AXIOMTEK

CAPA831

Intel® Atom™ D2550/N2800/N2600 Processor 3.5” SBC

User’s Manual

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

Trademarks Acknowledgments

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Chapter 1
Introduction

The CAPA831, a Capa board, supports Intel® Atom™ D2550/N2800/N2600 processors . The board integrates the Intel® NM10 chipset and delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions.

There is one 204-pin unbuffered SO-DIMM socket for single channel DDR3-800/1066MHz memory, maximum memory capacity up to 4GB (N2600 supports DDR3-800 up to 2GB only). It also features two Gigabit/Fast Ethernet ports, one serial ATA channels for total one Serial ATA hard drive at maximum transfer rate up to 300MB/sec, six USB 2.0 high speed compliant, and built-in HD audio codec that can achieve the best stability and reliability for industrial applications. Additionally, it provides you with unique embedded features, such as four serial ports and 3.5" form factor that applies an extensive array of PC peripherals.

1.1 Features

- Intel® Atom™ dual core D2550 (1.86 GHz), N2800 (1.86GHz) and N2600 (1.6GHz)
- Intel® NM10 chipset
- 1 DDR3 SO-DIMM supports up to 4GB memory capacity
- 6 USB 2.0 ports
- 4 COM ports
- +12V only DC-in supported

1.2 Specifications

- **CPU**
  - Intel® Atom™ dual core D2550 1.86 GHz.
  - Intel® Atom™ dual core N2800 1.86 GHz.
  - Intel® Atom™ dual core N2600 1.6 GHz

- **Thermal Solution**
  - Fanless solution

- **System Chipset**
  - Intel® NM10 chipset.

- **BIOS**
  - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
  - 16Mbit SPI Flash, DMI, Plug and Play.
  - RPL/PXE Ethernet Boot ROM.

- **System Memory**
  - One 204-pin unbuffered DDR3 SO-DIMM socket.
  - Maximum to 4GB DDR3 1066MHz memory for D2550/N2800.
  - Maximum to 2GB DDR3 800MHz memory for N2600.

- **Onboard Multi I/O**
  - Controller: Nuvoton NCT6627UD.
  - Serial Ports: Two ports for RS-232/422/485 and two ports for RS-232.

- **Serial ATA**
  - One SATA-300 connector.
  - One CFast™ socket.
  - mSATA support (Optional)

- **USB Interface**
  - Six USB ports with fuse protection and complies with USB Spec. Rev. 2.0.

- **Display**
  - A slim type 15-pin D-Sub connector as VGA connector.
  - One 40-pin connector for 18/24-bit single/dual channel LVDS and one 8-pin inverter connector. For N2600/N2800, LVDS resolution is up to 1600x1200 in 24-bit dual channel. For D2550, LVDS resolution is up to 1920x1200 in 24-bit dual channel.
  - One DisplayPort.

- **Trusted Platform Module (TPM)**
  - Controller: ST 33TPM12LPC via LPC bus interface.
  - Complies with TPM1.2 main and PC client specification.

- **Watchdog Timer**
  - 1~255 seconds or minutes; up to 255 levels.

- **Ethernet**
  - Two ports with Intel® 82583V for Gigabit/Fast Ethernet.

- **Audio**
  - HD audio compliant (with speaker/line-out and line-in/MIC-in) with Realtek ALC662.
  - Speaker/line-out and line-in/MIC-in via box header connector.

- **Expansion Interface**
  - One PCI-Express Mini Card socket complies with PCI-Express Mini Card Spec. V1.2.

- **Power Input**
  - 2x2 pin connector
  - +12V DC-in only
  - AT Auto Power ON function supported

- **Power Management**
  - ACPI (Advanced Configuration and Power Interface).

- **Form Factor**
  - 3.5" form factor.

Note: ***All specifications and images are subject to change without notice.***

1.3 Utilities Supported

- Chipset and graphics driver
- Ethernet driver (82583V)
- Audio driver
- Unify API for hardware monitor, digital I/O and watchdog timer

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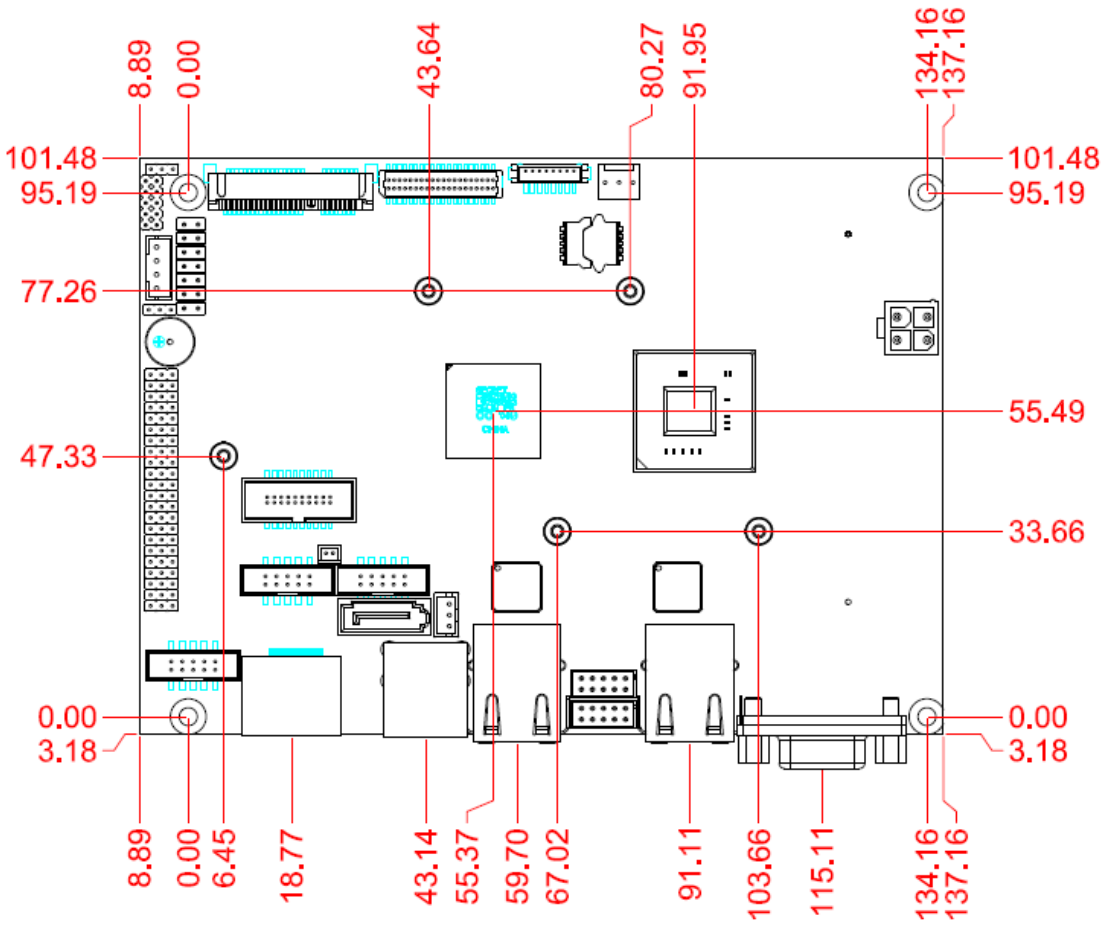
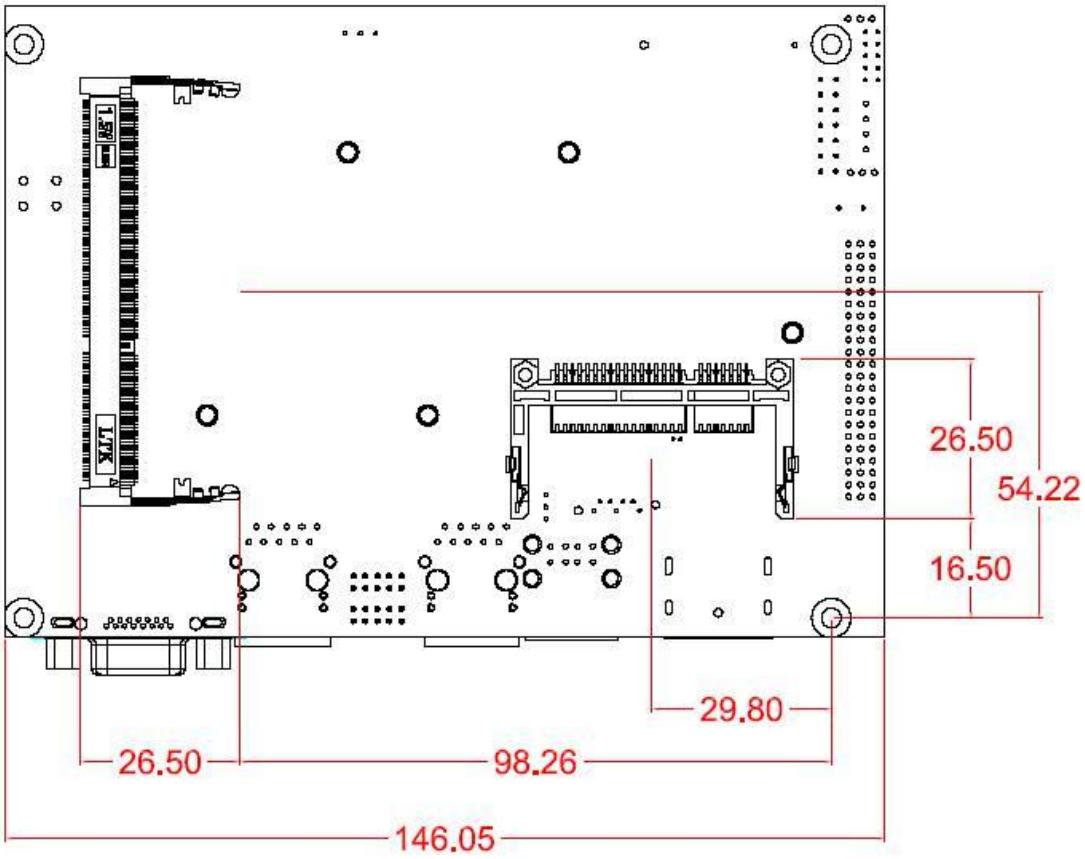
Chapter 2
Board and Pin Assignments

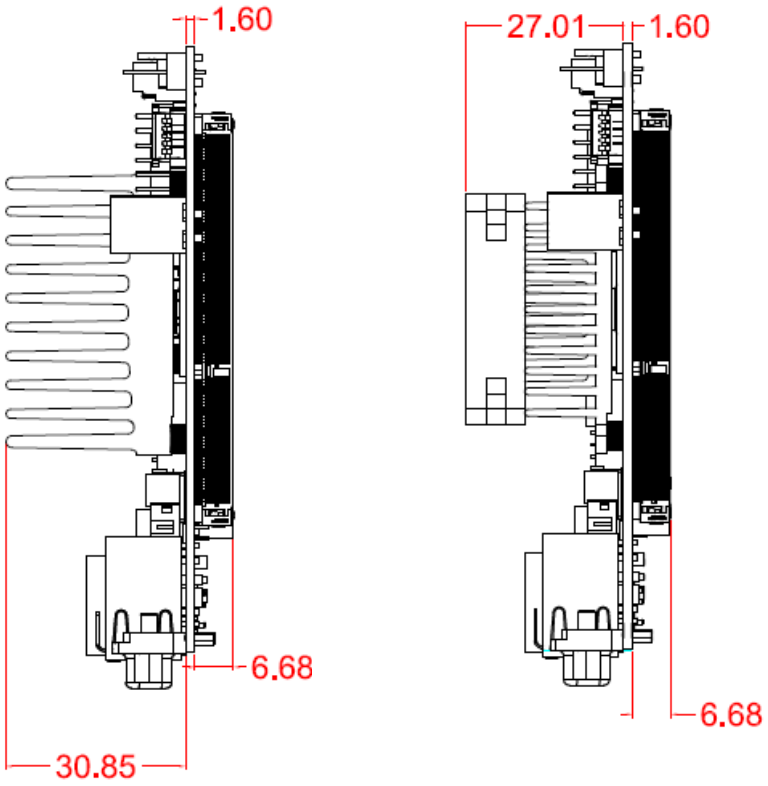
2.1 Board Dimensions and Fixing Holes



Top View

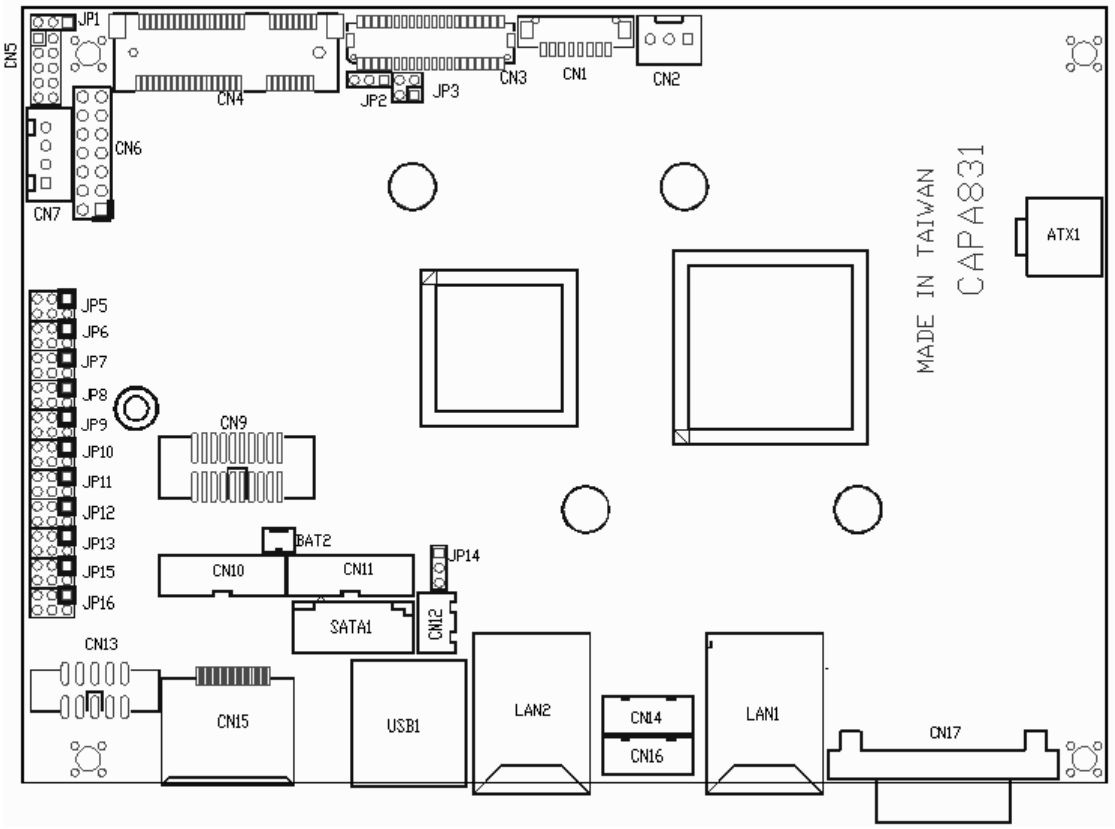


Bottom View

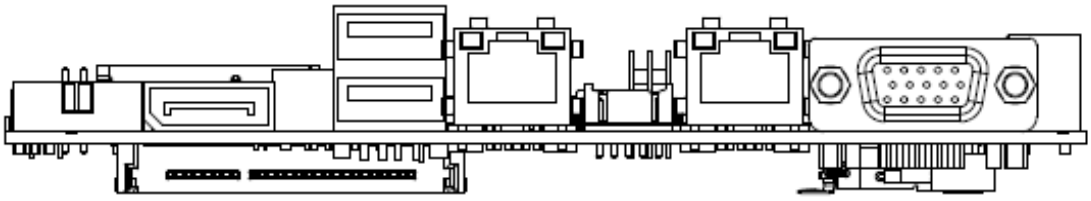


Side View

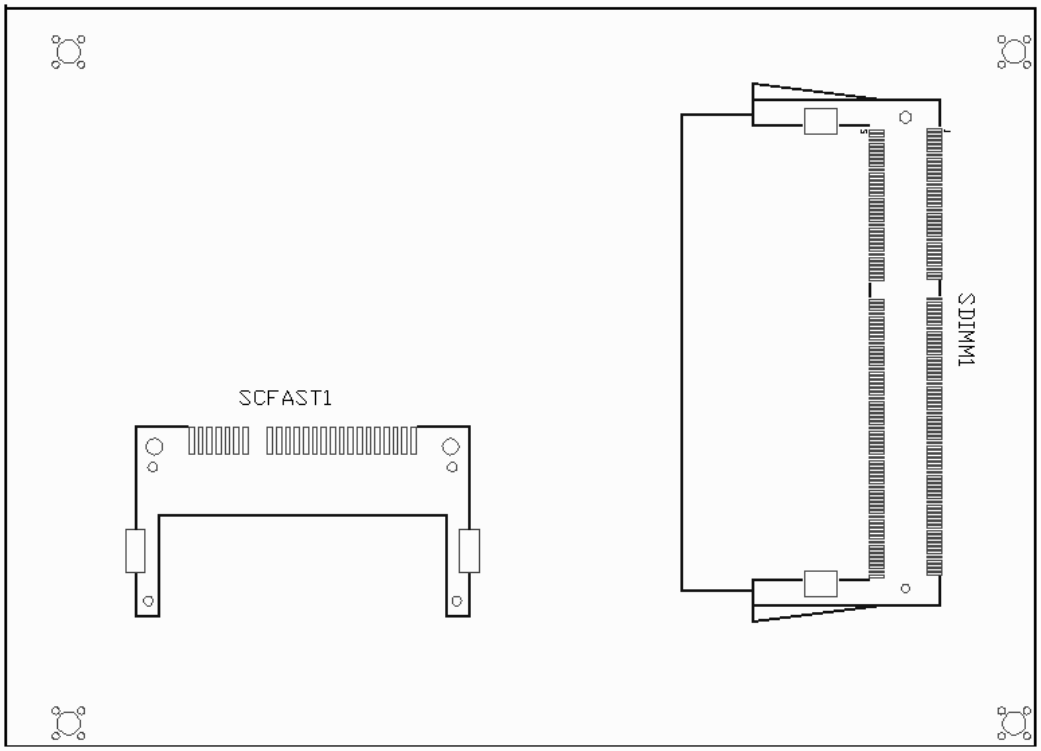
2.2 Board Layout



Top View



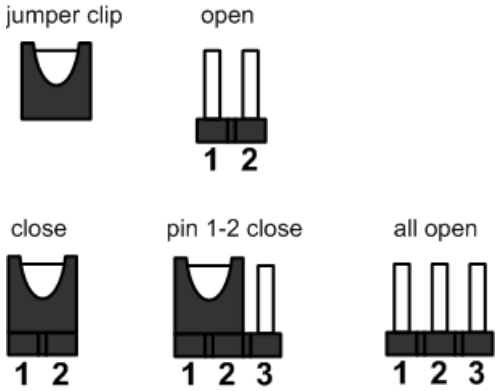
Side View



Bottom View

2.3 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. Below illustration shows how to set up jumper.



Properly configure jumper settings on the CAPA831 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.

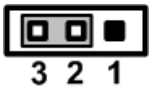
Note: Once the default jumper setting needs to be changed, please do it under power-off condition.

Jumper	Description		Jumper Setting
JP1	Auto Power On Default: Disable		2-3 close
JP2	LVDS Voltage Selection Default: +3.3V		1-2 close
JP3	LVDS Brightness Control Mode Setting Default: PWM Mode		1-2 close
JP5	COM2 RS-232/422/485 Mode Setting Default: RS-232		1-2 close
JP6			3-5, 4-6 close
JP7			3-5, 4-6 close
JP8	COM1 RS-232/422/485 Mode Setting Default: RS-232		1-2 close
JP9			3-5, 4-6 close
JP10			3-5, 4-6 close
JP11	COM4 Data/Power Selection Default: RS-232 Data	CN9 Pin 11: DCD	3-5 close
		CN9 Pin 18: RI	4-6 close
JP12	COM3 Data/Power Selection Default: RS-232 Data	CN9 Pin 1: DCD	3-5 close
		CN9 Pin 8: RI	4-6 close
JP13	COM2 Data/Power Selection Default: RS-232 Data	CN11 Pin 1: DCD	3-5 close
		CN11 Pin 8: RI	4-6 close
JP14	Restore BIOS Optimal Defaults Default: Normal Operation		1-2 close
JP15	COM1 Data/Power Selection Default: RS-232 Data	CN10 Pin 1: DCD	3-5 close
		CN10 Pin 8: RI	4-6 close
JP16	Audio Output Selection Default: Line-out		1-3, 2-4 close

2.3.1 Auto Power On (JP1)

If JP1 is enabled for AC power input, the system will be automatically power on without pressing soft power button. If JP1 is disabled for AC power input, it is necessary to manually press soft power button to power on the system.

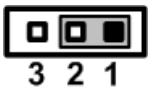
Function	Setting
Disable auto power on (Default)	2-3 close
Enable auto power on	1-2 close



2.3.2 LVDS Voltage Selection (JP2)

The board supports voltage selection for flat panel displays. Use JP2 to set LVDS connector (CN3) pin 1~6 VCCM to +3.3V or +5V voltage level.

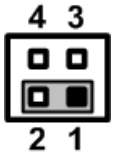
Function	Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close



2.3.3 LVDS Brightness Control Mode Setting (JP3)

The JP3 enables you to select PWM or voltage control mode for inverter connector (CN1). These two control modes are for adjusting the brightness of LVDS panel.

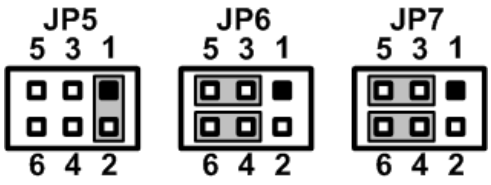
Function	Setting
PWM mode (Default)	1-2 close
Voltage mode	3-4 close



2.3.4 COM2 RS-232/422/485 Mode Setting (JP5, JP6, JP7)

Use these jumpers to set COM2 port to operate as RS-232, RS-422 or RS-485 communication mode. When these jumpers are set to operate as RS-422 or RS485, please make sure COM2 is on data mode (see section 2.3.8)

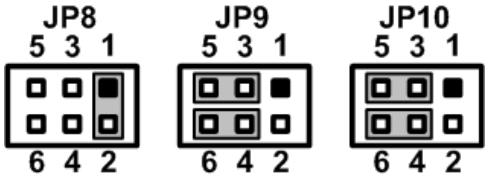
Function	Setting
RS-232 mode (Default)	JP5 1-2 close JP6 3-5, 4-6 close JP7 3-5, 4-6 close
RS-422 mode	JP5 3-4 close JP6 1-3, 2-4 close JP7 1-3, 2-4 close
RS-485 mode	JP5 5-6 close JP6 1-3, 2-4 close JP7 1-3, 2-4 close



2.3.5 COM1 RS-232/422/485 Mode Setting (JP8, JP9, JP10)

Use these jumpers to set COM1 port to operate as RS-232, RS-422 or RS-485 communication mode. When these jumpers are set to operate as RS-422 or RS485, please make sure COM1 is on data mode (see section 2.3.10)

Function	Setting
RS-232 mode (Default)	JP8 1-2 close JP9 3-5, 4-6 close JP10 3-5, 4-6 close
RS-422 mode	JP8 3-4 close JP9 1-3, 2-4 close JP10 1-3, 2-4 close
RS-485 mode	JP8 5-6 close JP9 1-3, 2-4 close JP10 1-3, 2-4 close



2.3.6 COM4 Data/Power Selection (JP11)

The COM4 port has +5V level power capability on DCD and +12V level on RI by setting this jumper.

Function	Setting
Power: Set CN9 pin 11 to +5V level	1-3 close
Data: Set CN9 pin 11 to DCD (Default)	3-5 close
Power: Set CN9 pin 18 to +12V level	2-4 close
Data: Set CN9 pin 18 to RI (Default)	4-6 close

2.3.7 COM3 Data/Power Selection (JP12)

The COM3 port has +5V level power capability on DCD and +12V level on RI by setting this jumper.

Function	Setting
Power: Set CN9 pin 1 to +5V level	1-3 close
Data: Set CN9 pin 1 to DCD (Default)	3-5 close
Power: Set CN9 pin 8 to +12V level	2-4 close
Data: Set CN9 pin 8 to RI (Default)	4-6 close

2.3.8 COM2 Data/Power Selection (JP13)

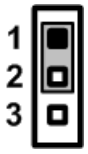
The COM2 port has +5V level power capability on DCD and +12V level on RI by setting this jumper. When this port is set to +5V or +12V level, please make sure its communication mode is RS-232 (see section 2.3.4).

Function	Setting
Power: Set CN11 pin 1 to +5V level	1-3 close
Data: Set CN11 pin 1 to DCD (Default)	3-5 close
Power: Set CN11 pin 8 to +12V level	2-4 close
Data: Set CN11 pin 8 to RI (Default)	4-6 close

2.3.9 Restore BIOS Optimal Defaults (JP14)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal (Default)	1-2 close
Restore BIOS optimal defaults	2-3 close



2.3.10 COM1 Data/Power Selection (JP15)

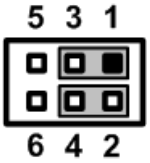
The COM1 port has +5V level power capability on DCD and +12V level on RI by setting this jumper. When this port is set to +5V or +12V level, please make sure its communication mode is RS-232 (see section 2.3.5).

Function	Setting
Power: Set CN10 pin 1 to +5V level	1-3 close
Data: Set CN10 pin 1 to DCD (Default)	3-5 close
Power: Set CN10 pin 8 to +12V level	2-4 close
Data: Set CN10 pin 8 to RI (Default)	4-6 close

2.3.11 Audio Output Selection (JP16)

Use this jumper to select line out or speaker out as source of audio output on audio connector. When speaker out is used, it delivers 1W/channel continuous at 8 Ohm loads.

Function	Setting
Line out (Default)	1-3, 2-4 close
Speaker out	3-5, 4-6 close



2.4 Connectors

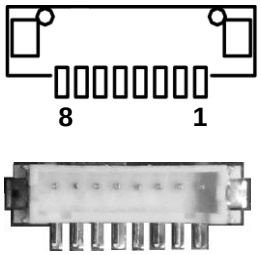
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	Inverter Connector
CN2	CPU Fan Connector
CN3	LVDS Connector
CN4	PCI-Express Mini Card Connector
CN5	Digital I/O Port Connector
CN6	Front Panel Connector
CN7	Power Output Connector
CN9	COM3 and COM4 Connector
CN10	COM1 Connector
CN11	COM2 Connector
CN12	SMBus Connector
CN13	Audio Connector
CN14	USB Wafer Port 4 and 5
CN15	DisplayPort Connector
CN16	USB Wafer Port 2 and 3
CN17	VGA Connector
ATX1	Power Connector
SATA1	Serial ATA Connector
USB1	USB Port 0 and 1
SCFAST1	CFast™ Socket
SDIMM1	DDRIII SO-DIMM Connector
LAN1	Ethernet Port 1
LAN2	Ethernet Port 2

2.4.1 Inverter Connector (CN1)

This is a DF13-8S-1.25C 8-pin connector for inverter. We strongly recommend you to use the matching DF13-8S-1.25C connector to avoid malfunction.

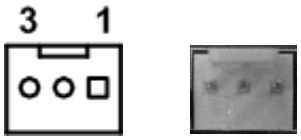
Pin	Signal
1	VBL1 (+12V level)
2	VBL1 (+12V level)
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND
8	VBL Brightness Control



2.4.2 CPU Fan Connector (CN2)

A CPU fan interface is available through this connector. You can find fan speed on BIOS Setup Utility if CPU fan is installed. For further information, see BIOS Setup Utility: Advanced\H/W Monitor\PC Health Status (see section 4.4).

Pin	Signal
1	GND
2	+12V level
3	Fan speed feedback

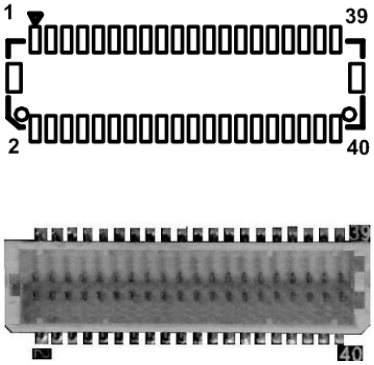


2.4.3 LVDS Connector (CN3)

This board has a 40-pin connector for LVDS LCD interface. It is strongly recommended to use the matching JST SHDR-40VS-B 40-pin connector for LVDS interface. Pin 1~6 VCCM can be set to +3.3V level or +5V level by setting JP2 (see section 2.3.2).

18-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	N.C.
31	Channel A D1+	32	N.C.
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND



24-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	N.C.	12	N.C.
13	N.C.	14	N.C.
15	GND	16	GND
17	N.C.	18	N.C.
19	N.C.	20	N.C.
21	GND	22	GND
23	Channel A D0-	24	N.C.
25	Channel A D0+	26	N.C.
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

18-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	N.C.	12	Channel B D0-
13	N.C.	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	N.C.
31	Channel A D1+	32	N.C.
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

24-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C.	8	N.C.
9	GND	10	GND
11	Channel B D3-	12	Channel B D0-
13	Channel B D3+	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

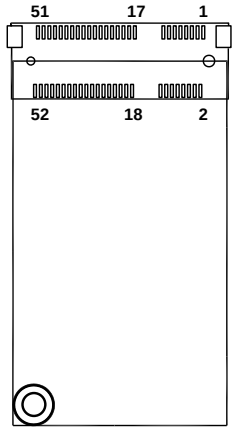
2.4.4 PCI-Express Mini Card Connector (CN4)

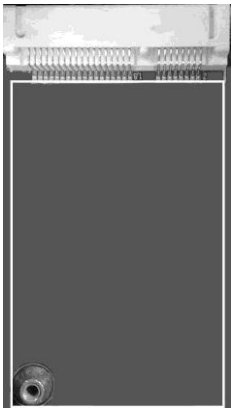
This is a PCI-Express Mini Card connector which supports PCI-Express x1 link/SATA link and USB 2.0 link. A PCI-Express Mini Card can be applied to either PCI-Express or USB 2.0 or SATA (mSATA). It complies with PCI-Express Mini Card Spec. V1.2.

It can support mSATA. Please check section 4.4 to enable it.

Note: ***If mSATA is enabled, the CFast™ socket can't function.***

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/ SATA_RXP	24	+3.3VSB
25	PE_RXP3/ SATA_RXN	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/ SATA_TXN	32	SMB_DATA
33	PE_TXP3/ SATA_TXP	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB

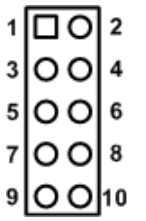




2.4.5 Digital I/O Port Connector (CN5)

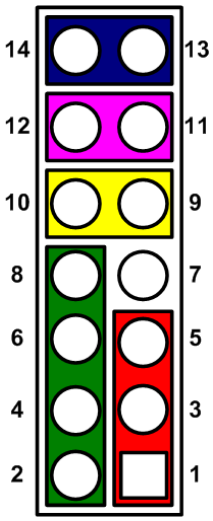
The board is equipped with an 8-channel (3 inputs and 5 outputs) digital I/O connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Pin	Signal	Pin	Signal
1	Digital Input 0	2	Digital Output 0
3	Digital Input 1	4	Digital Output 1
5	Digital Input 2	6	Digital Output 2
7	GND	8	Digital Output 3
9	GND	10	Digital Output 4



2.4.6 Front Panel Connector (CN6)

Pin	Signal
1	PWRLED+
2	EXT SPK-
3	N.C.
4	Buzzer
5	PWRLED-
6	N.C.
7	N.C.
8	EXT SPK+
9	PWRSW-
10	PWRSW+
11	HW RST-
12	HW RST+
13	HDDLED-
14	HDDLED+



Power LED
Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on.

External Speaker and Internal Buzzer
Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button
Pin 9 and 10 connect the power button on front panel to the CPU board, which allows users to turn on or off power supply.

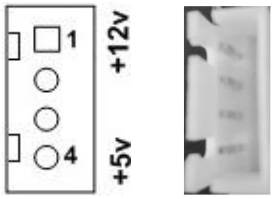
System Reset Switch
Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

HDD Activity LED
This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.4.7 Power Output Connector (CN7)

Use CN7 for interfacing to SATA 2.5" HDD power supply.

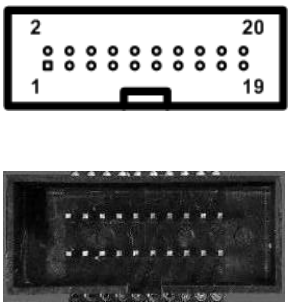
Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level



2.4.8 COM3 and COM4 Connector (CN9)

Both COM3 and COM4 ports have +5V level power capability on DCD and 12V level on RI by setting JP12 and JP11, respectively (see section 2.3.7 and 2.3.6). The pin assignments are listed in table below.

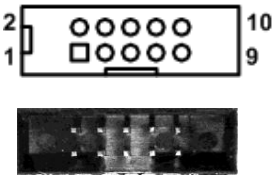
Pin	Signal	Pin	Signal
1	DCD3	2	DSR3
3	RXD3	4	RTS3
5	TXD3	6	CTS3
7	DTR3	8	RI3
9	GND	10	N.C.
11	DCD4	12	DSR4
13	RXD4	14	RTS4
15	TXD4	16	CTS4
17	DTR4	18	RI4
19	GND	20	N.C.



2.4.9 COM1 Connector (CN10)

This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP15 (see section 2.3.10). The pin assignments of RS-232/RS-422/RS-485 are listed in table below. If you need COM1 port to support RS-422 or RS-485, please refer to section 2.3.5.

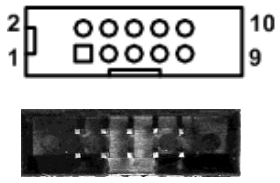
Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	DSR	No use	No use
3	RXD	TX+	Data+
4	RTS	No use	No use
5	TXD	RX+	No use
6	CTS	No use	No use
7	DTR	RX-	No use
8	RI	No use	No use
9	GND	No use	No use
10	No use	No use	No use



2.4.10 COM2 Connector (CN11)

The COM2 port has +5V level power capability on DCD and +12V level on RI by setting JP13 (see section 2.3.8). The pin assignments of RS-232/RS-422/RS-485 are listed in table below. If you need COM2 port to support RS-422 or RS-485, please refer to section 2.3.4.

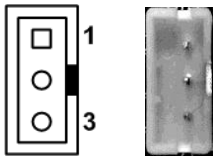
Pin	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	DSR	No use	No use
3	RXD	TX+	Data+
4	RTS	No use	No use
5	TXD	RX+	No use
6	CTS	No use	No use
7	DTR	RX-	No use
8	RI	No use	No use
9	GND	No use	No use
10	No use	No use	No use



2.4.11 SMBus Connector (CN12)

This connector is for SMBus interface. The SMBus (System Management Bus) is a simple 2-wire bus for the purpose of lightweight communication. Most commonly it is used for communication with the power source related applications such as on/off instructions.

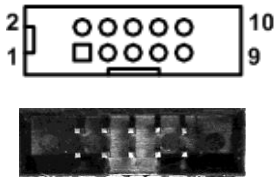
Pin	Signal
1	CLK
2	DATA
3	GND



2.4.12 Audio Connector (CN13)

Pin 7 and pin 9 of connector CN13 can be set to different audio source by setting JP16 (see section 2.3.11).

Pin	Signal	Pin	Signal
1	MIC_IN	2	GND
3	LINE_IN_L	4	GND
5	LINE_IN_R	6	GND
7	AUDIO_OUT_L	8	GND
9	AUDIO_OUT_R	10	GND



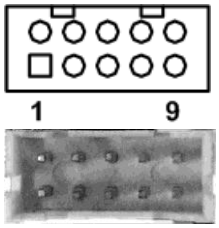
2.4.13 USB Wafer Connectors (CN14 and CN16)

These 2x5 pin wafers are Universal Serial Bus (USB) connectors. They are for installing versatile USB 2.0 compliant interface peripherals.

CN14 carries USB port 4 and 5 while CN16 carries USB port 2 and 3.

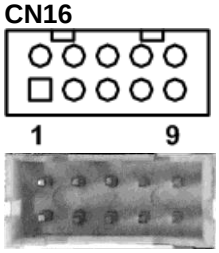
Pin	Signal	Pin	Signal
1	USB VCC (+5V level)	2	USB VCC (+5V level)
3	USB #4_D-	4	USB #5_D-
5	USB #4_D+	6	USB #5_D+
7	GND	8	GND
9	GND	10	GND

CN14



Pin	Signal	Pin	Signal
1	USB VCC (+5V level)	2	USB VCC (+5V level)
3	USB #2_D-	4	USB #3_D-
5	USB #2_D+	6	USB #3_D+
7	GND	8	GND
9	GND	10	GND

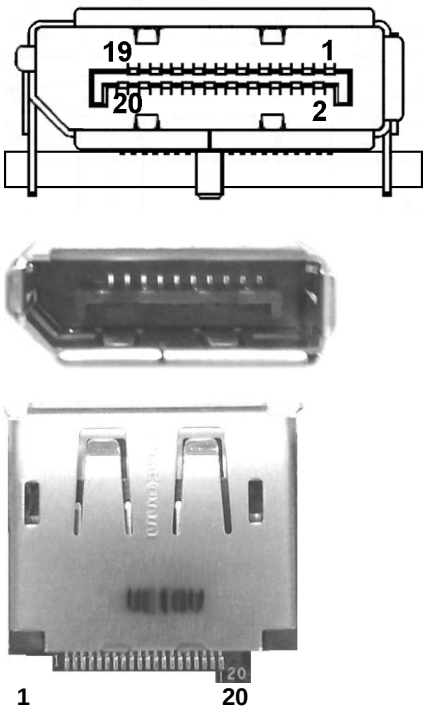
CN16



2.4.14 DisplayPort Connector (CN15)

DisplayPort interface is available through connector CN15.

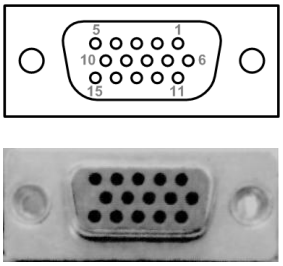
Pin	Signal
1	DPB_LANE0
2	GND
3	DPB_LANE0#
4	DPB_LANE1
5	GND
6	DPB_LANE1#
7	DPB_LANE2
8	GND
9	DPB_LANE2#
10	DPB_LANE3
11	GND
12	DPB_LANE3#
13	Detect Pin
14	GND
15	DPB_AUX
16	GND
17	DPB_AUX#
18	DPB_HPDE
19	GND
20	+3.3V



2.4.15 VGA Connector (CN17)

The CN17 is a slim type 15-pin D-Sub connector which is commonly used for CRT VGA monitor. This VGA interface configuration can be configured via software utility.

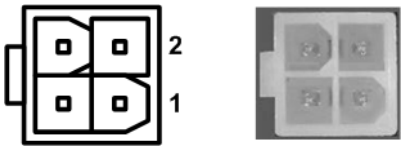
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	N.C.
5	GND	6	DETECT
7	GND	8	GND
9	VCC	10	GND
11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.4.16 Power Connector (ATX1)

The ATX1 is a 4-pin power supply interface. External power supply plug fits into ATX1 in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

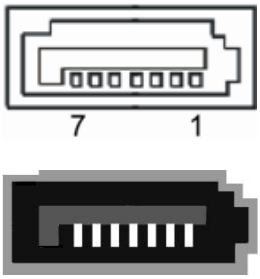
Pin	Signal
1	GND
2	GND
3	+12V
4	+12V



2.4.17 Serial ATA Connector (SATA1)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA interface ports. They are computer bus interfaces for connecting to devices such as hard disk drives.

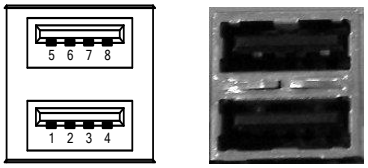
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.4.18 USB Connector (USB1)

This Universal Serial Bus (compliant with USB 2.0 (480Mbps)) connector on the rear I/O are for installing USB peripherals such as keyboard, mouse, scanner, etc.

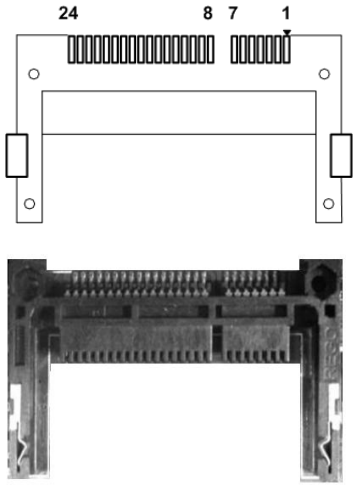
Pin	Signal	Pin	Signal
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #1_D-
3	USB #0_D+	7	USB #1_D+
4	GND	8	GND



2.4.19 CFast™ Socket (SCFAST1)

The board is equipped with a CFast™ socket on the bottom side to support a CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of the CFast™ card. When installing or removing the CFast™ card, please make sure the system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

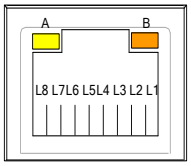
Pin	Signal	Pin	Signal
1	GND	13	N.C
2	SATA_TX+	14	GND
3	SATA_TX-	15	N.C
4	GND	16	CFAST_LED#
5	SATA_RX-	17	N.C
6	SATA_RX+	18	N.C
7	GND	19	N.C
8	N.C	20	+3.3V Level
9	GND	21	+3.3V Level
10	N.C	22	GND
11	N.C	23	GND
12	N.C	24	N.C

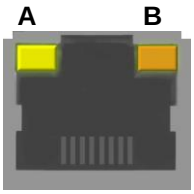


2.4.20 Ethernet Ports (LAN1 and LAN2)

The board has two RJ-45 connectors; LAN1 and LAN2. Ethernet connection can be established by plugging one end of the ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10-Base-T hub.

Pin	Signal	Pin	Signal
L1	MDI0+	L5	MDI2+
L2	MDI0-	L6	MDI2-
L3	MDI1+	L7	MDI3+
L4	MDI1-	L8	MDI3-
A	Active LED (Yellow)		
B	100 LAN LED (Green) / 1000 LAN LED (Orange)		





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Chapter 3
Hardware Description

3.1 Microprocessors

The CAPA831 supports Intel® Atom™ D2550/N2800/N2600 processors, which enable your system to operate under Windows® 7 environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

3.2 BIOS

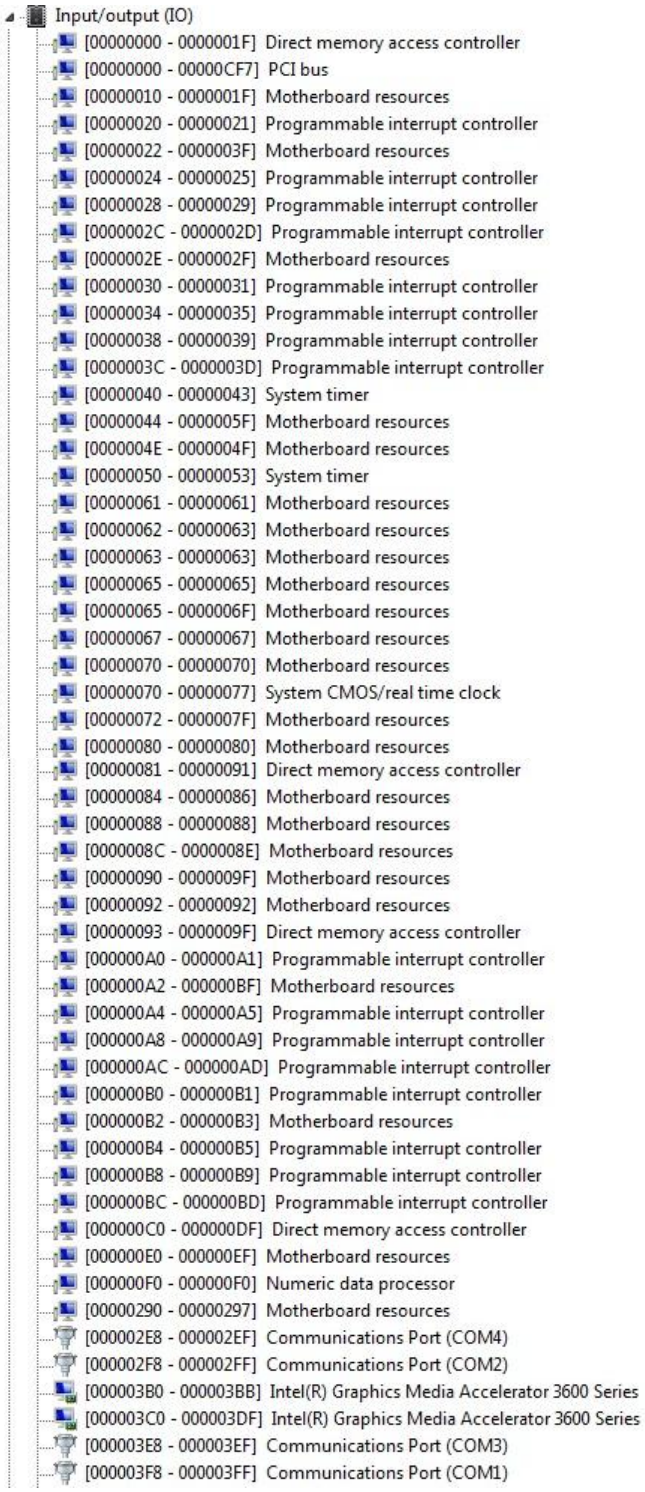
The CAPA831 uses AMI Plug and Play BIOS with a single 16Mbit SPI Flash.

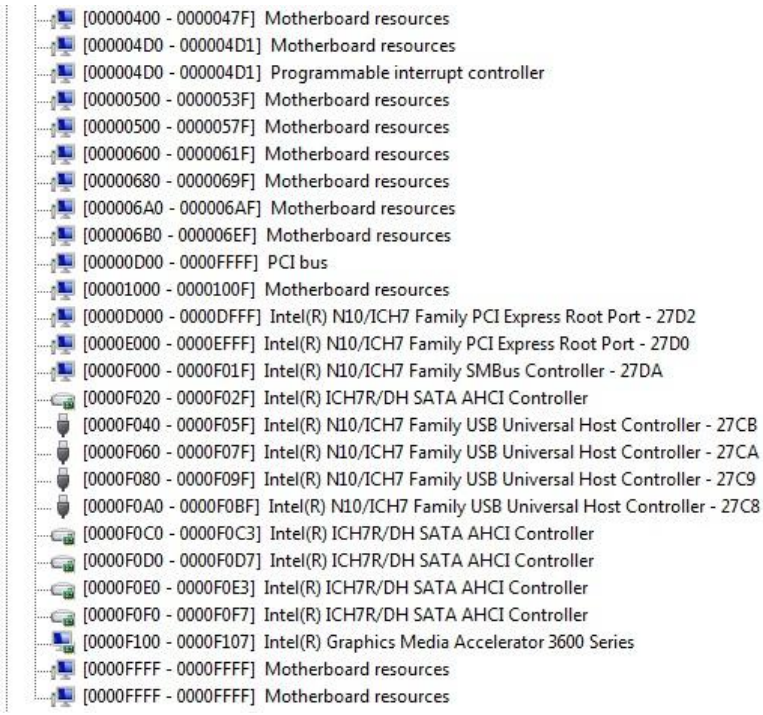
3.3 System Memory

The CAPA831 supports one 204-pin DDR3 SO-DIMM socket for a maximum memory of 4GB DDR3 SDRAMs. The memory module comes in sizes of 1GB, 2GB and 4GB.

3.4 I/O Port Address Map

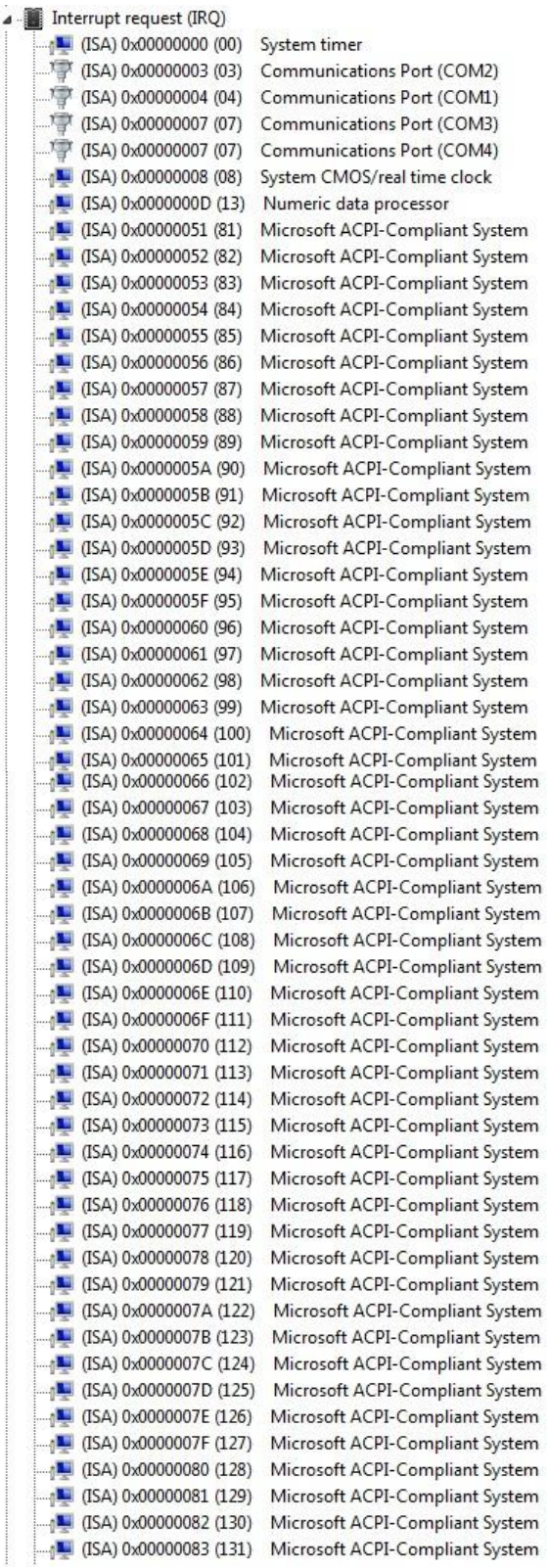
The Intel® Atom™ D2550/N2800/N2600 processors communicate via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.



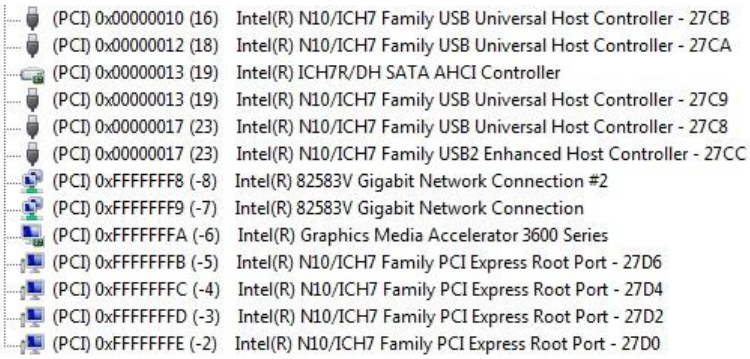

[00000400 - 0000047F] Motherboard resources
[000004D0 - 000004D1] Motherboard resources
[000004D0 - 000004D1] Programmable interrupt controller
[00000500 - 0000053F] Motherboard resources
[00000500 - 0000057F] Motherboard resources
[00000600 - 0000061F] Motherboard resources
[00000680 - 0000069F] Motherboard resources
[000006A0 - 000006AF] Motherboard resources
[000006B0 - 000006EF] Motherboard resources
[00000D00 - 0000FFFF] PCI bus
[00001000 - 0000100F] Motherboard resources
[0000D000 - 0000DFFF] Intel(R) N10/ICH7 Family PCI Express Root Port - 27D2
[0000E000 - 0000EFFF] Intel(R) N10/ICH7 Family PCI Express Root Port - 27D0
[0000F000 - 0000F01F] Intel(R) N10/ICH7 Family SMBus Controller - 27DA
[0000F020 - 0000F02F] Intel(R) ICH7R/DH SATA AHCI Controller
[0000F040 - 0000F05F] Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CB
[0000F060 - 0000F07F] Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CA
[0000F080 - 0000F09F] Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C9
[0000F0A0 - 0000F0BF] Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C8
[0000F0C0 - 0000F0C3] Intel(R) ICH7R/DH SATA AHCI Controller
[0000F0D0 - 0000F0D7] Intel(R) ICH7R/DH SATA AHCI Controller
[0000F0E0 - 0000F0E3] Intel(R) ICH7R/DH SATA AHCI Controller
[0000F0F0 - 0000F0F7] Intel(R) ICH7R/DH SATA AHCI Controller
[0000F100 - 0000F107] Intel(R) Graphics Media Accelerator 3600 Series
[0000FFFF - 0000FFFF] Motherboard resources
[0000FFFF - 0000FFFF] Motherboard resources

3.5 Interrupt Controller (IRQ) Map

The interrupt controller (IRQ) mapping list is shown as follows:

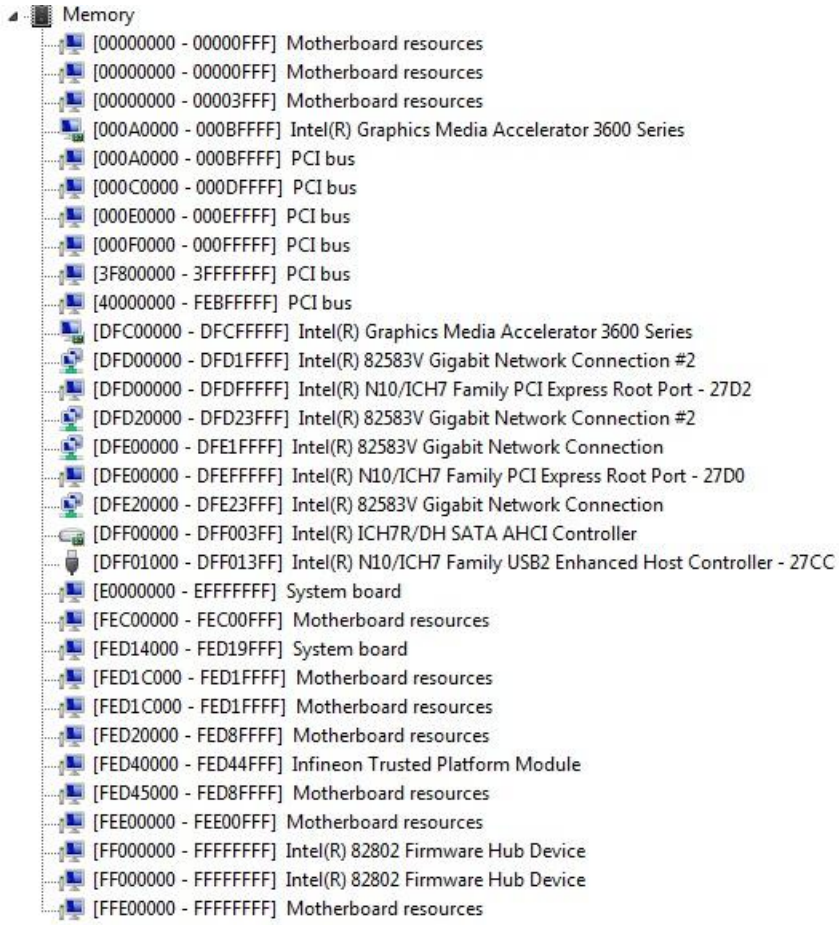


(ISA) 0x00000084 (132) Microsoft ACPI-Compliant System
(ISA) 0x00000085 (133) Microsoft ACPI-Compliant System
(ISA) 0x00000086 (134) Microsoft ACPI-Compliant System
(ISA) 0x00000087 (135) Microsoft ACPI-Compliant System
(ISA) 0x00000088 (136) Microsoft ACPI-Compliant System
(ISA) 0x00000089 (137) Microsoft ACPI-Compliant System
(ISA) 0x0000008A (138) Microsoft ACPI-Compliant System
(ISA) 0x0000008B (139) Microsoft ACPI-Compliant System
(ISA) 0x0000008C (140) Microsoft ACPI-Compliant System
(ISA) 0x0000008D (141) Microsoft ACPI-Compliant System
(ISA) 0x0000008E (142) Microsoft ACPI-Compliant System
(ISA) 0x0000008F (143) Microsoft ACPI-Compliant System
(ISA) 0x00000090 (144) Microsoft ACPI-Compliant System
(ISA) 0x00000091 (145) Microsoft ACPI-Compliant System
(ISA) 0x00000092 (146) Microsoft ACPI-Compliant System
(ISA) 0x00000093 (147) Microsoft ACPI-Compliant System
(ISA) 0x00000094 (148) Microsoft ACPI-Compliant System
(ISA) 0x00000095 (149) Microsoft ACPI-Compliant System
(ISA) 0x00000096 (150) Microsoft ACPI-Compliant System
(ISA) 0x00000097 (151) Microsoft ACPI-Compliant System
(ISA) 0x00000098 (152) Microsoft ACPI-Compliant System
(ISA) 0x00000099 (153) Microsoft ACPI-Compliant System
(ISA) 0x0000009A (154) Microsoft ACPI-Compliant System
(ISA) 0x0000009B (155) Microsoft ACPI-Compliant System
(ISA) 0x0000009C (156) Microsoft ACPI-Compliant System
(ISA) 0x0000009D (157) Microsoft ACPI-Compliant System
(ISA) 0x0000009E (158) Microsoft ACPI-Compliant System
(ISA) 0x0000009F (159) Microsoft ACPI-Compliant System
(ISA) 0x000000A0 (160) Microsoft ACPI-Compliant System
(ISA) 0x000000A1 (161) Microsoft ACPI-Compliant System
(ISA) 0x000000A2 (162) Microsoft ACPI-Compliant System
(ISA) 0x000000A3 (163) Microsoft ACPI-Compliant System
(ISA) 0x000000A4 (164) Microsoft ACPI-Compliant System
(ISA) 0x000000A5 (165) Microsoft ACPI-Compliant System
(ISA) 0x000000A6 (166) Microsoft ACPI-Compliant System
(ISA) 0x000000A7 (167) Microsoft ACPI-Compliant System
(ISA) 0x000000A8 (168) Microsoft ACPI-Compliant System
(ISA) 0x000000A9 (169) Microsoft ACPI-Compliant System
(ISA) 0x000000AA (170) Microsoft ACPI-Compliant System
(ISA) 0x000000AB (171) Microsoft ACPI-Compliant System
(ISA) 0x000000AC (172) Microsoft ACPI-Compliant System
(ISA) 0x000000AD (173) Microsoft ACPI-Compliant System
(ISA) 0x000000AE (174) Microsoft ACPI-Compliant System
(ISA) 0x000000AF (175) Microsoft ACPI-Compliant System
(ISA) 0x000000B0 (176) Microsoft ACPI-Compliant System
(ISA) 0x000000B1 (177) Microsoft ACPI-Compliant System
(ISA) 0x000000B2 (178) Microsoft ACPI-Compliant System
(ISA) 0x000000B3 (179) Microsoft ACPI-Compliant System
(ISA) 0x000000B4 (180) Microsoft ACPI-Compliant System
(ISA) 0x000000B5 (181) Microsoft ACPI-Compliant System
(ISA) 0x000000B6 (182) Microsoft ACPI-Compliant System
(ISA) 0x000000B7 (183) Microsoft ACPI-Compliant System
(ISA) 0x000000B8 (184) Microsoft ACPI-Compliant System
(ISA) 0x000000B9 (185) Microsoft ACPI-Compliant System
(ISA) 0x000000BA (186) Microsoft ACPI-Compliant System
(ISA) 0x000000BB (187) Microsoft ACPI-Compliant System
(ISA) 0x000000BC (188) Microsoft ACPI-Compliant System
(ISA) 0x000000BD (189) Microsoft ACPI-Compliant System
(ISA) 0x000000BE (190) Microsoft ACPI-Compliant System
(PCI) 0x0000000B (11) Intel(R) N10/ICH7 Family SMBus Controller - 27DA


(PCI) 0x00000010 (16) Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CB
(PCI) 0x00000012 (18) Intel(R) N10/ICH7 Family USB Universal Host Controller - 27CA
(PCI) 0x00000013 (19) Intel(R) ICH7R/DH SATA AHCI Controller
(PCI) 0x00000013 (19) Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C9
(PCI) 0x00000017 (23) Intel(R) N10/ICH7 Family USB Universal Host Controller - 27C8
(PCI) 0x00000017 (23) Intel(R) N10/ICH7 Family USB2 Enhanced Host Controller - 27CC
(PCI) 0xFFFFFFF8 (-8) Intel(R) 82583V Gigabit Network Connection #2
(PCI) 0xFFFFFFF9 (-7) Intel(R) 82583V Gigabit Network Connection
(PCI) 0xFFFFFFFA (-6) Intel(R) Graphics Media Accelerator 3600 Series
(PCI) 0xFFFFFFFB (-5) Intel(R) N10/ICH7 Family PCI Express Root Port - 27D6
(PCI) 0xFFFFFFFC (-4) Intel(R) N10/ICH7 Family PCI Express Root Port - 27D4
(PCI) 0xFFFFFFFD (-3) Intel(R) N10/ICH7 Family PCI Express Root Port - 27D2
(PCI) 0xFFFFFFFE (-2) Intel(R) N10/ICH7 Family PCI Express Root Port - 27D0

3.6 Memory Map

The memory mapping list is shown as follows:



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Chapter 4
AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

Note: ***If your computer can not boot after making and saving system changes with Setup, you can restore BIOS optimal defaults by setting JP14 (see section 2.3.9).***

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2 Navigation Keys

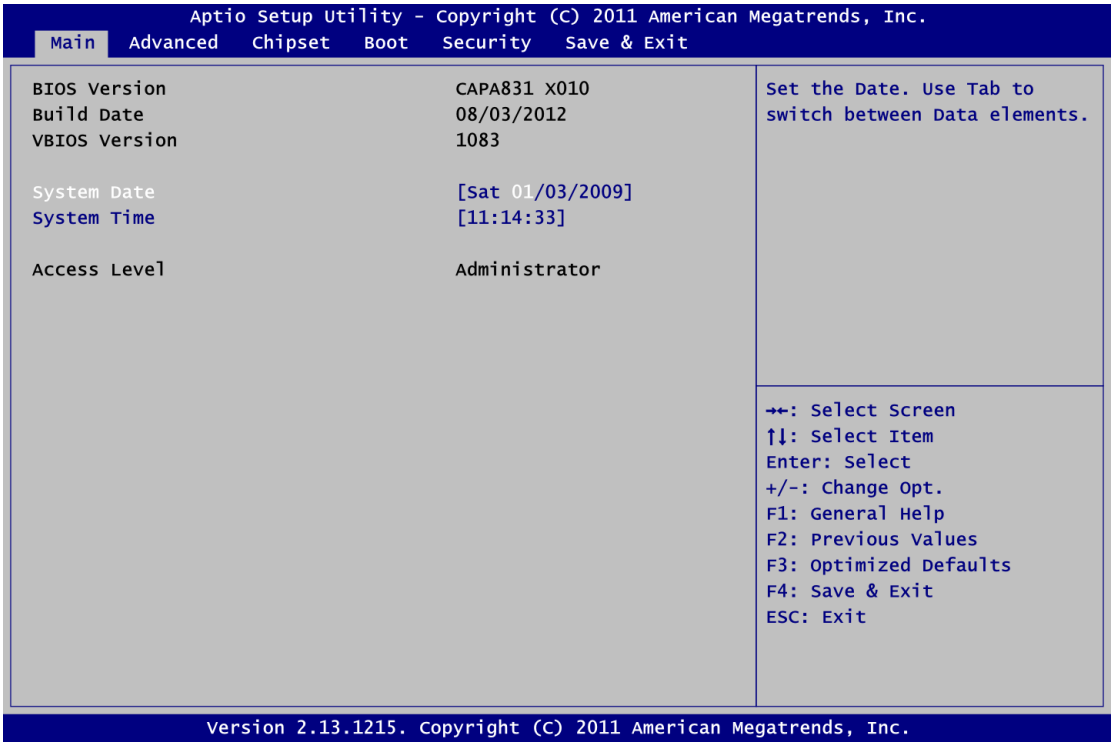
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

Note: ***Some of the navigation keys differ from one screen to another.***

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



- **System Date/Time**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

4.4 Advanced Menu

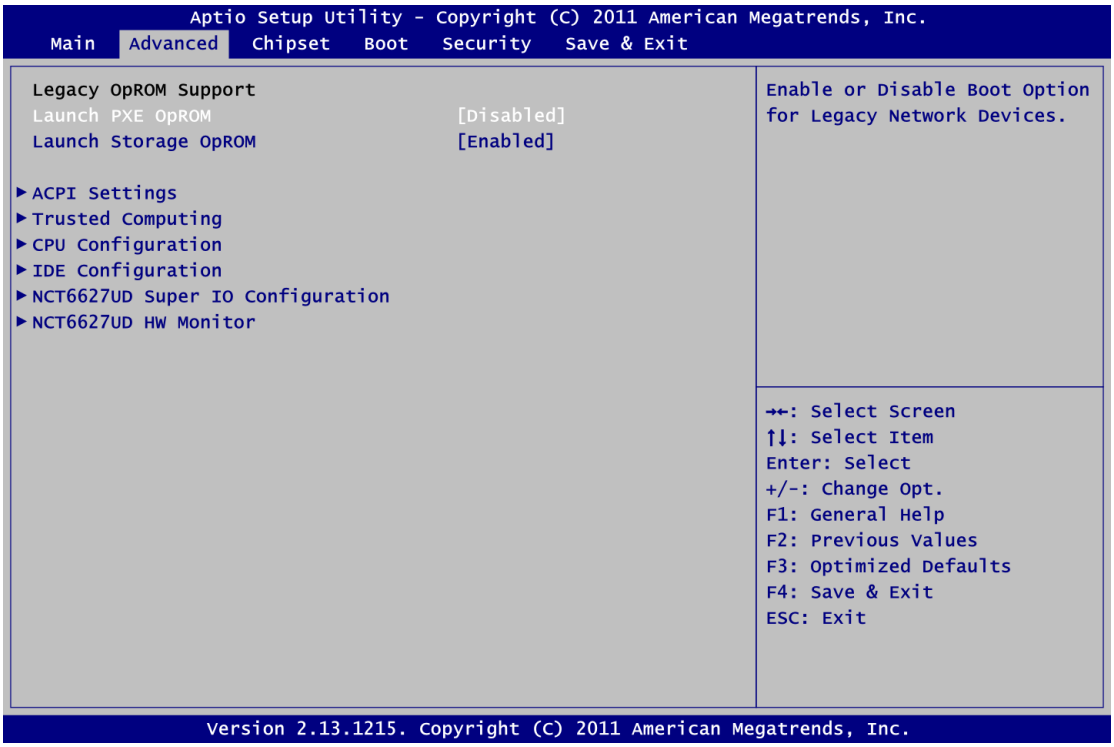
- **Launch PXE OpROM**
  Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.

- **Launch Storage OpROM**
  Enable or disable boot option for legacy mass storage devices with option ROM.

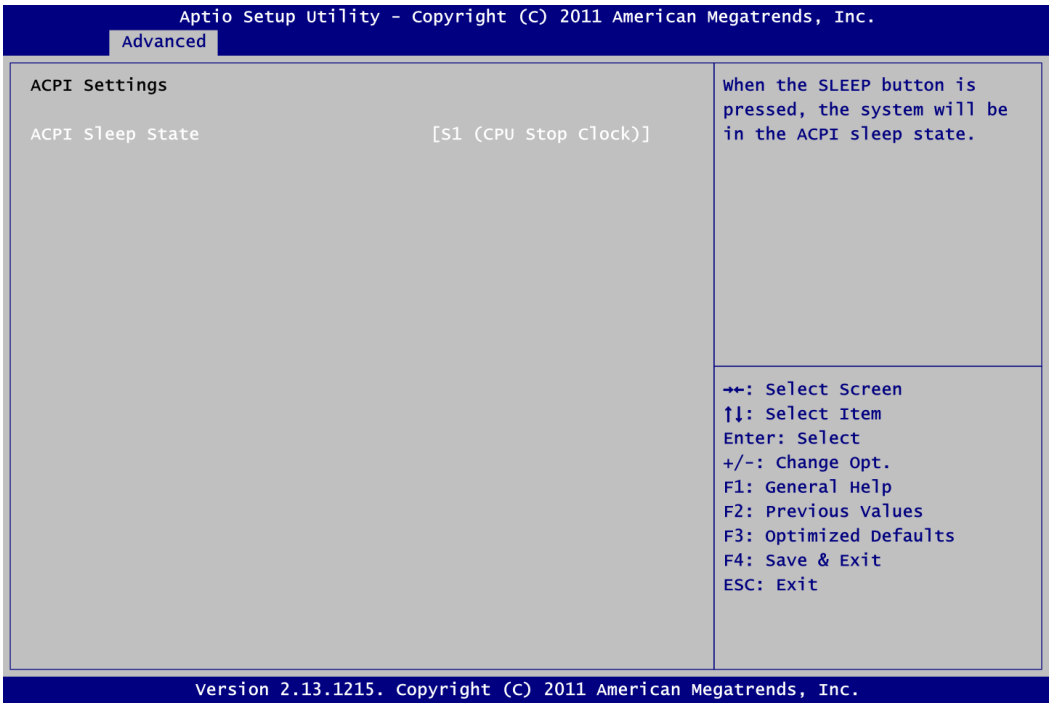
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► ACPI Settings
- ► Trusted Computing
- ► CPU Configuration
- ► IDE Configuration
- ► NCT6627UD Super IO Configuration
- ► NCT6627UD HW Monitor

For items marked with "►", please press <Enter> for more options.

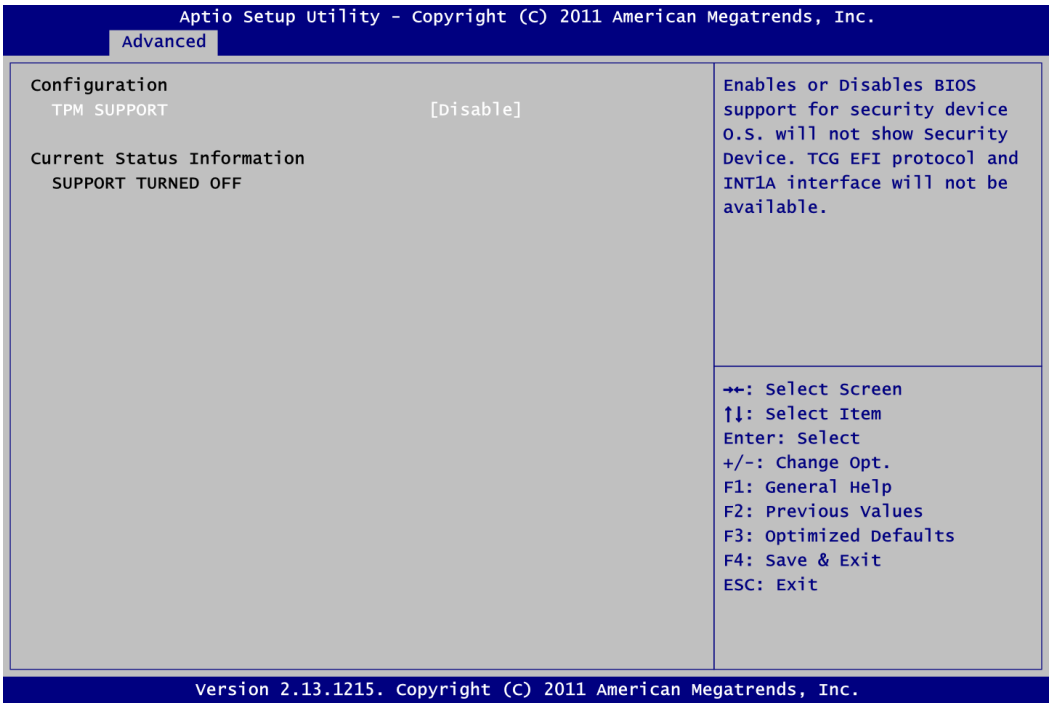


- **ACPI Settings**



ACPI Sleep State
When the sleep button is pressed, the system will be in the ACPI sleep state. The default is S1 (CPU Stop Clock).

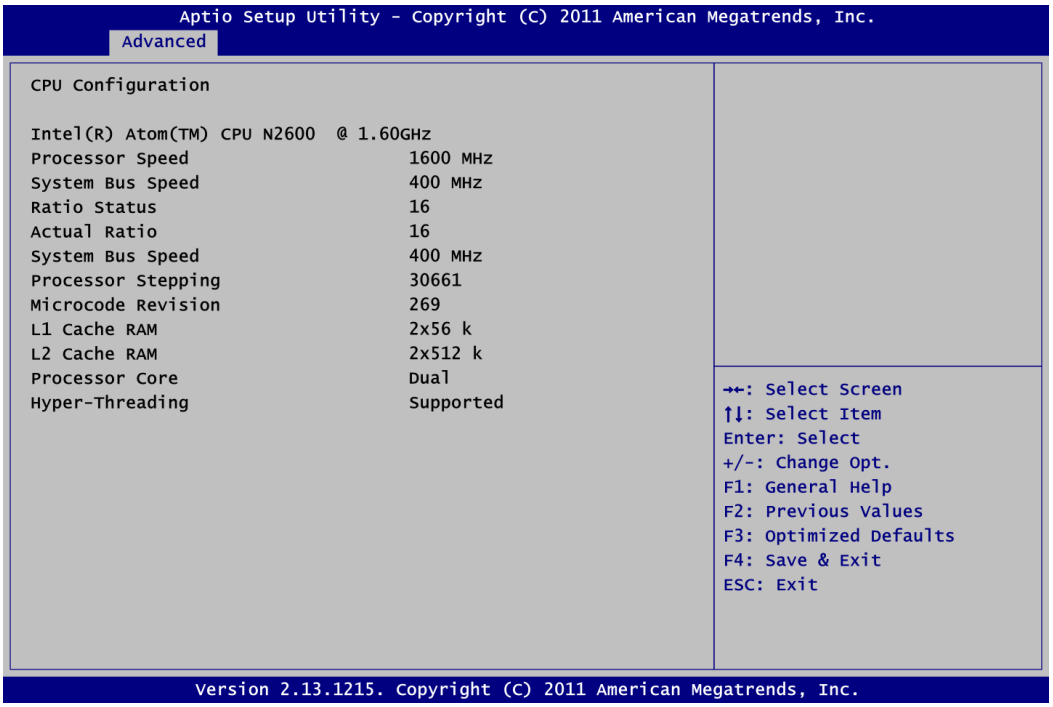
- **Trusted Computing**
  This screen provides function for specifying the TPM settings.



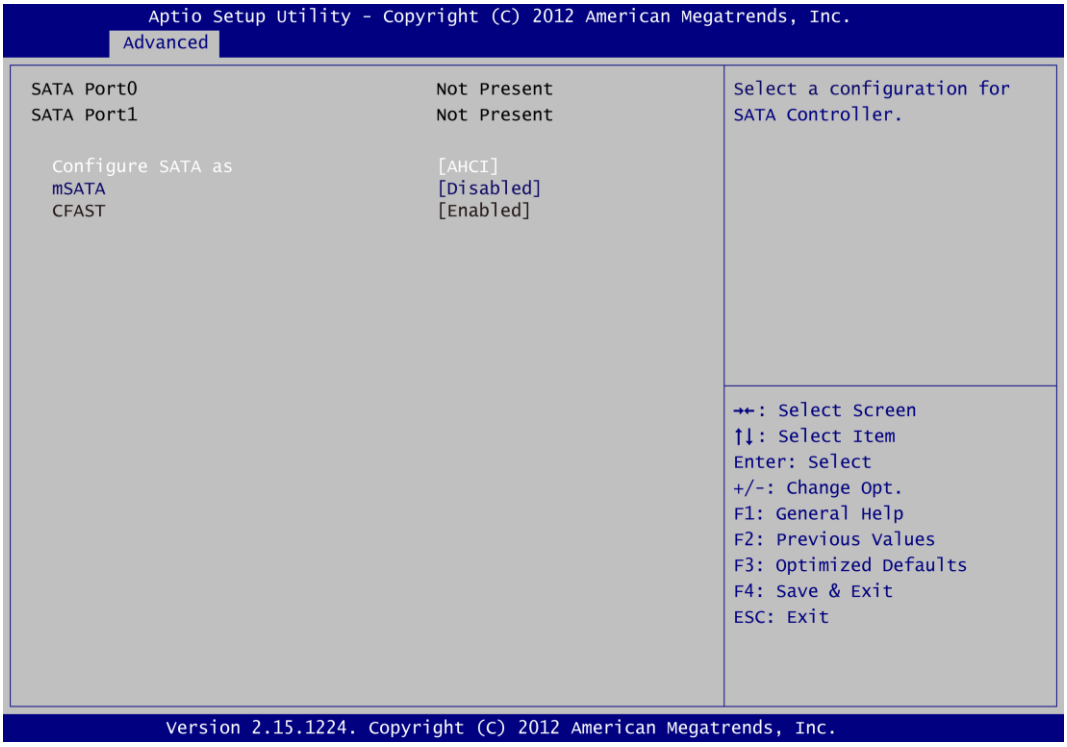
TPM Support
Enable or disable BIOS support for security device. "Disable" is the default.

Current Status Information
Display current TPM status information.

- **CPU Configuration**
  This screen shows the CPU Configuration.



- **IDE Configuration**
  In the IDE Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.

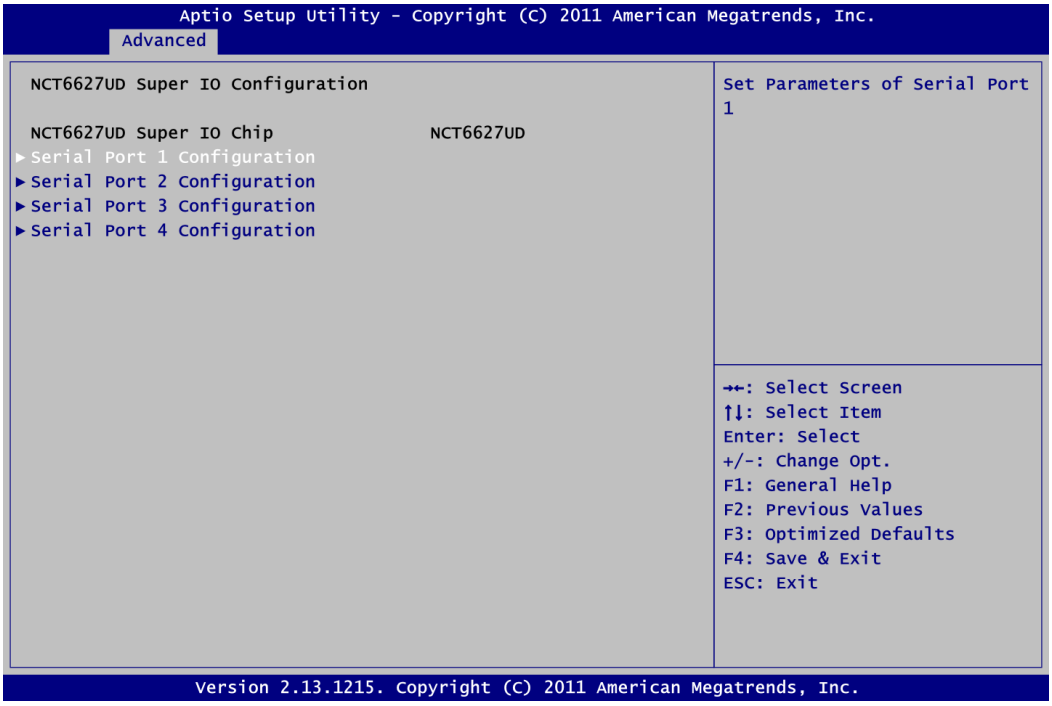


Configure SATA as
Determine how SATA controller(s) operate. Operation mode options are IDE Mode and AHCI (Advanced Host Controller Interface) Mode.

mSATA
It is to enable mSATA when the mSATA cards are installed in CN4 (see section 2.4.4). Default setting is Disabled.

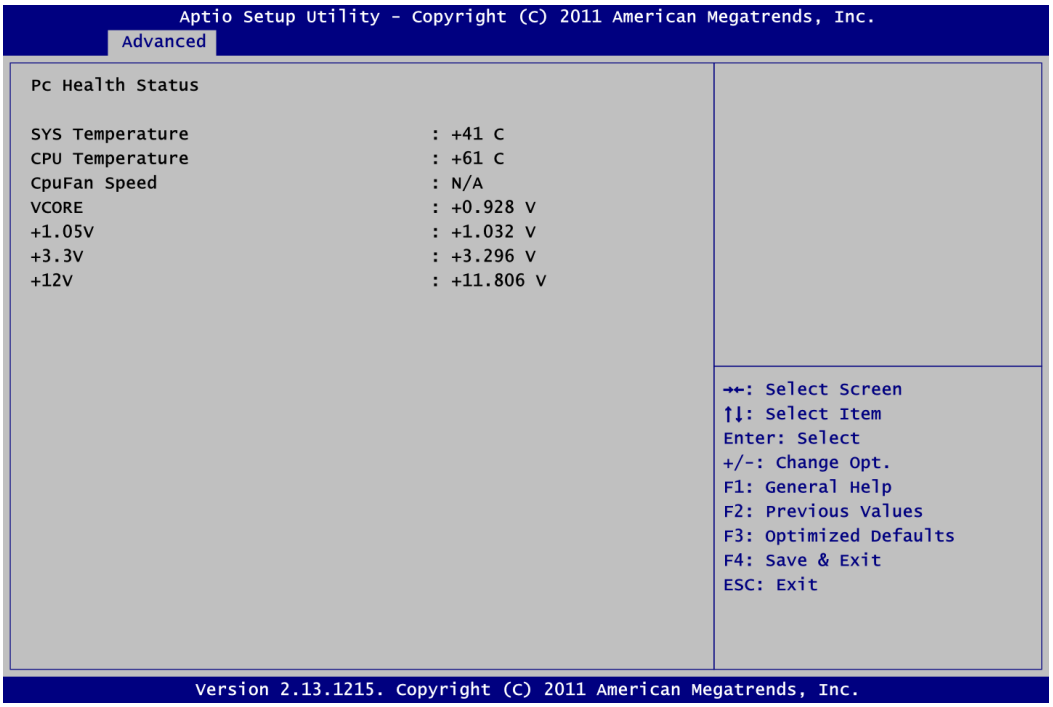
CFAST
Default setting is Enabled. Once mSATA is enabled, it will be set Disabled automatically.

- **NCT6627UD Super IO Configuration**
  You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "▶", please press <Enter> for more options.



Serial Port 1~4 Configuration
Use these items to enable or disable the serial port 1~4.

- **NCT6627UD HW Monitor**
  This screen monitors hardware health status.



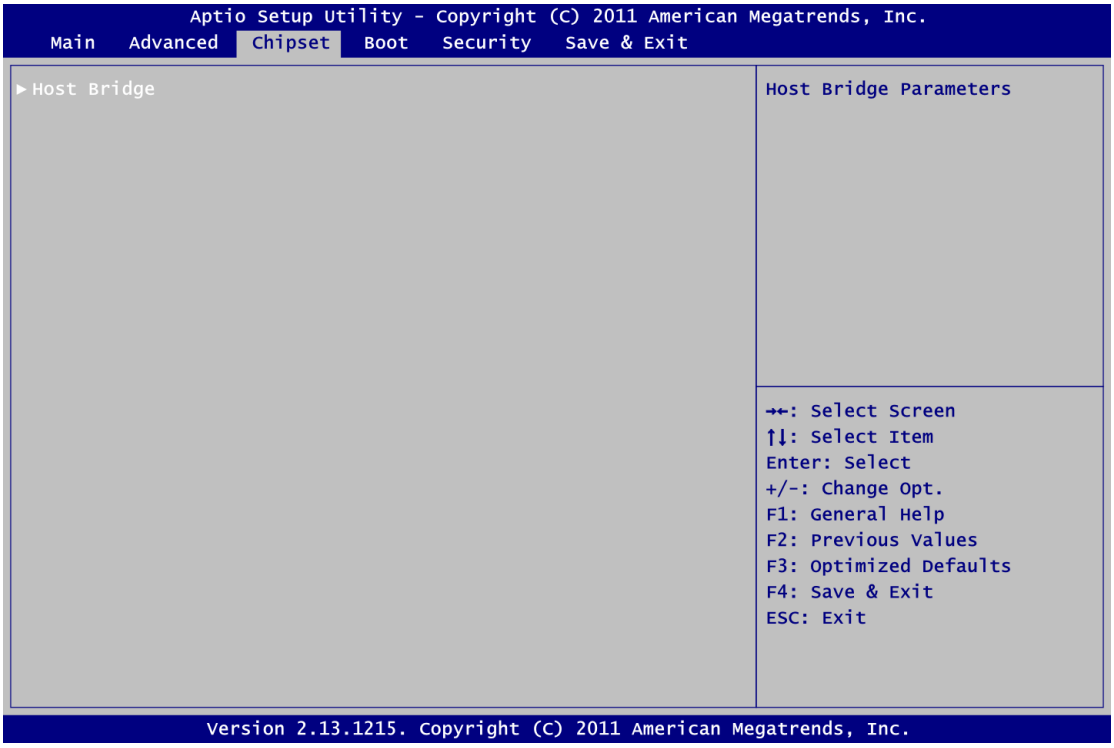
This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (VCORE, +1.05V, +3.3V and +12V).

4.5 Chipset Menu

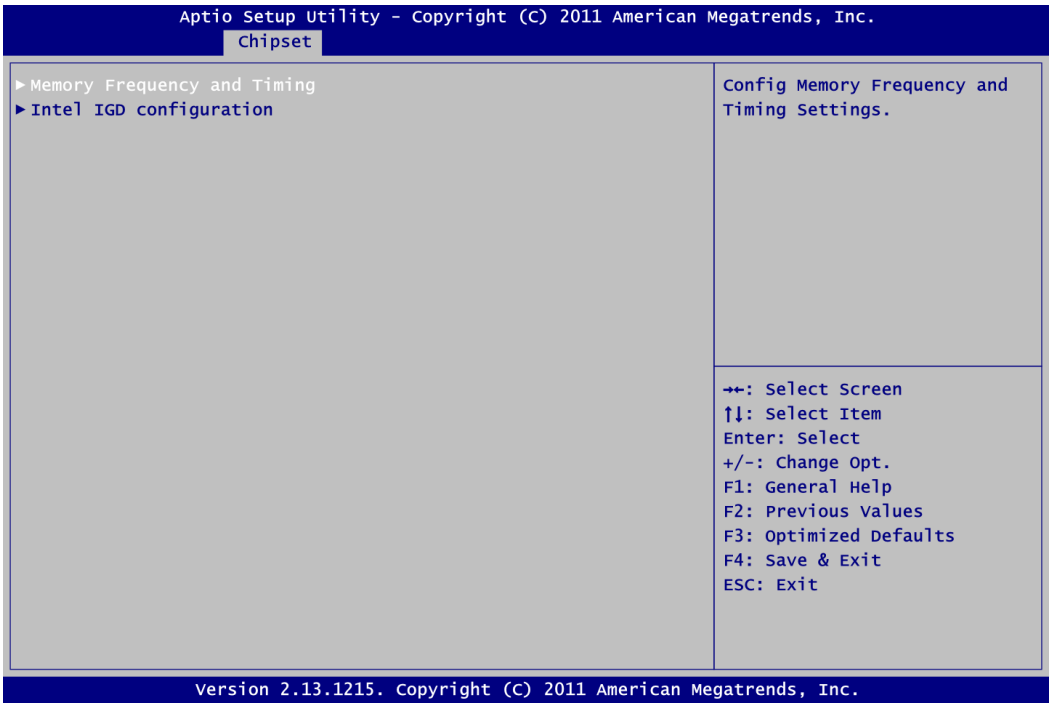
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► Host Bridge

For items marked with "►", please press <Enter> for more options.



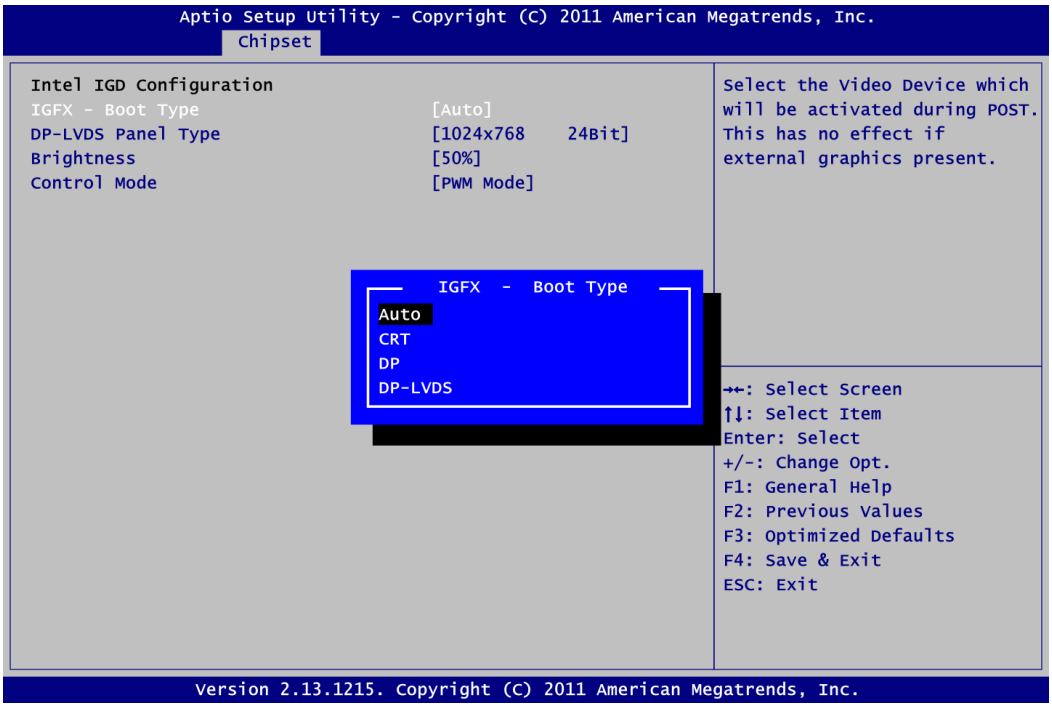
- **Host Bridge**
  This screen allows users to configure parameters of Host Bridge chipset.



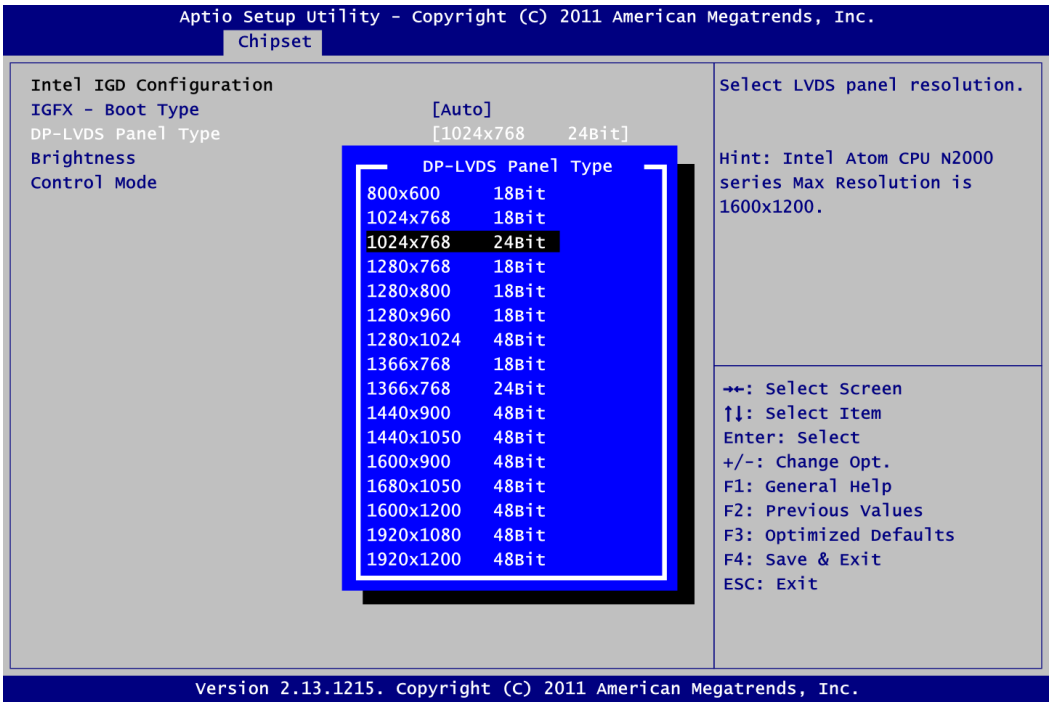
Memory Frequency and Timing
Use this item to refer to the information related to memory frequency.

Intel IGD Configuration
Use this item to configure internal graphics controller.

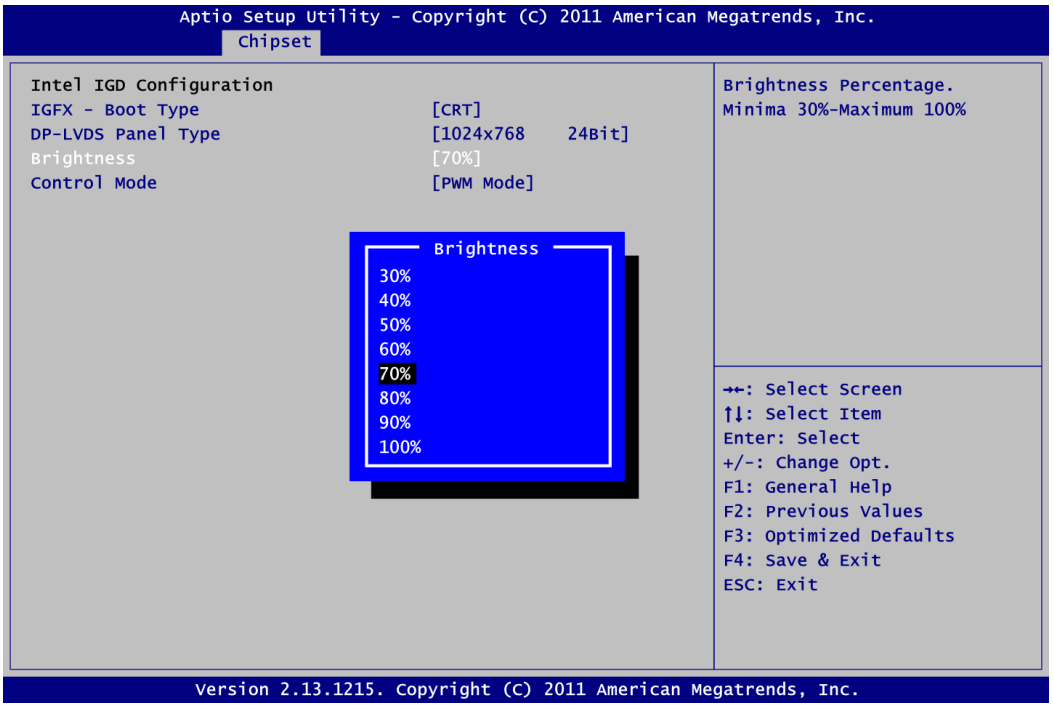
- **Intel IGD Configuration**



IGFX – Boot Type
Select the video device which will be activated during POST (Power-On Self Test). This has no effect if external graphics present.

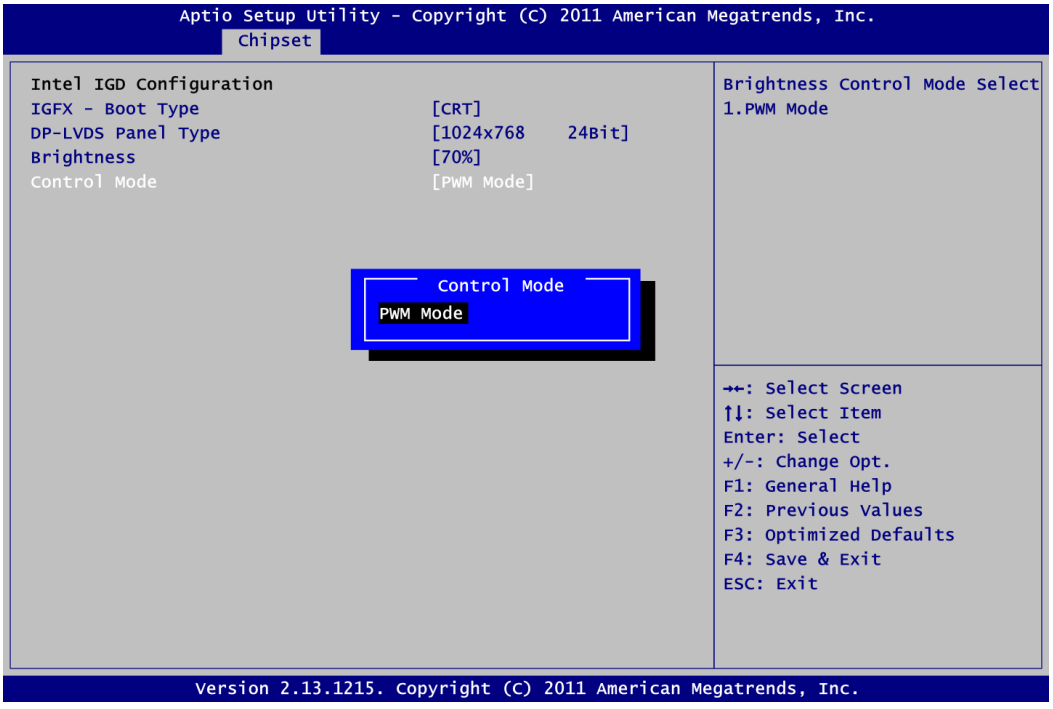


DP-LVDS Panel Type
Select LVDS panel resolution.



Brightness

Use this item to select the brightness percentage of LVDS panel. Its range is from 30% to 100%. The default is 70%.

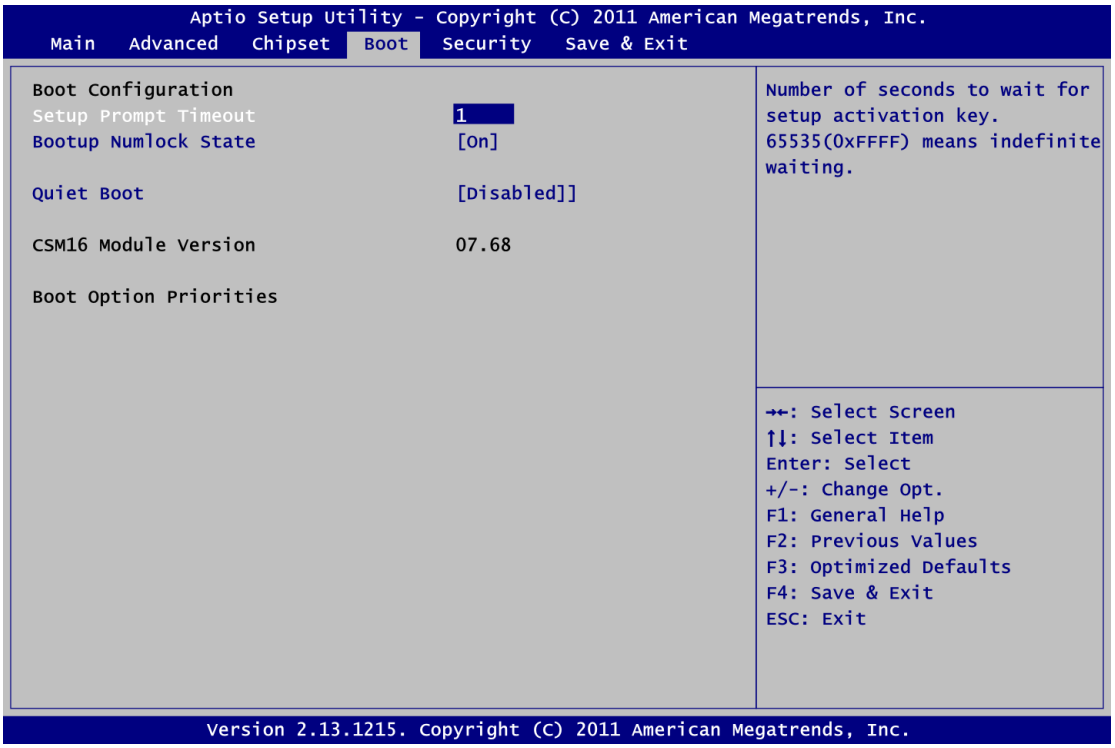


Control Mode

Use this item for brightness control mode. The default is PWM Mode.
Voltage Mode can be used by jumper selection. (see section 2.3.3).

4.6 Boot Menu

The Boot menu allows users to change boot options of the system.



- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

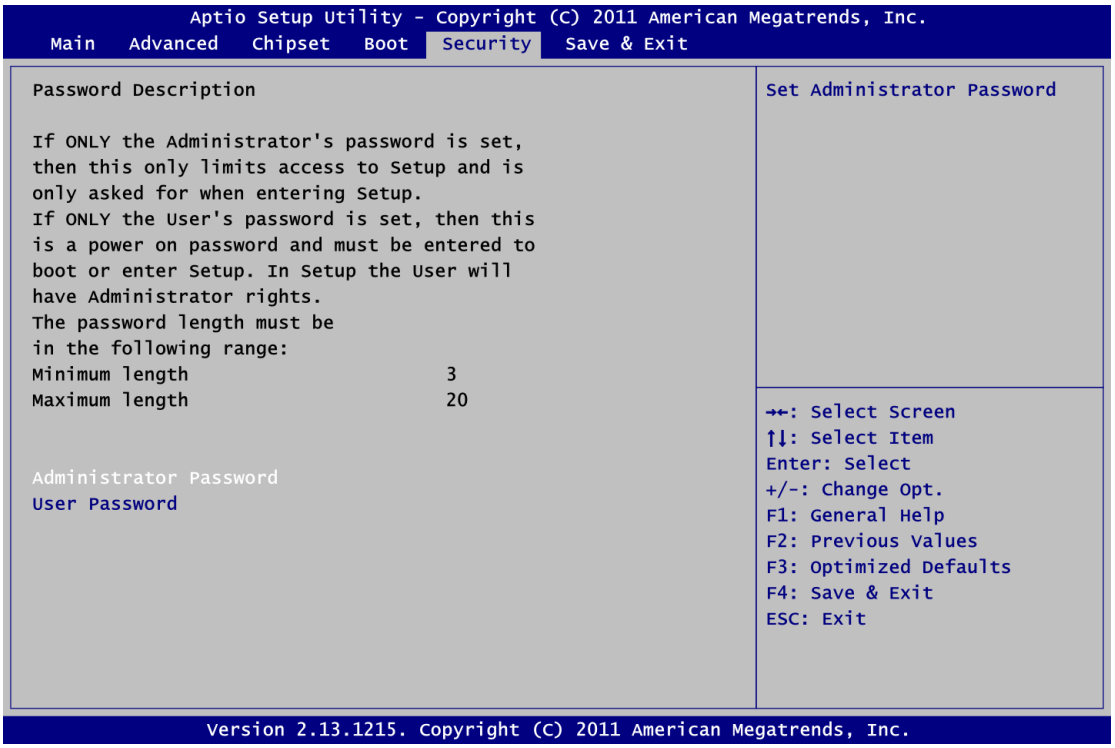
- **Bootup NumLock State**
  Use this item to select the power-on state for the NumLock.

- **Quiet Boot**
  Select to display either POST output messages or a splash screen during boot-up.

- **Boot Option Priorities**
  These are settings for boot priority. Specify the boot device priority sequence from the available devices.

4.7 Security Menu

The Security menu allows users to change the security settings for the system.

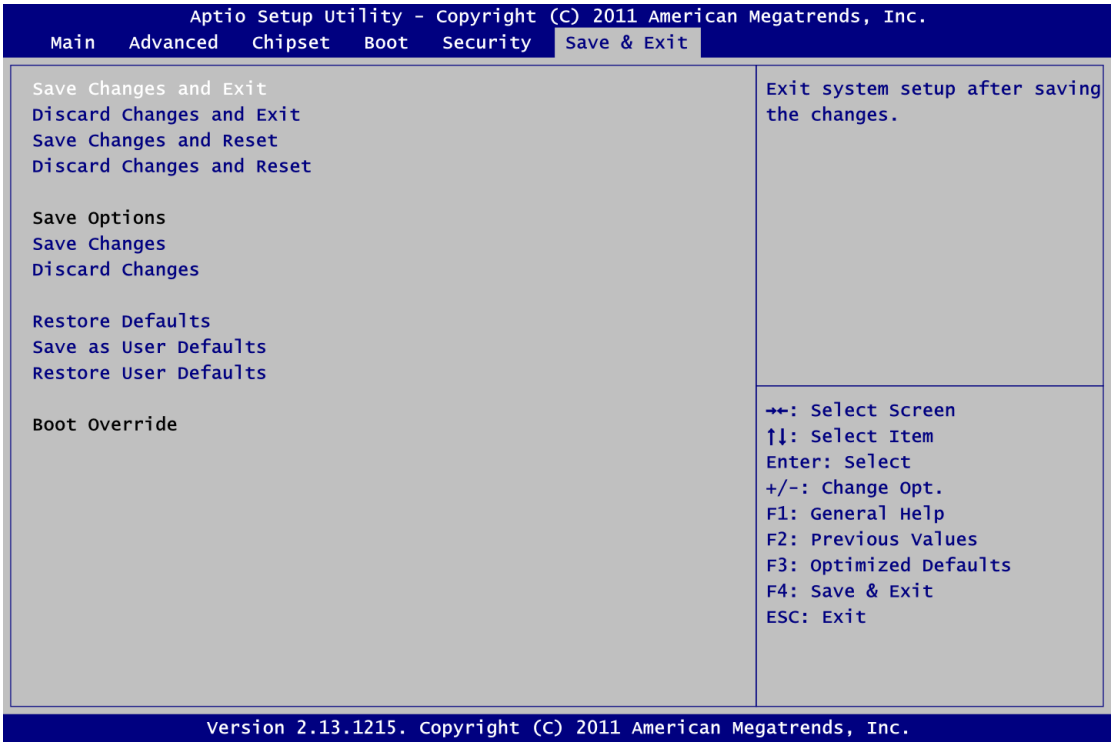


- **Administrator Password**
  This item indicates whether an administrator password has been set (installed or uninstalled).

- **User Password**
  This item indicates whether an user password has been set (installed or uninstalled).

4.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



- **Save Changes and Exit**
  When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

- **Discard Changes and Exit**
  Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

- **Save Changes and Reset**
  When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

- **Discard Changes and Reset**
  Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

- **Save Changes**
  When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

- **Discard Changes**
  Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

- **Restore Defaults**
  It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

- **Save as User Defaults**
  Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

- **Restore User Defaults**
  It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

- **Boot Override**
  Select a drive to immediately boot that device regardless of the current boot order.

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Chapter 5
Drivers Installation

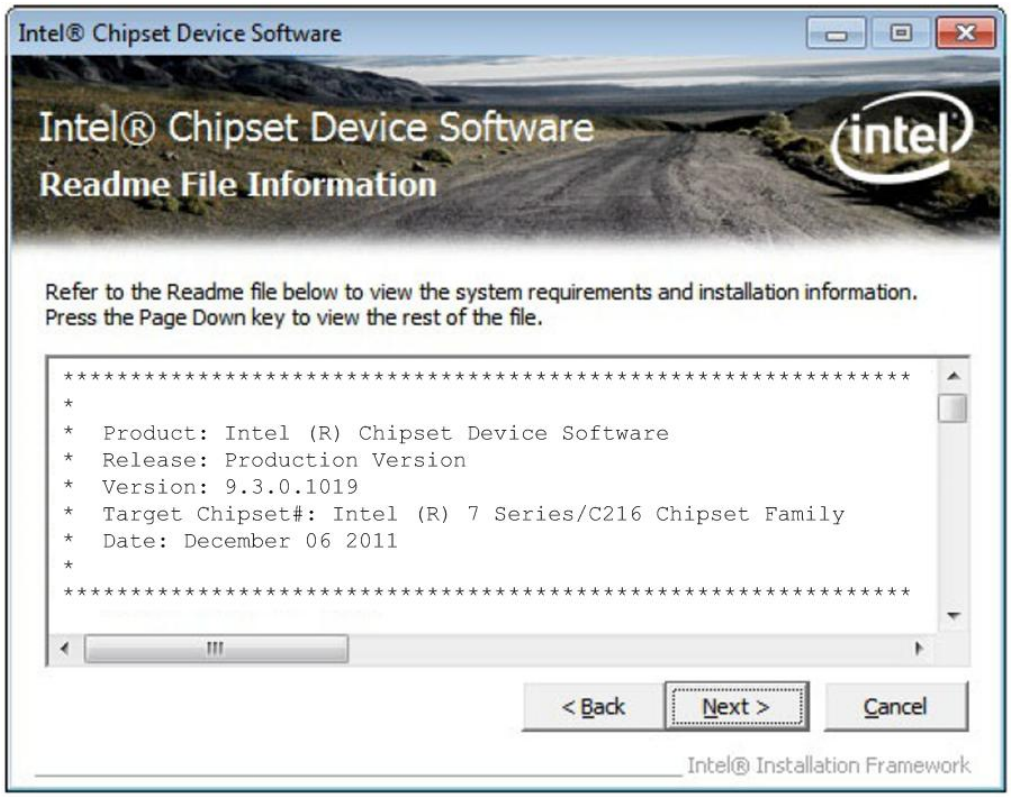
The device drivers are located on the product information CD that comes with the CAPA831 Series package. The auto-run function of drivers will guide you to install the utilities and device drivers under Windows system. You can follow the onscreen instructions to install these devices:

- Chipset
- Graphics
- Ethernet
- Audio

5.1 Installing Chipset Driver

1. Run the infinst_auto1.exe program from the driver directory in product information CD. Click "Next" to next step.

2. A Readme File Information screen appears to show you the system requirements and installation information. Click "Next" to next step.



3. Please wait while setup processes the following operations.

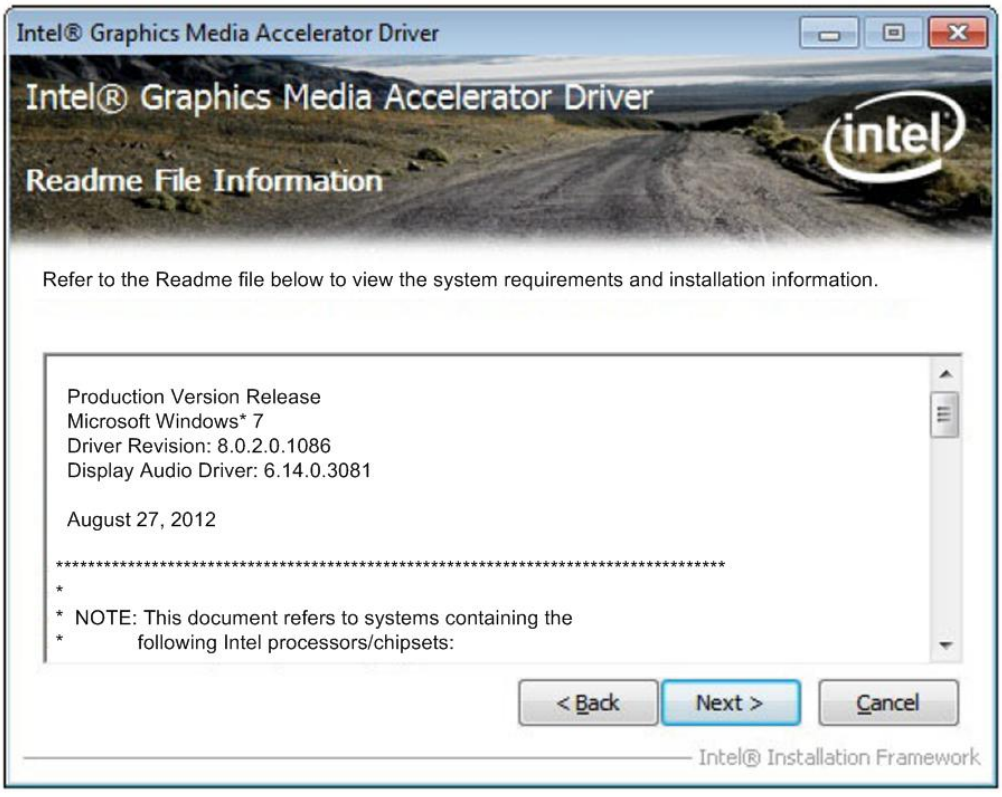
4. You are suggested to select "Yes, I want to restart this computer now". Click "Finish" to complete the setup process and reboot.

5.2 Installing Graphics Media Accelerator Driver

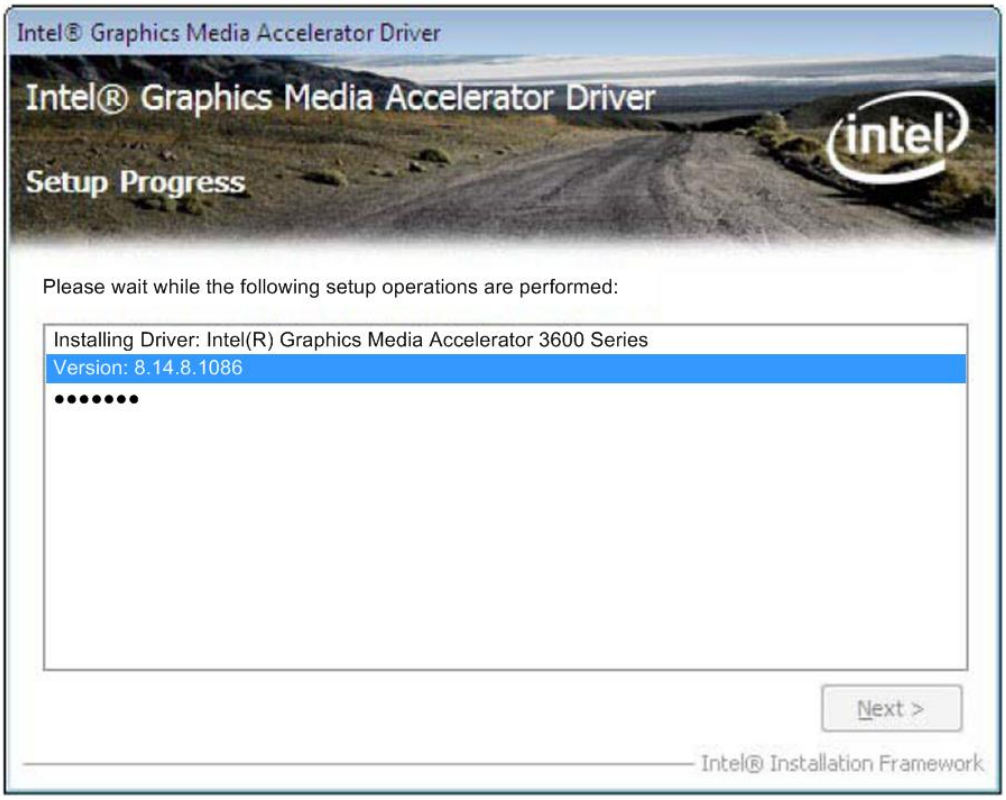
1. Run the setup.exe program from the driver directory in product information CD. Click "Next" to next step.

2. When Intel® License Agreement screen appears, please click "Yes" to next step.

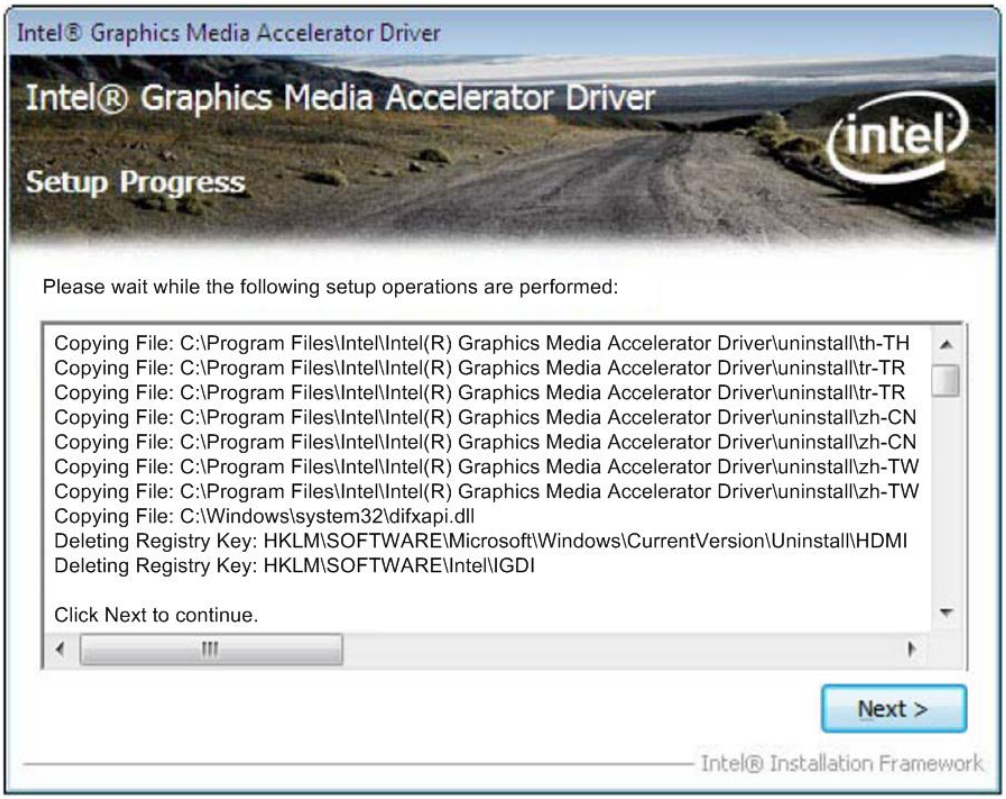
3. A Readme File Information screen appears to show you the system requirements and installation information. Click "Next" to next step.



4. Please wait while setup processes the following operations.



5. When the following screen appears, please click "Next".



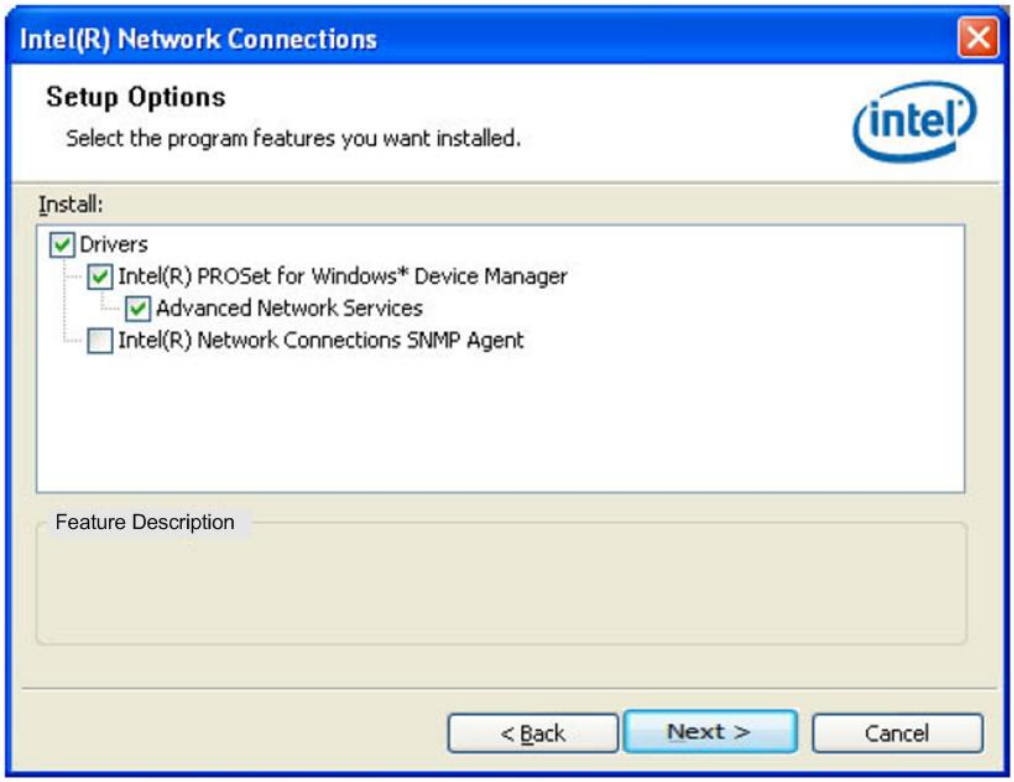
6. You are suggested to select "Yes, I want to restart this computer now". Click "Finish" to complete the setup process and reboot.

Note: After the computer reboots, the display is in extended mode. Please click hot key <Ctrl+Alt+F1> to switch display back to single mode.

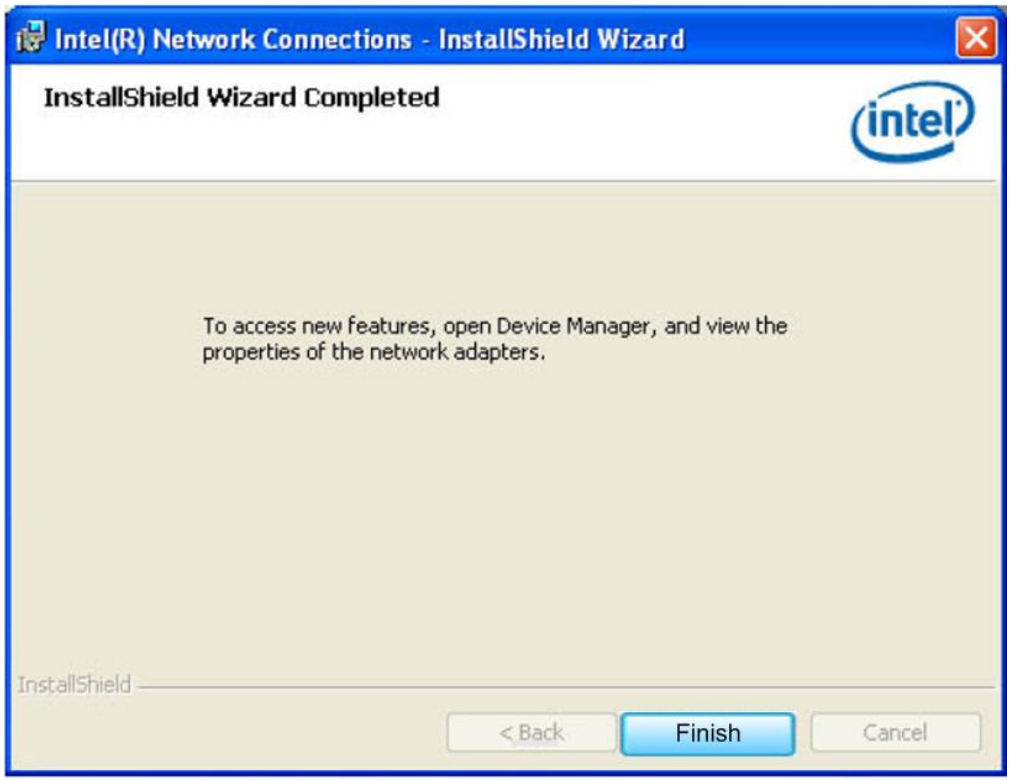
5.3 Installing Ethernet Driver

1. Unzip PROWin32 for ethernet driver from the driver directory in product information CD. Click "Next" to start the installation.

2. When the following screen appears, please select the program features you want to install. Click "Next" to continue.

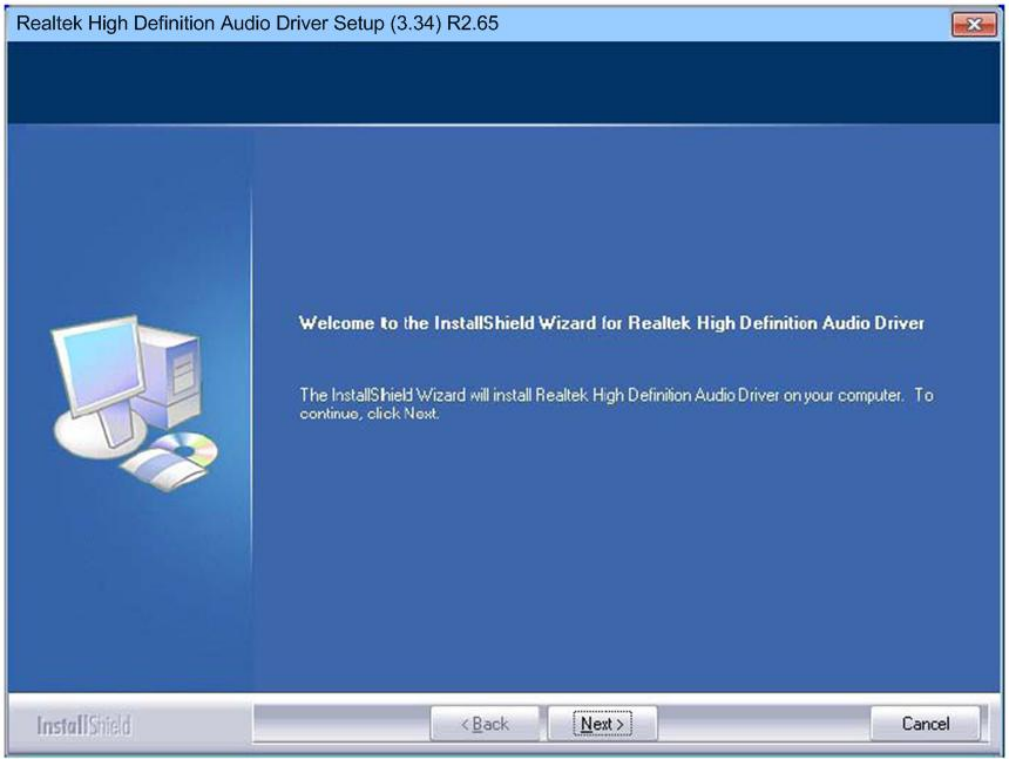


3. Click "Finish" to complete the installation.

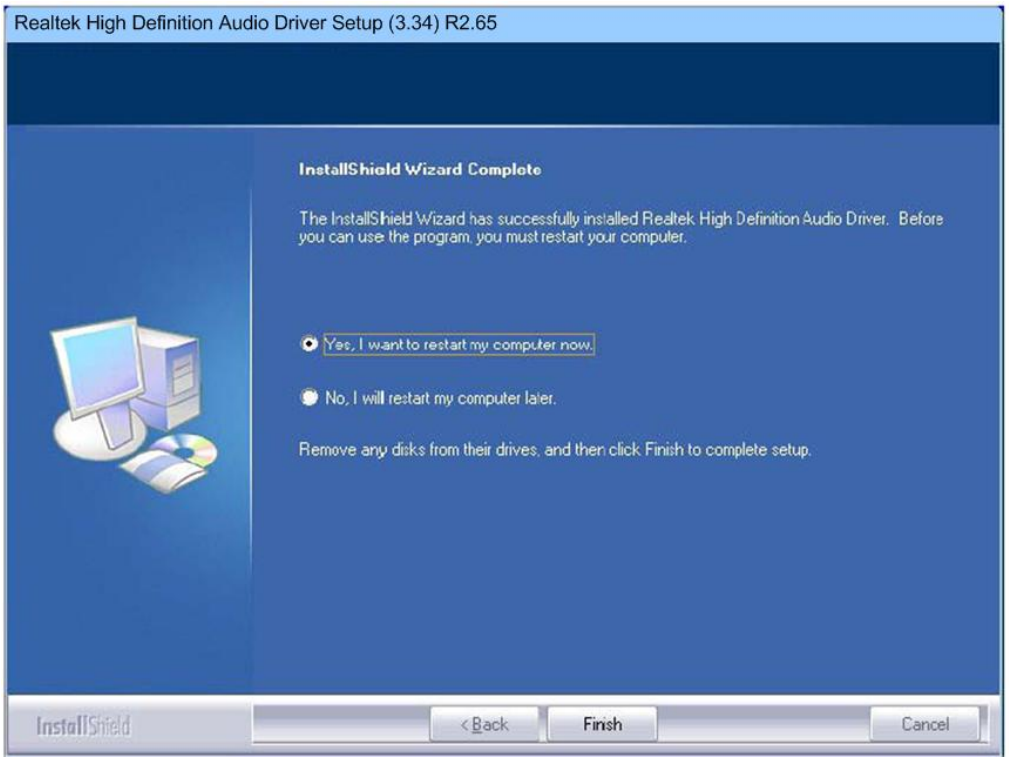


5.4 Installing Audio Driver

1. Run the setup.exe for audio from the driver directory in product information CD. Click "Next" to continue.



2. You are suggested to select "Yes, I want to restart my computer now". Click "Finish" to complete the setup process and reboot.



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Appendix A
Watchdog Timer

About Watchdog Timer

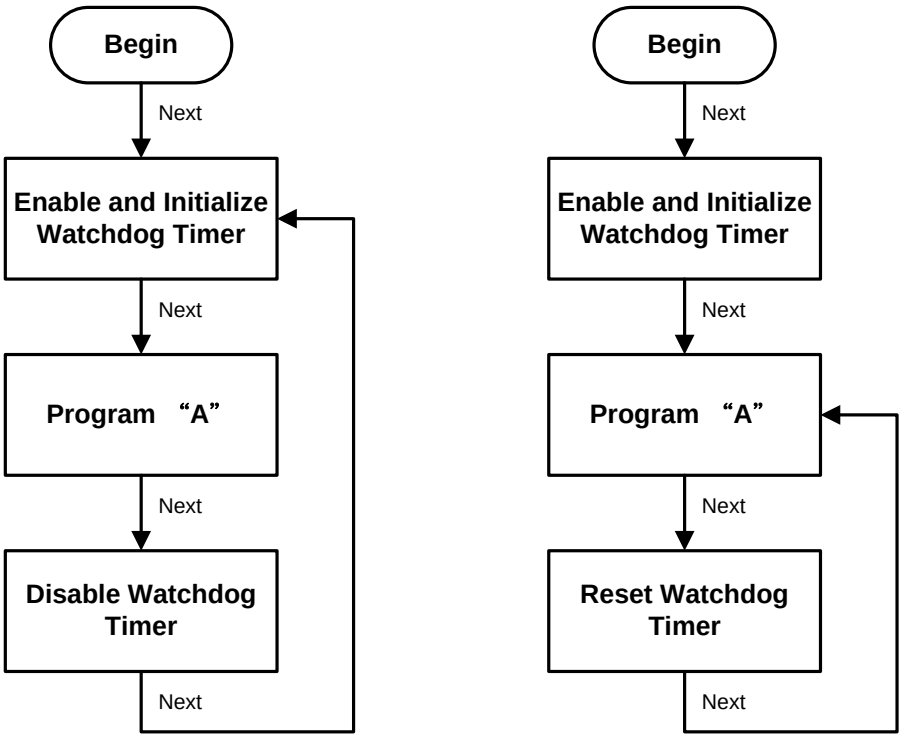
Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

How to Use Watchdog Timer

The I/O port base addresses of watchdog timer are 2E (hex) and 2F (hex). The 2E (hex) and 2F (hex) are address and data port respectively.

Assume that program A is put in a loop that must execute at least once every 10ms. Initialize watchdog timer with a value bigger than 10ms. If the software has no problems; watchdog timer will never expire because software will always restart the counter before it reaches zero.



Sample Program

Assembly sample code :

```
;Enable WDT:
mov     dx,2Eh
mov     al,87            ;Un-lock super I/O
out     dx,al
out     dx,al

;Select Logic device:
mov     dx,2Eh
mov     al,07h
out     dx,al
mov     dx,2Fh
mov     al,08h
out     dx,al

;Activate WDT:
mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,01h
out     dx,al

;Set Second or Minute :
mov     dx,2Eh
mov     al,0F5h
out     dx,al
mov     dx,2Fh
mov     al,Nh            ;N=00h or 08h(see below Note)
out     dx,al

;Set base timer :
mov     dx,2Eh
mov     al,0F6h
out     dx,al
mov     dx,2Fh
mov     al,Mh            ;M=00h,01h,...FFh (hex),Value=0 to 255
out     dx,al            ;(see below Note)

;Disable WDT:
mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,00h           ;Can be disabled at any time
out     dx,al
```

***Note**:*
*If **N**=00h, the time base is set to second.*
***M** = time value*
00: Time-out Disable
01: Time-out occurs after 1 second
02: Time-out occurs after 2 seconds
03: Time-out occurs after 3 seconds
.
.
FFh: Time-out occurs after 255 seconds

*If **N**=08h, the time base is set to minute.*
***M** = time value*
00: Time-out Disable
01: Time-out occurs after 1 minute
02: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

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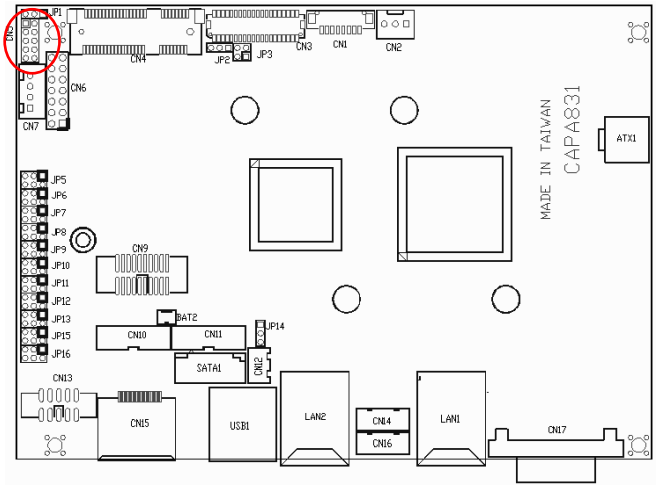
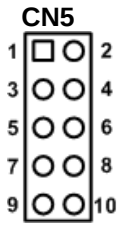
Appendix B
Digital I/O

About Digital I/O

The onboard digital I/O has 8 bits (DIO0~7). Each bit can be set to function as input or output by software programming. In default, all pins are pulled high with +5V level (according to main power). The BIOS default settings are 3 inputs and 5 outputs where all of these pins are set to 1.





Pin	Signal	Pin	Signal
1	DI0 (Bit0)	2	DO0 (Bit 3)
3	DI1 (Bit1)	4	DO1 (Bit 4)
5	DI2 (Bit2)	6	DO2 (Bit 5)
7	GND	8	DO3 (Bit 6)
9	GND	10	DO4 (Bit 7)

Digital I/O Programming

Assembly sample code :

Set functionality:

```
;Start set DIO program:
mov     dx,2Eh
mov     al,87h          ;Un-lock super I/O
out     dx,al
out     dx,al

mov     dx,2Eh
mov     al,07h
out     dx,al
mov     dx,2Fh
mov     al,08h
out     dx,al

mov     dx,2Eh
mov     al,30h
out     dx,al
mov     dx,2Fh
mov     al,02h
out     dx,al
```

```
;Programming DIO as in/out.
mov     dx,2Eh
mov     al,0E0h
out     dx,al
mov     dx,2Fh
mov     al,Nh           ;If N=07h, DIO is programmed as 3 inputs
out     dx,al           ;and 5 outputs (see below Note1)
```

Digital Input:

```
;Read digital input data.
mov     dx,2Eh
mov     al,0E1h
out     dx,al
mov     dx,2Fh          ;If N=07h, bit0~2 represent DIO0~2,
in      dx, al          ;bit0~2 are DIO pin 0~2 state (1 High, 0 Low)
                        ;(see below Note2)
```

Digital Output:

```
; Set DIO digital output pins value.
mov     dx,2Eh
mov     al,0E1h
out     dx,al
mov     dx,2Fh
mov     al,M            ;If N=07h, bit3~7 represent DIO3~7,
out     dx,al           ;set output value M
                        ;bit3~7 are DIO pin 3~7 state (1 High, 0 Low)
                        ;if M=FFh, all DIO pins are high
                        ;(see below Note3)
```

Note1:

*The **N** has 8 bits. Every bit's value is either 1 or 0.*
" 1" means that the bit is programmed to input.
" 0" means that the bit is programmed to output.

Ex:

*1. **N**=00h=00000000b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	Output	Output

*2. **N**=02h=0000000**1**0b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	Output	**Input**	Output

*3. **N**=07h=00000**111**b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**Input**	**Input**	**Input**

*4. **N**=F2h=**1111**00**1**0b*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Input	**Input**	**Input**	**Input**	Output	Output	**Input**	Output

Note2:

*If **N**=07h*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**Input**	**Input**	**Input**

1. When DIO0~2 are connected to external device, the device sets DIO0~2 to high

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**1**	**1**	**1**

2. When DIO0~2 are connected to external device, the device sets DIO0 to low and DIO1~2 to high

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**1**	**1**	0

Note3:

*If **N**=07h*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
Output	Output	Output	Output	Output	**Input**	**Input**	**Input**

*1. When **M**=FFh*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	1	1	1	1	1	1

*2. When **M**=D7h*

DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
1	1	0	1	0	1	1	1