

MB967

Intel® Ivy Bridge / C216 PCH

USER'S MANUAL

Version 1.3

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Introduction

Product Description

The MB967 networking motherboard is based on the latest Intel® C216 chipset. The platform supports 3rd generation Intel® Core processor family with LGA1155 packing and features an integrated dual-channel ECC or Non-ECC DDR3 memory controller as well as a graphics core.

The latest Intel® processors provide advanced performance in both computing and graphics quality. This meets the requirement of customers in the network security (Firewall, VPN, UTM...) and server market segment.

The C216 platform is made with 22-nanometer technology that supports Intel's first processor architecture to unite the CPU and the graphics core on the transistor level. MB967 utilizes the dramatic increase in performance provided this Intel's latest cutting-edge technology. Measuring 355mm x 185mm, MB967 features Intel® Active Management Technology 8.0, offers eight GbE LAN ports, two fast 6Gbps SATA ports and two USB3.0 ports.


MB967 Features

- Supports 8 Intel® 10/100/1000 LAN ports with 2 segments Bypass
- LAN bypass enable/disable pre-setting by BIOS when power on/off
- Supports Intel® 3rd Generation Core i7/i5/i3 / Xeon® processors
- DDR3 x4, up to 32 GB
- Mini PCI-e (m-SATA compatible) socket x1, CF socket x1, CFast socket x1
- iAMT 8.0 support

Specifications

Product Name	MB967
Processor	<p>Support for Intel® Sandy-Bridge and Ivy-Bridge processors which fall within mainstream TDP envelope, up to 95W TDP.</p> <p>Support for the following Intel® technologies:</p> <ul style="list-style-type: none"> • Intel SSE/MMX, AES and AVX new instructions • VT-x and VT-d Virtualization Technologies • ACPI 3.0 • Intel® 64 (64-bit extensions) • PCI-e 3.0 (1x16 or 2x8) • DMI 2.0
Chipset	<p>Intel® Panther Point C216 PCH</p> <ul style="list-style-type: none"> • SATA 3.0 • iAMT 8.0
BIOS	AMI BIOS
Memory	<ul style="list-style-type: none"> • Four DDR3 UDIMM total for 32GB max memory • Dual channel DDR3 up to 1600 MHz • Unbuffered • ECC or non-ECC
Video	<ul style="list-style-type: none"> • Intel® CPU integrated graphics • IBASE VGA4 pin header on board
Network Controller	<ul style="list-style-type: none"> • Eth1: Intel® 82579LM GbE PHY w/ iAMT 8.0 supporting. No Bypass • Eth2~4: Intel® 82583V GbE. No Bypass. • Eth5~6: Intel® 82583V GbE. Supports Bypass. • Eth7~8: Intel® 82583V GbE. Supports Bypass.
Network Bypass	<ul style="list-style-type: none"> • Two segment hardware Bypass (Eth5 & 6; Eth7 & 8) Control by GPIO / Watchdog / Electrical Disconnect • Bypass mode selection (H/W switch or BIOS)
SATA Connector	<ul style="list-style-type: none"> • SATA III (6.0Gb/s): 2 ports
USB Port	<ul style="list-style-type: none"> • Two USB 3.0 ports at front panel • USB 3.0 box header on board • Four USB 2.0 pin header on board
Compact Flash	ACARD ARC772 SATA to PATA for CompactFlash type II
LPC I/O	<p>Fintek F81866A:</p> <ul style="list-style-type: none"> • RS-232 [2x5] Pin Header on board x1 • RJ-45 Console x1 • KB/Mouse [1x6] Pin header • Hardware monitors • Fan connector x4
Fan Connector	<p>4-pin fan connectors:</p> <ul style="list-style-type: none"> • One for CPU fan (Smart Fan) • Three for System fans (Smart Fan)

INSTALLATIONS

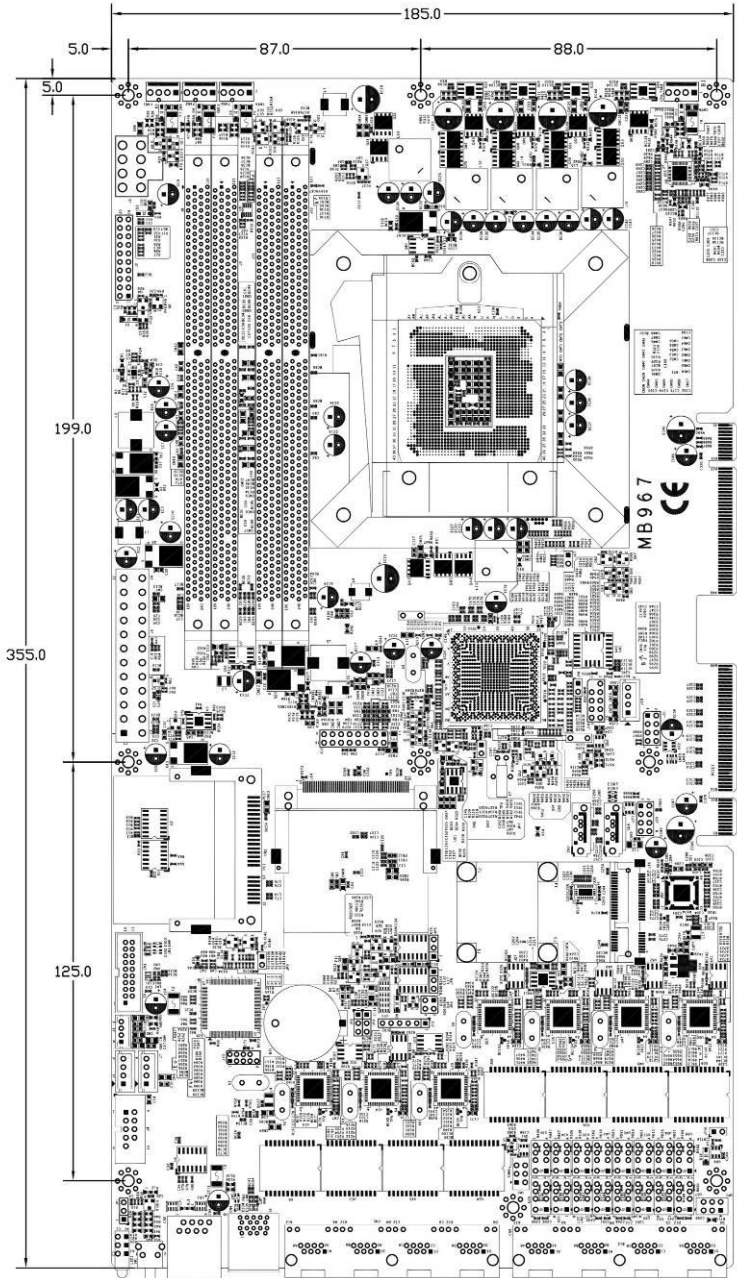
Smart Fan Control	The active temperature may be adjusted based on system thermal test result
RTC	Intel C216 built-in RTC with on-board lithium battery & holder
Expansion Slot	<ul style="list-style-type: none"> Golden finger PCI-e x8, Front Golden finger PCI-e x8, Rear
Expansion Interface	<ul style="list-style-type: none"> Mini PCI-e socket x1 (m-SATA compatible) CF card socket x1 CFast card socket x1
Front Panel LED	 <p>#3 LED: Status (GPIO control, Yellow / Red)</p> <p>#2 LED: Bypass: Green = LAN 5-6 or 7-8 Bypass, Off = LAN Normal</p> <p>#1 LED: Power (Green = Power On, Off= No Power)</p>
LCM	2x16 characters LCM (COM2)
Front Button & Connector	<ul style="list-style-type: none"> Two RJ-45 1x4 connectors for Eth1-4 & 5-6 USB 3.0 x2 RJ-45 (for console, COM1) Three LEDs for Power, Bypass & Status Factory Mode Restore Reset Switch
Watchdog Timer	Yes (256 segments, 0, 1, 2...255 sec/min) Present in BMC and configurable by O/S agent to automatically reset system if O/S hangs
TPM	nuvoTon WPCT210 TPM1.2
Operating Temperature	0°C ~ 60°C
Storage Temperature	-20°C ~ 80°C
Operational Humidity	10% ~ 90% Relative Humidity (non-condensing)
RoHS Compliant	Yes
Board Size	355 x 185mm, 1.6mm thickness

Checklist

Your MB967 package should include the items listed below.

- MB967 motherboard
- Driver DVD

Board Dimensions



Installations

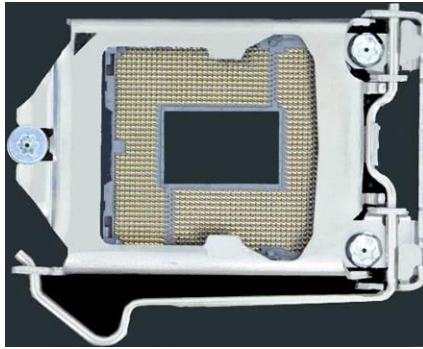
This section provides information on how to use the jumpers and connectors on the MB967 in order to set up a workable system. The topics covered are:

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Installing the CPU

The MB967 board supports an LGA1155 Socket (shown below) for Intel Clarkdale 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.*

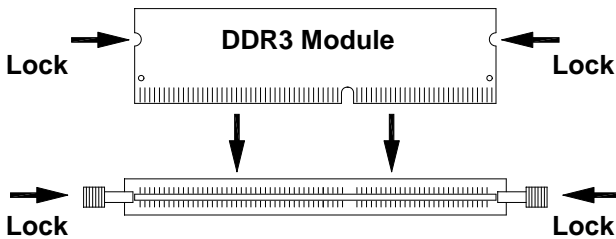
Installing the Memory

The MB967 board supports four DDR3 memory socket for a maximum total memory of 32GB in DDR3 DIMM memory type.

Installing and Removing Memory Modules

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

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



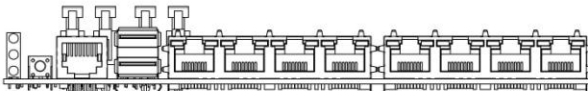
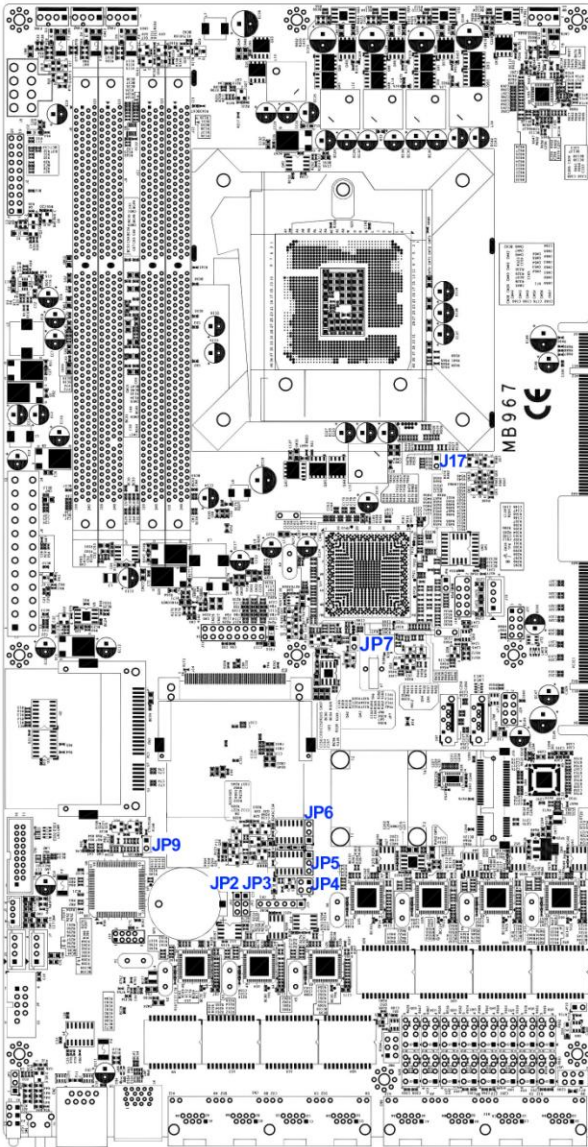
Setting the Jumpers

Jumpers are used on MB967 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 MB967 and their respective functions.

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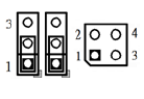
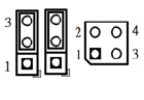
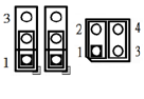
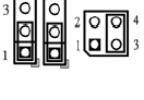
INSTALLATIONS

Jumper Locations on MB967





Jumper Settings on MB967

JP6, JP5, JP4: Bypass LANs & Reboot Setting

JP6,JP5 JP4	Setting	Function	Power OFF		Power ON		Power ON, OS run software	
			Normal	Bypass	Normal	Bypass	Normal	Bypass
	JP4 Pin 1-2 & 3-4 Open JP5,JP6 Pin 1-2 Closed	System will bypass LANs upon the time out of watchdog timer.	✓		✓			✓
 <p>Default Setting</p>	JP4 Pin 1-2 & 3-4 Open JP5,JP6 Pin 2-3 Closed	System LANs bypass function controlled by SIO GPIO43&44 or BIOS Select.	By BIOS Setting					
	JP4 Pin 1-2 & 3-4 Closed JP5,JP6 Pin 1-2 Closed	System will reboot upon the time out of watchdog timer.		✓		✓		LAN Bypass & System reboot
	JP4 Pin 3-4 Closed & 1-2 Open JP5,JP6 Pin 1-2 Closed	System will bypass LANs & reboot upon the time out of watchdog timer.	✓		✓			LAN Normal & System reboot



JP2: Clear CMOS Contents

Use JP2 to clear the CMOS contents. *Note that the ATX-power connector should be disconnected from the board before clearing CMOS.*



JP3	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear CMOS

INSTALLATIONS



JP3: Clear ME RTC Contents

JP3	Setting	Function
	Pin 1-2 Short/Closed	Normal
	Pin 2-3 Short/Closed	Clear ME RTC



JP7: Flash Descriptor Security Override (ME BIOS Update Jumper)

JP7	Setting	Function
	Open	Disable (Default)
	Short/Closed	Enable to update BIOS

JP9: ATX & AT Mode Select

JP9	Setting	Function
	Short/Closed	AT Mode (Default)
	Open	ATX Mode

J17: PCIE1 & PCIE2 Golden Finger PCI-e Configuration

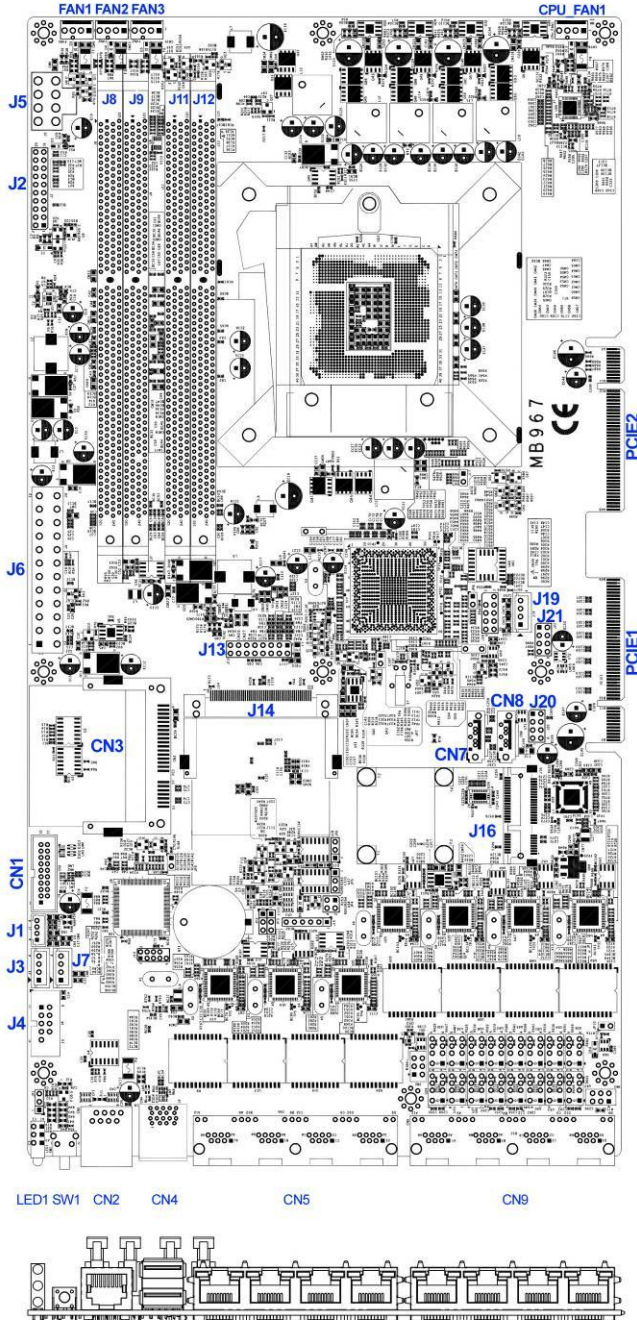
J17	Setting	Function	Remarks
	Open	Combine to 1x16	For CPU with 1x16 support
	Short / Closed	Separate to2x8	Default for CPU with 2x8 support

Connectors on MB967

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CN3:CFast Connector.....	19
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J10: LPC Debug Port (Reserved for factory use only).....	21
J11, J12: Channel A DDR3 Socket.....	21
J13: VGA Box Header.....	21
J14: Slim Type II Compact Flash Connector.....	21
J16: Mini PCI-e Card & m-SATA Connector.....	21
J18: SPI Debug Port (Reserved for factory use only)	21
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PCIE1: PCI-e x8 Golden Finger 1	22
PCIE2: PCI-e x8 Golden Finger 2	22
LED1: Power, Bypass & Status LED	23

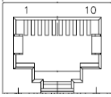
INSTALLATIONS

Connector Locations on MB967



CN1: USB 3.0 Box Header

CN2: COM1 RJ45 Connector



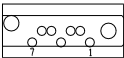
Pin #	Signal Name (RS-232)
1	RTS, Request to send
2	DTR, Data terminal ready
3	TXD, Transmit data
4	Ground
5	Ground
6	RXD, Receive data
7	DSR, Data set ready
8	CTS, Clear to send

CN3: CFast Connector

CN4: USB Connector

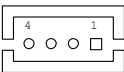
CN5, CN9: LAN Connectors

CN7, CN8: SATA HDD Connector



Pin #	Signal Name
1	Ground
2	TX+
3	TX-
4	Ground
5	RX-
6	RX+
7	Ground

J1, J3, J7, J19: Power Output Connector



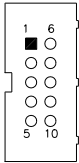
Pin #	Signal Name
1	+5V
2	GND
3	GND
4	+12V

INSTALLATIONS

J2: Front Panel Function Connector

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

J4: COM2 Serial Port



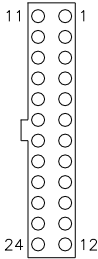
Pin #	Signal Name (RS-232)
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	Ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator
10	No Connect.

J5: ATX 12V Power Connector



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

J6: 24-pin ATX Power 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

J8, J9: Channel B DDR3 Socket

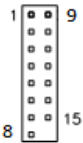
J8, J9 are the second-channel DDR3 sockets.

J10: LPC Debug Port (Reserved for factory use only)

J11, J12: Channel A DDR3 Socket

J11, J12 are the first-channel DDR3 sockets.

J13: VGA Box Header



Signal Name	Pin #	Pin #	Signal Name
R	1	9	+5V
G	2	10	GND
B	3	11	NC
NC	4	12	SPD1
GND	5	13	Hsync
GND	6	14	Vsync
GND	7	15	SPCLK
GND	8		

J14: Slim Type II Compact Flash Connector

J16: Mini PCI-e Card & m-SATA Connector

J18: SPI Debug Port (Reserved for factory use only)

INSTALLATIONS

J20, J21: USB 2.0 Pin Header



Signal Name	Pin #	Pin #	Signal Name
VCC	1	2	Ground
USB1-	3	4	USB2+
USB1+	5	6	USB2-
Ground	7	8	VCC

FAN1, 2, 3: System Fan Power Connector

FAN1/2/3 are 4-pin headers for System fan power.



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

CPU_FAN1: CPU Fan Power Connector



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

SW1: Software reset button



Signal Name	Pin #	Pin #	Signal Name
GND	1	2	PCH GPIO7

IO Base:

Read IO 0x500 and set bit 7 to “1” (Enabled GPIO function)

Read IO 0x504 and set bit 7 to “1” (GPIO act as GPI)




Read IO 0x50C and check the bit 7 (Control Pin)

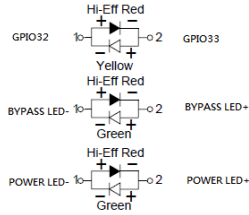
Note: SW3 is controlled by GPIO only.

PCIE1: PCI-e x8 Golden Finger 1

PCIE2: PCI-e x8 Golden Finger 2

LED1: Power, Bypass & Status LED

- C1  A1 Status (Yellow / Red)
- C2  A2 Bypass (Green)
- C3  A3 Power (Green)



Signal Name	Pin #	Pin #	Signal Name
SIO GPIO32	C1	A1	SIO GPIO33
Bypass LED-	C2	A2	Bypass LED+
POWER LED-	C3	A3	POWER LED+

STATUS LED	GPIO33	GPIO32
YELLOW	H	L
RED	L	H

Index port: 4E

Data port: 4F

Device: 06

30h → bit1 = 1

C0h → set bit2, bit3 = 1 for GPO

C3h → set bit2, bit3 = 1 for Push Pull

C1h → bit2, bit3 (Control pin) for GPO32, 33

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Digital I/O Sample Configuration

Filename : Main.cpp

```
//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81865.H"

#define BIT0 0x01
#define BIT1 0x02
#define BIT2 0x04
#define BIT3 0x08
#define BIT4 0x10
#define BIT5 0x20
#define BIT6 0x40
#define BIT7 0x80

//-----
int main (void);

void Dio5Initial(void);
void Dio5SetOutput(unsigned char);
unsigned char Dio5GetInput(void);
void Dio5SetDirection(unsigned char);
unsigned char Dio5GetDirection(void);
//-----
int main (void)
{
    char SIO;
    unsigned char DIO;

    printf("Fintek 81865/81866 digital I/O test program\n");

    SIO = Init_F81865();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81865/81866, program abort.\n");
        return(1);
    }
    if (SIO == 0)

    Dio5Initial();

/*
//for GPIO50..57
Dio5SetDirection(0xF0); //GP50..53 = input, GP54..57=output
printf("Current DIO direction = 0x%X\n", Dio5GetDirection());

printf("Current DIO status = 0x%X\n", Dio5GetInput());

printf("Set DIO output to high\n");
Dio5SetOutput(0x0F);

printf("Set DIO output to low\n");
Dio5SetOutput(0x00);
*/

//for GPIO50..57
Dio5SetDirection(0xF0); //GP50..53 = input, GP54..57=output

Dio5SetOutput(0x00); //clear
// DIO = Dio5GetInput() & 0x0F;
```

INSTALLATIONS

```
Dio5SetOutput(0x00);           //clear
DIO = Dio5GetInput() & 0x0F;
if (DIO != 0x0A)
{
    printf("The Fintek 81865 digital IO abnormal, abort.\n");
    return(1);
}/if (DIO != 0x0A)

Dio5SetOutput(0xA0);           //clr# is high
Dio5SetOutput(0xF0);           //clk and clr# is high
Dio5SetOutput(0xA0);           //clr# is high

DIO = Dio5GetInput() & 0x0F;
if (DIO != 0x05)
{
    printf("The Fintek 81865 digital IO abnormal, abort.\n");
    return(1);
}
printf("!!! Pass !!!\n");
return 0;
}
//-----
void Dio5Initial(void)
{
    unsigned char ucBuf;

    //switch GPIO multi-function pin for gpio 50~57

//gpio53~57 UR5_FULL_EN(bit1), clear UR6_FULL_EN(bit3)
//set UR5_FULL_EN,should set UR_GP_PROG_EN = 1 (reg26.bit0) first

    ucBuf = Get_F81865_Reg(0x26);
    ucBuf |= BIT0;
    Set_F81865_Reg(0x26, ucBuf);
    //set UR5_FULL_EN(bit1), clear UR6_FULL_EN(bit3)
    ucBuf = Get_F81865_Reg(0x2A);
    ucBuf &= ~BIT3;//clear bit 3,
    ucBuf |= BIT1;//set bit 1,
    Set_F81865_Reg(0x2a, ucBuf);

//GPIO51 ~ GPIO52
    //clear UR6_ALT_EN(bit5), IR_ALT_EN(bit4),set FDC_GP_EN(bit3)

//GPIO50
//set FDC_GP_EN(bit3), clear RTS6_ALT_EN(RTS6_2_ALT_EN)(bit6)

    ucBuf = Get_F81865_Reg(0x2A);
    ucBuf &= ~(BIT4+BIT5+BIT6); //clear UR6_ALT_EN(bit5), IR_ALT_EN(bit4),
RTS6_ALT_EN(RTS6_2_ALT_EN)(bit6)
    Set_F81865_Reg(0x2a, ucBuf);
    //set FDC_GP_EN(bit3), should clear UR_GP_PROG_EN (reg26.bit0) first
    ucBuf = Get_F81865_Reg(0x26);
    ucBuf &= ~BIT0;
    Set_F81865_Reg(0x26, ucBuf);//clear UR_GP_PROG_EN = 0 (reg26.bit0)

    ucBuf = Get_F81865_Reg(0x2A);
    ucBuf |= BIT3; //set FDC_GP_EN(bit3),
    Set_F81865_Reg(0x2a, ucBuf);

    Set_F81865_LD(0x06);           //switch to logic device 6

    //enable the GP5 group
    ucBuf = Get_F81865_Reg(0x30);
    ucBuf |= 0x01;
    Set_F81865_Reg(0x30, ucBuf);

    Set_F81865_Reg(0xA0, 0x00);     //define as input mode
    Set_F81865_Reg(0xA3, 0xFF);     //push pull mode
}
//-----
```

```

void Dio5SetOutput(unsigned char NewData)
{
    Set_F81865_LD(0x06); //switch to logic device 6
    Set_F81865_Reg(0xA1, NewData);
}
//-----
unsigned char Dio5GetInput(void)
{
    unsigned char result;

    Set_F81865_LD(0x06); //switch to logic device 6
    result = Get_F81865_Reg(0xA2);
    return (result);
}
//-----
void Dio5SetDirection(unsigned char NewData)
{
    //NewData : 1 for input, 0 for output
    Set_F81865_LD(0x06); //switch to logic device 6
    Set_F81865_Reg(0xA0, NewData);
}
//-----
unsigned char Dio5GetDirection(void)
{
    unsigned char result;

    Set_F81865_LD(0x06); //switch to logic device 6
    result = Get_F81865_Reg(0xA0);
    return (result);
}
//-----

```

Filename : 81865.cpp

```

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

    F81865_BASE = 0x4E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07||ucDid == 0x10) //Fintek 81865/66
    { goto Init_Finish; }

    F81865_BASE = 0x2E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07||ucDid == 0x10) //Fintek 81865/66
    { goto Init_Finish; }

    F81865_BASE = 0x00;
    result = F81865_BASE;
}

```

INSTALLATIONS

```
Init_Finish:
    return (result);
}
//-----
void Unlock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
}
//-----
void Lock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_LOCK);
}
//-----
void Set_F81865_LD( unsigned char LD)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, F81865_REG_LD);
    outportb(F81865_DATA_PORT, LD);
    Lock_F81865();
}
//-----
void Set_F81865_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, REG);
    outportb(F81865_DATA_PORT, DATA);
    Lock_F81865();
}
//-----
unsigned char Get_F81865_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, REG);
    Result = inportb(F81865_DATA_PORT);
    Lock_F81865();
    return Result;
}
//-----
```

Filename : 81865.h

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

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.

```
//-----
//
// 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(); }
}
```

INSTALLATIONS

```
    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
//-----

```

INSTALLATIONS

```
#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
```


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	34
BIOS Setup	34
Advanced Settings	36
Chipset Settings	49
Boot Settings.....	54
CSM parameters	55
Security Settings	56

BIOS Introduction

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

BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the 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 / <F2> to Enter Setup

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

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

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

Main Settings

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

Main	Advanced	Chipset	Boot	Security	Save & Exit
BIOS Information				Choose the system default language	
System Language		[English]		→ ← Select Screen	
System Date		[Tue 06/19/2012]		↑ ↓ Select Item	
Access Level		Administrator		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	Boot	Security	Save & Exit
	<ul style="list-style-type: none"> ▶ PCI Subsystem Settings ▶ ACPI Settings ▶ Wake up event setting ▶ Trusted Computing ▶ CPU Configuration ▶ SATA Configuration ▶ Shutdown Temperature Configuration ▶ AMT Configuration ▶ Acoustic Management Configuration ▶ USB Configuration ▶ F81866 Super IO Configuration ▶ F81866 H/W Monitor ▶ Serial Port Console Redirection ▶ CPU PPM Configuration 				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit

PCI Subsystem Settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
	PCI Bus Driver Version		V 2.05.02		→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
	PCI 64bit Resources Handling				
	Above 4G Decoding		[Disabled]		
	PCI Common Settings				
	PCI Latency Timer		[32 PCI Bus Clocks]		
	VGA Palette Snoop		[Disabled]		
	PERR# Generation		[Disabled]		
	SERR# Generation		[Disabled]		
	▶ PCI Express Settings				

Above 4G Decoding

Enables or Disables 64bit capable devices to be decoded in above 4G address space (only if system supports 64 bit PCI decoding).

PCI Latency Timer

Value to be programmed into PCI Latency Timer Register.

VGA Palette Snoop

Enables or disables VGA Palette Registers Snooping.

PERR# Generation

Enables or disables PCI device to generate PERR#.

SERR# Generation

Enables or disables PCI device to generate SERR#.

PCI Express Settings

Change PCI Express devices settings.

PCI Express Settings

Aptio Setup Utility

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

Relaxed Ordering

Enables or disables PCI Express Device Relaxed Ordering.

Extended Tag

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

No Snoop

Enables or disables PCI Express Device No Snoop option.

Maximum Payload

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

Maximum Read Request

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

ASPM Support

Set the ASPM Level: Force L0s – Force all links to L0s State:
AUTO – BIOS auto configure : DISABLE – Disables ASPM.

Extended Synch

If ENABLED allows generation of Extended Synchronization patterns.

Link Training Retry

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

Link Training Timeout

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

Unpopulated Links

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

ACPI Settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
ACPI Settings					→ ← Select Screen
Enable Hibernation			[Enabled]		↑ ↓ Select Item
ACPI Sleep State			[S1 only (CPU Stop C...)]		Enter: Select
Lock Legacy Resources			[Disabled]		+ - Change Field
S3 Video Repost			[Disabled]		F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Enable Hibernation

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

ACPI Sleep State

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

Lock Legacy Resources

Enabled or Disabled Lock of Legacy Resources.

S3 Video Repost

Enable or disable S3 Video Repost.

Wake up event settings

Aptio Setup Utility

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

Wake system with Fixed Time

Enables or Disables System wake on alarm event. When enabled, System will wake on the hr::min:: sec specified.

Wake on PCIE PME Wake Event

The options are Disabled and Enabled.

Trusted Computing

Aptio Setup Utility

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

Security Device Support

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

CPU Configuration

This section shows the CPU configuration parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU Configuration					
	Intel(R) Xeon(R) CPU E3-1225 V2	@	3.20GHz		
	CPU Signature		306a8		
	Microcode Patch		c		
	CPU Speed		3200 MHz		
	Processor Cores		4		
	Intel HT Technology		Not Supported		
	Intel VT-x Technology		Supported		
	Intel SMX Technology		Supported		
	64-bit		Supported		
	Active Processor Cores		[All]		→ ← Select Screen
	Limit CPUID Maximum		[Disabled]		↑ ↓ Select Item
	Execute Disable Bit		[Enabled]		Enter: Select
	Intel Virtualization		[Disabled]		+ - Change Field
	Hardware Prefetcher		[Disabled]		F1: General Help
	Adjacent Cache Line Prefetch		[Enabled]		F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Active Processor Cores

Number of cores to enable in each processor package.

Limit CPUID Maximum

Disabled for Windows XP.

Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, Re33dHat Enterprise 3 Update 3.)

Intel Virtualization Technology

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

Hardware Prefetcher

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

Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

BIOS SETUP

SATA Configuration

SATA Devices Configuration.

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
	SATA Controller(s)		[Enabled]		
	SATA Mode Selection		[IDE]		
	SATA Port0		Empty		
	Software Preserve		Unknown		
	SATA Port1		Empty		→ ← Select Screen
	Software Preserve		Unknown		↑ ↓ Select Item
	SATA Port2		Empty		Enter: Select
	Software Preserve		Unknown		+ - Change Field
	SATA Port3		Empty		F1: General Help
	Software Preserve		Unknown		F2: Previous Values
	SATA Port4		WDC WD5000BPKT (5		F3: Optimized Default
	Software Preserve		SUPPORTED		F4: Save ESC: Exit
	SATA Port5		Empty		
	Software Preserve		Unknown		

SATA Controller(s)

Enable / Disable Serial ATA Controller.

SATA Mode Selection

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

Shutdown Temperature Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
APCI Shutdown Temperature		[Disabled]			

ACPI Shutdown Temperature

Set function Disabled or 70/75/80/85/90/95 °C

AMT Configuration

Aptio Setup Utility

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

AMT Configuration

Options are Enabled and Disabled.

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

Unconfigure ME

Perform AMT/ME unconfigure without password operation.

Amt Wait Timer

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

BIOS SETUP

Activate Remote Assistance Process

Trigger CIRA boot.

PET Progress

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

Watchdog Timer

Enable/Disable Watchdog Timer.

Acoustic Management Configuration

Aptio Setup Utility

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

USB Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Devices: 1 Keyboard, 2 Hubs					
Legacy USB Support			[Enabled]		
USB3.0 Support			[Enabled]		
XHCI Hand-off			[Enabled]		→ ← Select Screen
EHCI Hand-off			[Enabled]		↑ ↓ Select Item
Port 60/64 Emulation			[Enabled]		Enter: Select
USB hardware delays and time-outs:					F1: General Help
USB Transfer time-out			[20 sec]		F2: Previous Values
Device reset time-out			[20 sec]		F3: Optimized Default
Device power-up delay			[Auto]		F4: Save ESC: Exit

Legacy USB Support

Enables Legacy USB support.

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

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

USB3.0 Support

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

XHCI Hand-off

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

EHCI Hand-off

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

Port 64/60 Emulation

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

USB Transfer time-out

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

Device reset time-out

USB mass Storage device start Unit command time-out.

Device power-up delay

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

F81866 Super IO Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Super IO Configuration					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit
F81866 Super IO Chip			F81866		
▶ Serial Port 0 Configuration					
▶ Serial Port 1 Configuration					
Power Failure			[Always off]		
KB/MS Power On			[None]		
LAN5,6 Bypass Function			[Bypass]		
LAN7,8 Bypass Function			[Bypass]		

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.

LAN5, 6 Bypass Function

LAN5, 6 Bypass Function Setting [Bypass] or [Normal]

LAN7, 8 Bypass Function

LAN7, 8 Bypass Function Setting [Bypass] or [Normal]

F81866 H/W Monitor

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					
CPU smart fan control			[60 C]		
Fan1 smart fan control			[60 C]		
Fan2 smart fan control			[60 C]		
CPU temperature			+41 C		
SYS temperature			+35 C		
CPU Fan Speed			7315 RPM		
FAN1 Speed			7308 RPM		
FAN2 Speed			7313 RPM		
Vcore			+0.928 V		
+5V			+5.213 V		
+12V			+12.144 V		
1.5V			+1.544 V		
+3.3V			+3.360 V		
					→ ← Select Screen
					↑ ↓ Select Item
					Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Temperatures/Voltages

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

CPU/Fan1/Fan2 Smart Fan Control

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

Serial Port Console Redirection

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
COM0	Console Redirection		[Enabled]		
	▶ Console Redirection Settings		[Enabled]		→ ← Select Screen
COM1 (Pci Bus0, Dev0, Func0)	Console Redirection		(Disabled)		↑ ↓ Select Item
	Port Is Disabled				Enter: Select
					+ - Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

Console Redirection Settings

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
COM0	Console Redirection Settings				Emulation: ANSI:
					Extended ASCII char
					Set. VT100: ASCII char
					Set. VT100+: Extends
					VT100 to support color,
					Function keys, etc.
					VT-UTF8: Uses UTF8
					Encoding to map Unicode
					Chars onto 1 or more

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

Chipset Settings

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

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

PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
			Intel PCH RC Version	1.1.0.0	PCI Express
			Intel PCH SKU Name	C216	Configuration settings
			Intel PCH Rev ID	O4/C1	
		<ul style="list-style-type: none"> ▶ PCI Express Configuration ▶ USB Configuration 			
		PCH LAN Controller	[Enabled]		→ ← Select Screen
		Wake on LAN	[Disabled]		↑ ↓ Select Item
		High Precision Event Timer Configuration			Enter: Select
		High Precision Timer	[Enabled]		+ - Change Field
		SLP_S4 Assertion Width	[4-5 Seconds]		F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save ESC: Exit

PCH LAN Controller

Enable or disable onboard NIC.

Wake on LAN

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

SLP_S4 Assertion Width

Select a minimum assertion width of the SLP_S4# signal.

PCI Express Configuration

Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Express Configuration					
PCI Express Clock Gating			[Enabled]		
DMI Link ASPM Control			[Enabled]		
DMI Link Extended Synch Control			[Disabled]		
PCIe-USB Glitch W/A			[Disabled]		
Subtractive Decode			[Disabled]		
PCI Express Port 1 is assign					
▶ PCI Express Root Port 2				→ ← Select Screen	
▶ PCI Express Root Port 3				↑ ↓ Select Item	
▶ PCI Express Root Port 4				Enter: Select	
▶ PCI Express Root Port 5				+- Change Field	
▶ PCI Express Root Port 6				F1: General Help	
▶ PCI Express Root Port 7				F2: Previous Values	
▶ PCI Express Root Port 8				F3: Optimized Default	
				F4: Save ESC: Exit	

PCI Express Clock Gating

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

DMI Link ASPM Control

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

PCIe-USB Glitch W/A

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

USB Configuration

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

HS Port #1/2/3/4 Switchable

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

xHCI Streams

Enable or disable xHCI Maximum Primary Stream Array Size.

EHCI1/2

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

USB Ports Per-Port Disable Control

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

BIOS SETUP

System Agent (SA) Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
		System Agent Bridge Name	IvyBridge		
		System Agent RC Version	1.1.0.0		
		VT-d Capability	Supported		
		VT-d	[Enabled]		
		CHAP Device (B0:D7:F0)	[Disabled]		→ ← Select Screen
		Thermal Device (B0:D4:F0)	[Disabled]		↑ ↓ Select Item
		Enable NB CRID	[Disabled]		Enter: Select
		BDAT ACPI Table Support	[Disabled]		+ - Change Field
		C-State Pre-Wake	[Enabled]		F1: General Help
		▶ Graphics Configuration			F2: Previous Values
		▶ Memory Configuration			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	Boot	Security	Save & Exit
		Graphics Configuration			
		IGFX VBIOS Version	2132		
		IGfx Frequency	350 MHz		
		Primary Display	[Auto]		
		Primary PEG	[Auto]		→ ← Select Screen
		Internal Graphics	[Auto]		↑ ↓ Select Item
		GTT Size	[2MB]		Enter: Select
		Aperture Size	[256MB]		+ - Change Field
		DVMT Pre-Allocated	[64M]		F1: General Help
		DVMT Total Gfx Mode	[256M]		F2: Previous Values
		Gfx Low Power Mode	[Disabled]		F3: Optimized Default
					F4: Save ESC: Exit

Primary Display

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

Internal Graphics

Keep IGD enabled based on the setup options.

DVMT Pre-Allocated

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

DVMT Total Gfx Mem

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

Gfx Low Power Mode

This option is applicable for SFF only.

Memory Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Memory Information					
Memory Frequency			1333 MHz		
Total Memory			32768 MB (DDR3)		
DIMM#0			8192 MB (DDR3)		
DIMM#1			8192 MB (DDR3)	→ ← Select Screen	
DIMM#2			8192 MB (DDR3)	↑ ↓ Select Item	
DIMM#3			8192 MB (DDR3)	Enter: Select	
CAS Latency (tCL)			9	+- Change Field	
Minimum delay time					
CAS to RAS (tRCDmin)			9	F1: General Help	
Row Precharge (tRPmin)			9	F2: Previous Values	
Active to Precharge (tRASmin)			24	F3: Optimized Default	
				F4: Save ESC: Exit	

Boot Settings**Aptio Setup Utility**

Main	Advanced	Chipset	Boot	Security	Save & Exit
Boot Configuration					
Setup Prompt Timeout			1		
Bootup NumLock State			[On]		
Quiet Boot			[Disabled]		
Fast Boot			[Disabled]		
CSM16 Module Version			07.68		→ ← Select Screen
GateA20 Active			[Upon Request]		↑ ↓ Select Item
Option ROM Messages			[Force BIOS]		Enter: Select
INT19 Trap Response			[Immediate]		+ - Change Field
Boot Option Priorities					F1: General Help
Boot Option #1			[SATA PM: WDC W		F2: Previous Values
Hard Drive BBS Priorities					F3: Optimized Default
▶ CSM parameters					F4: Save ESC: Exit

Setup Prompt Timeout

Number of seconds to wait for setup activation key.
65535(0xFFFF) means indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state.

Quiet Boot

Enables/Disables Quiet Boot option.

Fast Boot

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

GateA20 Active

UPON REQUEST – GA20 can be disabled using BIOS services.
ALWAYS – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

Option ROM Messages

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

INT19 Trap Response

Enable: Allows Option ROMs to trap Int 19.

Boot Option Priorities

Sets the system boot order.

CSM parameters

This section allows you to configure the boot settings.

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

Boot option filter

This option controls what devices system can boot to.

Launch PXE OpROM policy

Controls the execution of UEFI and Legacy PXE OpROM.

Launch Storage OpROM policy

Controls the execution of UEFI and Legacy Storage OpROM.

Launch Video OpROM policy

Controls the execution of UEFI and Legacy Video OpROM.

Other PCI device ROM priority

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

Save & Exit Settings

Aptio Setup Utility		
Main	Advanced	
Save Changes and Exit	→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save ESC: Exit	
Discard Changes and Exit		
Save Changes and Reset		
Discard Changes and Reset		
Save Options		
Save Changes		
Discard Changes		
Restore Defaults		
Save as User Defaults		
Restore User Defaults		
SATA PM: WDC WD5000BPKT-0		

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.

This page is intentionally left blank.

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	60
VGA Drivers Installation	63
LAN Drivers Installation	66
Intel® Management Engine Interface	70
Intel® USB 3.0 Drivers	73

IMPORTANT NOTE:

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

Intel Chipset Software Installation Utility

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

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



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



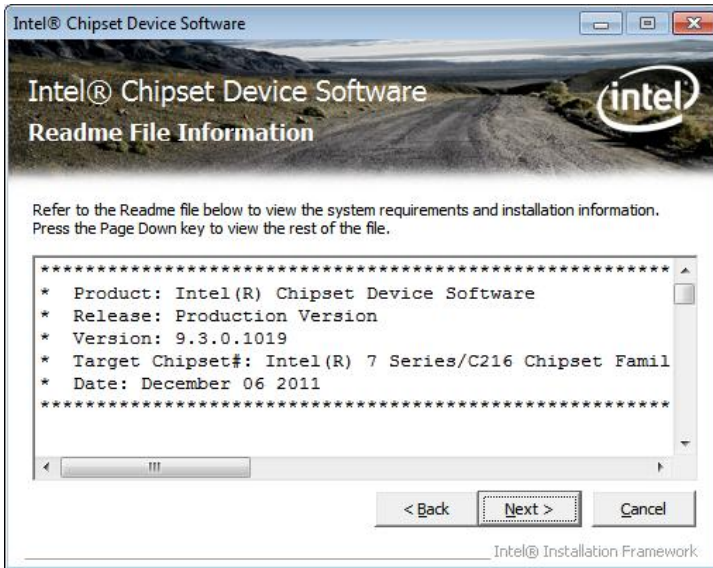
3. When the Welcome screen to the Intel® Chipset Device Software appears, click *Next* to continue.



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



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



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

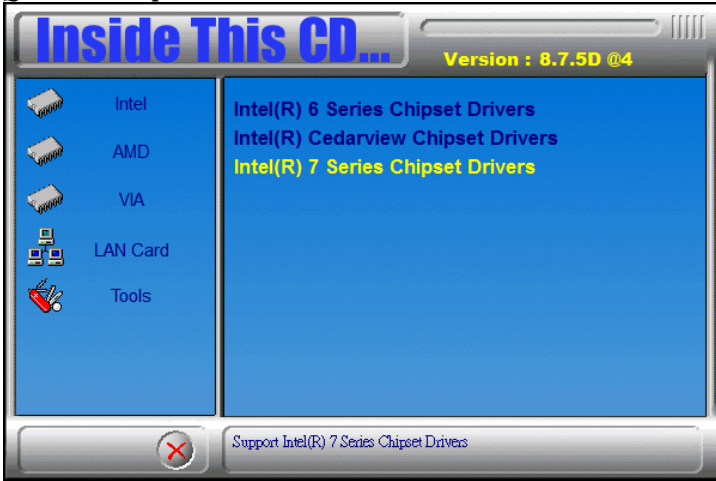


VGA Drivers Installation

NOTE: Before installing the *Intel(R) C216 Chipset Family Graphics Driver*, the Microsoft .NET Framework 3.5 SPI should be first installed.

To install the VGA drivers, follow the steps below.

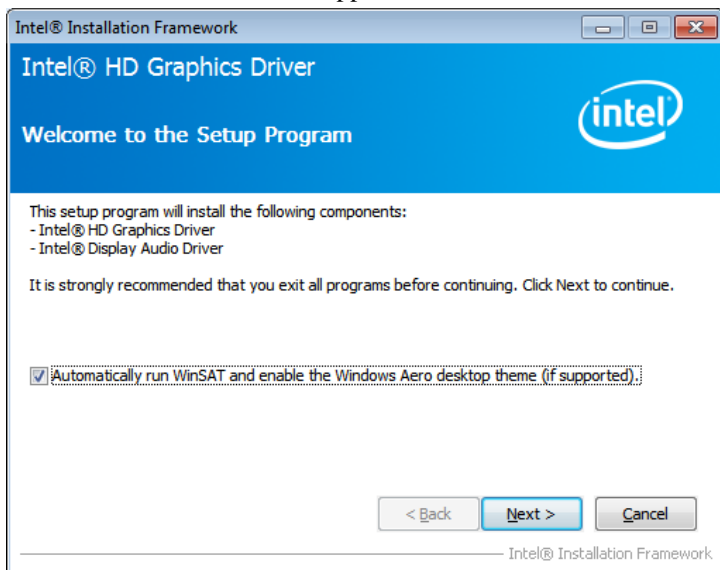
1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) Q7 Series Chipset Drivers*.



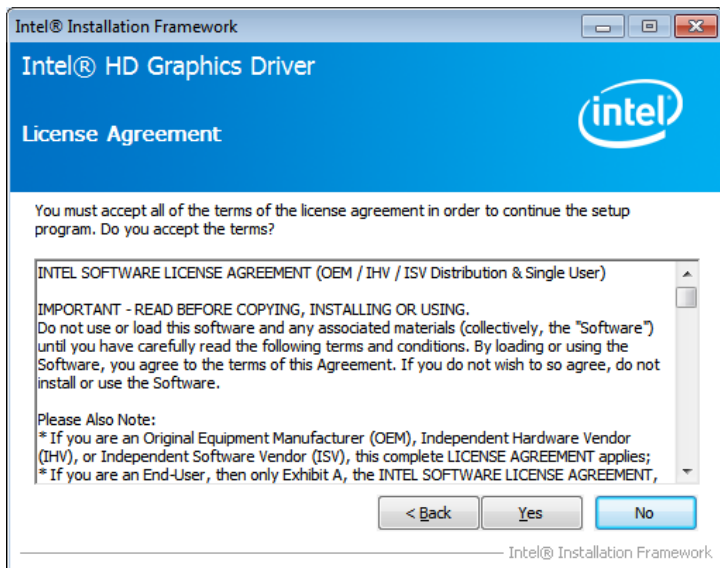
2. Click *Intel(R) C216 Chipset Family Graphics Driver*.



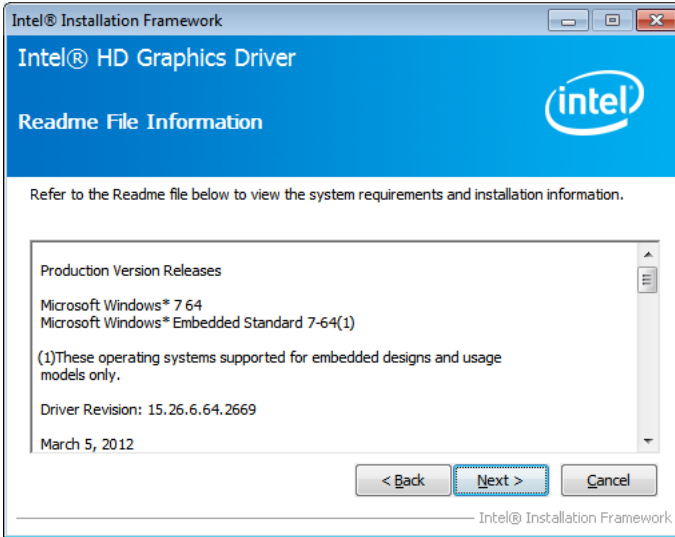
3. When the Welcome screen appears, click *Next* to continue.



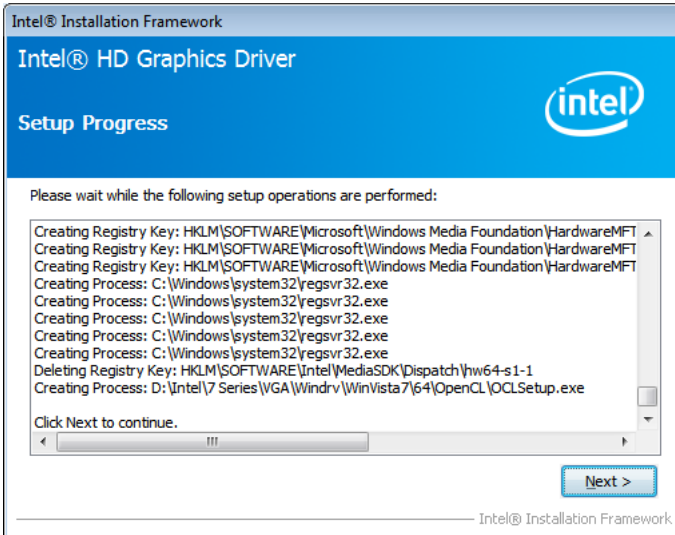
4. Click *Yes* to agree with the license agreement and continue the installation.



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



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



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

LAN Drivers Installation

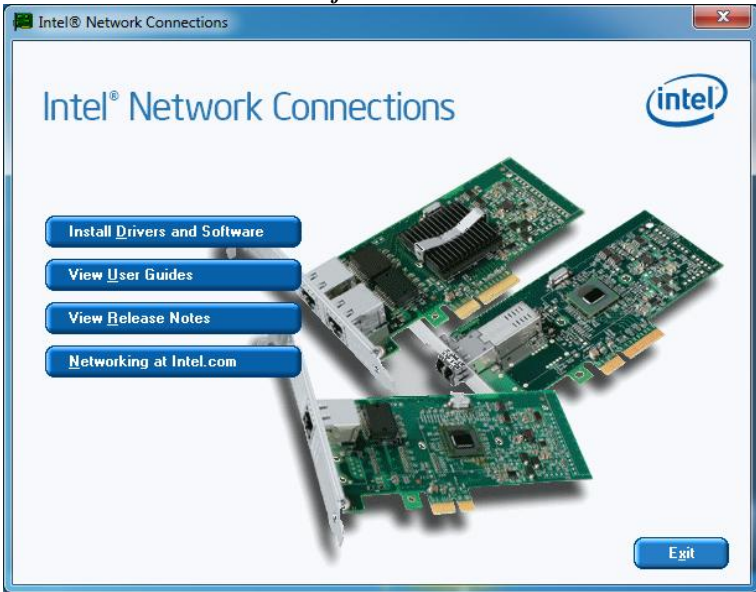
1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) Q7 Series Chipset Drivers*.



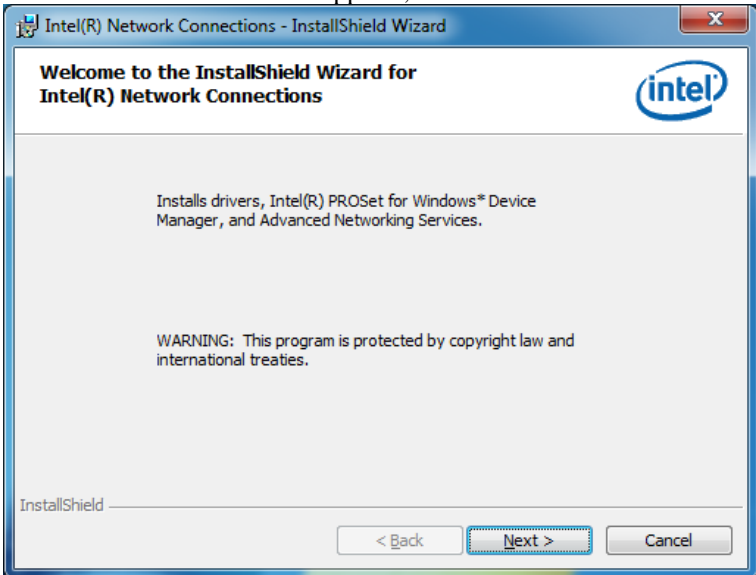
2. Click *Intel(R) PRO LAN Network Driver*.



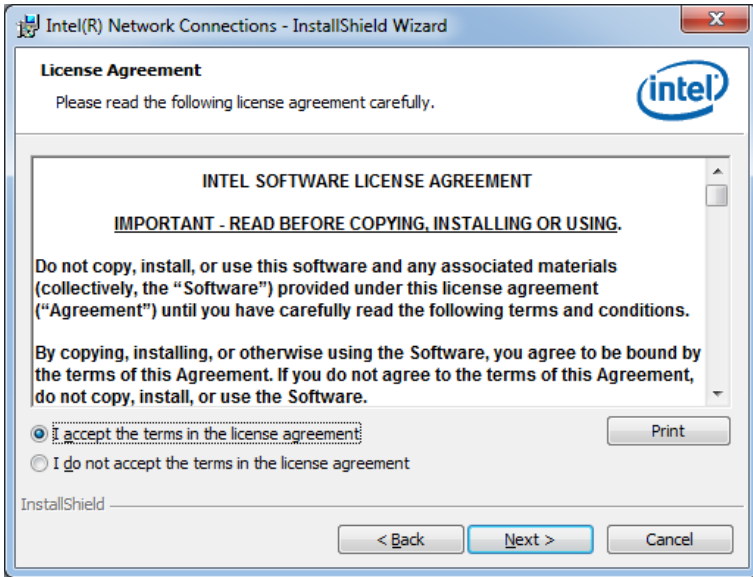
3. Click **Install Drivers and Software**.



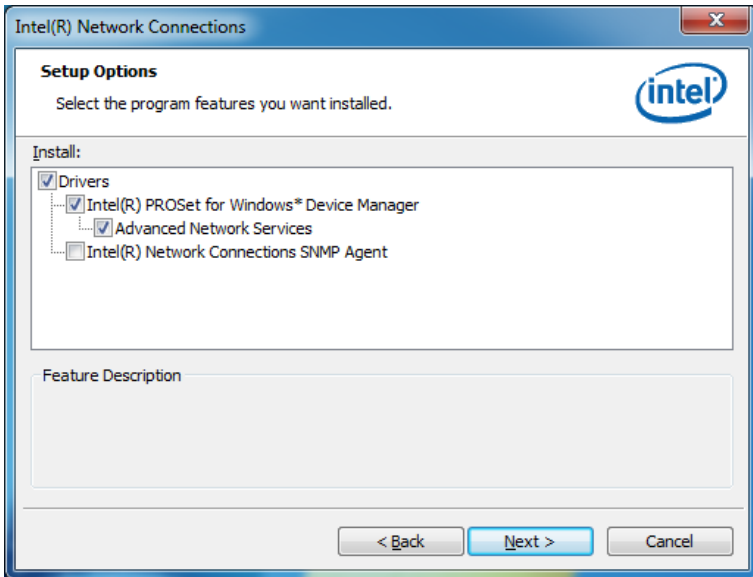
4. When the Welcome screen appears, click **Next**.



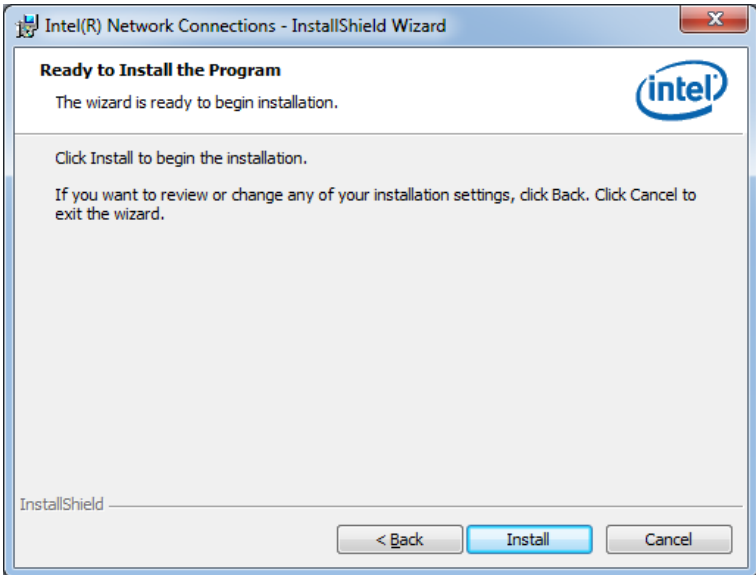
5. Click *Next* to agree with the license agreement.



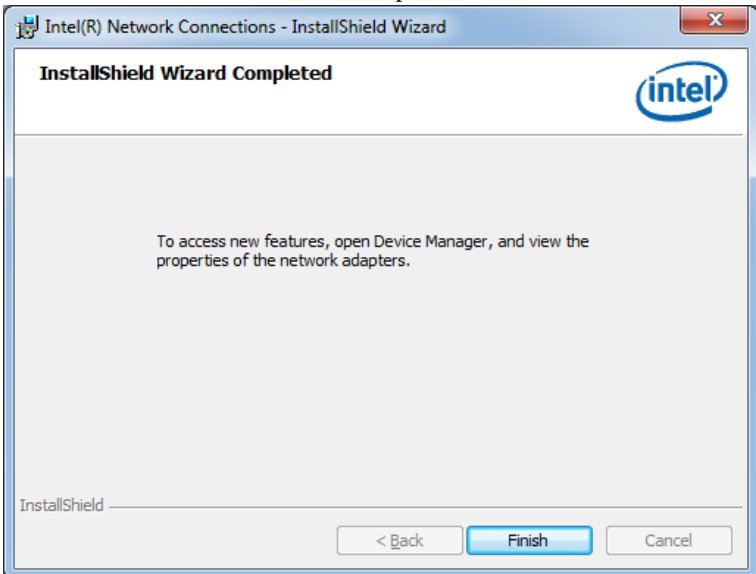
6. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.



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



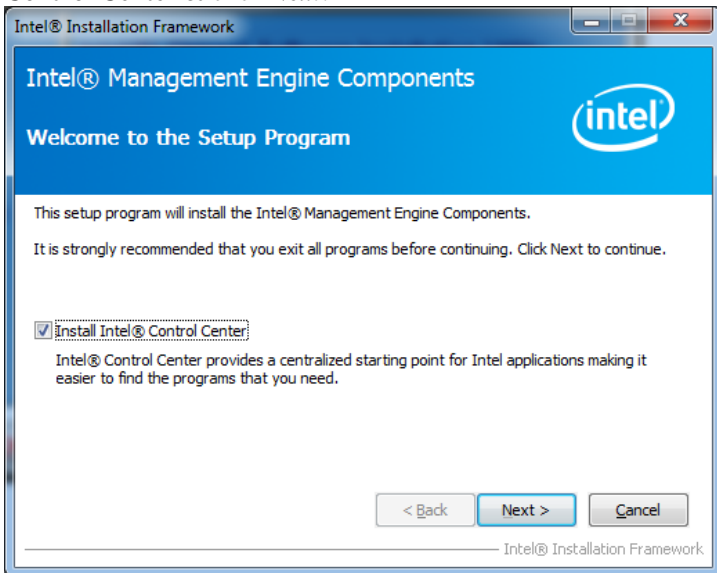
The following application requires Microsoft .NET Framework 3.5 or later: Intel® Management Engine Components. Please install the latest version of Microsoft .NET Framework from Microsoft Download Center to run this application correctly.

Follow the steps below to install the Intel Management Engine.

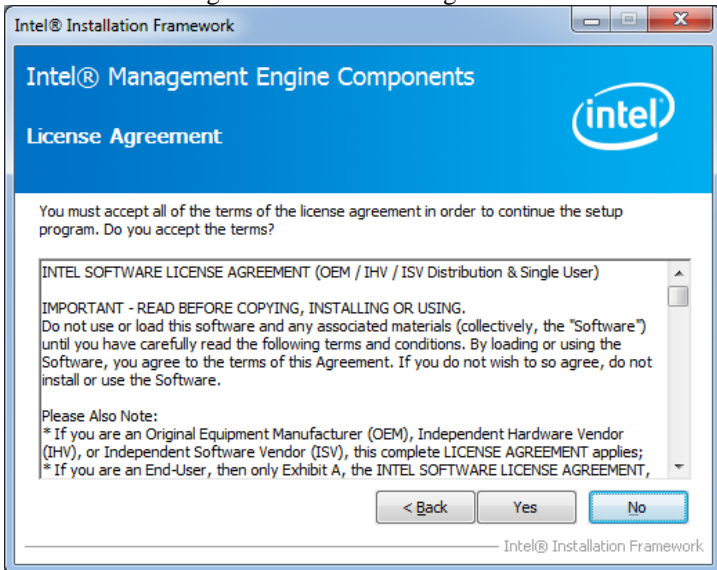
1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) AMT 8.0 Drivers*.



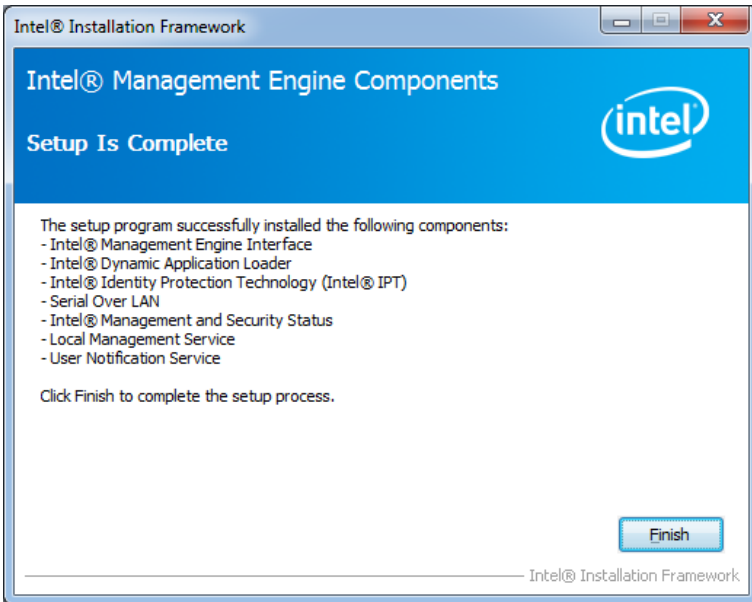
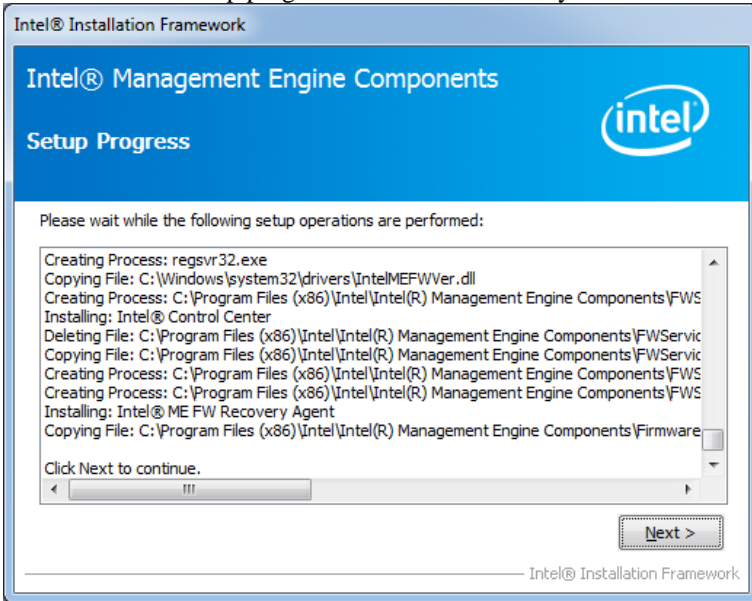
- When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click the checkbox for **Install Intel® Control Center** & click *Next*.



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



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



Intel® USB 3.0 Drivers

1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) C216 Series Chipset Drivers*.



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



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



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



5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.



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



Appendix

A. I/O Port Address Map

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

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

B. Interrupt Request Lines (IRQ)

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

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ8	Real Time Clock
IRQ14	Primary IDE
IRQ15	Secondary IDE