

MB990

Intel® 6th Generation Core Q170 PCH
ATX Motherboard

USER'S MANUAL

Version 1.0

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Table of Contents

Introduction.....	1
Product Description.....	1
Checklist.....	2
MB990 Specifications.....	3
Board Dimensions.....	5
Installations.....	6
Installing the CPU.....	7
Installing the Memory.....	8
Setting the Jumpers.....	9
Connectors on MB990.....	15
BIOS Setup.....	27
BIOS Introduction.....	28
BIOS Setup.....	28
Advanced Settings.....	30
CSM Configuration.....	37
Chipset Settings.....	41
Security Settings.....	44
Boot Settings.....	45
Save & Exit Settings.....	46
Drivers Installation.....	47
Intel Chipset Software Installation Utility.....	48
VGA Drivers Installation.....	50
Realtek HD Audio Driver Installation.....	53
LAN Drivers Installation.....	55
Intel® Management Engine Interface.....	58
Intel® USB 3.0 Drivers.....	60
Appendix.....	63
A. I/O Port Address Map.....	63
B. Interrupt Request Lines (IRQ).....	64
C. Watchdog Timer Configuration.....	65

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Introduction

Product Description

The MB990 ATX motherboard is based on the latest Intel® Q170 chipset. The platform supports 6th Generation Intel® Core processor family with LGA1151 packing and features an integrated dual-channel DDR4 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 MB990 Q170 platform is made with 14-nanometer technology that supports Intel's first processor architecture to unite the CPU and the graphics core on the transistor level. The MB990 ATX board utilizes the dramatic increase in performance provided this Intel's latest cutting-edge technology. Measuring 305mm x 244mm, the MB990 offers fast 6Gbps SATA support (6 ports), USB3.0 (10 ports) and interfaces for DVI-D, HDMI and DP displays. MB990VF features Intel® Active Management Technology 11.0.

MB990 FEATURES:

- Supports Intel® 6th Generation Core i7/i5/i3 QC/DC desktop processors
- Four DDR4 DIMM, 2133MHz, Max. 64GB memory
- Dual Intel® PCI-Express Gigabit LAN
- Integrated Graphics for DVI-D/DP/HDMI displays
- 6x SATA 3.0, 14x USB 2.0, USB 3.0 (10 ports), 6x COM, Watchdog timer
- 1x PCI-E (x16), 1x PCI-E (x8), 1x PCI-E (x4), 1x PCI-E(x4).
- 3x PCI
- Optional AMT (MB990VF only)

Checklist

Your MB990 package should include the items listed below.

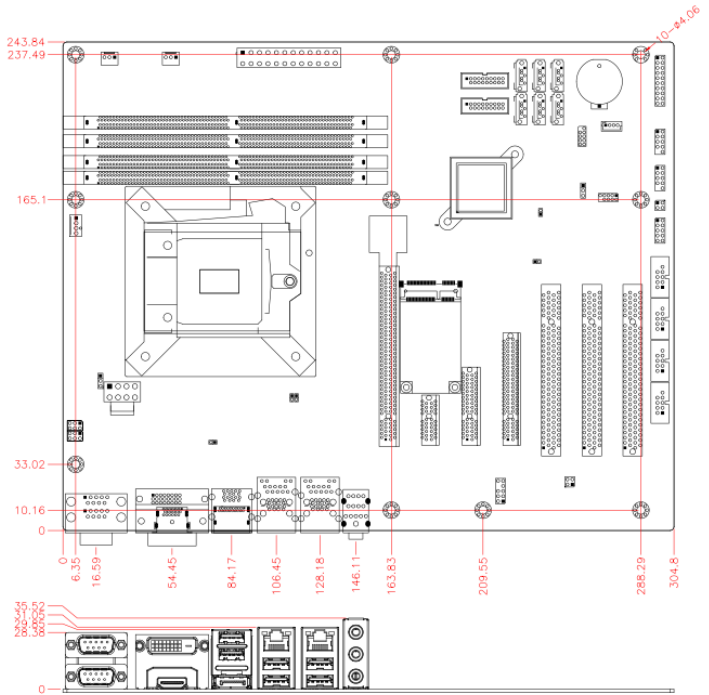
- The MB990 ATX motherboard
- This User's Manual
- 1 DVD containing chipset drivers and flash memory utility
- Serial ATA cable
- COM ports cable
- I/O shield

MB990 Specifications

Product Name	MB990
Form Factor	ATX
CPU Type	- Intel® 6th Generation Core processors (14nm monolithic) - TDP = 35W/65W/ (4+2) ; 35W/65W (2+2) - Package =37.5 mm x 37.5 mm x 4.4 mm
CPU Speed	TBD
Cache Size	Up to 8MB
CPU Socket	LGA1151(Socket H4)
Chipset	Intel® PCH-H, Q170 (MB990VF) /H170 (MB990EF) PCH Package = FCBGA 23 mm x 23 mm x 0.5 mm
BIOS	AMI BIOS
Memory	Intel® 6th Generation Core processors integrated memory controller - DDR4-2133 MHz @ 1.2V - UDIMM@288-pin x 4, Max. = 64GB
VGA	Intel® 6th Generation Core processor integrated HD Gfx, Supports 3 independent displays - DisplayPort x 1 (DP++, Thru port B, support DP1.3) **Resolution up to 4096x2304 @ 60 Hz** - HDMI X 1 (Thru port C, support HDMI 2.0) ** Resolution up to 4096x2304 @ 60 Hz** - DVI-D x 1 (Thru port D, with level shifter ASM1442K) ** Resolution up to 4096x2304 @ 30 Hz**
LAN	1. Intel® Jacksonville I219LM(MB990VF)/I219V(MB990EF) GbE PHY 6mm x 6mm, QFN48 2. Intel® Pearsonville I211AT as 2 nd GbE
USB	Intel® Q170 /H170 PCH integrated USB controller; USB 3.0 host controller, support 10 ports - 6 ports in the rear panel - 4 ports thru onboard box headers x 2 (MB990VF) / x 1(MB990EF) USB 2.0 host controller , support 4 ports - 4 ports via onboard pin header (2.54mm pitch)
Serial ATA	Intel® Q170 PCH built-in SATA controller, supports total 6 ports 6 x SATA (3.0) 6Gbps
Storage Device	N/A
Audio	Intel® Q170 PCH built-in High Definition Audio controller + Realtek ALC892 w/ 7.1 channels
Super I/O (LPC)	Fintek F81866AD-I (128-pin LQFP [14mm x 14 mm]) ▪ COM #1 (RS232/422/485) for jumper-less Support ring-in with power @500 mA (selectable for 5V or 12V) COM #2 (RS232 only) supports ring-in with power @500 mA (selectable for 5V or 12V) ▪ COM #3-COM #6 (RS232 only) Hardware Monitor - CPU FAN x 1 (PWM Fan type, 4-pin connector) - SYS FAN x 2 (DC Fan type, 3-pin connector)
Digital IO	4 in & 4 out
IAMT 11.0	Intel® Q170 PCH built-in
TPM 1.2 [For MB990VF only]	Infineon SLB9660 **Meet FIPS 140-2 certification**

Expansion Slots	<ul style="list-style-type: none"> - PCIe (16x) x1 [Gen 3.0 PEG] → From CPU - PCIe (1x) x 1 (Gen 3.0) - PCIe (1x) x 1 (Gen 3.0) [PCIe(4x) slot] - PCIe (4x) x 1 (Gen 3.0) [PCIe(8x) slot] - Mini PCIe x 1 (Gen 3.0) - PCI(32-bit) x 3 [via ITE IT8892E PCIe to PCI bridge]
Edge Connectors	<ul style="list-style-type: none"> Dual DB9 stack connector for COM #1 / COM #2 DVI-D + HDMI stack connector x 1 DP + dual USB (3.0) [Blue color] stack connector x 1 RJ-45 + dual USB (3.0) [Blue color] stack connector x 2 Triplet type Jack 3 x 1 for HD Audio
Onboard Header/Connector	<ul style="list-style-type: none"> 6 ports x SATA III [Blue color] 2x10 pins box-header for 4 ports USB 3.0 [Blue color] 2x5 pins pin-header for front panel audio [Support 7.1 Channel] 2x5 pins pin- header x 4 for COM3 ~ COM6 (RS232) 2x5 pins pin-header x1 for Digital IO
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec/min)
System Voltage	<ul style="list-style-type: none"> ATX standard 24-pin type 4 pin type (+12V only)
iSMART	iSMART 3.2
RAID	Support RAID 0/1/5
Others	<ul style="list-style-type: none"> - LAN Wakeup - Reserve S3 status signal connector (4-pin) - EuP/ErP (MB990EF only)
OS supporting	<ul style="list-style-type: none"> Windows 7 Pro (32b/64b) Windows 8.1(64b) / Embedded Industrial(64b) Windows 10 (64b) Linux Fedora (64b) / Ubuntu (64b)
Certification	<ul style="list-style-type: none"> CE (EN55032:2012) FCC Class B LVD
Board Size	305mm x 244mm
RoHS	YES

Board Dimensions



Installations

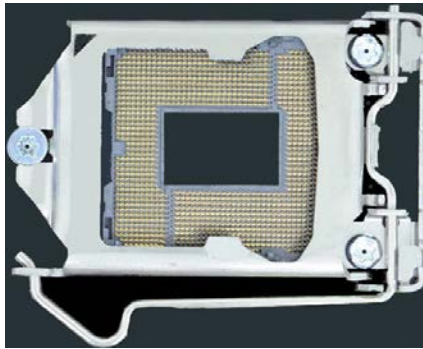
This section provides information on how to use the jumpers and connectors on the MB990 in order to set up a workable system. The topics covered are:

Installing the CPU.....	7
Installing the Memory.....	8
Setting the Jumpers.....	9
Connectors on MB990.....	15

Installing the CPU

The MB990 board supports an LGA1151 Socket (shown below) for Intel 6th Generation Core processors.

To install the CPU, unlock first the socket by pressing the lever sideways, then lift it up to a 90-degree. Then, position the CPU above the socket such that the CPU corner aligns with the gold triangle matching the socket corner with a small triangle. Carefully insert the CPU into the socket and push down the lever to secure the CPU. Then, install the heat sink and fan.



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.*

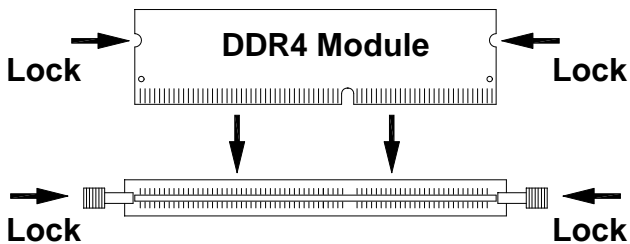
Installing the Memory

The MB990 board supports four DDR4 memory socket for a maximum total memory of 64GB in DDR4 DIMM memory type.

Installing and Removing Memory Modules

To install the DDR4 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR4 module so that the key of the DDR4 module aligned with that on the memory slot.
2. Gently push the DDR4 module in an upright position until the clips of the slot close to hold the DDR4 module in place when the DDR4 module touches the bottom of the slot.
3. To remove the DDR4 module, press the clips with both hands.

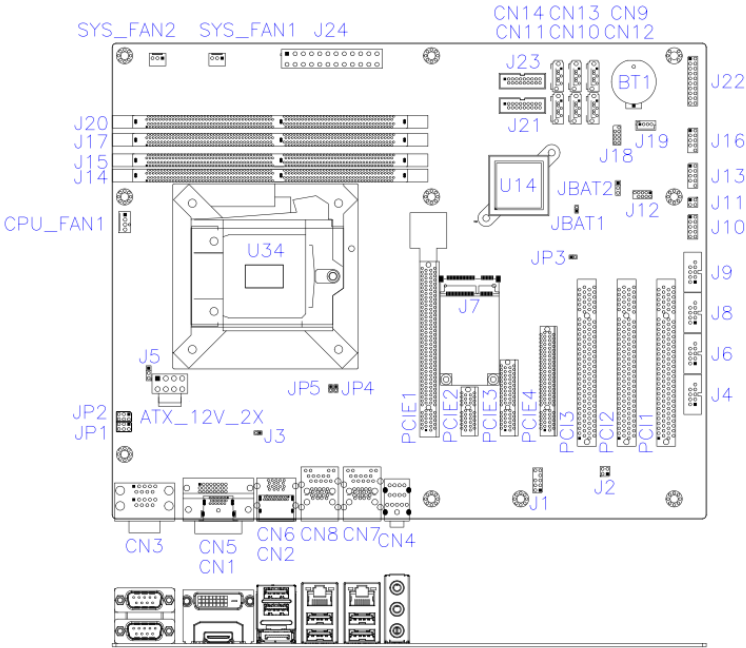


Setting the Jumpers

Jumpers are used on MB990 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 MB990 and their respective functions.



Jumper Locations on MB990	10
JBAT2: Clear CMOS Contents	11
JBAT1: Clear RTC Contents.....	11
JP1: COM1 RS232 RI/+5V/+12V Power Setting	12
JP2: COM2 RS232 RI/+5V/+12V Power Setting	12
JP3: Flash Descriptor Security Override (Factory use only)	13
JP4, JP5: Processor dgfx Bifurcation Function Setting.....	13
(MB990VF PCIE1 only)	13

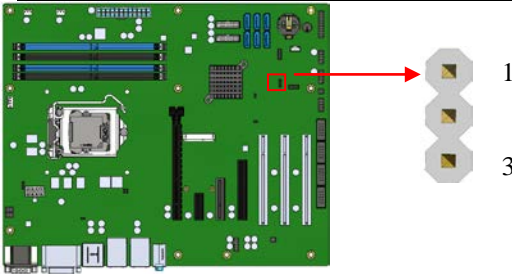
Jumper Locations on MB990



Jumpers on MB990.....	Page
JBAT2: Clear CMOS Contents	11
JBAT1: Clear RTC Contents.....	11
JP1: COM1 RS232 RI/+5V/+12V Power Setting.....	12
JP2: COM2 RS232 RI/+5V/+12V Power Setting.....	12
JP3: Flash Descriptor Security Override (Factory use only).....	13
JP4, JP5: Processor dgfx Bifurcation Function Setting	13

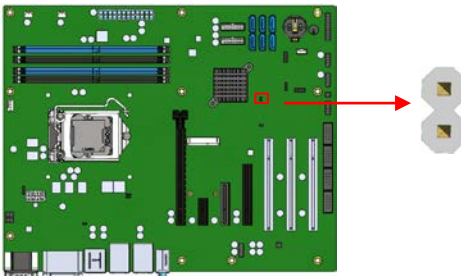
JBAT2: Clear CMOS Contents

JBAT2	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

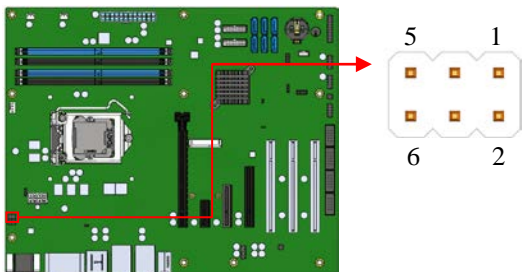


JBAT1: Clear RTC Contents

JBAT1	Flash Descriptor Security Override
Open	Normal (Default)
Close	Clear RTC

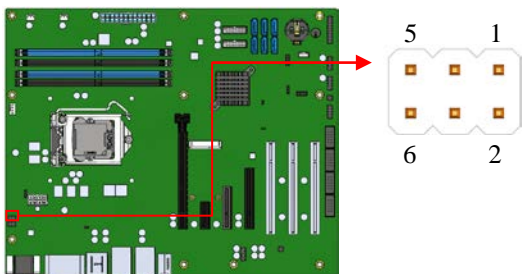


JP1: COM1 RS232 RI/+5V/+12V Power Setting



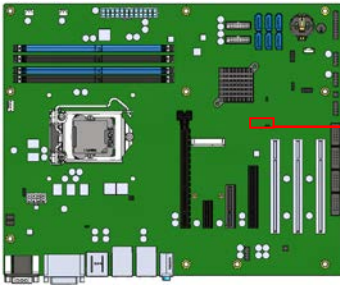
JP1	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-3 Short/Closed	+5V

JP2: COM2 RS232 RI/+5V/+12V Power Setting



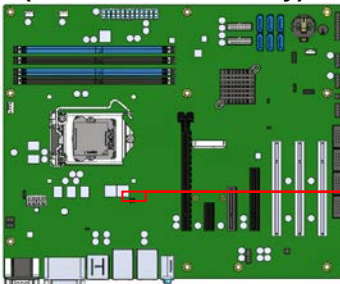
JP2	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-3 Short/Closed	+5V

JP3: Flash Descriptor Security Override (Factory use only)



JP3	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

JP4, JP5: Processor dgfx Bifurcation Function Setting (MB990VF PCIe1 only)



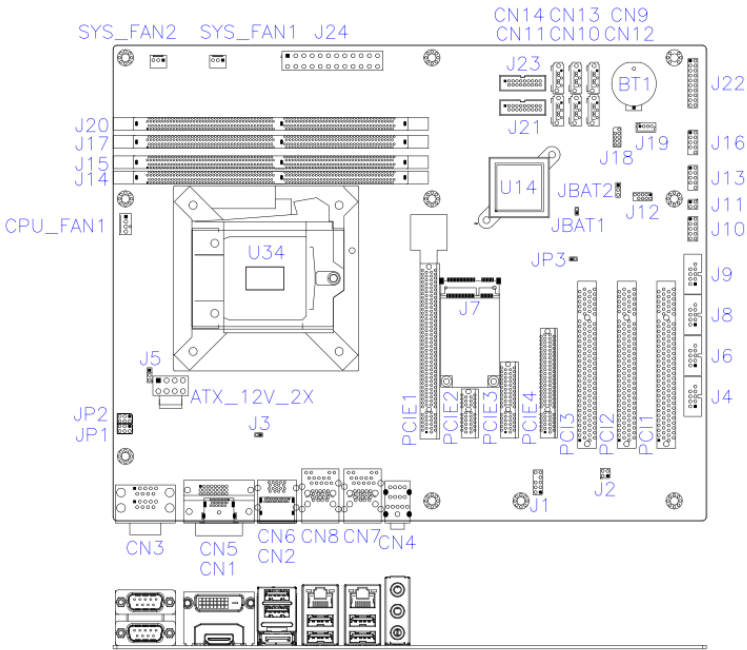
JP5	JP4	Processor dgfx Bifurcation Function Setting
Open	Open	1 X 16 (Default)
Open	Close	2 X 8
Close	Open	RSVD
Close	Close	X 8, X 4, X 4

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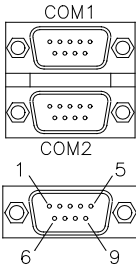
Connectors on MB990

Connector Locations on MB990	16
CN3: COM1 and COM2 Serial Ports	17
CN5: DVI-D and HDMI Connector	17
CN6: USB3.0 Connector	18
CN2: Display Port Connector.....	18
CN8: Gigabit LAN (Intel I219LM) + USB 0/1.....	18
CN7: Gigabit LAN (Intel I211AT) + USB 2/3.....	18
CN4: HD Audio Connector.....	18
CN9, CN10, CN11, CN12, CN13, CN14: SATA Connectors.....	18
J1: Audio Pin Header for Chassis Front Panel.....	18
J2: SPDIF I/O.....	19
ATX_12V_2X1: ATX 12V Power Connector.....	19
J9, J8, J6, J4: COM3~COM6 RS232 Serial Ports.....	20
J7: Mini PCI-E Connector(PCI-E X1 only)	20
J13, J16: USB2.0 Connectors.....	20
J21, J23: USB3.0 Connectors.....	21
J10: Digital I/O	21
J22: Front Panel Function Connector	22
J18: SPI Flash Connector (Factory use only).....	22
J24: ATX Power Supply Connector	23
CPU_FAN1: CPU Fan Power Connector	23
SYS_FAN1: System Fan1 Power Connector.....	24
SYS_FAN2: System Fan2 Power Connector.....	24
J11: ACPI Status LED	25
PCIE1: PCI-E X16 Slot	25
PCIE4: PCI-E X8 Slot (PCI-E X4)	25
PCIE3: PCI-E X4 Slot (PCI-E X1)	26
PCIE2: PCI-E X1 Slot	26
PCI1-PCI3: PCI 32-bit Slot.....	26

Connector Locations on MB990

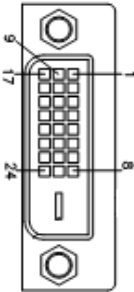


CN3: COM1 and COM2 Serial Ports



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

CN5: DVI-D and HDMI 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
NC	8	23	CLOCK +
DATA 1-	9	24	CLOCK -
DATA 1+	10		
SHIELD 1/3	11		
DATA 3-	12		
DATA 3+	13		
DDC POWER	14		
A GROUND 1	15		

CN6: USB3.0 Connector

CN2: Display Port Connector

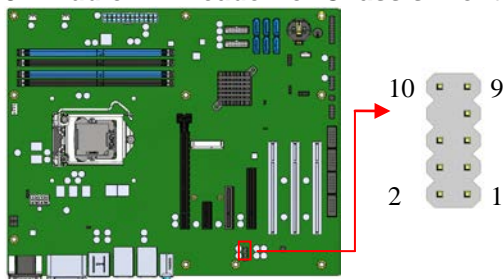
CN8: Gigabit LAN (Intel I219LM) + USB 0/1

CN7: Gigabit LAN (Intel I211AT) + USB 2/3

CN4: HD Audio Connector

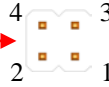
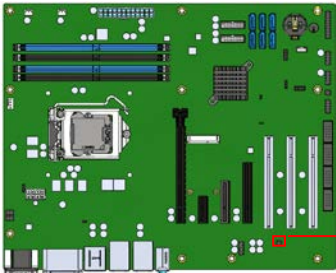
CN9, CN10, CN11, CN12, CN13, CN14: SATA Connectors

J1: 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	Sense Ground
Sense	7	8	KEY
LINE_L	9	10	Sense Ground

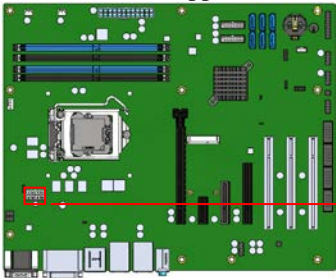
J2: SPDIF I/O



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

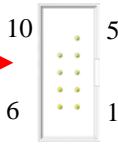
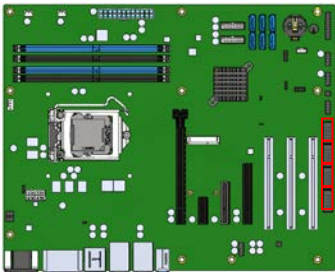
ATX_12V_2X1: ATX 12V Power Connector

This connector supplies the CPU operating voltage.



Signal Name	Pin #	Pin #	Signal Name
Ground	1	5	+12V
Ground	2	6	+12V
Ground	3	7	+12V
Ground	4	8	+12V

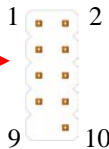
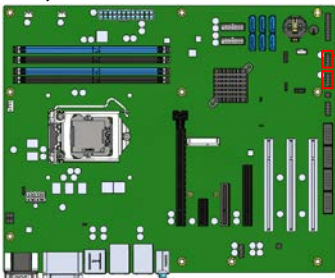
J9, J8, J6, J4: COM3~COM6 RS232 Serial Ports



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

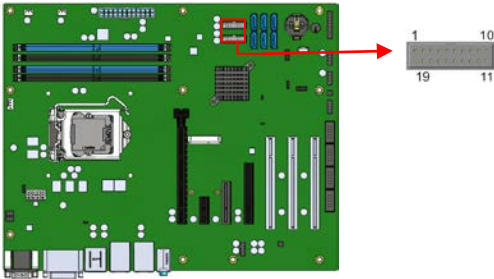
J7: Mini PCI-E Connector(PCI-E X1 only)

J13, J16: USB2.0 Connectors



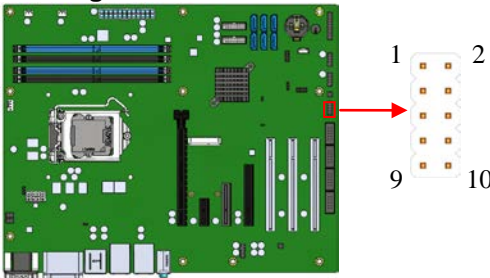
Signal Name	Pin #	Pin #	Signal Name
VCC	1	2	VCC
D0-	3	4	D1-
D0+	5	6	D1+
GND	7	8	GND
KEY	9	10	NC

J21, J23: USB3.0 Connectors



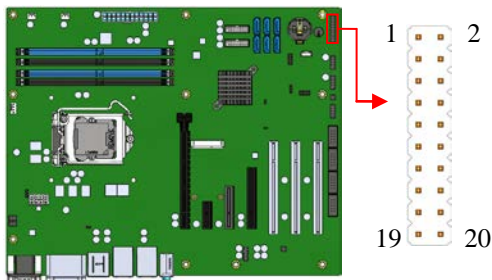
Signal Name	Pin #	Pin #	Signal Name
VCC(900mA)	1	X	
P1_SSRX-	2	19	VCC(900mA)
P1_SSRX+	3	18	P2_SSRX-
GND	4	17	P2_SSRX+
P1_SSTX-	5	16	GND
P1_SSTX+	6	15	P2_SSTX-
GND	7	14	P2_SSTX+
P1_U2_D-	8	13	GND
P1_U2_D+	9	12	P2_U2_D-
NC	10	11	P2_U2_D+

J10: Digital I/O



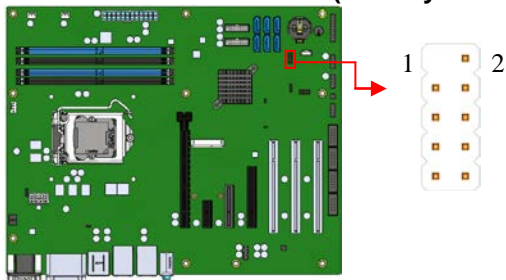
Signal Name	Pin #	Pin #	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

J22: Front Panel Function Connector

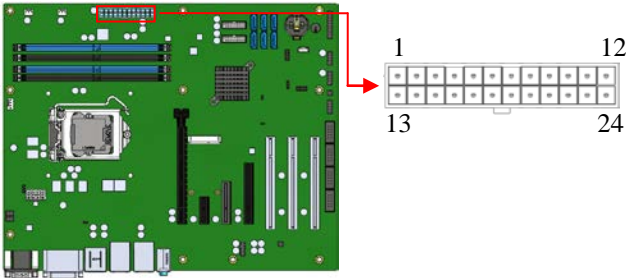


Signal Name	Pin #	Pin #	Signal Name
PWR LED +	1	2	SPK
NC	3	4	NC
PWR LED- (GND)	5	6	GND
NC	7	8	SPK (VCC)
GND	9	10	NC
GND	11	12	NC
PWR_SW	13	14	PWR_SW
NC	15	16	NC
GND	17	18	RST
HDD LED +	19	20	HDD LED -

J18: SPI Flash Connector (Factory use only)

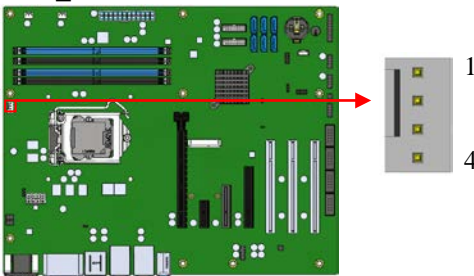


J24: ATX Power Supply Connector



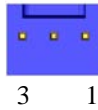
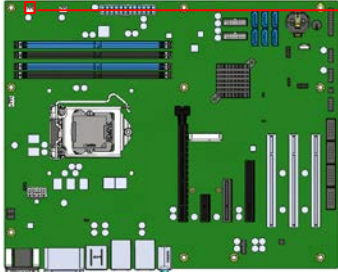
Signal Name	Pin #	Pin #	Signal Name
3.3V	13	1	3.3V
-12V	14	2	3.3V
Ground	15	3	Ground
PS-ON	16	4	+5V
Ground	17	5	Ground
Ground	18	6	+5V
Ground	19	7	Ground
-5V	20	8	Power good
+5V	21	9	5VSB
+5V	22	10	+12V
+5V	23	11	+12V
Ground	24	12	+3.3V

CPU_FAN1: CPU Fan Power Connector



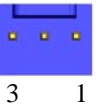
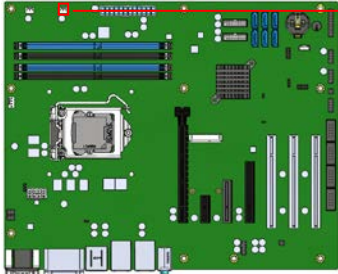
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

SYS_FAN1: System Fan1 Power Connector



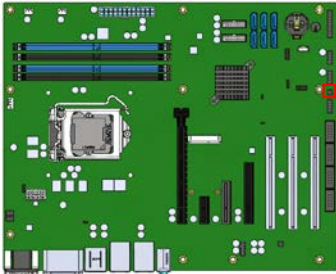
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

SYS_FAN2: System Fan2 Power Connector



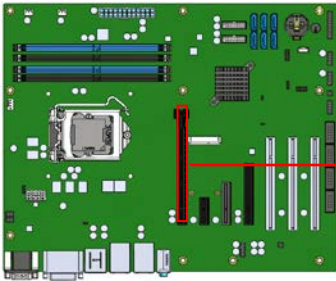
Pin #	Signal Name
1	Ground
2	+12V
3	NC

J11: ACPI Status LED

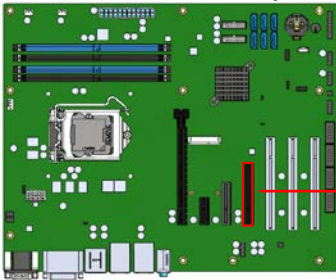


Pin #	Signal Name
1	+3VDUAL
2	GND
3	+VCC3
4	GND

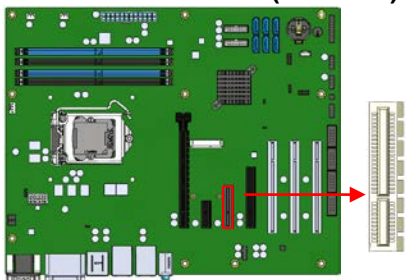
PCI-E1: PCI-E X16 Slot



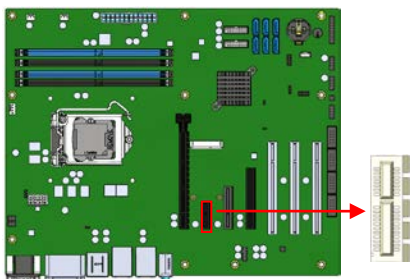
PCI-E4: PCI-E X8 Slot (PCI-E X4)



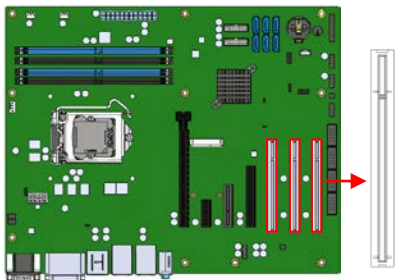
PCIE3: PCI-E X4 Slot (PCI-E X1)



PCIE2: PCI-E X1 Slot



PCI1-PCI3: PCI 32-bit Slot



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:

BIOS Introduction.....	28
BIOS Setup	28
Advanced Settings	30
CSM Configuration.....	37
Chipset Settings.....	41
Security Settings.....	44
Boot Settings.....	45
Save & Exit Settings.....	46

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 <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 © 2011 American Megatrends, Inc.

Main	Advanced	Chipset	Security	Boot	Save & Exit
System Language		[English]			Choose the system default language → ← Select Screen
System Date		[Tue 01/20/2009]			↑ ↓ Select Item
System Time		[21:52:06]			Enter: Select +- 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	Security	Boot	Save & Exit
<ul style="list-style-type: none"> ▶ ACPI Settings ▶ iSmart Controller ▶ AMT Configuration ▶ F81866 Super IO Configuration ▶ Hardware Monitor ▶ CPU Configuration ▶ SATA Configuration ▶ CSM Configuration ▶ Trusted Computing ▶ USB Configuration 				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	

ACPI Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Security	Boot	Save & Exit
ACPI Settings				→ ← Select Screen	
Enable Hibernation				↑ ↓ Select Item	
ACPI Sleep State				Enter: Select	
Lock Legacy Resources				+- Change Field	
S3 Video Repost				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.

iSmart Controller

Aptio Setup Utility

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

Power-On after Power failure

This field sets the system power status whether *Disable* or *Enable* when power returns to the system from a power failure situation.

Temperature Guardian

Generate the reset signal when system hangs up on POST

Schedule Slot 1 / 2

Setup the hour/minute for system power on.

AMT Configuration

Aptio Setup Utility

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

AMT Configuration

This configuration is supported only with MB990VF (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 MB990VF (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 MB990VF (with iAMT function). Enable/Disable Watchdog Timer.

F81866 Super IO Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
F81866 Super IO Configuration					
	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 MB990EF.

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.

Hardware Monitor

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
PC Health Status					
CPU smart fan control		Disabled			
System smart fan1 control		Disabled			
System smart fan2 control		Disabled			
CPU temperature		+33 C			
System temperature		+34 C			
CPU FAN Speed		2170 RPM			
SYS FAN1 Speed		N/A			→ ← Select Screen
SYS FAN2 Speed		N/A			↑ ↓ Select Item
VCORE		+1.112 V			Enter: Select
+5V		+5.087 V			+ - Change Field
+12V		+12.408 V			F1: General Help
Memory Voltage		+1.560 V			F2: Previous Values
+3.3V		+3.376V			F3: Optimized Default
CPU Shutdown Temperature		Disabled			F4: Save ESC: Exit

CPU/System smart fan control

This field enables or disables the smart fan feature.

Disabled (default)

- 50 °C
- 60 °C
- 70 °C
- 80 °C
- 90 °C

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.

CPU Shutdown Temperature

The default setting is Disabled.

CPU Configuration

This section shows the CPU configuration parameters.

Aptio Setup Utility - Copyright © 2012 American Megatrends, Inc.

Main	Advanced	Chipset	Security	Boot	Save & Exit
CPU Configuration					
Intel(R) CPU Core(TM)i5-6500TE @ 2.30GHz					
CPU Signature			506E3		
Microcode Patch			39		
Processor Cores			4		
Hyper Threading Technology			Not Supported		
Intel HT Technology			Supported		
Intel VT-x Technology			Supported		
Intel SMX Technology			Supported		
64-bit			Supported		
EIST Technology			Supported		
Intel(R) SpeedStep(tm)			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

Intel(R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

SATA Configuration

SATA Devices Configuration.

Aptio Setup Utility - Copyright © 2012 American Megatrends, Inc.

Main	Advanced	Chipset	Security	Boot	Save & Exit
	SATA Controller(s)		Enabled		
	SATA Mode Selection		AHCI		
	SATA Port0		Empty		
	Software Preserve		Unknown		
	Hot Plug		Disabled		
	SATA Port1		Empty		
	Software Preserve		Unknown		
	Hot Plug		Disabled		
	SATA Port2		Empty		
	Software Preserve		Unknown		
	Hot Plug		Disabled		
	SATA Port3		Empty		→ ← Select Screen
	Software Preserve		Unknown		↑ ↓ Select Item
	Hot Plug		Disabled		Enter: Select
	SATA Port4		Empty		+ - Change Opt.
	Software Preserve		Unknown		F1: General Help
	Hot Plug		Disabled		F2: Previous Values
	SATA Port5		Empty		F3: Optimized Defaults
	Software Preserve		Unknown		F4: Save & Exit
	Hot Plug		Disabled		ESC: Exit

SATA Controller(s)

Enable or disable SATA Device.

SATA Mode Selection

Determines how SATA controller(s) operate.

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

Hot Plug

Designates this port as Hot Pluggable.

CSM Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
Option ROM execution					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Network Do not launch					

Network

Controls the execution of UEFI and Legacy PXE OpROM

Trusted Computing

Aptio Setup Utility

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

Security Device Support

This configuration is supported only with MB990VF. Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required.

USB Configuration

Aptio Setup Utility – Copyright © 2012 American Megatrends, Inc.

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Module Version			12		
USB Controllers:					
1 XHCI					
USB Devices:					
2 Keyboards, 1 Mouse, 2 Hubs					
Legacy USB Support			Enabled		→ ← Select Screen
XHCI Hand-off			Disabled		↑ ↓ Select Item
USB Mass Storage Driver Support			Enabled		Enter: Select
Port 60/64 Emulation			Disabled		+ - Change Opt.
					F1: General Help
					F2: Previous Values
					F3: Optimized Defaults
					F4: Save & Exit
					ESC: Exit
USB hardware delays and time-outs:					
USB Transfer time-out			20 sec		
Device reset time-out			20 sec		
Device power-up delay			Auto		

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.

XHCI Hand-off

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

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

Port 60/64 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.

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 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.

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	Security	Boot	Save & Exit
<ul style="list-style-type: none"> ▶ System Agent (SA) Configuration ▶ PCH-IO Configuration 			→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit		

System Agent (SA) Configuration

Aptio Setup Utility					
Main	Advanced	Chipset	Security	Boot	Save & Exit
		System Agent Bridge Name	Skylake	→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
		SA PCIe Code Version	1.5.0.0		
		VT-d	Supported		
		VT-d	Enabled		
		<ul style="list-style-type: none"> ▶ Graphics Configuration ▶ Memory Configuration 			

VT-d

Check to enable VT-d function on MCH.

Graphics Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
Graphics Configuration					
		IGFX VBIOS Version	1031		
		Skip Scanning of External Gfx Card	Disabled		
		Primary Display	Auto		→ ← Select Screen
		Primary PEG	Auto		↑ ↓ Select Item
		Primary PCIE	Auto		Enter: Select
		Internal Graphics	Auto		+ - Change Field
		GTT Size	8MB		F1: General Help
		Aperture Size	256MB		F2: Previous Values
		DVMT Pre-Allocated	32M		F3: Optimized Default
		DVMT Total Gfx Mem	256MB		F4: Save ESC: Exit
		Gfx Low Power Mode	Disabled		

Skip Scanning of External Gfx Card

If Enable, it will not scan for External Gfx Card on PEG and PCH PCIE ports.

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.

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.

Memory Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
Memory Information					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
Memory RC Version		1.5.0.0			
Memory Frequency		2133 MHz			
Total Memory		16384 MB			

PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.

Aptio Setup Utility

Main	Advanced	Chipset	Security	Boot	Save & Exit
Intel PCH RC Version		1.5.0.0		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
Intel PCH SKU Name		PCH-H Desktop Q170 SKU			
Intel PCH Rev ID		31/D1			
PCH LAN Controller		Enabled			
Wake on LAN		Enabled			
SLP_LAN# Low on DC Power		Enabled			

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

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	Security	Boot	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.

Boot Settings

This section allows you to configure the boot settings.

Aptio Setup Utility					
Main	Advanced	Chipset	Security	Boot	Save & Exit
Boot Configuration					
Setup Prompt Timeout			1		
Bootup NumLock State			Off		
Quiet Boot			Disabled		
Fast Boot			Disabled		
New Boot Option Policy			Default		
Boot mode Select			LEGACY		
FIXED BOOT ORDER Priorities					
Boot Option #1			Hard Disk		→ ← Select Screen
Boot Option #2			CD/DVD		↑ ↓ Select Item
Boot Option #3			USB Hard Disk		Enter: Select
Boot Option #4			USB CD/DVD		+ - Change Field
Boot Option #5			USB Key		F1: General Help
Boot Option #6			USB Floppy		F2: Previous Values
Boot Option #7			USB Lan		F3: Optimized Default
Boot Option #8			Network		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.

New Boot Option Policy

Controls the placement of newly detected UEFI boot option.

FIXED BOOT ORDER Priorities

Sets the system boot order.

Save & Exit Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Security	Boot	Save & Exit
Save Options Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Changes Discard Changes Defaults Options 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.

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	48
VGA Drivers Installation	50
Realtek HD Audio Driver Installation	53
LAN Drivers Installation.....	55
Intel® Management Engine Interface	58
Intel® USB 3.0 Drivers	60

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.

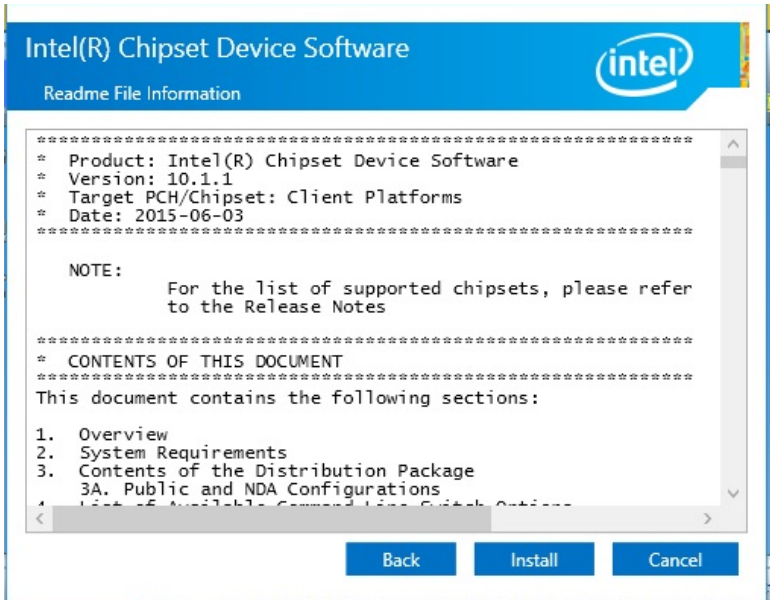
1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



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 *Install* 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

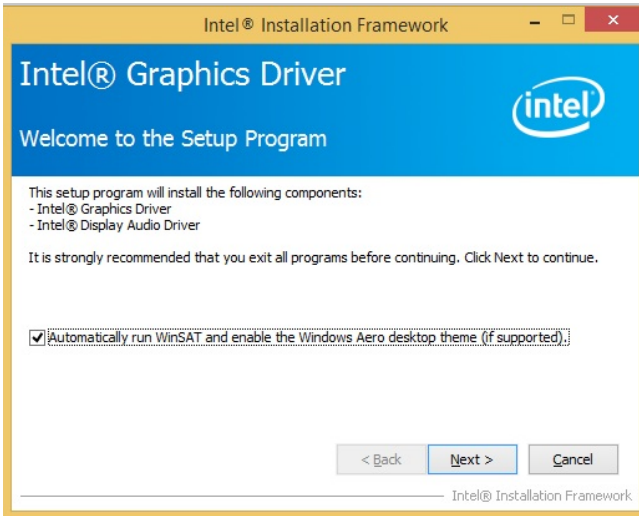
1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



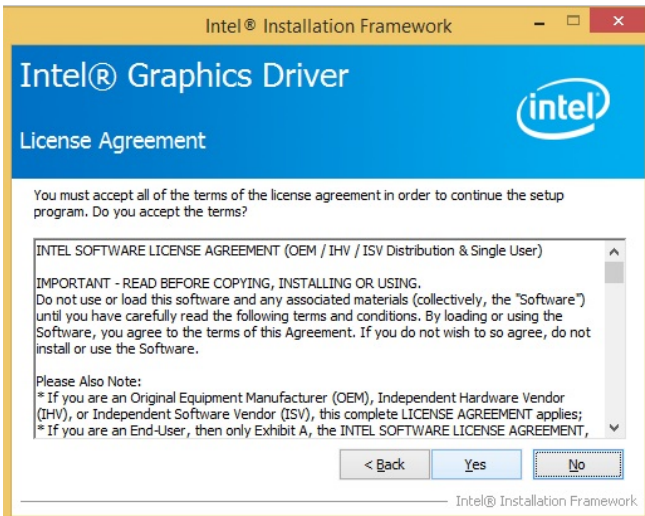
2. Click **Intel(R) HD Graphics Driver**.



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



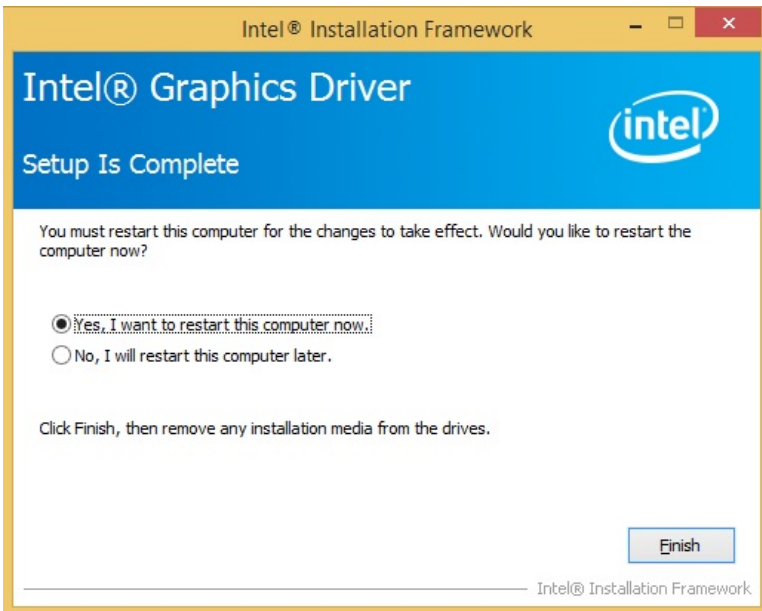
4. Click *Yes* to agree with the license agreement and continue the installation.



5. On the 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

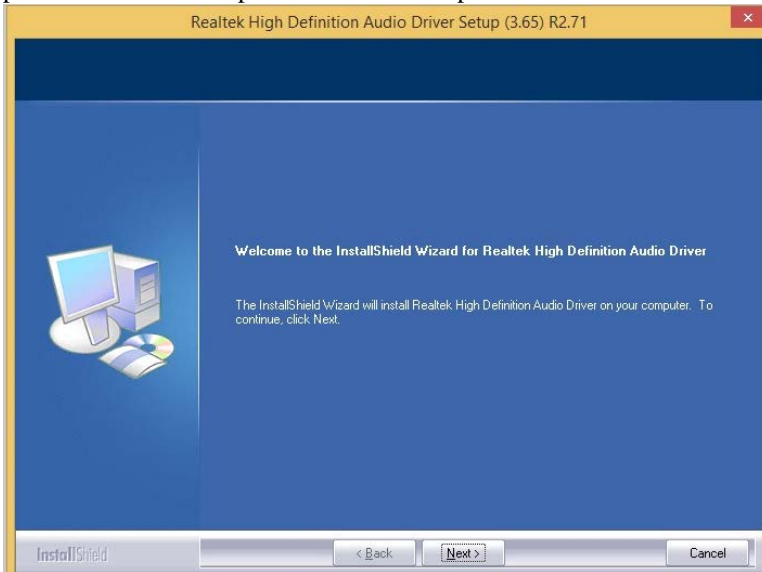
1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) Skylake Chipset Drivers*.



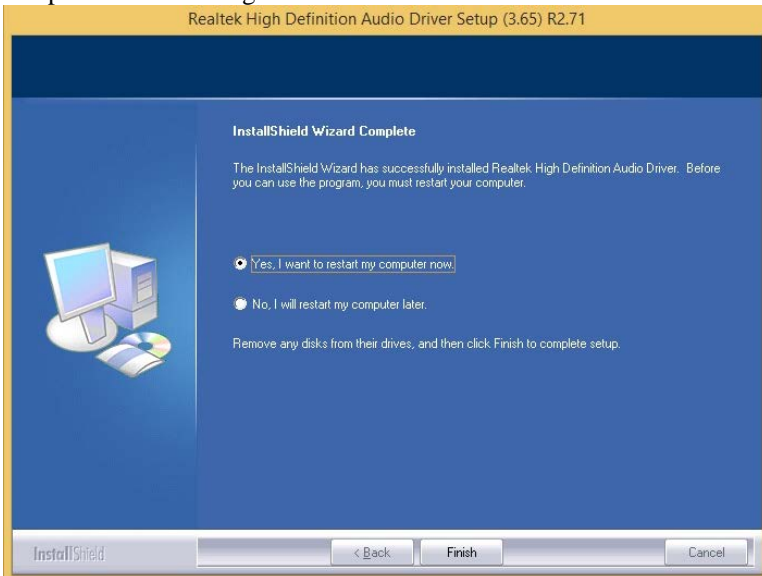
2. Click *Realtek High Definition Audio Driver*.



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

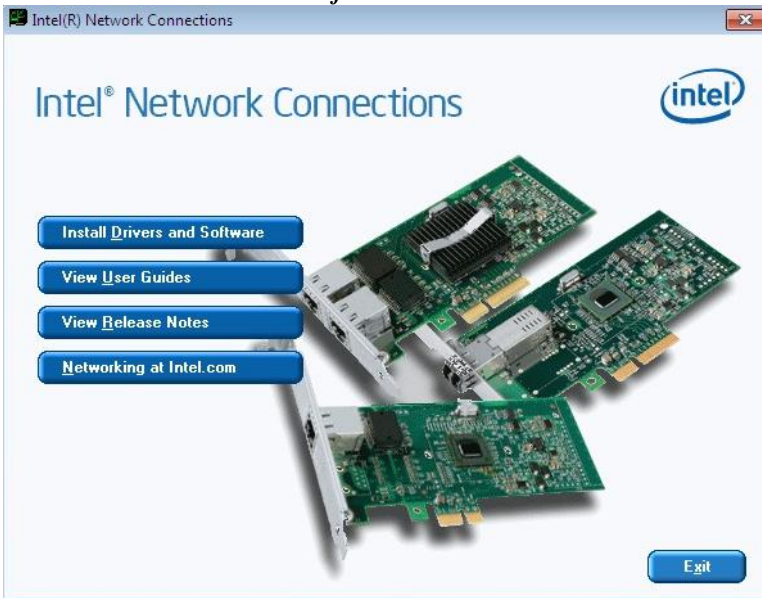
1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) Skylake Chipset Drivers*.



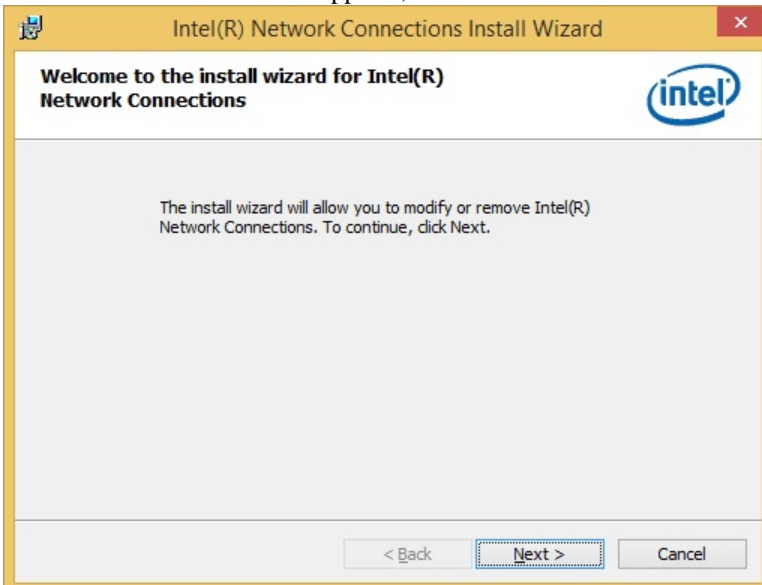
2. Click *Intel(R) PRO LAN Network Driver*.



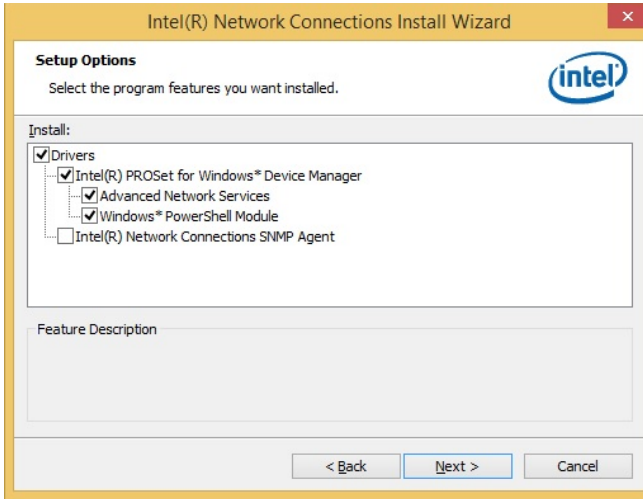
3. Click **Install Drivers and Software**.



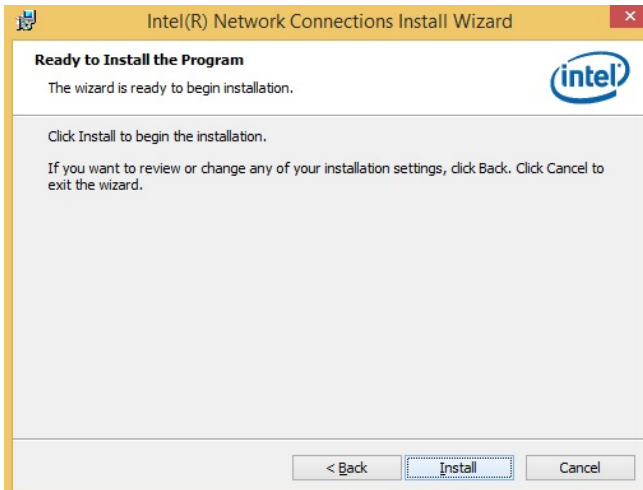
4. When the Welcome screen appears, click **Next**.



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.



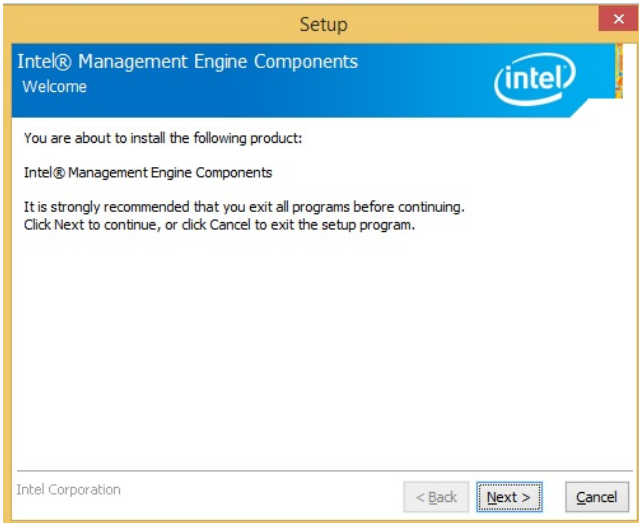
8. When InstallShield Wizard is complete, click **Finish**.

Intel® Management Engine Interface

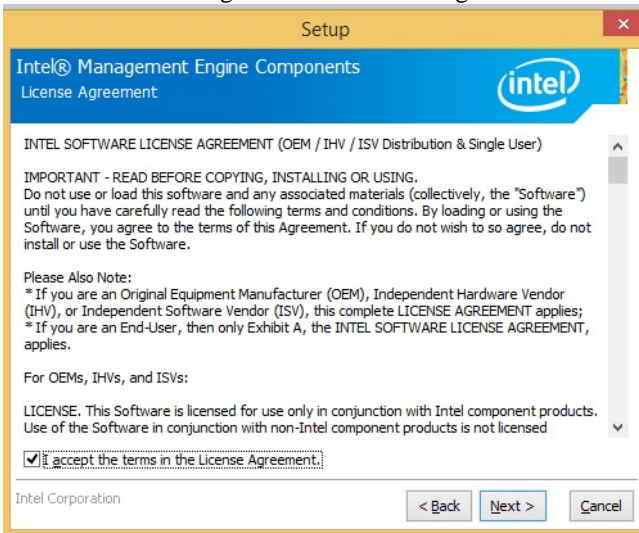
1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



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 **Next** 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

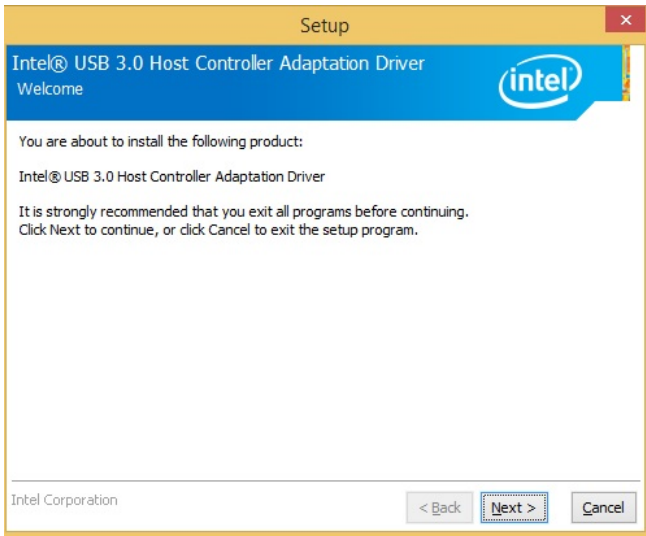
1. Insert the DVD that comes with the board. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



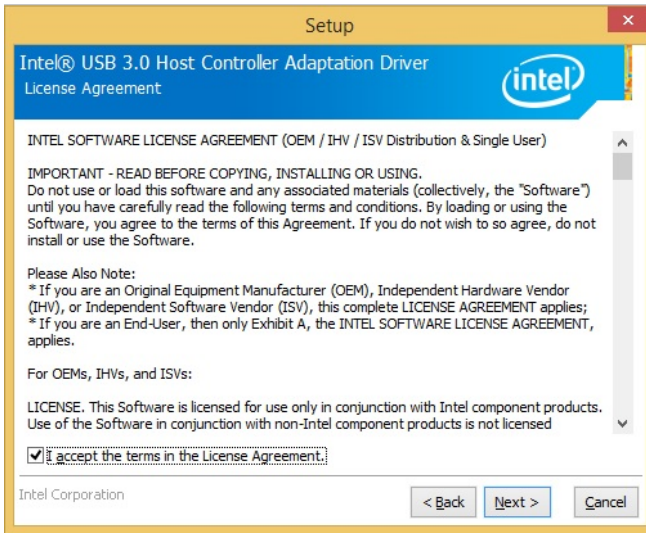
2. Click **Intel(R) USB 3.0 Drivers**.



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



- Click *Next* 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
0000h-0CF7h	PCI Express Root Complex
0040h-0043h	System timer
0050h-0053h	System timer
0070h-0070h	System CMOS/real time clock
00F0h-00F0h	Numeric data processor
02E0h-02E7h	Communications Port (COM6)
02E8h-02EFh	Communications Port (COM4)
02F0h-02F7h	Communications Port (COM5)
02F8h-02FFh	Communications Port (COM2)
03B0h-03BBh	Intel(R) HD Graphics 530
03C0h-03DFh	Intel(R) HD Graphics 530
03E8h-03EFh	Communications Port (COM3)
03F8h-03FFh	Communications Port (COM1)
0D00h-FFFFh	PCI Express Root Complex
E000h-EFFFh	Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115
F000h-F03Fh	Intel(R) HD Graphics 530
F040h-F05Fh	Intel(R) 100 Series/C230 Series Chipset SMBus - A123
F060h-F07Fh	Standard SATA AHCI Controller
F080h-F083h	Standard SATA AHCI Controller
F090h-F097h	Standard SATA AHCI Controller
F0A0h-F0A7h	Intel(R) Active Management Technology - SOL (COM7)

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
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Serial Port #3
IRQ7	Serial Port #4
IRQ8	Real Time Clock
IRQ 10	Serial Port #5
IRQ 11	Serial Port #6
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Family Integrated Sensor Hub - A135
IRQ 11	Intel(R) 100 Series/C230 Series Chipset SMBus - A123
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Thermal subsystem - A131
IRQ 13	Numeric data processor
IRQ 16	High Definition Audio Controller
IRQ 16	Standard SATA AHCI Controller
IRQ 17	Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115
IRQ 19	Intel(R) Active Management Technology - SOL (COM7)
IRQ 19	PCI standard PCI-to-PCI bridge

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();
}
//-----

```

```

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

```