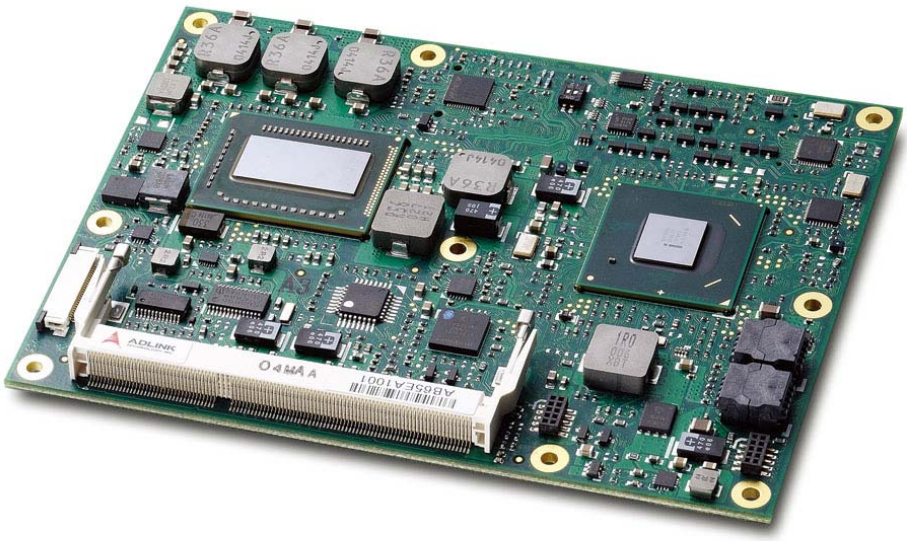
COM Express

Express-HR

User's Manual



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Revision History

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Preface

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.

Additional information, aids, and tips that help users perform tasks.

Information to prevent *mino*r physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

Information to prevent *serious* physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

1 Introduction

1.1 Description

The Express-HR is a COM Express™ COM.0 R2.0 Type 6 modules supporting the 64-bit Intel® Core™ i7/i5 processor with CPU, memory controller, and graphics processor on the same chip. Based on the latest Mobile Intel® QM67 Express chipset, the Express-HR is specifically designed for customers who need high-level processing and graphics performance in a long product life solution.

The Express-HR features the Intel® Core™ i7/i5 processor supporting Intel® Hyper-threading Technology (4 cores, 8 threads) and up to 16GB of DDR3 dual-channel memory at 1066/1333 MHz to provide excellent overall performance. Intel® Flexible Display Interface and Direct Media Interface provide high speed connectivity to the Intel® QM67 Express chipset.

Integrated HD Graphics 3000 includes features such as OpenGL 3.0, DirectX10.1, Intel® Clear Video HD Technology, Advanced Scheduler 2.0, 1.0, XPDM support, and DirectX Video Acceleration (DXVA) support for full AVC/VC1/MPEG2 hardware decode. Graphics outputs include CRT, LVDS and three DDI ports supporting HDMI / DVT / DisplayPort or SDVO. The Express-HR is specifically designed for customers with high-performance processing graphics requirements who want to outsource the custom core logic of their systems for reduced development time.

The Express-HR has dual stacked SODIMM sockets for up to 16 GB DDR3 memory. The Intel® Mobile QM67 Express chipset integrates CRT and dual-channel 18/24-bit LVDS display output. In addition to the onboard integrated graphics, a multiplexed PCI Express® x16 Graphics bus is available for discrete graphics expansion or general purpose x8 or x4 PCI Express® connectivity.

The Express-HR features a single onboard Gigabit Ethernet port, up to eight USB 2.0 ports, two SATA 6 Gb/s ports and two SATA 3 Gb/s ports with optional support for RAID 0/1/5/10. Support is provided for SMBus and I^2C. The module is equipped with SPI AMI EFI BIOS with CMOS backup, supporting embedded features such as remote console, CMOS backup, hardware monitor, and watchdog timer.

The Express-HR is a RoHS compliant and lead-free product.

2 Specifications

2.1 General

- CPU: Sandy Bridge 32 nm process, BGA type
  Intel® Core™ i7-2715QE 2.1 GHz (3.0 GHz Turbo), 6MB L3 cache, 45W
  Intel® Core™ i7-2655LE 2.2 GHz (2.9 GHz Turbo), 4MB L3 cache, 25W
  Intel® Core™ i7-2610UE 1.5 GHz (2.4 GHz Turbo), 4MB L3 cache, 17W
  Intel® Core™ i5-2515E 2.5 GHz (3.2 GHz Turbo), 3MB L3 cache, 35W
- Memory: Dual channel non-ECC 1066/1333 MHz DDR3 memory up to 16 GB in dual SODIMM socket
- Chipset: Mobile Intel® QM67 Express
- L3 Cache: 6MB (i7-2715QE), 4MB (i7-2655LE and i7-2610UE), 3MB (i5-2515E)
- BIOS: AMI EFI with CMOS backup in 16 Mbit SPI BIOS
- Debug Interface: XDP SFF-26 extension for ICE debug
- Hardware Monitor: Supply voltages and CPU temperature
- Watchdog Timer: Programmable timer ranges to generate RESET

2.2 Expansion Busses

- On Processor:
  - PCI Express x16 Graphics (Gen2) bus for discrete graphics solution or General Purpose PCI Express (2 x8 or 1 x8 with 2 x4)
- On Chipset:
  - 8 PCI Express x1: 0/1/2/3/4/5/6 are free, 7 is occupied by GbE LAN
  - LPC bus for optional connections to SIO, UART, etc.
- LPC bus, SMBus (system), I^2C (user)

2.3 Video

- Core: HD Graphics 3000 at 650–1300 MHz
- Integrated Graphics Features:

  - DirectX 10.1 and OpenGL 3.0
  - Intel Clear Video HD Technology
  - Advanced Scheduler 2.0, 1.0, XPDM support
  - DirectX Video Acceleration (DXVA) support for full AVC/VC1/MPEG2 hardware decode

- CRT Interface: Analog CRT support up to QXGA, 300MHz DAC, supports CRT hot plug
- LVDS Interface: Dual channel 18/24-bit
- DisplayPort: Three DDI ports supporting HDMI / DVT / DisplayPort or SDVO (see Note below).

DisplayPort

DisplayPort is a VESA interface standard for digital display. It defines a new license-free, royalty-free, state-of-the-art digital audio/video interconnect, intended to be used primarily between a computer and its display monitor, or a computer and a home theater system. It features 1.62 Gb/s and 2.7 Gb/s transfer rates over 1, 2 or 4 data lanes, 8b 10b coding, Hot-Plug detect support and HDCP support. Embedded DisplayPort (eDP) does not offer all features of standard DisplayPort because embedded applications do not require features such as link training, hot plug detection or logo testing. The eDP standard supports one data pair supporting XGA (1024x768) over two wires. Optionally 4 wires can be used for two data pairs to support 1280x1024.

2.4 Audio

- Chipset: Integrated in Intel® PCH QM67
- Audio Codec: on Express-BASE6 (ALC888)

2.5 LAN

- Chipset: Intel® Gigabit LAN PHY WG82579LM
- Interface: 10/100/1000 Mbps Ethernet

2.6 Multi I/O

- SATA: Supports two SATA ports at 6 Gb/s and two ports at 3 Gb/s with support for RAID 0,1,5,10
- USB: Supports up to eight ports USB 2.0
- SSD: Optional SATA based Solid State Disk, 8/16/32 GB

2.7 Super I/O

- Connected to LPC bus on carrier if needed

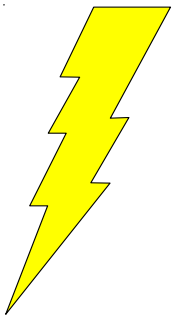
2.8 TPM (Trusted Platform Module)

- Chipset: Infineon SLB9635TT1.2
- Type: TPM 1.2

2.9 Power Specifications

- Input Power: AT mode (12 V +/- 5%) and ATX mode (12 V and 5 Vsb +/- 5%)
- Power States: supporting S0, S1, S3, S4, S5
- Smart Battery Support: yes

2.10 Power Consumption



The 12V measurement is power to the module only (excluding carrier board power draw). The 5Vsb measurement (in S3/S5 mode) includes both module power consumption plus active 5Vsb powered peripherals (such as PS/2 and USB) on the carrier that are needed for wakeup. Although all voltages were measured, only 12 V and 5 VSB are relevant because they are the only ones used by the Express module. The *Idle* power level was measured under Windows XP with no applications running (login screen). *Max Load* was measured under Windows XP running BurnIn software. Measurements were made with two 1GB 1066 MHz DDR3 SODIMM memory modules installed.

Intel® Core™ i7-2715QE 2.1 GHz

Power State	+12V	$+5V_{SB}$	Power Consumption
Idle (Windows XP login)	TBD	TBD	TBD
Max. Load (Windows XP - BurnIn)	TBD	TBD	TBD
S1 (standby powered on)	TBD	TBD	TBD
S3 (suspend to RAM)	TBD	TBD	TBD
S5 (soft off)	TBD	TBD	TBD

Intel® Core i7-2655LE 2.2 GHz

Power State	+12V	$+5V_{SB}$	Power Consumption
Idle (Windows XP login)	TBD	TBD	TBD
Max. Load (Windows XP - BurnIn)	TBD	TBD	TBD
S1 (standby powered on)	TBD	TBD	TBD
S3 (suspend to RAM)	TBD	TBD	TBD
S5 (soft off)	TBD	TBD	TBD

Intel® Core™ i7-2610UE 1.5 GHz

Power State	+12V	$+5V_{SB}$	Power Consumption
Idle (Windows XP login)	TBD	TBD	TBD
Max. Load (Windows XP - BurnIn)	TBD	TBD	TBD
S1 (standby powered on)	TBD	TBD	TBD
S3 (suspend to RAM)	TBD	TBD	TBD
S5 (soft off)	TBD	TBD	TBD

Power Consumption (cont'd)

Intel® Core™ i5-2515E 2.5 GHz

Power State	+12V	$+5V_{SB}$	Power Consumption
Idle (Windows XP login)	TBD	TBD	TBD
Max. Load (Windows XP - BurnIn)	TBD	TBD	TBD
S1 (standby powered on)	TBD	TBD	TBD
S3 (suspend to RAM)	TBD	TBD	TBD
S5 (soft off)	TBD	TBD	TBD

CMOS Battery Power Consumption

Current (+3V)	Power
TBD	TBD

2.11 Operating Systems

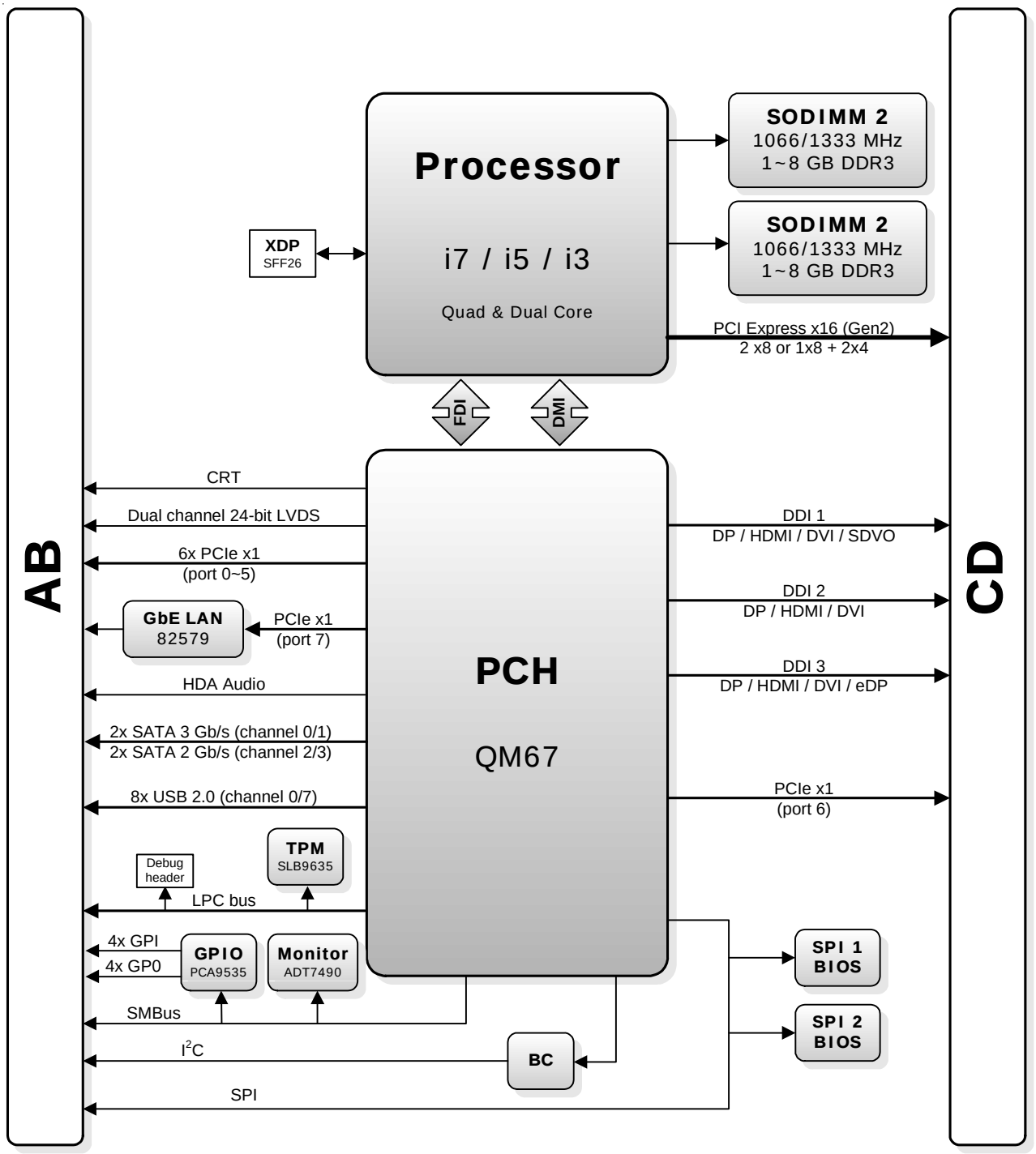
- Standard Support
  - Windows XP 32/64-bit
  - Windows Vista 32/64-bit
  - Windows Server 2003/2008

- Extended Support (BSP)
  - Embedded XP WES2009 BSP
  - Embedded Win7
  - Vxworks 6.x
  - Linux 2.6.xx
  - AIDI Library for Win32, Win7 32/64 and Linux

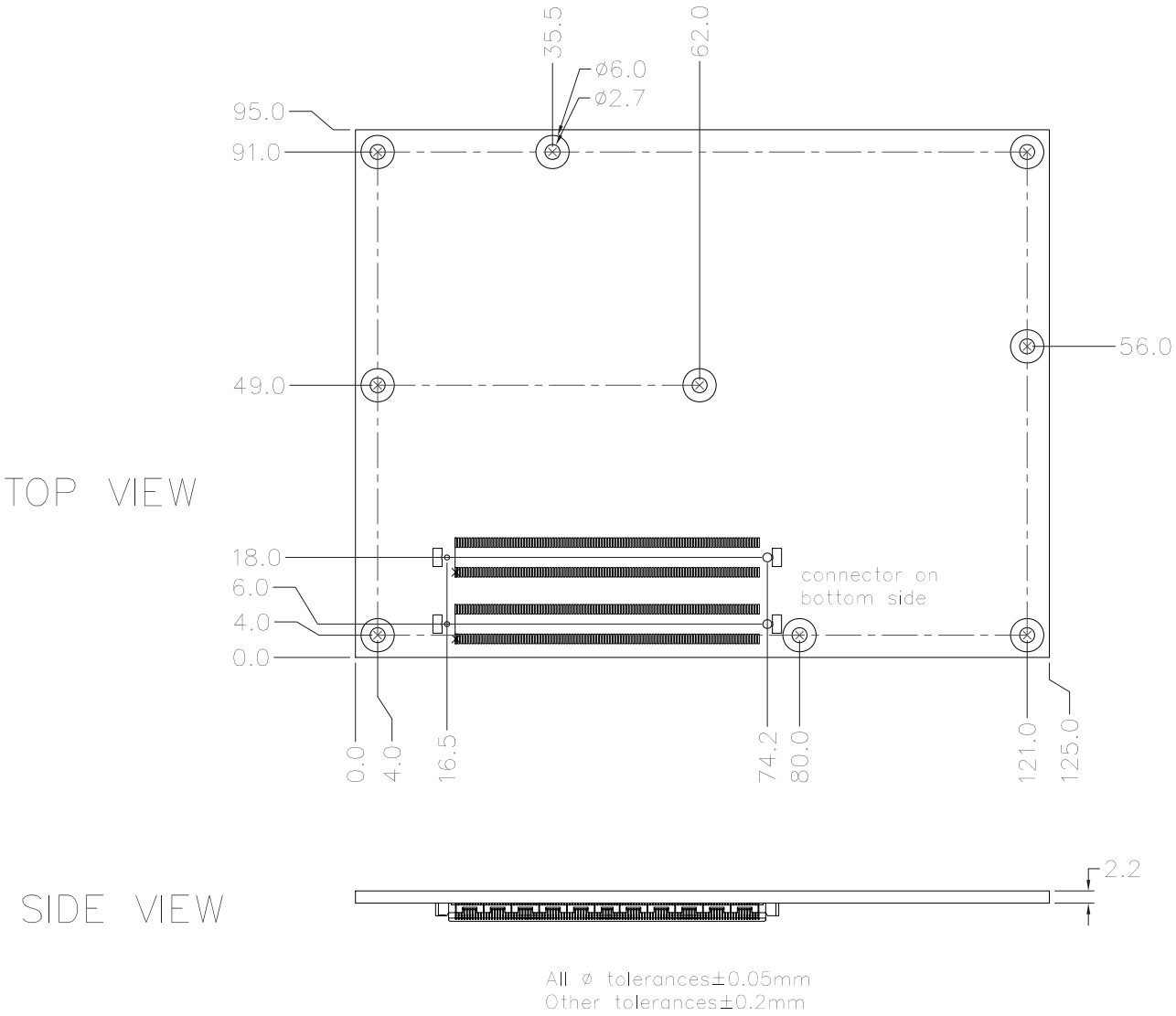
2.12 Mechanical and Environmental

- Form Factor : PICMG COM.0 R2, COM Express™ Basic form factor
- Type : PICMG COM.0 R2, COM Express™ Type 6 pinout
- Dimensions: 95 x 125 mm
- Standard Operating Temperature: 0°C to 60°C
- Relative Humidity: up to 90% at 60°C

3 Function Diagram



4 Mechanical Dimensions

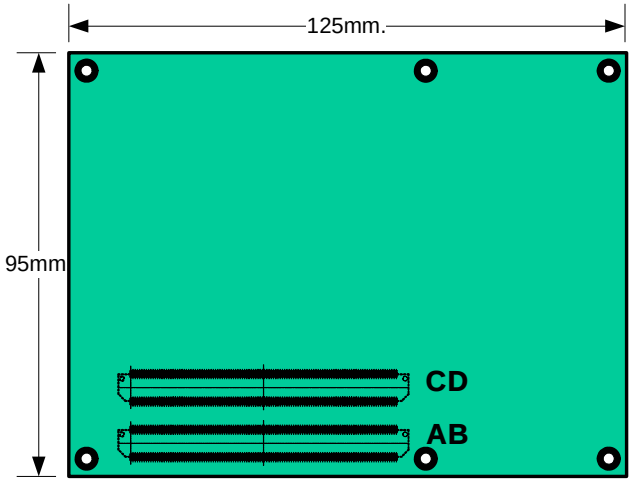


5 Pinout and Signal Descriptions

5.1 COM Express™ Type 6 compatible pinout

All signals on AB and CD connectors of the Express-HR comply with pinouts and conventions used in the original "PICMG® COM.0 R2.0: COM Express™ Module Base Specification".

AB Connector
1 Gigabit Ethernet port
LPC and SPI bus
4 Serial ATA channels
High Definition Audio
8 USB 2.0 ports
6 PCI Express Lanes x1
Dual 24-bit LVDS channels
Analog VGA
8 GPIO pins
SMBus and I^2C bus
Fan Control Signals
+12V primary power input
+5V standby and 3V RTC

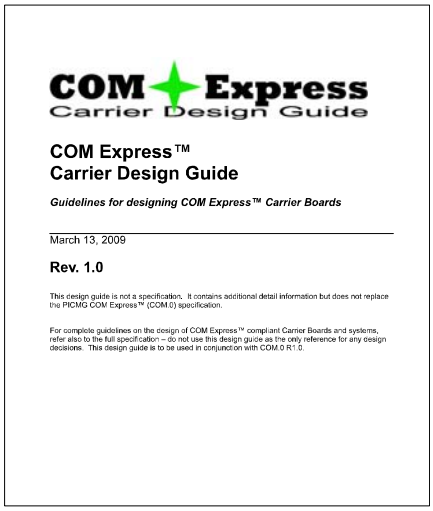


CD Connector
USB3.0 addtional signals to upgrade 4 USB ports on AB to USB230
2 PCI Express Lanes x1
3 DDI Channels Displayport/HDMI/DVI and SDVO
PCI Express x16 for Graphics or General purpose PCIe

NOTE: The above function mappings are a generic description of COM Express pinouts, and not necessarily supported on the module described in this manual.

5.2 Carrier Board Design Guide

The PICMG COM Express Carrier Design Guide is a 160-page document that provides information on designing a custom carrier board for COM Express modules. The design guide includes reference schematics for the external circuitry required to implement the various COM Express peripheral functions, explains how to extend the supported buses, and how to add additional peripherals and expansion slots to a COM Express-based system. You can download the document Carrier Design Guide at: http://www.adlinktech.com/ccps/picmg_comdg_100.pdf


COM Express
Carrier Design Guide

COM Express™
Carrier Design Guide

Guidelines for designing COM Express™ Carrier Boards

March 13, 2009

Rev. 1.0

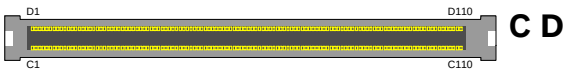
This design guide is not a specification. It contains additional detail information but does not replace the PICMG COM Express™ (COM.0) specification.

For complete guidelines on the design of COM Express™ compliant Carrier Boards and systems, refer also to the full specification – do not use this design guide as the only reference for any design decisions. This design guide is to be used in conjunction with COM.0 R1.0.

5.3 Pin Definitions

Pinouts for:

COM.0 R2.0 Type 6



Row A		Row B		Row C		Row D	
Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
A1	GND (FIXED)	B1	GND (FIXED)	C1	GND FIXED)	D1	GND FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#	**C2**	GND	**D2**	GND
A3	GBE0_MDI3+	B3	LPC_FRAME#	**C3**	USB_SSRX0-	**D3**	USB_SSTX0-
A4	GBE0_LINK100#	B4	LPC_AD0	**C4**	USB_SSRX0+	**D4**	USB_SSTX0+
A5	GBE0_LINK1000#	B5	LPC_AD1	**C5**	GND	**D5**	GND
A6	GBE0_MDI2-	B6	LPC_AD2	**C6**	USB_SSRX1-	**D6**	USB_SSTX1-
A7	GBE0_MDI2+	B7	LPC_AD3	**C7**	USB_SSRX1+	**D7**	USB_SSTX1+
A8	GBE0_LINK#	B8	LPC_DRQ0#	**C8**	GND	**D8**	GND
A9	GBE0_MDI1-	B9	LPC_DRQ1#	**C9**	USB_SSRX2-	**D9**	USB_SSTX2-
A10	GBE0_MDI1+	B10	LPC_CLK	**C10**	USB_SSRX2+	**D10**	USB_SSTX2+
A11	GND (FIXED)	B11	GND (FIXED)	C11	GND (FIXED)	D11	GND (FIXED)
A12	GBE0_MDI0-	B12	PWRBTN#	**C12**	USB_SSRX3-	**D12**	USB_SSTX3-
A13	GBE0_MDI0+	B13	SMB_CK	**C13**	USB_SSRX3+	**D13**	USB_SSTX3+
A14	GBE0_CTREF	B14	SMB_DAT	**C14**	GND	**D14**	GND
A15	SUS_S3#	B15	SMB_ALERT#	**C15**	DDI1_PAIR6+	**D15**	DDI1_CTRLCLK_AUX+
A16	SATA0_TX+	B16	SATA1_TX+	**C16**	DDI1_PAIR6-	**D16**	DDI1_CTRLDATA_AUX-
A17	SATA0_TX-	B17	SATA1_TX-	**C17**	RSVD	**D17**	RSVD
A18	SUS_S4#	B18	SUS_STAT#	**C18**	RSVD	**D18**	RSVD
A19	SATA0_RX+	B19	SATA1_RX+	**C19**	PCIE_RX6+	**D19**	PCIE_TX6+
A20	SATA0_RX-	B20	SATA1_RX-	**C20**	PCIE_RX6-	**D20**	PCIE_TX6-
A21	GND (FIXED)	B21	GND (FIXED)	C21	GND (FIXED)	D21	GND (FIXED)
A22	SATA2_TX+	B22	SATA3_TX+	**C22**	PCIE_RX7+	**D22**	PCIE_TX7+
A23	SATA2_TX-	B23	SATA3_TX-	**C23**	PCIE_RX7-	**D23**	PCIE_TX7-
A24	SUS_S5#	B24	PWR_OK	**C24**	DDI1_HPD	**D24**	RSVD
A25	SATA2_RX+	B25	SATA3_RX+	**C25**	DDI1_PAIR4+	**D25**	RSVD
A26	SATA2_RX-	B26	SATA3_RX-	**C26**	DDI1_PAIR4-	**D26**	DDI1_PAIR0+
A27	BATLOW#	B27	WDT	**C27**	RSVD	**D27**	DDI1_PAIR0-
A28	(S)ATA_ACT#	**B28**	AC/HDA_SDIN2	**C28**	RSVD	**D28**	RSVD
A29	AC/HDA_SYNC	**B29**	AC/HDA_SDIN1	**C29**	DDI1_PAIR5+	**D29**	DDI1_PAIR1+
A30	AC/HDA_RST#	**B30**	AC/HDA_SDIN0	**C30**	DDI1_PAIR5-	**D30**	DDI1_PAIR1-
A31	GND (FIXED)	B31	GND (FIXED)	C31	GND (FIXED)	D31	GND (FIXED)
A32	AC/HDA_BITCLK	B32	SPKR	**C32**	DDI2_CTRLCLK_AUX+	**D32**	DDI1_PAIR2+
A33	AC/HDA_SDOUT	B33	I2C_CK	**C33**	DDI2_CTRLDATA_AUX-	**D33**	DDI1_PAIR2-
A34	BIOS_DIS0#	B34	I2C_DAT	**C34**	DDI2_DDC_AUX_SEL	**D34**	DDI1_DDC_AUX_SEL
A35	THRMTRIP#	B35	THRM#	**C35**	RSVD	**D35**	RSVD
A36	USB6-	B36	USB7-	**C36**	DDI3_CTRLCLK_AUX+	**D36**	DDI1_PAIR3+
A37	USB6+	B37	USB7+	**C37**	DDI3_CTRLDATA_AUX-	**D37**	DDI1_PAIR3-
A38	USB_6_7_OC#	B38	USB_4_5_OC#	**C38**	DDI3_DDC_AUX_SEL	**D38**	RSVD
A39	USB4-	B39	USB5-	**C39**	DDI3_PAIR0+	**D39**	DDI2_PAIR0+
A40	USB4+	B40	USB5+	**C40**	DDI3_PAIR0-	**D40**	DDI2_PAIR0-
A41	GND (FIXED)	B41	GND (FIXED)	C41	GND (FIXED)	D41	GND (FIXED)
A42	USB2-	B42	USB3-	**C42**	DDI3_PAIR1+	D42	DDI2_PAIR1+
A43	USB2+	B43	USB3+	**C43**	DDI3_PAIR1-	D43	DDI2_PAIR1-
A44	USB_2_3_OC#	B44	USB_0_1_OC#	**C44**	DDI3_HPD	D44	DDI2_HPD
A45	USB0-	B45	USB1-	**C45**	RSVD	D45	RSVD
A46	USB0+	B46	USB1+	**C46**	DDI3_PAIR2+	D46	DDI2_PAIR2+
A47	VCC_RTC	B47	EXCD1_PERST#	**C47**	DDI3_PAIR2-	D47	DDI2_PAIR2-
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	**C48**	RSVD	D48	RSVD
A49	EXCD0_CPPE#	B49	SYS_RESET#	**C49**	DDI3_PAIR3+	D49	DDI2_PAIR3+
A50	LPC_SERIRQ	B50	CB_RESET#	**C50**	DDI3_PAIR3-	D50	DDI2_PAIR3-

Row A		Row B		Row C		Row D	
Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
A51	GND (FIXED)	B51	GND (FIXED)	C51	GND (FIXED)	D51	GND (FIXED)
A52	PCIE_TX5+	B52	PCIE_RX5+	C52	PEG_RX0+	D52	PEG_TX0+
A53	PCIE_TX5-	B53	PCIE_RX5-	C53	PEG_RX0-	D53	PEG_TX0-
A54	GPI0	B54	GPO1	C54	TYPE0#	D54	PEG_LANE_RV#
A55	PCIE_TX4+	B55	PCIE_RX4+	C55	PEG_RX1+	D55	PEG_TX1+
A56	PCIE_TX4-	B56	PCIE_RX4-	C56	PEG_RX1-	D56	PEG_TX1-
A57	GND	B57	GPO2	C57	TYPE1#	D57	TYPE2#
A58	PCIE_TX3+	B58	PCIE_RX3+	C58	PEG_RX2+	D58	PEG_TX2+
A59	PCIE_TX3-	B59	PCIE_RX3-	C59	PEG_RX2-	D59	PEG_TX2-
A60	GND (FIXED)	B60	GND (FIXED)	C60	GND (FIXED)	D60	GND (FIXED)
A61	PCIE_TX2+	B61	PCIE_RX2+	C61	PEG_RX3+	D61	PEG_TX3+
A62	PCIE_TX2-	B62	PCIE_RX2-	C62	PEG_RX3-	D62	PEG_TX3-
A63	GPI1	B63	GPO3	C63	RSVD	D63	RSVD
A64	PCIE_TX1+	B64	PCIE_RX1+	C64	RSVD	D64	RSVD
A65	PCIE_TX1-	B65	PCIE_RX1-	C65	PEG_RX4+	D65	PEG_TX4+
A66	GND	B66	WAKE0#	C66	PEG_RX4-	D66	PEG_TX4-
A67	GPI2	B67	WAKE1#	C67	RSVD	D67	GND
A68	PCIE_TX0+	B68	PCIE_RX0+	C68	PEG_RX5+	D68	PEG_TX5+
A69	PCIE_TX0-	B69	PCIE_RX0-	C69	PEG_RX5-	D69	PEG_TX5-
A70	GND (FIXED)	B70	GND (FIXED)	C70	GND (FIXED)	D70	GND (FIXED)
A71	LVDS_A0+	B71	LVDS_B0+	C71	PEG_RX6+	D71	PEG_TX6+
A72	LVDS_A0-	B72	LVDS_B0-	C72	PEG_RX6-	D72	PEG_TX6-
A73	LVDS_A1+	B73	LVDS_B1+	**C73**	GND	**D73**	GND
A74	LVDS_A1-	B74	LVDS_B1-	C74	PEG_RX7+	D74	PEG_TX7+
A75	LVDS_A2+	B75	LVDS_B2+	C75	PEG_RX7-	D75	PEG_TX7-
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	RSVD	**D77**	RSVD
A78	LVDS_A3+	B78	LVDS_B3-	C78	PEG_RX8+	D78	PEG_TX8+
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	PEG_RX8-	D79	PEG_TX8-
A80	GND (FIXED)	B80	GND (FIXED)	C80	GND (FIXED)	D80	GND (FIXED)
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	PEG_RX9+	D81	PEG_TX9+
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	PEG_RX9-	D82	PEG_TX9-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	**C83**	TPM_PP	D83	RSVD
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	GPI3	B85	VCC_5V_SBY	C85	PEG_RX10+	D85	PEG_TX10+
A86	RSVD	B86	VCC_5V_SBY	C86	PEG_RX10-	D86	PEG_TX10-
A87	RSVD	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE0_CK_REF+	**B88**	BIOS_DIS1#	C88	PEG_RX11+	D88	PEG_TX11+
A89	PCIE0_CK_REF-	B89	VGA_RED	C89	PEG_RX11-	D89	PEG_TX11-
A90	GND (FIXED)	B90	GND (FIXED)	C90	GND (FIXED)	D90	GND (FIXED)
A91	SPI_POWER	B91	VGA_GRN	C91	PEG_RX12+	D91	PEG_TX12+
A92	SPI_MISO	B92	VGA_BLU	C92	PEG_RX12-	D92	PEG_TX12-
A93	GPO0	B93	VGA_HSYNC	C93	GND	D93	GND
A94	SPI_CLK	B94	VGA_VSYNC	C94	PEG_RX13+	D94	PEG_TX13+
A95	SPI_MOSI	B95	VGA_I2C_CK	C95	PEG_RX13-	D95	PEG_TX13-
A96	TPM_PP	B96	VGA_I2C_DAT	C96	GND	D96	GND
A97	TYPE10#	**B97**	SPI_CS#	C97	RSVD	**D97**	RSVD
A98	~~SER0_TX~~	**B98**	RSVD	C98	PEG_RX14+	D98	PEG_TX14+
A99	~~SER0_RX~~	**B99**	RSVD	C99	PEG_RX14-	D99	PEG_TX14-
A100	GND (FIXED)	B100	GND (FIXED)	C100	GND (FIXED)	D100	GND (FIXED)
A101	~~SER1_TX~~	**B101**	FAN_PWMOUT	C101	PEG_RX15+	D101	PEG_TX15+
A102	~~SER1_RX~~	**B102**	FAN_TACHIN	C102	PEG_RX15-	D102	PEG_TX15-
A103	LID#	**B103**	SLEEP#	C103	GND	D103	GND
A104	VCC_12V	B104	VCC_12V	C104	VCC_12V	D104	VCC_12V
A105	VCC_12V	B105	VCC_12V	C105	VCC_12V	D105	VCC_12V
A106	VCC_12V	B106	VCC_12V	C106	VCC_12V	D106	VCC_12V
A107	VCC_12V	B107	VCC_12V	C107	VCC_12V	D107	VCC_12V
A108	VCC_12V	B108	VCC_12V	C108	VCC_12V	D108	VCC_12V
A109	VCC_12V	B109	VCC_12V	C109	VCC_12V	D109	VCC_12V
A110	GND (FIXED)	B110	GND (FIXED)	C110	GND (FIXED)	D110	GND (FIXED)

~~XXX~~ Strikethrough pin names indicates that the signal is not supported on this module.

5.4 Signal Descriptions

Row A

Pin	Signal	Description	Type	PU/PD	Comment
A1	GND	Ground	PWR	-	-
A2	GBE0_MDI3-	Ethernet Media Dependent Interface -	I/O - DP	-	-
A3	GBE0_MDI3+	Ethernet Media Dependent Interface +	I/O - DP	-	-
A4	GBE0_LINK100#	Ethernet Speed LED (100Mb)	OD	-	On at 100Mb/s
A5	GBE0_LINK1000#	Ethernet Speed LED (1000Mb)	OD	-	On at 1000Mb/s
A6	GBE0_MDI2-	Ethernet Media Dependent Interface -	I/O - DP	-	-
A7	GBE0_MDI2+	Ethernet Media Dependent Interface +	I/O - DP	-	-
A8	GBE0_LINK#	LAN Link LED	O-3.3		-
A9	GBE0_MDI1-	Ethernet Media Dependent Interface -	I/O - DP	-	-
A10	GBE0_MDI1+	Ethernet Media Dependent Interface +	I/O - DP	-	-
A11	GND	Ground	PWR	-	-
A12	GBE0_MDI0-	Ethernet Media Dependent Interface -	I/O - DP	-	-
A13	GBE0_MDI0+	Ethernet Media Dependent Interface +	I/O - DP	-	-
A14	GBE0_CTREF	ETHCTREF	O-1,8	-	-
A15	SUS_S3#	PM_SLP_S#3	O-3.3	-	-
A16	SATA0_TX+	SATA0_TX+ | SATA 0 Transmit Data +	O - DP	-	-
A17	SATA0_TX-	SATA0_TX- | SATA 0 Transmit Data -	O - DP	-	-
A18	SUS_S4#	PM_SLP_S#4	O-3.3	-	-
A19	SATA0_RX+	SATA0_RX+ | SATA 0 Receive Data +	I - DP	-	-
A20	SATA0_RX-	SATA0_RX - | SATA 0 Receive Data -	I - DP	-	-
A21	GND	Ground	PWR	-	-
A22	SATA2_TX+	SATA2_TX+ | SATA 2 Transmit Data +	O - DP	-	-
A23	SATA2_TX-	SATA2_TX- | SATA 2 Transmit Data -	O - DP	-	-
A24	SUS_S5#	PM_SLP_S#5	O-3.3	-	-
A25	SATA2_RX+	SATA2_RX+ | SATA 2 Receive Data +	I - DP	-	-
A26	SATA2_RX-	SATA2_RX- | SATA 2 Receive Data -	I - DP	-	-
A27	BATLOW#	PM_BATLOW# | Battery Low	I-3.3	PU 8k2 3.3Vsb	-
A28	ATA_ACT#	ATA_LED# | SATA LED	O-3.3	PU 10k 3.3V	
A29	AC_SYNC	AC_SYNC | AC'97 Sync	O-3.3	-	int. PD 20k in QM57
A30	AC_RST#	AC_RST# | AC'97 Reset	O-3.3	-	int. PD 20k in QM57
A31	GND	Ground	PWR	-	
A32	AC_BITCLK	AC_BITCLK | AC'97 Clock	O-3.3	-	int. PD 20k in QM57
A33	AC_SDOUT	AC_SDATAOUT | AC'97 Data	O-3.3	-	int. PD 20k in QM57
A34	BIOS_DISABLE#	BIOS_DISABLE#	I-3.3	PU 10k 3.3Vsb	-
A35	THRMTRIP#	PM_THRMTRIP#_CON	O-3.3	PU 330 3.3V	-
A36	USB6-	USB_PN6 | USB Data – Port6	I/O - DP	-	int. PD 20k in QM57
A37	USB6+	USB_PP6 | USB Data + Port6	I/O - DP	-	int. PD 20k in QM57
A38	USB_6_7_OC#	USB_OC#_6_7 | USB OverCurrent Port 6/7	I-3.3	PU 10k 3.3Vsb	-
A39	USB4-	USB_PN4 | USB Data - Port4	I/O - DP	-	int. PD 20k in QM57
A40	USB4+	USB_PP4 | USB Data + Port4	I/O - DP	-	int. PD 20k in QM57
A41	GND	Ground	PWR	-	-
A42	USB2-	USB_PN2 | USB Data - Port2	I/O - DP	-	int. PD 20k in QM57
A43	USB2+	USB_PP2 | USB Data + Port2	I/O - DP	-	int. PD 20k in QM57
A44	USB_2_3_OC#	USB_OC#_2_3 | USB OverCurrent Port 2/3	I-3.3	PU 10k 3.3Vsb	
A45	USB0-	USB_PN0 | USB Data - Port0	I/O - DP	-	int. PD 20k in QM57
A46	USB0+	USB_PP0 | USB Data + Port0	I/O - DP	-	int. PD 20k in QM57
A47	VCC_RTC	V_BAT	PWR	-	-
A48	EXCD0_PERST#	Express Card Support [0]|card reset	O-3.3	PU 10k 3.3Vsb	-
A49	EXCD0_CPPE#	Express Card Support [0]| capable request	I-3.3	PU 10k 3.3V	-
A50	LPC_SERIRQ	INT_SERIRQ | Serial Interrupt Request	IO-3.3	PU 10k 3.3V	-
A51	GND	Ground	PWR	-	-
A52	PCIE5_TX+	PCI Express 5 Transmit +	O - DP	-	-
A53	PCIE5_TX-	PCI Express 5 Transmit -	O - DP	-	-
A54	GPI0	General Purpose Input 0	I-3.3	PU 10k 3.3Vsb	-
A55	PCIE4_TX+	PCI Express 4 Transmit +	O - DP	-	-

Signal Descriptions (cont'd)

Row A

Pin	Signal	Description	Type	PU/PD	Comment
A56	PCIE4_TX-	PCI Express 4 Transmit -	O - DP	-	-
A57	GND	Ground	PWR	-	-
A58	PCIE3_TX+	PCI Express 3 Transmit +	O - DP	-	-
A59	PCIE3_TX-	PCI Express 3 Transmit -	O - DP	-	-
A60	GND	Ground	PWR	-	-
A61	PCIE2_TX+	PCI Express 2 Transmit +	O - DP	-	-
A62	PCIE2_TX-	PCI Express 2 Transmit -	O - DP	-	-
A63	GPI1	General Purpose Input 1	I-3.3	PU 10k 3.3Vsb	-
A64	PCIE1_TX+	PCI Express 1 Transmit +	O - DP	-	-
A65	PCIE1_TX-	PCI Express 1 Transmit -	O - DP	-	-
A66	GND	Ground	PWR	-	-
A67	GPI2	General Purpose Input 2	I-3.3	PU 10k 3.3Vsb	-
A68	PCIE0_TX+	PCI Express 0 +	O - DP	-	-
A69	PCIE0_TX-	PCI Express 0 -	O - DP	-	-
A70	GND	Ground	PWR	-	-
A71	LVDS_A0+	LVDS_AP0 | LVDS Channel A	O - DP	-	-
A72	LVDS_A0-	LVDS_AN0 | LVDS Channel A	O - DP	-	-
A73	LVDS_A1+	LVDS_AP1 | LVDS Channel A	O - DP	-	-
A74	LVDS_A1-	LVDS_AN1 | LVDS Channel A	O - DP	-	-
A75	LVDS_A2+	LVDS_AP2 | LVDS Channel A	O - DP	-	-
A76	LVDS_A2-	LVDS_AN2 | LVDS Channel A	O - DP	-	-
A77	LVDS_VDD_EN	LVDS_VDDEN | LVDS Panel Power	O-2,5	PD 10k	-
A78	LVDS_A3+	LVDS_AP3 | LVDS Channel A	O - DP	-	-
A79	LVDS_A3-	LVDS_AN3 | LVDS Channel A	O - DP	-	-
A80	GND	Ground	PWR	-	-
A81	LVDS_A_CK+	LVDS_CLKAP | LVDS Channel A	O - DP	-	-
A82	LVDS_A_CK-	LVDS_CLKAN | LVDS Channel A	O - DP	-	-
A83	LVDS_I2C_CK	LVDS_DDCPCLK | JILI I2C Clock	IO-3.3	PU 2k2 3.3V	-
A84	LVDS_I2C_DAT	LVDS_DDCPDATA | JILI I2C Data	IO-3.3	PU 2k2 3.3V	-
A85	GPI3	General Purpose Input 3	I-3.3	PU 10k 3.3Vsb	-
A86	RSVD	NC	NC		-
A87	RSVD	NC	NC		-
A88	PCIE_CK_REF+	CLK_PCIE_REF P	O - DP	-	-
A89	PCIE_CK_REF-	CLK_PCIE_REF N	O - DP	-	-
A90	GND	Ground	PWR	-	-
A91	SPI_POWER	Power supply for Carrier Board SPI	O-3.3	-	-
A92	SPI_MISO		IO	-	-
A93	GPO0	General Purpose Output 0	O-3.3	PU 10k 3.3Vsb	-
A94	SPI_CLK	Clock from Module to Carrier SPI	IO	-	-
A95	SPI_MOSI	Data out from Module to Carrier SPI	IO	-	-
A96	TPM_PP	Trusted Platform Module	IO-3.3	-	-
A97	TYPE10#	Module type ID pin 10	NC	-	-
A98	SER0_TX	serial port transmitter	NC	-	-
A99	SER0_RX	serial port receiver	NC	-	-
A100	GND	Ground	PWR	-	-
A101	SER1_TX	serial port transmitter	NC	-	-
A102	SER1_RX	serial port receiver	NC	-	-
A103	LID#	LID button.	OD	-	-
A104	VCC_12V	Power 12V	PWR	-	-
A105	VCC_12V	Power 12V	PWR	-	-
A106	VCC_12V	Power 12V	PWR	-	-
A107	VCC_12V	Power 12V	PWR	-	-
A108	VCC_12V	Power 12V	PWR	-	-
A109	VCC_12V	Power 12V	PWR	-	-
A110	GND	Ground	PWR	-	-

Signal Descriptions (cont'd)

Row B

Pin	Signal	Description	Type	PU/PD	Comment
B1	GND	Ground	PWR	-	-
B2	GBE0_ACT#	LAN_ACTLED# | Ethernet Activity LED	OD	PU 1k 3.3V	-
B3	LPC_FRAME#	LPC_FRAME# | LPC Frame Indicator	O-3.3	-	-
B4	LPC_AD0	LPC_AD0 | LPC Adress & DATA Bus	IO-3.3	-	
B5	LPC_AD1	LPC_AD1 | LPC Adress & DATA Bus	IO-3.3	-	
B6	LPC_AD2	LPC_AD2 | LPC Adress & DATA Bus	IO-3.3	-	
B7	LPC_AD3	LPC_AD3 | LPC Adress & DATA Bus	IO-3.3	-	
B8	LPC_DRQ0#	SIO_DRQ#0 | LPC Serial DMA Request 0	I-3.3	-	int. PU 20k in QM57
B9	LPC_DRQ1#	SIO_DRQ#1 | LPC Serial DMA Request 1	I-3.3	-	int. PU 20k in QM57
B10	LPC_CLK	CLK_SIOEXTPCI	O-3.3	-	-
B11	GND	Ground	I-3.3	-	-
B12	PWRBTN#	Power Button	I-5	PU 10k 3.3Vsb	-
B13	SMB_CK	SMBUS Clock	O-3.3	PU 2k2 3.3Vsb	-
B14	SMB_DAT	SMBUS Data	IO-3.3	PU 2k2 3.3Vsb	-
B15	SMB_ALERT#	SMB_ALERT#	I-3.3	PU 10k 3.3Vsb	-
B16	SATA1_TX+	SATA1_TX+ | SATA 1 Transmit Data +	O - DP	-	-
B17	SATA1_TX-	SATA1_TX- | SATA 1 Transmit Data -	O - DP	-	-
B18	SUS_STAT#	PM_SUS_ STAT#	O-3.3	-	-
B19	SATA1_RX+	SATA1_RX+ | SATA 1 Receive Data +	I - DP	-	-
B20	SATA1_RX-	SATA1_RX - | SATA 1 Receive Data -	I - DP	-	-
B21	GND	Ground	PWR	-	-
B22	SATA3_TX+	SATA3_TX+ | SATA 3 Transmit Data +	O - DP	-	-
B23	SATA3_TX-	SATA3_TX- | SATA 3 Transmit Data -	O - DP	-	-
B24	PWR_OK	Power OK	I,3.3	PU 10k 3.3Vsb	-
B25	SATA3_RX+	SATA3_RX+ | SATA 3 Receive Data +	I - DP	-	-
B26	SATA3_RX-	SATA3_RX - | SATA 3 Receive Data -	I - DP	-	-
B27	WDT	Watch Dog Timer	O-3.3		-
B28	AC_SDIN2	AC_SDATAIN2	I-3.3	-	int. PD 20k in QM57
B29	AC_SDIN1	AC_SDATAIN1	I-3.3	-	int. PD 20k in QM57
B30	AC_SDIN0	AC_SDATAIN0	I-3.3	-	int. PD 20k in QM57
B31	GND	Ground	PWR	-	
B32	SPKR	AC_SPKR	O-3.3	-	int. PD 20k in QM57
B33	I2C_CK	I2CLK	O-3.3	PU 10k 3.3V	-
B34	I2C_DAT	I2DAT	IO-3.3	PU 10k 3.3V	-
B35	THRM#	PM THRM# CON | Over Temperature	I-3.3		-
B36	USB7-	USB_PN7 | USB Data – Port7	I/O - DP	-	int. PD 20k in QM57
B37	USB7+	USB_PP7 | USB Data + Port7	I/O - DP	-	int. PD 20k in QM57
B38	USB_4_5_OC#	USB_OC#_4_5 | USB OverCurrent Port	I-3.3	PU 10k 3.3Vsb	
B39	USB5-	USB_PN5 | USB Data- Port5	I/O - DP	-	int. PD 20k in QM57
B40	USB5+	USB_PP5 | USB Data+ Port5	I/O - DP	-	int. PD 20k in QM57
B41	GND	Ground	I-3.3	-	-
B42	USB3-	USB_PN3 | USB Data- Port3	I/O - DP	-	int. PD 20k in QM57
B43	USB3+	USB_PP3 | USB Data+ Port3	I/O - DP	-	int. PD 20k in QM57
B44	USB_0_1_OC#	USB_OC#_0_1 | USB OverCurrent Port	I-3.3	PU 10k 3.3Vsb	-
B45	USB1-	USB_PN1 | USB Data- Port1	I/O - DP	-	int. PD 20k in QM57
B46	USB1+	USB_PP1 | USB Data+ Port1	I/O - DP	-	int. PD 20k in QM57
B47	EXCD1_PERST#	Express Card Support [1]|card reset	O-3.3	PU 10k 3.3Vsb	-
B48	EXCD1_CPPE#	Express Card Support [1]| capable c.	I-3.3	PU 10k 3.3V	-
B49	SYS_RESET#	ETX_SYS_RESET# | Reset Input	I-3.3	PU 10k 3.3Vsb	-
B50	CB_RESET#	PCI_RST# | PCI Bus Reset	O-3.3	-	-
B51	GND	Ground	PWR	-	-
B52	PCIE5_RX+	PCI Express 5 Recieve +	I - DP	-	-
B53	PCIE5_RX-	PCI Express 5 Receive -	I - DP	-	-
B54	GPO1	General Purpose Output 1	O-3.3	PU 10k 3.3Vsb	-
B55	PCIE4_RX+	PCI Express 4 Recieve +	I - DP	-	-

Signal Descriptions (cont'd)

Row B

Pin	Signal	Description	Type	PU/PD	Comment
B56	PCIE4_RX-	PCI Express 4 Receive -	I - DP	-	-
B57	GPO2	General Purpose Output 2	O-3.3	PU 10k 3.3Vsb	-
B58	PCIE3_RX+	PCI Express 3 Recieve +	I - DP	-	-
B59	PCIE3_RX-	PCI Express 3 Receive -	I - DP	-	-
B60	GND	Ground	PWR	-	-
B61	PCIE2_RX+	PCI Express 2 Receive +	I - DP	-	-
B62	PCIE2_RX-	PCI Express 2 Receive -	I - DP	-	-
B63	GPO3	General Purpose Output 3	O-3.3	PU 10k 3.3Vsb	-
B64	PCIE1_RX+	PCI Express 1 Receive +	I - DP	-	-
B65	PCIE1_RX-	PCI Express 1 Receive -	I - DP	-	-
B66	WAKE0#	PCIE_WAKEI#	I-3.3	PU 1k 3.3Vsb	-
B67	WAKE1#	WAKE1#	I-3.3	PU 10k 3.3Vsb	-
B68	PCIE0_RX+	PCI Express 0 Receive +	I - DP	-	-
B69	PCIE0_RX-	PCI Express 0 Receive -	I - DP	-	-
B70	GND	Ground	PWR	-	-
B71	LVDS_B0+	LVDS_BP0 | LVDS Channel B Data0+	O - DP	-	-
B72	LVDS_B0-	LVDS_BN0 | LVDS Channel B Data0-	O - DP	-	-
B73	LVDS_B1+	LVDS_BP1 | LVDS Channel B Data1+	O - DP	-	-
B74	LVDS_B1-	LVDS_BN1 | LVDS Channel B Data1-	O - DP	-	-
B75	LVDS_B2+	LVDS_BP2 | LVDS Channel B Data2+	O - DP	-	-
B76	LVDS_B2-	LVDS_BN2 | LVDS Channel B Data2-	O - DP	-	-
B77	LVDS_B3+	LVDS_BP3 | LVDS Channel B Data3+	O - DP	-	-
B78	LVDS_B3-	LVDS_BN3 | LVDS Channel B Data3-	O - DP	-	-
B79	LVDS_BKLT_EN	LVDS Panel Backlight Enable	O-3.3	PD 100k	-
B80	GND	Ground	PWR	-	-
B81	LVDS_B_CK+	LVDS_CLKBP | LVDS Channel B	O - DP	-	-
B82	LVDS_B_CK-	LVDS_CLKBM | LVDS Channel B	O - DP	-	-
B83	LVDS_BKLT_CTRL	Backlight Brightness	O-3.3	PD 100k	-
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_DS1#	Selection straps to determine BIOS boot device	I-3.3	-	-
B89	VGA_RED	Analog Video RGB-RED	OA	PD 150R	-
B90	GND	Ground	PWR	-	-
B91	VGA_GRN	Analog Video RGB-GREEN	OA	PD 150R	-
B92	VGA_BLU	Analog Video RGB-BLUE	OA	PD 150R	-
B93	VGA_HSYNC	Analog Video H-Sync	O-3.3	-	-
B94	VGA_VSYNC	Analog Video V-Sync	O-3.3	-	-
B95	VGA_I2C_CK	Display Data Channel - Clock	O-3.3		-
B96	VGA_I2C_DAT	Display Data Channel - Data	IO-3.3		-
B97	SPI_CS#	Chip select for Carrier Board SPI	O-3.3	-	-
B98	RSVD	NC	NC	-	-
B99	RSVD	NC	NC	-	-
B100	GND	Ground	PWR	-	-
B101	FAN_PWMOUT	Fan speed control.	O-3.3	-	-
B102	FAN_TACHIN	Fan tachometer input forfan with 2 pulse output	I-3.3	-	-
B103	SLEEP#	Sleep button.	I-3.3	-	-
B104	VCC_12V	Power 12V	PWR	-	-
B105	VCC_12V	Power 12V	PWR	-	-
B106	VCC_12V	Power 12V	PWR	-	-
B107	VCC_12V	Power 12V	PWR	-	-
B108	VCC_12V	Power 12V	PWR	-	-
B109	VCC_12V	Power 12V	PWR	-	-
B110	GND	Ground	PWR	-	-

Signal Descriptions (cont'd)

Row C

Pin	Signal	Description	Type	PU/PD	Comment
C1	GND	Ground	PWR	-	-
C2	GND	Ground	PWR		-
C3	USB_SSRX0-		NC	-	-
C4	USB_SSRX0+		NC	-	-
C5	GND	Ground	PWR	-	-
C6	USB_SSRX1-		NC	-	-
C7	USB_SSRX1+		NC	-	-
C8	GND	Ground	PWR	-	-
C9	USB_SSRX2-		NC	-	-
C10	USB_SSRX2+		NC	-	-
C11	GND	Ground	PWR	-	-
C12	USB_SSRX3-		NC	-	-
C13	USB_SSRX3+		NC		-
C14	GND	Ground	PWR		-
C15	DDI_PAIR6+	Digital Display Interface	O - DP		
C16	DDI_PAIR6-	Digital Display Interface	O - DP		
C17	RSVD		NC		-
C18	RSVD		NC		
C19	PCIE_RX6+	PCI Express 6 Receive +	O - DP		-
C20	PCIE_RX6-	PCI Express 6 Receive -	O - DP		
C21	GND	Ground	PWR		-
C22	PCIE_RX7+	PCI Express 7 Receive +	O - DP		-
C23	PCIE_RX7-	PCI Express 7 Receive -	O - DP	-	-
C24	DDI1_HPD	Digital Display Interface 1 Hot-Plug Detect	I-3.3	-	-
C25	DDI1_PAIR4+	Digital Display Interface 1 Pair 4+	O - DP	-	-
C26	DDI1_PAIR4-	Digital Display Interface 1 Pair 4 -	O - DP	-	-
C27	RSVD		NC	-	-
C28	RSVD		NC	-	-
C29	DDI1_PAIR5+	Digital Display Interface 1 Pair 5+	O - DP	-	-
C30	DDI1_PAIR5-	Digital Display Interface 1 Pair 5-	O - DP	-	-
C31	GND	Ground	PWR	-	-
C32	DDI2_CTRLCLK_AUX+	DP2 AUX+/HDMI2 CTRLCLK	IO-3.3	-	-
C33	DDI2_CTRLDATA_AUX-	DP2 AUX-/HDMI2 CTRLDATA	IO-3.3	-	-
C34	DDI2_DDC_AUX_SEL	DP2 and HDMI2 Selects mode	IO-3.3		-
C35	RSVD		NC		-
C36	DDP3_CTRLCLK_AUX+	DP3 AUX+/HDMI3 CTRLCLK	IO-3.3		-
C37	DDP3_CTRLCLK_AUX-	DP3 AUX-/HDMI3 CTRLDATA	IO-3.3		-
C38	DDI3_DDC_AUX_SEL	DP3 and HDMI3 Selects mode	IO-3.3		-
C39	DDI3_PAIR0+	Digital Display Interface 3 Pair 0+	O - DP	-	-
C40	DDI3_PAIR0-	Digital Display Interface 3 Pair 0-	O - DP	-	-
C41	GND	Ground	PWR	-	-
C42	DDI3_PAIR1+	Digital Display Interface 3 Pair 1+	O - DP	-	-
C43	DDI3_PAIR1-	Digital Display Interface 3 Pair 1-	O - DP	-	-
C44	DDI3_HPD	Digital Display Interface 3 Hot-Plug Detect	IO-3.3	-	-
C45	RSVD		NC	-	-
C46	DDI3_PAIR2+	Digital Display Interface 3 Pair 2+	O - DP	-	-
C47	DDI3_PAIR2-	Digital Display Interface 3 Pair 2-	O - DP	-	-
C48	RSVD		NC		-
C49	DDI3_PAIR3+	Digital Display Interface 3 Pair 3+	O - DP		-
C50	DDI3_PAIR2-	Digital Display Interface 3 Pair 3-	O - DP		-
C51	GND	Ground	PWR		-
C52	PEG_RX0+	PCIe 0 Recieve +	I - DP		-
C53	PEG_RX0-	PCIe 0 Recieve -	I - DP	-	-
C54	TYPE0#	Module type ID pin 0	STO	-	not connected
C55	PEG_RX1+	PCIe 1 Recieve +	I - DP	-	-

Signal Descriptions (cont'd)

Row C

Pin	Signal	Description	Type	PU/PD	Comment
C56	PEG_RX1-	PCIe 1 Recieve -	I - DP	-	-
C57	TYPE1#	Module type ID pin 1	STO	-	not connected
C58	PEG_RX2+	PCIe 2 Recieve +	I - DP	-	-
C59	PEG_RX2-	PCIe 2 Recieve -	I - DP	-	-
C60	GND	Ground	PWR	-	-
C61	PEG_RX3+	PCIe 3 Recieve +	I - DP	-	-
C62	PEG_RX3-	PCIe 3 Recieve -	I - DP	-	-
C63	RSVD	NC	NC	-	-
C64	RSVD	NC	NC	-	-
C65	PEG_RX4+	PCIe 4 Recieve +	I - DP	-	-
C66	PEG_RX4-	PCIe 4 Recieve -	I - DP	-	-
C67	RSVD	FAN_PWM_CTRL	0-5	-	-
C68	PEG_RX5+	PCIe 5 Recieve +	I - DP	-	-
C69	PEG_RX5-	PCIe 5 Recieve -	I - DP	-	-
C70	GND	Ground	PWR	-	-
C71	PEG_RX6+	PCIe 6 Recieve +	I - DP	-	-
C72	PEG_RX6-	PCIe 6 Recieve -	I - DP	-	-
C73	RSVD	NC	NC	-	-
C74	PEG_RX7+	PCIe 7 Recieve +	I - DP	-	-
C75	PEG_RX7-	PCIe 7 Recieve -	I - DP	-	-
C76	GND	Ground	PWR	-	-
C77	RSVD	FAN_TACH	I-5	-	-
C78	PEG_RX8+	PCIe 8 Recieve +	I - DP	-	-
C79	PEG_RX8-	PCIe 8 Recieve -	I - DP	-	-
C80	GND	Ground	PWR	-	-
C81	PEG_RX9+	PCIe 9 Recieve +	I - DP	-	-
C82	PEG_RX9-	PCIe 9 Recieve -	I - DP	-	-
C83	RSVD	Physical Presence	I-3.3	PU 10k 3.3Vsb	-
C84	GND	Ground	PWR	-	-
C85	PEG_RX10+	PCIe 10 Recieve +	I - DP	-	-
C86	PEG_RX10-	PCIe 10 Recieve -	I - DP	-	-
C87	GND	Ground	PWR	-	-
C88	PEG_RX11+	PCIe 11 Recieve +	I - DP	-	-
C89	PEG_RX11-	PCIe 11 Recieve –	I - DP	-	-
C90	GND	Ground	PWR	-	-
C91	PEG_RX12+	PCIe 12 Recieve +	I - DP	-	-
C92	PEG_RX12-	PCIe 12 Recieve -	I - DP	-	-
C93	GND	Ground	PWR	-	-
C94	PEG_RX13+	PCIe 13 Recieve +	I - DP	-	-
C95	PEG_RX13-	PCIe 13 Recieve -	I - DP	-	-
C96	GND	Ground	PWR	-	-
C97	RSVD	NC	NC	-	-
C98	PEG_RX14+	PCIe 14 Recieve +	I - DP	-	-
C99	PEG_RX14-	PCIe 14 Recieve -	I - DP	-	-
C100	GND	Ground	PWR	-	-
C101	PEG_RX15+	PCIe 15 Recieve +	I - DP	-	-
C102	PEG_RX15-	PCIe 15 Recieve -	I - DP	-	-
C103	GND	Ground	PWR	-	-
C104	VCC_12V	Power 12V	PWR	-	-
C105	VCC_12V	Power 12V	PWR	-	-
C106	VCC_12V	Power 12V	PWR	-	-
C107	VCC_12V	Power 12V	PWR	-	-
C108	VCC_12V	Power 12V	PWR	-	-
C109	VCC_12V	Power 12V	PWR	-	-
C110	GND	Ground	PWR	-	-

Signal Descriptions (cont'd)

Row D

Pin	Signal	Description	Type	PU/PD	Comment
D1	GND	Ground	PWR	-	-
D2	GND	Ground	PWR	-	-
D3	USB_SSTX0-		NC	-	-
D4	USB_SSTX0+		NC	-	-
D5	GND	Ground	PWR	-	-
D6	USB_SSTX1-		NC	-	-
D7	USB_SSTX1+		NC	-	-
D8	GND	Ground	PWR		-
D9	USB_SSTX2-		NC	-	-
D10	USB_SSTX2+		NC	-	-
D11	GND	Ground	PWR	-	-
D12	USB_SSTX3-		NC		-
D13	USB_SSTX3+		NC	-	-
D14	GND	Ground	PWR	-	-
D15	DDP1_CTRLCLK_AUX+	DP1 AUX+/HDMI1/SDVO CTRLCLK	O-3.3	-	-
D16	DDP1_CTRLDATA_AUX-	DP1 AUX-/HDMI1/SDVO CTRLDATA	O-3.3	-	-
D17	RSVD		NC	-	-
D18	RSVD		NC	-	-
D19	PCIE_TX6+	PCI Express 6 Receive +	O - DP	-	
D20	PCIE_TX6-	PCI Express 6 Receive -	O - DP		-
D21	GND	Ground	PWR	-	-
D22	PCIE_TX7+	PCI Express 7 Receive +	O - DP	-	-
D23	PCIE_TX7-	PCI Express 7 Receive -	O - DP	-	-
D24	RSVD		NC	-	-
D25	RSVD		NC	-	-
D26	DDI1_PAIR0+	Digital Display Interface 1 Pair 0+	O - DP	-	-
D27	DDI1_PAIR0-	Digital Display Interface 1 Pair 0 -	O - DP	-	-
D28	RSVD		NC	-	-
D29	DDI1_PAIR1+	Digital Display Interface 1 Pair 1+	O - DP	-	-
D30	DDI1_PAIR1-	Digital Display Interface 1 Pair 1 -	O - DP	-	-
D31	GND	Ground	PWR	-	-
D32	DDI1_PAIR2+	Digital Display Interface 1 Pair 2+	O - DP	-	-
D33	DDI1_PAIR2-	Digital Display Interface 1 Pair 2 -	O - DP		-
D34	DDI1_DDC_AUX_SEL	DP1 and HDMI1 Selects mode	IO-3.3		-
D35	RSVD		NC		-
D36	DDI1_PAIR3+	Digital Display Interface 1 Pair 3+	O - DP	PU 8K2 3.3V	-
D37	DDI1_PAIR3-	Digital Display Interface 1 Pair 3 -	O - DP	-	-
D38	RSVD		NC	-	-
D39	DDI2_PAIR0+	Digital Display Interface 2 Pair 0+	O - DP	-	-
D40	DDI2_PAIR0-	Digital Display Interface 2Pair 0 -	O - DP	-	-
D41	GND	Ground	PWR	-	-
D42	DDI2_PAIR1+	Digital Display Interface 2 Pair 1+	O - DP	-	-
D43	DDI2_PAIR1-	Digital Display Interface 2 Pair 1 -	O - DP	-	-
D44	DDI3_HPD	Digital Display Interface 3 Hot-Plug Detect	IO-3.3	-	-
D45	RSVD		NC	-	-
D46	DDI2_PAIR2+	Digital Display Interface 2 Pair 2+	O - DP	PU 8K2 3.3V	-
D47	DDI2_PAIR2-	Digital Display Interface 2 Pair 2 -	O - DP	PU 8K2 3.3V	-
D48	RSVD		NC		-
D49	DDI2_PAIR3+	Digital Display Interface 2 Pair 3+	O - DP	-	
D50	DDI2_PAIR3-	Digital Display Interface 2 Pair 3 -	O - DP	-	-
D51	GND	Ground	PWR	-	-
D52	PEG_TX0+	PCIe 0 Transmit +	O - DP	-	-
D53	PEG_TX0-	PCIe 0 Transmit -	O - DP	-	-
D54	PEG_LANE_RV#	PCIe Lane Reversal	I-3.3	-	-
D55	PEG_TX1+	PCIe 1 Transmit +	O - DP	-	-

Signal Descriptions (cont'd)

Row D

Pin	Signal	Description	Type	PU/PD	Comment
D56	PEG_TX1-	PCIe 1 Transmit -	O - DP	-	-
D57	TYPE2#	Module type ID pin 2	STO	-	not connected
D58	PEG_TX2+	PCIe 2 Transmit +	O - DP	-	-
D59	PEG_TX2-	PCIe 2 Transmit -	O - DP	-	-
D60	GND	Ground	PWR	-	-
D61	PEG_TX3+	PCIe 3 Transmit +	O - DP	-	-
D62	PEG_TX3-	PCIe 3 Transmit -	O - DP	-	-
D63	RSVD	NC	NC	-	-
D64	RSVD	NC	NC	-	-
D65	PEG_TX4+	PCIe 4 Transmit +	O - DP	-	-
D66	PEG_TX4-	PCIe 4 Transmit -	O - DP	-	-
D67	GND	Ground	PWR	-	-
D68	PEG_TX5+	PCIe 5 Transmit +	O - DP	-	-
D69	PEG_TX5-	PCIe 5 Transmit -	O - DP	-	-
D70	GND	Ground	PWR	-	-
D71	PEG_TX6+	PCIe 6 Transmit +	O - DP	-	-
D72	PEG_TX6-	PCIe 6 Transmit -	O - DP	-	-
D73	GND	Ground	PWR	-	-
D74	PEG_TX7+	PCIe 7 Transmit +	O - DP	-	-
D75	PEG_TX7-	PCIe 7 Transmit -	O - DP	-	-
D76	GND	Ground	PWR	-	-
D77	RSVD		NC		-
D78	PEG_TX8+	PCIe 8 Transmit +	O - DP	-	-
D79	PEG_TX8-	PCIe 8 Transmit -	O - DP	-	-
D80	GND	Ground	PWR	-	-
D81	PEG_TX9+	PCIe 9 Transmit +	O - DP	-	-
D82	PEG_TX9-	PCIe 9 Transmit -	O - DP	-	-
D83	RSVD	NC	NC	-	-
D84	RSVD		NC	-	-
D85	PEG_TX10+	PCIe 10 Transmit +	O - DP	-	-
D86	PEG_TX10-	PCIe 10 Transmit -	O - DP	-	-
D87	GND	Ground	PWR	-	-
D88	PEG_TX11+	PCIe 11 Transmit +	O - DP	-	-
D89	PEG_TX11-	PCIe 11 Transmit -	O - DP	-	-
D90	GND	Ground	PWR	-	-
D91	PEG_TX12+	PCIe 12 Transmit +	O - DP	-	-
D92	PEG_TX12-	PCIe 12 Transmit -	O - DP	-	-
D93	GND	Ground	PWR	-	-
D94	PEG_TX13+	PCIe 13 Transmit +	O - DP	-	-
D95	PEG_TX13-	PCIe 13 Transmit -	O - DP	-	-
D96	GND	Ground	PWR	-	-
D97	RSVD		NC		-
D98	PEG_TX14+	PCIe 14 Transmit +	O - DP	-	-
D99	PEG_TX14-	PCIe 14 Transmit -	O - DP	-	-
D100	GND	Ground	PWR	-	-
D101	PEG_TX15+	PCIe 15 Transmit +	O - DP	-	-
D102	PEG_TX15-	PCIe 15 Transmit -	O - DP	-	-
D103	GND	Ground	PWR	-	-
D104	VCC_12V	Power 12V	PWR	-	-
D105	VCC_12V	Power 12V	PWR	-	-
D106	VCC_12V	Power 12V	PWR	-	-
D107	VCC_12V	Power 12V	PWR	-	-
D108	VCC_12V	Power 12V	PWR	-	-
D109	VCC_12V	Power 12V	PWR	-	-
D110	GND	Ground	PWR	-	-

Signal Descriptions (cont'd)

Signal Type Legend	
IO-2,5	Bi-directional 2,5 V Input/Output
IO-3,3	Bi-directional 3,3 V Input/Output
IO-5	Bi-directional 5 V Input/Output
I-3,3	3,3 V Input
I-5	5 V Input
O-2,5	2,5 V Output
O-3,3	3,3 V Output
O-5	5 V Output
IO	Input/Output
OA	Analog Output
OD	Digital Output
I/O - DP	Differential Pair Input/Output
O - DP	Differential Pair Output
I - DP	Differential Pair Input
PWR	Power or Ground
STO	Strapping Output
PU	Pull Up Resistor
PD	Pull Down Resistor
NC	Not Connected / Reserved

6 Embedded Functions

All embedded board functions on ADLINK's Computer on Modules are supported at the operating system level using the ADLINK Intelligent Device Interface (AIDI) library. The AIDI API programming interface is compatible and identical across all ADLINK Computer on Modules and all supported operating systems. The AIDI library includes a demo program to demonstrate the library's functionallity.

6.1 Watchdog Timer

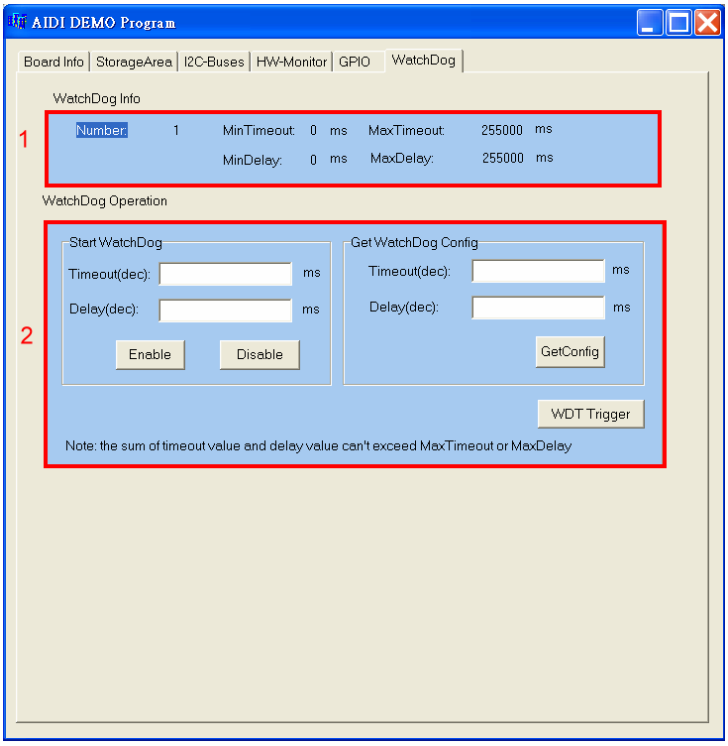
The Express-HR implements a Watchdog timer that can be used to automatically detect software execution problems or system hangs and reset the board if necessary. The Watchdog timer consists of a counter that counts down from an initial value to zero. When the system is operating normally, the software that sets the intial value periodically resets the counter so that the it never reaches zero. If the counter reaches zero before the software resets it, the system is presumed to be malfunctioning and a reset signal is asserted.

The AIDI Library Watchdog functions support Watchdog control of the board. If the Watchdog begins countdown and reaches zero, it will access the CPU's RESET signal to reset the system. This application must call another function named AidiWDogTrigger that triggers the Watchdog to restart to prevent system reset.

AIDI Demo Program
- Watchdog Tab

The AIDI Demo Program allows retrieval of the current Watchdog status and updating of the Watchdog settings

If the Watchdog is enabled, the user can click the *WDT Trigger* button to manually reset the counter and prevent the system from resetting



6.2 GPIO

GPIO library support is limited to GPIO signals that originate from the Computer on Module and extend to the carrier board. COM Express modules support 4 GPO and 4 GPI signals. Some of ADLINK's COM Express boards can configure all 8 ports for GPI or GPO use.

GPIO signals can be monitored and controlled by using the ADLINK Intelligent Device Interface (AIDI) library that is compatible and identical across all ADLINK COM Express modules and all supported operating systems.

The COM Express Type 6 standard assigns the following pins for either GPI or GPO

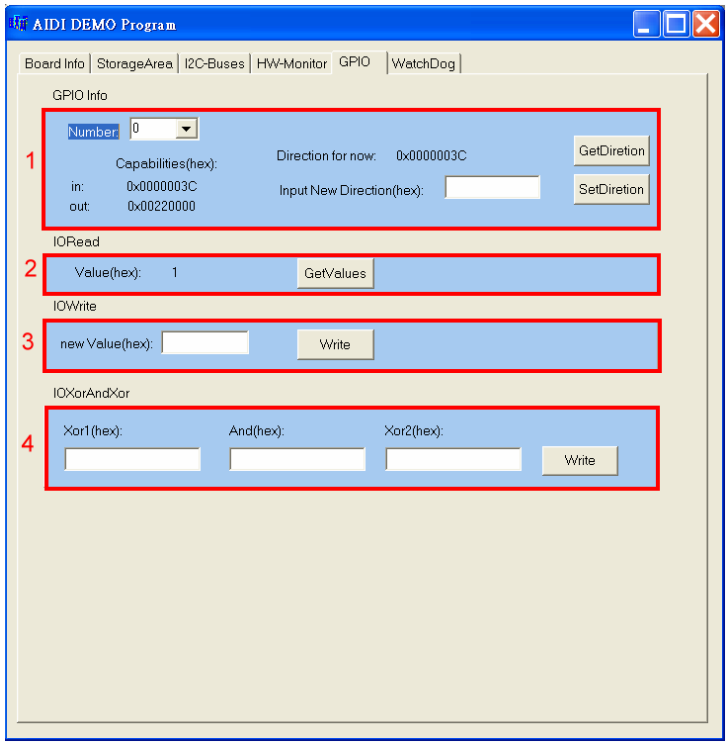
Pin	Signal Type #	AIDI ID (bit)	Remark
A54	GPI0	0	Express-HR can configure this pin for GPI and GPO
A63	GPI1	1	Express-HR can configure this pin for GPI and GPO
A67	GPI2	2	Express-HR can configure this pin for GPI andGPO
A85	GPI3	3	Express-HR can configure this pin for GPI andGPO
A93	GPO0	4	Express-HR can configure this pin for GPI and GPO
B54	GPO1	5	Express-HR can configure this pin for GPI and GPO
B57	GPO2	6	Express-HR can configure this pin for GPI and GPO
B63	GPO3	7	Express-HR can configure this pin for GPI and GPO

AIDI Demo Program
- GPIO Tab

The AIDI Demo Program displays current GPI or GPO status and allows reading of GPI and writing to GPO.

The table above links logical port numbers in AIDI to physical port numbers on the COM Express board-to-board connector.

For boards that support *multi-direction* the "SetDirection" button can configure the port for either GPI or GPO



6.3 Hardware Monitoring

To ensure system health of your embedded system ADLINK's COM Express modules come with built in support for monitoring and control of CPU and system temperatures, fan speed 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 limit set by the user.

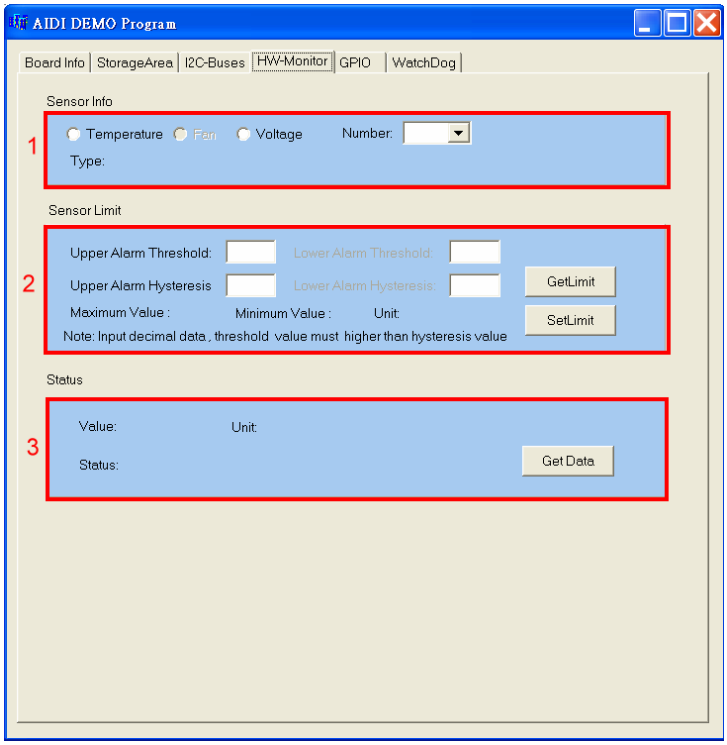
On the Express-HR the following monitored values can be read from the module: CPU temperature, system temperature, Vcore, 1.8V, 5V, 3.3V and 12V.

AIDI Demo Program
- HW Monitor Tab

Field 1 displays detected sensors (number).

Field 2 allows setting of upper and lower alarm limits.

Field 3 displays read out information of sensors.



7 System Resources

7.1 System Memory Map

Address Range (dec.)	Address Range (hex)	Size	Description
4 GB - 16 MB	FF000000 - FFFFFFFF	16 MB	Release for BIOS Area
4 GB - 18 MB	FEE00000 - FEEFFFFF	1 MB	Local APIC Configuration Space
4 GB - 19 MB + 64KB + 4KB*12	FED1C000 - FED1FFFF	16 KB	PCH RCBA(B0D1FF0 Off F0h)
4 GB - 19 MB + 64KB + 4KB*9	FED19000 - FED19FFF	4 KB	PxP egress port registers (B0D0F0 Off 40h)
4 GB - 19 MB + 64KB + 4KB*8	FED18000 - FED18FFF	4 KB	DMIBAR(B0D0F0 Off 68h)
4 GB - 19 MB + 64KB	FED10000 - FED17FFF	32KB	MCHBAR(B0D0F0 Off 48h)
4 GB - 19 MB	FED00000 - FED04000	16 KB	Enables High Performance Event Timer
4 GB - 20 MB	FEC00000 - FECFFFFF	1 MB	IO APIC Configuration Space
4 GB - 128 MB	F8000000 - FCFFFFFF	64 MB	PCIE Space(B0D0F0 Off 60h)
4 GB - 144 MB +12MB +172KB	F7C2B000 - F7C2B00F	16 B	ME(B0D16F0)
4 GB - 144 MB +12MB +164KB	F7C29000 - F7C29FFF	4 KB	Remote Keyboard and Text (KT) (B0D16F3) (When iAMT support)
4 GB - 144 MB +12MB +160KB	F7C28000 - F7C28FFF	4 KB	82579 Lan(B0D19F0)
4 GB - 144 MB +12MB +156KB	F7C27000 - F7C273FF	1 KB	EHCI(B0D1AF0)
4 GB - 144 MB +12MB +152KB	F7C26000 - F7C263FF	1 KB	EHCI(B0D1DF0)
4 GB - 144 MB +12MB +148KB	F7C25000 - F7C250FF	256 B	SMBUS(B0D1FF3)
4 GB - 144 MB +12MB +144KB	F7C24000 - F7C24FFF	4 KB	Thermal Sensor(B0D1FF6) (T04 support)
4 GB - 144 MB +12MB +128KB	F7C20000 - F7C23FFF	16 KB	HD Audio(B0D1BF0)
4 GB - 144 MB +12MB	F7C00000 - F7C1FFFF	128 KB	82579 Lan(B0D19F0)
4 GB - 144 MB + 8MB	F7800000 - F7BFFFFF	4 MB	VGA(B0D2F0)
960 KB - 1024 KB	F0000 - FFFFF	64 KB	System BIOS Area
896 KB - 960 KB	E0000 - EFFFF	64 KB	Extended System BIOS Area
768 KB - 896 KB	C0000 - DFFFF	128 KB	PCI expansion ROM area C0000 - C7FFF: Onboard VGA BIOS CB800 - CC7FFF: Intel 82579LM PXE option ROM when onboard LAN boot ROM is enabled.
640 KB - 768 KB	A0000 - BFFFF	128 KB	Video Buffer & SMM space
0 KB - 640 KB	00000 - 9FFFF	640 KB	DOS Area

7.2 Direct Memory Access Channels

Channel Number	Data Width	System Resource	Comment
0	8-bits	Open	
1	8-bits	Open	
2	8-bits	Open	
3	8-bits	Open	
4		Reserved - cascade channel	
5	16-bits	Open	
6	16-bits	Open	
7	16-bits	Open	

7.3 Legacy I/O Map

Address Range (hex)	Description
000-01F	DMA controller 1, 8237A-5 equivalent
020-02D and 030-03F	Interrupt controller 1, 8259 equivalent
02E-02F	LPC SIO (Win 83627DHG) configuration index/data registers
04E-04F	TPM
040-042, 050-052	Timer, 8254-2 equivalent
060, 062, 064, 066	8742 equivalent (keyboard)
061	NMI control and status
070-077	Real Time Clock Controller(bit 7 -NMI mask)
080-091	DMA page register
092	Reset (Bit 0)/ Fast Gate A20 (Bit 1)
093-09F	DMA page registers continued
0A0-0B1 and 0B4-0BD	Interrupt controller 2, 8259 equivalent
0B2 and 0B3	APM control
0C0-0DF	DMA controller 2, 8237A-5 equivalent
0F0	Read: PCI and Master abort. (Note 1) Write: FERR#/ IGNNE# /Interrupt controller
170-177 and 1F0-1F7 376 and 3F6	SATA controller or PCI
2F8	COM2
3F8	COM1
4D0 and 4D1	Interrupt controller
CF9	Reset Control register (8 bit I/O)
4700	TPM
E000-E03F	Graphics
E040-E05F	SMbus
E060-E07F	82579Lan
E080-E137	SATA
E140-E147	Remote Keyboard and Text (KT)(When iAMT support)

7.4 Interrupt Request (IRQ) Lines

PIC Mode

IRQ#	Typical Interrupt Resource	Connected	Available
0	Counter 0	Internal Timer / Counter 0 output / HPET #0	No
1	Keyboard controller	IRQ1 via SERIRQ	No
2	Cascade interrupt from slave PIC	Slave controller INTR output	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ	No
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ	No
5	Available	N/A	Yes
6	Available	N/A	Yes
7	Available	N/A	Yes
8	Real-time clock	Internal RTC / HPET #1	No
9	SCI / PCI	IRQ9 via SERIRQ	No
10	Available	N/A	Yes
11	Available	N/A	Yes
12	PS/2 Mouse	IRQ12 via SERIRQ	No
13	Math Processor	N/A	No
14	SATA Primary	IRQ14 via SERIRQ	No
15	SATA Secondary	IRQ15 via SERIRQ	No

APIC Mode

IRQ#	Typical Interrupt Resource	Connected	Available
0	Counter 0	Internal Timer / Counter 0 output / HPET #0	No
1	Keyboard controller	IRQ1 via SERIRQ	No
2	Cascade interrupt from slave PIC	Slave controller INTR output	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ	No
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ	No
5	Smbus&Thermal controller	IRQ5 via SERIRQ	No
6	Reserved	N/A	No
7	Reserved	N/A	No
8	Real-time clock	Internal RTC / HPET #1	No
9	SCI / PCI	IRQ9 via SERIRQ	No
10	Reserved	N/A	No
11	Reserved	N/A	No
12	PS/2 Mouse	IRQ12 via SERIRQ	No
13	Math Processor	N/A	No
14	SATA Primary	IRQ14 via SERIRQ	No
15	SATA Secondary	IRQ15 via SERIRQ	No
16	PCIE Root Port 0 EHCI Controller 0, HD Graphics ME	PCIE Root Port 0 EHCI Controller 0, HD Graphics ME	Yes
17	N/A	N/A	Yes
18	N/A	N/A	Yes
19	N/A	SATA controller 0 SATA controller 1	Yes
20	N/A	PCH 82579LM Lan controller	Yes
21	N/A	N/A	Yes
22	N/A	HDA	Yes
23	N/A	EHCI Controller 1	Yes

7.5 PCI Configuration Space Map

Bus No.	Device No.	Function No.	Routing	Description
00h	00h	00h	N/A	Host Bridge
00h	02h	00h	Internal	VGA Controller
00h	16h	00h	Internal	Management Engine
00h	16h	03h	Internal	KT
00h	19h	00h	Internal	GbE Controller
00h	1Ah	00h	Internal	Intel USB EHCI Controller #2
00h	1Bh	00h	Internal	High Definition Audio controller
00h	1Ch	00h	Internal	PCI Express Root port 1
00h	1Ch	01h	Internal	PCI Express Root port 2
00h	1Ch	02h	Internal	PCI Express Root port 3
00h	1Ch	03h	Internal	PCI Express Root port 4
00h	1Ch	04h	Internal	PCI Express Root port 5
00h	1Ch	05h	Internal	PCI Express Root port 6
00h	1Ch	06h	Internal	PCI Express Root port 7
00h	1Ch	07h	Internal	PCI Express Root port 8
00h	1Dh	00h	Internal	Intel USB EHCI Controller #1
00h	1Fh	00h	N/A	Intel LPC Interface Bridge
00h	1Fh	02h	Internal	Intel SATA controller #1
00h	1Fh	03h	Internal	Intel SMBus Controller
00h	1Fh	05h	Internal	Intel SATA controller #2
00h	1Fh	06h	Internal	Thermal Controller
11h	00h	0FFh	Internal	PCIE Port #0
12h	00h	0FFh	Internal	PCIE Port #1
13h	00h	0FFh	Internal	PCIE Port #2
14h	00h	0FFh	Internal	PCIE Port #3
15h	00h	0FFh	Internal	PCIE Port #4
16h	00h	0FFh	Internal	PCIE Port #5
17h	00h	0FFh	Internal	PCIE Port #6
18h	00h	0FFh	Internal	PCIE Port #7

7.6 PCI Interrupt Routing Map

PIRQ	INT Line	PEG Root Port	VGA	SATA Controller	SATA Controller 1	SMBus Controller	Therm. Controller	EHCI 1	EHCI 2	HAD	GbE	HECI Host 1	HECI Host 2
A	INTA	INTA	X						X				X
B	INTB	INTB											
C	INTC	INTC		X		X	X						
D	INTD	INTD		X	X								
E											X		
F													
G										X			
H								X				X	

PIRQ	PCIE port 0	PCIE port 1	PCIE port 2	PCIE port 3	PCIE port 4	PCIE port 5	PCIE port 6	PCIE port 7
A	INTA	INTB	INTC	INTD	INTA	INTB	INTC	INTD
B	INTB	INTC	INTD	INTA	INTB	INTC	INTD	INTA
C	INTC	INTD	INTA	INTB	INTC	INTD	INTA	INTB
D	INTD	INTA	INTB	INTC	INTD	INTA	INTB	INTC
E								
F								
G								
H								

8 BIOS Setup Utility

The following chapter describes basic navigation for the UEFI BIOS setup utility for the ADLINK Express-HR COM Express module.

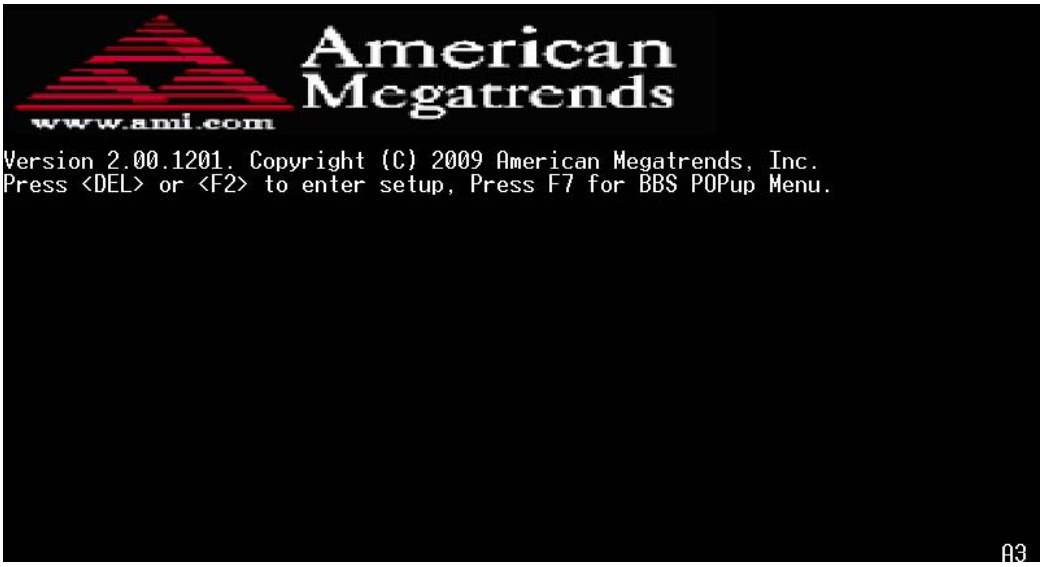
8.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:

   < Press DEL or Delete to run Setup >

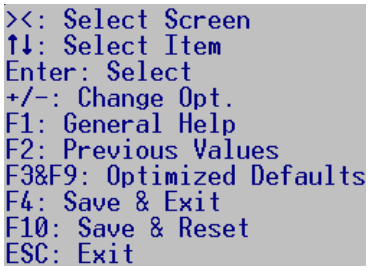
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as Chipset and Power menus.



NOTE: In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

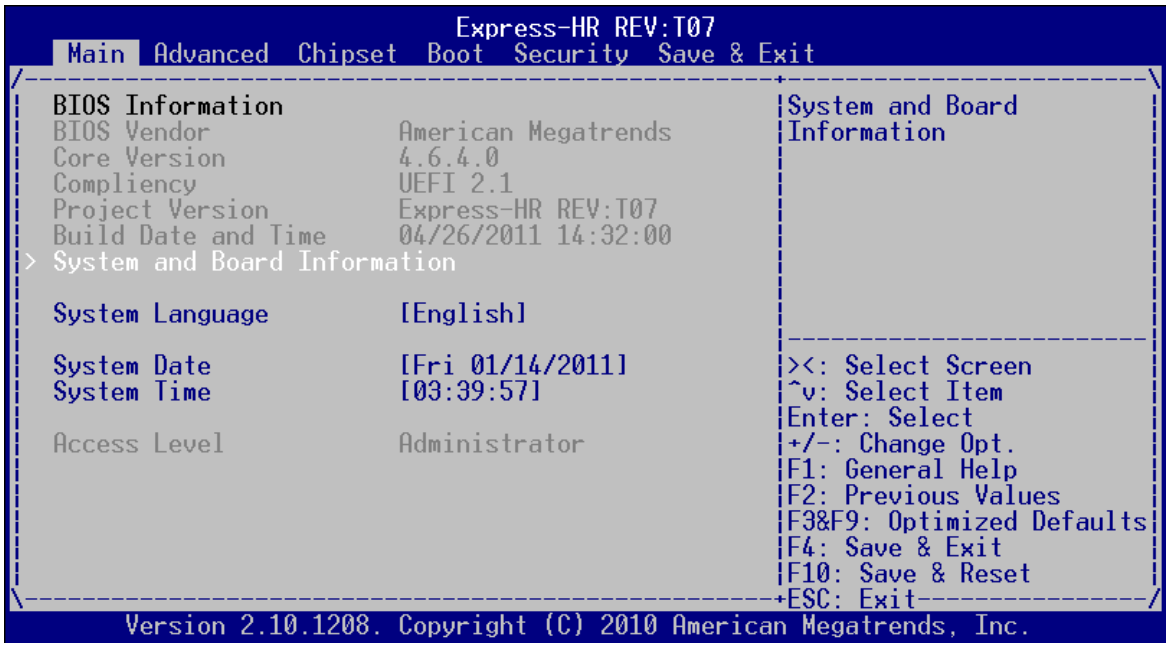
8.2 UEFI BIOS Setup Utility

The UEFI BIOS Setup Utility is a text-based basic input and output system that provides advance UEFI functionality with a familiar BIOS interface. The UEFI BIOS Setup Utility keyboard-based navigation can be accomplished using a combination of keys:

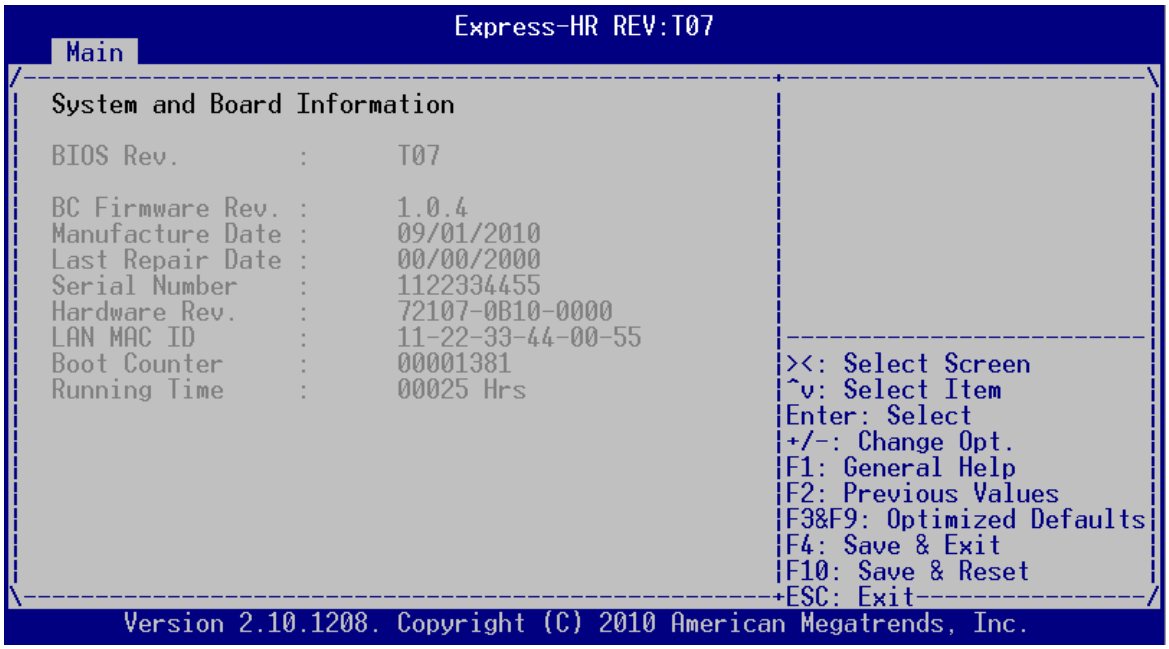


<ENTER>	The Enter key allows the user to select an option to edit its value or access a sub menu.
<Left>/<Right>	The Left and Right <Arrow> keys allow you to select an Aptio TSE screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
<Up>/<Down>	The Up and Down <Arrow> keys allow you to select an Aptio TSE item or sub-screen.
<Plus>/<Minus>	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item. For example: Date and Time.
<Tab>	The <Tab> key allows you to select Aptio TSE fields.
<F1>	This key displays the general help window for the user.
<F2>	This key enables users to load pervious values in TSE
<F3>&<F9>	This key enables users to load optimized default values in TSE
<F4>	This key enables users to save the current configuration and exit TSE.
<F10>	This key enables users to save the current configuration and Reset.
<ESC>	The <Esc> key allows you to discard any changes you have made and exit the Aptio TSE. Press the <Esc> key to exit the Aptio TSE without saving your changes. The following screen will appear: Press the <Enter> key to discard changes and exit. You can also use the<Arrow> key to select Cancel and then press the <Enter> key to abort this function and return to the previous screen.

8.3 Main Setup

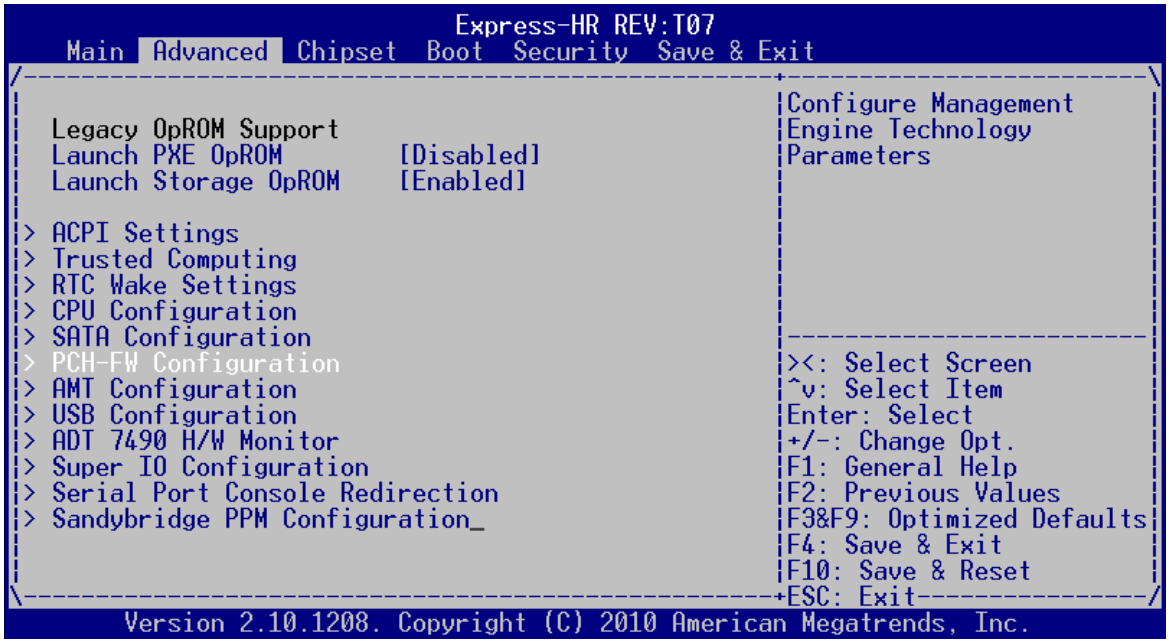


System and Board Information



8.3 Advanced Setup

Select the Advanced menu item from the UEFI BIOS Setup Utility screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as ACPI Settings and SATA Configuration.



WARNING: Setting incorrect or conflicting values in Advanced BIOS Setup may cause system malfunctions.

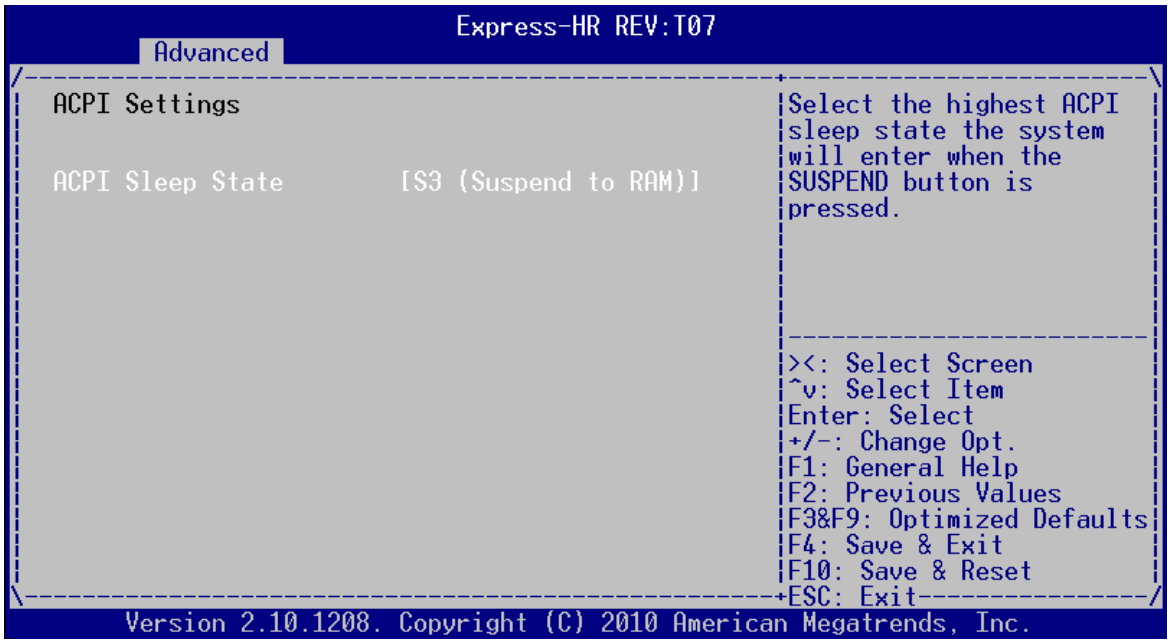
Launch PXE OpROM

Enabled - Set this value to allow the option for Legacy Network Device.
Disabled - Set this value to prevent the option for Legacy Network Device.

Launch Storage OpROM

Enabled - Set this value to allow the option for Legacy Mass Storage Devices with option ROM.
Disabled - Set this value to prevent the option for Legacy Mass Storage Devices with option

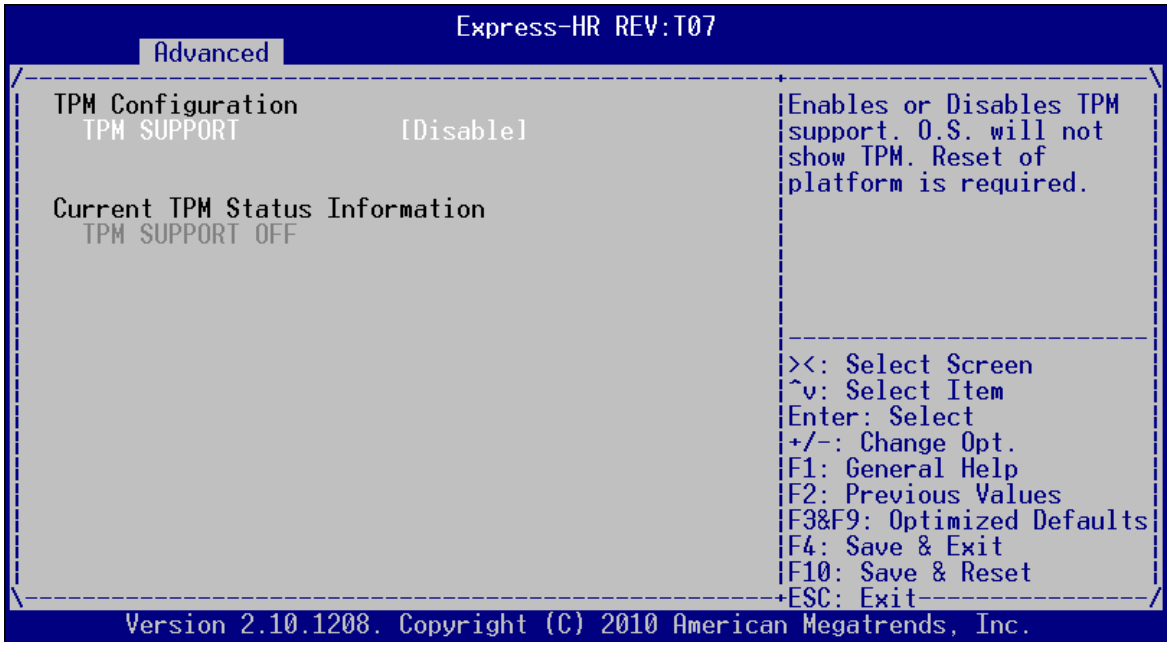
8.3.1 ACPI Settings



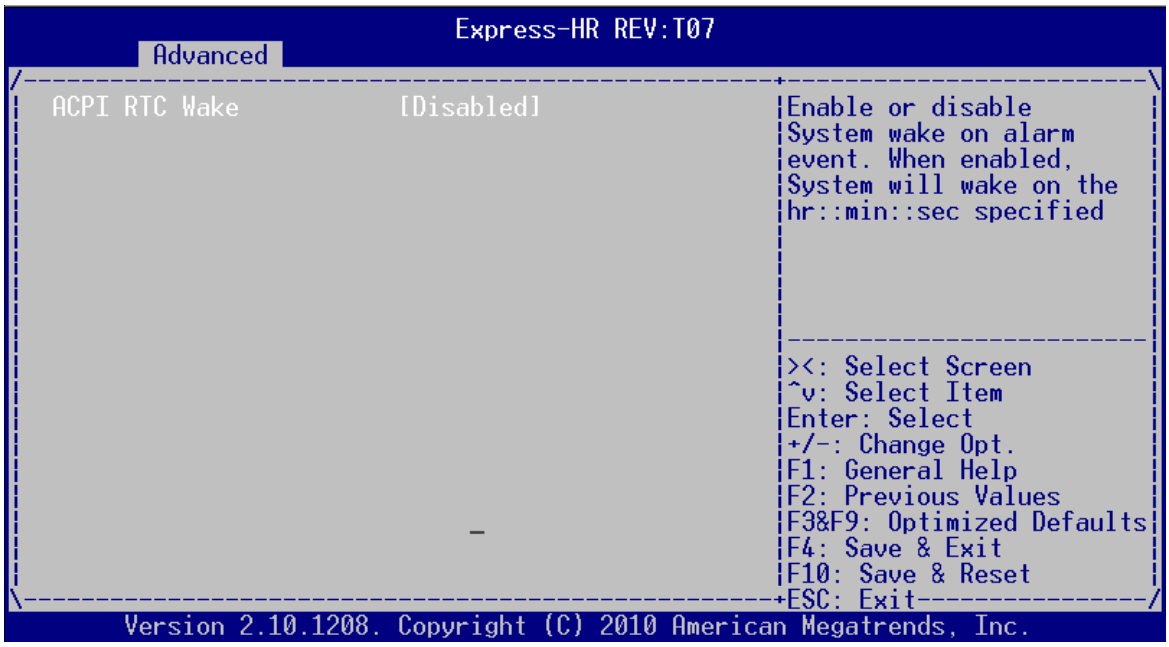
ACPI Sleep State

Select the highest ACPI sleep state the system will enter, when the Suspend button is pressed. The Default value is set as S3 (Suspend to RAM).

8.3.2 Trusted Computing



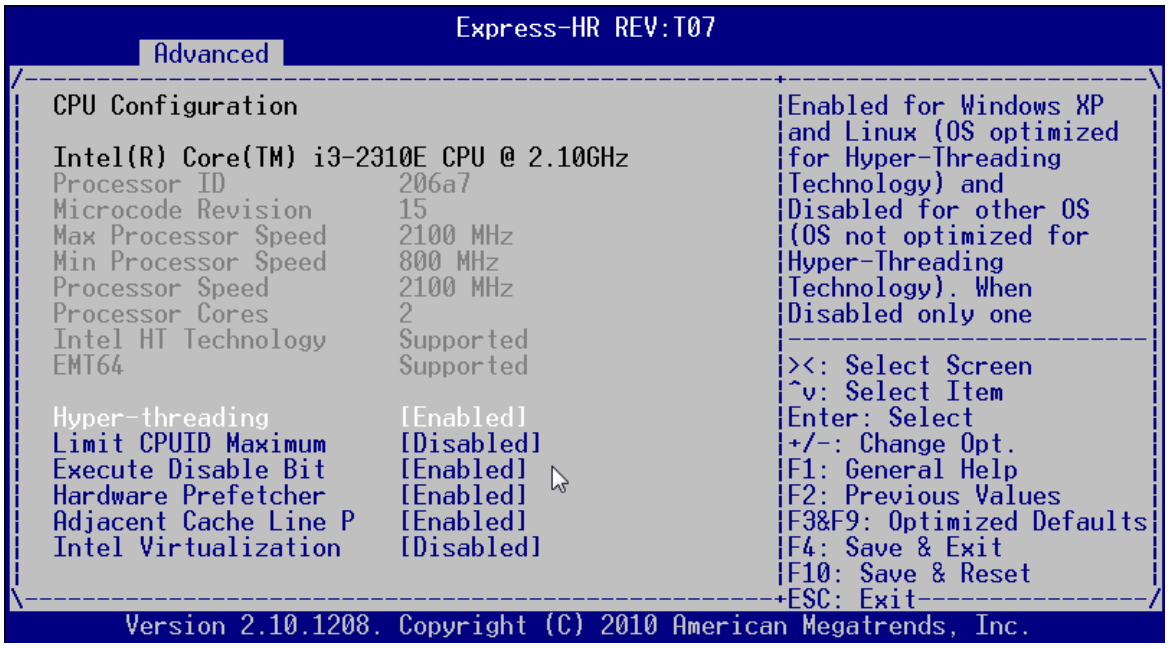
8.3.3 RTC Wake Settings



ACPI RTC Wake

Sets the ACPI RTC Wake time.

8.3.4 CPU Configuration



Hyper-Threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).

Limit CPUID Maximum

Enable this option to allow compatibility with older operating systems.

Execute Disable Bit

Execute Disable Bit can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS.

Hardware Prefetcher

This feature is used for reducing the wait time of DRAM. The hardware prefetcher looks for streams of data and tries to predict what data will be needed next by the processor and proactively tries to fetch these data.

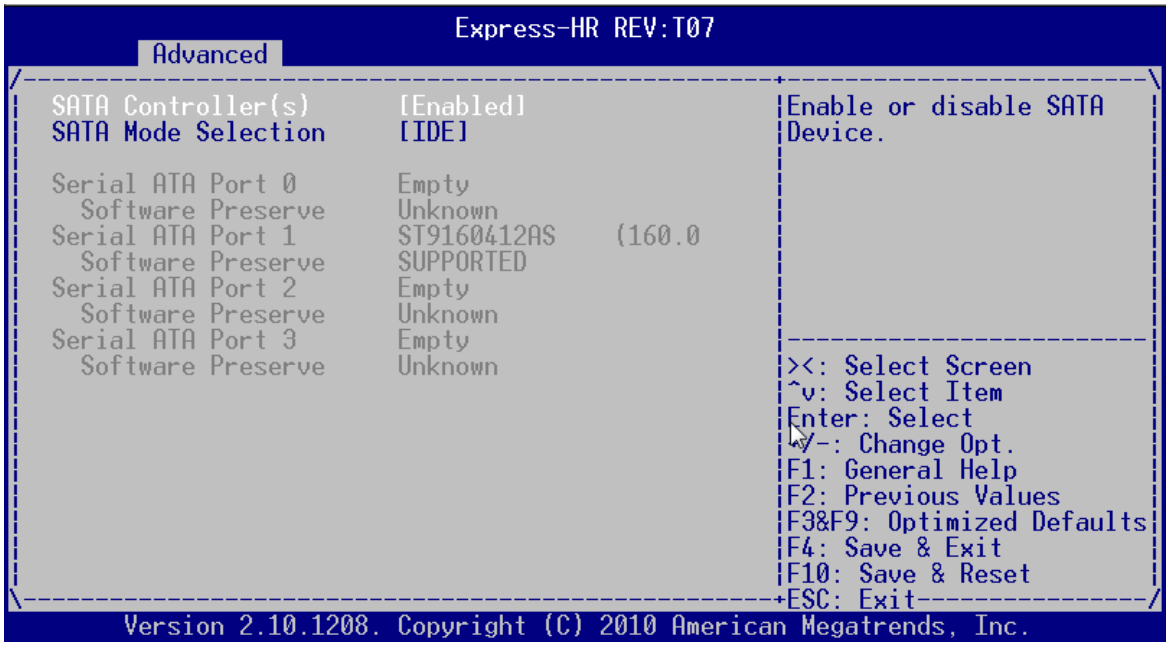
Adjacent Cache Line P

This feature is used to enable optimal use of sequential memory access for performance purposes. Disable this setting for applications requiring high use of random memory access.

Intel Virtualization

Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to function virtually as several systems. Options are Enabled/Disabled.

8.3.5 SATA Configuration



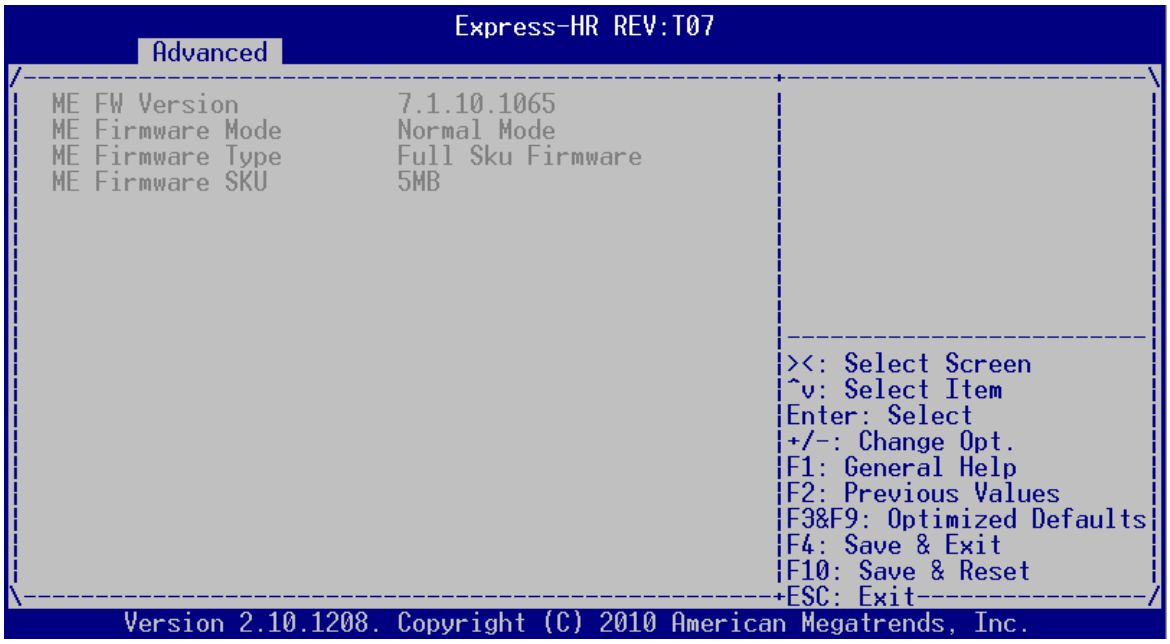
SATA Controller

Enable or disable the SATA Controller.

SATA Mode

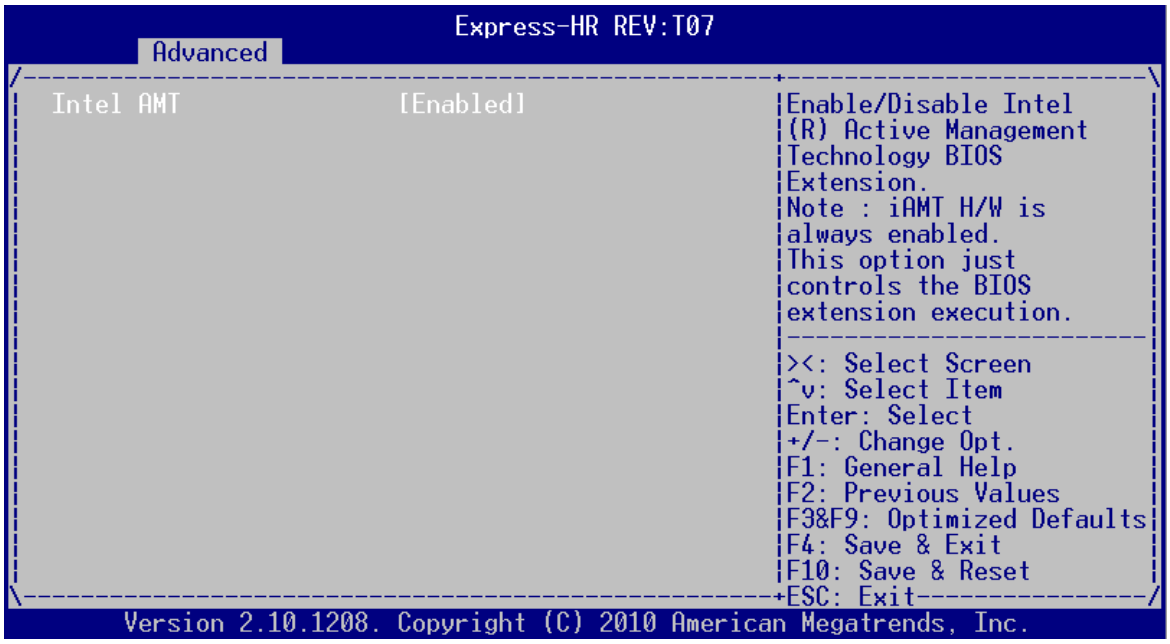
The SATA can be configured as a legacy IDE, RAID and AHCI mode.

8.3.6 PCH-FW Configuration



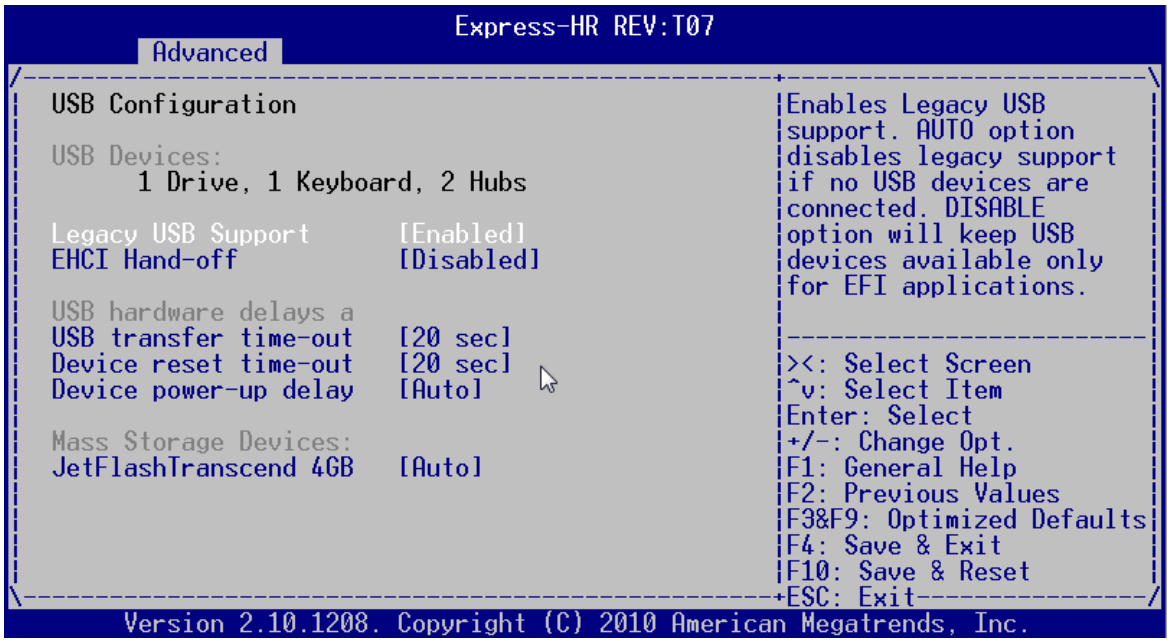
This option allows the user to view the information of the ME Firmware.

8.3.7 Intel AMT



This option allows the user to enable/disable Intel AMT.

8.3.8 USB Configuration



Legacy USB Support

Enables and disables Legacy USB support. Disabling this option will keep USB devices available only for EFI applications.

EHCI Hand-off

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver. Configuration options: Enable, Disable.

USB Transfer Time-out

The time-out value for Control, Bulk, and Interrupt transfers. Options: 10, 20, 30, 40 sec.

Device Reset Timeout

USB mass storage device Start Unit command timeout. Options: 10, 20, 30, 40 sec.

Device Power-up Delay

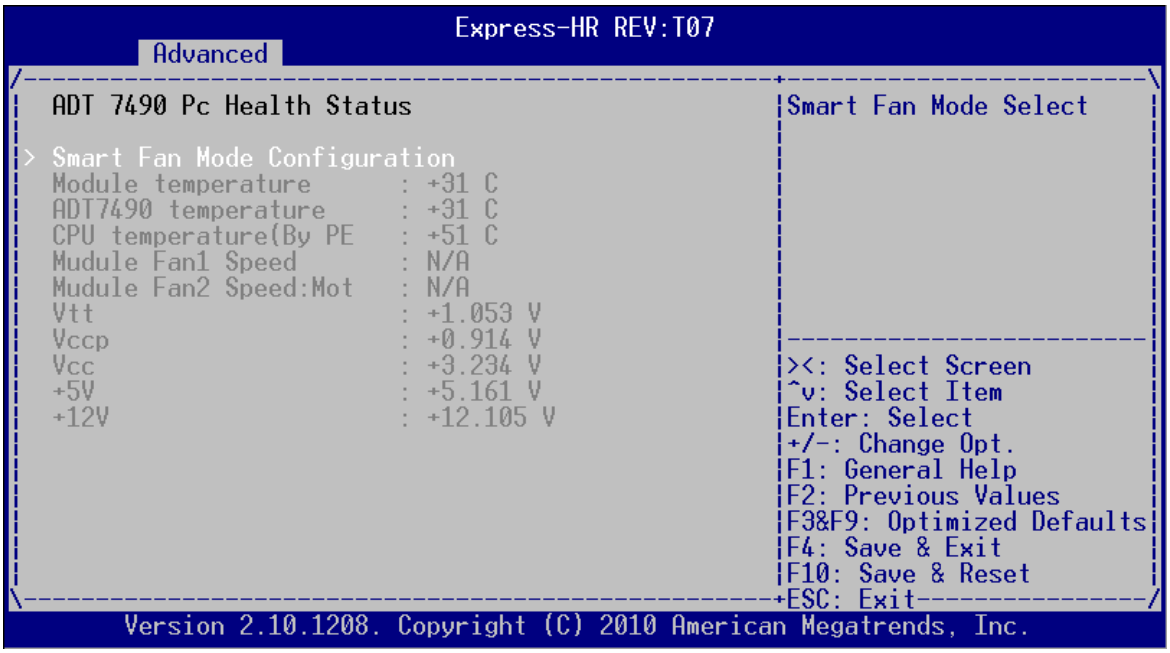
Sets USB device power-up delay to Auto or Manual.

Mass Storage Devices

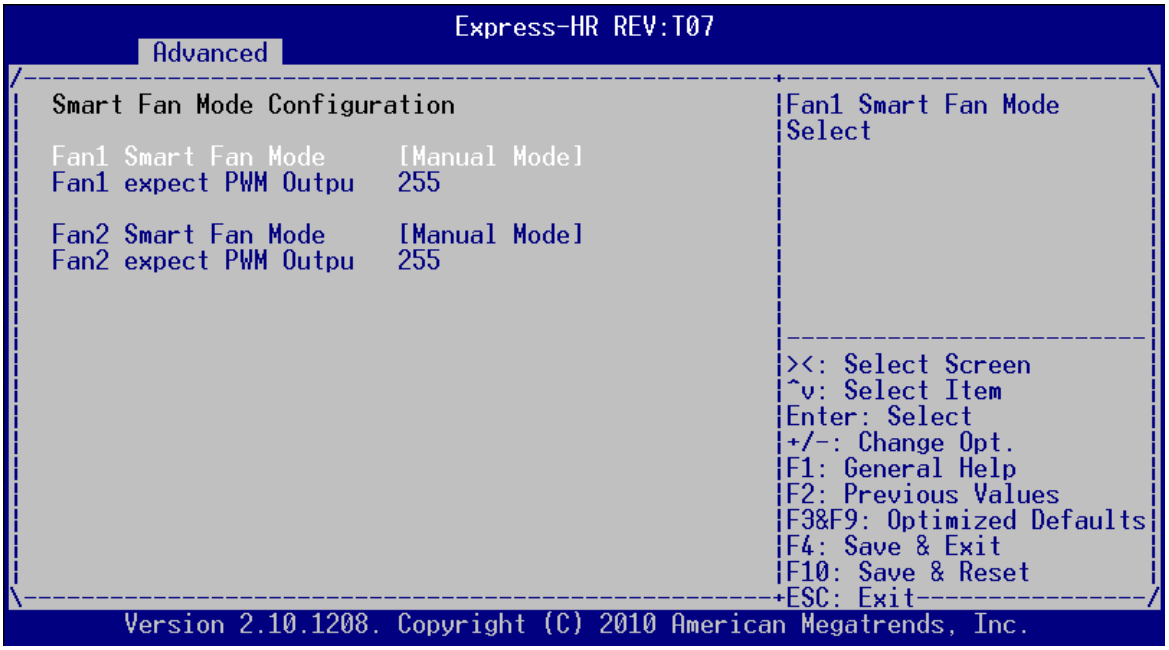
Allows the user to set the connected USB devices to emulate as a specific type. Option: Auto, Floppy, Force FDD, Hard Disk, CD-ROM.

8.3.9 ADT 7490 H/W Monitor

This option allows the user to view and configure the settings of the ADT7490 hardware monitor parameters.



Smart Fan Mode Configuration



Fan1/2 Smart Fan Mode

Allows the user to set the Fan1/2 Smart Fan mode.

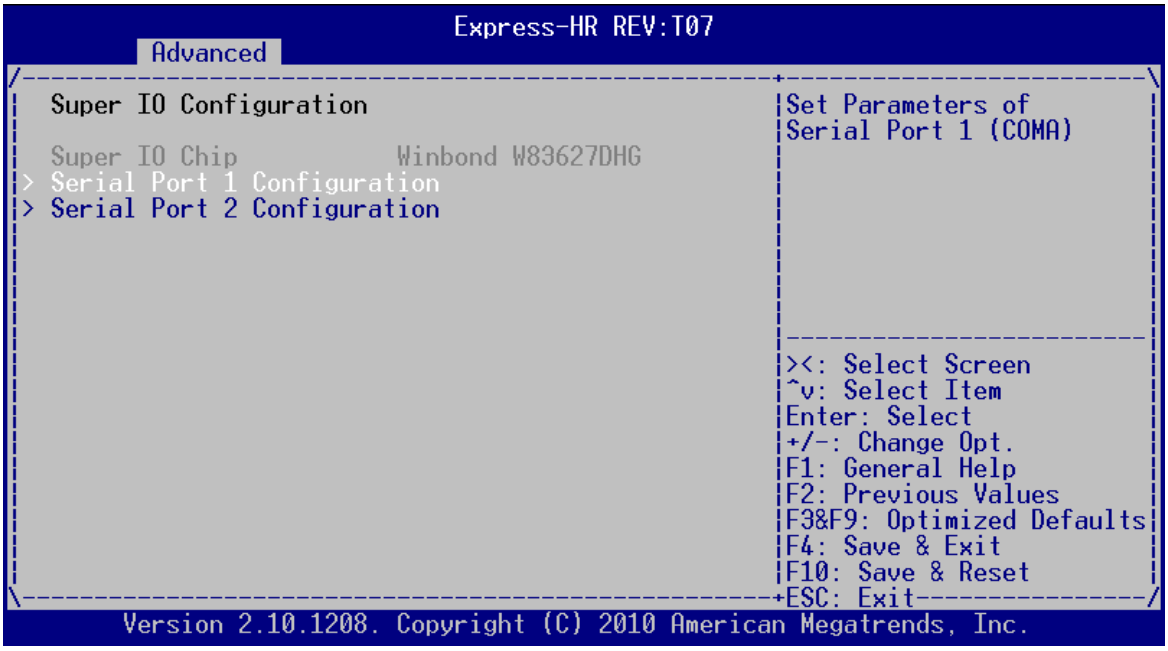
Option	Description
Manual	Setting by manual PWM
Auto Mode(Module)	Link to Module temperature
Auto Mode(ADT 7490)	Link to ADT 7490 temperature
Auto Mode(CPU)	Link to CPU temperature

Fan1/2 Expect PWM Output

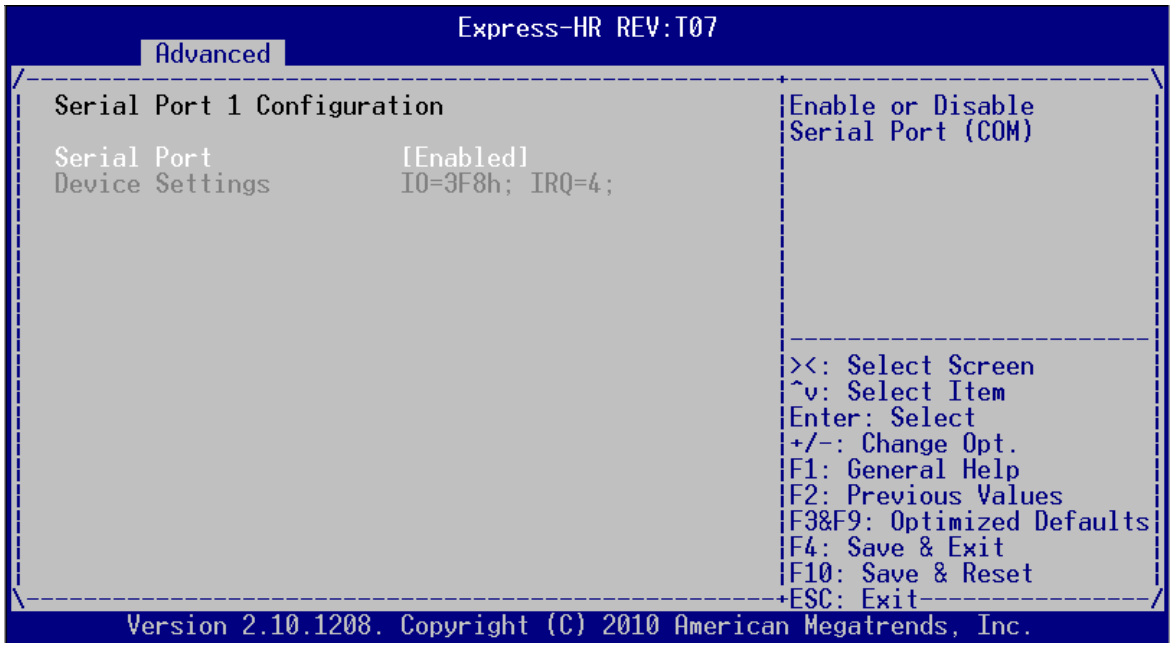
Sets the Fan1/2 PWM value. Options: 0-255.

8.3.10 Super IO Configuration

This option allows the user to view and configure the Super IO settings.



Serial Port 1/2 Configuration



Serial Port 1/2 Configuration

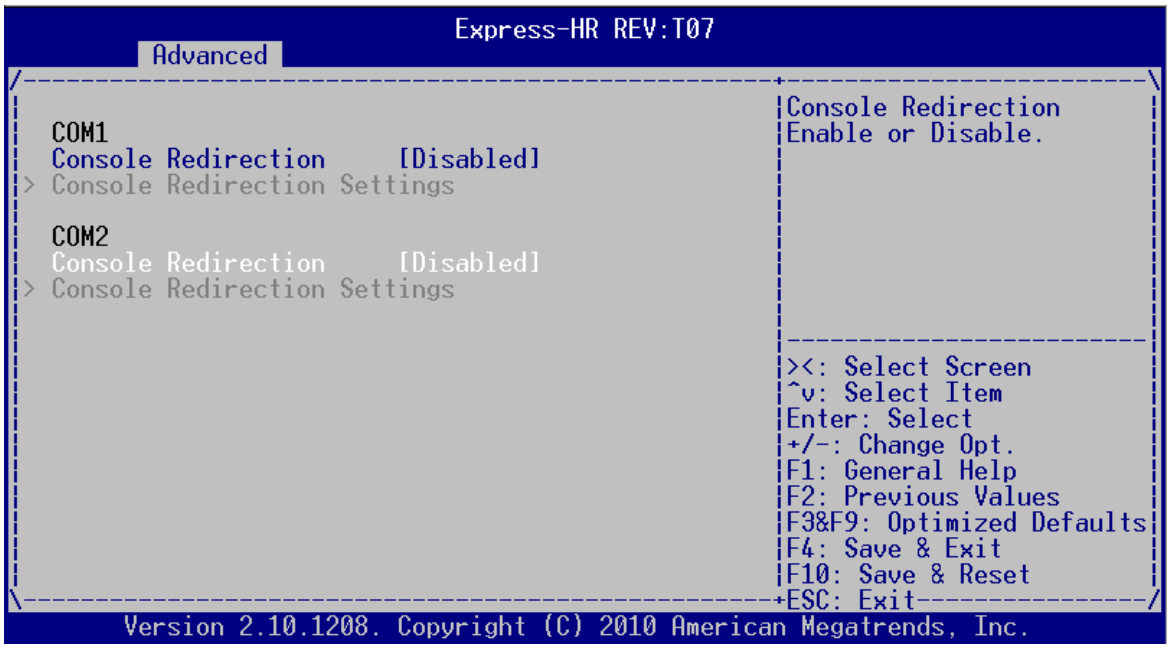
Serial Port

Set parameters of serial port 1/2. Options are Enabled/Disabled.

Change Settings

This option specifies the base I/O port address and Interrupt Request address of serial port 1/2. Configuration options: Auto, 3F8, 3E8, 2F8, 2E8.

8.3.11 **Serial Port Console Redirection**

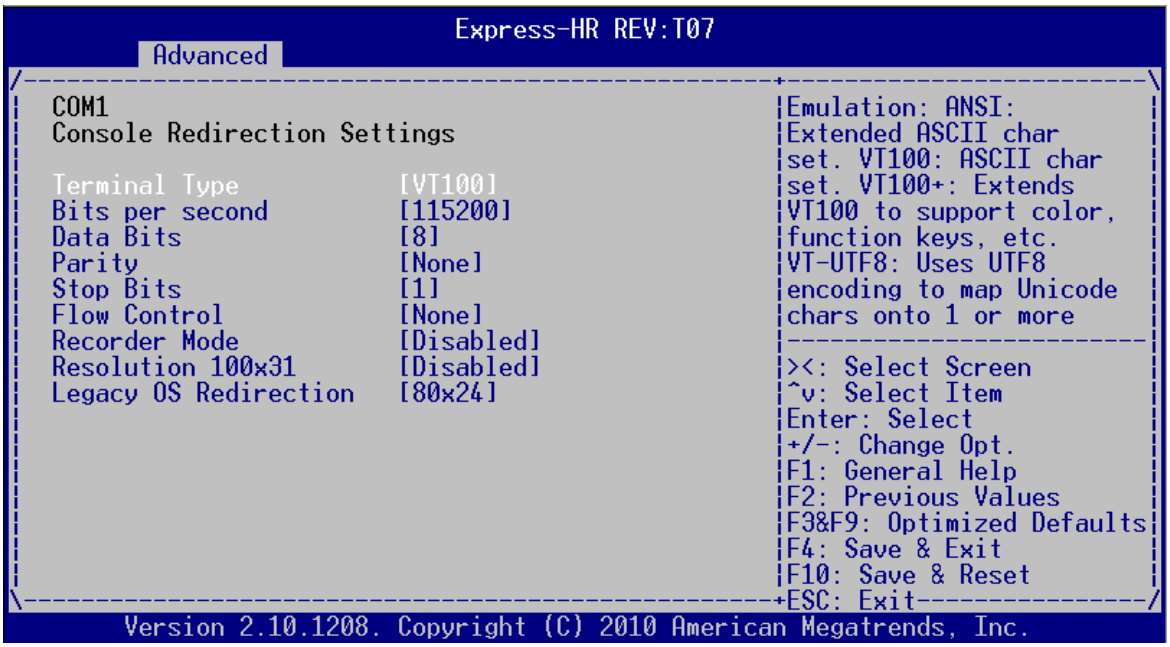


Console Redirection

Options are Enabled/Disabled.

Console Redirection Settings

The settings specify how the host computer and the remote computer will exchange data. Both computers should have the same or compatible settings.



Console Redirection Settings (cont'd)

Terminal Type

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. Configuration options: VT100, VT100+, VT-UTF8, ASNI.

Bits per second

Select the bits per second you want the serial port to use for console redirection. The options are 115200 ,57600 ,19200, 9600.

Data Bits

Select the data bits you want the serial port to use for console redirection. Set this value to 7 or 8.

Parity

Set this option to select parity for console redirection. The settings for this value are None, Even, Odd, Mark and Space.

Stop Bits

Stop bits indicate the end of a serial data packet. The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit. Set this value to 1 or 2.

Flow Control

Set this option to select Flow Control for console redirection. The settings for this value are None, Hardware and Software.

Recorder Mode

Allows the user to enable/disable the Recorder Mode.

Resolution 100x31

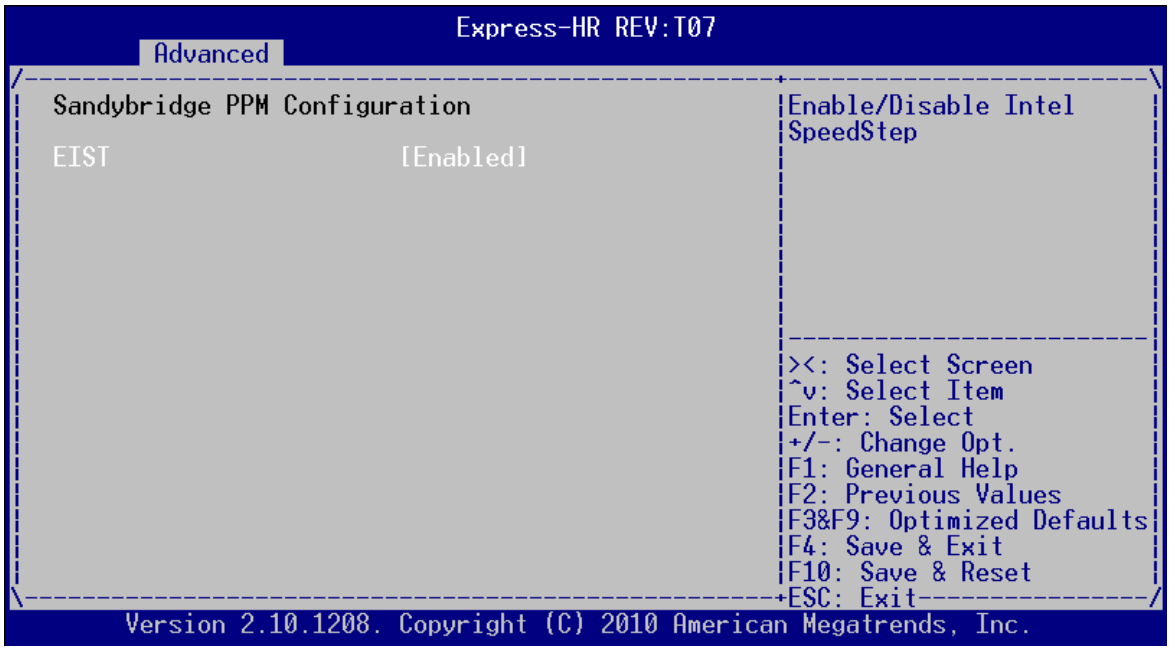
Allows the user to enable/disable Resolution 100x31.

Legacy OS Redirection

Allows the user to set Legacy OS Redirection. Options: 80x24, 80x25.

8.3.12 Sandy Bridge PPM Configuration

This option allows the user to view and configure the settings for processor power management.

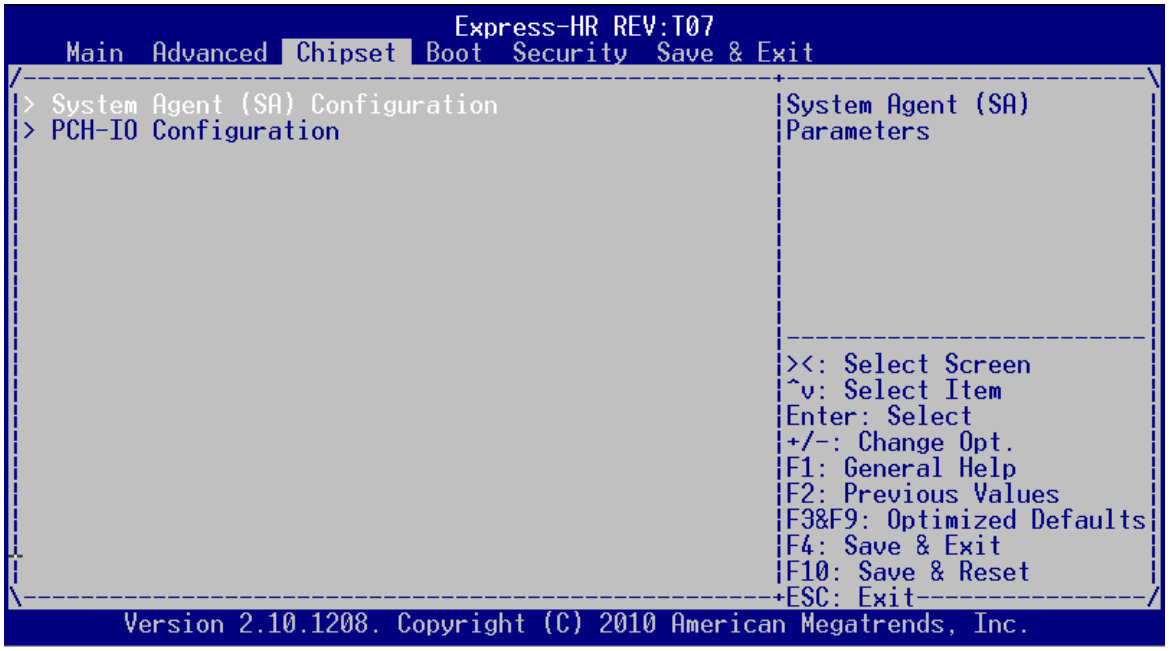


EIST

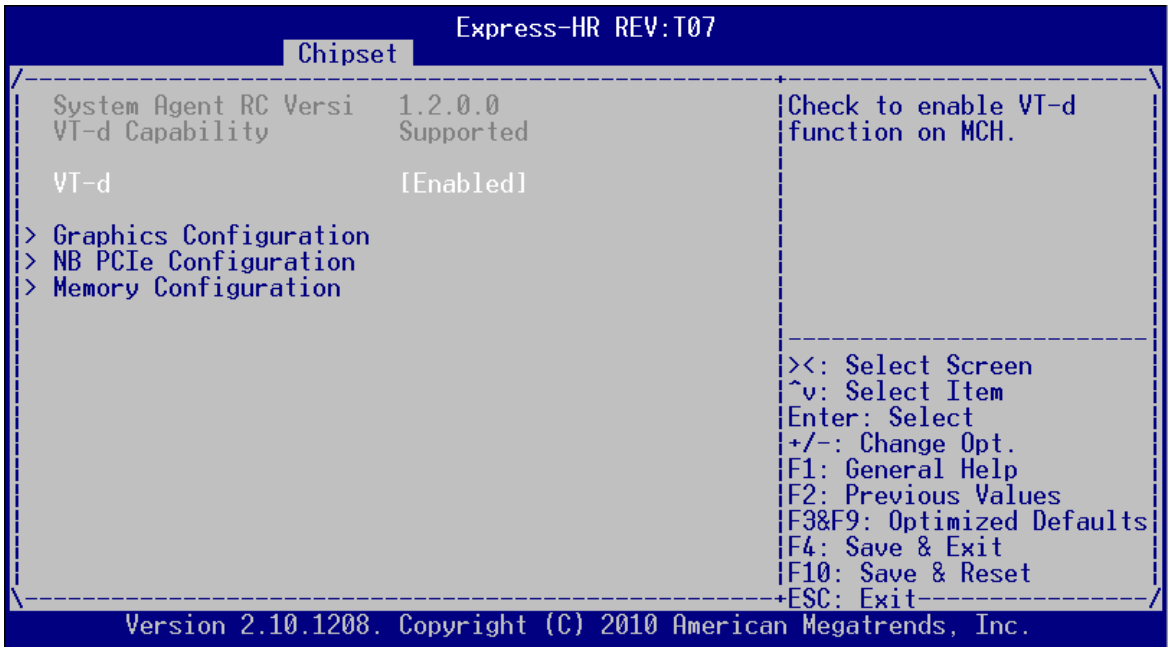
Allows the user to enable/disable Enhanced Intel SpeedStep Technology.

8.4 Chipset Configuration

Select the Chipset tab from the setup screen to enter the Chipset Configuration screen.



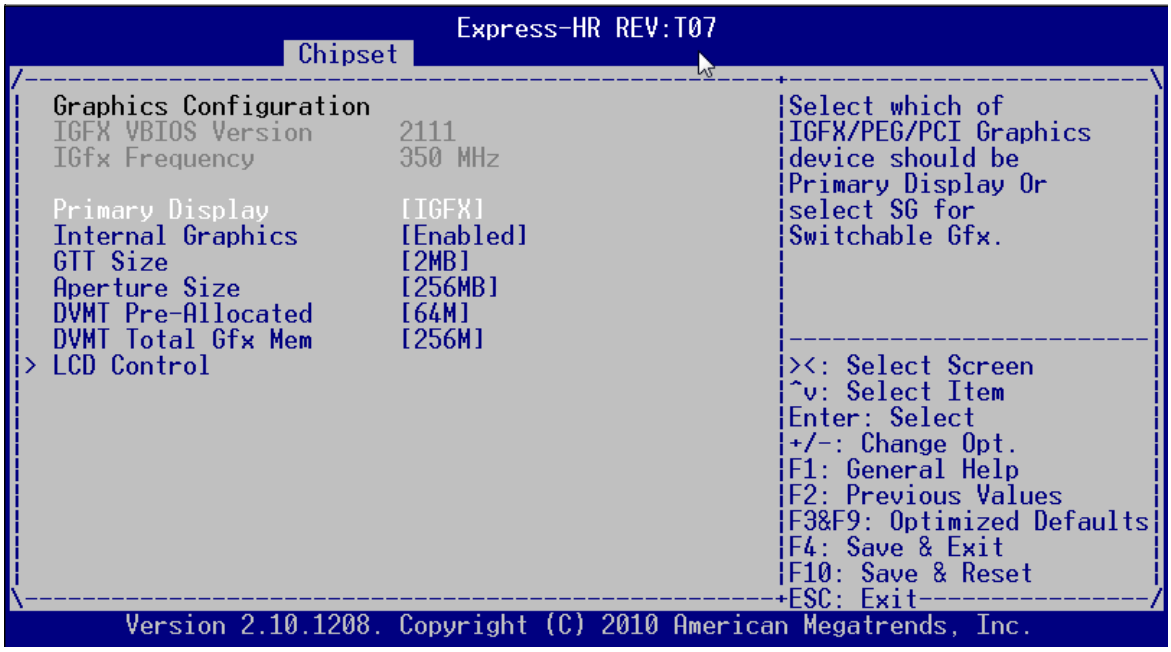
8.4.1 System Agent (SA) Configuration



VT-d

This option allows the user to enable/disable Intel Virtualization Technology for Directed I/O.

Graphics Configuration



Primary Display

Allows the user to set the primary display. Options: IGFX, PEG, PCI.

Internal Graphics

Allows the user to enable/disable the integrated graphics.

GTT Size

Allows the user to set the Graphics Translation Table size. Options: 1MB, 2MB.

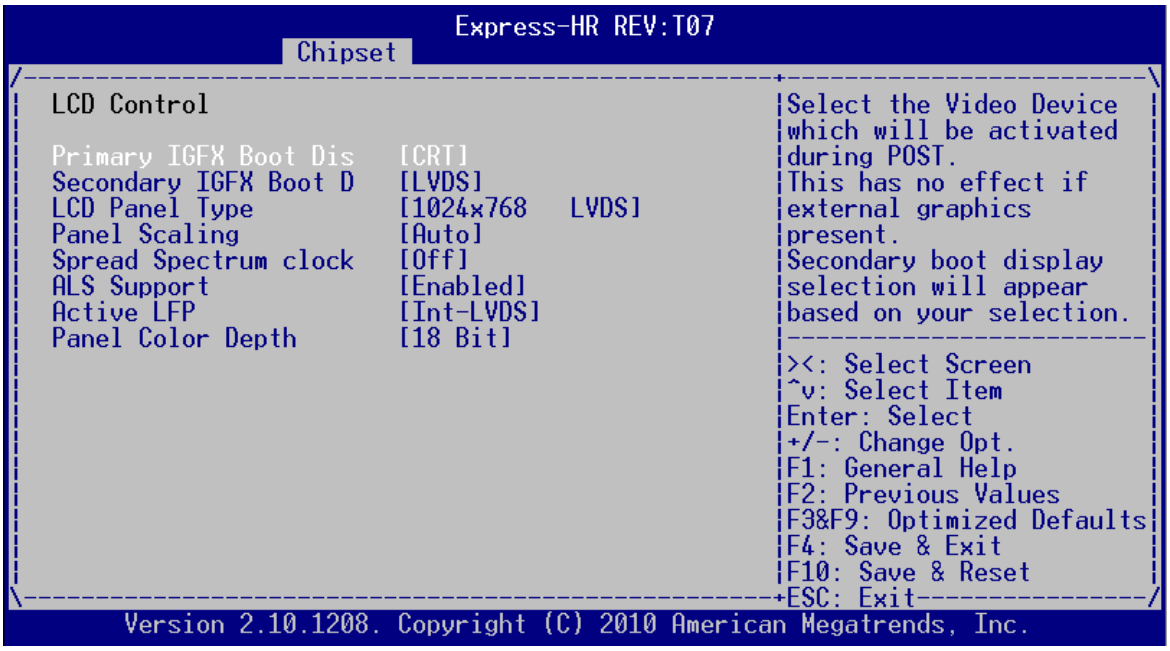
Aperture Size

Allows the user to set the Aperture Size. Options: 128MB, 256MB, 512MB.

DVMT Pre-Allocated

Allows the user to set the the amount of pre-allocated memory.

LCD Control



Primary IGFX Boot Display

Options: CRT, DDI1, DDI2, DDI3, LVDS

Secondary IGFX Boot Display

Options: CRT, DDI1, DDI2, DDI3, LVDS

LCD Panel Type

Options: 800x600 LVDS, 1024x768 LVDS, 1280x1024 LVDS, 1400x1050 LVDS1, 1400x1050 LVDS2, 1600x1200 LVDS, 1366x768 LVDS, 1680x1050 LVDS, 1920x1200 LVDS, 1024x768 LVDS, 1280x800 LVDS, 1920x1080 LVDS

Panel Scaling

Options: Auto, Off, Force Scaling

Spread Spectrum Clock

Options: Off, Hardware, Software

ALS Support

Options: enable/disable

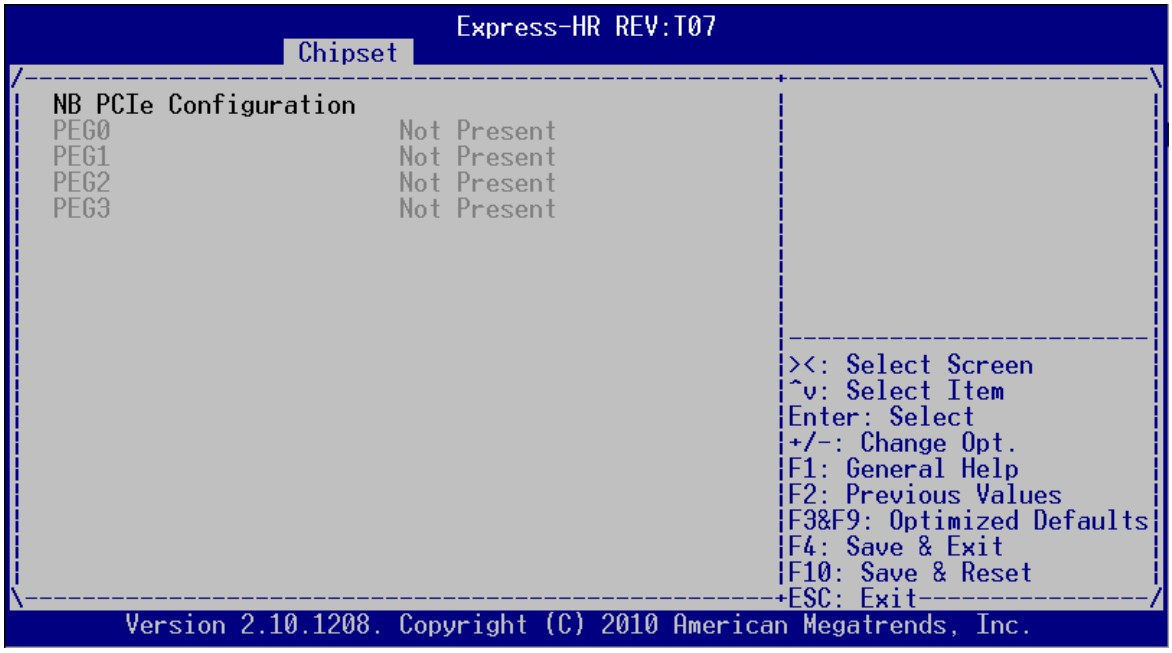
Active LFP

Options: No LVDS, Int-LVDS, SDVO LVDS, eDP Port A, eDP Port D

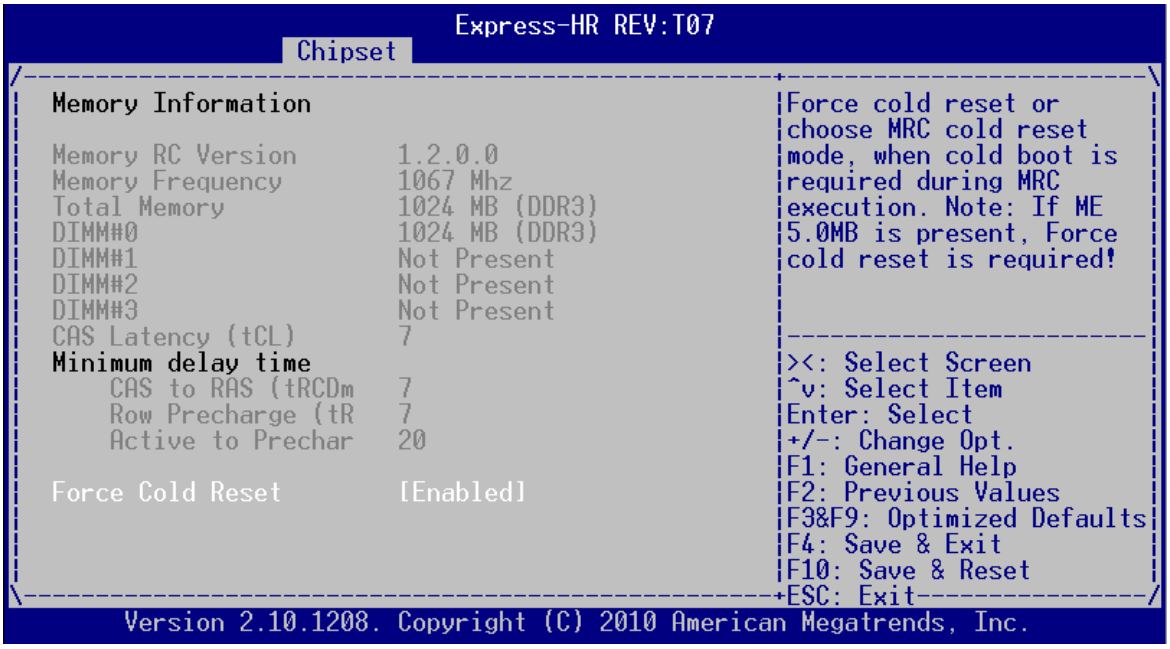
Panel Color Depth

Options: 18 Bit, 24 Bit

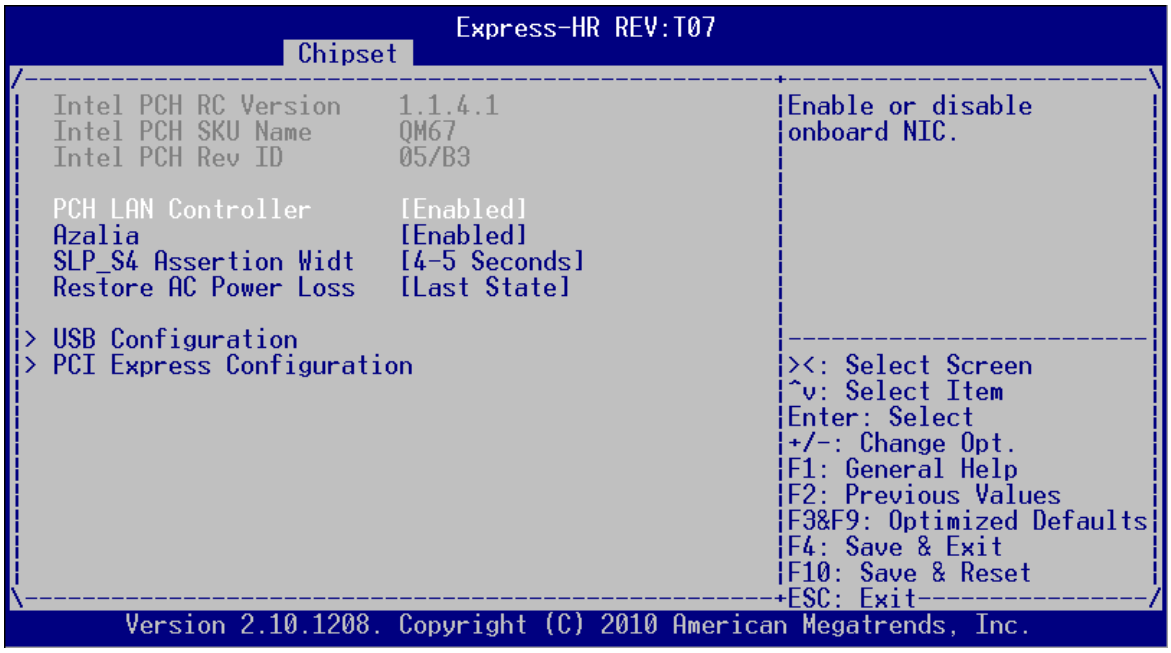
NB PCIe Configuration



Memory Configuration



8.4.2 PCH-IO Configuration



PCH LAN Controller

Options: enabled, disabled.

Azalia

Enable/disable the onboard High Definition audio.

SLP_S4 Assertion Width

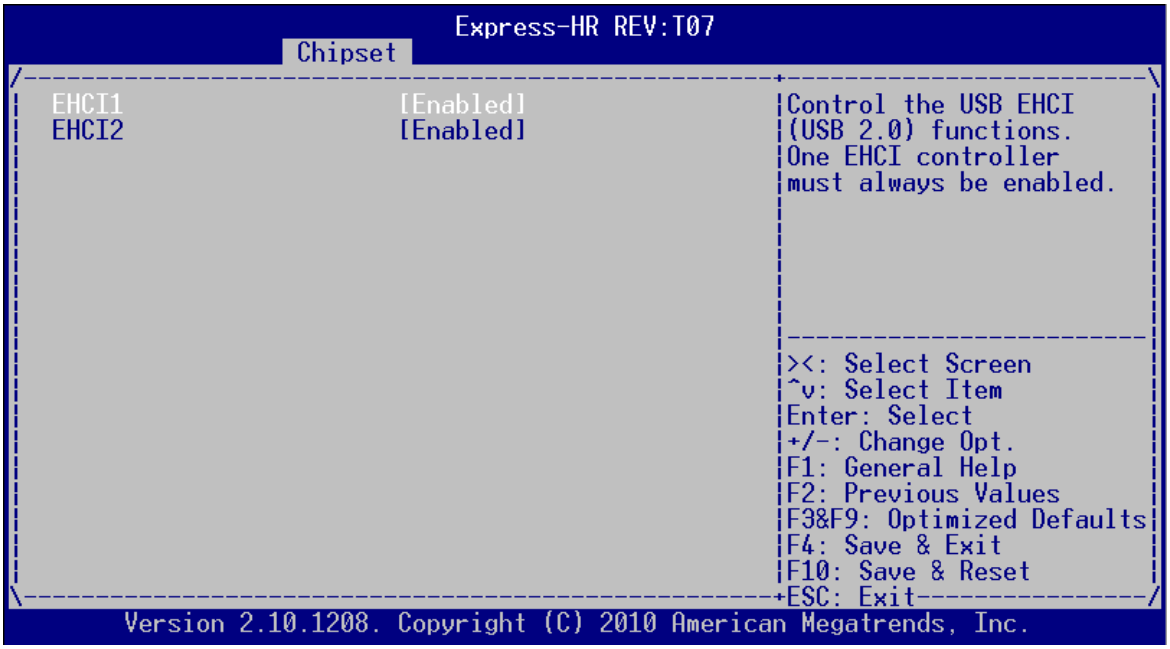
Options: 1-2 seconds, 2-3 seconds, 3-4 seconds, 4-5 seconds.

Restore on AC Power Loss

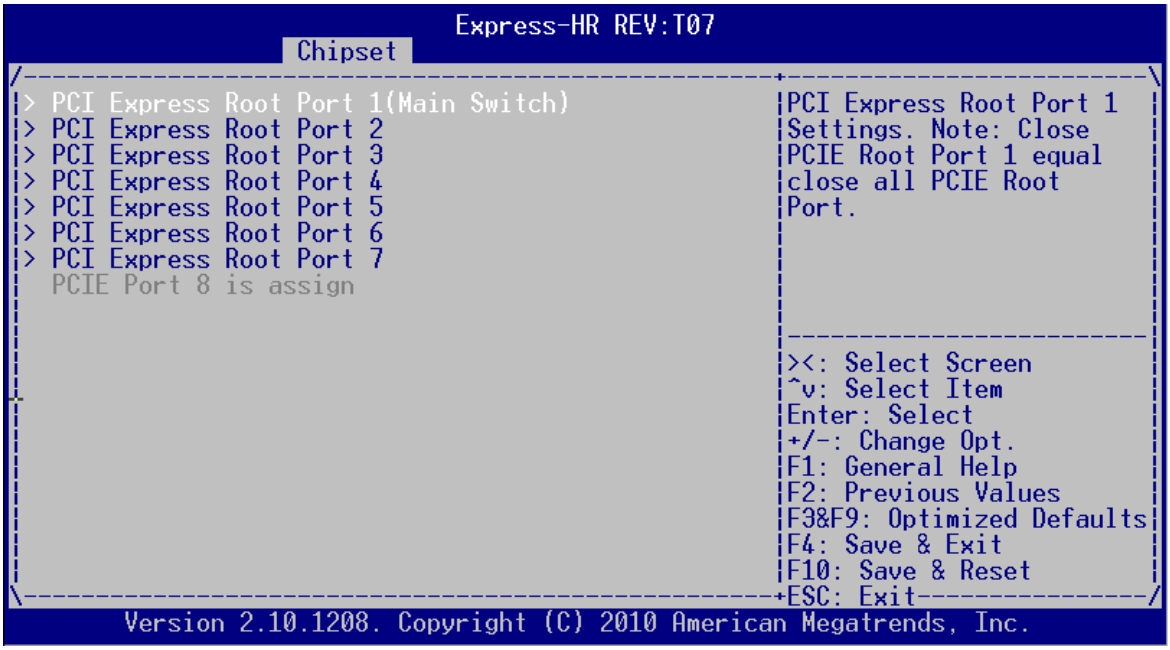
Determines what state the computer enters when AC power is restored after a power loss. The options for this value are Last State, Power On and Power Off.

Option	Description
Power Off	Set this value to always power off the system while AC power is restored.
Power On	Set this value to always power on the system while AC power is restored.
Last State	Set this value to power off/on the system depending on the last system power state while AC power is restored.

USB Configuration

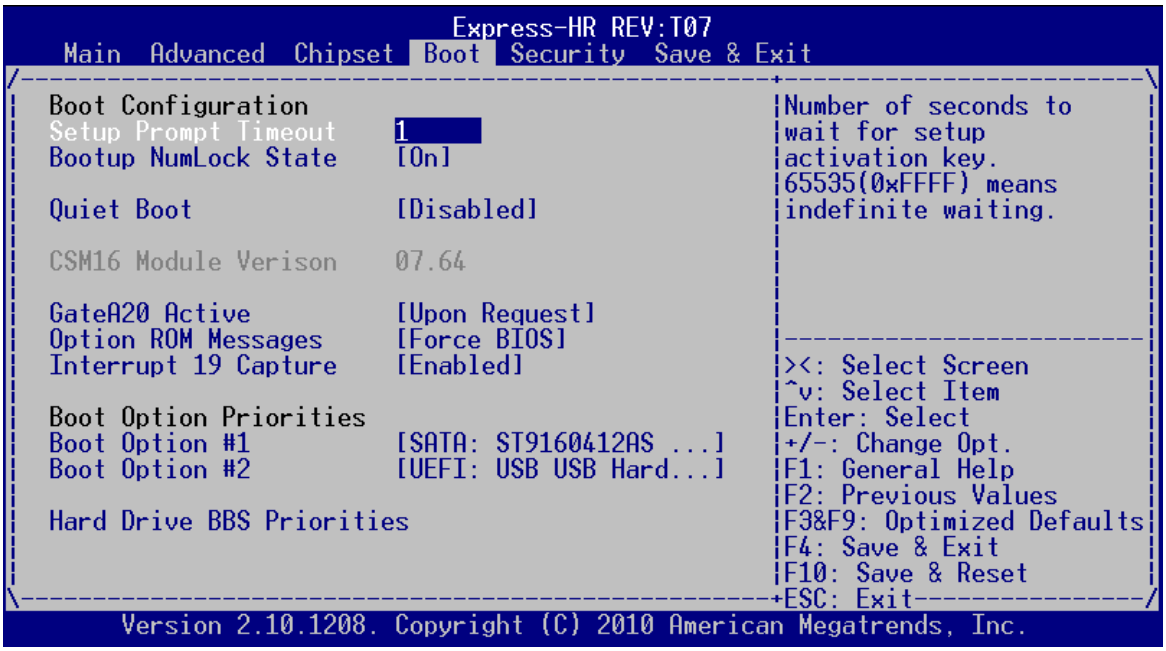


PCI Express Configuration



8.5 Boot Setup

Select the Boot tab from the setup screen to enter the Boot Setup screen.



Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535 (0xFFFF) means wait indefinitely.

Bootup Num-Lock

Set this value to allow the Number Lock setting to be modified during boot up.
Off - This option does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard will light up when the Number Lock is engaged.
On - Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is boot up. This allows the immediate use of 10-keys numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard will be lit.

Quiet Boot

Disabled - Set this value to allow the computer system to display the POST messages.
Enabled - Set this value to allow the computer system to display the OEM logo.

GateA20 Active

Upon Request - GA20 can be disabled using BIOS services. Always - do not allow disabling of GA20; this option is useful when any RT code is executed above 1MB.

Option ROM Messages

Force BIOS - Set this value to allow the system to display the Option ROM messages.
Keep Current - Set this value to not allow the Option ROM messages.

Interrupt 19 Capture

Allows option ROMs to trap Int 19. Set this value to Enabled/Disabled.

Boot Option Priorities

This option sets the priorities of the boot options. The user can change the priorities by selecting the particular boot option. The device selected in Boot option #1 will be the first priority, followed by second, third and so on.

Hard Drive BBS Priorities

The boot devices are listed in groups by device type. First press <Enter> to enter the sub-menu. Then you may use the arrow keys to select the desired device, then press <+>, <-> or <PageUp>, <PageDown> key to move it up/down in the priority list. Only the first device in each device group will be available for selection in Boot Option.

8.6 Security Setup

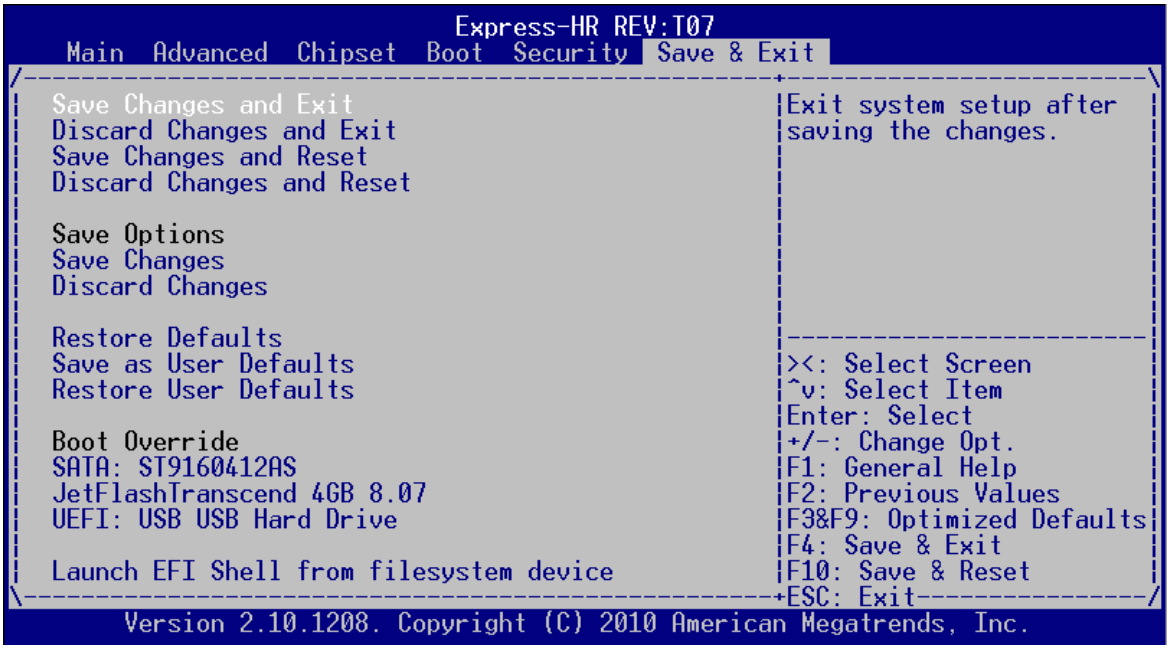
Administrator Password

Use this option to set a password for administrators with full control of the BIOS setup utility.

User Password

Use this option to set a password for users with limited access to the BIOS setup utility.

8.7 Save & Exit



Save Changes and Exit

When you have completed the system configuration changes, select this option to save changes and continue booting the system. New configuration parameters will take effect after the next system restart.

Discard Changes and Exit

Select this option to quit Setup without saving changes to the system configuration and continue booting.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save changes made so far to any of the setup options.

Discard Changes

Discard any unsaved changes

Restore Defaults

Restore standard 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

Use the up/down arrow keys to highlight a boot device or "Launch EFI Shell" to immediately exit the BIOS Setup and boot from the selected device.

9 BIOS Checkpoints, Beep Codes

This section of this document lists checkpoints and beep codes generated by AMIBIOS. The checkpoints defined in this document are inherent to the AMIBIOS generic core, and do not include any chipset or board specific checkpoint definitions.

Checkpoints and Beep Codes Definition

A checkpoint is either a byte or word value output to I/O port 80h. The BIOS outputs checkpoints throughout bootblock and Power-On Self Test (POST) to indicate the task the system is currently executing. Checkpoints are very useful for debugging problems that occur during the preboot process.

Beep codes are used by the BIOS to indicate a serious or fatal error. They are used when an error occurs before the system video has been initialized, and generated by the system board speaker.

Viewing BIOS Checkpoints

Viewing all checkpoints generated by the BIOS requires a checkpoint card, also referred to as a “POST Card” or “POST Diagnostic Card”. These are PCI add-in cards that show the value of I/O port 80h on a LED display.

Some computers display checkpoints in the bottom right corner of the screen during POST. This display method is limited, since it only displays checkpoints that occur after the video card has been activated.

Keep in mind that not all computers using AMIBIOS enable this feature. In most cases, a checkpoint card is the best tool for viewing AMIBIOS checkpoints.

9.1 Status Code Ranges

Status Code Range	Description
0x01 – 0x0F	SEC Status Codes & Errors
0x10 – 0x2F	PEI execution up to and including memory detection
0x30 – 0x4F	PEI execution after memory detection
0x50 – 0x5F	PEI errors
0x60 – 0xCF	DXE execution up to BDS
0xD0 – 0xDF	DXE errors
0xE0 – 0xE8	S3 Resume (PEI)
0xE9 – 0xEF	S3 Resume errors (PEI)
0xF0 – 0xF8	Recovery (PEI)
0xF9 – 0xFF	Recovery errors (PEI)

9.2 Standard Status Codes

SEC Status Codes

Status Code	Description
0x0	Not used
Progress Codes	
0x1	Power on. Reset type detection (soft/hard).
0x2	AP initialization before microcode loading
0x3	North Bridge initialization before microcode loading
0x4	South Bridge initialization before microcode loading
0x5	OEM initialization before microcode loading
0x6	Microcode loading
0x7	AP initialization after microcode loading
0x8	North Bridge initialization after microcode loading
0x9	South Bridge initialization after microcode loading
0xA	OEM initialization after microcode loading
0xB	Cache initialization
SEC Error Codes	
0xC – 0xD	Reserved for future AMI SEC error codes
0xE	Microcode not found
0xF	Microcode not loaded

SEC Beep Codes

None.

PEI Status Codes

Status Code	Description
0x0	Not used
Progress Codes	
0x10	PEI Core is started
0x11	Pre-memory CPU initialization is started
0x12	Pre-memory CPU initialization (CPU module specific)
0x13	Pre-memory CPU initialization (CPU module specific)
0x14	Pre-memory CPU initialization (CPU module specific)
0x15	Pre-memory North Bridge initialization is started
0x16	Pre-Memory North Bridge initialization (North Bridge module specific)
0x17	Pre-Memory North Bridge initialization (North Bridge module specific)
0x18	Pre-Memory North Bridge initialization (North Bridge module specific)
0x19	Pre-memory South Bridge initialization is started
0x1A	Pre-memory South Bridge initialization (South Bridge module specific)
0x1B	Pre-memory South Bridge initialization (South Bridge module specific)
0x1C	Pre-memory South Bridge initialization (South Bridge module specific)
0x1D – 0x2A	OEM pre-memory initialization codes
0x2B	Memory initialization. Serial Presence Detect (SPD) data reading
0x2C	Memory initialization. Memory presence detection
0x2D	Memory initialization. Programming memory timing information
0x2E	Memory initialization. Configuring memory
0x2F	Memory initialization (other).
0x30	Reserved for ASL (see ASL Status Codes section below)
0x31	Memory Installed
0x32	CPU post-memory initialization is started
0x33	CPU post-memory initialization. Cache initialization
0x34	CPU post-memory initialization. Application Processor(s) (AP) initialization
0x35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
0x36	CPU post-memory initialization. System Management Mode (SMM) initialization
0x37	Post-Memory North Bridge initialization is started
0x38	Post-Memory North Bridge initialization (North Bridge module specific)
0x39	Post-Memory North Bridge initialization (North Bridge module specific)
0x3A	Post-Memory North Bridge initialization (North Bridge module specific)
0x3B	Post-Memory South Bridge initialization is started
0x3C	Post-Memory South Bridge initialization (South Bridge module specific)
0x3D	Post-Memory South Bridge initialization (South Bridge module specific)
0x3E	Post-Memory South Bridge initialization (South Bridge module specific)
0x3F-0x4E	OEM post memory initialization codes
0x4F	DXE IPL is started

PEI Status Codes (cont'd)

PEI Error Codes	
0x50	Memory initialization error. Invalid memory type or incompatible memory speed
0x51	Memory initialization error. SPD reading has failed
0x52	Memory initialization error. Invalid memory size or memory modules do not match.
0x53	Memory initialization error. No usable memory detected
0x54	Unspecified memory initialization error.
0x55	Memory not installed
0x56	Invalid CPU type or Speed
0x57	CPU mismatch
0x58	CPU self test failed or possible CPU cache error
0x59	CPU micro-code is not found or micro-code update is failed
0x5A	Internal CPU error
0x5B	reset PPI is not available
0x5C-0x5F	Reserved for future AMI error codes
S3 Resume Progress Codes	
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
0xE1	S3 Boot Script execution
0xE2	Video repost
0xE3	OS S3 wake vector call
0xE4-0xE7	Reserved for future AMI progress codes
0xE0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
S3 Resume Error Codes	
0xE8	S3 Resume Failed in PEI
0xE9	S3 Resume PPI not Found
0xEA	S3 Resume Boot Script Error
0xEB	S3 OS Wake Error
0xEC-0xEF	Reserved for future AMI error codes
Recovery Progress Codes	
0xF0	Recovery condition triggered by firmware (Auto recovery)
0xF1	Recovery condition triggered by user (Forced recovery)
0xF2	Recovery process started
0xF3	Recovery firmware image is found
0xF4	Recovery firmware image is loaded
0xF5-0xF7	Reserved for future AMI progress codes
Recovery Error Codes	
0xF8	Recovery PPI is not available
0xF9	Recovery capsule is not found
0xFA	Invalid recovery capsule
0xFB – 0xFF	Reserved for future AMI error codes

PEI Beep Codes

# of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXEIPL was not found
3	DXE Core Firmware Volume was not found
7	Reset PPI is not available
4	Recovery failed
4	S3 Resume failed

DXE Status Codes

Status Code	Description
0x60	DXE Core is started
0x61	NVRAM initialization
0x62	Installation of the South Bridge Runtime Services
0x63	CPU DXE initialization is started
0x64	CPU DXE initialization (CPU module specific)
0x65	CPU DXE initialization (CPU module specific)
0x66	CPU DXE initialization (CPU module specific)
0x67	CPU DXE initialization (CPU module specific)
0x68	PCI host bridge initialization
0x69	North Bridge DXE initialization is started
0x6A	North Bridge DXE SMM initialization is started
0x6B	North Bridge DXE initialization (North Bridge module specific)
0x6C	North Bridge DXE initialization (North Bridge module specific)
0x6D	North Bridge DXE initialization (North Bridge module specific)
0x6E	North Bridge DXE initialization (North Bridge module specific)
0x6F	North Bridge DXE initialization (North Bridge module specific)
0x70	South Bridge DXE initialization is started
0x71	South Bridge DXE SMM initialization is started
0x72	South Bridge devices initialization
0x73	South Bridge DXE Initialization (South Bridge module specific)
0x74	South Bridge DXE Initialization (South Bridge module specific)
0x75	South Bridge DXE Initialization (South Bridge module specific)
0x76	South Bridge DXE Initialization (South Bridge module specific)
0x77	South Bridge DXE Initialization (South Bridge module specific)
0x78	ACPI module initialization
0x79	CSM initialization
0x7A – 0x7F	Reserved for future AMI DXE codes
0x80 – 0x8F	OEM DXE initialization codes
0x90	Boot Device Selection (BDS) phase is started
0x91	Driver connecting is started

DXE Status Codes (cont'd)

Status Code	Description
0x92	PCI Bus initialization is started
0x93	PCI Bus Hot Plug Controller Initialization
0x94	PCI Bus Enumeration
0x95	PCI Bus Request Resources
0x96	PCI Bus Assign Resources
0x97	Console Output devices connect
0x98	Console input devices connect
0x99	Super IO Initialization
0x9A	USB initialization is started
0x9B	USB Reset
0x9C	USB Detect
0x9D	USB Enable
0x9E – 0x9F	Reserved for future AMI codes
0xA0	IDE initialization is started
0xA1	IDE Reset
0xA2	IDE Detect
0xA3	IDE Enable
0xA4	SCSI initialization is started
0xA5	SCSI Reset
0xA6	SCSI Detect
0xA7	SCSI Enable
0xA8	Setup Verifying Password
0xA9	Start of Setup
0xAA	Reserved for ASL (see ASL Status Codes section below)
0xAB	Setup Input Wait
0xAC	Reserved for ASL (see ASL Status Codes section below)
0xAD	Ready To Boot event
0xAE	Legacy Boot event
0xAF	Exit Boot Services event
0xB0	Runtime Set Virtual Address MAP Begin
0xB1	Runtime Set Virtual Address MAP End
0xB2	Legacy Option ROM Initialization
0xB3	System Reset
0xB4	USB hot plug
0xB5	PCI bus hot plug
0xB6	Clean-up of NVRAM
0xB7	Configuration Reset (reset of NVRAM settings)
0xB8 – 0xBF	Reserved for future AMI codes
0xC0 – 0xCF	OEM BDS initialization codes

DXE Status Codes (cont'd)

DXE Error Codes	
0xD0	CPU initialization error
0xD1	North Bridge initialization error
0xD2	South Bridge initialization error
0xD3	Some of the Architectural Protocols are not available
0xD4	PCI resource allocation error. Out of Resources
0xD5	No Space for Legacy Option ROM
0xD6	No Console Output Devices are found
0xD7	No Console Input Devices are found
0xD8	Invalid password
0xD9	Error loading Boot Option (LoadImage returned error)
0xDA	Boot Option is failed (StartImage returned error)
0xDB	Flash update is failed
0xDC	Reset protocol is not available

DXE Beep Codes

# of Beeps	Description
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
1	Invalid password
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met

ACPI/ASL Status Codes

Status Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

9.3 OEM-Reserved Status Code Ranges

Status Code	Description
0x5	OEM SEC initialization before microcode loading
0xA	OEM SEC initialization after microcode loading
0x1D – 0x2A	OEM pre-memory initialization codes
0x3F – 0x4E	OEM PEI post memory initialization codes
0x80 – 0x8F	OEM DXE initialization codes
0xC0 – 0xCF	OEM BDS initialization codes

Important Safety Instructions

For user safety, please read and follow all instructions, warnings, cautions, and notes marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:

  - Turn off power and unplug any power cords/cables.

- To avoid electrical shock and/or damage to equipment:

  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

- Equipment must be serviced by authorized technicians when:

  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

Getting Service

Contact us should you require any service or assistance.

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