

MI970VF/MI970F

Intel® QM77 / HM76

Mini-ITX Motherboard

USER'S MANUAL

Version 1.1

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Introduction

Product Description

The MI970VF Mini ITX motherboard is based on the latest Intel® QM77 chipset. The platform supports 3rd generation Intel® Core processor family with rPGA988B packing and feature an integrated dual-channel DDR3 memory controller as well as a graphics core.

The latest Intel® processors provide advanced performance in both computing and graphics quality. This meets the requirement of customers in the gaming, POS, digital signage and server market segment.

The QM77 platform is made with 22-nanometer technology that supports Intel's first processor architecture to unite the CPU and the graphics core on the transistor level. The MI970VF Mini ITX board utilizes the dramatic increase in performance provided this Intel's latest cutting-edge technology. Measuring 170mm x 170mm, the MI970F offers fast 6Gbps SATA support (2 ports), USB3.0 (4 ports) and interfaces for DVI-D, DVI-I, LVDS and DisplayPort displays. MI970VF features Intel Active Management Technology 8.0.

MI970F FEATURES:

- Supports Intel® 3rd Generation Core i7/i5/i3 QC/DC mobile processors
- Two DDR3 SoDIMM, 1066/1333/1600MHz, Max. 16GB memory
- Dual Intel® PCI-Express Gigabit LAN
- Integrated Graphics for DVI-I, DVI-D/DisplayPort/LVDS displays
- 4x SATA 2.0, 2x SATA 3.0, 8x USB 2.0, USB 3.0 (4 ports), 4x COM, Watchdog timer
- 1x PCI-E (x16), 2x Mini PCI-E
- Optional AMT (MI970AF only)

Checklist

Your MI970 package should include the items listed below.

- The MI970 Mini-ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Serial ATA cable

MI970 Specifications

Product Name	MI970F [Supports ErP] MI970VF [Supports iAMT 8.0, TPM & vPro]
Form Factor	Mini-ITX
CPU Type	- Intel® 3 rd Generation Core™ i7/i5/i3 mobile processors - rPGA package, 37.5 mm x 37.5mm - TDP: QC = 45W/ DC = 35W **Ivy Bridge CPU socket is compatible with Sandy Bridge CPU**
CPU Speed	Up to 2.7GHz
Cache	Up to 8MB
CPU Socket	rPGA 988B (Socket G2)
Chipset	Intel® QM77 Platform Controller Hub (MI970VF) Intel® HM76 Platform Controller Hub (MI970F) 25 x 27 mm package size
BIOS	AMI BIOS [16MB SPI ROM]
Memory	Intel® Ivy-Bridge mobile processors integrated memory controller DDR3 1066/1333/1600 MHz - SO-DIMM [204-pin vertical type] x 2 (Non-ECC), Max. 16GB
VGA	- Intel® Ivy-Bridge mobile processor integrated Gfx, supports 3 independent displays, Direct X 11, OpenGL 3.1, Open CL 1.1 ● DVI-I X 1 (thru Level shifter ASM1442) ● DVI-D X 1 (thru DP to DVI converter ANX9830C) ● DisplayPort x 1 ● LVDS : DF13 x 2 for dual channel 24-bit support
LAN	1. Intel® Lewisville 82579LM GbE PHY [MI970VF only] or Intel® Lewisville 82579V GbE PHY [MI970F only] 2. Intel® 82583V as 2 nd GbE
USB	USB 2.0 host controller [Panther Point integrated], supports 8 ports - 4 ports in the rear panel - 2 ports via onboard pin header (2.54mm pitch) - 2 ports via MiniPCIe sockets USB 3.0 host controller [Panther Point integrated], support 4 ports - 2 ports in the rear panel - 2 ports via onboard box-header type [Blue color]
Serial ATA	Intel® QM77 PCH built-in SATA controller, supports total 6 ports 2 x SATA (3.0) 6Gbps+ 4 x SATA (2.0) 3Gbps ports
Audio	Intel® QM77 PCH built-in High Definition Audio controller + Realtek ALC892 w/ 7.1 channels
LPC I/O	Fintek F81866AD-I (128-pin LQFP [14mm x 14 mm]) COM1 (RS232/422/485) [EXAR SP339EER1 232/422/485 transceiver x 1 for jumper-less] COM2/COM3/COM4 (RS232), Hardware Monitor (2 thermal inputs, 4 voltage monitor inputs & 2 Fan headers) [CPU FAN & SYS FAN (DC Fan type, 3-pin connector)] COM1/2 with pin-9 with power for 2 ports (500 mA for each port)
Digital IO	4 in & 4 out
TPM 1.2	Nuvoton WPCT210AA0WX (MI970VF only) **Operation temperature for 0 ~ +60 degree C only**
iAMT	Intel® QM77 PCH built-in (MI970VF only) - Intel® Active Management Technology ver. 8.0
Expansion Slots	- PCI-Express (16x) x1 [Gen 3.0 PEG] - Mini PCI-Express x1 port [Full-sized] w/mSATA +USB 2.0 support - Mini PCI-Express x1 port [Half-sized] w/ USB 2.0 support

INTRODUCTION

Edge Connector [The same as MI956]	Dual DB9 stack connector for COM #1 / #2 DVI-D + DVI-I stack connector x 1 USB(3.0) dual stack + DP connector x1 RJ-45 + dual USB(2.0) stack connector x2 Triplet type Jack 3 x 1 for HD Audio
Onboard Header/Connector	2 ports x SATA III [Blue color] , 4 ports x SATA II , mSATA (w/JEDEC MO-300) [Share with SATA #5] DF-11 8 pins connector x 1 for 2 ports USB 2.0 DF-13 20 pins connector x 2 for dual –channel LVDS 2x10 pins box-header x 1 for 2 ports USB 3.0 [Blue color] 2x5 pins pin-header x 1 for front panel audio [Support 7.1 Channel] 2x5 pins pin-header x 2 for COM3 & COM4 2x5 pins pin-header x 1 for Digital IO 4 pins box header x 1 for LCD backlight control 1 x 5 pins pin-header x 1 for IrDA
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec/min)
System Voltage	ATX standard 20-pin type 4 pin type (+12V only)[For full system loading usage]
Others	- vPro [MI970VF only] - ErP feature for MI970F(F81866AD-I integrated ,WOL from 2nd GbE - iSMART function (TI MSP430G2433) - AT24C02C EEPROM [SO8 type] via SMBus (Optional)
Board Size	170mm x 170mm



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Installations

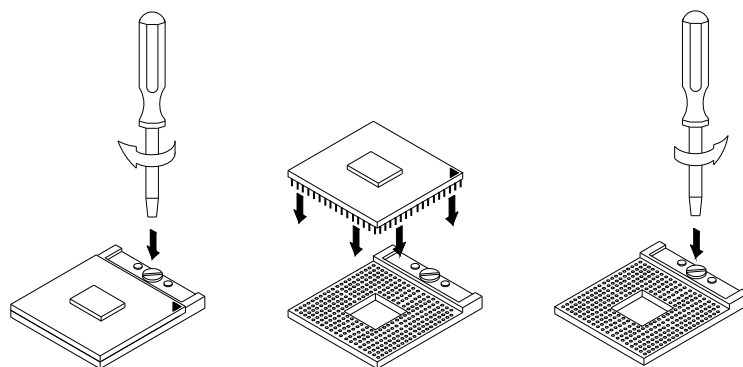
This section provides information on how to use the jumpers and connectors on the MI970 in order to set up a workable system. The topics covered are:

Installing the CPU	Fehler! Textmarke nicht definiert.
Installing the Memory	Fehler! Textmarke nicht definiert.
Setting the Jumpers.....	Fehler! Textmarke nicht definiert.
Connectors on MI970.....	Fehler! Textmarke nicht definiert.

Installing the CPU

The MI970 board supports rPGA988B socket for Intel® Ivy Bridge Dual Core mobile processors.

The processor socket comes with a screw to secure the processor. As shown in the left picture below, loosen the screw first before inserting the processor. Place the processor into the socket by making sure the notch on the corner of the CPU corresponds with the notch on the inside of the socket. Once the processor has slide into the socket, fasten the screw. Refer to the figures below.



NOTE: Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.

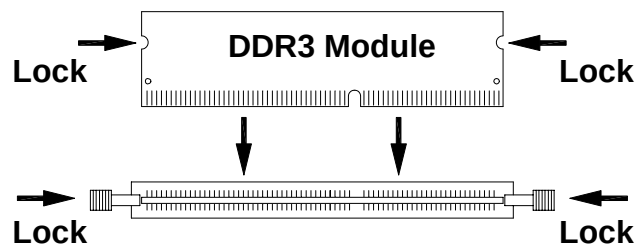
Installing the Memory

The MI970 board supports two DDR3 memory socket for a maximum total memory of 16GB in DDR3 SO-DIMM memory type.

Installing and Removing Memory Modules

To install the DDR3 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR3 module so that the key of the DDR3 module aligned with that on the memory slot.
2. Gently push the DDR3 module in an upright position until the clips of the slot close to hold the DDR3 module in place when the DDR3 module touches the bottom of the slot.
3. To remove the DDR3 module, press the clips with both hands.

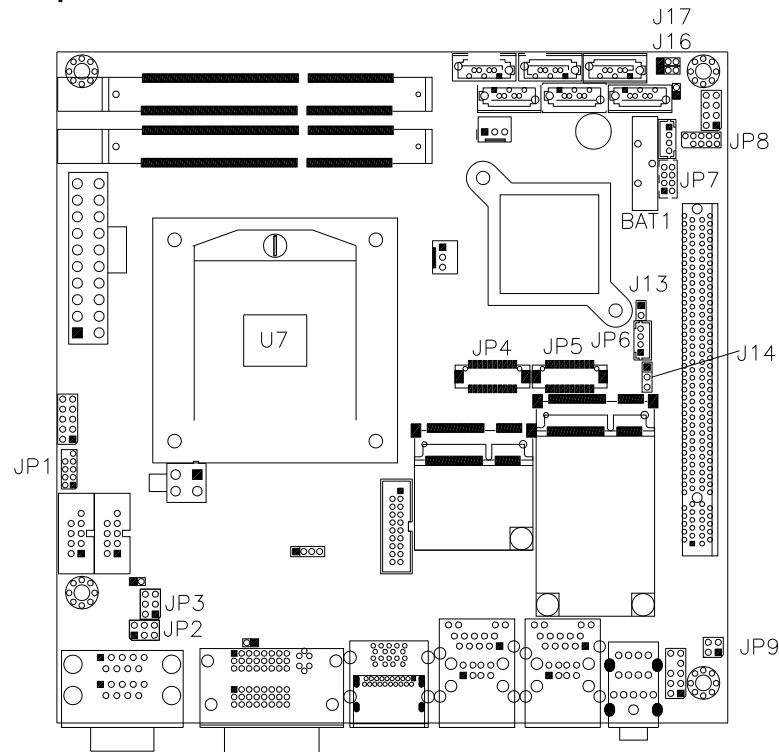


Setting the Jumpers

Jumpers are used on MI970 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on MI970 and their respective functions.

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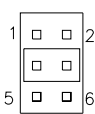
Jumper Locations on MI970



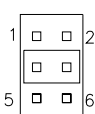
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JP1: LPC debug Connector (Factory use only)

JP2: COM1 RS232 RI/+5V/+12V Power Setting

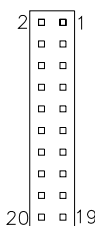
JP2	Setting	Function
	Pin 1-2 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-6 Short/Closed	+5V

JP3: COM2 RS232 RI/+5V/+12V Power Setting

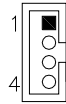
JP3	Setting	Function
	Pin 1-2 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-6 Short/Closed	+5V

JP4, JP5: LVDS Connectors (1st channel, 2nd channel)

The LVDS connectors on board consist of the first channel (LVDS1) and second channel (LVDS2).

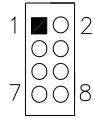
	Signal Name	Pin #	Pin #	Signal Name
	TX0-	2	1	TX0+
	Ground	4	3	Ground
	TX1-	6	5	TX1+
	5V/3.3V	8	7	Ground
	TX3-	10	9	TX3+
	TX2-	12	11	TX2+
	Ground	14	13	Ground
	TXC-	16	15	TXC+
	5V/3.3V	18	17	ENABKL
	+12V	20	19	+12V

JP6: LCD Backlight Connector



Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

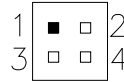
JP7: USB4/USB5 Connector



Signal Name	Pin #	Pin #	Signal Name
Vcc	1	2	Ground
D0-	3	4	D1+
D0+	5	6	D1-
Ground	7	8	Vcc

JP8: SPI Flash connector (Factory use only)

JP9: SPDIF I/O



Pin #	Signal Name
1	SPDIF IN
2	Ground
3	SPDIF OUT
4	Ground

J13: Flash Descriptor Security Override (Factory use only)

J13	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

J14: LCD Panel Power Selection

J14	LCD Panel Power
 1 2 3	3.3V
 1 2 3	5V

J16: Clear ME Contents

J16	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Normal
 1 2 3	Pin 2-3 Short/Closed	Clear

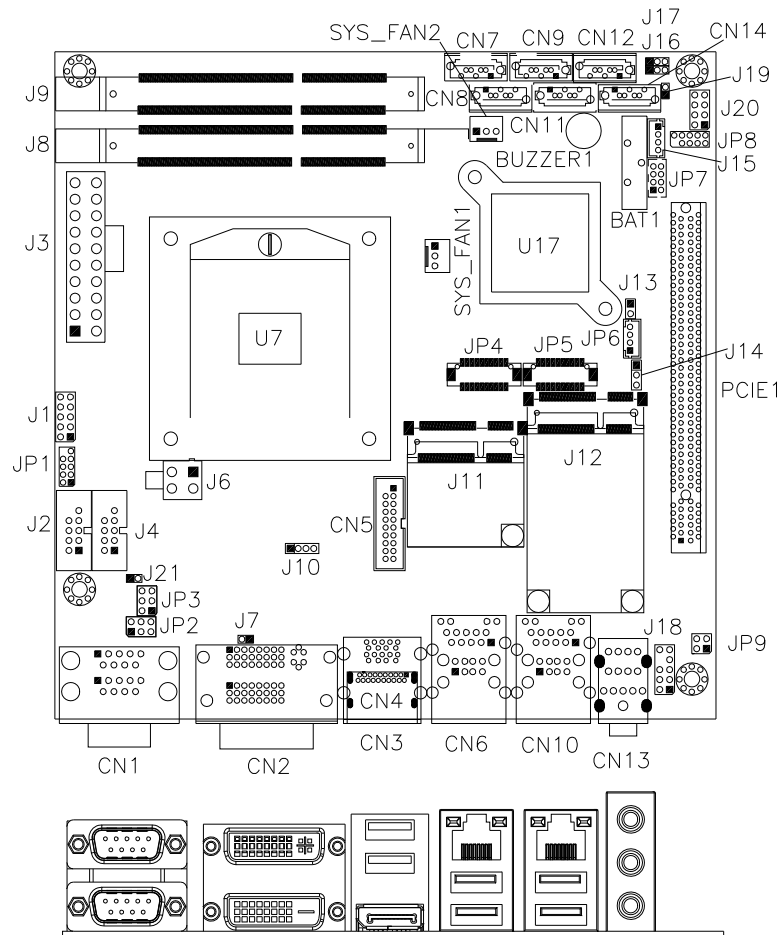
J17: Clear CMOS Contents

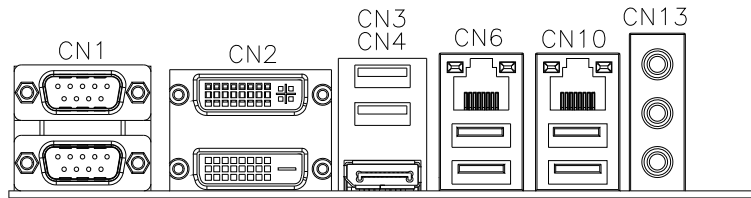
J17	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Normal
 1 2 3	Pin 2-3 Short/Closed	Clear CMOS

Connectors on MI970

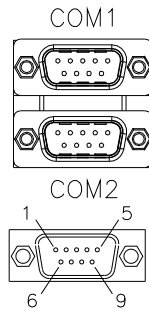
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Connector Locations on MI970



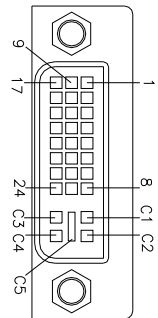


CN1: COM1 and COM2 Serial Ports

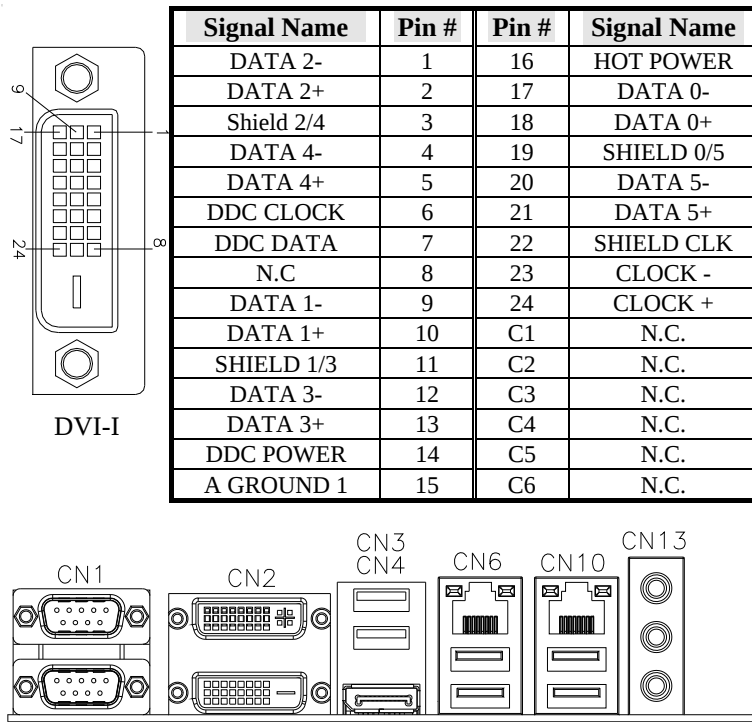


Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

CN2: DVI-D and DVI-I Connector



Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
Shield 2/4	3	18	DATA 0+
DATA 4-	4	19	SHIELD 0/5
DATA 4+	5	20	DATA 5-
DDC CLOCK	6	21	DATA 5+
DDC DATA	7	22	SHIELD CLK
N.C	8	23	CLOCK -
DATA 1-	9	24	CLOCK +
DATA 1+	10	C1	Analog Red
SHIELD 1/3	11	C2	Analog Green
DATA 3-	12	C3	Analog Blue
DATA 3+	13	C4	Analog HYNC
DDC POWER	14	C5	A GROUND2
A GROUND 1	15	C6	A GROUND3



CN3: USB3

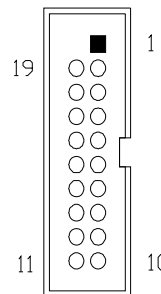
CN4: DisplayPort

CN6: Gigabit LAN (82579LM/V) +USB2 12/13

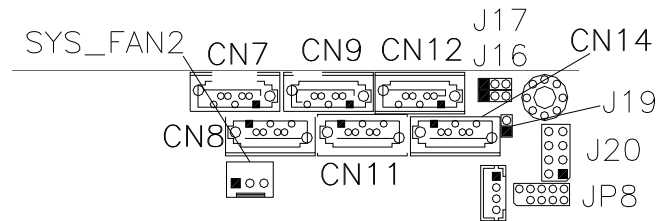
CN10: Gigabit LAN (82583V) + USB2 8/9

CN13: HDA Audio connector

CN5: USB3 Connector



Signal Name	Pin #	Pin #	Signal Name
Vcc	1	X	
P1_SSRX-	2	19	Vcc
P1_SSRX+	3	18	P2_SSRX-
GND	4	17	P2_SSRX+
P1_SSTX-	5	16	GND
P1_SSTX+	6	15	P2_SSTX-
GND	7	14	P2_SSTX+
P1_U2_D-	8	13	GND
P1_U2_D+	9	12	P2_U2_D-
NC	10	11	P2_U2_D+



CN7: SATA3 Connector Port2

CN8: SATA3 Connector Port1

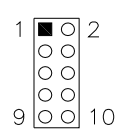
CN9: SATA2 Connector Port4

CN11: SATA2 Connector Port3

CN12: SATA2 Connector Port6 (Share with mSATA)

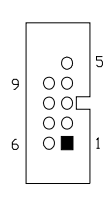
CN14: SATA2 Connector Port5

J1: Digital I/O Connector (4 in, 4 out)



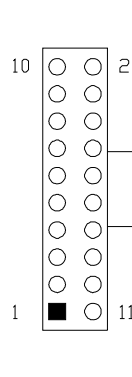
Signal Name	Pin #	Pin #	Signal Name
Ground	1	2	+5V
Out3	3	4	Out1
Out2	5	6	Out0
IN3	7	8	IN1
IN2	9	10	IN0

J4, J2: COM3, COM4 RS232 Serial Ports



Signal Name	Pin #	Pin #	Signal Name
DCD#	1	6	DSR#
SIN#	2	7	RTS#
SOUT	3	8	CTS#
DTR#	4	9	RI#
GND	5	X	KEY

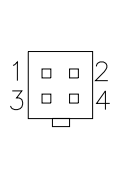
J3: ATX Power Supply Connector



Signal Name	Pin #	Pin #	Signal Name
3.3V	11	1	3.3V
-12V	12	2	3.3V
Ground	13	3	Ground
PS-ON	14	4	+5V
Ground	15	5	Ground
Ground	16	6	+5V
Ground	17	7	Ground
-5V	18	8	Power good
+5V	19	9	5VSB
+5V	20	10	+12V

J6: ATX 12V Power Connector

This connector supplies the CPU operating voltage.



Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

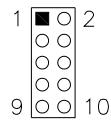
J8: DDR SO-DIMM Channel A

J9: DDR SO-DIMM Channel B

J11: Mini-PCIE Connector

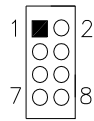
J12: Mini-PCIE Connector and mSATA/share with CN12

J18: Audio Pin Header for Chassis Front Panel



Signal Name	Pin #	Pin #	Signal Name
MIC IN_L	1	2	Ground
MIC IN_R	3	4	DET
LINE_R	5	6	Ground
Sense	7	8	KEY
LINE_L	9	10	Ground

J20: Front Panel

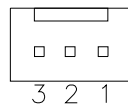


Signal Name	Pin #	Pin #	Signal Name
Power BTN	1	2	Power BTN
HDD LED+	3	4	HDD LED-
Reset BTN	5	6	Reset BTN
Power LED+	7	8	Power LED-

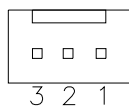
J21: PCIE Configuration

J21	PCIE Configuration
OPEN	PCIE X16 (DEFAULT)
CLOSE	PCIE X8, X8

SYS_FAN1: CPU Fan Power Connector



Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

SYS_FAN2: System Fan Power Connector

Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

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BIOS Introduction

The BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the key immediately allows you to enter the Setup utility. If you are a little bit late pressing the key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

Press to Enter Setup

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Warning: *It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

Main Settings

Aptio Setup Utility – Copyright © 2011 American Megatrends, Inc.

Main	Advanced	Chipset	Boot	Security	Save & Exit
BIOS Information				Choose the system default language	
System Language				[English]	→ ← Select Screen
System Date				[Tue 01/20/2009]	↑ ↓ Select Item
System Time				[00.00.00]	Enter: Select
Access Level				Administrator	+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

System Language

Choose the system default language.

System Date

Set the Date. Use Tab to switch between Data elements.

System Time

Set the Time. Use Tab to switch between Data elements.

Advanced Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
▶ PCI Subsystem Settings ▶ ACPI Settings ▶ Wake up event setting ▶ Trusted Computing ▶ CPU Configuration ▶ SATA Configuration ▶ Shutdown Temperature Configuration ▶ iSmart Controller ▶ AMT Configuration ▶ Acoustic Management Configuration ▶ USB Configuration ▶ F81866 Super IO Configuration ▶ F81866 H/W Monitor ▶ CPU PPM Configuration				→ ←Select Screen ↑ ↓ Select Item Enter: Select + - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

PCI Subsystem Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Bus Driver Version		V 2.0502			
▶ PCI Express Settings				→ ←Select Screen ↑ ↓ Select Item Enter: Select + - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

PCI Express Settings

Change PCI Express devices settings.

PCI Express Settings

Aptio Setup Utility

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

Relaxed Ordering

Enables or disables PCI Express Device Relaxed Ordering.

Extended Tag

If ENABLED allows device to use 8-bit Tag field as a requester.

No Snoop

Enables or disables PCI Express Device No Snoop option.

Maximum Payload

Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.

Maximum Read Request

Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.

ASPM Support

Set the ASPM Level: Force L0s – Force all links to L0s State:

AUTO – BIOS auto configure : DISABLE – Disables ASPM.

Extended Synch

If ENABLED allows generation of Extended Synchronization patterns.

Link Training Retry

Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.

Link Training Timeout (uS)

Defines number of Microseconds software will wait before polling 'Link Training' bit in Link Status register. Value range from 10 to 1000 uS.

Unpopulated Links

In order to save power, software will disable unpopulated PCI Express links, if this option set to 'Disable Link'.

ACPI Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
ACPI Settings				→ ←Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
Enable Hibernation		Enabled			
ACPI Sleep State		S3 (Suspend to R...)			
Lock Legacy Resources		Disabled			
S3 Video Repost		Disabled			

Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

ACPI Sleep State

Select ACPI sleep state the system will enter, when the SUSPEND button is pressed.

Lock Legacy Resources

Enabled or Disabled Lock of Legacy Resources.

S3 Video Repost

Enable or disable S3 Video Repost.

Wake up event settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
			Wake on Ring	Disabled	
			Wake on PCI PME	Disabled	
			Wake on PCIE Wake Event	Disabled	
					→ ← Select Screen
					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Wake on PCIE PME Wake Event

The options are Disabled and Enabled.

Trusted Computing

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
			TPM Configuration		
			TPM SUPPORT	Disabled	
			Current TPM Status Information		
			TPM SUPPORT OFF		
					→ ← Select Screen
					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

TPM Support

This configuration is supported only with MI970VF. Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required.

Security Device Support

Enables or disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

CPU Configuration

This section shows the CPU configuration parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU Configuration					
Intel® Core™ i7-3770 CPU @ 3.40GHz					
Processor Stepping		306a8			
Microcode Revision		c			
Max CPU Speed		3400 MHz			
Min CPU Speed		1600 MHz			
CPU Speed		3400 MHz			
Processor Cores		4			
Intel HT Technology		Supported			
Intel VT-x Technology		Supported			
Intel SMX Technology		Supported			
64-bit		Supported			
Hyper-threading		Enabled			
Active Processor Cores		All			
Limit CPUID Maximum		Disabled			
Execute Disable Bit		Enabled			
Intel Virtualization Technology		Disabled			
Hardware Prefetcher		Disabled			
Adjacent Cache Line Prefetch		Enabled			
				→ ←Select Screen	
				↑ ↓ Select Item	
				Enter: Select	
				+- Change Field	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Default	
				F4: Save ESC: Exit	

Hyper-threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled, only one thread per enabled core is enabled.

Active Processor Cores

Number of cores to enable in each processor package.

Limit CPUID Maximum

Disabled for Windows XP.

Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Hardware Prefetcher

To turn on/off the Mid level Cache (L2) streamer Prefetcher.

Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

SATA Configuration

SATA Devices Configuration.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
SATA Controller(s)		Enabled		→ ←Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
SATA Mode Selection		AHCI			
Aggressive LPM Support		Enabled			
SATA Controller Speed		Gen3			
SATA Port0		Empty			
Software Preserve		Unknown			
SATA Port1		Empty			
Software Preserve		Unknown			
SATA Port2		Empty			
Software Preserve		Unknown			
SATA Port3		Empty			
Software Preserve		Unknown			
SATA Port4		Empty			
Software Preserve		Unknown			
SATA Port5		Empty			
Software Preserve		Unknown			

SATA Controller(s)

Enable / Disable Serial ATA Controller.

SATA Mode Selection

- (1) IDE Mode.
- (2) AHCI Mode.
- (3) RAID Mode.

Shutdown Temperature Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
ACPI Shutdown Temperature				Disabled	→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

ACPI Shutdown Temperature

The default setting is Disabled.

iSmart Controller

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
iSmart Controller					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Power-On after Power failure			Disable		
Schedule Slot 1			None		
Schedule Slot 2			None		

iSmart Controller

Setup the power on time for the system.

Schedule Slot 1 / 2

Setup the hour/minute for system power on.

AMT Configuration

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Intel AMT			Enabled	→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
BIOS Hotkey Pressed			Disabled		
MEBx Selection Screen			Disabled		
Hide Un-Configure ME Confirmation			Disabled		
Un-Configure ME			Disabled		
Amt Wait Timer			0		
Activate Remote Assistance Process			Disabled		
USB Configure			Enabled		
PET Progress			Enabled		
AMT CIRA Timeout			0		
Watchdog			Disabled		
OS Timer			0		
BIOS Timer			0		

AMT Configuration

This configuration is supported only with MI970VF (with iAMT function). Options are Enabled and Disabled.

Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

Unconfigure ME

This configuration is supported only with MI970VF (with iAMT function). Perform AMT/ME unconfigure without password operation.

Amt Wait Timer

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

Activate Remote Assistance Process

Trigger CIRA boot.

PET Progress

User can Enable/Disable PET Events progress to receive PET events or not.

Watchdog Timer

This configuration is supported only with MI970VF (with iAMT function). Enable/Disable Watchdog Timer.

Acoustic Management Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Acoustic Management Configuration					
Acoustic Management				Disabled	
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

USB Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Devices: 2 Hubs					
Legacy USB Support				Enabled	
USB3.0 Support				Enabled	
XHCI Hand-off				Enabled	
EHCI Hand-off				Enabled	
Port 60/64 Emulation				Enabled	
USB hardware delays and time-outs:					
USB Transfer time-out				20 sec	
Device reset time-out				20 sec	
Device power-up delay				Auto	
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

Legacy USB Support

Enables Legacy USB support.

AUTO option disables legacy support if no USB devices are connected.

DISABLE option will keep USB devices available only for EFI applications.

USB3.0 Support

Enable/Disable USB3.0 (XHCI) Controller support.

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

EHCI Hand-off

Enabled/Disabled. This is a workaround for OSES without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

Port 64/60 Emulation

Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSES.

USB Transfer time-out

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

Device reset time-out

USB mass Storage device start Unit command time-out.

Device power-up delay

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

F81866 Super IO Configuration

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Super IO Configuration				→ ← Select Screen	
F81866 Super IO Chip				↑ ↓ Select Item	
F81866 ERP Support				Enter: Select	
▶ Serial Port 0 Configuration				+- Change Field	
▶ Serial Port 1 Configuration				F1: General Help	
▶ Serial Port 2 Configuration				F2: Previous Values	
▶ Serial Port 3 Configuration				F3: Optimized Default	
▶ IR Configuration				F4: Save ESC: Exit	
LVDS Backlight Level Control				[Level-1 (3.3V)]	

Serial Port Configuration

Set Parameters of Serial Ports. User can Enable/Disable the serial port and Select an optimal settings for the Super IO Device.

F81866 H/W Monitor

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					
CPU temperature			+41 C		
SYS temperature			+35 C		
CPU FAN Speed			2115 RPM		
SYS FAN Speed			N/A		
Vcore			+1.000 V		
+Vcc5V			+5.213 V		
+Vcc12V			+12.408 V		
+1.5V			+1.544 V		
+Vcc3.3V			+3.424 V		
Fan1 smart fan control			Disabled		
Fan2 smart fan control			Disabled		
					→ ← Select Screen
					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Temperatures/Voltages

These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

Fan1/Fan2 Smart Fan Control

This field enables or disables the smart fan feature. At a certain temperature, the fan starts turning. Once the temperature drops to a certain level, it stops turning again.

CPU PPM Configuration

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU PPM Configuration					
EIST				Enabled	
Turbo Mode				Enabled	
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

EIST

Enable/Disable Intel SpeedStep.

Chipset Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
▶ PCH-IO Configuration ▶ System Agent (SA) Configuration					
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
		Intel PCH RC Version	1.1.0.0		
		Intel PCH SKU Name	Q77		
		Intel PCH Rev ID	O4/C1		
		▶ PCI Express Configuration			
		▶ USB Configuration			
		▶ PCH Azalia Configuration			
		PCH LAN Controller	Enabled		
		Wake on LAN	Enabled		
		High Precision Event Timer Configuration			
		High Precision Timer	Enabled		
		SLP_S4 Assertion Width	4-5 Seconds		
		Restore AC Power Loss	Power On		
				→ ← Select Screen	
				↑ ↓ Select Item	
				Enter: Select	
				+- Change Field	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Default	
				F4: Save ESC: Exit	

PCH LAN Controller

Enable or disable onboard NIC.

Wake on LAN

Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)

SLP_S4 Assertion Width

Select a minimum assertion width of the SLP_S4# signal.

Restore AC Power Loss

Select AC power state when power is re-applied after a power failure.

PCI Express Configuration

Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Express Configuration					
PCI Express Clock Gating			Enabled		
DMI Link ASPM Control			Enabled		
DMI Link Extended Synch Control			Disabled		
PCIe-USB Glitch W/A			Disabled		
Subtractive Decode			Disabled		
▶ 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-E Port 6 is assigned to LAN ▶ PCI Express Root Port 7 ▶ PCI Express Root Port 8			→ ← Select Screen ↑ ↓ Select Item Enter: Select + - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit		

PCI Express Clock Gating

Enable or disable PCI Express Clock Gating for each root port.

DMI Link ASPM Control

The control of Active State Power Management on both NB side and SB side of the DMI link.

PCIe-USB Glitch W/A

PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIe/PEG port.

USB Configuration

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
XHCI Pre-Boot Driver			Enabled	→ ← Select Screen ↑ ↓ Select Item Enter: Select + - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
xHCI Mode			Smart Auto		
HS Port #1 Switchable			Enabled		
HS Port #2 Switchable			Enabled		
HS Port #3 Switchable			Enabled		
HS Port #4 Switchable			Enabled		
xHCI Streams			Enabled		
EHCI1			Enabled		
EHCI2			Enabled		
USB Ports Per-Port Disable Control			Disabled		

HS Port #1/2/3/4 Switchable

Allows for HS port switching between xHCI and EHCI. If disabled, port is routed to EHCI. If HS port is routed to xHCI, the corresponding SS port is enabled.

xHCI Streams

Enable or disable xHCI Maximum Primary Stream Array Size.

EHCI1/2

Control the USAB EHCI (USB 2.0) functions. One EHCI controller must always be enabled.

USB Ports Per-Port Disable Control

Control each of the USB ports (0~13) disabling.

PCH Azalia Configuration

Main	Advanced	Chipset	Boot	Security	Save & Exit
PCH Azalia Configuration				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
Azalia		Auto			

Azalia

Control Detection of the Azalia device.

Disabled = Azalia will unconditionally disabled.

Enabled Azalia will be unconditionally enabled.

Auto = Azalia will enabled if present, disabled otherwise.

System Agent (SA) Configuration

Aptio Setup Utility

Apilo Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
System Agent Bridge Name			IvyBridge	→ ←Select Screen ↑ ↓ Select Item Enter: Select + - Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
System Agent RC Version			1.1.0.0		
VT-d Capability			Supported		
VT-d			Enabled		
CHAP Device (B0:D7:F0)			Disabled		
Thermal Device (B0:D4:F0)			Disabled		
Enable NB CRID			Disabled		
BDAT ACPI Table Support			Disabled		
C-State Pre-Wake			Enabled		
▶ Graphics Configuration					
▶ Memory Configuration					

VT-d

Check to enable VT-d function on MCH.

Enable NB CRID

Enable or disable NB CRID WorkAround.

C-State Pre-Wake

Controls C-State Pre-Wake feature for ARAT, in SSKPD[57].

Graphics Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Graphics Configuration					
IGFX VBIOS Version			2132		
IGfx Frequency			350 MHz		
Primary Display			Auto		
Internal Graphics			Auto		→ ← Select Screen
GTT Size			2MB		↑ ↓ Select Item
Aperture Size			256MB		Enter: Select
DVMT Pre-Allocated			64M		+ - Change Field
DVMT Total Gfx Mode			Disabled		F1: General Help
► LCD Control					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Primary Display

Select which of IGFX/PEG/PCI graphics device should be primary display or select SG for switchable Gfx.

Internal Graphics

Keep IGD enabled based on the setup options.

DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) graphics memory size used by the internal graphics device.

DVMT Total Gfx Mem

Select DVMT 5.0 total graphics memory size used by the internal graphics device.

Gfx Low Power Mode

This option is applicable for SFF only.

Primary IGFX Boot Display (LCD Control)

Select the Video Device that will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.

Memory Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Memory Information					
Memory Frequency			1333 MHz		
Total Memory			8192 MB (DDR3)		
DIMM#0			2048 MB (DDR3)		
DIMM#1			2048 MB (DDR3)		
DIMM#2			2048 MB (DDR3)		
DIMM#3			2048 MB (DDR3)		
CAS Latency (tCL)			9		
Minimum delay time					
CAS to RAS (tRCDmin)			9		
Row Precharge (tRPmin)			9		
Active to Precharge (tRASmin)			24		
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

Boot Settings

This section allows you to configure the boot settings.

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Boot Configuration					
Setup Prompt Timeout			1		
Bootup NumLock State			On		
Quiet Boot			Disabled		
Fast Boot			Disabled		
CSM16 Module Version			07.69		
GateA20 Active			Upon Request		
Option ROM Messages			Force BIOS		
INT19 Trap Response			Immediate		
Boot Option Priorities					
► CSM parameters					
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

Setup Prompt Timeout

Number of seconds to wait for setup activation key.

65535(0xFFFF) means indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state.

Quiet Boot

Enables/Disables Quiet Boot option.

Fast Boot

Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

GateA20 Active

UPON REQUEST – GA20 can be disabled using BIOS services.

ALWAYS – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

Option ROM Messages

Set display mode for Option ROM. Options are Force BIOS and Keep Current.

INT19 Trap Response

Enable: Allows Option ROMs to trap Int 19.

Boot Option Priorities

Sets the system boot order.

CSM parameters

This section allows you to configure the boot settings.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
			Launch CSM	Always	
			Boot option filter	UEFI and Legacy	
			Launch PXE OpROM policy	Do not launch	
			Launch Storage OpROM policy	Legacy only	
			Launch Video OpROM policy	Legacy only	
			Other PCI device ROM priority	Legacy OpROM	
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

Boot option filter

This option controls what devices system can boot to.

Launch PXE OpROM policy

Controls the execution of UEFI and Legacy PXE OpROM.

Launch Storage OpROM policy

Controls the execution of UEFI and Legacy Storage OpROM.

Launch Video OpROM policy

Controls the execution of UEFI and Legacy Video OpROM.

Other PCI device ROM priority

For PCI devices other than Network, Mass storage or Video defines which OpROM to launch.

Security Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Password Description					
If ONLY the Administrator's password is set, then this only limit access to Setup and is only asked for when entering Setup.					
If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights					
The password length must be in the following range:					
Minimum length				3	
Maximum length				20	
Administrator Password					
User Password					
				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

Administrator Password

Set Setup Administrator Password.

User Password

Set User Password.

Save & Exit Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Options Save Changes Discard Changes Restore Defaults Save as User Defaults Restore User Defaults				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

Save Changes and Exit

Exit system setup after saving the changes.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save Changes done so far to any of the setup options.

Discard Changes

Discard Changes done so far to any of the setup options.

Restore Defaults

Restore/Load Defaults values for all the setup options.

Save as User Defaults

Save the changes done so far as User Defaults.

Restore User Defaults

Restore the User Defaults to all the setup options.

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Drivers Installation

This section describes the installation procedures for software and drivers. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

Intel Chipset Software Installation Utility	50
VGA Drivers Installation	53
Realtek HD Audio Driver Installation	56
LAN Drivers Installation	58
Intel® Management Engine Interface	62
Intel® USB 3.0 Drivers	65

IMPORTANT NOTE:

After installing your Windows operating system, you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.

Intel Chipset Software Installation Utility

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) 7 Series Chipset Drivers**.



2. Click **Intel(R) Chipset Software Installation Utility**.



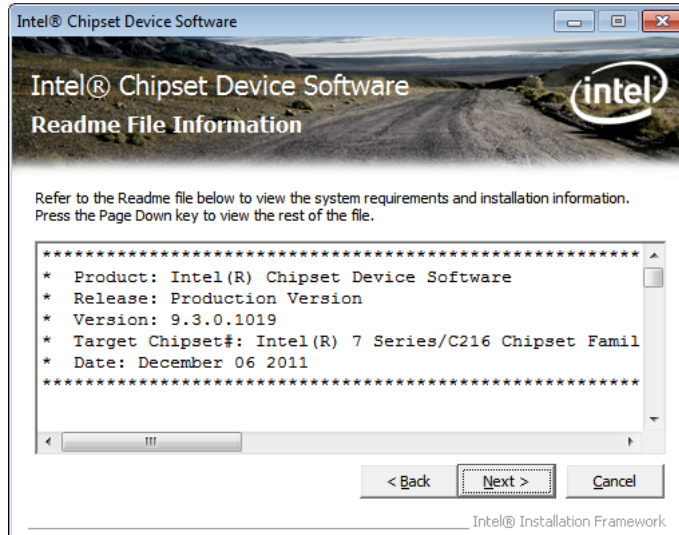
- When the Welcome screen to the Intel® Chipset Device Software appears, click **Next** to continue.



- Click **Yes** to accept the software license agreement and proceed with the installation process.



5. On the Readme File Information screen, click **Next** to continue the installation.



6. The Setup process is now complete. Click **Finish** to restart the computer and for changes to take effect.



VGA Drivers Installation

NOTE: Before installing the *Intel(R) Q77 Chipset Family Graphics Driver*, the Microsoft .NET Framework 3.5 SPI should be first installed.

To install the VGA drivers, follow the steps below.

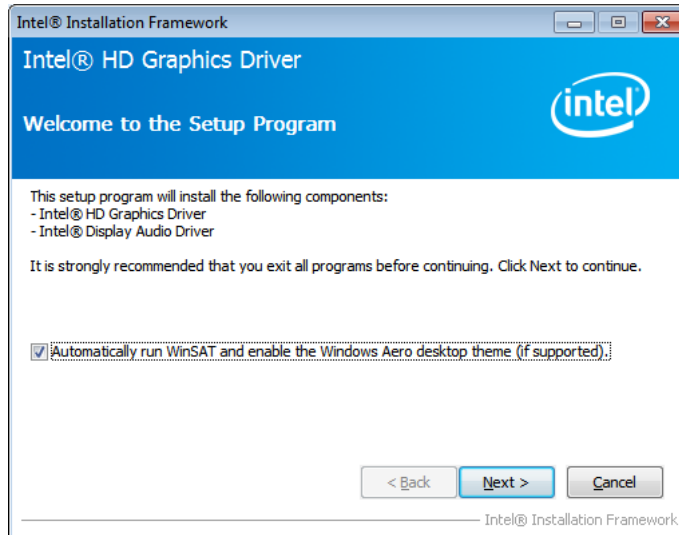
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) Q77 Series Chipset Drivers**.



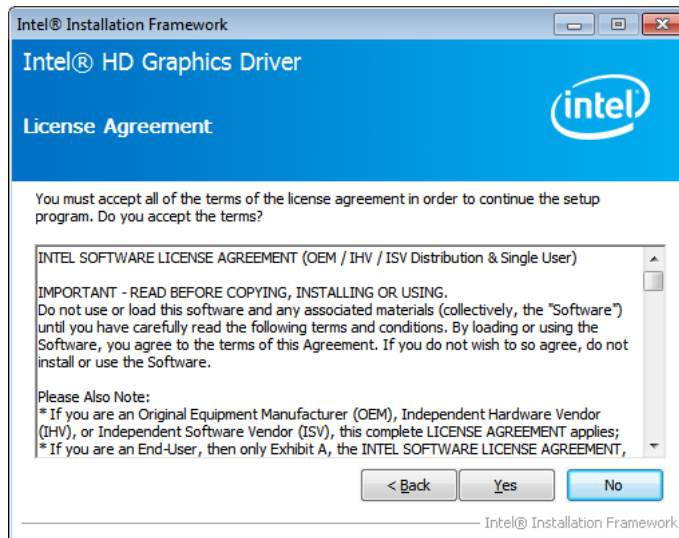
2. Click **Intel(R) Q77 Chipset Family Graphics Driver**.



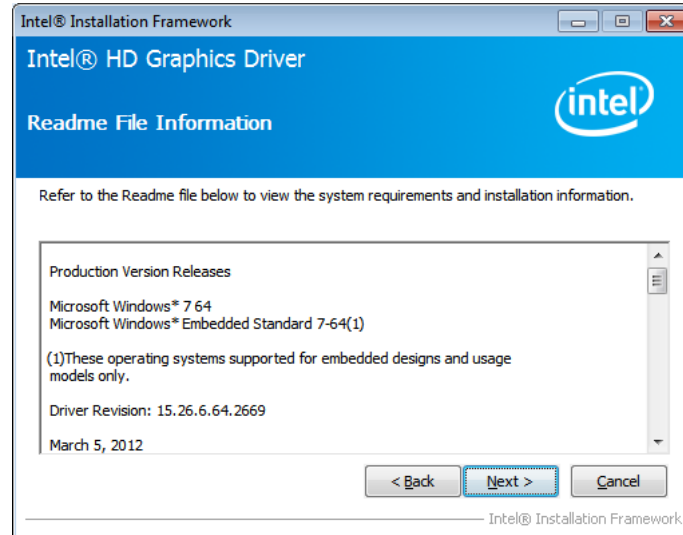
3. When the Welcome screen appears, click **Next** to continue.



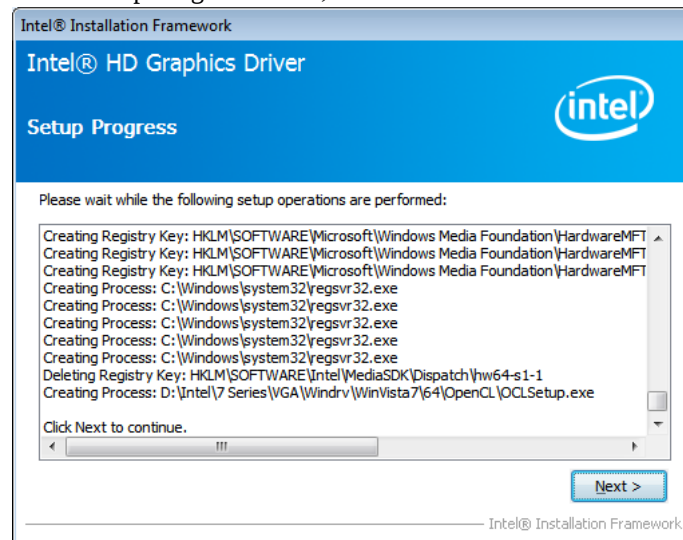
4. Click **Yes** to agree with the license agreement and continue the installation.



5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® Graphics Media Accelerator Driver.



6. On Setup Progress screen, click **Next** to continue.



7. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

Realtek HD Audio Driver Installation

Follow the steps below to install the Realtek HD Audio Drivers.

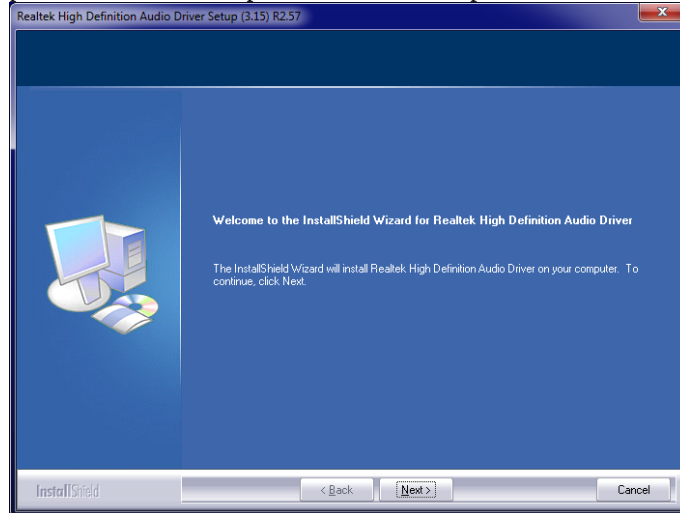
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) Q7 Series Chipset Drivers**.



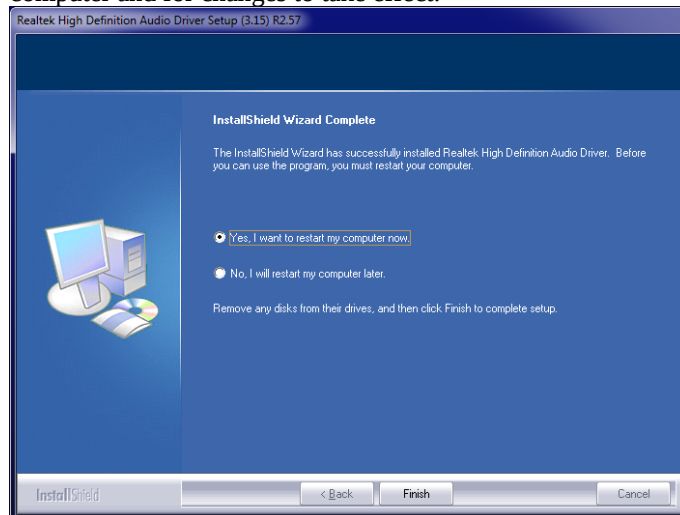
2. Click **Realtek High Definition Audio Driver**.



3. On the Welcome to the InstallShield Wizard screen, click **Next** to proceed with and complete the installation process.



4. The InstallShield Wizard Complete. Click **Finish** to restart the computer and for changes to take effect.



LAN Drivers Installation

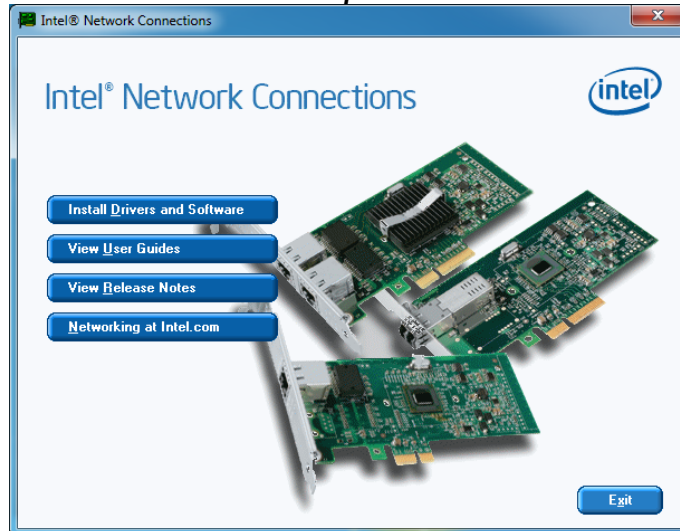
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) Q7 Series Chipset Drivers**.



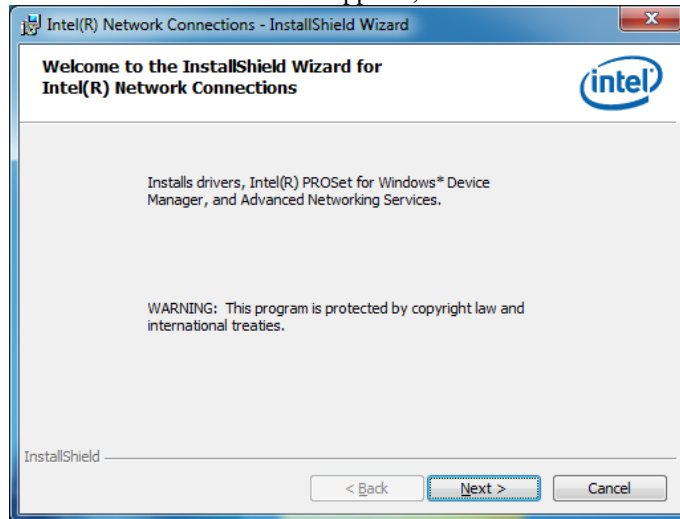
2. Click **Intel(R) PRO LAN Network Driver**.



3. Click **Install Drivers and Software**.



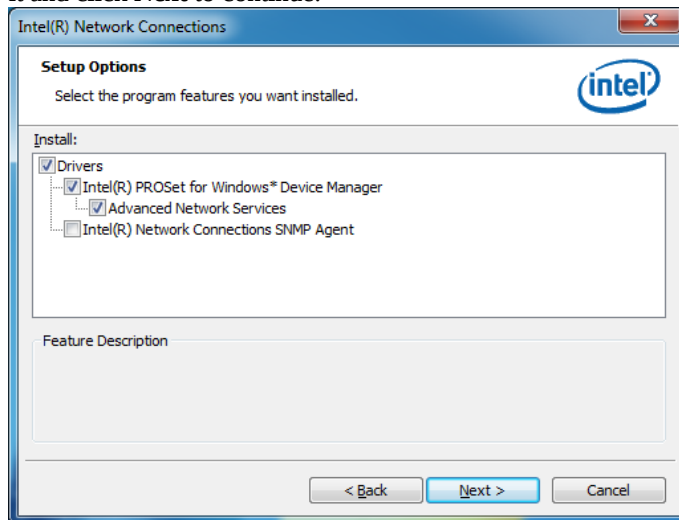
4. When the Welcome screen appears, click **Next**.



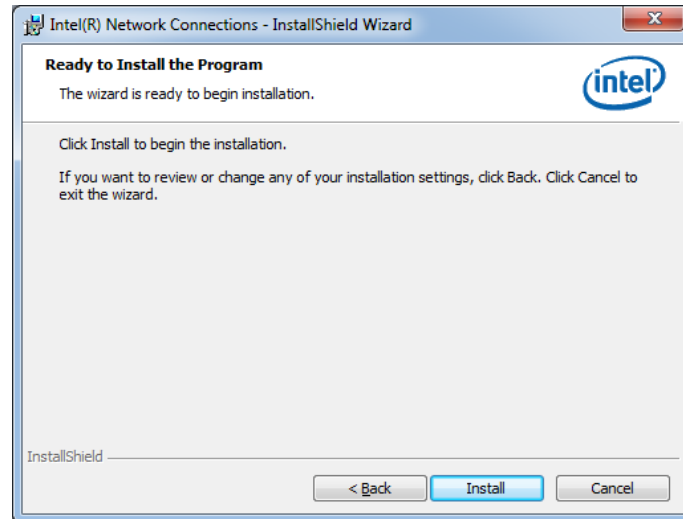
5. Click **Next** to to agree with the license agreement.



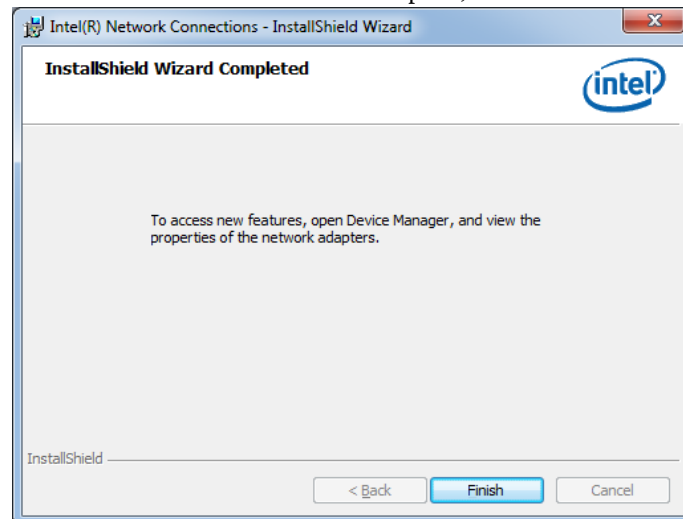
6. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.



7. The wizard is ready to begin installation. Click **Install** to begin the installation.



8. When InstallShield Wizard is complete, click **Finish**.



Intel® Management Engine Interface

REMARKS: The Intel iAMT 8.0 Drivers can be installed on MI970VF, not MI970F.



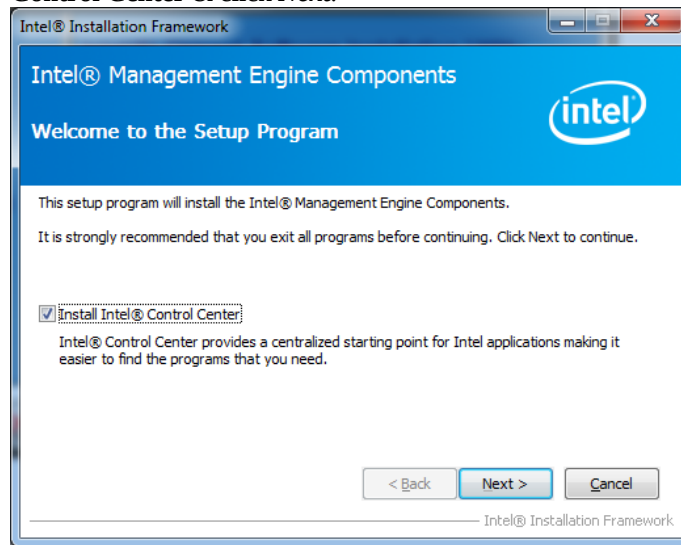
The following application requires Microsoft .NET Framework 3.5 or later: Intel® Management Engine Components. Please install the latest version of Microsoft .NET Framework from Microsoft Download Center to run this application correctly.

Follow the steps below to install the Intel Management Engine.

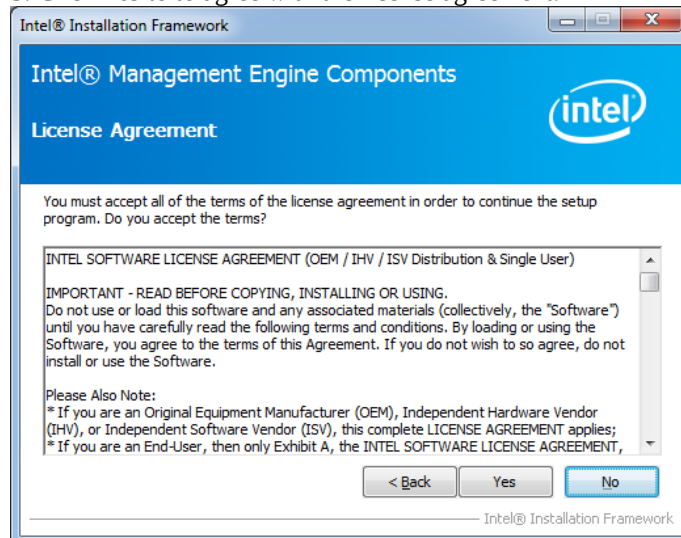
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) AMT 8.0 Drivers**.



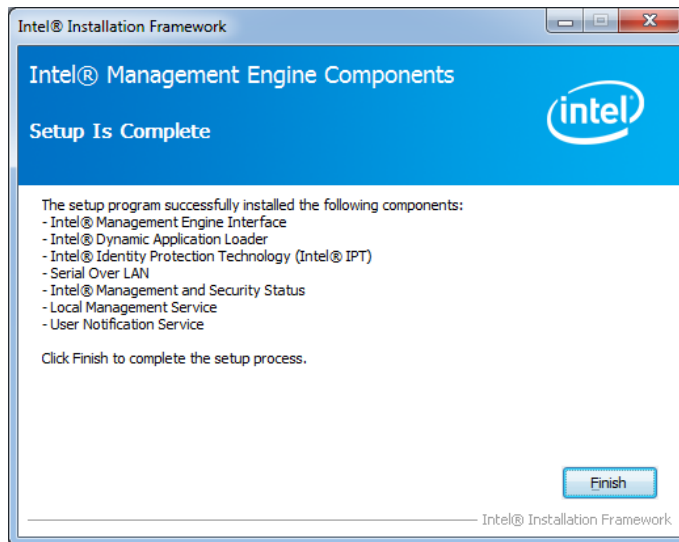
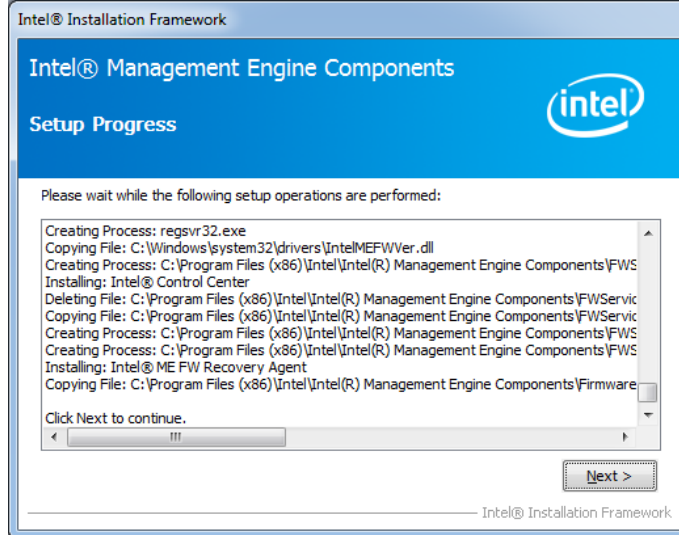
2. When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click the checkbox for **Install Intel® Control Center** & click **Next**.



3. Click **Yes** to agree with the license agreement.



4. When the Setup Progress screen appears, click **Next**. Then, click **Finish** when the setup progress has been successfully installed.



Intel® USB 3.0 Drivers

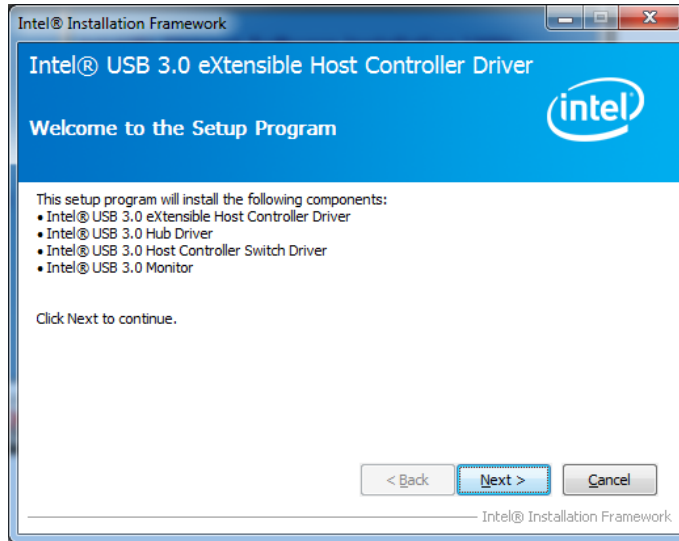
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) Q7 Series Chipset Drivers**.



2. Click **Intel(R) USB 3.0 Drivers**.



3. When the Welcome screen to the InstallShield Wizard for Intel® USB 3.0 eXtensible Host Controller Driver, click **Next**.



4. Click **Yes** to agree with the license agreement and continue the installation.
5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.
6. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

Appendix

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
278h - 27Fh	Parallel Port #2(LPT2)
2E8h - 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
2B0h - 2DFh	Graphics adapter Controller
360h - 36Fh	Network Ports
3B0h - 3BFh	Monochrome & Printer adapter
3C0h - 3CFh	EGA adapter
3D0h - 3DFh	CGA adapter
3E8h - 3EFh	Serial Port #3(COM3)
3F8h - 3FFh	Serial Port #1(COM1)

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Reserved
IRQ7	Reserved
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Serial Port #3
IRQ11	Serial Port #4
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE

C. Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

SAMPLE CODE:

```
//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81865.H"
//-----
int main (int argc, char *argv[])
void EnableWDT(int);
void DisableWDT(void);
//-----
int main (int argc, char *argv[])
{
    unsigned char bBuf;
    unsigned char bTime;
    char **endptr;

    char SIO;

    printf("Fintek 81865 watch dog program\n");

    SIO = Init_F81865();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81865, program abort.\n");
        return(1);
    }
    if (SIO == 0)

    if (argc != 2)
    {
        printf(" Parameter incorrect!!\n");
        return (1);
    }

    bTime = strtol (argv[1], endptr, 10);
    printf("System will reset after %d seconds\n", bTime);

    if (bTime)
    {
        EnableWDT(bTime);
    }
    else
    {
        DisableWDT();
    }

    return 0;
}
```

```
//-----  
void EnableWDT(int interval)  
{  
    unsigned char bBuf;  
  
    bBuf = Get_F81865_Reg(0x2B);  
    bBuf &= (~0x20);  
    Set_F81865_Reg(0x2B, bBuf);           //Enable WDTO  
  
    Set_F81865_LD(0x07);                 //switch to logic device 7  
    Set_F81865_Reg(0x30, 0x01);         //enable timer  
  
    bBuf = Get_F81865_Reg(0xF5);  
    bBuf &= (~0x0F);  
    bBuf |= 0x52;  
    Set_F81865_Reg(0xF5, bBuf);         //count mode is second  
  
    Set_F81865_Reg(0xF6, interval);      //set timer  
  
    bBuf = Get_F81865_Reg(0xFA);  
    bBuf |= 0x01;  
    Set_F81865_Reg(0xFA, bBuf);         //enable WDTO output  
  
    bBuf = Get_F81865_Reg(0xF5);  
    bBuf |= 0x20;  
    Set_F81865_Reg(0xF5, bBuf);         //start counting  
}  
//-----  
void DisableWDT(void)  
{  
    unsigned char bBuf;  
  
    Set_F81865_LD(0x07);                 //switch to logic device 7  
  
    bBuf = Get_F81865_Reg(0xFA);  
    bBuf &= ~0x01;  
    Set_F81865_Reg(0xFA, bBuf);         //disable WDTO output  
  
    bBuf = Get_F81865_Reg(0xF5);  
    bBuf &= ~0x20;  
    bBuf |= 0x40;  
    Set_F81865_Reg(0xF5, bBuf);         //disable WDT  
}  
//-----
```

```

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#include "F81865.H"
#include <dos.h>
//-----
unsigned int F81865_BASE;
void Unlock_F81865 (void);
void Lock_F81865 (void);
//-----
unsigned int Init_F81865(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81865_BASE = 0x4E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07)                                //Fintek 81865
    {
        goto Init_Finish;
    }

    F81865_BASE = 0x2E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07)                                //Fintek 81865
    {
        goto Init_Finish;
    }

    F81865_BASE = 0x00;
    result = F81865_BASE;

Init_Finish:
    return (result);
}
//-----
void Unlock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
}
//-----
void Lock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_LOCK);
}
//-----
void Set_F81865_LD( unsigned char LD)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, F81865_REG_LD);
    outportb(F81865_DATA_PORT, LD);
    Lock_F81865();
}
//-----
void Set_F81865_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, REG);
    outportb(F81865_DATA_PORT, DATA);
    Lock_F81865();
}
}

```

```
//-----
unsigned char Get_F81865_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, REG);
    Result = inportb(F81865_DATA_PORT);
    Lock_F81865();
    return Result;
}
//-----

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#ifndef __F81865_H
#define __F81865_H                1
//-----
#define      F81865_INDEX_PORT      (F81865_BASE)
#define      F81865_DATA_PORT      (F81865_BASE+1)
//-----
#define      F81865_REG_LD          0x07
//-----
#define F81865_UNLOCK                0x87
#define      F81865_LOCK                0xAA
//-----
unsigned int Init_F81865(void);
void Set_F81865_LD( unsigned char);
void Set_F81865_Reg( unsigned char, unsigned char);
unsigned char Get_F81865_Reg( unsigned char);
//-----
#endif __F81865_H
```