MB990

**Intel ® 6th Generation Core Q170 PCH
ATX Motherboard**

USER'S MANUAL

Version 1.0

Acknowledgments

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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
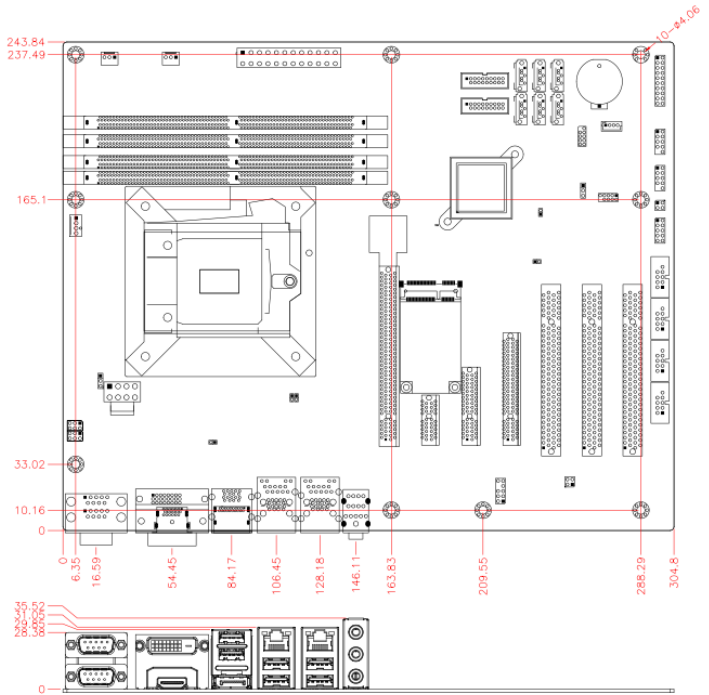- COM ports cable
- I/O shield

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 2nd 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	- 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	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	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	ATX standard 24-pin type 4 pin type (+12V only)
iSMART	iSMART 3.2
RAID	Support RAID 0/1/5
Others	- LAN Wakeup - Reserve S3 status signal connector (4-pin) - EuP/ErP (MB990EF only)
OS supporting	Windows 7 Pro (32b/64b) Windows 8.1(64b) / Embedded Industrial(64b) Windows 10 (64b) Linux Fedora (64b) / Ubuntu (64b)
Certification	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

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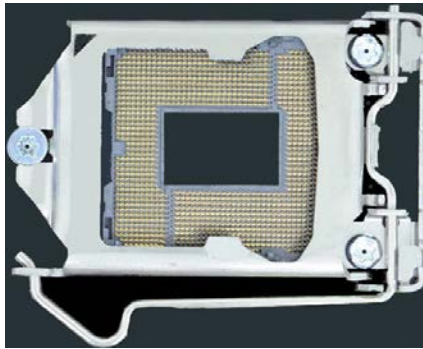
NOTE: *Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.*

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.
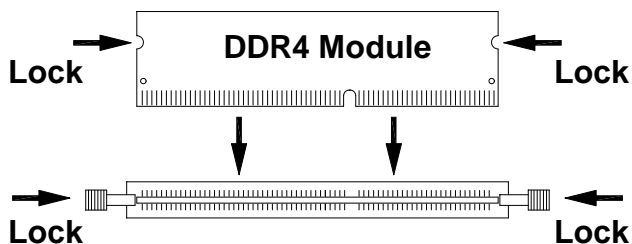
Setting the Jumpers

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

JBAT2: Clear CMOS Contents

JBAT2	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS
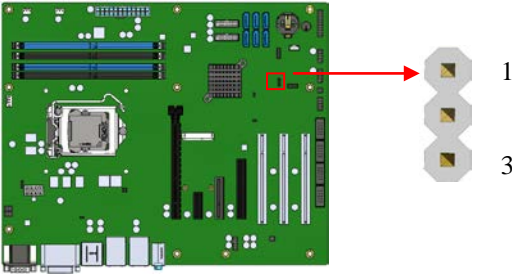
JBAT1: Clear RTC Contents

JBAT1	Flash Descriptor Security Override
Open	Normal (Default)
Close	Clear RTC
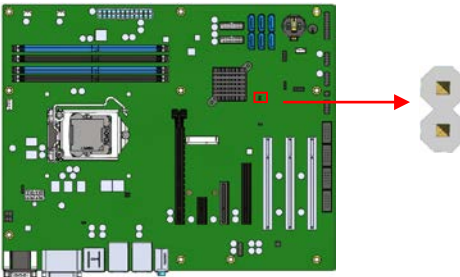
JP1: COM1 RS232 RI/+5V/+12V Power Setting
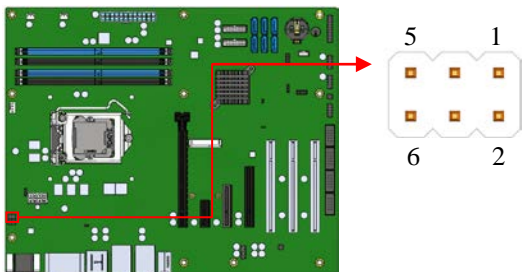
JP1	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-3 Short/Closed	+5V

JP2: COM2 RS232 RI/+5V/+12V Power Setting
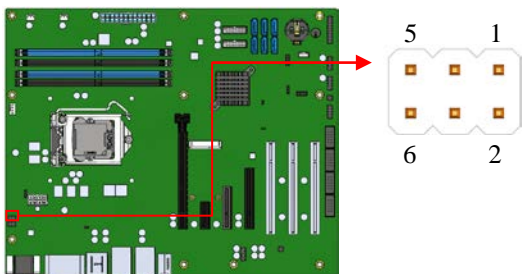
JP2	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-3 Short/Closed	+5V

JP3: Flash Descriptor Security Override (Factory use only)
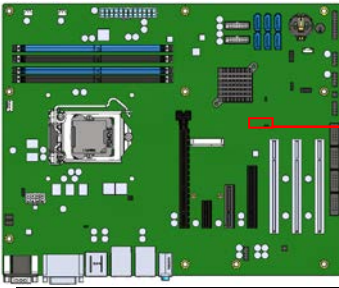
JP3	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

JP4, JP5: Processor dgfx Bifurcation Function Setting (MB990VF PCIE1 only)
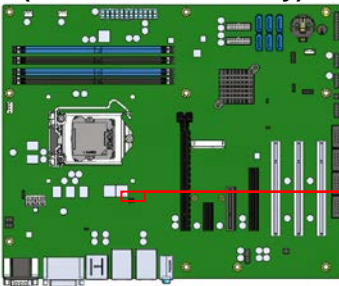
JP5	JP4	Processor dgfx Bifurcation Function Setting
Open	Open	1 X 16 (Default)
Open	Close	2 X 8
Close	Open	RSVD
Close	Close	X 8, X 4, X 4

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Connectors on MB990

Connector Locations on MB990

CN3: COM1 and COM2 Serial Ports
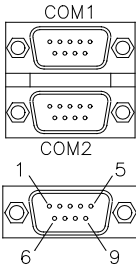
Pin #	Signal Name		
	RS-232	**R2-422**	**RS-485**
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

CN5: DVI-D and HDMI Connector
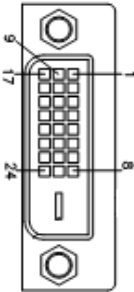
Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
Shield 2/4	3	18	DATA 0+
DATA 4-	4	19	SHIELD 0/5
DATA 4+	5	20	DATA 5-
DDC CLOCK	6	21	DATA 5+
DDC DATA	7	22	SHIELD CLK
NC	8	23	CLOCK +
DATA 1-	9	24	CLOCK -
DATA 1+	10		
SHIELD 1/3	11		
DATA 3-	12		
DATA 3+	13		
DDC POWER	14		
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
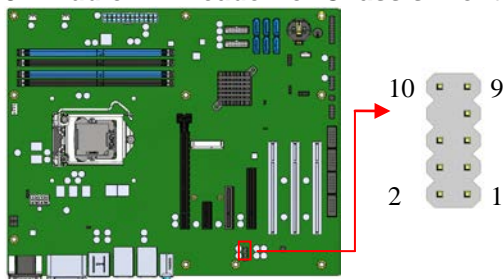
Signal Name	Pin #	Pin #	Signal Name
MIC IN_L	1	2	Ground
MIC IN_R	3	4	DET
LINE_R	5	6	Sense Ground
Sense	7	8	KEY
LINE_L	9	10	Sense Ground

J2: SPDIF I/O

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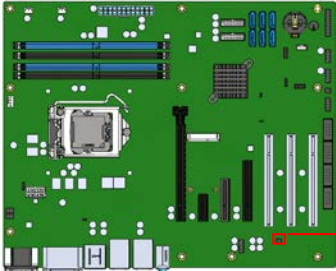
Pin #	Signal Name
1	SPDIF IN
2	Ground
3	SPDIF OUT
4	Ground

ATX_12V_2X1: ATX 12V Power Connector

This connector supplies the CPU operating voltage.

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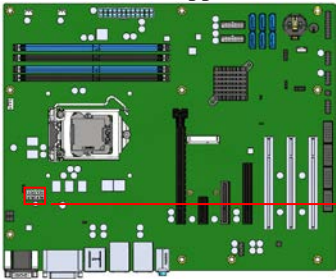
Signal Name	Pin #	Pin #	Signal Name
Ground	1	5	+12V
Ground	2	6	+12V
Ground	3	7	+12V
Ground	4	8	+12V

J9, J8, J6, J4: COM3~COM6 RS232 Serial Ports
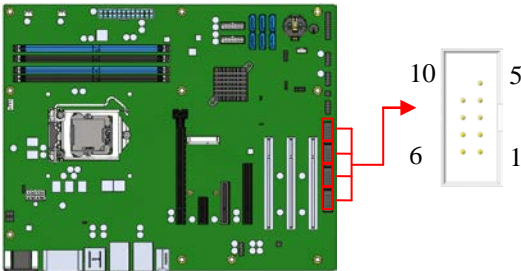
Signal Name	Pin #	Pin #	Signal Name
DCD#	1	6	DSR#
SIN	2	7	RTS#
SOUT	3	8	CTS#
DTR#	4	9	RI#
GND	5	X	KEY

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

J13, J16: USB2.0 Connectors
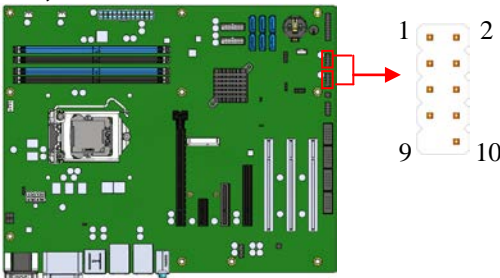
Signal Name	Pin #	Pin #	Signal Name
VCC	1	2	VCC
D0-	3	4	D1-
D0+	5	6	D1+
GND	7	8	GND
KEY	9	10	NC

J21, J23: USB3.0 Connectors
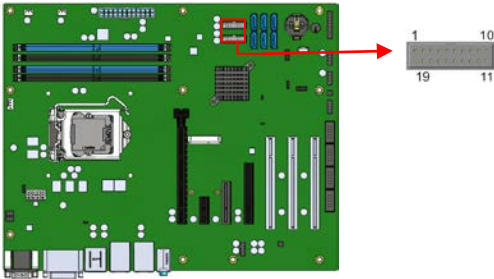
Signal Name	Pin #	Pin #	Signal Name
VCC(900mA)	1	X	
P1_SSRX-	2	19	VCC(900mA)
P1_SSRX+	3	18	P2_SSRX-
GND	4	17	P2_SSRX+
P1_SSTX-	5	16	GND
P1_SSTX+	6	15	P2_SSTX-
GND	7	14	P2_SSTX+
P1_U2_D-	8	13	GND
P1_U2_D+	9	12	P2_U2_D-
NC	10	11	P2_U2_D+

J10: Digital I/O
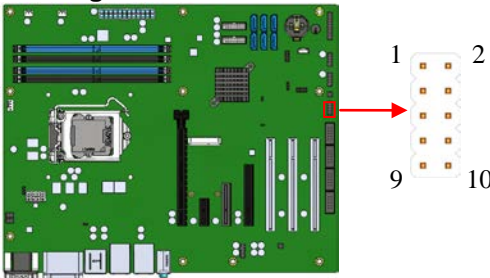
Signal Name	Pin #	Pin #	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

J22: Front Panel Function Connector
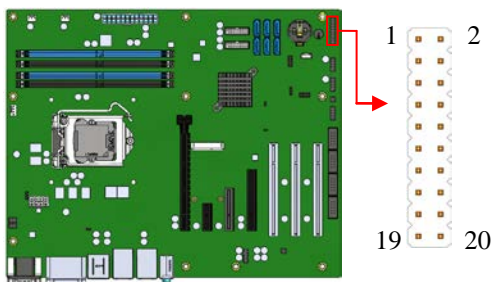
Signal Name	Pin #	Pin #	Signal Name
PWR LED +	1	2	SPK
NC	3	4	NC
PWR LED- (GND)	5	6	GND
NC	7	8	SPK (VCC)
GND	9	10	NC
GND	11	12	NC
PWR_SW	13	14	PWR_SW
NC	15	16	NC
GND	17	18	RST
HDD LED +	19	20	HDD LED -

J18: SPI Flash Connector (Factory use only)
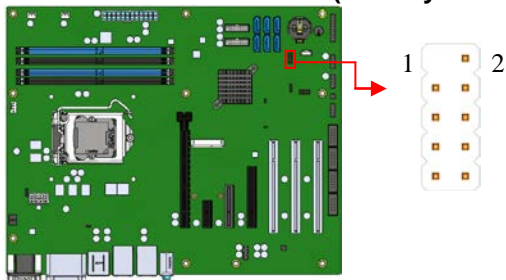
J24: ATX Power Supply Connector
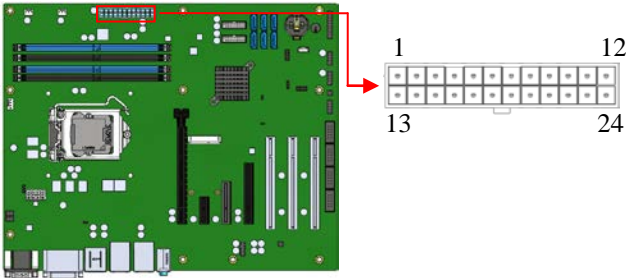
Signal Name	Pin #	Pin #	Signal Name
3.3V	13	1	3.3V
-12V	14	2	3.3V
Ground	15	3	Ground
PS-ON	16	4	+5V
Ground	17	5	Ground
Ground	18	6	+5V
Ground	19	7	Ground
-5V	20	8	Power good
+5V	21	9	5VSB
+5V	22	10	+12V
+5V	23	11	+12V
Ground	24	12	+3.3V

CPU_FAN1: CPU Fan Power Connector
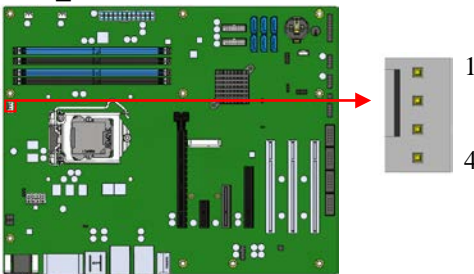
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

SYS_FAN1: System Fan1 Power Connector

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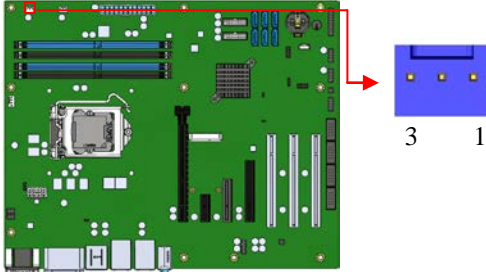
Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection

SYS_FAN2: System Fan2 Power Connector

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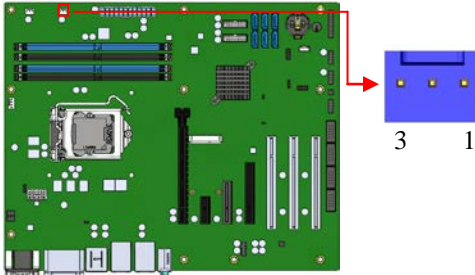
Pin #	Signal Name
1	Ground
2	+12V
3	NC

J11: ACPI Status LED
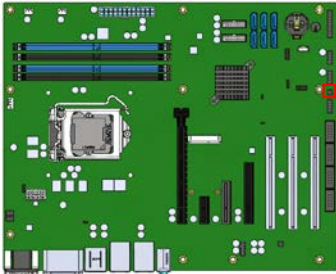
Pin #	Signal Name
1	+3VDUAL
2	GND
3	+VCC3
4	GND

PCIE1: PCI-E X16 Slot
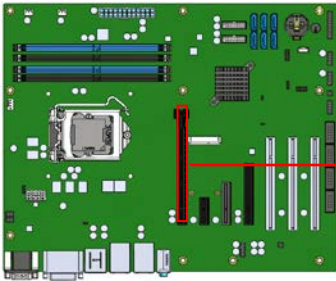
PCIE4: PCI-E X8 Slot (PCI-E X4)
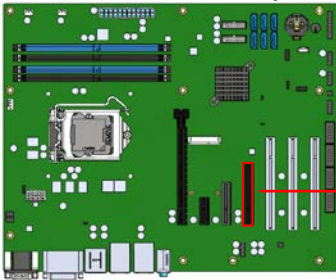
PCIE3: PCI-E X4 Slot (PCI-E X1)
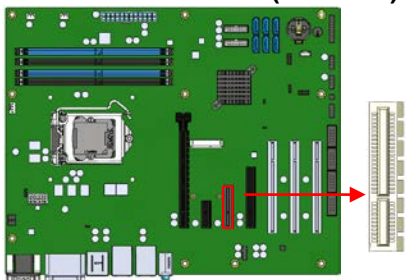
PCIE2: PCI-E X1 Slot
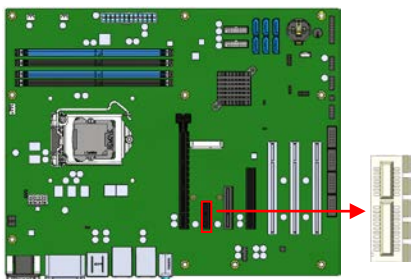
PCI1-PCI3: PCI 32-bit Slot
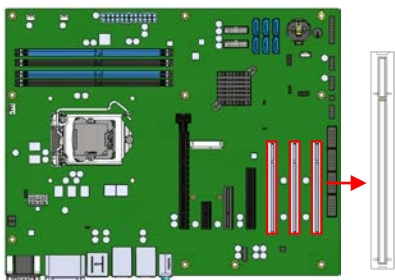
BIOS Setup

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

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 <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

Main	Advanced	Chipset	Security	Boot	Save & Exit
					Choose the system default language
System Language			[English]		→ ←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

► 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

Enable Hibernation	Enabled
ACPI Sleep State	S3 (Suspend to R…)
Lock Legacy Resources	Disabled
S3 Video Repost	Disabled

→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+- 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.

iSmart Controller

Main	**Advanced**	Chipset	Security	Boot	Save & Exit

iSmart Controller		
		→ ←**Select Screen**
Power-On after Power failure	Disable	↑ ↓ **Select Item**
Temperature Guardian	Disable	**Enter: Select**
Schedule Slot 1	None	**+- Change Field**
Schedule Slot 2	None	**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
USB Configure	Enabled
PET Progress	Enabled
AMT CIRA Timeout	0
Watchdog	Disabled
OS Timer	0
BIOS Timer	0

```
→ ←Select Screen
↑↓ Select Item
Enter: Select
+-  Change Field
F1: General Help
F2: Previous Values
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

Standby Power on S5   All Enable

► Serial Port 1 Configuration
► Serial Port 2 Configuration
► Serial Port 3 Configuration
► Serial Port 4 Configuration
► Serial Port 5 Configuration
► Serial Port 6 Configuration

```
→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+-  Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
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
					F4: Save ESC: Exit
CPU Shutdown Temperature			Disabled		

CPU/System smart fan control
This field enables or disables the smart fan feature.
Disabled (default)
50 ℃
60 ℃
70 ℃
80 ℃
90 ℃

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.

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
Network			Do not launch		Enter: Select
					+- Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save
					ESC: Exit

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**
		↑↓ **Select Item**
Current Status Information		**Enter: Select**
SUPPORT TURNED OFF		**+- 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

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
XHCI Hand-off   Disabled
USB Mass Storage Driver Support   Enabled
Port 60/64 Emulation   Disabled

USB hardware delays and time-outs:
USB Transfer time-out   20 sec
Device reset tine-out   20 sec
Device power-up delay   Auto

→ ←**Select Screen**
↑ ↓ **Select Item**
Enter: Select
+- Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
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.

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 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.

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.

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

► 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
SA PCIe Code Version   1.5.0.0
VT-d   Supported

VT-d   Enabled

► Graphics Configuration
► Memory Configuration

→ ←Select Screen
↑↓ Select Item
Enter: Select
+- Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

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/PCIE6PCIE7 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
Memory RC Version		1.5.0.0			↑ ↓ Select Item
Memory Frequency		2133 MHz			Enter: Select
Total Memory		16384 MB			+- Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.

Aptio Setup Utility

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

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					→ ←Select Screen
Boot Option #1			Hard Disk		↑↓ Select Item
Boot Option #2			CD/DVD		Enter: Select
Boot Option #3			USB Hard Disk		+- Change Field
Boot Option #4			USB CD/DVD		F1: General Help
Boot Option #5			USB Key		F2: Previous Values
Boot Option #6			USB Floppy		F3: Optimized Default
Boot Option #7			USB Lan		F4: Save ESC: Exit
Boot Option #8			Network		

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 oprion.

FIXED BOOT ORDER Priorities
Sets the system boot order.

Save & Exit Settings

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					
					→ ←Select Screen
Save Changes					↑↓ Select Item
Discard Changes					Enter: Select
					+- Change Field
Defaults Options					F1: General Help
Restore Defaults					F2: Previous Values
Save as User Defaults					F3: Optimized Default
Restore User Defaults					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:

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.
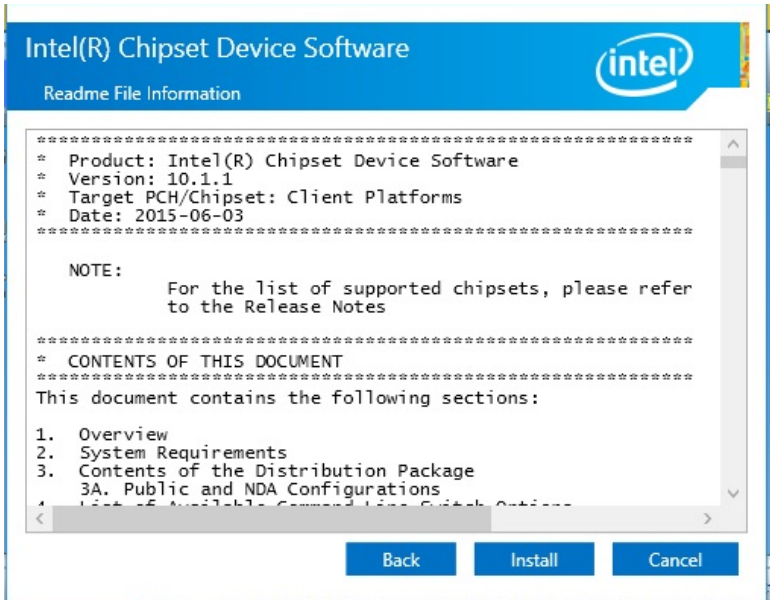
VGA Drivers Installation

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 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.
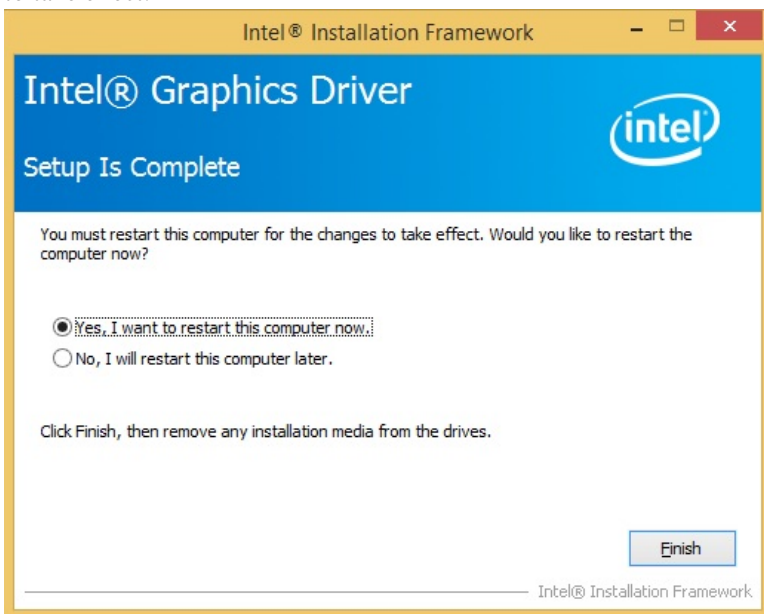
Realtek HD Audio Driver Installation

1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) Skylake Chipset Drivers*.
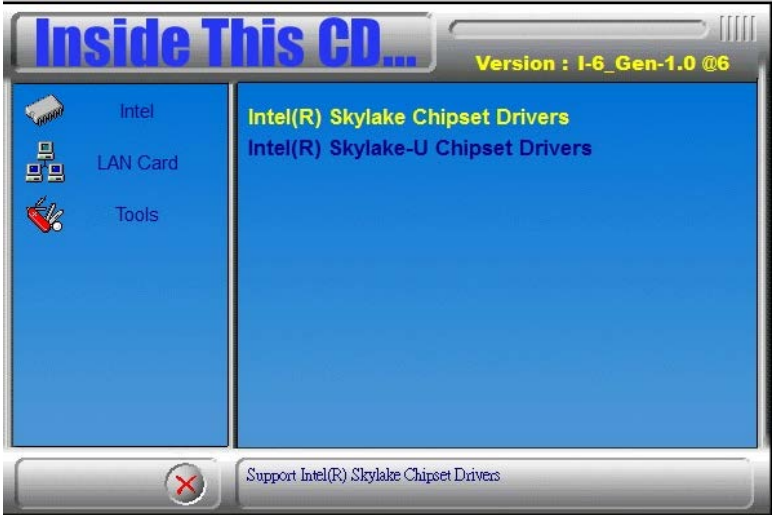
2. Click *Realtek High Definition Audio Driver.*

3. On the Welcome to the InstallShield Wizard screen, click *Next* to proceed with and complete the installation process.
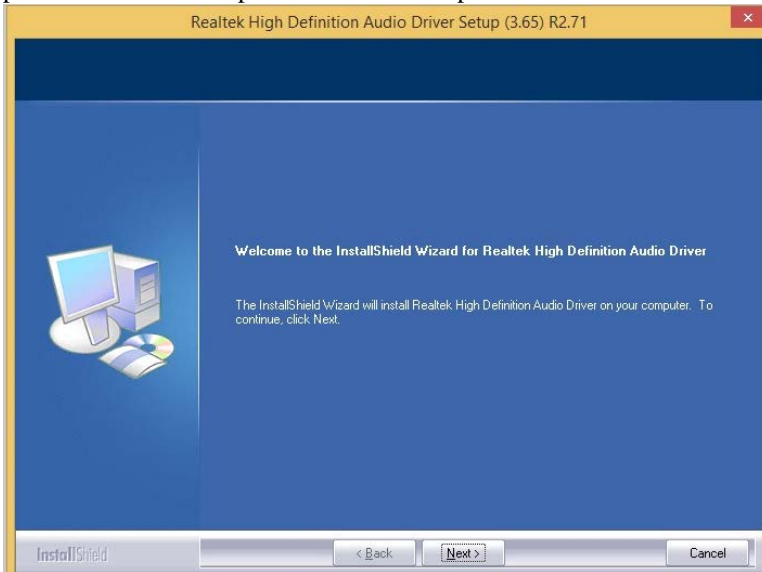
4. The InstallShield Wizard Complete. Click *Finish* to restart the computer and for changes to take effect.
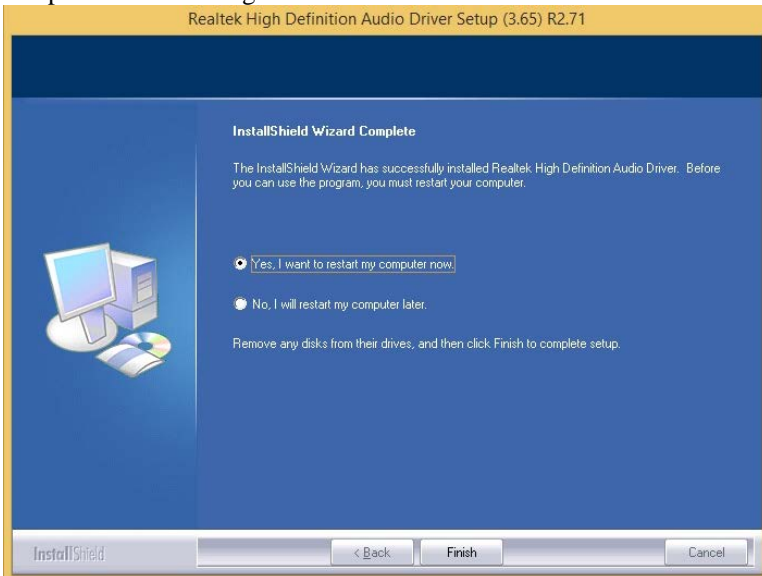
LAN Drivers Installation
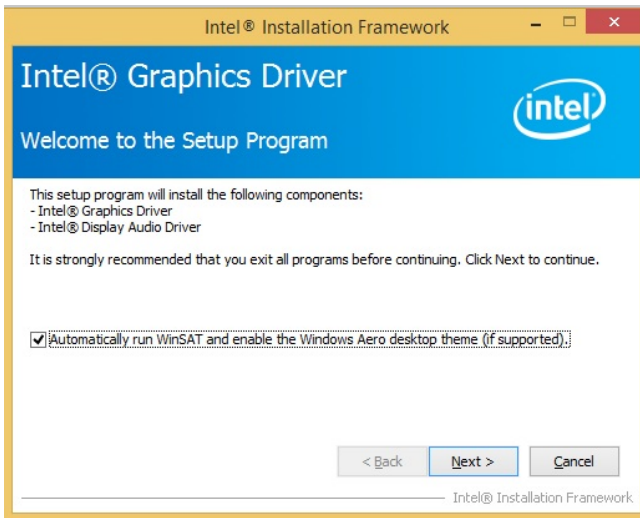
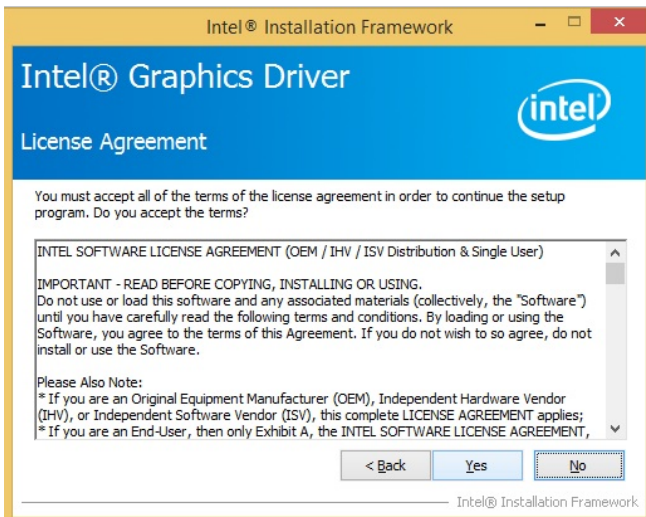1. Insert the DVD that comes with the board. Click *Intel* and then *Intel(R) Skylake Chipset Drivers*.

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

3. Click *Install Drivers and Software.*
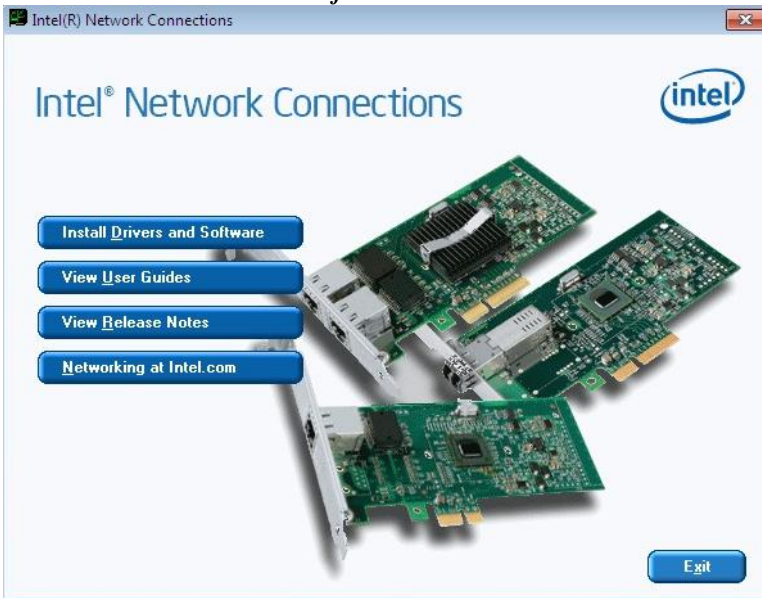
4. When the Welcome screen appears, click *Next*.
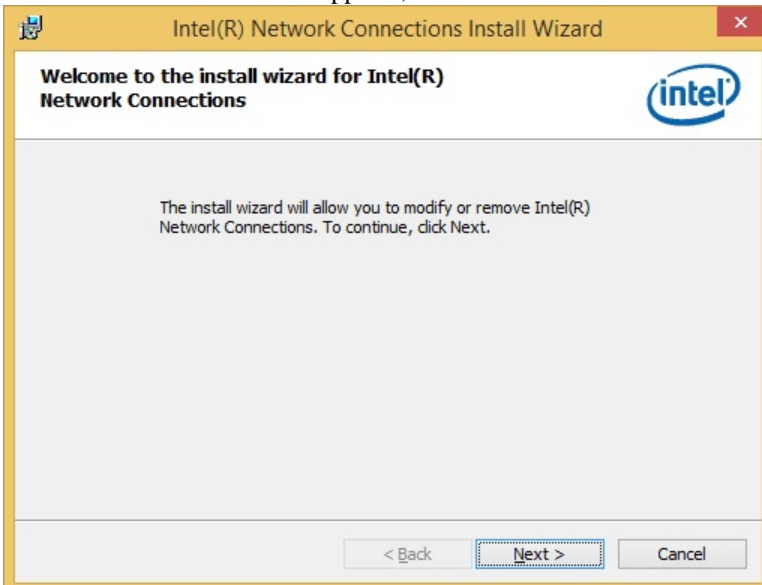
5. Click *Next* to to agree with the license agreement.

6. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.
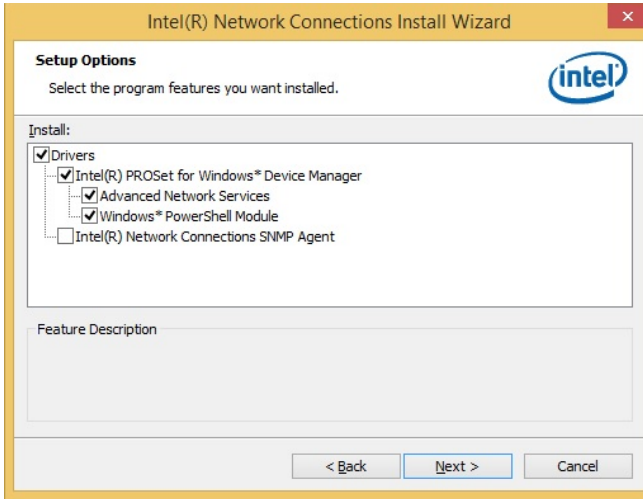
7. The wizard is ready to begin installation. Click *Install* to begin the installation.
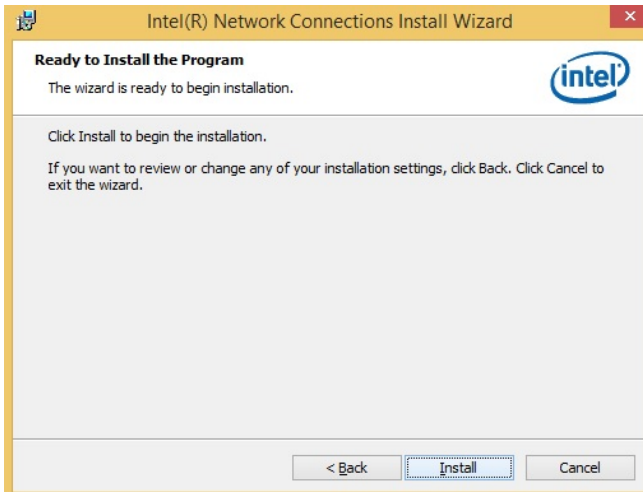
8. When InstallShield Wizard is complete, click *Finish*.

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*.
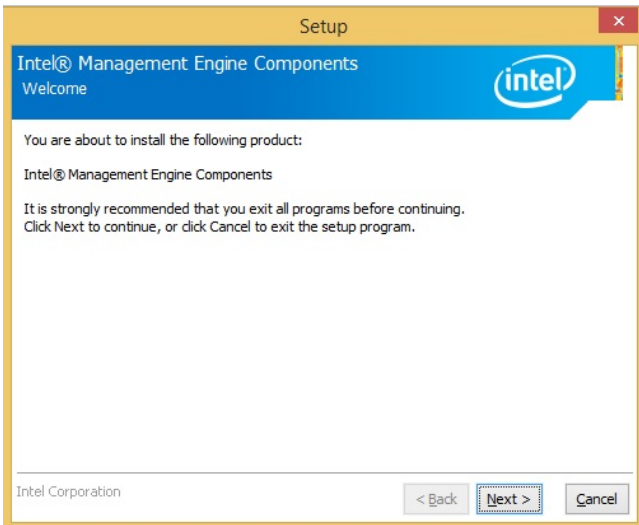
3. Click *Next* to to agree with the license agreement.
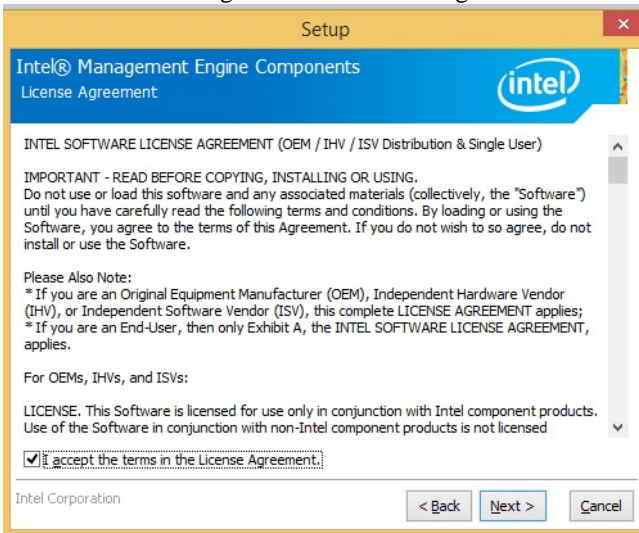
4. When the Setup Progress screen appears, click *Next*. Then, click *Finish* when the setup progress has been successfully installed.

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.*

3. When the Welcome screen to the InstallShield Wizard for Intel® USB 3.0 eXtensible Host Controller Driver, click *Next*.
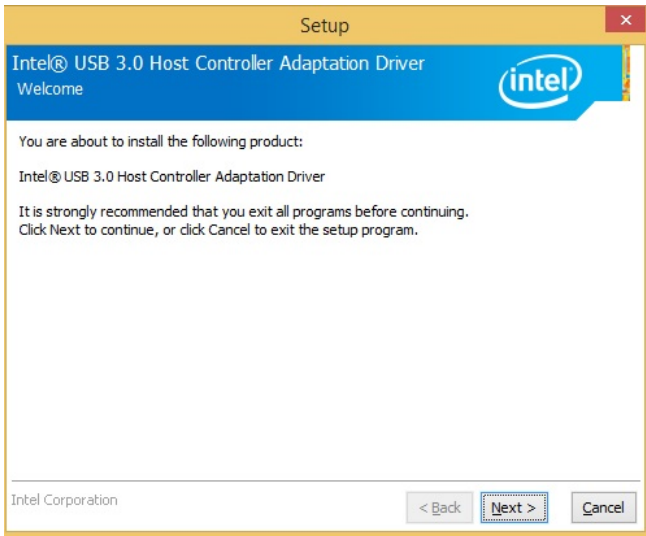
4. Click *Next* to to agree with the license agreement and continue the installation.
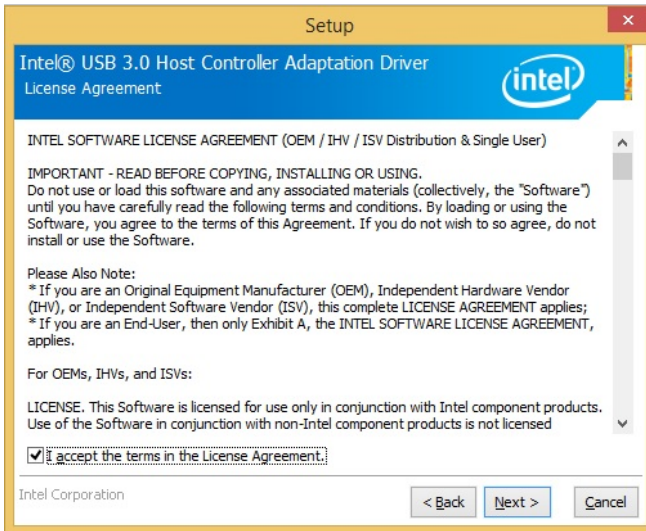
5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.

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;
}
//-------------------------------------------------------------------------
```

```
//-------------------------------------------------------------------------
//
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// 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
```