



# HM961-QM87/HM86

COM Express Basic Module User's Manual

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## **Trademarks**

Product names or trademarks appearing in this manual are for identification purpose only and are the properties of the respective owners.

## **COM Express Specification Reference**

PICMG<sup>®</sup> COM Express Module<sup>™</sup> Base Specification.

http://www.picmg.org/

## FCC and DOC Statement on Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- · Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- · Consult the dealer or an experienced radio TV technician for help.

### Notice:

- 1. The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- 2. Shielded interface cables must be used in order to comply with the emission limits.

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## **About this Manual**

An electronic file of this manual is included in the CD. To view the user's manual in the CD, insert the CD into a CD-ROM drive. The autorun screen (Main Board Utility CD) will appear. Click "User's Manual" on the main menu.

## Warranty

- 1. Warranty does not cover damages or failures that arised from misuse of the product, inability to use the product, unauthorized replacement or alteration of components and product specifications.
- 2. The warranty is void if the product has been subjected to physical abuse, improper installation, modification, accidents or unauthorized repair of the product.
- 3. Unless otherwise instructed in this user's manual, the user may not, under any circumstances, attempt to perform service, adjustments or repairs on the product, whether in or out of warranty. It must be returned to the purchase point, factory or authorized service agency for all such work.
- 4. We will not be liable for any indirect, special, incidental or consequencial damages to the product that has been modified or altered.

## **Static Electricity Precautions**

It is quite easy to inadvertently damage your PC, system board, components or devices even before installing them in your system unit. Static electrical discharge can damage computer components without causing any signs of physical damage. You must take extra care in handling them to ensure against electrostatic build-up.

- 1. To prevent electrostatic build-up, leave the system board in its anti-static bag until you are ready to install it.
- 2. Wear an antistatic wrist strap.
- 3. Do all preparation work on a static-free surface.
- 4. Hold the device only by its edges. Be careful not to touch any of the components, contacts or connections.
- 5. Avoid touching the pins or contacts on all modules and connectors. Hold modules or connectors by their ends.

Important:
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Electrostatic discharge (ESD) can damage your processor, disk drive and other components. Perform the upgrade instruction procedures described at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

## **Safety Measures**

To avoid damage to the system:

• Use the correct AC input voltage range.

To reduce the risk of electric shock:

• Unplug the power cord before removing the system chassis cover for installation or servicing. After installation or servicing, cover the system chassis before plugging the power cord.

## About the Package

The package contains the following items. If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

- One HM961 board
- One DVD
- One QR (Quick Reference)
- Heat spreader with heat sink and fan

## **Optional Items**

- COM331-B carrier board kit
- Heat spreader

The board and accessories in the package may not come similar to the information listed above. This may differ in accordance with the sales region or models in which it was sold. For more information about the standard package in your region, please contact your dealer or sales representative.

## Before Using the System Board

Before using the system board, prepare basic system components.

If you are installing the system board in a new system, you will need at least the following internal components.

- Memory module
- Storage devices such as hard disk drive, CD-ROM, etc.

You will also need external system peripherals you intend to use which will normally include at least a keyboard, a mouse and a video display monitor.

# Chapter 1 - Introduction

# **Specifications**

Processor	<ul> <li>4th generation Intel<sup>®</sup> Core<sup>™</sup> processors 4700EQ : Intel<sup>®</sup> Core<sup>™</sup> i7-4700EQ, 6M Cache, 2.4GHz (3.4GHz), 47W 4400E : Intel<sup>®</sup> Core<sup>™</sup> i5-4400E, 3M Cache, 2.7GHz (3.3GHz), 37W 4402E : Intel<sup>®</sup> Core<sup>™</sup> i5-4402E, 3M Cache, 1.6GHz (2.7GHz), 25W 4100E : Intel<sup>®</sup> Core<sup>™</sup> i3-4100E, 3M Cache, 2.4 GHz, 37W 4102E : Intel<sup>®</sup> Core<sup>™</sup> i3-4102E, 3M Cache, 1.6 GHz, 25W</li> <li>BGA 1364 packaging technology</li> <li>22nm process technology</li> </ul>
Chipset	<ul> <li>Intel<sup>®</sup> QM87 Express Chipset (HM961-QM87)</li> <li>Intel<sup>®</sup> HM86 Express Chipset (HM961-HM86)</li> </ul>
System Memory	<ul> <li>Two 204-pin DDR3L SODIMM sockets</li> <li>Supports DDR3L 1333/1600MHz ECC SODIMM</li> <li>Supports up to 16GB system memory</li> <li>DRAM device technologies: 1Gb, 2Gb and 4Gb DDR3L DRAM technologies are supported for x8 and x16 devices, ECC DRAM only</li> </ul>
Graphics	<ul> <li>Intel<sup>®</sup> HD Graphics 4600</li> <li>Supports 1 VGA, 1 LVDS and 3 DDI</li> <li>VGA: resolution up to 2048x1536 @75Hz</li> <li>LVDS: NXP PTN3460, 24-bit, dual channel, resolution up to 1920x1200 @60Hz</li> <li>Digital Display Interfaces: HDMI, DVI and DP</li> <li>HDMI: resolution up to 4096x2304 @24Hz or 2560x1600 @60Hz</li> <li>DVI: resolution up to 1920x1200 @60Hz</li> <li>DVI: resolution up to 3840x2160 @60Hz</li> <li>Intel<sup>®</sup> Clear Video Technology</li> <li>Intel<sup>®</sup> Advanced Vector Extensions (Intel<sup>®</sup> AVX) Instructions</li> <li>Supports DirectX 11.1, OpenGL 4.0, OpenCL 1.2</li> </ul>
Audio	Supports High Definition Audio interface
LAN	<ul> <li>Intel<sup>®</sup> I217LM with iAMT9.0 Gigabit Ethernet Phy (HM961-QM87)</li> <li>Intel<sup>®</sup> I217LM Gigabit Ethernet Phy (HM961-HM86)</li> <li>Integrated 10/100/1000 transceiver</li> <li>Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab</li> </ul>
Serial ATA	HM961-QM87: • Supports 4 SATA 3.0 with data transfer rate up to 6Gb/s • Integrated Advanced Host Controller Interface (AHCI) controller • Supports RAID 0/1/5/10 • Supports Intel <sup>®</sup> Smart Response Technology
	HM961-HM86: • Supports 2 SATA 3.0, and 2 SATA 2.0 • Supports 2 SATA 3.0, 1 SATA 2.0, and 1 SSD* (optional) • Integrated Advanced Host Controller Interface (AHCI) controller
USB Interface	HM961-QM87: • XHCI Host Controller supports up to 4 super speed USB 3.0 ports
	HM961-HM86: • XHCI Host Controller supports up to 2 super speed USB 3.0 ports

SSD* (optional)	<ul> <li>2GB/4GB/8GB/16GB/32GB/64GB</li> <li>Write: 30MB/sec (max), Read: 70MB/sec (max)</li> <li>SATA to SSD onboard</li> </ul>
Expansion Interfaces	HM961-QM87: • Supports 4 USB 3.0 interfaces • Supports 8 USB 2.0 interfaces • Supports 1 PCle x16 Gen 3 interface • Supports 7 PCle x1 interfaces • Supports LPC interface • Supports SMBus interface • Supports 1 <sup>2</sup> C interface • Supports 2 serial interfaces (TX/RX) • Supports 4-bit input and 4-bit output GPIO
	HM961-HM86: • Supports 2 USB 3.0 interfaces • Supports 8 USB 2.0 interfaces • Supports 1 PCIe x16 Gen 3 interface • Supports 7 PCIe x1 interfaces • Supports LPC interface • Supports SMBus interface • Supports 2 serial interfaces (TX/RX) • Supports 4-bit input and 4-bit output GPIO
Trusted Platform Module - TPM* (optional)	<ul> <li>Provides a Trusted PC for secure transactions</li> <li>Provides software license protection, enforcement and password protection</li> </ul>
Intel® Active Management Technology - AMT (HM961-QM87)	<ul> <li>Supports iAMT9.0</li> <li>Out-of-band system access</li> <li>Remote troubleshooting and recovery</li> <li>Hardware-based agent presence checking</li> <li>Proactive alerting</li> <li>Remote hardware and software asset tracking</li> </ul>
Damage Free Intelligence	<ul> <li>Monitors CPU temperature and overheat alarm</li> <li>Monitors CPU fan speed and failure alarm</li> <li>Monitors Vcore/1.05V/DDR voltages and failure alarm</li> </ul>
BIOS	• AMI BIOS - 64Mbit SPI BIOS
WatchDog Timer	Software programmable from 1 to 255 seconds
Power	Input: 12V, VCC_RTC, 5VSB* (optional)
Power Consumption	HM961-QM87BS4-4700EQ: 55.39W with i7-4700EQ at 2.4GHz and 2x 8GB DDR3L SODIMM
Temperature	<ul> <li>Operating: 0°C to 60°C</li> <li>Storage: -20°C to 85°C</li> </ul>
Humidity	• 5% to 90%

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OS Support	<ul> <li>Windows XP Professional x86 &amp; SP3 (32-bit) (limited function)</li> <li>Windows 7 Ultimate x86 &amp; SP1 (32-bit)</li> <li>Windows 7 Ultimate x64 &amp; SP1 (64-bit)</li> <li>Windows 8 Enterprise x86 (32-bit)</li> <li>Windows 8 Enterprise x64 (64-bit)</li> </ul>
РСВ	<ul> <li>Dimensions <ul> <li>COM Express<sup>®</sup> Basic</li> <li>95mm (3.74") x 125mm (4.9")</li> </ul> </li> <li>Compliance <ul> <li>PICMG COM Express<sup>®</sup> R2.1, Type 6</li> </ul> </li> </ul>



#### Note:

\*Optional and is not supported in standard model. Please contact your sales representative for more information.

## **Features**

### Watchdog Timer

The Watchdog Timer function allows your application to regularly "clear" the system at the set time interval. If the system hangs or fails to function, it will reset at the set time interval so that your system will continue to operate.

### DDR3L ECC

DDR3L ECC supports low-voltage processors and also ensures high-quality processing performance and computing density, in line with the needs of end systems. The issue of dramatically reducing system power consumption is the most trusted memory solutions for cloud data centers.

### Graphics

The integrated Intel<sup>®</sup> HD graphics engine delivers an excellent blend of graphics performance and features to meet business needs. It provides excellent video and 3D graphics with outstanding graphics responsiveness. These enhancements deliver the performance and compatibility needed for today's and tomorrow's business applications. It supports VGA, LVDS and DDI interfaces for display outputs.

### Serial ATA

Serial ATA is a storage interface that is compliant with SATA 1.0a specification. With speed of up to 3Gb/s (SATA 2.0) and 6Gb/s (SATA 3.0), it improves hard drive performance faster than the standard parallel ATA whose data transfer rate is 100MB/s. The bandwidth of the SATA 3.0 will be limited by carrier board design.

### • Gigabit LAN

The Intel® I217LM Gigabit LAN controller supports up to 1Gbps data transmission.

#### • USB

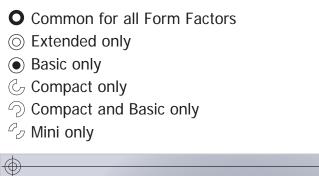
The system board supports the new USB 3.0. It is capable of running at a maximum transmission speed of up to 5 Gbit/s (625 MB/s) and is faster than USB 2.0 (480 Mbit/s, or 60 MB/s) and USB 1.1 (12Mb/s). USB 3.0 reduces the time required for data transmission, reduces power consumption, and is backward compatible with USB 2.0. It is a marked improvement in device transfer speeds between your computer and a wide range of simultaneously accessible external Plug and Play peripherals.

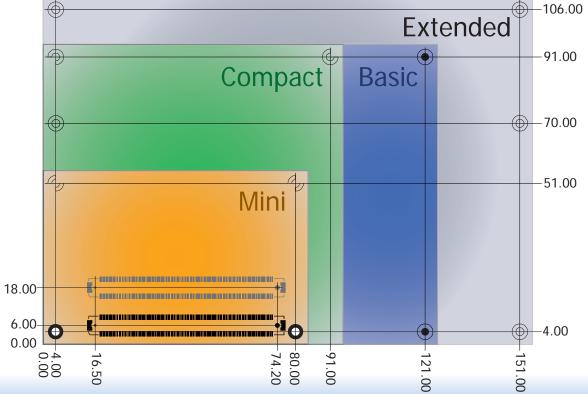
## Chapter 2 - Concept

## **COM Express Module Standards**

The figure below shows the dimensions of the different types of COM Express modules.

HM961-QM87/HM86 is a COM Express Basic module. The dimension is 95mm x 125mm.





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# **Specification Comparison Table**

The table below shows the COM Express standard specifications and the corresponding specifications supported on the HM961-QM87/HM86 module.

Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI+ USB3) Min / Max	DFI HM961-QM87/HM86 Type 6
A-B		System I/O	
A-B	PCI Express Lanes 0 - 5	1/6	6
A-B	LVDS Channel A	0 / 1	1
A-B	LVDS Channel B	0 / 1	1
A-B	eDP on LVDS CH A pins	0 / 1	0
A-B	VGA Port	0 / 1	1
A-B	TV-Out	NA	NA
A-B	DDI 0	NA	NA
A-B <sup>5</sup>	Serial Ports 1 - 2	0 / 2	2
A-B	CAN interface on SER1	0 / 1	0
A-B	SATA / SAS Ports	1 / 4	4
A-B	AC'97 / HDA Digital Interface	0 / 1	1
A-B	USB 2.0 Ports	4 / 8	8
A-B	USB Client	0 / 1	0
A-B	USB 3.0 Ports	NA	NA
A-B	LAN Port 0	1/1	1
A-B	Express Card Support	1/2	2
A-B	LPC Bus	1/1	1
A-B	SPI	1/2	1
A-B		System Management	
A-B <sup>6</sup>	SDIO (muxed on GPIO)	0 / 1	0
A-B-	General Purpose I/O	8 / 8	8
A-B	SMBus	1/1	1
A-B	12C	1/1	1
A-B	Watchdog Timer	0 / 1	1
A-B	Speaker Out	1/1	1
A-B	External BIOS ROM Support	0 / 2	1
A-B	Reset Functions	1/1	1

• 5 Indicates 12V-tolerant features on former VCC\_12V signals.

• 6 Cells in the connected columns spanning rows provide a rough approximation of features sharing connector pins.

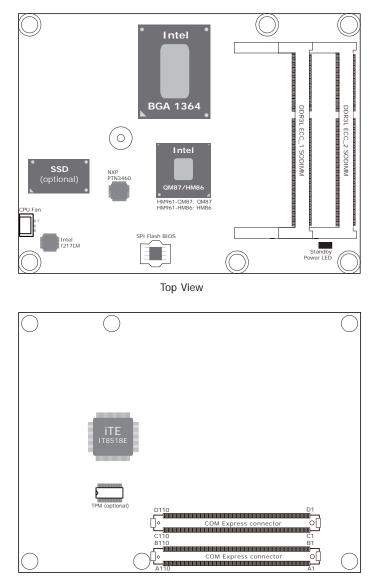
Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI+ USB3) Min / Max	DFI HM961-QM87/HM86 Type 6
A-B		Power Management	
A-B	Thermal Protection	0 / 1	1
A-B	Battery Low Alarm	0 / 1	1
A-B	Suspend/Wake Signals	0/3	2
A-B	Power Button Support	1/1	1
A-B	Power Good	1/1	1
A-B	VCC_5V_SBY Contacts	4 / 4	4
A-B <sup>5</sup>	Sleep Input	0 / 1	1
A-B <sup>5</sup>	Lid Input	0 / 1	1
A-B <sup>5</sup>	Fan Control Signals	0 / 2	2
A-B	Trusted Platform Modules	0 / 1	1
A-B		Power	
A-B	VCC_12V Contacts	12 / 12	12

Module Pin-out - Required and Optional Features C-D Connector. PICMG® COM.0Revision 2.1

Connector	Feature	COM Express Module Base Specification Type 6 (No IDE or PCI, add DDI + USB3) Min / Max	DFI HM961-QM87/HM86 Type 6
C-D		System I/O	
	PCI Express Lanes 16 - 31	0 / 16	16
	PCI Express Graphics (PEG)	0 / 1	1
C-D <sup>6</sup>	Muxed SDVO Channels 1 - 2	NA	NA
	PCI Express Lanes 6 - 15	0 / 2	1
	PCI Bus - 32 Bit	NA	NA
	PATA Port	NA	NA
	LAN Ports 1 - 2	NA	NA
	DDIs 1 - 3	0 / 3	3
C-D <sup>6</sup>	USB 3.0 Ports	0 / 4	4
C-D		Power	
C-D	VCC_12V Contacts	12 / 12	12

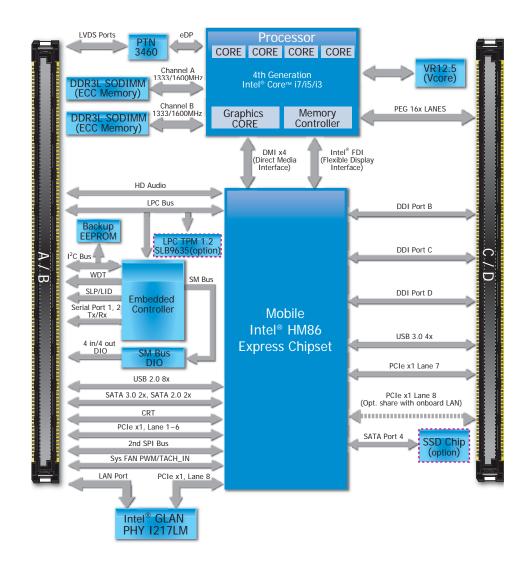
# **Chapter 3 - Hardware Installation**

## **Board Layout**



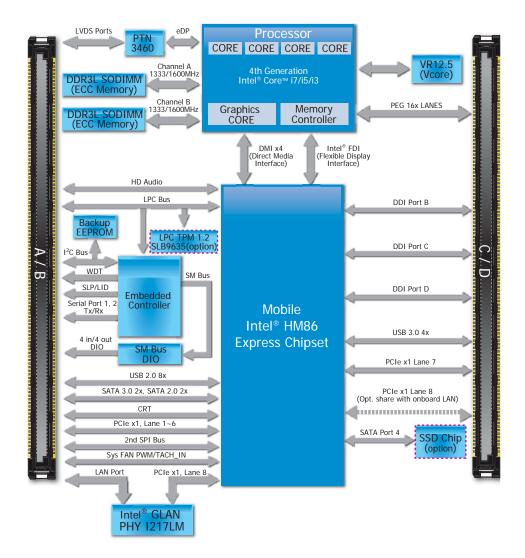
Bottom View

# Block Diagram For HM961-QM87



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## For HM961-HM86



# **Mechanical Diagram**

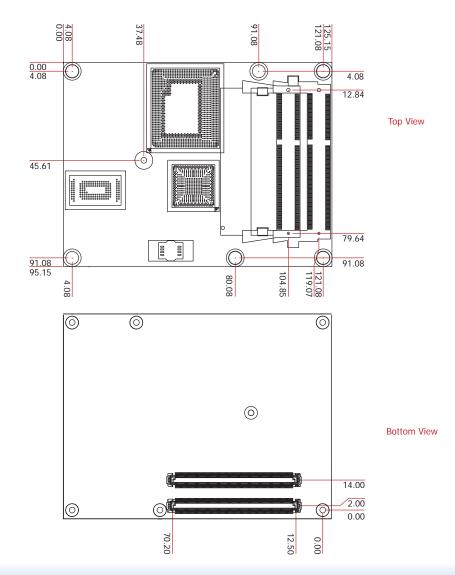
# 

HM961-QM87/HM86 Module with Heat Sink

Side View of the Module with Heat Sink and Carrier Board

-standoff

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### HM961-QM87/HM86 Module



### Important:

Electrostatic discharge (ESD) can damage your board, processor, disk drives, add-in boards, and other components. Perform installation procedures at an ESD workstation only. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis. If a wrist strap is unavailable, establish and maintain contact with the system chassis throughout any procedures requiring ESD protection.

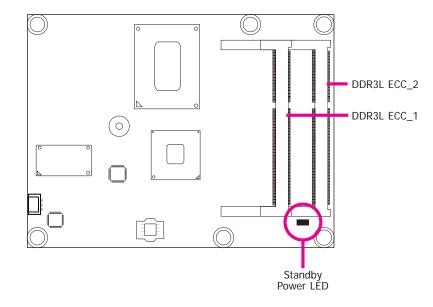
## System Memory

The system board is equipped with two 204-pin SODIMM sockets that only support DDR3L ECC memory modules. Supports up to 16GB system memory.



#### Important:

When the Standby Power LED lights red, it indicates that there is power on the board. Power-off the PC then unplug the power cord prior to installing any devices. Failure to do so will cause severe damage to the board and components.

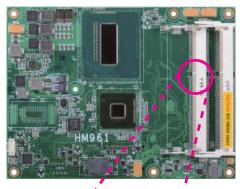


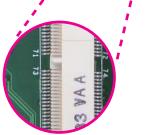
### Installing the DIMM Module



The system board used in the following illustrations may not resemble the actual one. These illustrations are for reference only.

- 1. Make sure the PC and all other peripheral devices connected to it has been powered down.
- 2. Disconnect all power cords and cables.
- 3. Locate the SODIMM socket on the system board.
- 4. Note the key on the socket. The key ensures the module can be plugged into the socket in only one direction.





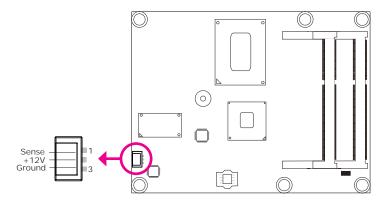
Warning: HM961-QM87/HM86 ONLY supports DDR3L ECC DRAM.

5. Grasping the module by its edges, align the module into the socket at an approximately 30 degrees angle. Apply firm even pressure to each end of the module until it slips down into the socket. The contact fingers on the edge of the module will almost completely disappear inside the socket.



## Connectors

### **CPU Fan Connector**



6. Push down the module until the clips at each end of the socket lock into position. You will hear a distinctive "click", indicating the module is correctly locked into position.



Connect the CPU fan's cable connector to the CPU fan connector on the board. The cooling fan will provide adequate airflow throughout the chassis to prevent overheating the CPU and board components.

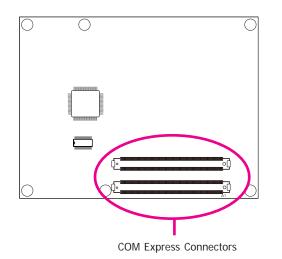
## **BIOS Setting**

"PC Health Status" submenu in the Advanced menu of the BIOS will display the current speed of the cooling fan. Refer to chapter 4 of the manual for more information.

## **COM Express Connectors**

The COM Express connectors are used to interface the HM961-QM87/HM86 COM Express board to a carrier board. Connect the COM Express connectors (located on the solder side of the board) to the COM Express connectors on the carrier board.

Refer to the "Installing HM961-QM87/HM86 onto a Carrier Board" section for more information.



Refer to the following pages for the pin functions of these connectors.

# **COM Express Connectors**

Row A Row B		3	
A1	GND (FIXED)	B1	GND (FIXED)
A2	GBE0_MDI3-	B2	GBE0_ACT#
A3	GBE0 MDI3+	B3	LPC FRAME#
A4	GBE0_LINK100#	B4	LPC_AD0
A5	GBE0_LINK1000#	B5	LPC_AD1
A6	GBE0 MDI2-	B6	LPC_AD2
A7	GBE0 MDI2+	B7	LPC_AD3
A8	GBE0 LINK#	B8	LPC_DRQ0#
A9	GBE0 MDI1-	B9	LPC DRQ1#
A10	GBE0 MDI1+	B10	LPC CLK
A11	GND (FIXED)	B11	GND (FIXED)
A12	GBE0 MDI0-	B12	PWRBTN#
A13	GBE0 MDI0+	B13	SMB CK
A14	GBE0 CTREF	B14	SMB_DAT
A15	SLP S3#	B15	SMB ALERT#
A16	SATAO TX+	B16	SATA1 TX+
A17	SATAO TX-	B10	SATA1 TX-
A18	SLP_S4#	B18	SUS STAT#
A19	SATA0_RX+	B10	SATA1_RX+
A20	SATAO RX-	B10	SATA1 RX-
A21	GND (FIXED)	B21	GND (FIXED)
A22	SATA2_TX+	B21	SATA3 TX+
A23	SATA2_TX-	B23	SATA3_TX-
A24	SUS_S5#	B24	PWR_OK
A25	SATA2 RX+	B25	SATA3 RX+
A26	SATA2_RX-	B25	SATA3_RX-
A27	BATLOW#	B20	WDT
A28	(S)ATA_ACT#	B28	AC/HDA_SDIN2
A29	AC/HDA_SYNC	B20	AC/HDA_SDIN1
A30	AC/HDA_STRC	B30	AC/HDA_SDIN0
A30	GND (FIXED)	B31	GND (FIXED)
A32	AC/HDA BITCLK	B32	SPKR
A32	AC/HDA_BITCLK	B33	I2C_CK
A34	BIOS_DISO#	B33	I2C_DAT
A34 A35	THRMTRIP#	B35	THRM#
A35 A36	USB6-	B36	USB7-
A30 A37	USB6+	B30 B37	USB7+
A37 A38	USB 6 7 OC#	B38	USB 4 5 OC#
A38 A39	USB_6_7_0C# USB4-	B38 B39	USB_4_5_0C# USB5-
A39 A40	USB4+	B39 B40	USB5+
A40 A41		B40	
A41 A42	GND (FIXED) USB2-	B41 B42	GND (FIXED) USB3-
A43	USB2+	B43	USB3+
A44	USB_2_3_0C#	B44	USB_0_1_OC#
A45	USB0-	B45	USB1-
A46	USB0+	B46	USB1+
A47	VCC_RTC	B47	EXCD1_PERST#
A48	EXCD0_PERST#	B48	EXCD1_CPPE#
A49	EXCD0_CPPE#	B49	SYS_RESET#
A50	LPC_SERIRQ	B50	CB_RESET#

		Down				
Row		Row B				
	GND (FIXED)	B51	GND (FIXED)			
A52	PCIE_TX5+	B52	PCIE_RX5+			
A53	PCIE_TX5-	B53	PCIE_RX5-			
A54	GPI0	B54	GP01			
A55	PCIE_TX4+	B55	PCIE_RX4+			
A56	PCIE_TX4-	B56	PCIE_RX4-			
A57	GND	B57	GPO2			
A58	PCIE_TX3+	B58	PCIE_RX3+			
A59	PCIE_TX3-	B59	PCIE_RX3-			
A60	GND (FIXED)	B60	GND (FIXED)			
A61	PCIE_TX2+	B61	PCIE_RX2+			
A62	PCIE_TX2-	B62	PCIE_RX2-			
A63	GPI1	B63	GPO3			
A64	PCIE_TX1+	B64	PCIE_RX1+			
A65	PCIE_TX1-	B65	PCIE_RX1-			
A66	GND	B66	WAKE0#			
A67	GPI2	B67	WAKE1#			
A68	PCIE_TX0+	B68	PCIE_RX0+			
A69	PCIE_TX0-	B69	PCIE_RX0-			
A70	GND (FIXED)	B70	GND (FIXED)			
A71	LVDS_A0+	B71	LVDS_B0+			
A72	LVDS_A0-	B72	LVDS_B0-			
A73	LVDS_A1+	B73	LVDS_B1+			
A74	LVDS_A1-	B74	LVDS_B1-			
A75	LVDS_A2+	B75	LVDS_B2+			
A76	LVDS_A2-	B76	LVDS_B2-			
A77	LVDS_VDD_EN	B77	LVDS_B3+			
A78	LVDS A3+	B78	LVDS B3-			
A79	LVDS_A3-	B79	LVDS BKLT EN			
A80	GND (FIXED)	B80	GND (FIXED)			
A81	LVDS_A_CK+	B81	LVDS_B_CK+			
A82	LVDS_A_CK-	B82	LVDS_B_CK-			
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL			
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY			
A85	GPI3	B85	VCC_5V_SBY			
A86	RSVD	B86	VCC_5V_SBY			
A87	RSVD	B87	VCC_5V_SBY			
A88	PCIE0_CK_REF+	B88	BIOS_DIS1#			
A89	PCIE0_CK_REF-	B89	VGA_RED			
A90	GND (FIXED)	B90	GND (FIXED)			
A91	SPI_POWER	B91	VGA_GRN			
A92	SPI_MISO	B92	VGA_BLU			
A93	GPO0	B93	VGA_HSYNC			
A94	SPI_CLK	B94	VGA_VSYNC			
A95	SPI_MOSI	B95	VGA_I2C_CK			
A96	TPM_PP	B96	VGA_I2C_DAT			
A97	TYPE10#	B97	SPI_CS#			
A98	SER0_TX	B98	RSVD			
A99	SER0_RX	B99	RSVD			
A100		B100	GND (FIXED)			
A101	SER1_TX	B101	FAN_PWMOUT			
A102	SER1_RX	B102	FAN_TACHIN			
A103	LID#	B103	SLEEP#			
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		B109	VCC_12V			
A110	GND (FIXED)	B110	GND (FIXED)			

Row C		Row D	
C1	GND (FIXED)	D1	GND (FIXED)
C2	GND	D2	GND
C3	USB_SSRX0-	D3	USB_SSTX0-
C4	USB_SSRX0+	D4	USB_SSTX0+
C5	GND	D5	GND
C6	USB_SSRX1-	D6	USB_SSTX1-
C7	USB_SSRX1+	D7	USB_SSTX1+
C8	GND	D8	GND
C9	USB_SSRX2-	D9	USB_SSTX2-
C10	USB_SSRX2+	D10	USB_SSTX2+
C11	GND (FIXED)	D11	GND (FIXED)
C12	USB_SSRX3-	D12	USB_SSTX3-
C13	USB_SSRX3+	D13	USB_SSTX3+
C14	GND	D14	GND
C15	DDI1_PAIR6+	D15	DDI1_CTRLCLK_AUX+
C16	DDI1_PAIR6-	D16	DDI1_CTRLDATA_AUX-
C17	RSVD	D17	RSVD
C18	RSVD	D18	RSVD
C19	PCIE_RX6+	D19	PCIE_TX6+
C20	PCIE_RX6-	D20	PCIE_TX6-
C21	GND (FIXED)	D21	GND (FIXED)
C22	PCIE_RX7+	D22	PCIE_TX7+
C23	PCIE_RX7-	D23	PCIE_TX7-
C24	DDI1_HPD	D24	RSVD
C25	DDI1_PAIR4+	D25	RSVD
C26	DDI1_PAIR4-	D26	DDI1_PAIR0+
C27	RSVD	D27	DDI1_PAIR0-
C28	RSVD	D28	RSVD
C29	DDI1_PAIR5+	D29	DDI1_PAIR1+
C30	DDI1_PAIR5-	D30	DDI1_PAIR1-
C31	GND (FIXED)	D31	GND (FIXED)
C32	DDI2_CTRLCLK_AUX+	D32	DDI1_PAIR2+
C33	DDI2_CTRLDATA_AUX-	D33	DDI1_PAIR2-
C34	DDI2_DDC_AUX_SEL	D34	DDI1_DDC_AUX_SEL
C35	RSVD	D35	RSVD
C36	DDI3_CTRLCLK_AUX+	D36	DDI1_PAIR3+
C37	DDI3_CTRLDATA_AUX-	D37	DDI1_PAIR3-
C38	DDI3_DDC_AUX_SEL	D38	RSVD
C39	DDI3_PAIR0+	D39	DDI2_PAIR0+
C40	DDI3_PAIR0-	D40	DDI2_PAIR0-
C41	GND (FIXED)	D41	GND (FIXED)
C42	DDI3_PAIR1+	D42	DDI2_PAIR1+
C43	DDI3_PAIR1-	D43	DDI2_PAIR1-
C44	DDI3_HPD	D44	DDI2_HPD
C45	RSVD	D45	RSVD
C46	DDI3_PAIR2+	D46	DDI2_PAIR2+
C47	DDI3_PAIR2-	D47	DDI2_PAIR2-
C48	RSVD	D48	RSVD
C49	DDI3_PAIR3+	D49	DDI2_PAIR3+
C50	DDI3 PAIR3-	D50	DDI2 PAIR3-

Row C		Row D	)
C51	GND (FIXED)	D51	GND (FIXED)
C52	PEG RX0+	D52	PEG_TX0+
C53	PEG_RX0-	D53	PEG_TX0-
C54	TYPE0#	D54	PEG LANE RV#
C55	PEG_RX1+	D55	PEG_TX1+
C56	PEG_RX1-	D56	PEG_TX1-
C57	TYPE1#	D57	TYPE2#
	PEG RX2+	D57	
C58			PEG_TX2+
C59	PEG_RX2-	D59	PEG_TX2-
C60	GND (FIXED)	D60	GND (FIXED)
C61	PEG_RX3+	D61	PEG_TX3+
C62	PEG_RX3-	D62	PEG_TX3-
C63	RSVD	D63	RSVD
C64	RSVD	D64	RSVD
C65	PEG RX4+	D65	PEG_TX4+
C66	PEG_RX4-	D66	PEG_TX4-
C67	NC	D67	GND
C68	PEG_RX5+	D68	PEG_TX5+
C69	PEG RX5-	D69	PEG TX5-
C70	GND (FIXED)	D89	GND (FIXED)
C71	PEG_RX6+	D71	PEG_TX6+ PEG_TX6-
C72	PEG_RX6-	D72	
C73	GND	D73	GND
C74	PEG_RX7+	D74	PEG_TX7+
C75	PEG_RX7-	D75	PEG_TX7-
C76	GND	D76	GND
C77	RSVD	D77	RSVD
C78	PEG RX8+	D78	PEG_TX8+
C79	PEG_RX8-	D79	PEG TX8-
C80	GND (FIXED)	D80	GND (FIXED)
C81	PEG RX9+	D81	PEG_TX9+
C82	PEG_RX9-	D81	PEG_TX9-
C83	RSVD	D83	RSVD
C84	GND	D84	GND
C85	PEG_RX10+	D85	PEG_TX10+
C86	PEG_RX10-	D86	PEG_TX10-
C87	GND	D87	GND
C88	PEG_RX11+	D88	PEG_TX11+
C89	PEG RX11-	D89	PEG_TX11-
C90	GND (FIXED)	D90	GND (FIXED)
C91	PEG_RX12+	D91	PEG_TX12+
C92	PEG_RX12-	D92	PEG_TX12-
C93	GND	D93	GND
C94	PEG_RX13+	D94	PEG_TX13+
C95	PEG_RX13-	D95	PEG_TX13-
C96	GND	D96	GND
C97	RSVD	D97	RSVD
C98	PEG RX14+	D98	PEG_TX14+
C99	PEG RX14-	D99	PEG TX14-
C100	GND (FIXED)	D100	GND (FIXED)
C100	PEG_RX15+	D100	PEG_TX15+
C101	PEG_RX15-	D101	PEG_TX15-
C102 C103	GND	D102	GND
C104	VCC_12V	D104	VCC_12V
C105	VCC_12V	D105	VCC_12V
C106	VCC_12V	D106	VCC_12V
C107	VCC_12V	D107	VCC_12V
C108	VCC_12V	D108	VCC_12V
			VCC 12V
C109	VCC 12V	D109	VCC IZV

# **COM Express Connectors Signal Description**

Pin Types I Input to the Module O Output from the Module

I/O Bi-directional input / output signal

OD Open drain output

Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
AC/HAD_RST#	A30	O CMOS	3.3V Suspend/3.3V		Connect to CODEC pin 11 RESET#	Reset output to CODEC, active low.
AC/HDA_SYNC	A29	O CMOS	3.3V/3.3V		Connect to CODEC pin 10 SYNC	Sample-synchronization signal to the CODEC(s).
AC/HDA_BITCLK	A32	I/O CMOS	3.3V/3.3V		Connect to CODEC pin 6 BIT_CLK	Serial data clock generated by the external CODEC(s).
AC/HDA_SDOUT	A33	O CMOS	3.3V/3.3V		Connect to CODEC pin 5 SDATA_OUT	Serial TDM data output to the CODEC.
AC/HDA_SDIN2	B28	I/O CMOS	3.3V Suspend/3.3V		Connect 33 $\Omega$ in series to CODEC2 pin 8 SDATA_IN	
AC/HDA_SDIN1	B29	I/O CMOS	3.3V Suspend/3.3V		Connect 33 $\Omega$ in series to CODEC1 pin 8 SDATA_IN	Serial TDM data inputs from up to 3 CODECs.
AC/HDA_SDIN0	B30	I/O CMOS	3.3V Suspend/3.3V		Connect 33 $\Omega$ in series to CODEC0 pin 8 SDATA_IN	

Gigabit Ethernet Sig	nals Descriptions	5				
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
GBE0_MDI0+	A13	I/O Analog	3.3V max Suspend		Connect to Magnetics Module MDI0+/-	Gigabit Ethernet Controller 0: Media Dependent Interface Differential
GBE0_MDI0-	A12	I/O Analog	3.3V max Suspend		connect to Magnetics Module MD10+7-	Pairs 0,1,2,3. The MDI can operate in 1000, 100 and 10 Mbit / sec
GBE0_MDI1+	A10	I/O Analog	3.3V max Suspend		Connect to Magnetics Module MDI1+/-	modes. Some pairs are unused in some modes, per the following:
GBE0_MDI1-	A9	I/O Analog	3.3V max Suspend		connect to magnetics module mb11+7-	1000BASE-T 100BASE-TX 10BASE-T
GBE0_MDI2+	A7	I/O Analog	3.3V max Suspend		Connect to Magnetics Module MDI2+/-	MDI[0]+/- B1_DA+/- TX+/- TX+/-
GBE0_MDI2-	A6	I/O Analog	3.3V max Suspend		connect to magnetics module mb12+7-	MDI[1]+/- B1_DB+/- RX+/- RX+/-
GBE0_MDI3+	A3	I/O Analog	3.3V max Suspend		Connect to Magnetics Module MDI3+/-	MDI[2]+/- B1_DC+/-
GBE0_MDI3-	A2	I/O Analog	3.3V max Suspend		connect to magnetics module mb13+7-	MDI[3]+/- B1_DD+/-
GBE0_ACT#	B2	OD CMOS	3.3V Suspend/3.3V		Connect to LED and <b>recommend</b> current limit resistor 150 $\Omega$ to 3.3VSB	Gigabit Ethernet Controller 0 activity indicator, active low.
GBE0_LINK#	A8	OD CMOS	3.3V Suspend/3.3V		NC	Gigabit Ethernet Controller 0 link indicator, active low.
GBE0_LINK100#	A4	OD CMOS	3.3V Suspend/3.3V			Gigabit Ethernet Controller 0 100 Mbit / sec link indicator, active low.
GBE0_LINK1000#	A5	OD CMOS	3.3V Suspend/3.3V		Connect to LED and recommend current limit resistor 150.0 to 3.3VSB	Gigabit Ethernet Controller 0 1000 Mbit / sec link indicator, active low.

SATA Signals Descr	ptions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
SATA4_TX+	A16	O SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATAO Conn TX pin	Serial ATA or SAS Channel 0 transmit differential pair.
SATA4_TX-	A17	O SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATAO Conn TX pin	
SATA4_RX+	A19	I SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATAO Conn RX pin	Serial ATA or SAS Channel 0 receive differential pair.
SATA4_RX-	A20	I SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATAO Conn KA pin	
SATA5_TX+	B16	O SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA1 Conn TX pin	Serial ATA or SAS Channel 1 transmit differential pair.
SATA5_TX-	B17	O SATA	AC coupled on Module	AC Coupling capacitor	connect to SATAT conn TA pin	
SATA5_RX+	B19	I SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA1 Conn RX pin	Serial ATA or SAS Channel 1 receive differential pair.
SATA5_RX-	B20	I SATA	AC coupled on Module	AC Coupling capacitor	connect to SATAT conn tx pin	
SATA0_TX+	A22	O SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA2 Conn TX pin	Serial ATA or SAS Channel 2 transmit differential pair.
SATA0_TX-	A23	O SATA	AC coupled on Module	AC Coupling capacitor	connect to SATAZ conn TX pin	
SATA0_RX+	A25	I SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA2 Conn RX pin	Serial ATA or SAS Channel 2 receive differential pair.
SATA0_RX-	A26	I SATA	AC coupled on Module	AC Coupling capacitor	connect to SATAZ conn tx pin	
SATA2_TX+	B22	O SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA3 Conn TX pin	Serial ATA or SAS Channel 3 transmit differential pair.
SATA2_TX-	B23	O SATA	AC coupled on Module	AC Coupling capacitor	connect to SATAS conn TX pin	
SATA2_RX+	B25	I SATA	AC coupled on Module	AC Coupling capacitor	Our of the CATAO Our DV site	
SATA2_RX-	B26	I SATA	AC coupled on Module	AC Coupling capacitor	Connect to SATA3 Conn RX pin	Serial ATA or SAS Channel 3 receive differential pair.
ATA_ACT#	A28	I/O CMOS	3.3V / 3.3V	PU 10K to 3.3V	Connect to LED and <b>recommend</b> current limit resistor $220\Omega$ to $3.3V$	ATA (parallel and serial) or SAS activity indicator, active low.

PCI Express Lanes Signal	s Description	าร				
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
PCIE_TX0+	A68	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 0
PCIE_TX0-	A69	OFCIL	AC coupled on would	AC Coupling capacitor		
PCIE_RX0+	B68	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 0
PCIE_RX0-	B69	TTOLE	no coupica on module		Slot - Connect to PCIE Conn pin	
PCIE_TX1+	A64	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 1
PCIE_TX1-	A65	OTOLE	no coupied on module	AC Coupling capacitor		
PCIE_RX1+	B64	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 1
PCIE_RX1-	B65		no ocupica en modulo		Slot - Connect to PCIE Conn pin	
PCIE_TX2+	A61	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 2
PCIE_TX2-	A62	0.012	no ocupica en modale	AC Coupling capacitor		
PCIE_RX2+	B61	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 2
PCIE_RX2-	B62				Slot - Connect to PCIE Conn pin	
PCIE_TX3+	A58	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 3
PCIE_TX3-	A59			AC Coupling capacitor		
PCIE_RX3+	B58	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 3
PCIE_RX3-	B59	-			Slot - Connect to PCIE Conn pin	· · · · · · · · · · · · · · · · · · ·
PCIE_TX4+	A55	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 4
PCIE_TX4-	A56			AC Coupling capacitor		· · · · · · · · · · · · · · · · · · ·
PCIE_RX4+	B55	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 4
PCIE_RX4-	B56				Slot - Connect to PCIE Conn pin	
PCIE_TX5+	A52	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 5
PCIE_TX5-	A53			AC Coupling capacitor		
PCIE_RX5+	B52	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 5
PCIE_RX5-	B53				Slot - Connect to PCIE Conn pin	
PCIE_TX6+	D19	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Differential Transmit Pairs 6
PCIE_TX6-	D20			AC Coupling capacitor	Device Connect AC Courling con 0.1.5	
PCIE_RX6+	C19 C20	I PCIE	AC coupled off Module		Device - Connect AC Coupling cap 0.1uF	PCI Express Differential Receive Pairs 6
PCIE_RX6-	D22			NIA	Slot - Connect to PCIE Conn pin	DOL Europea Differential Transmit Daire 7
PCIE_TX7+		O PCIE	AC coupled on Module	NA	NA	PCI Express Differential Transmit Pairs 7
PCIE_TX7-	D23			NA		(Optional with on board LAN, Default setting as NC)
PCIE_RX7+	C22 C23	I PCIE	AC coupled off Module	NA	NA	PCI Express Differential Receive Pairs 7
PCIE_RX7-				NA		(Optional with on board LAN, Default setting as NC)
PCIE0_CK_REF+	A88 A89	O PCIE	PCIE		Connect to PCIE device, PCIe CLK Buffer or slot	Reference clock output for all PCI Express and PCI Express Graphics
PCIE0_CK_REF-	A87					lanes.

PEG Signals Descriptions						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
PEG_TX0+	D52	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 0
PEG_TX0-	D53	OFCIL	AC coupled on wodule	AC Coupling capacitor	Connect to FCTE device of slot	
PEG_RX0+	C52	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 0
PEG_RX0-	C53	TTOLE	no coupied on module		Connect no coupling cup 0.22ui	
PEG_TX1+	D55	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 1
PEG_TX1-	D56	OTOLE	no coupied on module	AC Coupling capacitor		
PEG_RX1+	C55	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 1
PEG_RX1-	C56					· · · · · · · · · · · · · · · · · · ·
PEG_TX2+	D58	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 2
PEG_TX2-	D59			AC Coupling capacitor		
PEG_RX2+	C58	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 2
PEG_RX2-	C59					· · · · · · · · · · · · · · · · · · ·
PEG_TX3+	D61	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 3
PEG_TX3-	D62	0.012	no coupica en modulo	AC Coupling capacitor		
PEG_RX3+	C61	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 3
PEG_RX3-	C62		no coupied en medule		sonnost no souphing sup sizzai	
PEG_TX4+	D65	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 4
PEG_TX4-	D66	0.012	no coupica en modulo	AC Coupling capacitor		
PEG_RX4+	C65	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 4
PEG_RX4-	C66		no coupied en module		connective coupling out official	
PEG_TX5+	D68	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 5
PEG_TX5-	D69	0 1 0.L	no coupled on module	AC Coupling capacitor		
PEG_RX5+	C68	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 5
PEG_RX5-	C69		no soupied on module			

PEG Signals Descrip	otions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
PEG_TX6+	D71	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 6
PEG_TX6-	D72	OFCIL	AC COUPIED ON MODULE	AC Coupling capacitor	Connect to FCTE device of slot	For Express Graphics transmit differential pairs o
PEG_RX6+	C71	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 6
PEG_RX6-	C72	TFUL	AC COUPIED ON MODULE		connect Ac coupling cap 0.220	Fer Express Graphics receive differential pairs o
PEG_TX7+	D74	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 7
PEG_TX7-	D75	OTOL	Ac coupled on module	AC Coupling capacitor	connect to relie device or slot	
PEG_RX7+	C74	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 7
PEG_RX7-	C75	TTOL	Ac coupled on module		connect Ac coupling cap 0.220	Tor Express Graphics receive unterential pairs 7
PEG_TX8+	D78	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 8
PEG_TX8-	D79	OTOL	no coupied on module	AC Coupling capacitor		
PEG_RX8+	C78	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 8
PEG_RX8-	C79	TTOLE	no coupied on module			
PEG_TX9+	D81	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 9
PEG_TX9-	D82	OTOLE	no coupied on module	AC Coupling capacitor		
PEG_RX9+	C81	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 9
PEG_RX9-	C82	11012	no coupied en medulo			
PEG_TX10+	D85	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 10
PEG_TX10-	D86	0.012	no ocupica on modalo	AC Coupling capacitor		
PEG_RX10+	C85	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 10
PEG_RX10-	C86		no ocupica on modulo		Some Seaping sap Sizzai	
PEG_TX11+	D88	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 11
PEG_TX11-	D89			AC Coupling capacitor		
PEG_RX11+	C88	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 11
PEG_RX11-	C89					
PEG_TX12+	D91	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 12
PEG_TX12-	D92			AC Coupling capacitor		
PEG_RX12+	C91	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 12
PEG_RX12-	C92					
PEG_TX13+	D94	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 13
PEG_TX13-	D95			AC Coupling capacitor		
PEG_RX13+	C94	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 13
PEG_RX13-	C95					· · · · · · · · · · · · · · · · ·
PEG_TX14+	D98	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 14
PEG_TX14-	D99			AC Coupling capacitor		r r r r r r r r r r r r r r r r r r r
PEG_RX14+	C98	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 14
PEG_RX14-	C99					· · · · · · · · · · · · · · · · · · ·
PEG_TX15+	D101	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect to PCIE device or slot	PCI Express Graphics transmit differential pairs 15
PEG_TX15-	D102			AC Coupling capacitor		
PEG_RX15+	C101	I PCIE	AC coupled off Module		Connect AC Coupling cap 0.22uF	PCI Express Graphics receive differential pairs 15
PEG_RX15-	C102					
PEG_LANE_RV#	D54	I CMOS	3.3V / 3.3V			PCI Express Graphics lane reversal input strap. Pull low on the Carrier board to reverse lane order.

ExpressCard Signals	ExpressCard Signals Descriptions											
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description						
EXCD0_CPPE#	A49	I CMOS	3.3V /3.3V			PCI ExpressCard: PCI Express capable card request, active low, one per						
EXCD1_CPPE#	B48	I CIVIOS	3.3873.38			card						
EXCD0_PERST#	A48	O CMOS	3.3V /3.3V			PCI ExpressCard: reset, active low, one per card						
EXCD1_PERST#	B47	U CIVIUS	3.38/3.38			PCT Expressed u. Teset, active low, one per card						

<b>DDI Signals Descriptions</b>						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
DDI1_PAIR0+/SDVO1_RED+	D26	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 1 Pair 0 differential pairs/Serial Digital Video B red output differential pair
DDI1_PAIR0-/SDVO1_RED-	D27	OFCIL	AC COUPIED OIT MODULE		Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR1+/SDVO1_GRN+	D29	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 1 Pair 1 differential pairs/Serial Digital Video B green output differential pair
DDI1_PAIR1-/SDVO1_GRN-	D30	OTOLE	no coupica on module		Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR2+/SDVO1_BLU+	D32	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 1 Pair 2 differential pairs/Serial Digital Video B blue output differential pair
DDI1_PAIR2-/SDVO1_BLU-	D33	OTOLE	no coupica on module		Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR3+/SDVO1_CK+	D36	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 1 Pair 3 differential pairs/Serial Digital Video B clock output differential pair.
DDI1_PAIR3-/SDVO1_CK-	D37	OTOLE	no coupica on module		Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR4+/SDVO1_INT+	C25	I PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	Serial Digital Video B interrupt input differential pair.
DDI1_PAIR4-/SDVO1_INT-	C26				Connect AC Coupling Capacitors 0.1uF to Device	···· 2
DDI1_PAIR5+/SDVO1_TVCLKIN+	C29	I PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	Serial Digital Video TVOUT synchronization clock input differential pair.
DDI1_PAIR5-/SDVO1_TVCLKIN-	C30	TTOL	Ac coupled on woodale		Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR6+/SDVO1_FLDSTALL+	C15				Connect AC Coupling Capacitors 0.1uF to Device	
DDI1_PAIR6-/SDVO1_FLDSTALL-	C16	I PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	Serial Digital Video Field Stall input differential pair.
		I/O PCIE	AC coupled on Module	PD 49.9K to GND (S/W IC between Rpu/PCH)	Connect to DP AUX+	DP AUX+ function if DDI1_DDC_AUX_SEL is no connect
DDI1_CTRLCLK_AUX+/SDVO1_CTRLC	LK D15	I/O OD CMOS	3.3V / 3.3V	PU 2.2K to 3.3V, PD 49.9K to GND (S/W IC between Rpu/Rpd resistor)	Connect to HDMI/DVI 12C CTRLCLK	HDMI/DVI I2C CTRLCLK if DDI1_DDC_AUX_SEL is pulled high
DDI1 CTRLCLK AUX-		I/O PCIE	AC coupled on Module	PU 100K to 3.3V (S/W IC between Rpu/PCH)	Connect to DP AUX-	DP AUX- function if DDI1_DDC_AUX_SEL is no connect
/SDV01_CTRLDATA	D16	I/O OD CMOS	3.3V / 3.3V	PU 2.2K to 3.3V/PU 100K to 3.3V (S/W IC between 2.2K/100K resistor)	Connect to HDMI/DVI 12C CTRLDATA	HDMI/DVI I2C CTRLDATA if DDI1_DDC_AUX_SEL is pulled high
DDI1_HPD	C24	I CMOS	3.3V / 3.3V		PD 1M and Connect to device Hot Plug Detect	DDI Hot-Plug Detect
DDI1_DDC_AUX_SEL	D34	I CMOS	3.3V / 3.3V	PD 1M TO GND	PU 100K to 3.3V for DDC(HDMI/DVI)	Selects the function of DDI1_CTRLCLK_AUX+ and DDI1_CTRLDATA_AUX
DDI2 PAIR0+	D39				Connect AC Coupling Capacitors 0.1uF to Device	
DDI2 PAIRO-	D40	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 2 Pair 0 differential pairs
DDI2_PAIR1+	D42				Connect AC Coupling Capacitors 0.1uF to Device	
DDI2 PAIR1-	D43	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 2 Pair 1 differential pairs
DDI2_PAIR2+	D46				Connect AC Coupling Capacitors 0.1uF to Device	
DDI2 PAIR2-	D47	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 2 Pair 2 differential pairs
DDI2_PAIR3+	D49				Connect AC Coupling Capacitors 0.1uF to Device	
DDI2 PAIR3-	D50	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 2 Pair 3 differential pairs
	500	I/O PCIE	AC coupled on Module	PD 49.9K to GND (S/W IC between Rpu/PCH)	Connect to DP AUX+	DP AUX+ function if DDI2_DDC_AUX_SEL is no connect
DDI2_CTRLCLK_AUX+	C32	I/O OD CMOS	3.3V / 3.3V	PU 2.2K to 3.3V, PD 49.9K to GND (S/W IC between Rpu/Rpd	Connect to HDMI/DVI I2C CTRLCLK	HDMI/DVI I2C CTRLCLK if DDI2_DDC_AUX_SEL is pulled high
		I/O PCIE	AC coupled on Module	PU 100K to 3.3V (S/W IC between Rpu/PCH)	Connect to DP AUX-	DP AUX- function if DDI2_DDC_AUX_SEL is no connect
DDI2_CTRLCLK_AUX-	C33	I/O OD CMOS	3.3V / 3.3V	PU 2.2K to 3.3V/PU 100K to 3.3V (S/W IC between 2.2K/100K resistor)	Connect to HDMI/DVI 12C CTRLDATA	HDMI/DVI 12C CTRLDATA if DD12_DDC_AUX_SEL is pulled high
DDI2_HPD	D44	I CMOS	3.3V / 3.3V		PD 1M and Connect to device Hot Plug Detect	DDI Hot-Plug Detect
DDI2_DDC_AUX_SEL	C34	I CMOS	3.3V / 3.3V	PD 1M TO GND	PU 100K to 3.3V for DDC(HDMI/DVI)	Selects the function of DDI2_CTRLCLK_AUX+ and DDI2_CTRLDATA_AUX
DDI3_PAIR0+	C39	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	- DDI 3 Pair 0 differential pairs
DDI3_PAIR0-	C40	UPUE	AC COUPIEU OIT MODUle		Connect AC Coupling Capacitors 0.1uF to Device	
DDI3_PAIR1+	C42	O PCIE	AC coupled off Modula		Connect AC Coupling Capacitors 0.1uF to Device	DDL 2 Dair 1 differential pairs
DDI3_PAIR1-	C43	UPUE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 3 Pair 1 differential pairs
DDI3_PAIR2+	C46	O PCIE	AC coupled off Medule		Connect AC Coupling Capacitors 0.1uF to Device	DDL 2 Dair 2 differential pairs
DDI3_PAIR2-	C47	U PUIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 3 Pair 2 differential pairs
DDI3_PAIR3+	C49	O PCIE	AC coupled off Module		Connect AC Coupling Capacitors 0.1uF to Device	DDI 3 Pair 3 differential pairs
DDI3_PAIR3-	C50	UFUE	AC COUPIER OIL MODULE		Connect AC Coupling Capacitors 0.1uF to Device	

<b>DDI Signals Description</b>	ns					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
		I/O PCIE	AC coupled on Module	PD 49.9K to GND (S/W IC between Rpu/PCH)	Connect to DP AUX+	DP AUX+ function if DDI3_DDC_AUX_SEL is no connect
DDI3_CTRLCLK_AUX+	C36	I/O OD CMOS	3.3V / 3.3V	PU 2.2K to 3.3V, PD 49.9K to GND (S/W IC between Rpu/Rpd	Connect to HDMI/DVI I2C CTRLCLK	HDMI/DVI I2C CTRLCLK if DDI3_DDC_AUX_SEL is pulled high
				PU 100K to 3.3V (S/W IC between Rpu/PCH)	Connect to DP AUX-	DP AUX- function if DDI3_DDC_AUX_SEL is no connect
DDI3_CTRLCLK_AUX-	C37	I/O OD CMOS		PU 2.2K to 3.3V/PU 100K to 3.3V (S/W IC between 2.2K/100K resistor)	Connect to HDMI/DVI I2C CTRLDATA	HDMI/DVI I2C CTRLDATA if DDI3_DDC_AUX_SEL is pulled high
DDI3_HPD	C44	I CMOS	3.3V / 3.3V	NC	PD 1M and Connect to device Hot Plug Detect	DDI Hot-Plug Detect
DDI3_DDC_AUX_SEL	C38	I CMOS	3.3V / 3.3V	PD 1M TO GND	PU 100K to 3.3V for DDC(HDMI/DVI)	Selects the function of DDI3_CTRLCLK_AUX+ and DDI3_CTRLDATA_AUX

USB Signals Descri	ptions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
USB0+	A46		2 214 6		Connect 90 @ @100MHz Common Choke in series	
USB0-	A45	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 0
USB1+	B46		0.01/ 0.000		Connect 90 @ 100MHz Common Choke in series	LICD - USC
USB1-	B45	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 1
USB2+	A43				Connect 90 @ 100MHz Common Choke in series	
USB2-	A42	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 2
USB3+	B43				Connect 90 @ 100MHz Common Choke in series	
USB3-	B42	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 3
USB4+	A40				Connect 90 @ 100MHz Common Choke in series	
USB4-	A39	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 4
USB5+	B40				Connect 90 @ 100MHz Common Choke in series	
USB5-	B39	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 5
USB6+	A37				Connect 90 Q @100MHz Common Choke in series	
USB6-	A36	I/O USB	3.3V Suspend/3.3V		and ESD suppressors to GND to USB connector	USB differential pairs 6
USB7+	B37					
		I/O USB	3.3V Suspend/3.3V		Connect 90 @ @100MHz Common Choke in series	USB differential pairs 7, USB7 may be configured as a USB client or as a host, or both, at the
USB7-	B36				and ESD suppressors to GND to USB connector	Module designer's discretion. (HM961-QM87/HM86 default set as a host)
						USB over-current sense, USB channels 0 and 1. A pull-up for this line
			3.3V Suspend/3.3V			shall be present on the Module. An open drain driver from a USB
USB_0_1_OC#	B44	I CMOS		PU 10K TO 3V3_DU	Connect to Overcurrent of USB Power Switch	current monitor on the Carrier Board may drive this line low. Do not
						pull this line high on the Carrier Board.
						USB over-current sense, USB channels 2 and 3. A pull-up for this line
				PLL 10K TO 2V2 DLL Connect to Overcurrent of LISP Rever Switch		shall be present on the Module. An open drain driver from a USB
USB_2_3_OC#	A44	T CMOS	CMOS 3.3V Suspend/3.3V		current monitor on the Carrier Board may drive this line low. Do not	
						pull this line high on the Carrier Board.
						USB over-current sense, USB channels 4 and 5. A pull-up for this line
	820	LCNOS	2 214 Cumment (2 2)4		Compare to Overseyment of UCD Deves Switch	shall be present on the Module. An open drain driver from a USB
USB_4_5_OC#	B38	I CMOS	3.3V Suspend/3.3V	PU 10K TO 3V3_DU	DU Connect to Overcurrent of USB Power Switch	current monitor on the Carrier Board may drive this line low. Do not
						pull this line high on the Carrier Board.
						USB over-current sense, USB channels 6 and 7. A pull-up for this line
1100 ( 7 00 //	4.20	1 01100	2 214 6			shall be present on the Module. An open drain driver from a USB
USB_6_7_OC#	A38	I CMOS	3.3V Suspend/3.3V	PU 10K TO 3V3_DU	Connect to Overcurrent of USB Power Switch	current monitor on the Carrier Board may drive this line low. Do not
						pull this line high on the Carrier Board.
USB_SSTX0+	D4	0.0015		AC Coupling capacitor	Connect 90 @ 100MHz Common Choke in series	
USB_SSTX0-	D3	O PCIE	AC coupled on Module	AC Coupling capacitor	and ESD suppressors to GND to USB connector	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB SSRX0+	C4	1.0015			Connect 90 @ 100MHz Common Choke in series	
USB_SSRX0-	C3	I PCIE	AC coupled off Modul		and ESD suppressors to GND to USB connector	Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSTX1+	D7			AC Coupling capacitor	Connect 90 @ 200MHz Common Choke in series	
USB_SSTX1-	D6	O PCIE	AC coupled on Module	AC Coupling capacitor	and ESD suppressors to GND to USB connector	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSRX1+	C7				Connect 90 Q @100MHz Common Choke in series	
USB_SSRX1-	C6	I PCIE	AC coupled off Modul		and ESD suppressors to GND to USB connector	Additional receive signal differential pairs for the SuperSpeed USB data path.
USB_SSTX2+	D10			AC Coupling capacitor	Connect 90 $\Omega$ @100MHz Common Choke in series	
USB_SSTX2-	D10	O PCIE	AC coupled on Module	AC Coupling capacitor	and ESD suppressors to GND to USB connector	Additional transmit signal differential pairs for the SuperSpeed USB data path.
030_33172-	D7			AC COUPIII y Capacitor	and Lob suppressors to GND to OSB connector	

USB Signals Descriptions	JSB Signals Descriptions								
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description			
USB_SSRX2+	C10	I PCIE	AC coupled off Modul		Connect 90 @ @ 100 MHz Common Choke in series	Additional receive signal differential pairs for the SuperSpeed USB data path.			
USB_SSRX2-	C9	IFUL	AC COUPIEU ON MOUUI		and ESD suppressors to GND to USB connector	Adultional receive signal unreferitial pairs for the superspeed osb data path.			
USB_SSTX3+	D13	O PCIE	AC coupled on Module	AC Coupling capacitor	Connect 90 Q @100MHz Common Choke in series	Additional transmit signal differential pairs for the SuperSpeed USB data path.			
USB_SSTX3-	D12	OFCIL	AC COUPIEU ON MOUUIE	AC Coupling capacitor	and ESD suppressors to GND to USB connector	Additional transmit signal differential pairs for the superspeed osb data path.			
USB_SSRX3+	C13	I PCIE	AC coupled off Modul		Connect 90 Q @100MHz Common Choke in series	Additional receive signal differential pairs for the SuperSpeed USB data path.			
USB_SSRX3-	C12	TFUL	AC COUPIEU ON MOUUI		and ESD suppressors to GND to USB connector	Additional receive signal differential pairs for the superspeed osb data path.			

LVDS Signals Descri	ptions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
LVDS_A0+	A71	O LVDS	LVDS		Connect to LVDS connector	
LVDS_A0-	A72	U LVDS	LVDS			
LVDS_A1+	A73	O LVDS	LVDS		Connect to LVDS connector	
LVDS_A1-	A74	O LVD3	LVD3			LVDS Channel A differential pairs
LVDS_A2+	A75	O LVDS	LVDS		Connect to LVDS connector	
LVDS_A2-	A76	O LVD3	LVD3			
LVDS_A3+	A78	O LVDS	LVDS		Connect to LVDS connector	
LVDS_A3-	A79	O LVD3	LVDJ			
LVDS_A_CK+	A81	O LVDS	LVDS		Connect to LVDS connector	LVDS Channel A differential clock
LVDS_A_CK-	A82	O LVD3	LVDJ			
LVDS_B0+	B71	O LVDS	LVDS		Connect to LVDS connector	
LVDS_B0-	B72	0 2005	2005			
LVDS_B1+	B73	O LVDS	LVDS		Connect to LVDS connector	
LVDS_B1-	B74	O LVD3	LVDJ			
LVDS_B2+	B75	O LVDS	LVDS		Connect to LVDS connector	EVDS Granner D unrerentiar pairs
LVDS_B2-	B76	O LVD3	LVDJ			
LVDS_B3+	B77	O LVDS	LVDS		Connect to LVDS connector	
LVDS_B3-	B78	O LVD3	LVDJ			
LVDS_B_CK+	B81	O LVDS	LVDS		Connect to LVDS connector	LVDS Channel B differential clock
LVDS_B_CK-	B82	O LVD3				
LVDS_VDD_EN	A77	O CMOS	3.3V / 3.3V		Connect to enable control of LVDS panel power	LVDS panel power enable
LVDS_BKLT_EN	B79	O CMOS	3.3V / 3.3V		Connect to enable control of LVDS panel backlight	LVDS panel backlight enable
LVDS_BKLT_CTRL	B83	O CMOS	3.3V / 3.3V		Connect to brightness control of LVDS panel backlig	pht LVDS panel backlight brightness control
LVDS_I2C_CK	A83		DS 3.3V / 3.3V	PU 4.7K TO 3V3	Connect to DDC clock of LVDS panel	I2C clock output for LVDS display use
LVDS_I2C_DAT	A84	I/O OD CM	DS 3.3V / 3.3V	PU 4.7K TO 3V3	Connect to DDC data of LVDS panel	I2C data line for LVDS display use

LPC Signals Descriptions								
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description		
LPC_AD0	B4							
LPC_AD1	B5	I/O CMOS	3.3V / 3.3V			LPC multiplexed address, command and data bus		
LPC_AD2	B6	1/0 CIVIOS	3.30 / 3.30		-			
LPC_AD3	B7							
LPC_FRAME#	B3	O CMOS	3.3V / 3.3V		Connect to LPC device	LPC frame indicates the start of an LPC cycle		
LPC_DRQ0#	B8	I CMOS	3.3V / 3.3V			LPC serial DMA request		
LPC_DRQ1#	B9	I CIVIOS	3.3V / 3.3V			LPC Serial Divia request		
LPC_SERIRQ	A50	I/O CMOS	3.3V / 3.3V	PU 8.2K TO 3V3		LPC serial interrupt		
LPC_CLK	B10	O CMOS	3.3V / 3.3V			LPC clock output - 33MHz nominal		

SPI Signals Descri	otions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
SPI_CS#	B97	O CMOS	3.3V Suspend/3.3V		Connect a series resistor 3 SPI Device CS# pin	3Ω to Carrier Board Chip select for Carrier Board SPI - may be sourced from chipset SPI0 or SPI1
SPI_MISO	A92	I CMOS	3.3V Suspend/3.3V		Connect a series resistor 3	3Ω to Carrier Board Data in to Module from Carrier SPI
SPI_MOSI	A95	O CMOS	3.3V Suspend/3.3V		Connect a series resistor 3	3Ω to Carrier Board Data out from Module to Carrier SPI
SPI_CLK	A94	O CMOS	3.3V Suspend/3.3V		Connect a series resistor 3	3Ω to Carrier Board Clock from Module to Carrier SPI
SPI_POWER	A91	0	3.3V Suspend/3.3V			Power supply for Carrier Board SPI – sourced from Module – nominally 3.3V. The Module shall provide a minimum of 100mA on SPI_POWER. Carriers shall use less than 100mA of SPI_POWER. SPI_POWER shall only be used to power SPI devices on the Carrier
BIOS_DIS0#	A34					
BIOS_DIS1#	B88	I CMOS	NA			Selection straps to determine the BIOS boot device. The Carrier should only float these or pull them low, please refer to COM Express Module Base Specification Revision 2.1 for strapping options of BIOS disable signals.

VGA Signals Descriptions						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
VGA_RED	B89	O Analog	Analog	PD 150 TO GND	PD 150R, connect to VGA connector with EMI	Red for monitor. Analog output
VGA_GRN	B91	O Analog	Analog	PD 150 TO GND	PD 150R, connect to VGA connector with EMI	Green for monitor. Analog output
VGA_BLU	B92	O Analog	Analog	PD 150 TO GND	PD 150R, connect to VGA connector with EMI	Blue for monitor. Analog output
VGA_HSYNC	B93	O CMOS	3.3V / 3.3V		Connect to VGA connector with a3.3V Buffer	Horizontal sync output to VGA monitor
VGA_VSYNC	B94	O CMOS	3.3V / 3.3V		Connect to VGA connector with a 33V Buffer	Vertical sync output to VGA monitor
VGA_I2C_CK	B95	I/O OD CMOS	3.3V / 3.3V	PU 2.2K TO 3V3	Connect to VGA connector with a 3.3V to 5V	DDC clock line (I2C port dedicated to identify VGA monitor capabilities)
VGA_I2C_DAT	B96	I/O OD CMOS	3.3V / 3.3V	PU 2.2K TO 3V3	Connect to VGA connector with a 3.3V to 5V	DDC data line.

Serial Interface Signals Descriptions									
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description			
SER0_TX	A98	O CMOS	3.3V/5V		PD 4.7K TO GND	General purpose serial port 0 transmitter			
SER0_RX	A99	I CMOS	3.3V/5V	PU 47K TO 3V3		General purpose serial port 0 receiver			
SER1_TX	A101	O CMOS	3.3V/5V		PD 4.7K TO GND	General purpose serial port 1 transmitter			
SER1_RX	A102	I CMOS	3.3V/5V	PU 47K TO 3V3		General purpose serial port 1 receiver			

Miscellaneous Sig	nal Descriptions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
12C_CK	B33	I/O OD CMOS	3.3V Suspend/3.3V	PU 2.2K TO 3V3_DU_EC		General purpose I2C port clock output
I2C_DAT	B34	I/O OD CMOS	3.3V Suspend/3.3V	PU 2.2K TO 3V3_DU_EC		General purpose I2C port data I/O line
						Output for audio enunciator - the "speaker" in PC-AT systems.
SPKR	B32	O CMOS	3.3V / 3.3V			This port provides the PC beep signal and is mostly intended for
						debugging purposes.
WDT	B27	O CMOS	3.3V / 3.3V			Output indicating that a watchdog time-out event has occurred.
FAN_PWNOUT	B101	O OD CMOS	3.3V / 12V			Fan speed control. Uses the Pulse Width Modulation (PWM) technique to control the fan's RPM.
FAN_TACHIN	B102	I OD CMOS	3.3V / 12V	PU 10K TO 3V3		Fan tachometer input for a fan with a two pulse output.
						Trusted Platform Module (TPM) Physical Presence pin. Active high.
TPM_PP	A96	I CMOS	3.3V / 3.3V	PU 10K TO GND		TPM chip has an internal pull down. This signal is used to indicate
						Physical Presence to the TPM.

Power and System	n Management Sig	nals Descript	ions			
ignal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
PWRBTN#	B12	I CMOS	3.3V Suspend/3.3V	PU 10K TO 3V3_DU_EC	PU 4.7K TO 3V3_SB	A falling edge creates a power button event. Power button events can be used to bring a system out of S5 soft off and other suspend states, as well as powering the system down.
SYS_RESET#	B49	I CMOS	3.3V Suspend/3.3V	PU 10K TO 3V3_DU	NC PU 4.7K TO 3V3_SB	Reset button input. Active low request for Module to reset and reboot. May be falling edge sensitive. For situations when SYS_RESET# is not able to reestablish control of the system, PWR_OK or a power cycle may be used.
CB_RESET#	B50	O CMOS	3.3V Suspend/3.3V			Reset output from Module to Carrier Board. Active low. Issued by Module chipset and may result from a low SYS_RESET# input, a low PWR_OK input, a VCC_12V power input that falls below the minimum specification, a watchdog timeout, or may be initiated by the Module software.
PWR_OK	B24	I CMOS	3.3V / 3.3V	PU 10K TO 3V3		Power OK from main power supply. A high value indicates that the power is good. This signal can be used to hold off Module startup to allow Carrier based FPGAs or other configurable devices time to be programmed.
SUS_STAT#	B18	O CMOS	3.3V Suspend/3.3V			Indicates imminent suspend operation; used to notify LPC devices.
SUS_S3#	A15	O CMOS	3.3V Suspend/3.3V			Indicates system is in Suspend to RAM state. Active low output. An inverted copy of SUS_S3# on the Carrier Board may be used to enable the non-standby power on a typical ATX supply.
SUS_S4#	A18	O CMOS	3.3V Suspend/3.3V			Indicates system is in Suspend to Disk state. Active low output.
SUS_S5#	A24	O CMOS	3.3V Suspend/3.3V			Indicates system is in Soft Off state.
NAKE0#	B66	I CMOS	3.3V Suspend/3.3V	PU 1K TO 3V3_DU		PCI Express wake up signal.
WAKE1#	B67	I CMOS	3.3V Suspend/3.3V	PU 10K TO 3V3_DU	NC PU 10 K TO 3V3_DU	General purpose wake up signal. May be used to implement wake-up on PS2 keyboard or mouse activity.
BATLOW#	A27	I CMOS	3.3V Suspend/ 3.3V	PU 8.2K TO 3V3_DU		Indicates that external battery is low. This port provides a battery-low signal to the Module for orderly transitioning to power saving or power cut-off ACPI modes.
_ID#	A103	I OD CMOS	3.3V Suspend/12V			LID switch. Low active signal used by the ACPI operating system for a LID switch.
SLEEP#	B103	I OD CMOS	3.3V Suspend/12V	PU 10K TO 3V3_DU		Sleep button. Low active signal used by the ACPI operating system to bring the system to sleep state or to wake it up again.
FHRM#	B35	I CMOS	3.3V / 3.3V	PU 10K TO 3V3		Input from off-Module temp sensor indicating an over-temp situation.
THRMTRIP#	A35	O CMOS	3.3V / 3.3V	PU 10K TO 3V3		Active low output indicating that the CPU has entered thermal shutdown.
SMB_CK	B13		S 3.3V Suspend/3.3V	PU 2.2K TO 3V3_DU_EC	NC PU 4.7K TO 3V3_DU	System Management Bus bidirectional clock line.
SMB_DAT	B14	I/O OD CMO	S 3.3V Suspend/3.3V	PU 2.2K TO 3V3_DU_EC	NC PU 4.7K TO 3V3_DU	System Management Bus bidirectional data line.
SMB_ALERT#	B15	I CMOS	3.3V Suspend/3.3V			System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system.

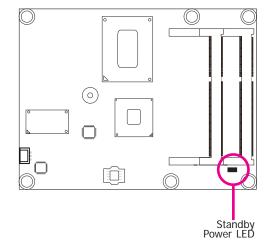
<b>GPIO Signals Descriptions</b>						
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
GPO0	A93					
GPO1	B54	O CMOS	3.3V / 3.3V			General purpose output pins.
GPO2	B57	0 01003	3.377 3.37			serieral purpose output pins.
GPO3	B63					
GPI0	A54			PU 47K TO 3V3		
GPI1	A63	I CMOS	3.3V / 3.3V	PU 47K TO 3V3		Concret nurness input nins
GPI2	A67		3.30/ 3.30	PU 47K TO 3V3		-General purpose input pins.
GPI3	A85			PU 47K TO 3V3		

Chapter 3	
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Power and GND Signal D	escriptions					
Signal	Pin#	Pin Type	Pwr Rail /Tolerance	HM961-QM87/HM86	Carrier Board	Description
VCC_12V	A104~A109 B104~B109 C104~C109 D104~D109	Power				Primary power input: +12V nominal. All available VCC_12V pins on the connector(s) shall be used.
VCC_5V_SBY	B84~B87	Power				Standby power input: +5.0V nominal. If VCC5_SBY is used, all available VCC_SV_SBY pins on the connector(s) shall be used. Only used for standby and suspend functions. May be left unconnected if these functions are not used in the system design.
VCC_RTC	A47	Power				Real-time clock circuit-power input. Nominally +3.0V.
GND	A1, A11, A21, A31, A41, A51, A57, A60, A66, A70, A80, A90, A100, A110, B1, B11, B21, B31, B41, B51, B60, B70, B80, B90, B100, B110, C1, C2, C5, C8, C11, C14, C21, C31, C41, C51, C60, C70, C73, C76, C80, C84, C87, C90, C93, C96, C100, C103, C110, D1, D2, DE D8, D11, D14, D21, D31, D51, D60, D67, D70, D73, D76, D80, D84, D87, D90, D93, D96, D100, D103, D110	Power				Ground - DC power and signal and AC signal return path. All available GND connector pins shall be used and tied to Carrier Board GND plane.

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## **Standby Power LED**



This LED will light when the system is in the standby mode.

## **Cooling Option**

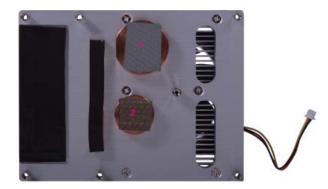
## Heat Spreader with Heat Sink and Fan



The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.



Top View of the Heat Sink



Bottom View of the Heat Sink

• "1" and "2" denote the locations of the thermal pads designed to contact the corresponding components that are on HM961-QM87/HM86.



#### Important:

Remove the plastic covering from the thermal pads prior to mounting the heat sink onto HM961-QM87/HM86.

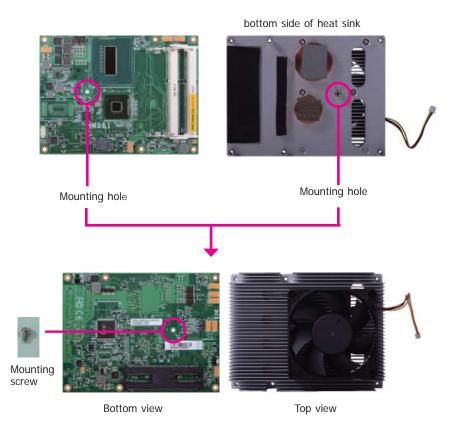
## Installing HM961-QM87/HM86 onto a Carrier Board



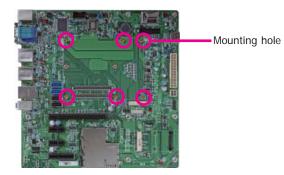
## Important:

The carrier board (COM331-B) used in this section is for reference purpose only and may not resemble your carrier board. These illustrations are mainly to guide you on how to install HM961-QM87/HM86 onto the carrier board of your choice.

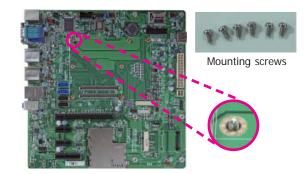
- To download COM331-B datasheet and manual
- 1. Use the provided screw to install the heatsink onto the module. First align the mounting hole of the heatsink with the mounting hole of the module and then from the bottom side of the module, secure them with the provided screw. The module and heatsink as sembly should look like the one shown below.



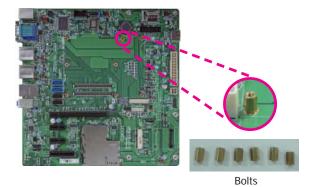
2. Now install the module and heatsink assembly onto the carrier board. The photo below shows the locations of the mounting holes on carrier board.



3. Insert the provided mounting screws into the mounting holes - from the bottom through the top of the carrier board.

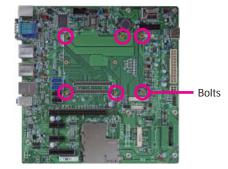


4. While supporting the mounting screw at the bottom, from the top side of the board, fasten a bolt into the screw.

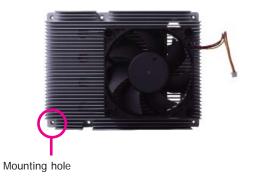


5. The photo below shows the solder side of the board with the screws already fixed in place.

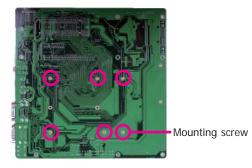
6. The photo below shows the component side of the board with the bolts already fixed in place.



 Position the heat sink on the top of HM961-QM87/HM86 with the heat sink's mounting holes aligned with HM961-QM87/HM86 mounting holes. Insert one of the provided long screws into the mounting hole shown in the photo below.





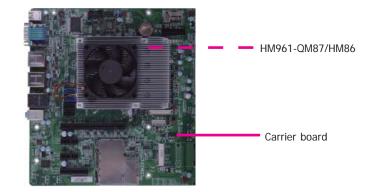


8. From the bottom of the board, fasten the provided bolt into the screw and then connect the heat spreader/heat spreader with heat sink and fan's cable to the fan connector on HM961-QM87/HM86.



Fan connector

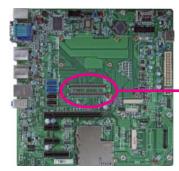
10. Press HM961-QM87/HM86 down firmly until it is completely seated on the COM Express connectors of the carrier board.



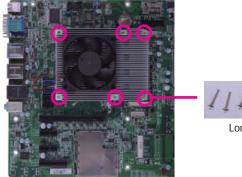
- 11. Use the provided mounting screws to secure HM961-QM87/HM86 with heat sink to the carrier board. The photo below shows the locations of the long/short mounting screws.
- 9. Grasping HM961-QM87/HM86 by its edges, position it on top of the carrier board with its mounting holes aligned with the bolts on the carrier board. This will also align the COM Express connectors of the two boards to each other.

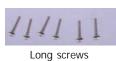


COM Express connectors on HM961-QM87/HM86



COM Express connectors on the carrier board





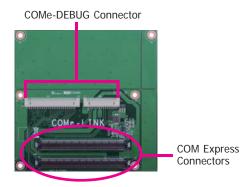
## Installing the COM Express Debug Card



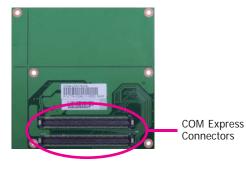
The system board used in the following illustrations may not resemble the actual board. These illustrations are for reference only.

1. COMe-LINK1 is the COM Express debug card designed for COM Express Basic modules to debug and display signals and codes of COM Express modules.

#### COMe-LINK1

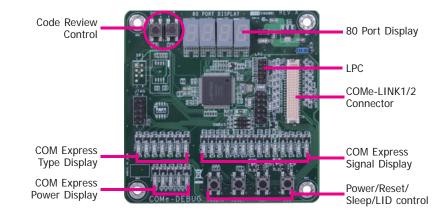


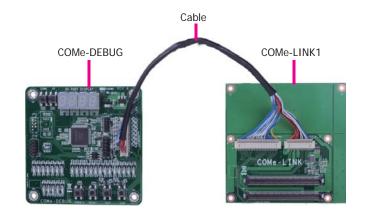
Top view



2. Connect the COMe-DEBUG card to COMe-LINK1 via a cable.

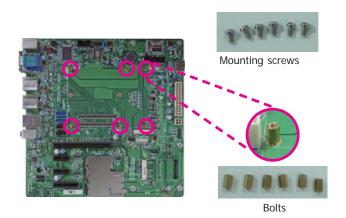
### **COMe-DEBUG**



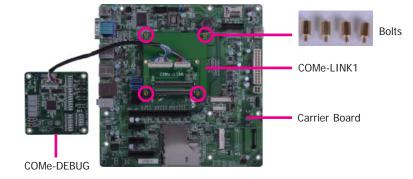


Bottom view

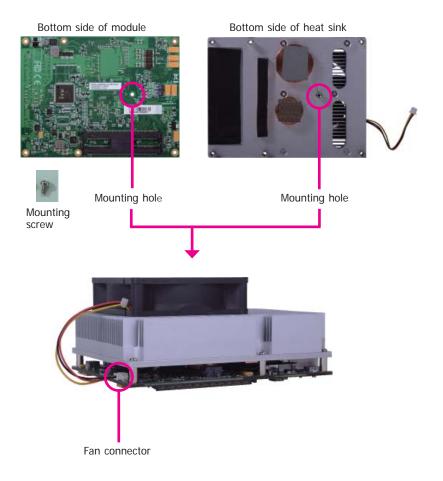
3. Fasten bolts with mounting screws through mounting holes to be fixed in place.



4. Use the provided bolts to fix the COMe-LINK1 debug card onto the carrier board.

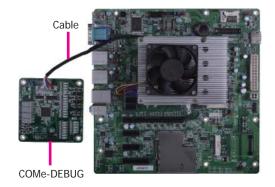


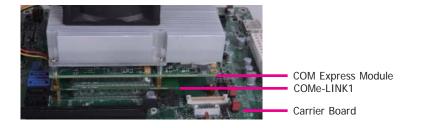
5. Align the mounting hole on the heat sink with the mounting hole on the module and secure the heat sink onto the module by a mounting screw from the bottom side of the module.



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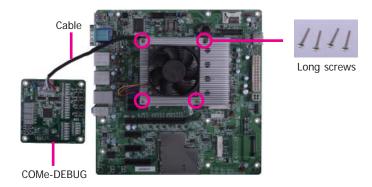
6. Grasp HM961-QM87/HM86 with the heat sink by its edges and position them down firmly on the top of the COMe-LINK1 debug card.





Side View of the Module, Debug Card and Carrier Board

7. Use the long mounting screws to secure them on the top of the COMe-LINK1 debug card and the carrier board. The photo below shows the locations of long mounting screws.



## Chapter 4 - BIOS Setup

## **Overview**

The BIOS is a program that takes care of the basic level of communication between the CPU and peripherals. It contains codes for various advanced features found in this system board. The BIOS allows you to configure the system and save the configuration in a battery-backed CMOS so that the data retains even when the power is off. In general, the information stored in the CMOS RAM of the EEPROM will stay unchanged unless a configuration change has been made such as a hard drive replaced or a device added.

It is possible that the CMOS battery will fail causing CMOS data loss. If this happens, you need to install a new CMOS battery and reconfigure the BIOS settings.



The BIOS is constantly updated to improve the performance of the system board; therefore the BIOS screens in this chapter may not appear the same as the actual one. These screens are for reference purpose only.

## **Default Configuration**

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

## **Entering the BIOS Setup Utility**

The BIOS Setup Utility can only be operated from the keyboard and all commands are keyboard commands. The commands are available at the right side of each setup screen.

The BIOS Setup Utility does not require an operating system to run. After you power up the system, the BIOS message appears on the screen and the memory count begins. After the memory test, the message "Press DEL to run setup" will appear on the screen. If the message disappears before you respond, restart the system or press the "Reset" button. You may also restart the system by pressing the <Ctrl> <Alt> and <Del> keys simultaneously.

### Legends

KEYs	Function
Right and Left Arrows	Moves the highlight left or right to select a menu.
Up and Down Arrows	Moves the highlight up or down between submenus or fields.
<esc></esc>	Exits to the BIOS setup utility
+ (plus key)	Scrolls forward through the values or options of the hightlighted field.
- (minus key)	Scolls backward through the values or options of the hightlighted field.
<f1></f1>	Displays general help
<f2></f2>	Displays previous values
<f3></f3>	Optimized defaults
<f4></f4>	Saves and reset the setup program.
<enter></enter>	Press <enter> to enter the highlighted submenu</enter>

### **Scroll Bar**

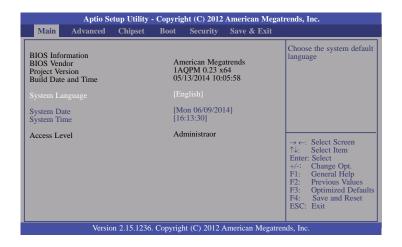
When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

### **Submenu**

When " $\blacktriangleright$ " appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

# AMI BIOS Setup Utility Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



#### System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1980 to 2099.

#### System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

## **Advanced**

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.						
Main <mark>A</mark>	dvanced	Chipset	Boot	Security	Save &	Exit
ACPI Settir     PC Health S     PC Health S     PC Health S     SATA Confi     Intel(R) Rai     AMT Confi     USB Config     PCH-FWC     Network St     WatchDog (     Intel(R) Eth	Status guration iguration pid Start Te- guration guration onfiguration ack Configuration	n on	ion i217-	LM - 88:88:	38:	System ACPI Parameters. → ←: Select Screen ↑4: Select Item Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.						

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### **ACPI Settings**

This section is used to configure the ACPI settings.

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.			
Advanced			
ACPI Settings ACPI Sleep State Resume by PME Resume by RTC Alarm	[S3 only (Suspend to] [Disabled] [Disabled]	Select ACPI sleep state the system will enter when the SUSPEND button is pressed.	
		→ $\leftarrow$ : Select Screen $\uparrow$ ↓: Select Item Enter: Select +/·: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit	
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.			

#### **ACPI Sleep State**

Select the highest ACPI sleep state that the system will enter when the Suspend button is pressed.

**S3(STR)** Enable the Suspend to RAM function.

### Resume by PME

Enable this field to use the PME signal to wake up the system (via PCI, PCIE and onboard LAN).

### Resume by RTC Alarm

When Enabled, the system uses the RTC alarm to generate a wakeup event.

#### **PC Health Status**

This section displays the hardware health monitor.

Aptio Setup Utility Advanced	- Copyright (C) 2012 American	Megatrends, Inc.	
System Hardware Monitor EC Version CPU Smart Fan CPU Temperature CPU Temperature CPU Temperature CPU Temperature OUT Temperature DDR 1V05	2014.03.04 v1.2 [Enabled] : +30 C : 3878 RPM : +1.730 V : +1.346 V : +1.049 V	Enable/ Disable CPU SmartFan	
		→ $\leftarrow$ : Select Screen $\uparrow \downarrow$ : Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit	
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.			

#### **CPU Smart Fan**

Enable or disable the CPU smart fan.

#### **CPU Configuration**

This section is used to configure the CPU. It will also display the detection of CPU information.

Aptio Setup Utility - Copyrig Advanced	ht (C) 2012 American Megati	rends, Inc.
CPU Configuration Intel(R) Core(TM) i3-4102E CPU @ 1.60GHz CPU Signature Microcode Patch Max CPU Speed OPU Speed Processor Cores Intel HT Technology Intel SMX Technology Intel SMX Technology G4-bit EIST Technology CPU C3 State CPU C6 State CPU C6 State CPU C7 State L1 Data Cache L1 Code Cache L2 Cache L3 Cache Hyper-threading Active Processor Cores Limit CPUID Maximum Intel Virtualization Technology EIST	306c3 8 1600 MHz 800 MHz 1600 MHz 2 Supported S	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled. → ←: Select Screen Tk: Select Item Enter: Select +/:: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.1236. Copyright	nt (C) 2012 American Megatren	nds, Inc.

#### Hyper-threading

Enable this field for Windows XP and Linux which are optimized for Hyper-Threading technology. Select disabled for other OSes not optimized for Hyper-Threading technology. When disabled, only one thread per enabled core is enabled.

#### **Active Processor Cores**

Enables number of cores in each processor package.

#### Limit CPUID Maximum

The CPUID instruction of some newer CPUs will return a value greater than 3. The default is Disabled because this problem does not exist in the Windows series operating systems. If you are using an operating system other than Windows, this problem may occur. To avoid this problem, enable this field to limit the return value to 3 or less than 3.

#### Intel Virtualization Technology

When this field is set to Enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

#### EIST

This field is used to enable or disable the Intel Enhanced SpeedStep Technology.

### **SATA Configuration**

This section is used to configure the settings of SATA device.

Aptio Setup U Advanced	tility - Copyright (C) 2012 American M	legatrends, Inc.
SATA Controller(s) SATA Mode Selection Software Preserve Serial ATA Port 1 Software Preserve Serial ATA Port 2 Software Preserve Serial ATA Port 4 Software Preserve Serial ATA Port 5 Software Preserve	[Enabled] [IDE] PIONEER DVD-RW ATAPI N/A Empty Unknown Bmpty Unknown ST31000333AS (1000.2GB) SUPPORTED ST3640323AS (640.1GB) SUPPORTED	Enable or disable SATA Device. → ←: Select Screen ?↓: Select Item Enter: Select +/:: Change Opt. FI: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15	.1236. Copyright (C) 2012 American Me	gatrends, Inc.

#### SATA Controller(s)

This field is used to enable or disable the Serial ATA device.

#### SATA Mode Selection

Determine how the Serial ATA controller(s) operates.

#### IDE Mode

This option configures the Serial ATA drives as Parallel ATA storage devices.

#### AHCI Mode

This option allows the Serial ATA devices to use AHCI (Advanced Host Controller Interface).

#### RAID Mode

This option allows the Serial ATA devices to use RAID 0/1/5/10/Recovery (Redundant Array of Independent Disks)

When AHCI mode is selected in the SATA Mode Selection, it will display the following information:

^	ity - Copyright (C) 2012 American Meg	gatrends, Inc.
Aptio Setup Util Advanced SATA Controller(s) SATA Mode Selection Software Preserve Port 0 SATA Device Type Serial ATA Port 1 Software Preserve Port 1	ity - Copyright (C) 2012 American Meg [Enabled] [AHCI] PIONEER DVD-RW ATAPI N/A [Enabled] [Hard Disk Drive] Empty Unknown [Enabled]	Determines how SATA controller(s) operate.
SATA Device Type Serial ATA Port 2 Software Preserve Port 2 SATA Device Type Serial ATA Port 4 Software Preserve Port 4 SATA Device Type Serial ATA Port 5 Software Preserve Port 5 SATA Device Type	[Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] ST31000333AS (1000.2GB) SUPPORTED [Enabled] [Hard Disk Drive] ST3640323AS (640.1GB) SUPPORTED [Enabled] [Hard Disk Drive]	→ ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.12	236. Copyright (C) 2012 American Megat	trends, Inc.

When RAID mode is selected in the SATA Mode Selection, it will display the following information:

Aptio Setup Util Advanced	ity - Copyright (C) 2012 American Me	gatrends, Inc.
SATA Controller(s) SATA Mode Selection Smart Response Technology Serial ATA Port 0 Software Preserve Port 0 SATA Device Type Serial ATA Port 1 Software Preserve Port 1 SATA Device Type Serial ATA Port 2 Software Preserve Port 2 SATA Device Type Serial ATA Port 4 Software Preserve Port 4 Software Preserve Port 4 Software Preserve Port 5 Software Preserve	[Enabled] [RAID] [Enabled] PIONEER DVD-RW ATAPI N/A [Enabled] [Hard Disk Drive] Empty Unknown [Enabled] [Hard Disk Drive] ST31000333AS (1000.2GB) SUPPORTED [Enabled] [Hard Disk Drive] ST3404032AS (640.1GB) SUPPORTED [Enabled] [Hard Disk Drive]	Determines how SATA controller(s) operate.         → ←: Select Screen         ↑↓: Select Item         Enter: Select         +/-: Change Opt.         F1: General Help         F2: Previous Values         F3: Optimized Defaults         F4: Save and Reset         ESC: Exit
Version 2.15.1	236. Copyright (C) 2012 American Mega	atrends. Inc.

## Smart Response Technology

This field is used to enable or disable the Smart Response Technology.

### Port 0/1/2/4/5

Enable or disable the Serial ATA port.

### SATA Device Type

Identify the Serial ATA port which is connected to Solid State Drive or Hard Disk Drive.

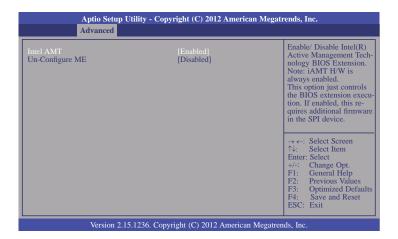
## Intel(R) Rapid Start Technology

This section is used to enable or disable the Intel Rapid Start Technology.

Aptio Setup Utility - Advanced	Copyright (C) 2012 Americ	can Megatrends, Inc.
Intel(R) Rapid Start Technology	[Disabled]	Enable or disable Intel(R) Rapid Start Technology → ←: Select Screen ↑↓: Select Item Enter: Select Item Enter: Select Item F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.1236.	Copyright (C) 2012 America	n Megatrends, Inc.

#### **AMT Configuration**

This section configures the parameters of Active Management Technology.



#### Intel AMT

Enable or disable the AMT function.

#### **Un-Configure ME**

Select Enabled to unconfigure the ME function without the need for a password.

#### **USB** Configuration

This section is used to configure parameters of the USB device.

Advanced		
USB Configuration USB Devices: 1 Keyboard, 1 Mouse, 2 Hubs Legacy USB Support EHCI Hand-off	[Enabled] [Disabled]	Enables Legacy USB support. AUTO option disables legacy support it no USB devices are connected. DISABLE option will keep USB devices available only fo EFI applications.
USB hardware delays and time-outs: USB transfer time-out Device reset time-out Device power-up delay	[20 sec] [20 sec] [Auto]	→ $\leftarrow$ : Select Screen $\uparrow$ \: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaul F4: Save and Reset ESC: Exit

#### Legacy USB Support

Enabled Enable legacy USB.

#### Auto

Disable support for legacy when no USB devices are connected.

#### Disabled

Keep USB devices available only for EFI applications.

#### **EHCI Hand-off**

This is a workaround for OSes without the EHCI hand-off support. The chane of EHCI ownership should be claimed by the EHCI driver.

#### **USB transfer time-out**

Select the time-out value for Control, Bulk and Interrupt transfers.

#### Device reset time-out

Select the command timeout for the USB mass storage device to start.

### Device power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller. "Auto" is the default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

### **PCH-FW Configuration**

This section is used to configure parameters of the Management Engine Technology.

Aptio Setup Utility Advanced	- Copyright (C) 2012 American Megatr	rends, Inc.
ME FW Version ME Firmware Mode	9.0.10.1372 Normal Mode Full Sku Firmware 5MB	Configure Management Engine Technology Parameters. → ←: Select Screen ↑↓: Select Item Enter: Select Item Enter: Select 0pt. +/: Change 0pt. F1: General Help
		F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.1230	5. Copyright (C) 2012 American Megatren	ds, Inc.

### Firmware Update Configuration

	Aptio Setup Ut Advanced	ility - Copyright (C) 2012 America	nn Megatrends, Inc.
ME FW Image	Re-Flash	[Disabled]	Enable/Disable Me FW Image Re-Flash function. → ←: Select Screen ↑↓: Select Item Enter: Select Item +/: Change Opt.
			F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
	Version 2.15.	1236. Copyright (C) 2012 American	Megatrends, Inc.

#### **Network Stack**

This section is used to enable or disable UEFI network stack.

	Aptio Setup Utility - Copyright (C Advanced	) 2012 American Megatr	ends, Inc.
Network Star	-k	[Disabled]	Enable/Disable UEFI network stack. → ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
	Version 2.15.1236. Copyright (C)	2012 American Megatren	ds, Inc.

When Network Stack is set to enabled, it will display the following information:

Aptio Setup Utility -	Copyright (C) 2012 American Mega	trends, Inc.
Advanced		
Network Stack Ipv4 PXE Support Ipv6 PXE Support	(Enabled) [Enabled] [Enabled]	Enable/Disable UEFI network stack.         → ←: Select Screen         ↑↓: Select Item         Enter: Select         +/-: Change Opt.         +/-: Previous Values         F3: Optimized Defaults         F4: Save and Reset         ESC: Exit
Version 2.15.1236.	Copyright (C) 2012 American Megatr	ends, Inc.

## Ipv4 PXE Support

When enabled,  $\ensuremath{\text{Ipv4}}\xspace$  PXE boot supports. When disabled,  $\ensuremath{\text{Ipv4}}\xspace$  PXE boot option will not be created.

### Ipv6 PXE Support

When enabled, Ipv6 PXE boot supports. When disabled, Ipv6 PXE boot option will not be created.

## WatchDog Configuration

This field is used to enable or disable the Watchdog timer function.

	lity - Copyright (C) 2012 American Meg	atrends, Inc.
Advanced		
WatchDog1 function	[Disabled]	Enable/Disable IT8518 WatchDog Timer.
		→ $\leftarrow$ : Select Screen $\uparrow$ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2 15 1	236. Copyright (C) 2012 American Megati	rends Inc

### Intel(R) Ethernet Network Connection i217-LM - 88:88:88:...

This section is used to configure the parameters of Gigabit Ethernet device.

PORT CONFIGURATION MENU NIC Configuration Blink LEDs (range 0-15 seconds) 0 PORT CONFIGURATION INFORMATION UEFI Driver: Intel(R) 1GbE DEV 5.1 Adapter PBA: FFFFFF-OFF	Click to configure the network device port.
Adapter FDA:     FFFFFF-OFF       Chip Type:     Intel PCH LPT       PCI Device ID     153A       PCI Bus: Device: Function:     0:25:0       Link Status     [Disconnected]       Factory MAC Address:     88:88:88:88:87:88	

#### Blink LEDs

Blink LEDs for the specified duration (up to 15 seconds).

#### Link Status

This field indicates the link status of the network device.

## **NIC Configuration**

This field is used to configure the network device.

		Copyright (C) 2012 American Megatr	ends, Inc.
	Advanced		
Link Spee Wake on L		[AutoNeg] [Enabled]	Change link speed and duplex for current port.
			→ ←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save Changes and Reset ESC: Exit
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.			

## Link Speed

Selects the link speed and duplex for the current network port.

### Wake on LAN

Enables this option to wake the system with a magic packet.

# Chipset

The section configures the relevant functions of chipset.

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.						
Main	Advanced	Chipset	Boot	Security	Save & Exit	
► System	) Configuration Agent (SA) C Ie Bifurcation	onfiguration	n			PCH Parameters ←→: Select Screen
						<ul> <li>↓: Select Item</li> <li>Enter: Select</li> <li>+/-: Change Opt.</li> <li>F1: General Help</li> <li>F2: Previous Values</li> <li>F3: Optimized Default</li> <li>F4: Save and Reset</li> <li>ESC: Exit</li> </ul>
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.						

#### **PCH-IO Configuration**

This section configures PCH parameters.

Aptio Setup Utility - Chipset	• Copyright (C) 2012 America	an Megatrends, Inc.	
Intel PCH RC Version Intel PCH SKU Name Intel PCH Rev ID PCT Express Configuration > USB Configuration > PCH Azalia Configuration i217 LAN Controller Wake on LAN Restore AC Power Loss	1.4.0.0 QM87 05/C2 [Enabled] [Disabled] [Power On]	PCI Express Configuration settings.	
		→ $\leftarrow$ : Select Screen $\uparrow$ L: Select Item Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit	
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.			

#### i217 LAN Controller

Enable or disable onboard NIC.

#### Wake on LAN

Set this field to enable to wake up the system via the onboard LAN or via a LAN card that supports the remote wake up function.

#### **Restore AC Power Loss**

#### Power-off

When power returns after an AC power failure, the system's power is off. You must press the Power button to power-on the system.

#### Power-on

When power returns after an AC power failure, the system will automatically power-on.

#### Last State

When power returns after an AC power failure, the system will return to the state where you left off before power failure occurs. If the system's power is off when AC power failure occurs, it will remain off when power returns. If the system's power is on when AC power failure occurs, the system will power-on when power returns.

#### PCI Express Configuration

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc. Chipset				
PCI Express Configuration PCI Express Root Port 1 PCI Express Root Port 2 PCI Express Root Port 3 PCI Express Root Port 4 PCI Express Root Port 5 PCI Express Root Port 6 PCI Express Root Port 7 PCIE Port 8 is assigned to LAN	PCI Express Root Port 1 Settings. → ←: Select Screen ↑↓: Select Item Enter: Select +/: Change Opt. +/: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit			
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.				

#### PCI Express Root Port 1 to PCI Express Root Port 7

Control the PCI Express Root Port.

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc. Chipset			
PCI Express Root Port 1 PCIe Speed	[Enabled] [Gen1]	Control the PCI Express Root Port. → ←: Select Screen ↑↓: Select Item Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit	
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.			

#### PCIe Speed

Select the PCIe Speed: Gen1 or Gen 2.

$\mathbf{C}$	ha	nt	or	4
	la	μ	.er	- 4

## **USB** Configuration

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc. Chipset				
USB Configuration XHCI Mode	[Auto]	Mode of operation of XHCI Controller.		
		$\rightarrow \leftarrow: Select Screen$ $\uparrow :: Select Item$ Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit		
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.				

## XHCI Mode

Select the operation mode of the XHCI controller. These options are Smart Auto, Auto, Enabled, Disabled and Manual.

## PCH Azalia Configuration

Chipset				
PCH Azalia Configuration Azalia		Control detection of the Azalia device. Disable= Azalia will be unconditionally disabled Enabled= Azalia will be unconditionally enabled Auto=Azalia will be ena bled if present, disabled otherwise.		
		→ ←: Select Screen ↑4: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defau F4: Save and Reset ESC: Exit		

## System Agent (SA) Configuration

This section configures System Agent (SA) parameters.

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.				
Chipset				
System Agent Bridge Name System Agent RC Version VT-d Capability • Graphics Configuration • NB PCIe Configuration • Memory Configuration	Haswell 1.4.0.0 Unsupported	Config Graphics Settings.		
		→ ←: Select Screen ↑↓: Select Item Enter: Select +/: Change Opt. FI: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit		
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.				

### **Graphics Configuration**

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc. Chipset				
Graphics Configuration IGFX VBIOS Version IGfX Frequency Primary Display Internal Graphics DVMT Pre-Allocated ► LCD Control	2175 800 MHz [Auto] [Enabled] [32MB]	Select which of IGFX/ PEG/PCI graphics device should be primary display or select SG for Switch- able Gfx.		
		→ $\leftarrow$ : Select Screen $\uparrow\downarrow$ : Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit		
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.				

### Primary Display

- Auto When the system boots, it will auto detects the display device.
- **IGFX** When the system boots, it will first initialize the onboard VGA.
- **PEG** When the system boots, it will first initialize the PCI Express x16 graphics card.

#### **Internal Graphics**

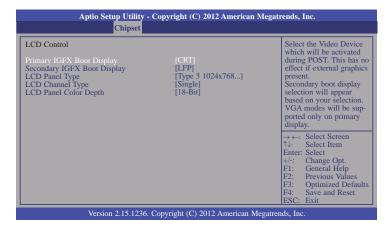
Keep IGD enabled based on setup options.

#### **DVMT Pre-Allocated**

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. Please refer to the screen shown below.

Aptio Setup Utili	ty - Copyright (C) 2012 American Meg	gatrends, Inc.		
Chipse	t			
Graphics Configuration IGFX VBIOS Version IGFX Frequency Primary Display Internal Graphics DVMT Pre-Allocated ► LCD Control	2175 800 MHz DVMT Pre-Allocated 32M 64M 96M 128M 160M 192M 224M 256M 288M 320M 352M 352M 352M 354M 416M 448M 416M 448M 512M 1024M	Select DVMT5.0 Pre- Allocated (Fixed) Graph- ics Memory size used by the Internal Graphics Device. → ←: Select Screen 1\: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit		
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.				

#### **LCD Control**



#### Primary IGFX Boot Display

Select the Video Device which will be activated during POST. This has no effect if the external graphics presents. The selection of secondary boot display will appear based on your selection. VGA modes will be supported only on primary display.

#### Secondary IGFX Boot Display

Select secondary display device.

#### LCD Panel Type

Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item. Please refer to the screen shown below.

Aptio Setup Uti Chips	lity - Copyright (C) 2012 American Megati iet	rends, Inc.
LCD Control Primary IGFX Boot Display Secondary IGFX Boot Display LCD Panel Type LCD Channel Type LCD Panel Color Depth	Image: CRT j           LCD Panel Type           VBIOS Default           Type 1         640x480           18 Bit           Type 2         800x600           18 Bit           Type 3         1024x768           18 Dit           Type 4         1280x1024           36 Bit           Type 5         1400x1050 (108MHz) 36 Bit           Type 6         1400x1050 (122MHz) 36 Bit           Type 7         1600x1200           36 Bit         Type 9           179pe 9         1680x1050           1920x1200         36 Bit           Type 10         1920x1200           36 Bit         Type 11           140x900         36 Bit           Type 13         1280x1024           48 Bit         Type 14           1200x400         36 Bit           Type 14         1280x800           36 Bit         Type 14           180x800         36 Bit           Type 14         1280x800           36 Bit         Type 16           2048x1536         48 Bit	Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item. → ←: Select Screen ↑↓: Select Item Enter: Select Heiter: Select F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.	236. Copyright (C) 2012 American Megatrer	nds, Inc.

#### LCD Channel Type

Select the LCD Channel Type. The option is dual or single.

#### LCD Panel Color Depth

Select the color mode of the LCD display. The option is 24-bit or 18-bit.

## **NB PCIe Configuration**

This section is used to configure settings NB PCI Express settings.

Aptio Setup Uti	lity - Copyright (C) 2012 American	Megatrends, Inc.
Chips	set	
NB PCle Configuration PEG0 - Gen X Enable PEG	[Auto] [Enabled]	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
Version 2.15.	236. Copyright (C) 2012 American M	legatrends, Inc.

## PEG0-Gen X

Configure PEG0 Gen1-Gen3.

Enable PEG

Enable or disable the PEG.

## **Memory Configuration**

This section only display the parameters of memory configuration.

Memory Information         Memory RC Version       1.4.0.3         Memory Frequency       1600 Mhz         Total Memory       4096 MB (DDR3)         DIMM#1       4096 MB (DDR3)         DIMM#2       Not Present         CAS Latency (tCL)       11         Minimum delay time       12         CAS to RAS (tRCDmin)       11         Row Precharge (tRPmin)       11         Active to Precharge (tRASmin)       28	
	$\rightarrow \leftarrow: Select Screen$ $\uparrow \downarrow: Select Item$ Enter: Select $\neq /: Change Opt.$ F1: General Help F2: Previous Values F3: Optimized Defaul F4: Save and Reset ESC: Exit

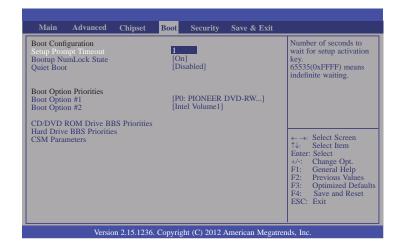
C	ha	n	te	r	4
$\mathbf{U}$	nu	Ρ			

#### **NB PCIe Bifurcation Configuration**

This field is used to configure the parameters of CPU PEG Bifurcation.

Aptio Setup Utilit	y - Copyright (C) 2012 American Megat	rends, Inc.
Chipset		
NB PCIe Bifurcation Configuration		PEG bifurcated configura- tion.
PEG Bifurcation		lion.
	PEG Birfurcation x8, x4, x4 Reserved x8, x8 x16	→ ←: Select Screen ↑↓: Select Item Enter; Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.123	36. Copyright (C) 2012 American Megatrer	ds, Inc.

# **Boot**



#### Setup Prompt Timeout

Select the number of seconds to wait for the setup activation key. 65535(0xFFF) denotes indefinite waiting.

#### **Bootup NumLock State**

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

#### **Quiet Boot**

Enable or disable the quiet boot function.

Boot Option #1 and #2

Set the order of the system boot.

#### Hard Driver BBS Priorities

Set the order of the legacy devices in this group.

#### **CSM Parameters**

Apti	o Setup Utility ·	· Copyrig	ht (C) 2012	American Megat	rends, Inc.
Main Advance	ed Chipset	Boot	Security	Save & Exit	
Launch PXE OpRO Launch Storage OpF			not launch] gacy only]		Controls the execution of UEFI and Legacy PXE OpROM. ←→: Select Screen ↑↓: Select Item
V	ervion 2 15 1236	Copyrigh	nt (C) 2012 4	American Megatrei	Enter: Select +/-: Change Opt. F1: General Help E2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit

## Launch PXE OpROM policy

Control the execution of UEFI and legacy PXE OpROM.

## Launch Storage OpROM policy

Control the execution of UEFI and legacy storage OpROM.

# Security

Aptio Setup Utility	- Copyri	ght (C) 2012	American Megat	rends, Inc.
Main Advanced Chipset	Boot	Security	Save & Exit	
Password Description If ONLY the Administrator's passwor then this only limits access to Setup asked for when entering Setup. If ONLY the User's password in set, is a power on password and must be boot or enter Setup. In Setup the Us Administrator rights. The password length must be in the following range: Minimum length Maximum length Administrator Password User Password	and is onl then this entered to	D		Set Administrator Password. → ←: Select Screen 1↓: Select Item Enter: Select Help F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.123	6. Copyrig	ght (C) 2012 .	American Megatrer	nds, Inc.

#### **Administrator Password**

Set the administrator password.

## User Password

Set the user password.

# Save & Exit

	Aptio S	etup Utility ·	- Copyri	ght (C) 2012	American Megat	rends, Inc.
Main	Advanced	Chipset	Boot	Security	Save & Exit	
Discard Cl Restore De Save as Us Restore Us Boot Over	ser Defaults ser Defaults ride EER DVD-RW					Reset the system after saving the changes.
						←→: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
	Versio	on 2.15.1236.	. Copyrig	ht (C) 2012.	American Megatrer	nds, Inc.

#### Save Changes and Reset

To save the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system after saving all changes made.

#### **Discard Changes and Reset**

To discard the changes, select this field and then press <Enter>. A dialog box will appear. Select Yes to reset the system setup without saving any changes.

#### **Restore Defaults**

To restore and load the optimized default values, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore the default values of all the setup options.

#### Save as User Defaults

To save changes done so far as user default, select this field and then press <Enter>. A dialog box will appear. Select Yes to save values as user default.

#### **Restore User Defaults**

To restore user default to all the setup options, select this field and then press <Enter>. A dialog box will appear. Select Yes to restore user default.

# **Updating the BIOS**

To update the BIOS, you will need the new BIOS file and a flash utility, AFUDOS.EXE. Please contact technical support or your sales representative for the files.

To execute the utility, type: A:> AFUDOS BIOS\_File\_Name /b /p /n then press <Enter>.

	Firmware Update Utility(APTIO) v2.25   18 American Megatrends Inc. All Rights Reserved.   +
Reading file Erasing flash Writing flash Verifying flash Erasing BootBlock Writing BootBlock Verifying BootBlock 	done done done done

After finishing BIOS update, please turn off the AC power. Wait about 10 seconds and then turn on the AC power again.

# Notice: **BIOS SPI ROM**

- 1. The Intel® Management Engine has already been integrated into this system board. Due to the safety concerns, the BIOS (SPI ROM) chip cannot be removed from this system board and used on another system board of the same model.
- 2. The BIOS (SPI ROM) on this system board must be the original equipment from the factory and cannot be used to replace one which has been utilized on other system boards.
- 3. If you do not follow the methods above, the Intel® Management Engine will not be updated and will cease to be effective.

Note:

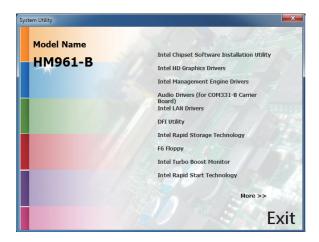
- a. You can take advantage of flash tools to update the default configuration of the BIOS (SPI ROM) to the latest version anytime.
- b. When the BIOS IC needs to be replaced, you have to populate it properly onto the system board after the EEPROM programmer has been burned and follow the technical person's instructions to confirm that the MAC address should be burned or not.

# **Chapter 5 - Supported Software**

The CD that came with the system board contains drivers, utilities and software applications required to enhance the performance of the system board.

Insert the CD into a CD-ROM drive. The autorun screen (Mainboard Utility CD) will appear. If after inserting the CD, "Autorun" did not automatically start (which is, the Mainboard Utility CD screen did not appear), please go directly to the root directory of the CD and double-click "Setup".

## Auto Run Page (For Windows 8)





# Auto Run Page (For Windows 7)





# Auto Run Page (For Windows XP)





## Microsoft Framework 3.5 (For Windows XP)



Before installing Microsoft .NET Framework 3.5, make sure you have updated your Windows XP operating system to Service Pack 3.

To install the driver, click "Microsoft .NET Framework 3.5" on the main menu.

1. Read the license agreement carefully.

Click "I have read and accept the terms of the License Agree ment" then click Install.



.net Framework

Microsoft .NET Framework 3.5 Setup

Download complete. You can now disconnect from the Internet.

Download and Install Progress

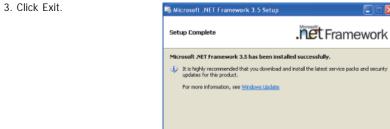
Installing:

2. Setup is now installing the driver.

Cancel

.net Framework

Exit



## Intel Chipset Software Installation Utility

The Intel Chipset Software Installation Utility is used for updating Windows INF files so that the Intel chipset can be recognized and configured properly in the system.

To install the utility, click "Intel Chipset Software Installation Utility" on the main menu.

Intel® Chipset Device Software

License Agreement

Intel<sup>®</sup> Chipset Device Software

You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms? INTEL SOFTWARE LICENSE AGREEMENT (OEM / DHV / ISV Distribution & Single User) 3MPORTANT - READ BEFORE COPYING, INSTALLING CR USING. Do not use or load this software and any associated materials (collectively, the "Software") unity you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not with to so agree, do not install or use the Software.

Please Also Note: \*17 you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;

< Back Yes

1. Setup is now ready to install Intel® Chipzet Device Soft the utility. Click Next.

ntel® Chipset Device S	-	Cince
Welcome to the Setup Program		
This setup program will install the Intel® CI strongly recommended that you exit all pro		puter. It is

- X

(intel

No Intel® Installation Frame

2. Read the license agreement then click Yes.

# Chapter 5

3. Go through the readme document for system requirements and installation tips then click Next.

The second s	the subscription of the su
ntel® Chipset Device Readme File Information	A CONTRACTOR OF A CONTRACTOR O
tefer to the Readine file below to view th ress the Page Down key to view the res	he system requirements and installation information. It of the file.
<ul> <li>Product: Intel(R) Chi</li> </ul>	
<ul> <li>Release: Production V</li> <li>Version: 9.1.1.1024</li> </ul>	ersion
	1(R) 5 Series/3400 Series Chinse
	1(R) 5 Series/3400 Series Chipse 9
* Target Chipset#: Inte	
* Target Chipset#: Inte	
<ul> <li>Target Chipset#: Inte</li> </ul>	
<ul> <li>Target Chipset#: Inte</li> <li>Date: November 18 200</li> </ul>	

4. After completing installation, click Finish to exit setup.



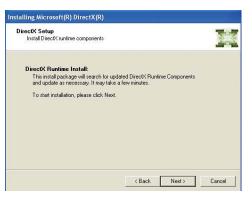
# Microsoft DirectX 9.0C (For Windows XP)

To install the utility, click "Microsoft DirectX 9.0C Driver" on the main menu.

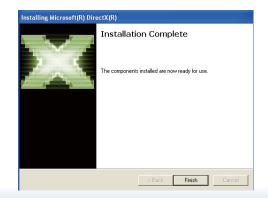
1. Click "I accept the agreement" then click Next.



2. To start installation, click Next.



 Click Finish. Reboot the system for DirectX to take effect.



# Intel HD Graphics Drivers (For Windows XP)



Note: Before installing Intel HD Graphics Drivers, make sure you have installed Microsoft .NET Framework 3.5 SP1.

To install the driver, click "Intel HD Graphics Drivers" on the main menu.

1. Setup is ready to install the graphics driver. Click Next.



2. Read the license agreement then click Yes.

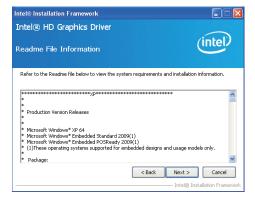
	nics Driver	(interf)
icense Agreemer	ıt	(intel)
You must accept all of the program. Do you accept t	e terms of the license agreement in the terms?	order to continue the setup
IMPORTANT - READ BEF Do not use or load this so until you have carefully r	SE AGREEMENT (OEM / IHV / ISV Die ORE COPVING, INSTALLING OR USI oftware and any associated materia ead the following terms and conditio the terms of this Agreement. If you 'e.	NG. ils (collectively, the "Software") ons. By loading or using the
	quipment Manufacturer (OEM), Ind oftware Vendor (ISV), this complete	

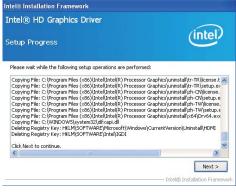
3. Go through the readme document for more installation tips then click Next.

4. Setup is currently installing the

pleted, click Next.

driver. After installation has com-





5. Click "Yes, I want to restart this computer now." then click Finish.

Restarting the system will allow the new software installation to take effect.



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# Intel HD Graphics Drivers (For Windows 7/8)

To install the driver, click "Intel HD Graphics Drivers" on the main menu.

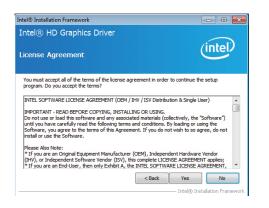
1. Setup is now ready to install the graphics driver. Click Next.



By default, the "Automatically run WinSAT and enable the Windows Aero desktop theme" is enabled. With this enabled, after installing the graphics driver and the system rebooted, the screen will turn blank for 1 to 2 minutes (while WinSAT is running) before the Windows 7/ Windows 8 desktop appears. The "blank screen" period is the time Windows is testing the graphics performance.

We recommend that you skip this process by disabling this function then click Next.

2. Read the license agreement then click Yes.



3. Go through the readme document for system requirements and installation tips then click Next.

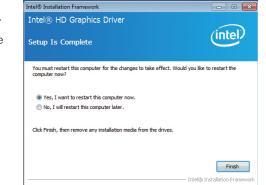
4. Setup is now installing the driver. Click Next to continue.



etup Pro	gress	intel
Please wait w	hile the following setup operations are performed:	
	jistry Key: HKLM\SOFTWARE\Microsoft\Windows Me jistry Key: HKLM\SOFTWARE\Microsoft\Windows Me	
Creating Pro Creating Pro Creating Pro Creating Pro Deleting Reg	cess: C: Windows kystem32 keps 32.exe cess: C: Windows kystem32 keps 32.exe keps 4.exe set: C: KiPA dows kystem32 keps 32.exe cess: C: Windows kys	h\hw64-s1-1

5. Click "Yes, I want to restart this computer now" then click Finish.

Restarting the system will allow the new software installation to take effect.



# Intel Management Engine Drivers

To install the driver, click "Intel Management Engine Drivers" on the main menu.

1. Setup is ready to install the driver. Click Next.	Intel® Installation Framework Intel® Management Engine Components Welcome to the Setup Program	(intel)
	This setup program will install the Intel® Management Engine Components. It is strongly recommended that you exit all programs before continuing. Clin <a href="https://www.strongle.com">strongle.com</a> <a href="https://www.strongle.com"></a> <a href="https://www.strongle.com">strongle.com</a> <a href="https://www.strongle.com"></a> strongle.com <a href="https://wwww.strongle.com"></a> strongle.com <a href="https://wwww.strongle.com"></a> strongle.com <a (oem),="" an="" are="" equipment="" hir<br="" href="https://wwww.strongle.&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td&gt;2. Read the license agreement then&lt;/td&gt;&lt;td&gt;Intel® Installation Framework&lt;/td&gt;&lt;td&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td&gt;click Yes.&lt;/td&gt;&lt;td&gt;Intel® Management Engine Components&lt;br&gt;License Agreement&lt;/td&gt;&lt;td&gt;(intel)&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td&gt;&lt;/td&gt;&lt;td&gt;You must accept all of the terms of the license agreement in order to conti&lt;br&gt;program. Do you accept the terms?&lt;br&gt;INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHW / ISV Distribution &amp; Si&lt;br&gt;IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.&lt;br&gt;Do not use or load this software and any associated materials (collectively&lt;br&gt;until you have carefully read the following terms and conditions. By loadin&lt;br&gt;Software, you agree to the terms of this Agreement. If you do not widh to&lt;br&gt;instal or use the Software.&lt;br&gt;Please Notice:&lt;br&gt;" if="" independent="" manufacturer="" original="" you="">(HM), or Independent Software Vendor (ICEN). Bis complete ICENSE AGR (HM), ou are an End-User, then only Exhibit A, the INTEL SOFTWARE LICE</a>	ngle User) , the "Software") or using the p so agree, do not dware Vendor LEEMENT applies;

< Back Yes No - Intel® Installation Frame

3. Setup is currently installing the driver. After installation has completed, click Next.

4. After completing installation, click Finish.

etup Pro	gress	(intel
Please wait w	hile the following setup operations are	performed:
Creating Pro Deleting File:		el(R) Management Engine Components\FWS Management Engine Components\FWServic
Creating Pro Creating Pro Installing: In	cess: C:\Program Files (x86)\Intel\Inte tel@ ME FW Recovery Agent	Management Engine Components/FWS (R) Management Engine Components/FWS el(R) Management Engine Components\Firmware
Creating Pro Creating Pro Installing: In	cess: C:\Program Files (x86)\Intel\Inte tel@ ME FW Recovery Agent C:\Program Files (x86)\Intel\Intel(R) M continue.	el(R) Management Engine Components\FWS el(R) Management Engine Components\FWS
Creating Pro Creating Pro Installing: In Copying File:	cess: C:\Program Files (x86)\Intel\Inte tel@ ME FW Recovery Agent C:\Program Files (x86)\Intel\Intel(R) M	sl(R) Management Engine Components/FWE al(R) Management Engine Components/FWE Management Engine Components/Firmware
Creating Pro Creating Pro Installing: In Copying File:	cess: C:\Program Files (x86)\Intel\Inte tel@ ME FW Recovery Agent C:\Program Files (x86)\Intel\Intel(R) M continue.	el(R) Management Engine Components\FWS el(R) Management Engine Components\FWS

etup Is Complete	intel
The setup program successfully installed the following components - Intel® Management Engine Interface	:
- Intel® Dynamic Application Loader	
<ul> <li>Intel® Identity Protection Technology (Intel® IPT)</li> <li>Local Management Service</li> </ul>	
- User Notification Service	
You must restart this computer for the changes to take effect. We computer now?	uld you like to restart the
Yes, I want to restart this computer now.	
<ul> <li>Yes, I want to restart this computer now.</li> <li>No, I will restart this computer later.</li> </ul>	

# Audio Drivers (For COM331-B Carrier Board)

To install the driver, click "Audio Drivers (for COM331-B Carrier Board" on the main menu.

- 1. Setup is now ready to install the audio driver. Click Next.
- 2. Follow the remainder of the steps on the screen; clicking "Next" each time you finish a step.



3. Click "Yes, I want to restart my computer now" then click Finish.

Restarting the system will allow the new software installation to take effect.

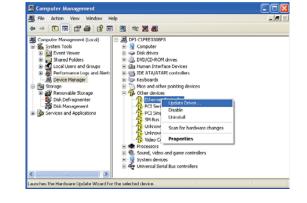


# Intel LAN Drivers (For Windows XP)

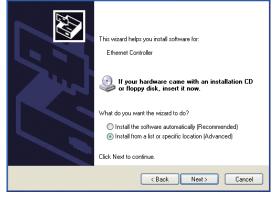
The LAN drivers for Windows XP supporting on the HM961-QM87/HM86 system board has to be installed manually. When you want to install the LAN driver for Windows XP, please follow the steps below to accomplish the installation.

Hardware Update Wizard

1. Launch the Hardware Update Wizard for the selected device. Select "Update Driver."

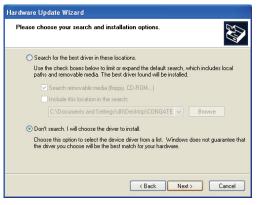


2. Choose "Install from a list or specific location (Advanced)" and click "Next" to continue the installation.



# Chapter 5

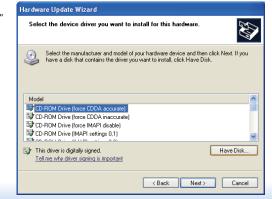
3. Choose the option "Don't search. I will choose the driver to install" in order to select the device driver from a list, and click "Next."



4. Select a hardware type: DVD/CD-ROM drives. Then, click "Next."



5. Select your hardware disk and then click "Have Disk ... "



6. Insert the installation disk and make sure the selected drive is correct.

7. Select the device driver

"Next."

hardware and then click

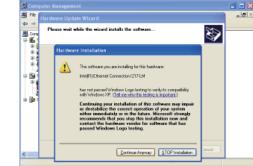


(For 32-bit, the file name is "e1d5132.inf".)

# you want to install for this

Sele	ect the device driver you want to	install for this hardware.
٩	Select the manufacturer and model of have a disk that contains the driver ye	f your hardware device and then click Next. If you ou want to install, click Have Disk.
🗹 Sho	ow compatible hardware	
Mod	el tel(R) Ethernet Connection I217-LM	
		Have Disk
	his driver is not digitally signed! ell me why driver signing is important	Have Disk
		<back next=""> Cancel</back>

8. Check the software you are installing, Then, click "Continue Anyway" to start the installation.



9. Click "Finish" to close the wizard. Hardware Update Wizard



 After completing the installation, the Network adapters "Intel(R) Ethernet Connection I217LM" will appear on the computer management list.

· File Action View Window H 수 수 한 🖪 🗊 🚙 😰 🗷	The second sec	- 10
Concurster Versugener (Josef) System Tok William Controls South Server South Server Serve	Borner Construction     Decision     De	

# Intel LAN Drivers (For Windows 7/8)

To install the driver, click "Intel LAN Drivers" on the main menu.

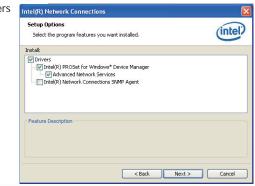
 Setup is ready to install the driver. Click Next.



2. Click "I accept the terms in the license agreement" then click "Next".



 Select the program featuers you want installed then click Next.



# Chapter 5

4. Click Install to begin the installation.

Ready to Install the Program The wizard is ready to begin installation.	inte
Click Install to begin the installation.	
If you want to review or change any of your installation setti exit the wizard.	ngs, click Back. Click Cancel to

5. After completing installation, click Finish.



# **DFI Utility**

DFI Utility provides information about the board, HW Health, Watchdog and DIO. To access the utility, click "DFI Utility" on the main menu.

1. Setup is ready to install the DFI Utility drifer. Click Next.



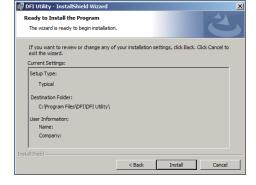
2. Click "I accept the terms in the license agreement" and then click Next.



3. Enter "User Name" and "Organization" information and then click Next.



4. Click Install to begin the installation.



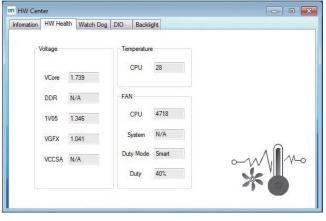
5. After completing installation, click Finish.



The DFI Utility icon will appear on the desktop. Double-click the icon to open the utility.



Information



HW Health

Cha	pter	5

Infomation	HW Health	Watch Dog	DIO	Backlight	
			E	EC Watch Dog Enable	
				Software Reset	
				20	
				20	
				EC WDT Set	
				Count 20	

WatchDog

mation HW Healt	th Watch Dog	DIO	Backlight			
	- Inpu	t				
		D3	D2	D1	DO	
		Т	Т	Т	Т	
	Outp	w.t				
		D3	D2	D1	D0	
		F	F	F	F	
		-		-		

DIO

Backlight

# Intel USB 3.0 Drivers (For Windows 7 only)

To install the driver, click "Intel USB 3.0 Driver" on the main menu.

1. Setup is ready to install the driver. Click Next.



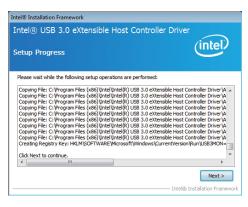
2. Read the license agreement then click Yes.



3. Go through the readme document for more installation tips then click Next.



4. Setup is currently installing the driver. After installation has completed, click Next.



5. After completing installation, click Finish.



# Chapter 5

3. Read the license agreement then

click Yes.

Intel® Installation Framework

License Agreement

program. Do you accept the terms

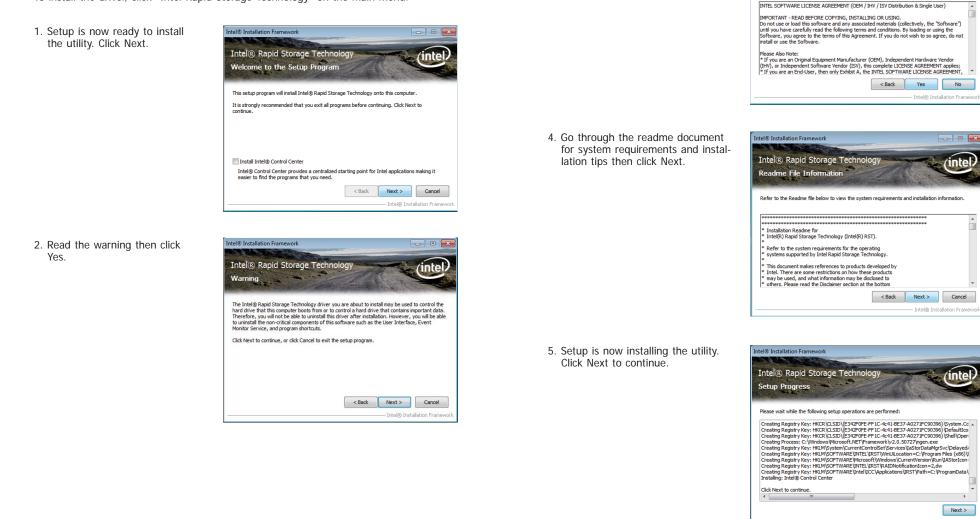
Intel® Rapid Storage Technology

You must accept all of the terms of the license agreement in order to continue the setup

## Intel Rapid Storage Technology

The Intel Rapid Storage Technology is a utility that allows you to monitor the current status of the SATA drives. It enables enhanced performance and power management for the storage subsystem.

To install the driver, click "Intel Rapid Storage Technology" on the main menu.



Intel® Installation Framewo

- • ×

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# Chapter 5

6. Click "Yes, I want to restart my computer now" then click Finish.

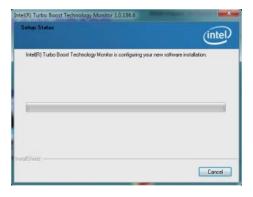
Restarting the system will allow the new software installation to take effect.



# Intel Turbo Boost Monitor (For Windows 7/8)

To install the driver, click "Intel Turbo Boost Monitor" on the main menu.

1. The setup program is configuring the new software installation.



2. Click Next.



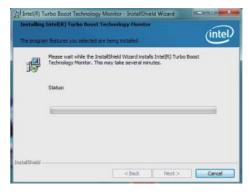
3. Read the license agreement and then click "I accept the terms in the license agreement". Click Next.



#### 4. Click Install.

leady to Install the Prog The weard is ready to been		(intel
Click Install to begin the inst	alation.	
If you want to review or che exit the wizard.	inge any of your installation settings	, dick Back. Click Cancel to
allShield		

5. The setup program is currently installing the software.



#### 6. Click Finish.



# Intel Rapid Start Technology (For Windows 7/8)

The Intel Rapid Start Technology is a utility that allows your system to wake up and run faster. To install the driver, click "Intel Rapid Start Technology" on the main menu.

1. Setup is now ready to install the utility. Click Next.



2. Click ON and select the Advanced Settings to enable the Intel Rapid Start Technology. Then, click Save.

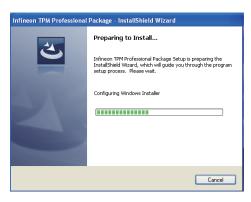
	Start Techno anager	ogy	(int
Status Intel Rapid Start Technology 🛛	On	Off	
lide Advanced Settings			
Advanced Settings			
Critical Battery 🔞	On	Off	
Timer 🕑	On	Off	
	10 Minutes		
0			120
	Save		ancel

# Chapter 5

# Infineon TPM Drivers and Tools (option)

To install the driver, click "Infineon TPM driver and tool (option)" on the main menu.

1. The setup program is preparing to install the driver.



- 2. The setup program is now ready to install the utility. Click Next.
- Infineon TPM Professional Package InstallShield Wizard

   Infineon TPM Professional Package

   Version 4.3.100.3287

   The InstallShield(R) Wizard will install Infineon TPM Professional Package on your computer. To continue, click Next.

   R is recommended that you close all other applications before starting Setup.

   WARNING: This program is protected by copyright law and international treates.

   <tr
- 3. Click "I accept the terms in the license agreement" and then click "Next".



4. Enter the necessary information and then click Next.



5. Select a setup type and then click Next.



Click Install.



# Chapter 5

7. TPM requires installing the Microsoft Visual C++ package prior to installing the utility. Click Install.

🙀 Infineor	n TPM Professional Package - InstallShield Wizard 📃 🗖 🔀
	Infineon TPM Professional Package gram features you selected are being installed.
	Please wait while the InstallShield Wizard installs Infineon TPM Professional
15	Package. This may take several minutes.
	Installing Microsoft Visual C++ 2010 SP1 Redistributable Package
Tostalishield -	
nu recentari nena -	< Back Next > Cancel

 The setup program is currently installing the Microsoft Visual C++ package.

	g Infineon TPM Professional Package gram features you selected are being installed.
ß	Please wait while the InstallShield Wizard installs Infineon TPM Professional Package. This may take several minutes.
	Status:
	Copying new files

9. Click Finish.



10. Click "Yes" to restart your system.

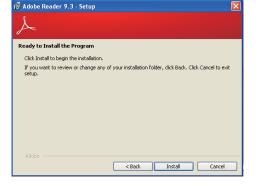


### Adobe Acrobat Reader 9.3

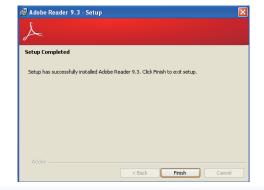
To install the reader, click "Adobe Acrobat Reader 9.3" on the main menu.

1. Click Next to install or click Change Destination Folder to select another folder. Destination Folder Click Next to install to this Folder, or click Change to install to a different folder. Destination Folder Click Next to install Adobe Reader 9.3 to: C:\Program Files\Adobe\Reader 9.0\; WARNING: This program is protected by copyright law and international treates. Adobe Change Destination Folder.... < Back Next > Cancel

2. Click Install to begin installation.



3. Click Finish to exit installation.



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# Chapter 6 - GPIO Programming Guide

# **Function Description**

Get\_EC\_Data (unsigned char ucData): Read a Byte data from EC. Write\_EC\_Data (unsigned char ucData, unsigned char Data): Write a Byte data to EC.

# Sample Code

## **GPIO Input Process**

EC_DIO_Read_Input() { BYTE Data; //Pin0-3 Input Mode Data = Get_EC_Data(0xBA); Data  = 0x80; Write_EC_Data(0xBA, Data); while(((Get_EC_Data(0xBA) >> 7)&0x01)) { Data = Get_EC_Data(0xBA); } Return Data ; }	
<pre>//Pin0-3 Input Mode Data = Get_EC_Data(0xBA); Data  = 0x80; Write_EC_Data(0xBA, Data); while(((Get_EC_Data(0xBA) &gt;&gt; 7)&amp;0x01)) { Data = Get_EC_Data(0xBA); }</pre>	EC_DIO_Read_Input()
Data = Get_EC_Data(0xBA); Data  = 0x80; Write_EC_Data(0xBA, Data); while(((Get_EC_Data(0xBA) >> 7)&0x01)) { Data = Get_EC_Data(0xBA); }	BYTE Data;
Data  = 0x80; Write_EC_Data(0xBA, Data); while(((Get_EC_Data(0xBA) >> 7)&0x01)) { Data = Get_EC_Data(0xBA); }	
while(((Get_EC_Data(0xBA) >> 7)&0x01)) { Data = Get_EC_Data(0xBA); }	Data  = 0x80;
}	
} Return Data ;	{ Data = Get_EC_Data(0xBA);
Return Data ;	}
	Return Data ;

## **GPIO Output Process**

```
EC_DIO_Write_Output(unsigned char udata)
{
    //Pin4-7 Output Mode
    udata <<= 4;
    udata |= 0x01;
    Write_EC_Data(0xBB, udata);
    return 0;
EC_DIO_Read_Output()
{
    BYTE Data;
    //Pin4-7 Output Mode
    Write_EC_Data(0xBB, 0x02);
    Delay;
    Data = Get_EC_Data(0xBB);
    Data >>= 4;
    Return Data;
}
```

# Chapter 7 - RAID (HM961-QM87)

The system board allows configuring RAID on Serial ATA drives. It supports RAID 0, RAID 1, RAID 5 and RAID 10.

## **RAID** Levels

## RAID 0 (Striped Disk Array without Fault Tolerance)

RAID 0 uses two new identical hard disk drives to read and write data in parallel, interleaved stacks. Data is divided into stripes and each stripe is written alternately between two disk drives. This improves the I/O performance of the drives at different channel; however it is not fault tolerant. A failed disk will result in data loss in the disk array.

### **RAID 1 (Mirroring Disk Array with Fault Tolerance)**

RAID 1 copies and maintains an identical image of the data from one drive to the other drive. If a drive fails to function, the disk array management software directs all applications to the other drive since it contains a complete copy of the drive's data. This enhances data protection and increases fault tolerance to the entire system. Use two new drives or an existing drive and a new drive but the size of the new drive must be the same or larger than the existing drive.

### RAID 5

RAID 5 stripes data and parity information across hard drives. It is fault tolerant and provides better hard drive performance and more storage capacity.

## **RAID 10 (Mirroring and Striping)**

RAID 10 is a combination of data striping and data mirroring providing the benefits of both RAID 0 and RAID 1. Use four new drives or an existing drive and three new drives for this configuration.

## **Settings**

To enable the RAID function, the following settings are required.

- 1. Connect the Serial ATA drives.
- 2. Configure Serial ATA in the AMI BIOS.
- 3. Configure RAID in the RAID BIOS.
- 4. Install the RAID driver during OS installation.
- 5. Install the Intel Rapid Storage Drivers.

### **Step 1: Connect the Serial ATA Drives**

Refer to chapter 2 for details on connecting the Serial ATA drives.

### Important:

- 1. Make sure you have installed the Serial ATA drives and connected the data cables otherwise you won't be able to enter the RAID BIOS utility.
- 2. Treat the cables with extreme caution especially while creating RAID. A damaged cable will ruin the entire installation process and operating system. The system will not boot and you will lost all data in the hard drives. Please give special attention to this warning because there is no way of recovering back the data.

### Step 2: Configure Serial ATA in the AMI BIOS

- 1. Power-on the system then press <Del> to enter the main menu of the AMI BIOS.
- 2. Configure Serial ATA in the appropriate fields.
- 3. Save the changes in the Save & Exit menu.
- 4. Reboot the system.

### Step 3: Configure RAID in the RAID BIOS

When the system powers-up and all drives have been detected, the Intel RAID BIOS status message screen will appear. Press the <Ctrl> and <I> keys simultaneously to enter the utility. The utility allows you to build a RAID system on Serial ATA drives.

## Step 4: Install the RAID Driver During OS Installation

The RAID driver must be installed during the Windows<sup>®</sup> XP or Windows<sup>®</sup> 2000 installation using the F6 installation method. This is required in order to install the operating system onto a hard drive or RAID volume when in RAID mode or onto a hard drive when in AHCI mode.

- 1. Start Windows Setup by booting from the installation CD.
- 2. Press <F6> when prompted in the status line with the 'Press F6 if you need to install a third party SCSI or RAID driver' message.
- 3. Press <S> to "Specify Additional Device".
- 4. At this point you will be prompted to insert a floppy disk containing the RAID driver. Insert the RAID driver diskette.
- 5. Locate for the drive where you inserted the diskette then select RAID or AHCI controller that corresponds to your BIOS setup. Press <Enter> to confirm.

You have successfully installed the driver. However you must continue installing the OS. Leave the floppy disk in the floppy drive until the system reboots itself because Windows setup will need to copy the files again from the floppy disk to the Windows installation folders. After Windows setup has copied these files again, remove the floppy diskette so that Windows setup can reboot as needed.

### Step 5: Install the Intel Rapid Storage Technology Utility

The Intel Rapid Storage Technology Utility can be installed from within Windows. It allows RAID volume management (create, delete, migrate) from within the operating system. It will also display useful SATA device and RAID volume information. The user interface, tray icon service and monitor service allow you to monitor the current status of the RAID volume and/ or SATA drives. It enables enhanced performance and power management for the storage subsystem.

- 1. Insert the provided CD into an optical drive.
- 2. Click "Intel Rapid Storage Technology Utility" on the main menu.
- 3. Setup is ready to install the utility. Click Next.

	lowing product:	
Intel® Rapid Storage Technol	ogy	
	at you exit all programs before cor Cancel to exit the setup program.	

 Read the license agreement and click "I accept the terms in the License Agreement." Then, click Next.



# Chapter 7

5. Go through the readme document to view system requirements and installation information then click Next.

	Setup		
ntel® Rapid Storage Techr Readme File Information	nology	(intel)	
******	***************************************	*****	^
* Installation Readme for * Intel(R) Rapid Storage Technology *	(Intel(R) RST).		1
* Refer to the system requirements * systems supported by Intel Rapid *			
* This document makes references t * Intel. There are some restrictions * may be used, and what informatio * others. Please read the Disclaimer * of this document, and contact you representative if you would like mo	on how these products n may be disclosed to section at the bottom ir Intel field		
-			
* Intel is making no claims of usabilit	y, efficacy or	****************	,
Intel Corporation	< Back	Next > Cancel	_

 Click Next to install to the default folder or click change to choose another destination folder.

ntel® Rapid Storage T Destination Folder		(intel)
lick Next to install to the defa	ult folder, or dick Change to cho	oose another destination folder.
C:\Program Files\Intel\Intel(R	) Rapid Storage Technology	Change

#### Confirm the installation and click Next.

ou are about to install the following components	s:	
Intel® Rapid Storage Technology		

×

 Click "Yes, I want to restart this computer now" to complete the installation and then click Finish.



# Chapter 8 - Intel AMT Settings (HM961-QM87)

## **Overview**

Intel Active Management Technology (Intel® AMT) combines hardware and software solution to provide maximum system defense and protection to networked systems.

The hardware and software information are stored in non-volatile memory. With its built-in manageability and latest security applications, Intel® AMT provides the following functions.

### Discover

Allows remote access and management of networked systems even while PCs are powered off; significantly reducing desk-side visits.

### Repair

Remotely repair systems after OS failures. Alerting and event logging help detect problems quickly to reduce downtime.

### • Protect

Intel AMT's System Defense capability remotely updates all systems with the latest security software. It protects the network from threats at the source by proactively blocking incoming threats, reactively containing infected clients before they impact the network, and proactively alerting when critical software agents are removed.

# Enable Intel<sup>®</sup> AMT in the AMI BIOS

- 1. Power-on the system then press <Del> to enter the main menu of the AMI BIOS.
- 2. In the Advanced menu, select AMT Configuration.

Aptio Se	tup Utility ·	- Copyrig	ght (C) 2012	American M	egatrends, Inc.
Main <mark>Advanced</mark>	Chipset	Boot	Security	Save & Exi	t
<ul> <li>ACPI Power Manager</li> <li>Trusted Computing</li> <li>CPU Configuration</li> <li>SATA Configuration</li> <li>PCH-FW Configuration</li> <li>USB Configuration</li> <li>Super IO Configuration</li> <li>Super IO Configuration</li> <li>PC H-eith Status</li> <li>Network Stack</li> <li>Intel(R) Ethernet Netw</li> <li>Intel(R) 1210 Gigabit</li> </ul>	nent Configu n n vork Connec	tion i217-	-LM - 00:01:	29:	ACPI Power Management Configuration → ←: Select Screen ↑↓: Select Item Enter: Select +/:: Change Opt. F1: General Help F2: Previous Values
					F3: Optimized Defaults F4: Save & Reset ESC: Exit
Versio	n 2.15.1236.	Copyrig	ht (C) 2012 A	American Meg	atrends, Inc.

3. In the Advanced menu, select Enable in the AMT field.

Aptio Setup Util Advanced	lity - Copyright (C) 2012 Americ	an Megatrends, Inc.
Intel AMT Un-Configure ME Disable ME	[Enabled] [Disabled] [Disabled]	Enable/Disable Intel(R) Active Management Tech- nology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execu- tion. If enabled, this re- quires additional firmware in the SPI device. → ←: Select Screen ↑↓: Select Screen ↑↓: Select Item Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save and Reset ESC: Exit
Version 2.15.1	236. Copyright (C) 2012 Americar	n Megatrends, Inc.

4. In the Save & Exit menu, select Save Changes and Reset then select OK.

	Aptio S	etup Utility	- Copyri	ght (C) 2012	American Megat	rends, Inc.
Main	Advanced	Chipset	Boot	Security	Save & Exit	
	iges and Reset hanges and Re	set				Reset the system after saving the changes.
Restore D	efaults					
Boot Over	ride					
Launch El	FI Shell from fi	ilesystem dev	/ice			
						→ ←: Select Screen ↑↓: Select Item Enter: Select +/: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Reset ESC: Exit
	Versio	on 2.15.1236	. Copyrig	tht (C) 2012	American Megatrer	ids, Inc.

# Enable Intel<sup>®</sup> AMT in the Intel<sup>®</sup> Management Engine BIOS Extension (MEBX) Screen

 When the system reboots, the following message will be displayed. Press <Ctrl-P> as soon as the message is displayed; as this message will be displayed for only a few seconds.



2. You will be prompted for a password. The default password is "admin". Enter the default password in the space provided under Intel(R) ME Password then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
MAIN MENU
MEBx Login > Intel (R) ME General Settings > Intel (R) AMT Configuration MEBx Exit
Intel(R) ME Password
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Select Entry [Esc]= Exit

- 3. Enter a new password in the space provided under Intel(R) ME New Password then press Enter. The password must include:
  - 8-32 characters

  - Strong 7-bit ASCII characters excluding : , and " characters
    At least one digit character (0, 1, ...9)
    At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
    Both lower case and upper case characters

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.137
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
MAIN MENU
MEBx Login > Intel (R) ME General Settings > Intel (R) AMT Configuration MEBx Exit Intel (R) ME New Password
Intel(R) ME Password
$[\uparrow\downarrow] = Move Highlight$ [Enter] = Select Entry [Esc]= Exit

4. You will be asked to verify the password. Enter the same new password in the space provided under Verify Password then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372				
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.				
MAIN MENU				
MEBx Login > Intel (R) ME General Settings > Intel (R) AMT Configuration MEBx Exit Verify Password				
Intel(R) ME Password				
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Select Entry [Esc]= Exit				

5. Select Intel(R) ME General Settings then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
MAIN MENU
Intel (R) ME General Settings Intel (R) AMT Configuration MEBx Exit
$\uparrow\uparrow\downarrow$ ] = Move Highlight [Enter] = Select Entry [Esc]= Exit

6. Select Change Intel(R) ME Password then press Enter.

You will be prompted for a password. The default password is "**admin**". Enter the default password in the space provided under Intel(R) ME New Password then press Enter.

- 8-32 characters
- Strong 7-bit ASCII characters excluding : , and " characters
  At least one digit character (0, 1, ...9)
- At least one 7-bit ASCII non alpha-numeric character, above 0x20, (e.g. !, \$, ;)
  Both lower case and upper case characters

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.		
INTEL (R) ME PLATFORM CONFIGURATION		
Change ME Password Local FW Update	<enabled></enabled>	
Intel (R) ME New P	assword	
[∱↓] – Move Highlight		

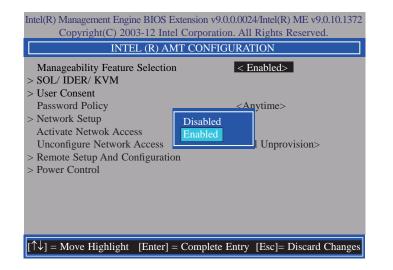
7. Select Local FW Update then press Enter. Select Enabled then press Enter.

	he BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 13-12 Intel Corporation. All Rights Reserved.
INTEL (R)	ME PLATFORM CONFIGURATION
Change ME Password Local FW Update	<enabled></enabled>
	Disabled Enabled Password Protected
$\uparrow \downarrow ] = Move Highlight$	[Enter] = Complete Entry [Esc]= Discard Changes

8. Select Previous Menu until you return to the Main Menu. Select Intel(R) AMT Configuration then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved. INTEL (R) AMT CONFIGURATION	
Manageability Feature Selection > SOL/ IDER/ KVM	< Enabled>
> User Consent Password Policy > Network Setup	<anytime></anytime>
Activate Netwok Access Unconfigure Network Access	<full unprovision=""></full>
<ul><li>&gt; Remote Setup And Configuration</li><li>&gt; Power Control</li></ul>	
$\left[\uparrow\downarrow\right] =$ Move Highlight [Enter] = Sele	ect Entry [Esc]= Exit

9. In the Intel(R) AMT Configuration menu, select Manageability Feature Selection then press Enter. Select Disabled then press Enter.



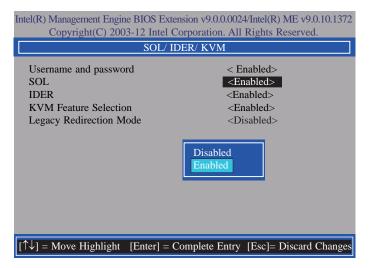
10. In the Intel(R) AMT Configuration menu, select SOL/IDER/KVM then press Enter.

	sion v9.0.0.0024/Intel(R) ME v9.0.10.1372 orporation. All Rights Reserved.
SOL/ ID	ER/ KVM
Username and Password	< Enabled>
SOL	<enabled></enabled>
IDER	<enabled></enabled>
KVM Feature Selection	<enabled></enabled>
Legacy Redirection Mode	<disabled></disabled>
Menu for FW Redirection Confi	guration
$[\uparrow\downarrow] = Move Highlight [Enter] = S$	elect Entry [Esc]= Exit

11. In the **SOL/IDER/KVM** menu, select **Username and Password** then press Enter. Select **Disabled** then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
SOL/ IDER/ KVM	
Username and Password	< Enabled>
SOL	<enabled></enabled>
IDER	<enabled></enabled>
KVM Feature Selection	<enabled></enabled>
Legacy Redirection Mode	<disabled></disabled>
	Disabled Enabled
$[\uparrow\downarrow] = Move Highlight [Enter] = 0$	Complete Entry [Esc]= Discard Changes

12. In the **SOL/IDER/KVM** menu, select **SOL** then press Enter. Select **Disabled** then press Enter.



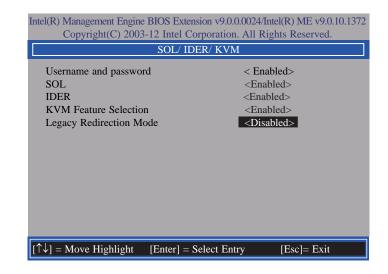
13. In the **SOL/IDER/KVM** menu, select **IDER** then press Enter. Select **Disabled** then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
SOL/ IDER/ KVM	
Username and password SOL IDER KVM Feature Selection Legacy Redirection Mode	< Enabled> <enabled> <enabled> <enabled> <disabled></disabled></enabled></enabled></enabled>
	Disabled Enabled
$[\uparrow\downarrow] =$ Move Highlight [Enter] =	Complete Entry [Esc]= Discard Changes

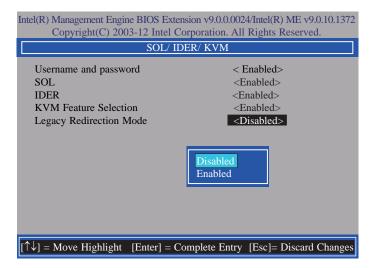
14. In the SOL/IDER/KVM menu, select KVM Feature Selection then press Enter. Select Disabled then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
SOL/ IDER/ KVM	
Username and password SOL IDER KVM Feature Selection Legacy Redirection Mode	< Enabled> <enabled> <enabled> <b><enabled></enabled></b> <disabled></disabled></enabled></enabled>
	Disabled Enabled
$[\uparrow\downarrow] = Move Highlight [Enter] = 0$	Complete Entry [Esc]= Discard Changes

15. In the SOL/IDER/KVM menu, select Legacy Redirection Mode then press Enter.



16. Select **Enabled** then press Enter.



17. Select Previous Menu until you return to the Intel(R) AMT Configuration menu. Select User Consent then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
USER CONSENT	
User Opt-in Configurable from Remote IT < KVM> Opt-in Configurable from Remote IT < Enabled>	
Configure when user consent should be required.	
$[\uparrow\downarrow]$ = Move Highlight [Enter] = Select Entry [Esc] = Exit	

18. In the **User Consent** menu, select **User Opt-in** then press Enter. Select **None** then press Enter.

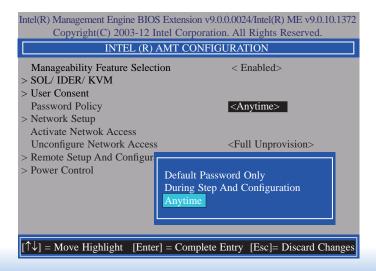
Intel(R) Management Engine BIO Copyright(C) 2003-12 I	S Extension v9.0.0.0024/Intel(R) ntel Corporation. All Rights R	
U	SER CONSENT	
User Opt-in Opt-in Configurable from Re	mote IT < KVM>	>
	NONE KVM ALL	
$[\uparrow\downarrow] =$ Move Highlight [Ente	r] = Complete Entry [Esc]= D	iscard Changes

19. In the User Consent menu, select Opt-in Configurable from Remote IT then press Enter. Select Disable Remote Control of KVM Opt-in Policy then press Enter.

Intel(R) Management Engine BIOS Extensio Copyright(C) 2003-12 Intel Corp	
USER CO	NSENT
User Opt-in Opt-in Configurable from Remote IT	< KVM> < Enabled>
	Disabled Enabled
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Com	plete Entry [Esc]= Discard Changes

20. Select Previous Menu until you return to the Intel(R) AMT Configuration menu. Select Password Policy then press Enter.

You may choose to use a password only during setup and configuration or to use a password anytime the system is being accessed.



21. In the Intel(R) AMT Configuration menu, select Network Setup then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
INTEL (R) AMT CONFIGURATION	
Manageability Feature Selection > SOL/ IDER/ KVM	< Enabled>
<ul> <li>&gt; User Consent</li> <li>Password Policy</li> <li>&gt; Network Setup</li> </ul>	<anytime></anytime>
Activate Network Access Unconfigure Network Access > Remote Setup And Configuration > Power Control	<full unprovision=""></full>
$[\uparrow\downarrow] = Move Highlight [Enter] = Selet$	ect Entry [Esc]= Exit

22. In the Intel(R) ME Network Setup menu, select Intel(R) ME Network Name Settings then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) ME NETWORK SETUP
Intel (R) ME Network Name Settings TCP/ IP Settings
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Select Entry [Esc]= Exit

23. In the Intel(R) ME Network Name Settings menu, select Host Name then press Enter. Enter the computer's host name then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) ME NETWORK NAME SETTINGS
Host Name Domain Name Shared/ Dedicated FQDN Dynamic DNS Update Computer Host Name
[Enter] = Complete Entry [Esc]= Discard Changes

24. Select **Domain Name** then press Enter. Enter the computer's domain name then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) ME NETWORK NAME SETTINGS
Host Name Domain Name Shared/ Dedicated FQDN Dynamic DNS Update Computer Domain Name
[Enter] = Complete Entry [Esc]= Discard Changes

25. Select **Shared/Dedicated FQDN** then press Enter. Select **Shared** or **Dedicated** then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) ME NETWORK NAME SETTINGS
Host Name – Domain Name – Shared/ Dedicated FQDN <shared> Dynamic DNS Update <disabled></disabled></shared>
Dedicated Shared
$\uparrow\uparrow\downarrow$ ] = Move Highlight [Enter] = Complete Entry [Esc]= Discard Changes

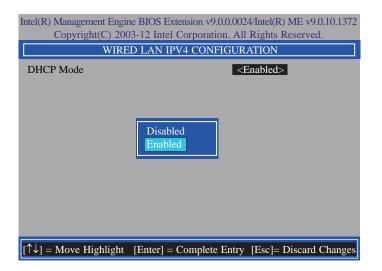
26. Select **Dynamic DNS Update** then press Enter. Select **Enabled** or **Disabled** then press Enter.

U U U	OS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Intel Corporation. All Rights Reserved.
1000	NETWORK NAME SETTINGS
Host Name Domain Name Shared/ Dedicated FQDN Dynamic DNS Update	− <shared> <b><disabled></disabled></b></shared>
Disa Enal	abled bled
$[\uparrow\downarrow] = Move Highlight$ [Ent	er] = Complete Entry [Esc]= Discard Changes

27. Select Previous Menu until you return to the Intel(R) ME Network Setup menu. Select TCP/IP Settings then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
TCP/ IP SETTINGS
> Wired LAN IPV4 Configuration
- The Brittin TT Connignation
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Select Entry [Esc]= Exit

28. In the TCP/IP Settings menu, select Wired LAN IPV4 Configuration then press Enter.



29. Select Previous Menu until you return to the Intel(R) AMT Configuration menu. Select Activate Network Access then press Enter. Type Y then press Enter.

	xtension v9.0.0024/Intel(R) ME v9.0.10.1372 Corporation. All Rights Reserved.
INTEL (R) AM	IT CONFIGURATION
Manageability Feature Selection > SOL/IDER/KVM	n < Enabled>
<ul> <li>&gt; User Consent</li> <li>Password Policy</li> <li>&gt; Network Setup</li> </ul>	<anytime></anytime>
> Kemole Setup And Conngl	tiviates the current network settings ad opens the ME netwotk interface Continue: (Y/N)
[↑↓] = Move Highlight [Enter]	= Select Entry [Esc]= Exit

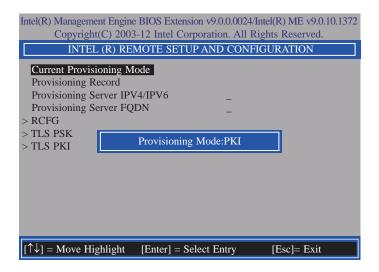
30. In the Intel(R) AMT Configuration menu, select Unconfigure Network Access then press Enter.



31. In the Intel(R) AMT Configuration menu, select Remote Setup And Configuration then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
INTEL (R) AMT CO	NFIGURATION
Manageability Feature Selection > SOL/IDER/KVM	< Enabled>
> User Consent Password Policy	<anytime></anytime>
> Network Setup Activate Network Access	
Unconfigure Network Access > Remote Setup And Configuration	<full unprovision=""></full>
> Power Control	
$[\uparrow\downarrow] = Move Highlight [Enter] = Sele$	ct Entry [Esc]= Exit

32. In the Intel(R) Remote Setup And Configuration menu, select Current Provisioning Mode then press Enter.



33. In the Intel(R) Remote Setup And Configuration menu, select Provisioning Record then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) REMOTE SETUP AND CONFIGURATION
Current Provisioning Mode Provisioning Record Provisioning Server IPV4/IPV6 Provisioning Server FQDN > RCFG > TLS PSK > TLS PSK Provision Record is not present
$[\uparrow\downarrow] =$ Move Highlight [Enter] = Select Entry [Esc]= Exit

 Select Previous Menu until you return to the Intel(R) Remote Setup And Configuration menu. Select Provisioning Server IPV4/IPV6 then press Enter. Type server address then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) REMOTE SETUP AND CONFIGURATION
Current Provisioning Mode Provisioning Record Provisioning Server IPV4/IPV6 Provisioning Server FQDN > RCFG > TLS PSK > TLS PKI Provisioning server address
[Enter] = Complete Entry [Esc]= Discard Changes

35. In the Intel(R) Remote Automated Setup And Configuration menu, select Provisioning Server FQDN then press Enter. Type FQDN of provisioning server then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0024/Intel(R) ME v9.0.10.1372
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) REMOTE SETUP AND CONFIGURATION
Current Provisioning Mode Provisioning Record Provisioning Server IPV4/IPV6 Provisioning Server FQDN > RCFG > TLS PSK > TLS PKI Enter FQDN of provisioning server
<enter> = Complete Entry [ESC]= Discard Changes</enter>

36. In the Intel(R) Remote Automated Setup And Configuration menu, select RCFG then press Enter. Select Start Configuration, and type Y then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) REMOTE CONFIGURATION
Start Configuration
This will activate Remote Configuration. Continue: (Y/N)
$\uparrow\downarrow$ ] = Move highlight [ENTER] = Select Entry [ESC]= Exit

37. In the Intel(R) Remote Automated Setup And Configuration menu, select TLS PSK then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) TLS PSK CONFIGURATION
Set PID and PPS ** Delete PID and PPS **
Enter PID (e.g. ABCD-1234)
$\uparrow\downarrow$ ] = Move highlight [ENTER] = Select Entry [ESC]= Exit

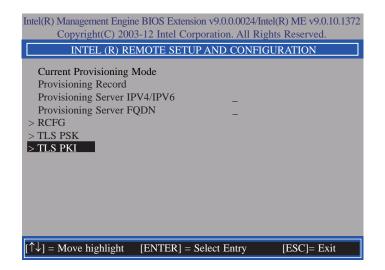
38. In the Intel(R) TLS PSK Configuration menu, select Set PID and PPS \*\* then press Enter. Type PID code then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.
INTEL (R) TLS PSK CONFIGURATION
Set PID and PPS ** Delete PID and PPS ** Enter PID (e.g. ABCD-1234)
[Enter] = Complete Entry [Esc]= Discard Changes

39. In the Intel(R) TLS PSK Configuration menu, select Delete PID and PPS \*\* then press Enter. Type Y then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.		
1,7 8 (	NTEL (R) TLS PSK CONFIGURATION	
Set PID and PPS Delete PID and P		
	CAUTION: This will delete the PID and PPS entries Continue: (Y/N)	
$\uparrow\uparrow\downarrow$ ] = Move high	light [ENTER] = Select Entry	[ESC]= Exit

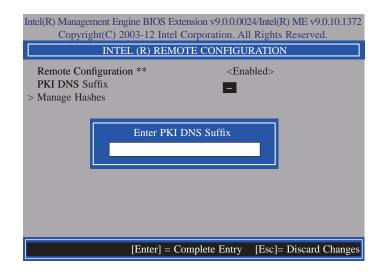
40. Select Previous Menu until you return to the Intel(R) Remote Setup And Configuration menu. Select TLS PKI then press Enter.



41. In the Intel(R) Remote Configuration menu, select Remote Configuration \*\* then press Enter. Select Disabled then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.		
INTEL (R) REMOTE CONFIGURATION		
Remote Configuration PKI DNS Suffix > Manage Hashes	** < <u><ena< u=""></ena<></u>	bled>
	Disabled Enabled	
[↑↓] = Move Highlight	[Enter] = Complete Entry	[Esc]= Discard Changes

42. In the Intel(R) Remote Configuration menu, select PKI DNS Suffix then press Enter. Type PKI DNS Suffix then press Enter.



43. In the Intel(R) Remote Configuration menu, select Manage Hashes then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.00024/Intel(R) ME v9.0.10.1372			
Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.			served.
INTEL (R) REMOTE CONFIGURATION			
Hash Name	Active	Default	Algorithm
VeriSign Class 3	Active: [*]	Default: [*]	SHA1
VeriSign Class 3	Active: [*]	Default: [*]	SHA1
Go Daddy Class 2	Active: [*]	Default: [*]	SHA1
Comodo AAA CA	Active: [*]	Default: [*]	SHA1
Starfield Class 2	Active: [*]	Default: [*]	SHA1
VeriSign Class 3	Active: [*]	Default: [*]	SHA1
VeriSign Class 3	Active: [*]	Default: [*]	SHA1
VeriSign Class 3	Active: [*]	Default: [*]	SHA1
GTE CyberTrust G1	Active: [*]	Default: [*]	SHA1
Baltimore Cyber Tr	Active: [*]	Default: [*]	SHA1
Cyber Trust Global	Active: [*]	Default: [*]	SHA1
Verizon Global Ro	Active: [*]	Default: [*]	SHA1
Entrust. net CA (2	Active: [*]	Default: [*]	SHA1
Entrust Root CA	Active: [*]	Default: [*]	SHA1
VeriSign Universa	Active: [*]	Default: [*]	SHA1
[Ins]= Add New Hash [↑↓] =Move Highlight	[Delete] = Delete Hash [Enter] = View Hash	[+] = Activate Hash [Esc]= Exit	

44. In the Intel(R) AMT Configuration menu, select Power Control then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.		
INTEL (R) AMT CONFIGURATION		
Manageability Feature Selection	< Enabled>	
> SOL/ IDER/ KVM		
> User Consent		
Password Policy	<anytime></anytime>	
> Network Setup		
Activate Netwok Access		
Unconfigure Network Access	<full unprovision=""></full>	
> Remote Setup And Configuration		
> Power Control		
$[\uparrow\downarrow] =$ Move Highlight [Enter] = S	elect Entry [Esc]= Exit	

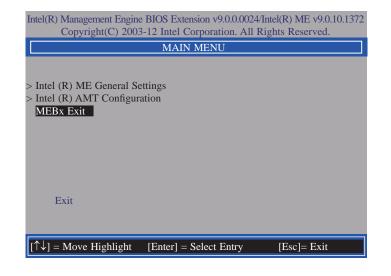
45. In the Intel(R) AMT Power Control menu, select Intel(R) AMT ON in Host Sleep States then press Enter. Select an option then press Enter.

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.1372 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.	
INTEL (R) AMT POWER CONTROL	
This configurations are effective only after AMT provisioning has started	
Intel (R) AMT ON in Host Sleep States	<desktop: in="" on="" s0,<br="">ME Wake in S3, S4-5&gt;</desktop:>
Idle Timeout	65535
Desktop: ON in S0 Desktop: ON in S0, ME Wake in S3, S	<u>84-5</u>
11 - Maus Highlight [Enter] - Complete I	Entry Ecol-Discourd Changes
$\uparrow\uparrow\downarrow$ ] = Move Highlight [Enter] = Complete Entry [Esc]= Discard Changes	

46. In the Intel(R) AMT Power Control menu, select Idle Timeout then press Enter. Enter the timeout value (1-65535).

Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.10.13 Copyright(C) 2003-12 Intel Corporation. All Rights Reserved.		
INTEL (R) AMT POWER CONTROL		
This configurations are effective only after AMT provisioning has started		
Intel (R) ME ON in Host Sleep States <desktop: in="" on="" s0,<="" td=""></desktop:>		
	ME Wake in S3, S4-5>	
Idle Timeout	65535	
Timeout Value (1-65	535)	
<pre><enter> = Complete Entry [ESC]= Discard Changes</enter></pre>		

47. Select Previous Menu until you return to the **Main Menu**. Select **Exit** then press Enter. Type **Y** then press Enter.



# Appendix A - Watchdog Sample Code

#include <stdio.h></stdio.h>	int GetWDTime(void)
/ ∉define EC_EnablePort 0x66	{ int sum,data_h,data_l;
define EC_DataPort 0x62	//Select EC Read Type
/	outportb(EC_EnablePort,0x80);
oid WriteEC(char,int);	delay(5);
void SetWDTime(int,int);	//Get Remaining Count High Byte
nt GetWDTime(void);	outportb(EC_DataPort,0xF4);
/	delay(5);
, nain()	data_h=inportb(EC_DataPort);
	delay(5);
unsigned int countdown;	//Select EC Read Type
unsigned int input,count_h,count_l;	outportb(EC_EnablePort,0x80);
	delay(5);
printf("Input WD Time: ");	//Get Remaining Count Low Byte
scanf("%d",&input);	outportb(EC_DataPort,0xF5);
printf("\n");	delay(5);
count_h=input>>8;	data_l=inportb(EC_DataPort);
count_l=input&0x00FF;	
SetWDTime(count_h,count_l);	delay(5);
Setwornine(count_i),	data h<<=8;
while(1)	$data_{1} < < = 0;$ $data_{h} = 0xFF00;$
<i>k</i>	sum=data_h data_l;
countdown = GetWDTime();	return sum;
delay(100);	i letuiri suiri,
printf("\rTime Remaining: %d ",countdown);	} //
}	void WriteEC(char EC_Addr, int data)
J	
/	//Select EC Write Type
, oid SetWDTime(int count_H,int count_L)	outportb(EC_EnablePort,0x81);
	delay(5);
//Set Count	outportb(EC_DataPort,EC_Addr);
WriteEC(0xB5,count_H); //High Byte	delay(5);
WriteEC(0xB6,count_L); //Low Byte	outportb(EC_DataPort,data);
//Enable Watch Dog Timer	delay(5);
WriteEC(0xB4,0x01);	
	} //
/	//

# Appendix B - System Error Message

When the BIOS encounters an error that requires the user to correct something, either a beep code will sound or a message will be displayed in a box in the middle of the screen and the message, PRESS F1 TO CONTINUE, CTRL-ALT-ESC or DEL TO ENTER SETUP, will be shown in the information box at the bottom. Enter Setup to correct the error.

### **Error Messages**

One or more of the following messages may be displayed if the BIOS detects an error during the POST. This list indicates the error messages for all Awards BIOSes:

### **CMOS BATTERY HAS FAILED**

The CMOS battery is no longer functional. It should be replaced.



Important:

Danger of explosion if battery incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

### CMOS CHECKSUM ERROR

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

## **DISPLAY SWITCH IS SET INCORRECTLY**

The display switch on the motherboard can be set to either monochrome or color. This indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, either turn off the system and change the jumper or enter Setup and change the VIDEO selection.

# Appendix C - Troubleshooting

## **Troubleshooting Checklist**

This chapter of the manual is designed to help you with problems that you may encounter with your personal computer. To efficiently troubleshoot your system, treat each problem individually. This is to ensure an accurate diagnosis of the problem in case a problem has multiple causes.

Some of the most common things to check when you encounter problems while using your system are listed below.

1. The power switch of each peripheral device is turned on.

2. All cables and power cords are tightly connected.

3. The electrical outlet to which your peripheral devices are connected is working. Test the outlet by plugging in a lamp or other electrical device.

4. The monitor is turned on.

5. The display's brightness and contrast controls are adjusted properly.

6. All add-in boards in the expansion slots are seated securely.

7. Any add-in board you have installed is designed for your system and is set up correctly.

## **Monitor/Display**

### If the display screen remains dark after the system is turned on:

1. Make sure that the monitor's power switch is on.

2. Check that one end of the monitor's power cord is properly attached to the monitor and the other end is plugged into a working AC outlet. If necessary, try another outlet.

3. Check that the video input cable is properly attached to the monitor and the system's display adapter.

4. Adjust the brightness of the display by turning the monitor's brightness control knob.

### The picture seems to be constantly moving.

1. The monitor has lost its vertical sync. Adjust the monitor's vertical sync.

2. Move away any objects, such as another monitor or fan, that may be creating a magnetic field around the display.

3. Make sure your video card's output frequencies are supported by this monitor.

### The screen seems to be constantly wavering.

1. If the monitor is close to another monitor, the adjacent monitor may need to be turned off. Fluorescent lights adjacent to the monitor may also cause screen wavering.

### **Power Supply**

#### When the computer is turned on, nothing happens.

1. Check that one end of the AC power cord is plugged into a live outlet and the other end properly plugged into the back of the system.

2. Make sure that the voltage selection switch on the back panel is set for the correct type of voltage you are using.

3. The power cord may have a "short" or "open". Inspect the cord and install a new one if necessary.

# Appendix C

### Hard Drive

### Hard disk failure.

1. Make sure the correct drive type for the hard disk drive has been entered in the BIOS.

2. If the system is configured with two hard drives, make sure the bootable (first) hard drive is configured as Master and the second hard drive is configured as Slave. The master hard drive must have an active/bootable partition.

### Excessively long formatting period.

If your hard drive takes an excessively long period of time to format, it is likely a cable connection problem. However, if your hard drive has a large capacity, it will take a longer time to format.

## **Serial Port**

### The serial device (modem, printer) doesn't output anything or is outputting garbled

### characters.

1. Make sure that the serial device's power is turned on and that the device is on-line.

2. Verify that the device is plugged into the correct serial port on the rear of the computer.

3. Verify that the attached serial device works by attaching it to a serial port that is working and configured correctly. If the serial device does not work, either the cable or the serial device has a problem. If the serial device works, the problem may be due to the onboard I/O or the address setting.

4. Make sure the COM settings and I/O address are configured correctly.

## **Keyboard**

### Nothing happens when a key on the keyboard was pressed.

1. Make sure the keyboard is properly connected.

2. Make sure there are no objects resting on the keyboard and that no keys are pressed during the booting process.

## System Board

1. Make sure the add-in card is seated securely in the expansion slot. If the add-in card is loose, power off the system, re-install the card and power up the system.

- 2. Check the jumper settings to ensure that the jumpers are properly set.
- 3. Verify that all memory modules are seated securely into the memory sockets.
- 4. Make sure the memory modules are in the correct locations.

5. If the board fails to function, place the board on a flat surface and seat all socketed components. Gently press each component into the socket.

6. If you made changes to the BIOS settings, re-enter setup and load the BIOS defaults.