

# **MI980**

**Intel® 4<sup>th</sup> Generation Core / QM87 PCH  
Mini ITX Motherboard**

## **USER'S MANUAL**

**Version 1.0**

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# Introduction

## Product Description

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The MI980 Mini ITX motherboard is based on the latest Intel® QM87 chipset. The platform supports onboard 4<sup>th</sup> generation Intel® Core processor family features 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 QM87 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 MI980 Mini ITX board utilizes the dramatic increase in performance provided this Intel's latest cutting-edge technology. Measuring 170mm x 170mm, the MI980 offers fast 6Gbps SATA support, USB3.0 and interfaces for DVI-D, DVI-I, LVDS and DP displays.

## Checklist

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Your MI980 package should include the items listed below.

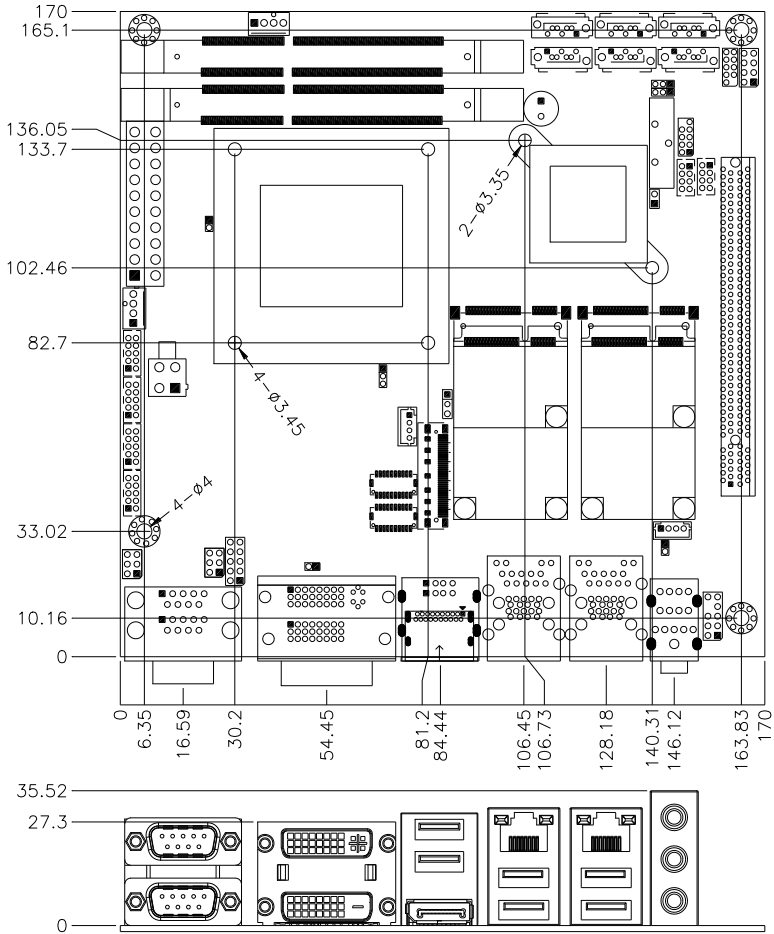
- The MI980 MINI ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Serial ATA cable

# MI980 Specifications

<b>Product Name</b>	<b>MI980VF [Supports iAMT 9.0 &amp; vPro] MI980F [Supports EuP/ErP]</b>
<b>Form Factor</b>	Mini-ITX
<b>CPU Type</b>	- Intel® 4 <sup>th</sup> Generation Core mobile processors (22nm monolithic) - BGA1364 , Package= 37.5 mmx 32 mm [Performance Halo SKUs] - TDP = 47W (QC) / 37W(DC)
<b>Cache</b>	Up to 8MB
<b>Chipset</b>	Intel® QM87 PCH Mobile Platform Controller Hub Package =23 mm x 22 mm, 0.65 mm ball pitch; TDP = 3W QM87 for MI980VF ; HM86 for MI980F
<b>BIOS</b>	AMI BIOS [16MB SPI ROM]
<b>Memory</b>	Intel® 4 <sup>th</sup> Generation Core mobile processors integrated memory controller DDRIII 1600 MHz (supports dual channel DDR3/DDR3L) - SO-DIMM [204-pin vertical type] x 2 (Non-ECC), Max. 16GB
<b>VGA</b>	Intel® 4 <sup>th</sup> Generation Core mobile processor integrated HD Gfx, supports 3 independent displays, Direct X 11.1, OpenGL 3.2, Open CL 1.2 ● DVI-I X 1 (Thru port B, via VGA@ QM87 PCH+ Level shifter ASM1442) ● DVI-D x 1 (Thru port C, with level shifter ASM1442) ● DisplayPort x 1 (Thru port D) ● LVDS (Thru eDP, via NXP PTN3460)
<b>LAN</b>	1. Intel® Clarkville I217LM GbE PHY [For MI980VF] or I217V GbE PHY [For MI980F] ** Package = 6mm x 6mm, QFN48** 2. Intel® Pearsonville I211AT as 2 <sup>nd</sup> GbE
<b>USB</b>	USB <u>2.0</u> host controller [QM87 PCH integrated], supports 8 ports - 2 ports in the rear panel - 4 ports via onboard pin header (2.0mm pitch) - 2 ports via MiniPCIe sockets USB <u>3.0</u> host controller [QM87 PCH integrated] supports 4 ports - 4 ports in the rear panel for MI980VF
<b>Serial ATA</b>	Intel® QM87 PCH built-in SATA controller, supports 6 ports 4 x SATA (3.0) 6Gbps & shared mSATA for 1 port (SATA port #5) 2 x SATA (2.0) 3Gbps ** QM87 supports 4 x SATA III ; HM86 supports 2 x SATA III only**
<b>Audio</b>	Intel® Mobile QM87 PCH built-in High Definition Audio controller + Realtek ALC892 w/ 7.1 channels
<b>LPC I/O</b>	Fintek <b>F81866AD-1</b> (128-pin LQFP [14mm x 14 mm]) - COM #1 (RS232/422/485) supports ring-in with power @500mA (selectable for 5V or 12V) [EXAR SP339EER1 232/422/485 transceiver x 1 for jumper-less] - COM #2 (RS232 only), supports ring-in with power @500mA (selectable for 5V or 12V) - COM #3~COM #6 (RS232 only) Hardware Monitor (2 thermal, 4 voltage monitor inputs & 2 fan headers) - CPU fan x 1(PWM fan type, 4-pin connector) - SYS fan x 1 (DC/PWM Auto-Detect fan type, 4-pin connector)]
<b>Digital IO</b>	4 in & 4 out
<b>TPM 1.2</b>	Nuvoton WPCT210AA0WX (MI980VF only) **Operation temperature for 0 ~ +60 degree C only**
<b>iAMT</b>	Intel® Mobile QM87 PCH built-in - Intel® Active Management Technology, version 9.0 (MI980VF only)
<b>Expansion Slots</b>	- PCI-Express (16x) x1 [Gen 3.0 PEG] - Mini PCI-Express x 2 port [Full-sized], both support USB 2.0 - One slot supports mSATA (6Gbps)

<b>Edge Connectors</b>	Dual DB9 stack connector for COM #1 / #2 DVI-D + DVI-I stack connector x 1 DisplayPort + dual USB (2.0) stack connector x 1 RJ-45 + dual USB (3.0) stack connector x 2 Triplet type Jack 3 x 1 for HD Audio
<b>Onboard Header/Connector</b>	4 ports x SATA III [Blue color] (For MI980VF) 2 ports x SATA III [Blue color] (For MI980F) 2 ports x SATA II DF-11 8-pin connector x 2 for 4 ports USB 2.0 DF-20 20-pin connector x 2 for dual –channel LVDS eDP LVDS panel connector x 1 2x5 pin-header x 1 for front panel audio [supports 7.1 Channel] DF-11 10-pin header x 4 for COM3 ~ COM6 2x5 pin-header x 1 for Digital IO 4-pin box header x 1 for LCD backlight control
<b>Watchdog Timer</b>	Yes (256 segments, 0, 1, 2...255 sec/min)
<b>System Voltage</b>	ATX standard 20-pin type 4 pin type (+12V only)[For full system loading usage]
<b>Others</b>	<ul style="list-style-type: none"><li>- vPro [MI980VF only]</li><li>- ErP feature (F81866AD-I integrated, WOL from 2<sup>nd</sup> GbE)</li><li>- iSMART ( via TI MSP430G2433 MCU)</li><li>- AT24C02C EEPROM [SO8 type] via SMBus (Reserved)</li></ul>
<b>Board Size</b>	170mm x 170mm

**Board Dimensions**





## **Installations**

This section provides information on how to use the jumpers and connectors on the MI980 in order to set up a workable system. The topics covered are:

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### **Installing the Memory**

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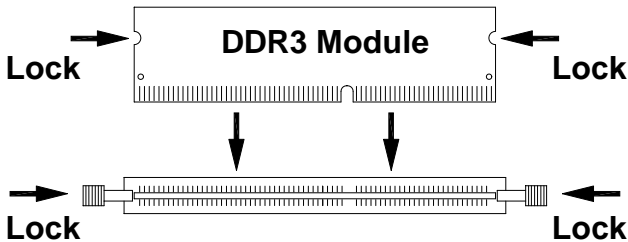
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The MI980 board supports two DDR3 memory socket for a maximum total memory of 16GB in DDR3 SODIMM memory type.

#### **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.



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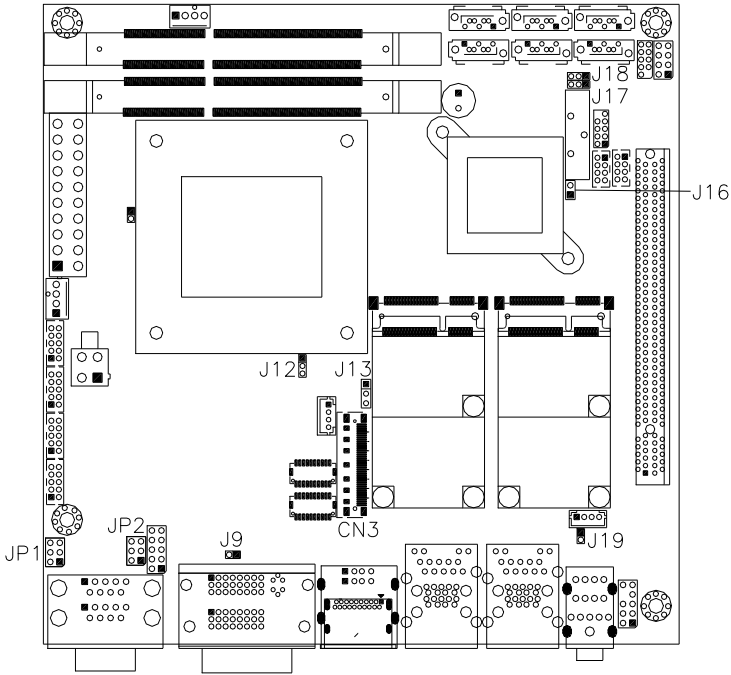
## **Setting the Jumpers**

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Jumpers are used on MI980 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 MI980 and their respective functions.

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J16: Flash Descriptor Security Override (Factory use only) .....	10
J17: Clear CMOS Contents.....	11
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**Jumper Locations on MI980**



Jumpers on MI980.....Page

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JP2: COM1 RS232 RI/+5V/+12V Power Setting..... 9

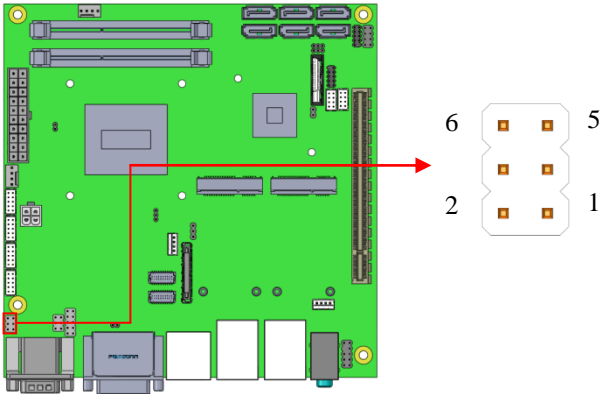
J13: LCD Panel Power Selection ..... 10

J16: Flash Descriptor Security Override (Factory use only) ..... 10

J17: Clear CMOS Contents..... 11

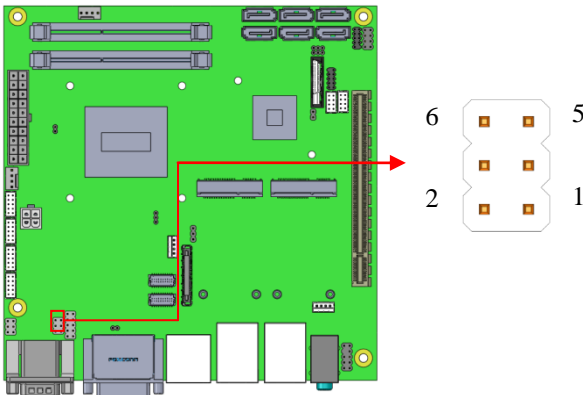
J18: Clear ME Contents..... 11

**JP1: COM2 RS232 RI/+5V/+12V Power Setting**



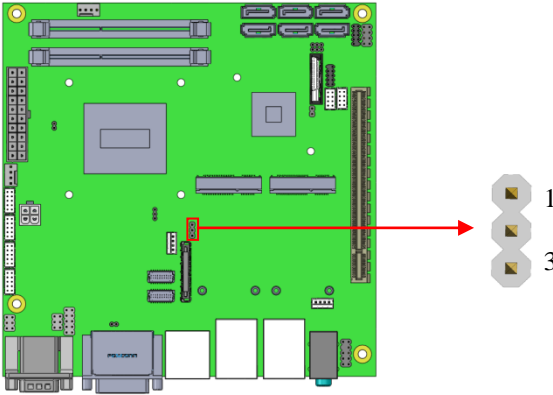
JP1	Setting	Function
	Pin 1-3, Short/Closed	+12V
	Pin 3-4, Short/Closed	RI
	Pin 3-5, Short/Closed	+5V

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



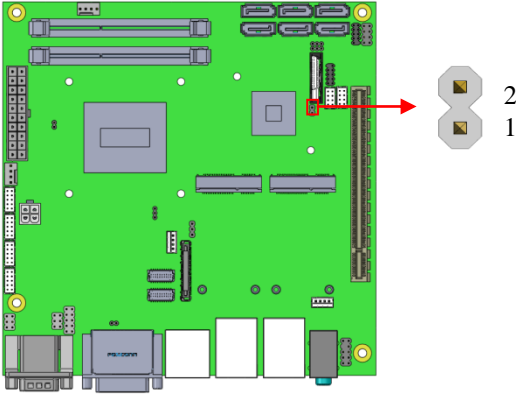
JP2	Setting	Function
	Pin 1-3, Short/Closed	+12V
	Pin 3-4, Short/Closed	RI
	Pin 3-5, Short/Closed	+5V

## J13: LCD Panel Power Selection



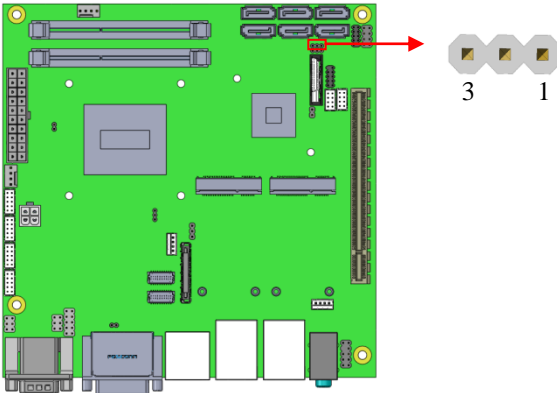
J13	LCD Panel Power
 1 2 3	3.3V
 1 2 3	5V



## J16: Flash Descriptor Security Override (Factory use only)



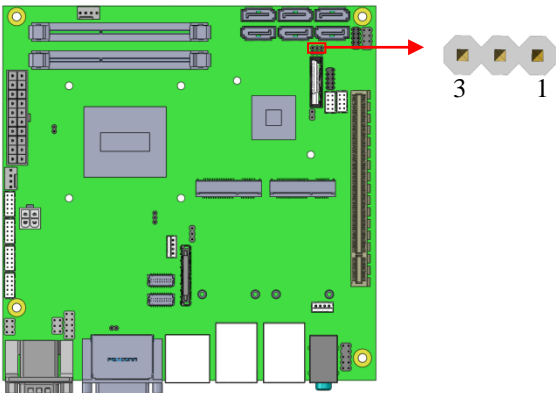
J16	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled



**J17: Clear CMOS Contents**



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

**J18: Clear ME Contents**



J18	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

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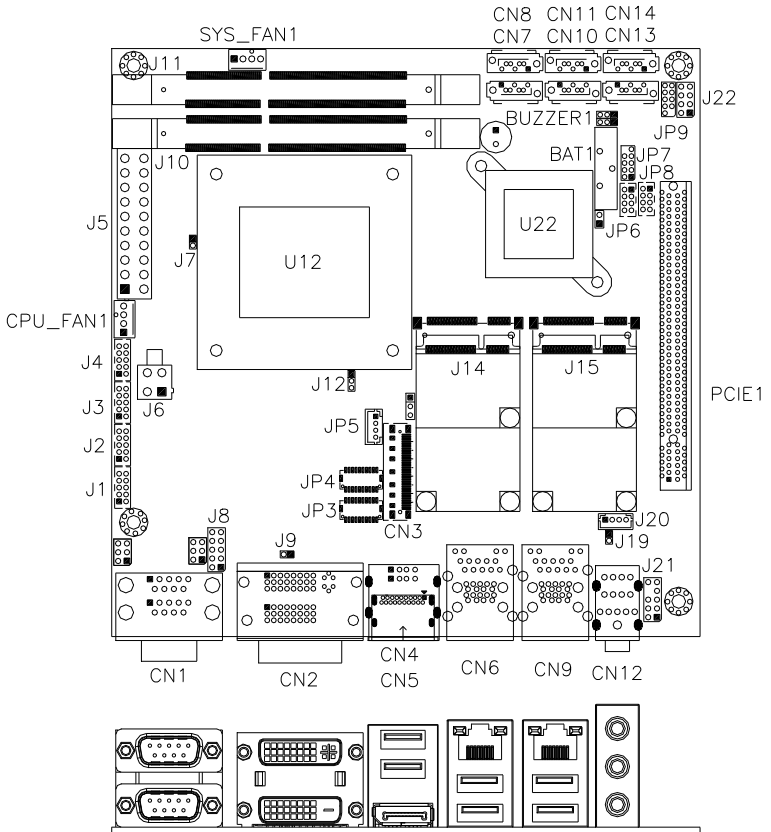
**Connectors on MI980**

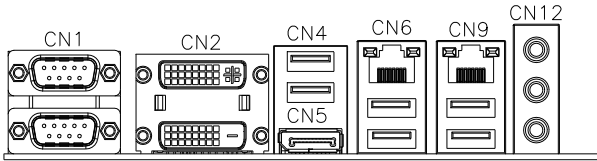
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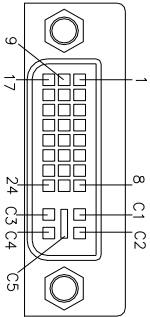


**Connector Locations on MI980**

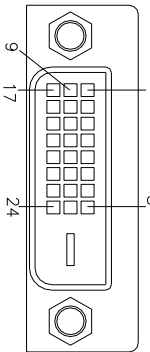




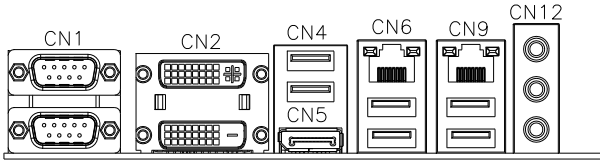
**CN2: DVI-I and DVI-D Connector**



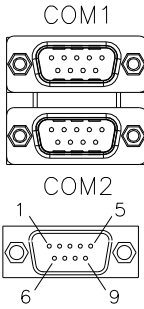
Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
Shield 2/4	3	18	DATA 0+
DATA 4-	4	19	SHIELD 0/5
DATA 4+	5	20	DATA 5-
DDC CLOCK	6	21	DATA 5+
DDC DATA	7	22	SHIELD CLK
Analog VSYNC	8	23	CLOCK -
DATA 1-	9	24	CLOCK +
DATA 1+	10	C1	Analog Red
SHIELD 1/3	11	C2	Analog Green
DATA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



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	N.C.
SHIELD 1/3	11	C2	N.C.
DATA 3-	12	C3	N.C.
DATA 3+	13	C4	N.C.
DDC POWER	14	C5	N.C.
A GROUND 1	15	C6	N.C.



**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

**CN4: Display Port**

Signal Name	Pin #	Pin #	Signal Name
LANE0_P	1	11	GND
GND	2	12	LANE3_N
LANE0_N	3	13	GND
LANE1_P	4	14	GND
GND	5	15	AUX_P
LANE1_N	6	16	GND
LANE2_P	7	17	AUX_N
GND	8	18	HPD
LANE2_N	9	19	GND
LANE3_P	10	20	VCC3.

**CN5: USB2 #6/#7**

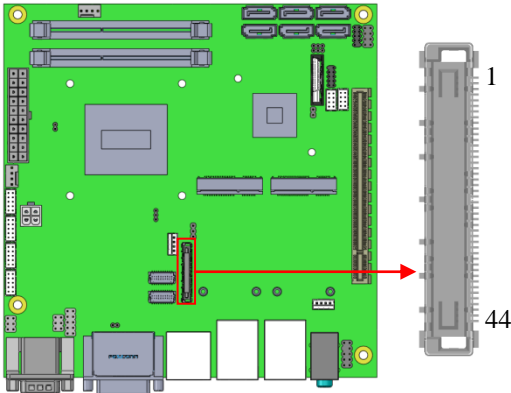
**CN6: Gigabit LAN (I217) + USB3 #0/#1**

**CN7, CN8: SATA3 Connectors**

**CN9: Gigabit LAN (I211) + USB3 #2/#3**

## INSTALLATIONS

### CN3: eDP Connector (JAE\_FI-TD44SB-E-R750)



Signal Name	Pin #	Pin #	Signal Name
3.3V	1	23	TXN0
3.3V	2	24	TXP0
3.3V	3	25	GND
3.3V	4	26	AUXP
3.3V	5	27	AUXN
GND	6	28	NC
GND	7	29	VCC3
GND	8	30	NC
GND	9	31	VCC12
HPD	10	32	NC
NC	11	33	GND
NC	12	34	VCC5
GND	13	35	NC
NC	14	36	Brightness
NC	15	37	BKLT_EN
GND	16	38	VCC12
NC	17	39	VCC3
NC	18	40	GND
GND	19	41	SMB_THRM_CLK
TXN1	20	42	SMB_THRM_DATA
TXP1	21	43	NC
GND	22	44	NC

**CN10: SATA2 Connector (MI980VF only)**

**CN11: SATA2 Connectors**

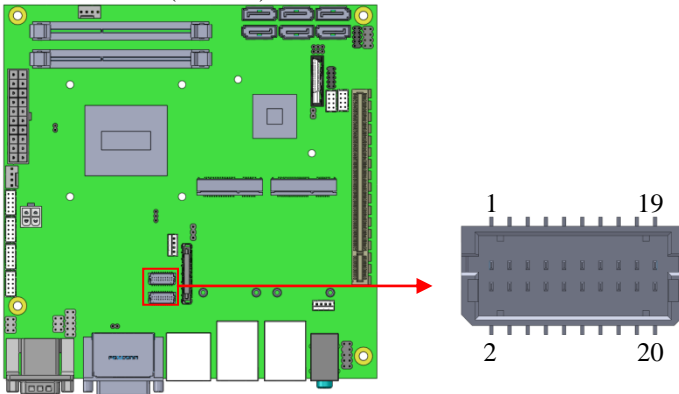
**CN12: HD Audio Connector**

**CN13: SATA3 Connector (MI980VF only)**

**CN14: SATA3 Connector support MI980VF  
Or SATA2 Connector support MI980F**

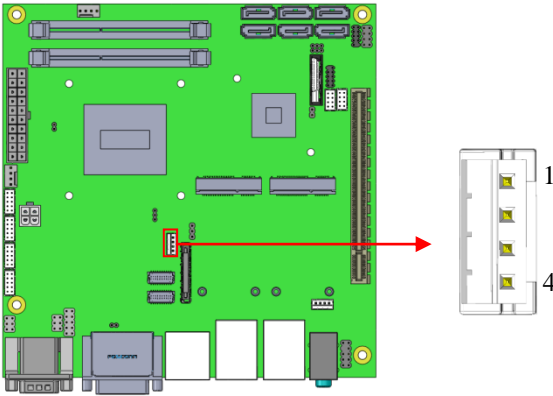
**JP3, JP4: LVDS Connectors (LVDS2, LVDS1) Hirose  
DF20G-20DP-1V**

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



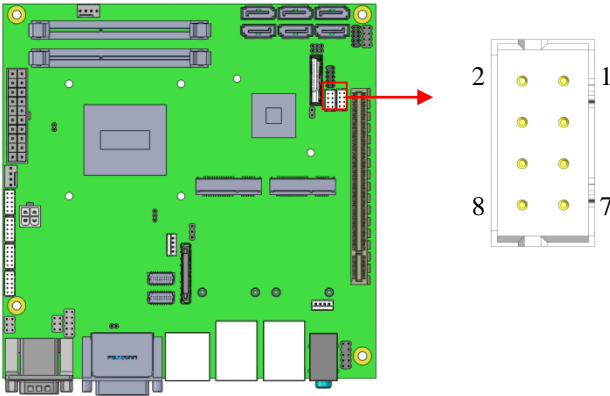
Signal Name	Pin #	Pin #	Signal Name
TX0N	2	1	TX0P
Ground	4	3	Ground
TX1N	6	5	TX1P
Ground	8	7	Ground
TX2N	10	9	TX2P
Ground	12	11	Ground
CLKN	14	13	CLKP
Ground	16	15	Ground
TX3N	18	17	TX3P
Power	20	19	Power

**JP5: LCD Backlight Connector**



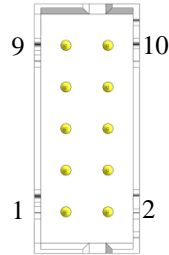
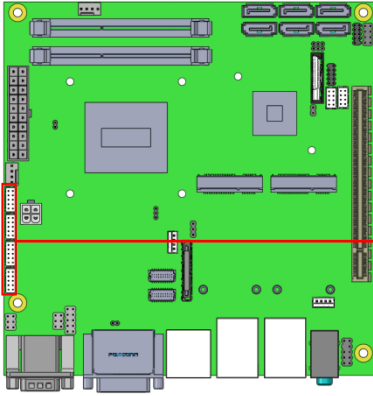
Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

**JP6, JP8: USB2 #8/#9, USB2 #4/#5 Connectors**



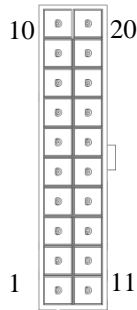
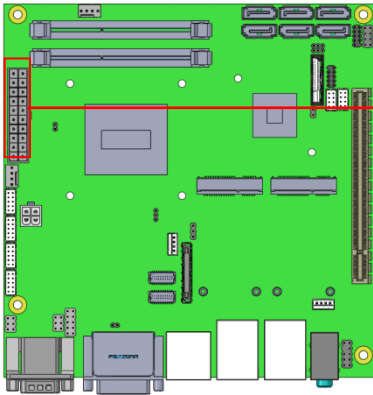
Signal Name	Pin #	Pin #	Signal Name
Vcc	1	2	Ground
D0-	3	4	D1+
D0+	5	6	D1-
Ground	7	8	Vcc

**J1, J2, J3, J4: COM6, COM5, COM3, COM4 RS232 Serial Ports (HIROSE DF11-10DP-2DSA)**



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

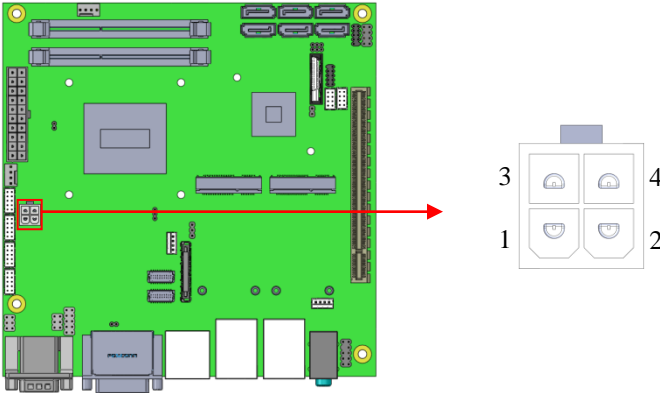
**J5: ATX Power Supply Connector**



## INSTALLATIONS

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.

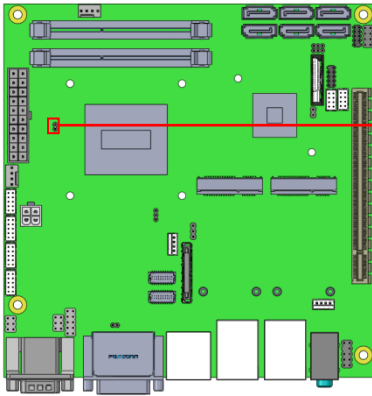
Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

### JP7: LPC debug Connector (Factory use only)

### JP9: SPI Flash Connector (Factory use only)

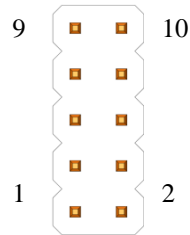
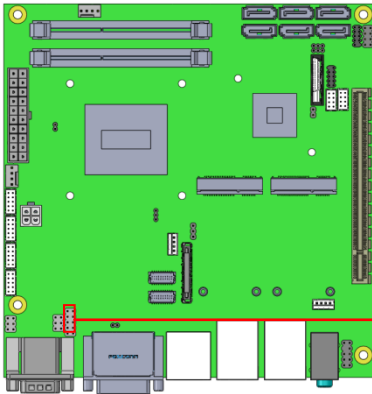


**J7: PCIE1 Configuration**



J7	PCIE1 Configuration
Open	PCIE X16 (Default)
Short	PCIE X8, X8

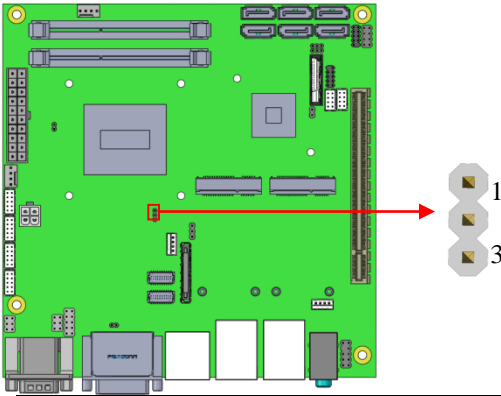
**J8: Digital I/O Connector (4 in, 4 out)**





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

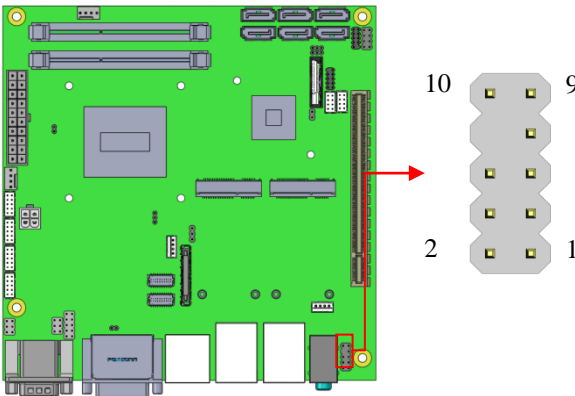
**J10, J11: DDR3 SO-DIMM Socket**

**J12: LVDS/eDP Select**



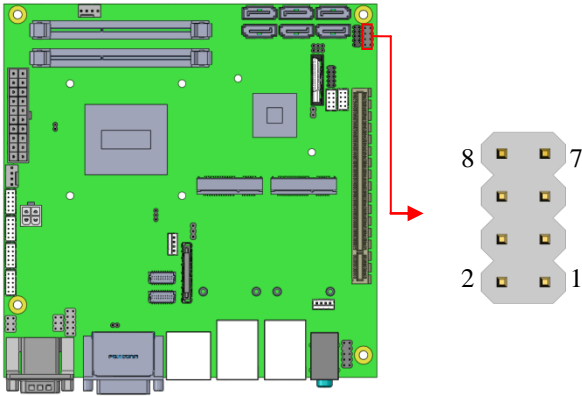
J12	Setting	Function
	Pin 1-2, Short/Closed	eDP Connector
	Pin 2-3, Short/Closed	LVDS

**J21: Audio Pin Header for Chassis Front Panel**



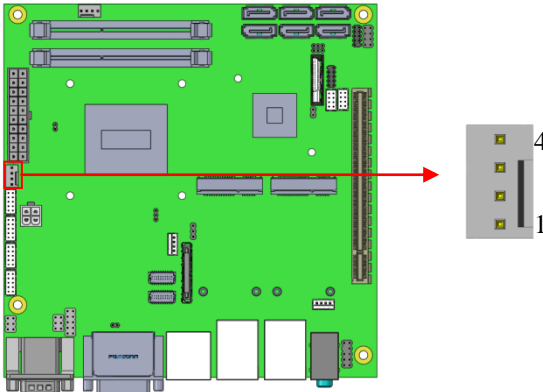
Signal Name	Pin #	Pin #	Signal Name
MIC IN_L	1	2	Ground
MIC IN_R	3	4	DET
LINE_R	5	6	Ground
Sense	7	8	KEY
LINE_L	9	10	Ground

**J22: 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-

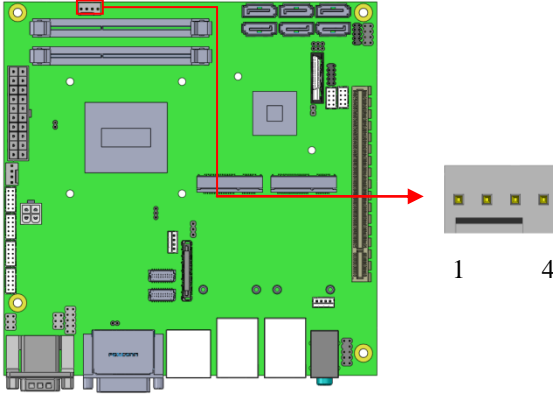
**CPU\_FAN1: CPU Fan Power Connector**



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

## INSTALLATIONS

### SYS\_FAN2: System Fan Power Connector (DC/PWM Auto-Detect)



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

**J14: Mini PCIE/mSATA (share with CN7) Connector**

**J15: Mini PCIE Connector**

# 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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Chipset Settings .....	40
Boot Settings .....	47
CSM parameters .....	48
Security Settings .....	49
Save & Exit Settings .....	50

### **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 provides 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 <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> 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 <DEL> 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 © 2013 American Megatrends, Inc.

Main	Advanced	Chipset	Boot	Security	Save & Exit
BIOS Information				Choose the system default language	
Total Memory			4096 MB (DDR3)	→ ← Select Screen	
Memory Frequency			1333 Mhz	↑ ↓ Select Item	
System Date			[Tue 01/20/2009]	Enter: Select	
System Time			[21:52:06]	+- Change Field	
Access Level			Administrator	F1: General Help	
				F2: Previous Values	
				F3: Optimized Default	
				F4: Save ESC: Exit	

**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	<b>Advanced</b>	Chipset	Boot	Security	Save & Exit
	<ul style="list-style-type: none"> <li>▶ PCI Subsystem Settings</li> <li>▶ ACPI Settings</li> <li>▶ Wake up event setting</li> <li>▶ Trusted Computing</li> <li>▶ CPU Configuration</li> <li>▶ SATA Configuration</li> <li>▶ Shutdown Temperature Configuration</li> <li>▶ iSmart Controller</li> <li>▶ AMT Configuration</li> <li>▶ USB Configuration</li> <li>▶ F81866 Super IO Configuration</li> <li>▶ F81866 H/W Monitor</li> </ul>				→ ← 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	<b>Advanced</b>	Chipset	Boot	Security	Save & Exit
	PCI Bus Driver Version  PCI Common Settings PCI Latency Timer VGA Palette Snoop PERR# Generation SERR# Generation  ▶ PCI Express Settings		V 2.0502  32 PCI Bus Clocks Disabled Disabled Disabled		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit



**PCI Latency Timer**

Value to be programmed into PCI Latency Timer Register.

**VGA Palette Snoop**

Enables or disables VGA Palette Registers Snooping.

**PERR# Generation**

Enables or disables PCI device to generate PERR#.

**SERR# Generation**

Enables or disables PCI device to generate SERR#.

**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						
Relaxed Ordering			Disabled		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
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			
Restore PCIe Registers			Disabled			

**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'.

### **Restore PCIE Registers**

On non-PCI Express aware OS's (Pre Windows Vista) some devices may not be correctly reinitialized after S3. Enabling this restore PCI Express device configuration on S3 resume

Warning: Enabling this may cause issues with other hardware after S3 resume.

**ACPI Settings**

Aptio Setup Utility

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

**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 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	→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Current TPM Status Information		TPM SUPPORT OFF			

**TPM Support**

This configuration is supported only with MI980VF. 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(R) CPU Core(TM)i5-4402E @ 1.60GHz					
CPU Signature			306c3		
Processor Family			6		
Microcode Patch			8		
FSB Speed			100MHz		
Max CPU Speed			1600 MHz		
Min CPU Speed			800 MHz		
CPU Speed			2600 MHz		
Processor Cores			2		
Intel HT Technology			Supported		
Intel VT-x Technology			Supported		
Intel SMX Technology			Supported		
64-bit			Supported		
EIST			Supported		
CPU C3 State			Supported		
CPU C6 State			Supported		
CPU C7 State			Supported		
Active Processor Cores			All		
Overclocking lock			Disabled		
Limit CPUID Maximum			Disabled		
Execute Disable Bit			Enabled		
Intel Virtualization Technology			Enabled		
Adjacent Cache Line Prefetch			Enabled		
Boot performance mode			Turbo performance		
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

**Active Processor Cores**

Number of cores to enable in each processor package.

**Overclocking lock**

Flex\_RATIO(194)MSR

**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

### Intel Virtualization Technology

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

### Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

### Boot Performance Mode

Select the performance state that the BIOS will set before OS handoff.

### EIST

Enabled/Disabled Intel Speedstep.

## SATA Configuration

SATA Devices Configuration.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
		SATA Controller(s)	Enabled		
		SATA Mode Selection	IDE		
		SATA Port0	Empty		→ ← Select Screen
		Software Preserve	Unknown		↑ ↓ Select Item
		SATA Port1	Empty		Enter: Select
		Software Preserve	Unknown		+ - Change Field
		SATA Port2	Empty		F1: General Help
		Software Preserve	Unknown		F2: Previous Values
		SATA Port3	Empty		F3: Optimized Default
		Software Preserve	Unknown		F4: Save ESC: Exit
		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. (This configuration is supported only with MI980VF)

## 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					
Power-On after Power failure			Disable		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
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	
			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	→ ← Select Screen
			PET Progress	Enabled	↑ ↓ Select Item
			AMT CIRA Timeout	0	Enter: Select
			Watchdog	Disabled	+ - Change Field
			OS Timer	0	F1: General Help
			BIOS Timer	0	F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

**AMT Configuration**

This configuration is supported only with MI980VF (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**

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**

Enable/Disable Watchdog Timer.



**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		→ ← Select Screen
EHCI Hand-off			Enabled		↑ ↓ Select Item
USB Mass Storage Driver Support			Enabled		Enter: Select
USB hardware delays and time-outs:					+ - Change Field
USB Transfer time-out			20 sec		F1: General Help
Device reset time-out			20 sec		F2: Previous Values
Device power-up delay			Auto		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.

**USB Mass Storage Driver Support**

Enable/Disable USB Mass Storage Driver Support.

**USB Transfer time-out**

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

### Device reset tine-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					
F81866 Super IO Chip			F81866		→ ← Select Screen
Standby Power on S5			All Enable		↑ ↓ Select Item
▶ Serial Port 1 Configuration					Enter: Select
▶ Serial Port 2 Configuration					+ - Change Field
▶ Serial Port 3 Configuration					F1: General Help
▶ Serial Port 4 Configuration					F2: Previous Values
▶ Serial Port 5 Configuration					F3: Optimized Default
▶ Serial Port 6 Configuration					F4: Save ESC: Exit

### Standby Power On S5

This configuration is supported only with MI980F.

[Enable] Provide the standby power for devices.

[Disabled] Shutdown the standby power.

### 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.

Main	Advanced	Chipset	Boot	Security	Save & Exit
Serial port 0 Configuration					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Serial port		Enabled			
Device Settings		IO=3F8h ; IRQ=4			
Change Settings		Auto			
F81866 SERIAL PORT1 MODE SELECT			RS232 Mode		

**F81866 SERIAL PORT1 MODE SELECT**

For RS232/RS422/RS485 mode select

**F81866 H/W Monitor**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Fan 1 smart fan control		Disabled			
Fan 2 smart fan control		Disabled			
CPU temperature		+33 C			
SYS temperature		+34 C			
FAN1 Speed		2170 RPM			
FAN2 Speed		N/A			
Vcore		+1.800 V			
+5V		+5.087 V			
+12V		+12.408 V			
Memory Voltage		+1.392 V			
VSB5V		+5.016 V			

**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.



**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	1.5.0.0		
		Intel PCH SKU Name	QM87		
		Intel PCH Rev ID	04/C1		
		▶ PCI Express Configuration			
		▶ USB Configuration			
		▶ PCH Azalia Configuration			
		PCH LAN Controller	Enabled		
		Wake on LAN	Disabled		
		SLP_LAN# Low on DC Power	Enabled		
					→ ← 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\_LAN# Low on DC Power**

Enable or Disable SLP\_LAN# Low on DC Power

**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		
PCIe Root Function Swapping			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 Express Root Port 6			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					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
USB Precondition		Disabled			
xHCI Mode		Auto			
USB Ports Per-Port Disable Control		Disabled			

**USB Precondition**

Precondition work on USB host controller and root ports for faster enumeration.

**xHCI Mode**

Mode of operation of xHCI controller.

**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 be unconditionally be disabled.

Enabled = Azalia will be unconditionally be enabled.

Auto = Azalia will be enabled if present, disabled otherwise.

**System Agent (SA) Configuration**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
		System Agent Bridge Name	Haswell		
		System Agent RC Version	1.5.0.0		
		VT-d Capability	Supported		
		VT-d	Enabled		
		CHAP Device (B0:D7:F0)	Disabled		→ ← Select Screen
		Thermal Device (B0:D4:F0)	Disabled		↑ ↓ Select Item
		CPU SA Audio Device (B0:D3:F0)	Enabled		Enter: Select
		Enable NB CRID	Disabled		+ - Change Field
		BDAT ACPI Table Support	Disabled		F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit
		▶ Graphics Configuration			
		▶ Memory Configuration			

**VT-d**

Check to enable VT-d function on MCH.

**Enable NB CRID**

Enable or disable NB CRID WorkAround.



**Graphics Configuration**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Graphics Configuration					
			IGFX VBIOS Version	2166	
			IGfx Frequency	800 MHz	
			Primary Display	Auto	
			Primary PEG	Auto	→ ← Select Screen
			Primary PCIE	Auto	↑ ↓ Select Item
			Internal Graphics	Auto	Enter: Select
			Aperture Size	256MB	+ - Change Field
			DVMT Pre-Allocated	64M	F1: General Help
			DVMT Total Gfx Mem	256MB	F2: Previous Values
			Primary IGFX Boot Display	VBIOS Default	F3: Optimized Default
			LVDS/EDP Control	Disabled	F4: Save ESC: Exit
			Gfx Low Power Mode	Disabled	

**Primary Display**

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

**Primary PEG**

Select PEGO/PEG1/PEG2/PEG3 Graphics device should be Primary PEG.

**Primary PCIE**

Select PCIE0/PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE6/PCIE7 Graphics device should be primary PCIE.

**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.

## BIOS SETUP

### DVMT Total Gfx Mem

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

### Primary IGFX Boot Display

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.

### LVDS/EDP Control

LVDS/EDP Control

### Gfx Low Power Mode

This option is applicable for SFF only.

## Memory Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Memory Information					
		Memory Frequency	1333 MHz		
		Total Memory	4096 MB (DDR3)		
		DIMM#0	2048 MB (DDR3)		
		DIMM#1	2048 MB (DDR3)		
		CAS Latency (tCL)	11		→ ← Select Screen
		Minimum delay time			↑ ↓ Select Item
		CAS to RAS (tRCDmin)	11		Enter: Select
		Row Precharge (tRPmin)	11		+ - Change Field
		Active to Precharge (tRASmin)	28		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		
Boot Option Priorities					→ ← Select Screen
Boot Option #1					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit
Hard Drive BBS Priorities					
▶ CSM16 Parameters					
CSM Parameters					

### 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.

### 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	Security
<p>Administrator Password</p> <p>User Password</p>	<p>Minimum length 3</p> <p>Maximum length 20</p>	<p>→ ← Select Screen</p> <p>↑ ↓ Select Item</p> <p>Enter: Select</p> <p>+ - Change Field</p> <p>F1: General Help</p> <p>F2: Previous Values</p> <p>F3: Optimized Default</p> <p>F4: Save ESC: Exit</p>

### 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			→ ← Select Screen
Restore Defaults	Save as User Defaults	Restore User Defaults			↑ ↓ 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.

## 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 .....	52
VGA Drivers Installation .....	54
Realtek HD Audio Driver Installation .....	56
LAN Drivers Installation.....	58
Intel® Management Engine Interface .....	61
Intel® USB 3.0 Drivers .....	64

### **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 DVD that comes with the board. Click **Intel** and then **Intel(R) 8 Series Chipset Drivers**.



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





3. When the Welcome screen to the Intel® Chipset Device Software appears, click **Next** to continue.
4. 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

1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) 8 Series Chipset Drivers*.



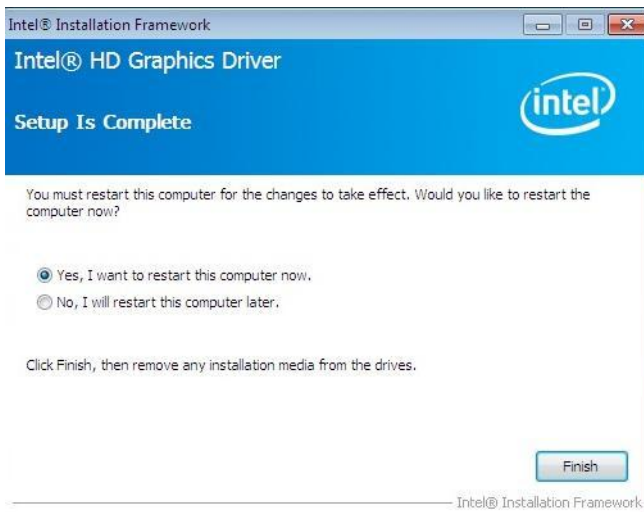
2. Click *Intel(R) Core(TM) i3/i5/i7 Graphics Driver*.



3. When the Welcome screen appears, click *Next* to continue.
4. Click *Yes* to to agree with the license agreement and continue the installation.
5. On the screen shown below, click *Install* to continue.



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

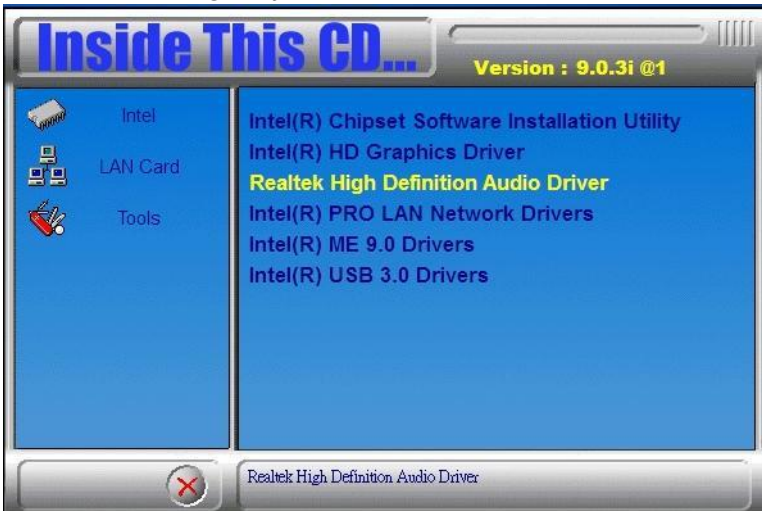


## Realtek HD Audio Driver Installation

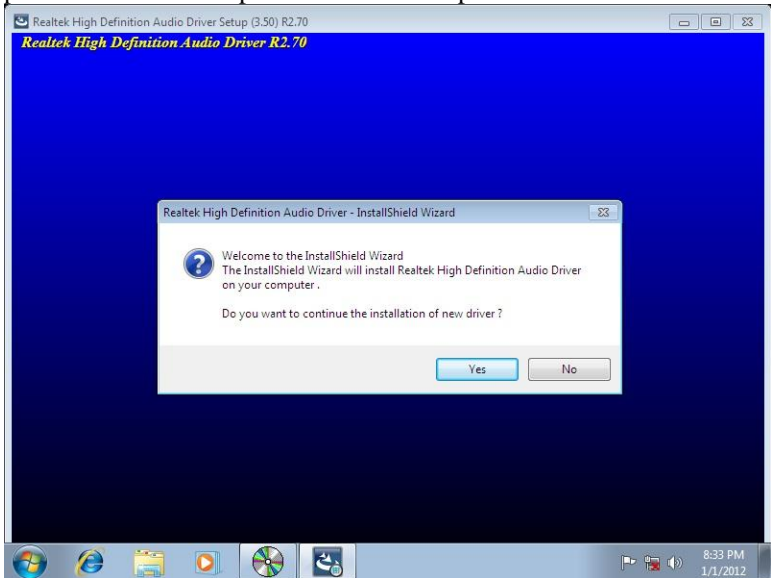
1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) 8 Series Chipset Drivers*.



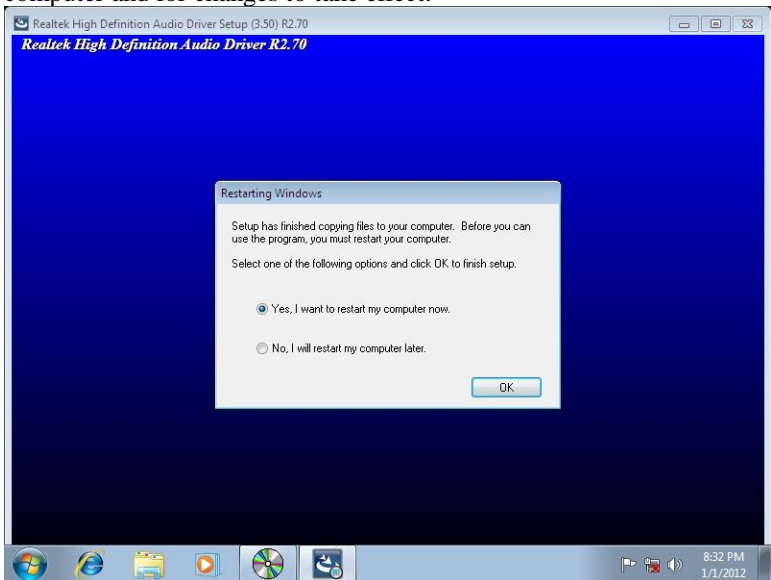
2. Click *Realtek High Definition Audio Driver*.



3. On the Welcome to the InstallShield Wizard screen, click *Yes* 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

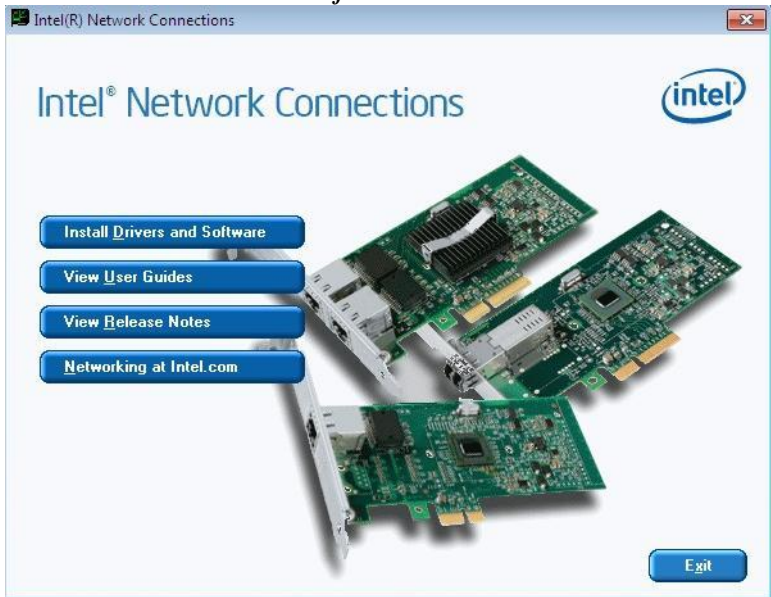
1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) 8 Series Chipset Drivers**.



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



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



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

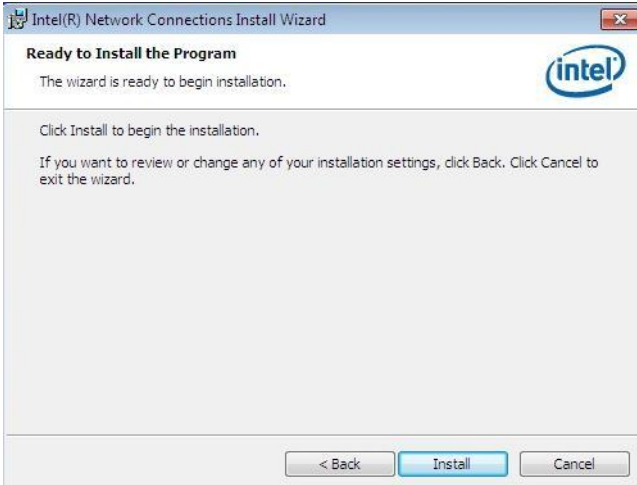
5. Click **Next** to agree with the license agreement.

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

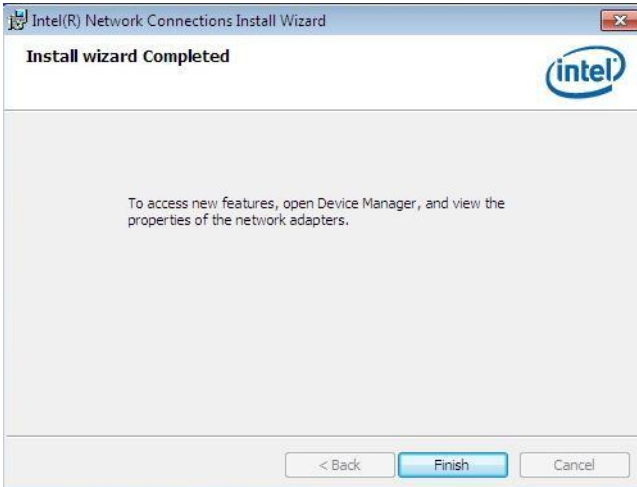
## DRIVER INSTALLATION

---

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



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 DVD that comes with the board. Click *Intel* and then *Intel(R) 8 Series Chipset Drivers* and then *Intel(R) AMT 9.0 Drivers*.

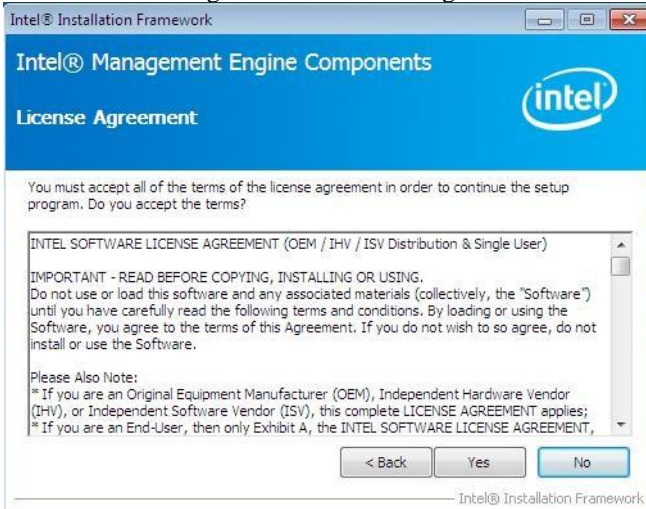


## DRIVER INSTALLATION

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 DVD that comes with the board. Click *Intel* and then *Intel(R) 8 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.



## **DRIVER 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.

<b>Address</b>	<b>Device Description</b>
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
2F8h - 2FFh	Serial Port #2(COM2)
2B0h- 2DFh	Graphics adapter Controller
360h - 36Fh	Network Ports
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.

<b>Level</b>	<b>Function</b>
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ8	Real Time Clock
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 "F81866.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 81866 watch dog program\n");

    SIO = Init_F81866();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81866, 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_F81866_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81866_Reg(0x2B, bBuf); //Enable WDTO

    Set_F81866_LD(0x07); //switch to logic device 7
    Set_F81866_Reg(0x30, 0x01); //enable timer

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81866_Reg(0xF5, bBuf); //count mode is second

    Set_F81866_Reg(0xF6, interval); //set timer

    bBuf = Get_F81866_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81866_Reg(0xFA, bBuf); //enable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81866_Reg(0xF5, bBuf); //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;

    Set_F81866_LD(0x07); //switch to logic device 7

    bBuf = Get_F81866_Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81866_Reg(0xFA, bBuf); //disable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= ~0x20;
    bBuf |= 0x40;
    Set_F81866_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 "F81866.H"
#include <dos.h>
//-----
unsigned int F81866_BASE;
void Unlock_F81866 (void);
void Lock_F81866 (void);
//-----
unsigned int Init_F81866(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81866_BASE = 0x4E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x2E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x00;
    result = F81866_BASE;
}

Init_Finish:
    return (result);
}
//-----
void Unlock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
}
//-----
void Lock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_LOCK);
}
//-----
void Set_F81866_LD( unsigned char LD)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, F81866_REG_LD);
    outportb(F81866_DATA_PORT, LD);
    Lock_F81866();
}
//-----
void Set_F81866_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, REG);
    outportb(F81866_DATA_PORT, DATA);
    Lock_F81866();
}
//-----

```

## APPENDIX

---

```
unsigned char Get_F81866_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, REG);
    Result = inportb(F81866_DATA_PORT);
    Lock_F81866();
    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 __F81866_H
#define __F81866_H                1
//-----
#define F81866_INDEX_PORT        (F81866_BASE)
#define F81866_DATA_PORT        (F81866_BASE+1)
//-----
#define F81866_REG_LD            0x07
//-----
#define F81866_UNLOCK            0x87
#define F81866_LOCK              0xAA
//-----
unsigned int Init_F81866(void);
void Set_F81866_LD( unsigned char);
void Set_F81866_Reg( unsigned char, unsigned char);
unsigned char Get_F81866_Reg( unsigned char);
//-----
#endif __F81866_H
```