)	Qualified to maintain optimal performance up to +70°C.
Heat Spreader	Provides a simple thermal platform on which to build a cooling solution.

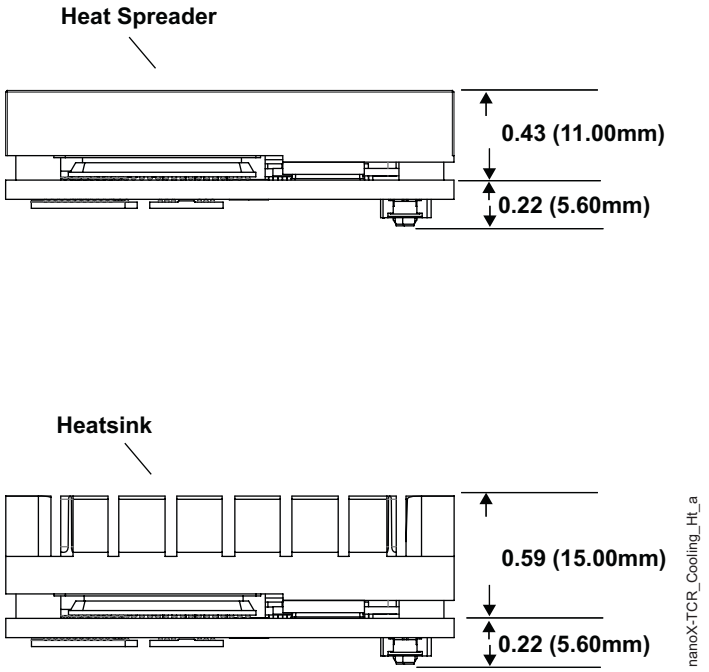


Figure 2-7. Stack Heights of Cooling Assemblies (Side Width Views)

> **NOTE** All heights are given in inches.

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Chapter 3 Hardware

Overview

This chapter discusses the module features in the following order:

- CPU
- Graphics
- Memory
- Interrupt Channel Assignments
- Memory Map
- I/O Address Map
- COM Express Connector A-B
  - LPC interface
  - SATA interface
  - USB interface
  - Power interface
  - Power Management
  - Video interfaces
  - HD Audio interface
  - Gigabit Ethernet interface
  - I²C interface
  - PCI Express interface
  - SMBus
  - CAN Bus [**Optional**]
  - GPIO interface
- COM Express A-B Connector Signals
- Watchdog Timer
- Temperature Sensor

> **NOTE** ADLINK Technology, Inc. only supports the features/options tested and listed in this manual. The main chips used in the nanoX-TCR may provide more features or options than are listed for the nanoX-TCR, but some of these features or options are not supported on the module and will not function as specified in the chip documentation.

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CPU

The nanoX-TCR offers three versions of the Intel® Atom™ E6XXT CPU—the E620T, E660T, and E680T—operating at 600MHz, 1.3GHz, and 1.6GHz, respectively. The E6XXT integrates a high-performance x86 Processor Core with Memory Controller and 3D Graphics Engine. This single chip is based on 45-nm process technology and provides an open-standard PCI Express v1.0 interface, supporting user-defined PCH, ASIC, FPGA, and off-the-shelf discrete components, ideal for deeply embedded applications.

Graphics

The E6XXT CPU provides a 2D/3D graphics engine that performs pixel shading and vertex shading within a single hardware accelerator, which minimizes access to memory and improves render performance.

Memory

The nanoX-TCR employs two ranks of four system DRAM memory chips, which provide up to 2GB of extended memory, supporting aggressive power management to reduce power consumption, shallow self-refresh and a new deep self-refresh, proactive page closing policies to close unused pages, and partial writes through data mask pins.

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Interrupt Channel Assignments

The interrupt channel assignments are shown in Table 3-1.

> **NOTE** Table 3-1 is only for reference. Interrupt channel assignments are tied to the specific legacy Super I/O device residing on the baseboard. This table can be used with the baseboard in ADLINK's Quick Start Kit.

Table 3-1. Interrupt Channel Assignments

Device vs IRQ No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Timer	X															
PS/2 Keyboard*		X														
Secondary Cascade			X													
COM0*				O	D											
COM1*				D	O											
Floppy*							D									
Parallel*						O		D								
RTC									X							
Math Coprocessor														X		
PS/2 Mouse*													X			
Audio Controller	Automatically Assigned															
PCI INTA	Automatically Assigned															
PCI INTB	Automatically Assigned															
PCI INTC	Automatically Assigned															
PCI INTD	Automatically Assigned															
USB	Automatically Assigned															
Video	Automatically Assigned															
Ethernet	Automatically Assigned															

*Located on baseboard, if supported

Legend: D = Default, X = Fixed, O = Optional

> **NOTE** The IRQs for the Ethernet, Video, and USB are automatically assigned by the BIOS Plug and Play logic. Local IRQs assigned during initialization can not be used by external devices.

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Memory Map

The following table provides the common PC/AT memory allocations. Memory below 000500h is used by the BIOS.

Table 3-2. Memory Map

Base Address			Function
00000000h	-	0009FFFFh	Conventional Memory
000A0000h	-	000AFFFFh	Graphics Memory
000B0000h	-	000B7FFFh	Mono Text Memory
000B8000h	-	000BFFFFh	Color Text Memory
000C0000h	-	000CFFFFh	Standard Video BIOS
000D0000h	-	000DFFFFh	Reserved for Extended BIOS
000E0000h	-	000EFFFFh	Extended System BIOS Area
000F0000h	-	000FFFFFh	System BIOS Area (Storage and RAM Shadowing)
Top 32, 64, or 128MB of Physical Memory			Shared memory of Integrated Graphics enabled
FFE00000h	-	FFFFFFFFh	System Flash

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I/O Address Map

Table 3-3 shows the I/O address map.

> **NOTE** Table 3-3 is only for reference. I/O addresses are tied to the specific legacy Super I/O device residing on the baseboard. This table can be used with the baseboard in ADLINK's Quick Start Kit.

Table 3-3. I/O Address Map

Address (hex)	Subsystem
0000-000F	Primary DMA Controller
0020-0021	Master Interrupt Controller
0040-0043	Programmable Interrupt Timer (Clock/Timer)
0060	Keyboard Controller*
0061	NMI, Speaker control
0063	NMI Controller
0064	Keyboard Controller*
0065	NMI Controller
0067	NMI Controller
0070-007F	CMOS RAM, NMI Mask Reg, RT Clock
0080	System reserved
0081-0083	DMA Page Registers
0084-0086	System reserved
0087	DMA Page Register
0088	System reserved
0089-008B	DMA Page Registers
008C-008E	System reserved
008F	DMA Page Register
0090-0091	System reserved
0092	Fast A20 gate and CPU reset*
0093-009F	System reserved
00A0-00A1	Slave Interrupt Controller
00A2-00BF	System reserved
00C0-00DF	Slave DMA Controller #2
00E0-00EF	System reserved
00F0-00FF	Math Coprocessor
01F0-01F7	SATA Controller
02F8-02FF	Serial Port 2 (COM1)*
03B0-03BB	Video (monochrome)
03F8-03FF	Serial Port 1 (COM0)*
04D0-04D1	Edge/Level Trigger PIC
0CF9	Reset Control Register

*Located on the baseboard.

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COM Express A-B Connector

This section provides descriptions of interfaces and signals within the COM Express A-B connector. The COM Express A-B connector provides the following features:

- LPC interface
- SATA interface
- USB interface
- Power interface
- Power Management
- Video interfaces
- HD Audio interface
- Gigabit Ethernet interface
- I²C interface
- PCI Express
- SMBus
- CAN Bus [**Optional**]
- GPIO

LPC Interface

The nanoX-TCR offers the LPC (Low Pin Count) bus through the CPU. Many devices already exist for this Intel defined bus. The LPC bus corresponds approximately to a serialized ISA bus yet with a significantly reduced number of signals. Because of the software compatibility to an ISA bus, I/O extensions such as additional serial ports can be easily implemented on an application specific baseboard using this bus.

SATA Interface

Two Serial ATA connections (SATA0 and SATA1) are provided through the Intel® EG20T (PCH). The SATA1 port is dedicated for an optional SSD (Solid State Drive) and is not available for use if the board model supports an SSD. SATA is an enhancement of parallel ATA therefore offering higher performance. As a result of this enhancement, the traditional restrictions of parallel ATA are overcome with respect to speed and EMI. SATA starts with a transfer rate of 1.5 Gb/s and can be expanded up to 3Gb/s. SATA is completely protocol and software compatible to parallel ATA.

USB Interface

The PCH offers two USB host controllers, which contain six USB ports. Each port complies with USB standards 1.1 and 2.0 and offers high-speed, full-speed, and low-speed capabilities. The USB interface also provides one USB client port for the Mini-USB connector on the baseboard.

Power Interface

A 12V voltage rail on the A-B COM Express connector accepts the voltages required for the board. The RTC 3.3V battery feed and 5V standby functions draw power through the A-B connector. The nanoX-TCR requires a 4.75V to 14V wide-range power supply with optional 5V standby for ATX support.

Power Management

The nanoX-TCR is ACPI 3.0 compliant with smart battery support. The board supports S0, S1, S3, S4, and S5 sleep states.

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Video Interfaces

The Atom™ E6XXT CPU provides an integrated 2D/3D graphics engine, which supports video decode such as MPEG2, MPEG4, VC1, WMV9, H.264 (main, baseline at L3 and High-profile level 4.0/4.1), and DivX* as well as video encode such as MPEG4, H.264 (baseline at L3). The CPU supports LVDS and SDVO display ports, permitting simultaneous, independent operation of two displays. The video interface features are listed in the following two bullet lists.

LVDS

- Supports a maximum resolution of 1280 x 768 at 60 Hz (pixel clock rate up to 80 MHz)
- Supports minimum pixel clock rate of 19.75 MHz
- Supports pixel color depths of 18 and 24 bits
- Supports 20 MHz to 80 MHz derivative clock frequency

SDVO

- Supports a maximum resolution of 1280 x 1024 at 85Hz (pixel clock rate up to 160MHz)
- Supports 100MHz to 160MHz derivative clock frequency
- Supports third-party output formats such as DVI, LVDS, HDMI, TV-Out, and VGA
- Provides a control bus able to operate at up to 1MHz

Audio Interface

The High Definition (HD) Audio controller resides in the CPU and communicates with external codec(s) on the baseboard (such as audio and modem codecs) over the Intel HD Audio serial link. The PCH implements a single Serial Data Output signal (AC/HDA_SDOUT) that is connected to all external codecs. Two Serial Digital Input signals (AC/HDA_SDIN) support up to two codecs.

Ethernet Interface

The nanoX-TCR supports one Gigabit Ethernet interface. The Ethernet interface is implemented from the 82574IT Ethernet controller and provides one GLAN interface, which occupies PCI Express port 1. The Ethernet function supports multi-speed operation at 10/100/1000 Mbps and operates in full-duplex at all supported speeds or half duplex at 10/100 Mbps while adhering to the IEEE 802.3x flow control specification.

The Ethernet interface offers the following features:

- Full duplex or half duplex support at 10 Mbps, 100 Mbps, or 1000 Mbps
- In full duplex mode, the Ethernet controller adheres to the IEEE 802.3x Flow Control specification
- In half duplex mode, performance is enhanced by a proprietary collision reduction mechanism
- IEEE 802.3 compatible physical layer to wire transformer
- IEEE 802.3u Auto-Negotiation support
- Fast back-to-back transmission support with minimum interframe spacing (IFS)
- IEEE 802.3x auto-negotiation support for speed and duplex operation
- 3 kB transmit and 3 kB receive FIFOs (helps prevent data underflow and overflow)
- Requires magnetics (Ethernet isolation transformer) on the baseboard

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I²C™ Bus

The I²C bus is implemented through the use of the Atmel ATmega168 board controller. The board controller provides a Fast Mode (400kHz max.) multi-master I²C bus that has maximum I²C bandwidth. Use the ADLINK Intelligent Device Interface (AIDI) Library for access to the I²C bus. AIDI driver information is available in the Utilities link of the nanoX-TCR product page at: http://www.adlinktech.com. An AIDI demo program and the AIDI User's Manual describing how to use the I²C bus also reside in the Utilities link of the nanoX-TCR product page.

PCI Express™

The nanoX-TCR offers four (4x) PCI Express x1 ports (ports 0-3) through the COM Express A-B connector, originating from the CPU. Ports 2 and 3 can be configured to support PCI Express edge cards or ExpressCards, supporting up to 2.5 Gb/s bandwidth in each direction. The first x1 port (port 0) acts as the connection between the CPU and the PCH and cannot be used as a PCIe port. The second x1 port (port 1) is occupied by the onboard Gigabit Ethernet controller and is also unavailable as a PCIe port. The PCI Express interface is based on the *PCI Express Specification 1.0a.*

System Management Bus (SMBus)

The E6XXT chip contains a host SMBus port. The host port allows the CPU access to the SMBus slaves. The SMBus slaves include the Gigabit Ethernet Controller and the CPU Temperature Sensor. Table 3-4 lists the device names and corresponding reserved binary addresses on the SMBus.

Table 3-4. SMBus Reserved Addresses

Component	Address (binary)
CPU Temperature Sensor	$1001,100x_b$
Gigabit Ethernet Controller	$1100,001x_b$

CAN Bus [Optional]

The CAN controller resides in the PCH and performs communication in accordance with the Bosch CAN Protocol version 2.0B (standard and extended formats.) The CAN controller transmits and receives CAN signals to and from the CAN header on the baseboard. The CAN interface delivers CAN signals used for automotive, industrial automation, and medical scanning and imaging applications. The following list describes some of the features of the CAN Bus Interface.

- +/- 12 kV ESD protection
- Low-current Standby mode with bus wake up: 5µA typical
- Bus-fault protection of -27V to 40V
- Over-temperature shutdown

NOTE Please contact your ADLINK sales representative for ordering information on the optional CAN bus.

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GPIO

The nanoX-TCR provides GPIO (General Purpose I/O) pins for custom use through the COM Express A-B connector. Use the ADLINK Intelligent Device Interface (AIDI) Library to configure the GPIO interface. AIDI driver information is available in the Utilities link of the nanoX-TCR product page at: http://www.adlinktech.com. An AIDI demo program and the AIDI User's Manual describing how to use the GPIO pins also reside in the Utilities link of the nanoX-TCR product page.

For more information about GPIO pin operation, refer to the PCA9535BS GPIO Generator Datasheet. Refer to "References" on page 1 for a hyper link to the datasheet.

Table 3-5 provides the pin signals for the COM Express A-B connector.

Table 3-5. COM Express A-B Connector Signal Descriptions

Pin #	Row A	Pin #	Row B
A1	GND	B1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT# (PU 10k 3.3V)
A3	GBE0_MDI3+	B3	LPC_FRAME#
A4	GBE0_LINK100# (Ethernet Speed LED)	B4	LPC_AD0
A5	GBE0_LINK1000# (Ethernet Speed LED)	B5	LPC_AD1
A6	GBE0_MDI2-	B6	LPC_AD2
A7	GBE0_MDI2+	B7	LPC_AD3
A8	GBE0_LINK# (LAN Link LED)	B8	NC (Not Connected)
A9	GBE0_MDI1-	B9	NC (Not Connected)
A10	GBE0_MDI1+	B10	LPC_CLK
A11	GND	B11	GND
A12	GBE0_MDI0-	B12	PWRBTN# (PU 10k 3.3V S5 Standby)
A13	GBE0_MDI0+	B13	SMB_CK (PU 4.7k 3.3V S5 Standby)
A14	GBE0_CTREF	B14	SMB_DAT (PU 4.7k 3.3V S5 Standby)
A15	SUS_S3#	B15	SMB_ALERT#
A16	SATA0_TX+	B16	SATA1_TX+ (Occupied by optional SSD)
A17	SATA0_TX-	B17	SATA1_TX- (Occupied by optional SSD)
A18	SUS_S4#	B18	SUS_STAT# (Not Used)
A19	SATA0_RX+	B19	SATA1_RX+ (Occupied by optional SSD)
A20	SATA0_RX-	B20	SATA1_RX- (Occupied by optional SSD)
A21	GND	B21	GND
A22	RSVD	B22	RSVD
A23	RSVD	B23	RSVD
A24	SUS_S5# (Connected S4)	B24	PWR_OK
A25	RSVD	B25	RSVD
A26	RSVD	B26	RSVD
A27	BATLOW# ()	B27	WDT (PU 10k 3.3V S5 Standby)
A28	ATA_ACT# (PU 10k 3.3V)	B28	NC (Not Connected)
A29	AC/HDA_SYNC	B29	AC_SDIN1 (Weak Pull Down)
A30	AC/HDA_RST#	B30	AC_SDIN0 (Weak Pull Down)
A31	GND	B31	GND

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Table 3-5. COM Express A-B Connector Signal Descriptions (Continued)

A32	AC/HDA_BITCLK (Int. weak Pull-Down)	B32	SPKR (HDA Speaker)
A33	AC/HDA_SDOUT	B33	I2C_CK
A34	BIOS_DISABLE# (PU 10k 3.3V S5 Standby)	B34	I2C_DAT
A35	THRMTRIP# (PU 1k 3.3V)	B35	THRM# (Over Temperature - PU 1.2k 3.3V S5 Standby)
A36	NC (Not Connected)	B36	USB7- (Client Port)
A37	NC (Not Connected)	B37	USB7+ (Client Port)
A38	USB_6_7_OC# (PU 10k 3.3V)	B38	USB_4_5_OC# (PU 10k 3.3V)
A39	USB4-	B39	USB5-
A40	USB4+	B40	USB5+
A41	GND	B41	GND
A42	USB2-	B42	USB3-
A43	USB2+	B43	USB3+
A44	USB_2_3_OC# (PU 10k 3.3V)	B44	USB_0_1_OC# (PU 10k 3.3V)
A45	USB0-	B45	USB1-
A46	USB0+	B46	USB1+
A47	VCC_RTC (VBAT)	B47	EXCD1_PERST# (Express Card Reset - PU 10k 3.3V S5 Standby)
A48	EXCD0_PERST# (Express Card Reset - PU 10k 3.3V S5 Standby)	B48	EXCD1_CPPE# (Express Card Capable Request - PU 10k 3.3V S5 Standby)
A49	EXCD0_CPPE# (Express Card Capable Request - PU 10k 3.3V S5 Standby)	B49	SYS_RESET#
A50	LPC_SERIRQ (PU 10k 3.3V S5 Standby)	B50	CB_RESET# (Carrier Board Reset)
A51	GND	B51	GND
A52	NC (Not Connected)	B52	NC (Not Connected)
A53	NC (Not Connected)	B53	NC (Not Connected)
A54	GPI0	B54	GPO1
A55	NC (Not Connected)	B55	NC (Not Connected)
A56	NC (Not Connected)	B56	NC (Not Connected)
A57	GND	B57	GPO2
A58	PCIE3_TX+ (Occupied by Gb Ethernet - PCIE1 of CPU)	B58	PCIE3_RX+ (Occupied by Gb Ethernet - PCIE1 of CPU)
A59	PCIE3_TX- (Occupied by Gb Ethernet - PCIE1 of CPU)	B59	PCIE3_RX- (Occupied by Gb Ethernet - PCIE1 of CPU)
A60	GND	B60	GND
A61	PCIE2_TX+ (Occupied by PCH - PCIE0)	B61	PCIE2_RX+ (Occupied by PCH - PCIE0)

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Table 3-5. COM Express A-B Connector Signal Descriptions (Continued)

A62	PCIE2_TX- (Occupied by PCH - PCIE0)	B62	PCIE2_RX- (Occupied by PCH - PCIE0)
A63	GPI1	B63	GPO3
A64	PCIE1_TX+	B64	PCIE1_RX+
A65	PCIE1_TX-	B65	PCIE1_RX-
A66	GND	B66	WAKE0# (PU 1k 3.3V S5 Standby)
A67	GPI2	B67	WAKE1# (PU 1k 3.3V S5 Standby)
A68	PCIE0_TX+	B68	PCIE0_RX+
A69	PCIE0_TX-	B69	PCIE0_RX-
A70	GND	B70	GND
A71	LVDS_A0+	B71	DDIO_PAIR0+ (SDVO_RED+)
A72	LVDS_A0-	B72	DDIO_PAIR0- (SDVO_RED-)
A73	LVDS_A1+	B73	DDIO_PAIR1+ (SDVO_GREEN+)
A74	LVDS_A1-	B74	DDIO_PAIR1- (SDVO_GREEN-)
A75	LVDS_A2+	B75	DDIO_PAIR2+ (SDVO_BLUE+)
A76	LVDS_A2-	B76	DDIO_PAIR2- (SDVO_BLUE-)
A77	LVDS_VDD_EN (PD 10k)	B77	DDIO_PAIR4+ (SDVO_INT+)
A78	LVDS_A3+	B78	DDIO_PAIR4- (SDVO_INT-)
A79	LVDS_A3-	B79	LVDS_BKLT_EN (Backlight Enable)
A80	GND	B80	GND
A81	LVDS_A_CK+	B81	DDIO_PAIR3+ (SDVO_CLK+)
A82	LVDS_A_CK-	B82	DDIO_PAIR3- (SDVO_CLK-)
A83	LVDS_I2C_CK (PU 2.2k 3.3V S5 Standby)	B83	LVDS_BKLT_CTRL (Backlight Brightness)
A84	LVDS_I2C_DAT (PU 2.2k 3.3V S5 Standby)	B84	VCC_5V_SBY
A85	GPI3 (PU 10k 3.3V S5 Standby)	B85	VCC_5V_SBY
A86	RSVD	B86	VCC_5V_SBY
A87	RSVD	B87	VCC_5V_SBY
A88	PCIE_CK_REF+	B88	BIOS_DS1# (PU 10k 3.3V Standby)
A89	PCIE_CK_REF-	B89	DD0_HPD (Hot Plug Detect - PU 10k 3.3V Standby)
A90	GND	B90	GND
A91	SPI_POWER (3.3 V S5 Standby)	B91	DDIO_PAIR5+ (SDVO_TVCLKINP)
A92	SPI_MISO	B92	DDIO_PAIR5- (SDVO_TVCLKINN)
A93	GPO0	B93	DDIO_PAIR6+ (SDVO_STALLP)
A94	SPI_CLK	B94	DDIO_PAIR6- (SDVO_STALLN)
A95	SPI_MOSI	B95	RSVD
A96	NC (Not Connected)	B96	RSVD
A97	NC (Not Connected)	B97	SPI_CS# (SPI Chip Select for Carrier)

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Table 3-5. COM Express A-B Connector Signal Descriptions (Continued)

A98	SER0_TX	B98	DDI0_CTRLCLK_AUX+ (SDVO Control Clock)
A99	SER0_RX	B99	DDI0_CTRLDATA_AUX- (SDVO Control Data)
A100	GND	B100	GND
A101	SER1_TX	B101	FAN_PWMOUT (Fan Speed Control)
A102	SER1_RX	B102	FAN_TACHIN (Fan Tachometer - PU 10k 3.3V)
A103	LID# (ACPI type LID Switch - PU 10k 3.3V S5 Standby)	B103	SLEEP# (GPIO4 of PCH - PU 10k 3.3V S5 Standby)
A104	VCC_12V	B104	VCC_12V
A105	VCC_12V	B105	VCC_12V
A106	VCC_12V	B106	VCC_12V
A107	VCC_12V	B107	VCC_12V
A108	VCC_12V	B108	VCC_12V
A109	VCC_12V	B109	VCC_12V
A110	GND	B110	GND

Watchdog Timer

The Watchdog Timer (WDT) restarts the system if a mishap occurs, ensuring proper start-up after the interruption. Possible problems include failure to boot properly, the application software's loss of control, failure of an interface device, unexpected conditions on the bus, or other hardware or software malfunctions. Use the ADLINK Intelligent Device Interface (AIDI) Library to configure the WDT interface. AIDI driver information is available in the Utilities link of the nanoX-TCR product page at: http://www.adlinktech.com. An AIDI demo program and the AIDI User's Manual showing how to use the WDT function also reside in the Utilities link of the nanoX-TCR product page.

The WDT (Watchdog Timer) can be used both during the boot process and during normal system operation.

- During the Boot process – If the OS fails to boot in the time interval set in the AIDI Library, the system will reset.

  Enable the WDT as described in the AIDI Library User's guide. Set the WDT for a time-out interval in seconds, between 1 and 255, in one second increments. Ensure you allow enough time for the boot process to complete and for the OS to boot. The OS or application must tickle the WDT as soon as it comes up.

- During System Operation – The user can set up the WDT hardware by accessing the hardware directly using the AIDI Library. The system must tickle the WDT in the time set when the WDT is initialized or the system will be reset.

- Watchdog Code example – ADLINK provides a source code example (AIDI demo program) in the Utilities link of the nanoX-TCR product page illustrating how to control the WDT. The code example can be easily copied to your development environment to compile and test or make any desired changes before compiling.

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Temperature Sensor

The nanoX-TCR provides a temperature sensor to ensure the health of your embedded system with built-in support for monitoring and control of system temperatures, fan speeds, and critical module voltage levels. The AIDI Library provides simple APIs at the application level to support these functions and adds alarm functions when voltage or temperature levels exceed the upper or lower limits set by the user. AIDI driver information for the nanoX-TCR is available in the Utilities link of the nanoX-TCR product page at: http://www.adlinktech.com. An AIDI demo program and the AIDI User's Manual showing how to use the Temperature Sensor also reside in the Utilities link of the nanoX-TCR product page.

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Chapter 4 BIOS Setup

Introduction

This section assumes the user is familiar with general BIOS Setup and does not attempt to describe the BIOS functions. Refer to "BIOS Setup Menus " on page 33 in this chapter for a map of the BIOS Setup settings. If ADLINK has added to or modified any of the standard BIOS functions, these functions will be described.

Entering BIOS Setup (Local Video Display)

To enter BIOS Setup using a local video display for the nanoX-TCR:

1. Power on the display and the power supply to the nanoX-TCR.
2. Start Setup by pressing the [Del] or [F2] keys (F2 allows you to load previous settings) when the following message appears on the boot screen.

```
Please wait. This will take a few seconds
```

> **NOTE** If the setting for *Fast Boot* is [Enabled], the system may not enter the BIOS set up if you do not press the <Del> or <F2> keys early in the boot sequence.

3. Follow the instructions on the right side of the screen to navigate through the selections and modify any settings.

Entering BIOS Setup (Serial Port Console)

This section describes how to enter the BIOS setup through a remote serial terminal or PC.

1. Turn on the power supply to the nanoX-TCR and enter the BIOS Setup Utility using a local video display.
2. Ensure the BIOS feature *Serial Port Console Redirection* is set to [Enabled] under the **Advanced** menu.
3. Accept the default options or make your own selections for the balance of the Console Redirection fields and record your settings.
4. Ensure you select the type of remote serial terminal you will be using and record your selection.
5. Select *Save Changes and Exit* and then shut down the nanoX-TCR.
6. Connect the remote serial terminal (or the PC with communications software) to the COM port you selected and recorded earlier in the procedure.
7. Turn on the remote serial terminal or PC and set it to the settings you selected earlier in the procedure.

   The default settings for the nanoX-TCR are:

   - ANSI
   - 115200
   - 8 bits
   - no parity (None)
   - 1 stop bit
   - no flow control (None)
   - Disabled Recorder Mode
   - Disabled Resolution 100x31
   - [80x24] for Legacy OS Redirection

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8. Restore power to the nanoX-TCR.
9. Press the F2 key to enter Setup (early in the boot sequence if *Fast Boot* is set to [Enabled].)

   If *Fast Boot* is set to [Enabled], you may never see the screen prompt.
10. Use the <Enter> key to select the screen menus listed in the Opening BIOS screen.

> **NOTE** The serial console port is not hardware protected. Diagnostic software that probes hardware addresses may cause a loss or failure of the serial console functions.

OEM Logo Utility

The nanoX-TCR BIOS supports a graphical logo utility, which allows the user to customize the boot screen image. The graphical image can be a company logo or any custom image the user wants to display during the boot process. The custom image can be displayed as the first image on screen during the boot process and remain there while the OS boots, depending on the options selected in BIOS Setup.

> **NOTE** The Quiet Boot feature must be set to Enabled in the Boot screen of BIOS Setup for the system to recognize the OEM Logo feature.

Logo Image Requirements

Please contact your ADLINK Sales Representative for more information on OEM Logo Utility requirements.

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BIOS Setup Menus

This section provides illustrations of the six top-level setup screens in the nanoX-TCR BIOS Setup Utility. Below each illustration is a bullet list of the screen's submenus and setting selections. The setting selections are presented in brackets after each submenu or menu item, and the optimal default settings are presented in bold. For more detailed definitions of the BIOS settings, refer to the AMI Aptio TSE User Manual: http://www.ami.com/support/doc/AMI_TSE_User_Manual_PUB.pdf.

Table 4-1. BIOS Setup Menus

BIOS Setup Utility Menu	Item/Topic
Main	Date and Time
Advanced	Launch PXE OpROM, ACPI, CPU, USB, Hardware Monitor, Super IO, Serial Port Console Redirection
Chipset	North Bridge and South Bridge
Boot	Boot up Settings, Boot Options, Boot Order
Security	Setting or changing Passwords
Save & Exit	Exiting with or without changing settings, Loading and restoring Optimal or User defaults

Main BIOS Setup Screen

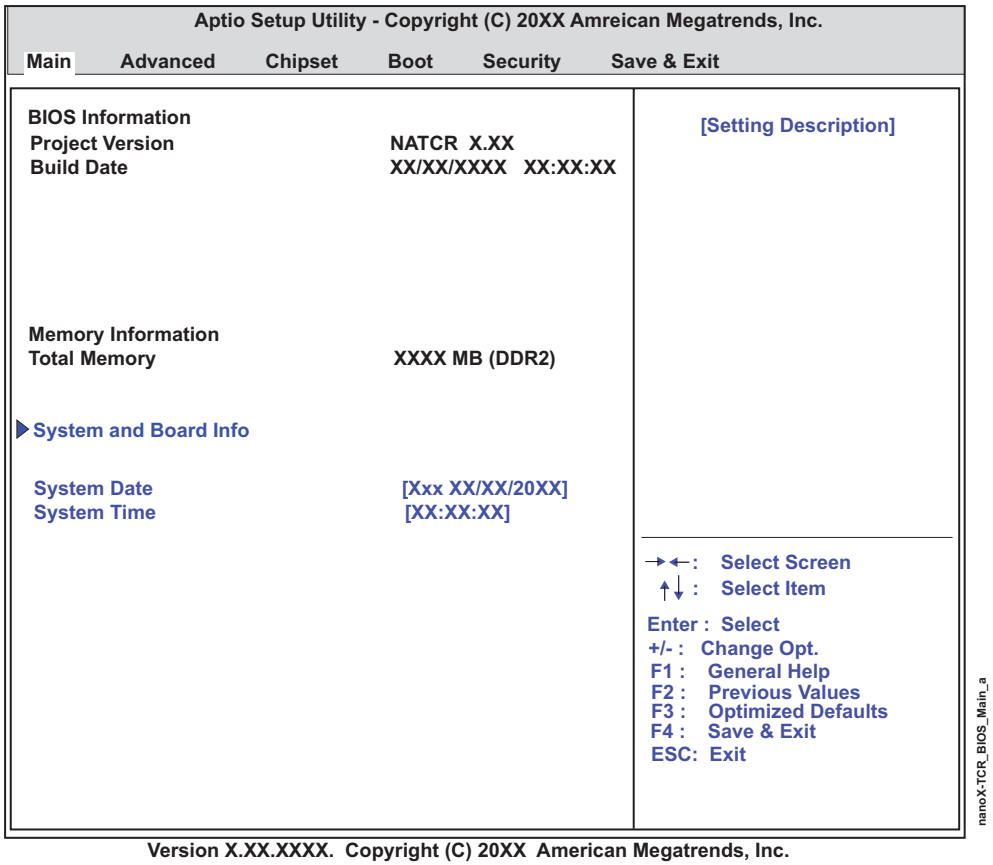


Figure 4-1. Main BIOS Setup Screen

- **System and Board Info**
  - BIOS Rev. [XXX]
  - BC Firmware Rev. [X.X.X]

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- Manufacture Date [XX/XX/20XX]
- Last Repair Date [XX/XX/20XX]
- Serial Number [XXXXXXXXXX]
- Hardware Rev [XXXXX-XXXX-XXXX]
- LAN MAC ID [XX-XX-XX-XX-XX-XX]
- Boot Counter [XXXXXXXX]
- Running Time [XXXXX HRs]

- **System Date**

  System Date (day of week, mm:dd:yyyy) – This field requires the alpha-numeric entry of the day of week, day of the month, calendar month, and all 4 digits of the year, indicating the century plus year (*Fri XX/XX/20XX*).

- **System Time**

  System Time (hh:mm:ss) – This is a 24-hour clock setting in hours, minutes, and seconds.

Advanced BIOS Setup Screen

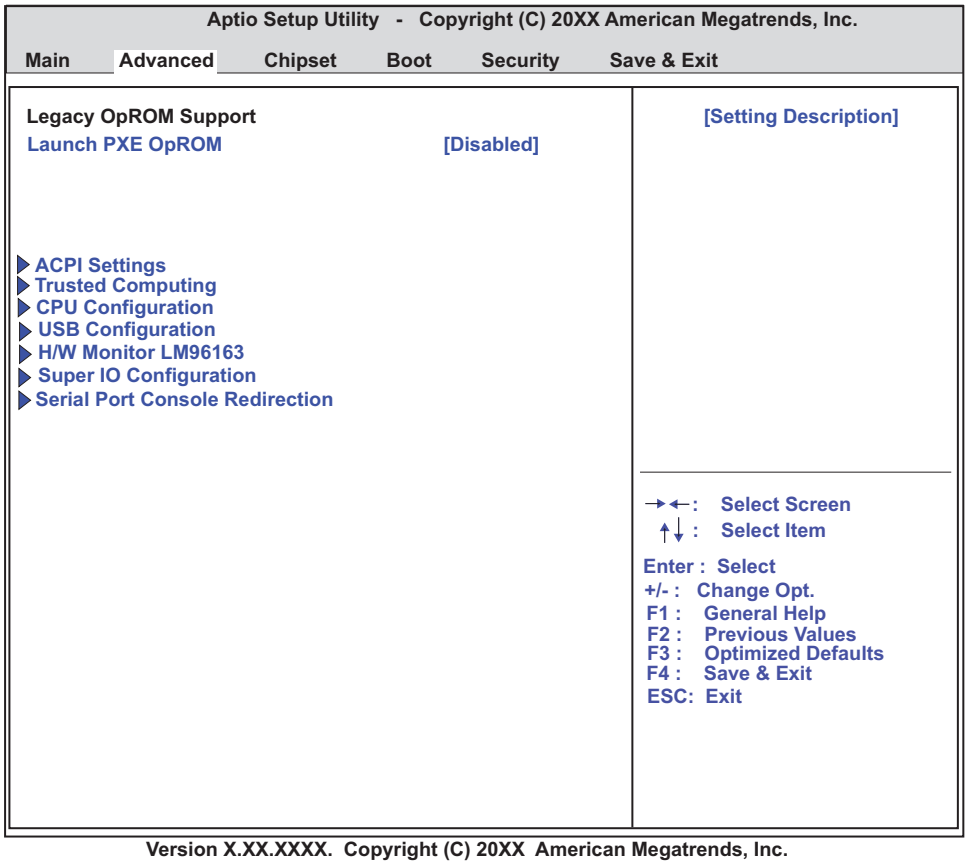


Figure 4-2. Advanced BIOS Setup Screen

- **Legacy OpROM Support**
  - Launch PXE OpROM [**Disabled**; Enabled]

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- **Trusted Computing**
  - TPM SUPPORT [**Disabled**; Enabled]
  - Current TPM Status Information [no TPM on board]
- **CPU Configuration**
  - Processor Type Genuine Intel(R) CPU
  - EMT64 Supported
  - Processor Speed XXXX MHz
  - System Bus Speed XXX MHz
  - Ratio Status XX
  - Actual Ratio XX
  - Processor Stepping XXXXX
  - Microcode Revision XXX
  - L1 Cache RAM XX k
  - L1 Cache RAM XXX k
  - Processor Core Single
  - Hyper-Threading Supported

  - Intel SpeedStep [Disabled; **Enabled**]
  - Hyper-Threading [Disabled; **Enabled**]
  - Execute Disable Bit [Disabled; **Enabled**]
  - Limit CPUID Maximum [**Disabled**; Enabled]
  - Intel Virtualization Technology [**Disabled**; Enabled]
  - C-States [Disabled; **Enabled**]
- **USB Configuration**
  - USB Devices:
    1 Keyboard
    - Legacy USB Support [Disabled; **Enabled**]
    - EHCI Hand-off [**Disabled**; Enabled]
- **H/W Monitor LM9163**
  - Pc Health Status
    - System temperature : +XX C
    - CPU temperature (By PECI) : +XX C
    - Fan1 Speed : N/A
    - Fan2 Speed : N/AXXXX RPM
    - Fan3 Speed : N/A
    - Fan4 Speed : N/A

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- **Super IO Configuration**
  - Serial Port 0 Configuration
    - Serial Port [Disabled; **Enabled**]
    - Device Settings IO=3F8h; IRQ=4
    - 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;]
  - Serial Port 1 Configuration
    - Serial Port [Disabled; **Enabled**]
    - Device Settings IO=2F8h; IRQ=3
    - 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;]
- **Serial Port Console Redirection**
  - COM0
    - Console Redirection [**Disabled**; Enabled]
    - Console Redirection Settings
      - Terminal Type [VT100; VT100+; VT-UTF8; **ANSI**]
      - Bits per second [9600; 19200; 38400; 57600; **115200**]
      - Data Bits [7; **8**]
      - Parity [**None**; Even; Odd; Mark; Space]
      - Stop Bits [**1**; 2]
      - Flow Control [**None**; Hardware RTS/CTS]
      - Recorder Mode [**Disabled**; Enabled]
      - Resolution 100x31 [**Disabled**; Enabled]
      - Legacy OS Redirection Resolution [**80x24**; 80x25]
  - COM1
    - Console Redirection [**Disabled**; Enabled]
    - Console Redirection Settings [Same as COM0]

      .

NOTE	The serial port console is not hardware protected. Diagnostic software that probes hardware addresses may cause a loss or failure of the serial console functions.

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Chipset BIOS Setup Screen

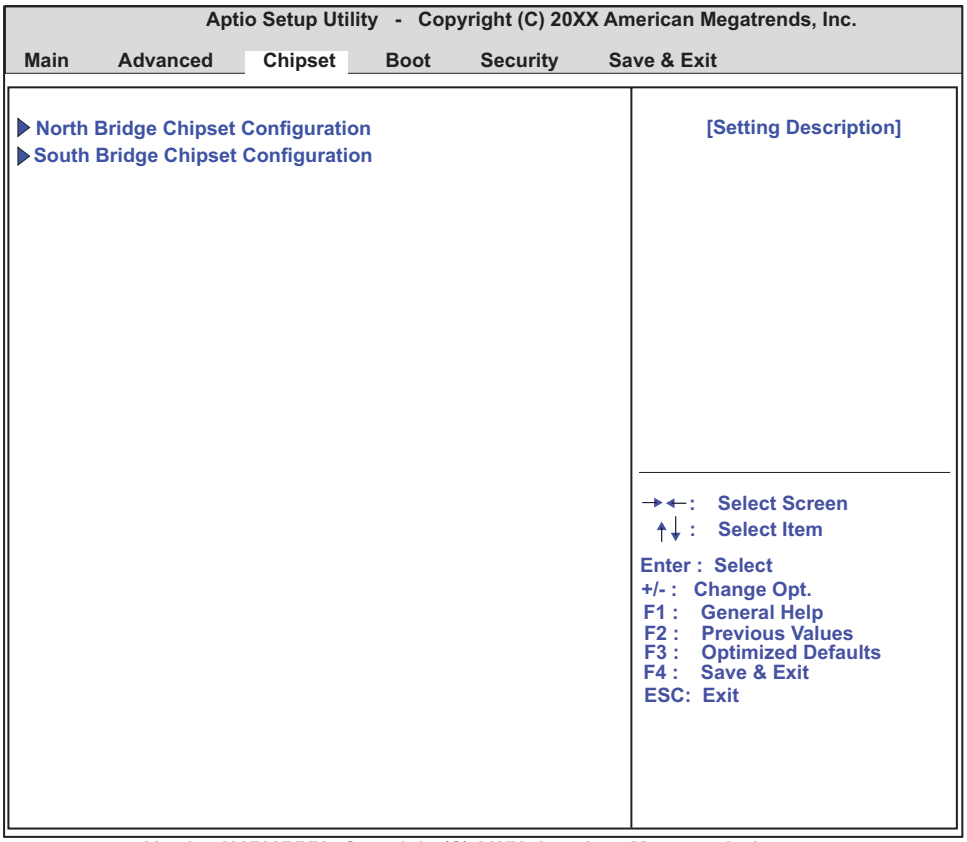


Figure 4-3. Chipset BIOS Setup Screen

- **North Bridge Chipset Configuration**
  - Memory Information
    - Total Memory XXXX MB (DDR2)
  - IGD Mode Select [Disabled;
    Enabled, 1MB;
    Enabled, 4MB;
    Enabled, 8MB;
    Enabled, 16MB;
    Enabled, 32MB;
    Enabled, 48MB;
    Enabled, 64MB]
  - MSAC Mode Select [Enabled, 512MB;
    Enabled, 256MB;
    Enabled, 128MB]
  - Boot Display Configuration
    - Boot Display Device [**Integrated LVDS**; External DVI/HDMI]
    - Flat Panel Type [640x480 18bit(generic);

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800x600 18bit(generic);
1024x600 18bit;
1024x768 18bit;
1280x768 18bit;
640x480 24bit;
800x600 24bit;
1024x600 24bit;
1024x768 24bit;
1280x768 24bit]

- LVDS Backlight Controller [0%; 20%; 40%; 60%; 80%; **100%**]

- **South Bridge Chipset Configuration**
  - Audio Controller [Disabled; Enabled; **Auto**]
  - SMBus Controller [**Enabled**; Disabled]
  - PCI Express Ports Configuration
    - PCI Express Root Port 0 [Disabled; **Enabled**]
    - PCI Express Root Port 1 [Disabled; **Enabled**]
    - PCI Express Root Port 2 [Disabled; **Enabled**]
    - PCI Express Root Port 3 [Disabled; **Enabled**]

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Boot BIOS Setup Screen

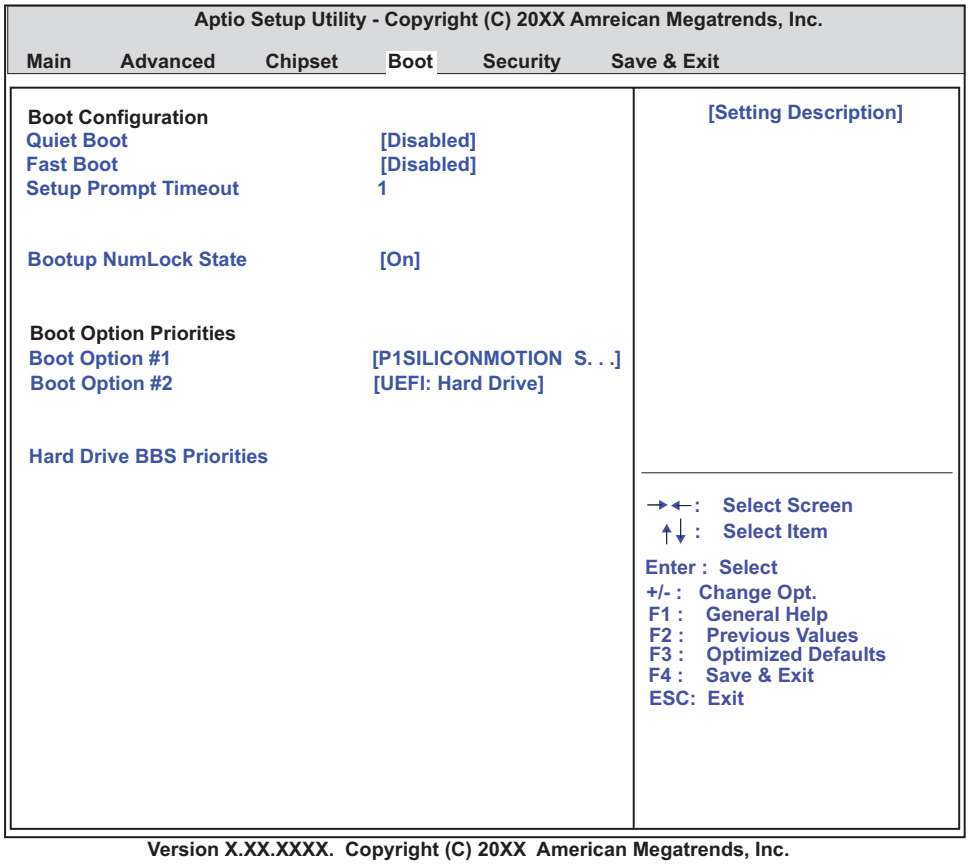


Figure 4-4. Boot BIOS Setup Screen

- **Boot Configuration**
  - Quiet Boot [**Disabled**; Enabled]
  - Fast Boot [**Disabled**; Enabled]
  - Setup Prompt Timeout 1
  - Bootup NumLock State [**On**; Off]
- **Boot Option Priorities**
  - Boot Option #1 [**P1-SILICONMOTION SM631GX8AB**; UEFI: Hard Drive; Disabled]
  - Boot Option #2 [P1-SILICONMOTION SM631GX8AB; **UEFI: Hard Drive**; Disabled]
  - Hard Drive BBS Priorities
    - Boot Option #1 [**P1-SILICONMOTION SM631GX8AB**; SDHC - SDC; Disabled]
    - Boot Option #2 [P1-SILICONMOTION SM631GX8AB; **SDHC - SDC**; Disabled]

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Security BIOS Setup Screen

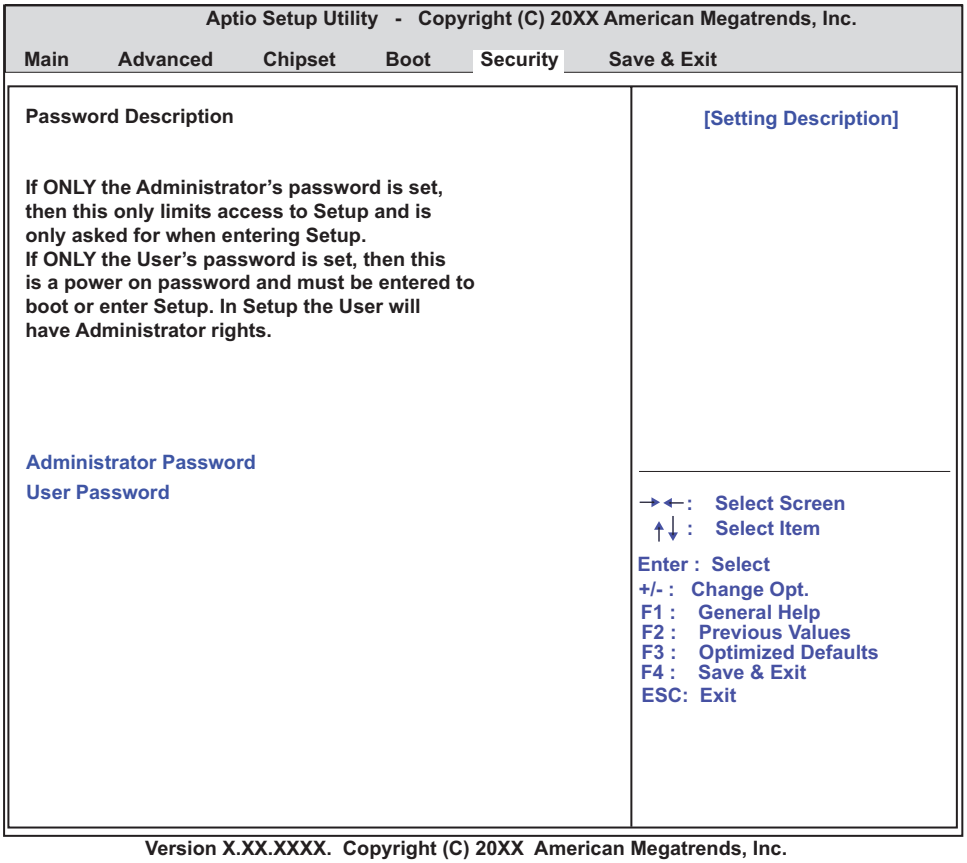


Figure 4-5. Security BIOS Setup Screen

- **Password Description**
  - Administrator Password [Create New Password]
  - User Password [Create New Password]

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Save & Exit BIOS Setup Screen

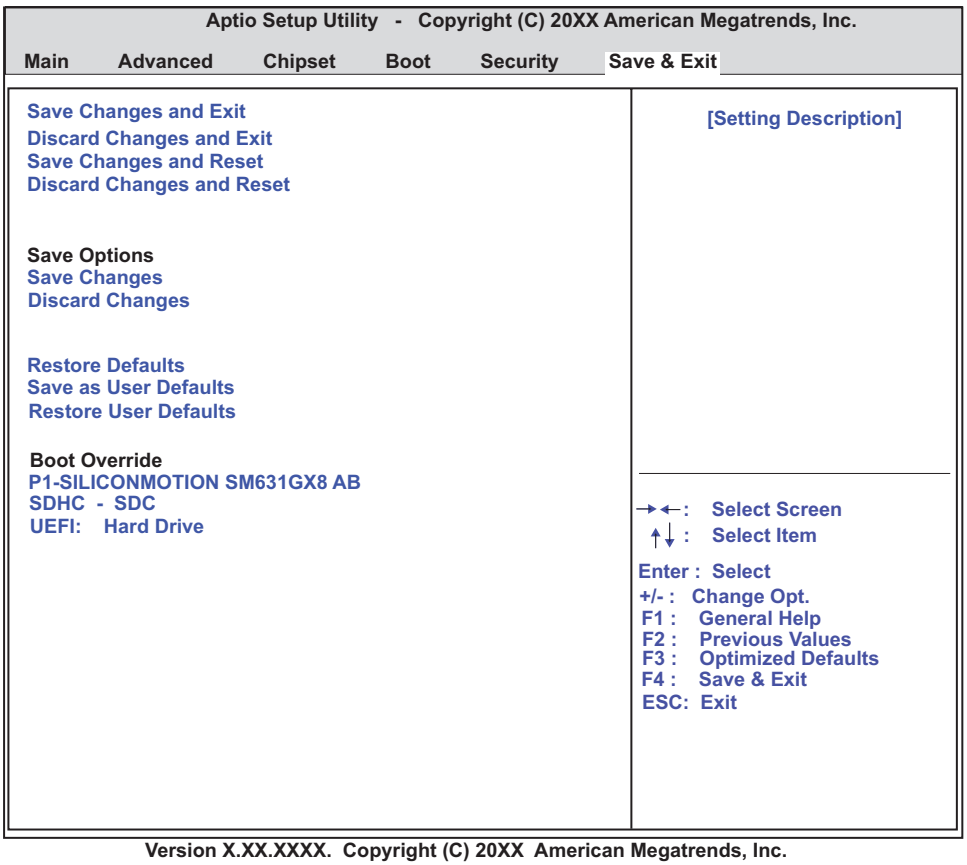


Figure 4-6. Save & Exit BIOS Setup Screen

- **Exit and Reset Options**
  - Save Changes and Exit
    - Save configuration and exit? [**Yes**; No]
  - Discard Changes and Exit
    - Quit without saving? [**Yes**; No] (ESC key can be used for this operation.)
  - Save Changes and Reset
    - Save configuration and reset? [**Yes**; No]
  - Discard Changes and Reset
    - Reset without saving? [**Yes**; No]

- **Save Options**
  - Save Changes
    - Save configuration [**Yes**; No]
  - Discard Changes (F7 key can be used for this operation.)
    - Load Previous Values [**Yes**; No]
  - Restore Defaults
    - Load Optimized Defaults [**Yes**; No]

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- Save as User Defaults
  - Save configuration? [**Yes**; No]
- Restore User Defaults
  - Restore User Defaults? [**Yes**; No]

- **Boot Override**
  - P1-SILICONMOTION SM631GX8AB
  - SDHC - SDC
  - UEFI: Hard Drive

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Appendix A Technical Support

ADLINK Technology, Inc. provides a number of methods for contacting Technical Support listed in the Table A-1 below. Requests for support through Ask an Expert are given the highest priority, and usually will be addressed within one working day.

- ADLINK Ask an Expert – This is a comprehensive support center designed to meet all your technical needs. This service is free and available 24 hours a day through the Ampro By ADLINK web page at http://www.adlinktech.com/AAE/. This includes a searchable database of Frequently Asked Questions, which will help you with the common information requested by most customers. This is a good source of information to look at first for your technical solutions. However, you must register online if you wish to use the Ask a Question feature.

  ADLINK strongly suggests that you register with the web site. By creating a profile on the ADLINK web site, you will have a portal page called "My ADLINK", unique to you with access to exclusive services and account information.

- Personal Assistance – You may also request personal assistance by creating an Ask an Expert account and then going to the Ask a Question feature. Requests can be submitted 24 hours a day, 7 days a week. You will receive immediate confirmation that your request has been entered. Once you have submitted your request, you must log in to go to the My Question area where you can check status, update your request, and access other features.

- Download Service – This service is also free and available 24 hours a day at http://www.adlinktech.com. For certain downloads such as technical documents and software, you must register online before you can log in to this service.

Table A-1. Technical Support Contact Information

Method	Contact Information
Ask an Expert	http://www.adlinktech.com/AAE/
Web Site	http://www.adlinktech.com
Standard Mail	Contact us should you require any service or assistance. **ADLINK Technology, Inc.** Address: 9F, No.166 Jian Yi Road, Zhonghe District New Taipei City 235, Taiwan 新北市中和區建一路 166 號 9 樓 Tel: +886-2-8226-5877 Fax: +886-2-8226-5717 Email: service@adlinktech.com **Ampro ADLINK Technology, Inc.** Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA Tel: +1-408-360-0200 Toll Free: +1-800-966-5200 (USA only) Fax: +1-408-360-0222 Email: info@adlinktech.com **ADLINK Technology (China) Co., Ltd.** Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203) 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area, Shanghai, 201203 China Tel: +86-21-5132-8988 Fax: +86-21-5132-3588 Email: market@adlinktech.com

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Table A-1. Technical Support Contact Information (Continued)

ADLINK Technology Beijing
Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室(100085)
Rm. 801, Power Creative E, No. 1, B/D
Shang Di East Rd., Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8625
Email: market@adlinktech.com

ADLINK Technology Shenzhen
Address: 深圳市南山区科技园南区高新南七道 数字技术园
A1 栋 2 楼 C 区 (518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7,
High-Tech Industrial Park S., Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

ADLINK Technology (Europe) GmbH
Address: Nord Carree 3, 40477 Duesseldorf, Germany
Tel: +49-211-495-5552
Fax: +49-211-495-5557
Email: emea@adlinktech.com

ADLINK Technology, Inc. (French Liaison Office)
Address: 15 rue Emile Baudot, 91300 Massy CEDEX, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology Japan Corporation
Address: 〒101-0045 東京都千代田区神田鍛冶町 3-7-4
神田 374 ビル 4F
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,
Chiyoda-ku, Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

ADLINK Technology, Inc. (Korean Liaison Office)
Address: 서울시 서초구 서초동 1506-25 한도 B/D 2 층
2F, Hando B/D, 1506-25, Seocho-Dong, Seocho-Gu,
Seoul 137-070, Korea
Tel: +82-2-2057-0565
Fax: +82-2-2057-0563
Email: korea@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.
Address: 84 Genting Lane #07-02A, Cityneon Design Centre,
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)
Address: No. 1357, "Anupama", Sri Aurobindo Marg, 9th Cross,
JP Nagar Phase I, Bangalore - 560078, India
Tel: +91-80-65605817
Fax: +91-80-22443548
Email: india@adlinktech.com

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