AXIOMTEK

CAPA110/111

AMD Embedded G-Series Processor Capa Board with LVDS

User's Manual

RoHS

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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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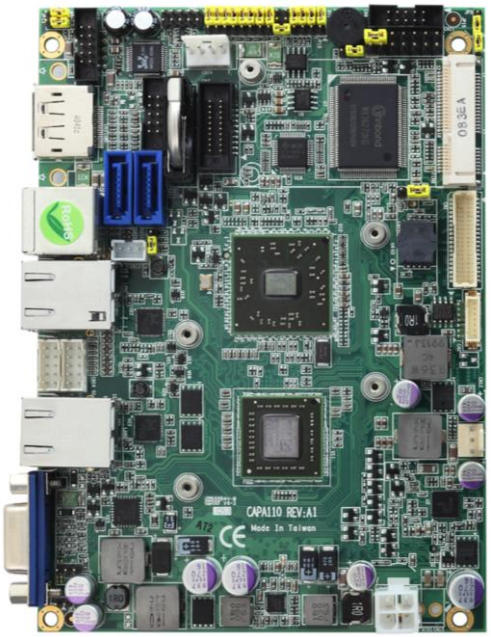
Chapter 1
Introduction



CAPA11

CAPA111

The CAPA110/111, a Capa board, supports AMD G-Series APU T56N/T40E/T40R. The board integrates the Fusion Controller Hub A50M 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 DDR3-1066/1333 MHz memory (only T56N can be up to DDR3-1333), maximum memory capacity up to 4GB. It also features two Gigabit/Fast Ethernet ports, two serial ATA channels for total two Serial ATA hard drives at maximum transfer rate up to 600MB/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 4 serial ports and 3.5” form factor that applies an extensive array of PC peripherals.

1.1 Features

- AMD G-Series APU dual core T56N (1.65 GHz)/T40E (1.0GHz) and single core T40R (1.0GHz)
- AMD Fusion Controller Hub A50M chipset
- 1 DDR3 SO-DIMM supports up to 4 GB memory capacity
- 6 USB 2.0 ports
- 4 COM ports
- +12V only DC-in supported
- DirectX®11 support

1.2 Specifications

- **CPU**
  - AMD G-Series APU dual core T56N 1.65 GHz
  - AMD G-Series APU dual core T40E 1.0 GHz
  - AMD G-Series APU single core T40R 1.0GHz

- **Thermal Solution**
  - With AMD G-Series APU dual core T56N 1.65GHz is with fan
  - With AMD G-Series APU dual core T40E 1.0GHz and single core T40R 1.0GHz is fanless.

- **System Chipset**
  - AMD FCH A50M

- **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 1066 MHz memory for T40E/T40R
  - Maximum to 4GB DDR3 1333 MHz memory for T56N

- **Onboard Multi I/O**
  - Controller: Nuvoton W83627UHG
  - Serial Ports: One port for RS-232/422/485 and three ports for RS-232

- **SATA**
  - Two SATA-600 connectors

- **CompactFlash™ Socket**
  - One CompactFlash™ Type II Socket

- **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 7-pin inverter connector. LVDS resolution is up to 1920x1080 in 24-bit dual channel.
  - One Display Port (CAPA110 only)

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

- **Ethernet**
  - Two ports with Realtek RTL8111E for Gigabit/Fast Ethernet

- **Audio**
  - HD audio compliant (with speaker/line-out & line/MIC-in) with Realtek ALC662
  - Speaker/line-out & MIC-in & Line-in via Box Header connector\

- **Expansion Interface**
  - One PCI-Express Mini Card socket which complies with PCI-Express Mini Card spec v1.2

- **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 Graphic Driver
- Ethernet Driver (RTL8111E)
- Audio Driver
- AHCI Driver

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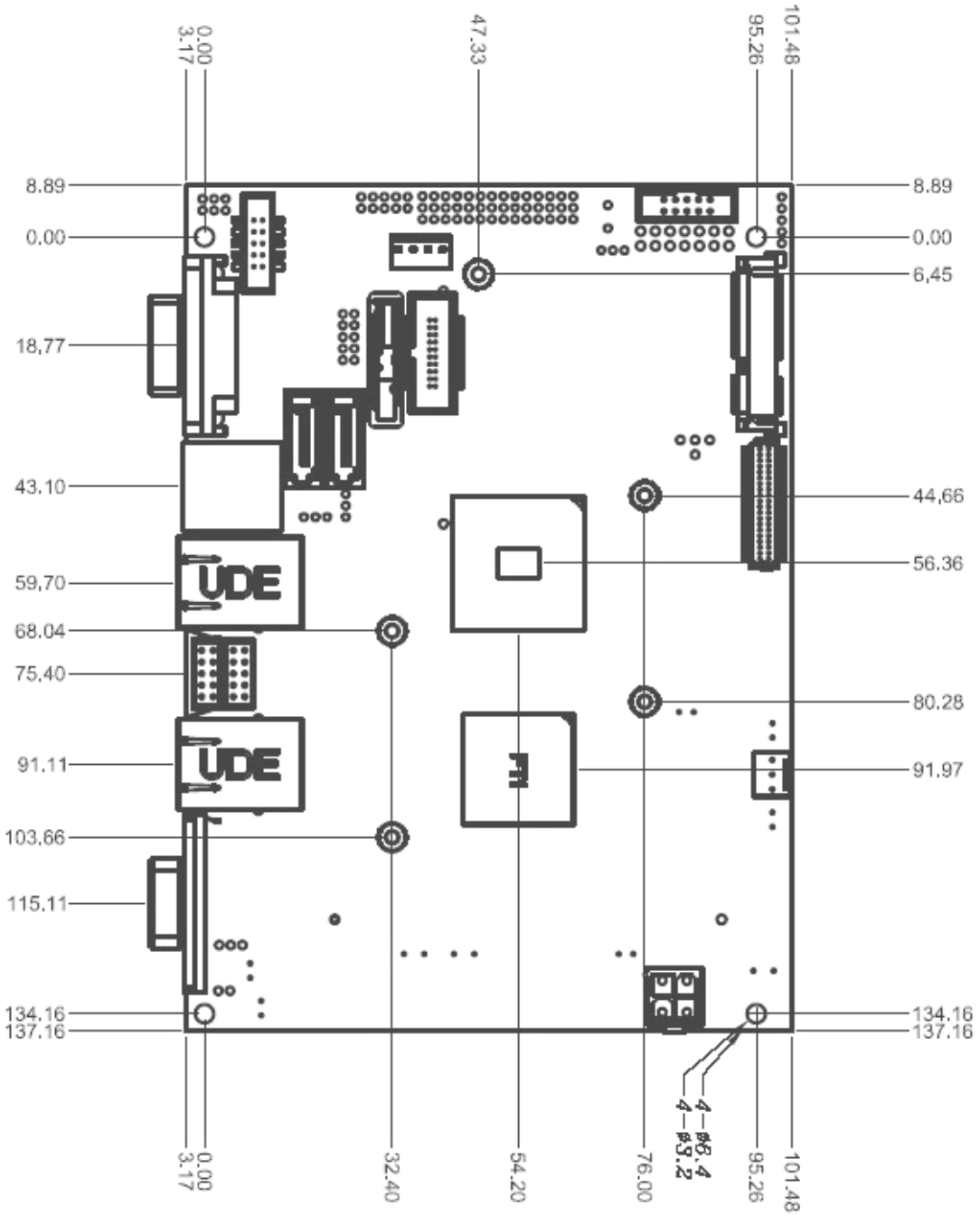
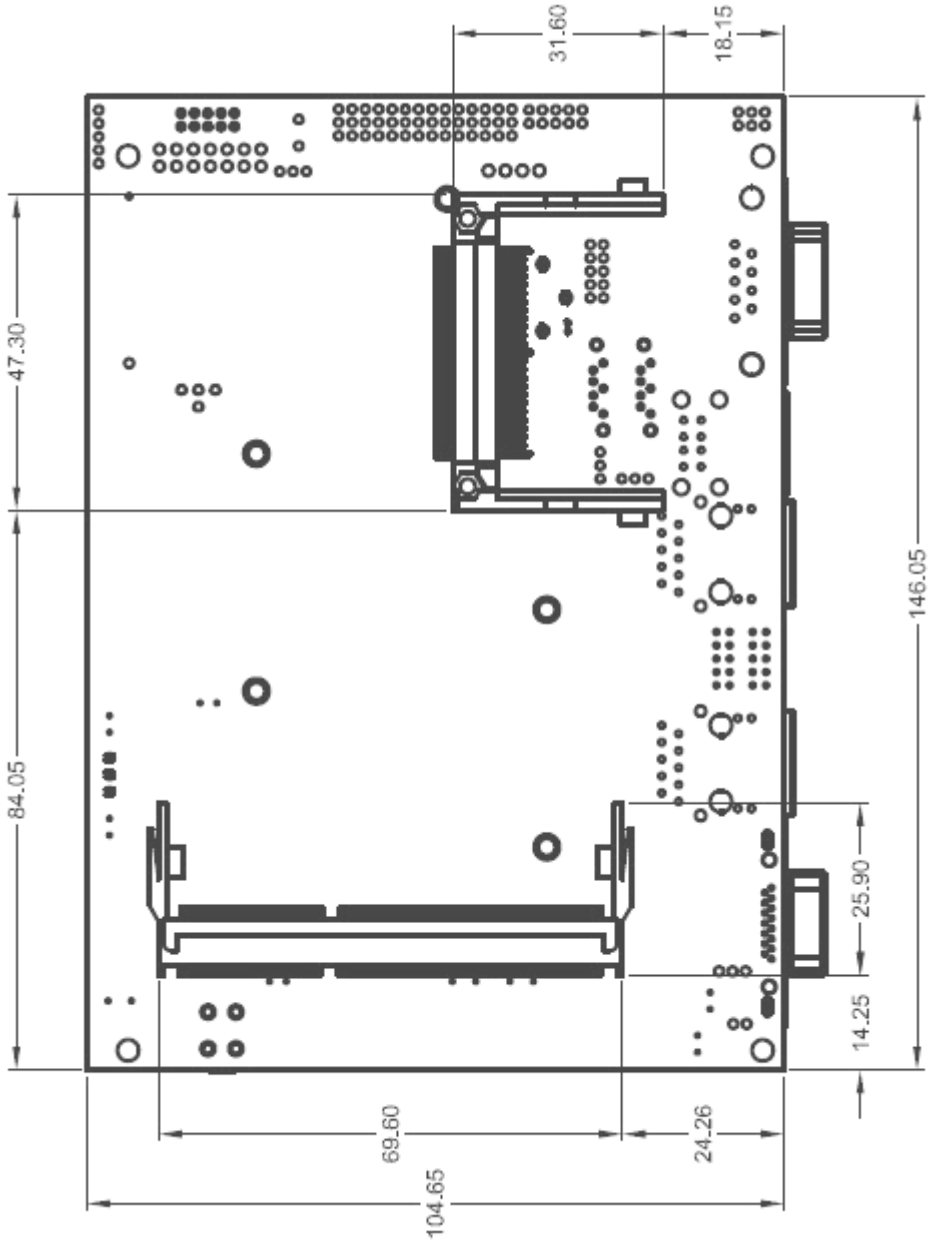
Chapter 2
Board Layout and Pin Assignments

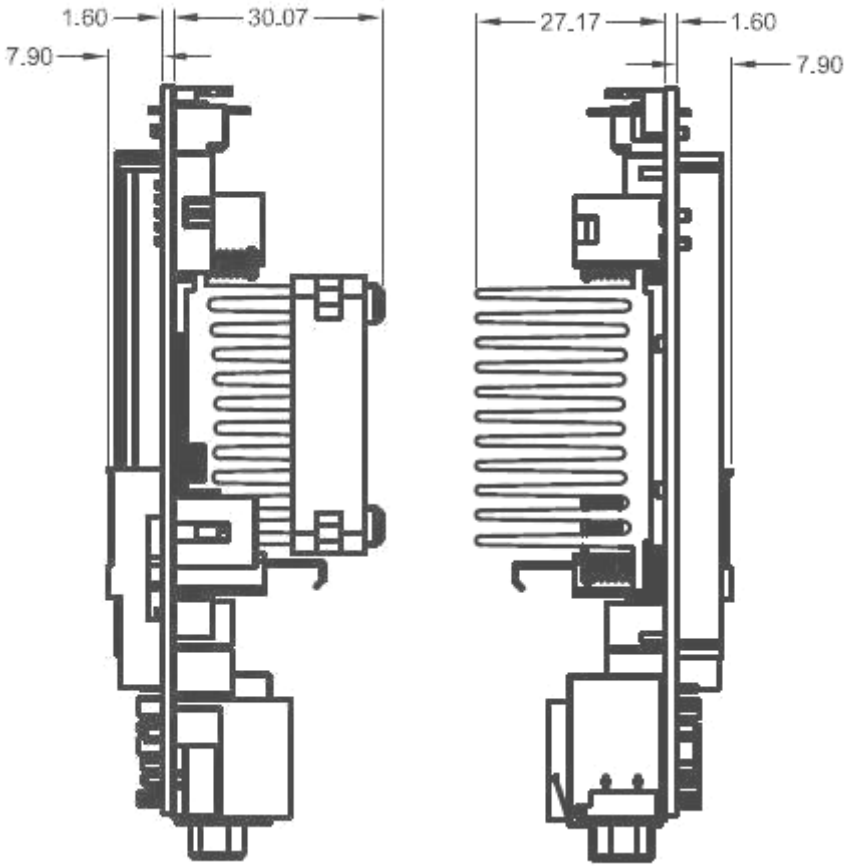
2.1 Board Dimensions and Fixing Holes



Top Side

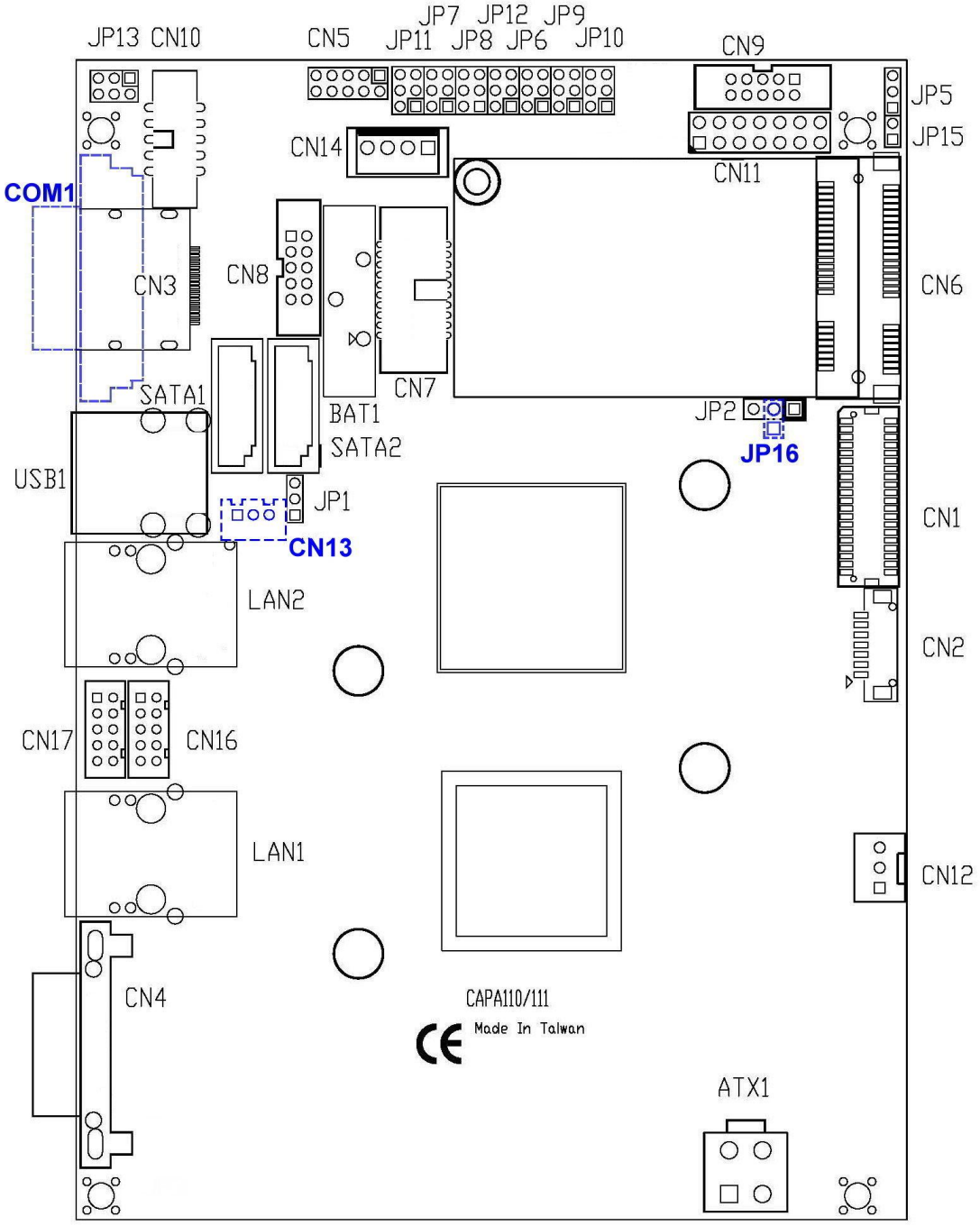


Bottom Side

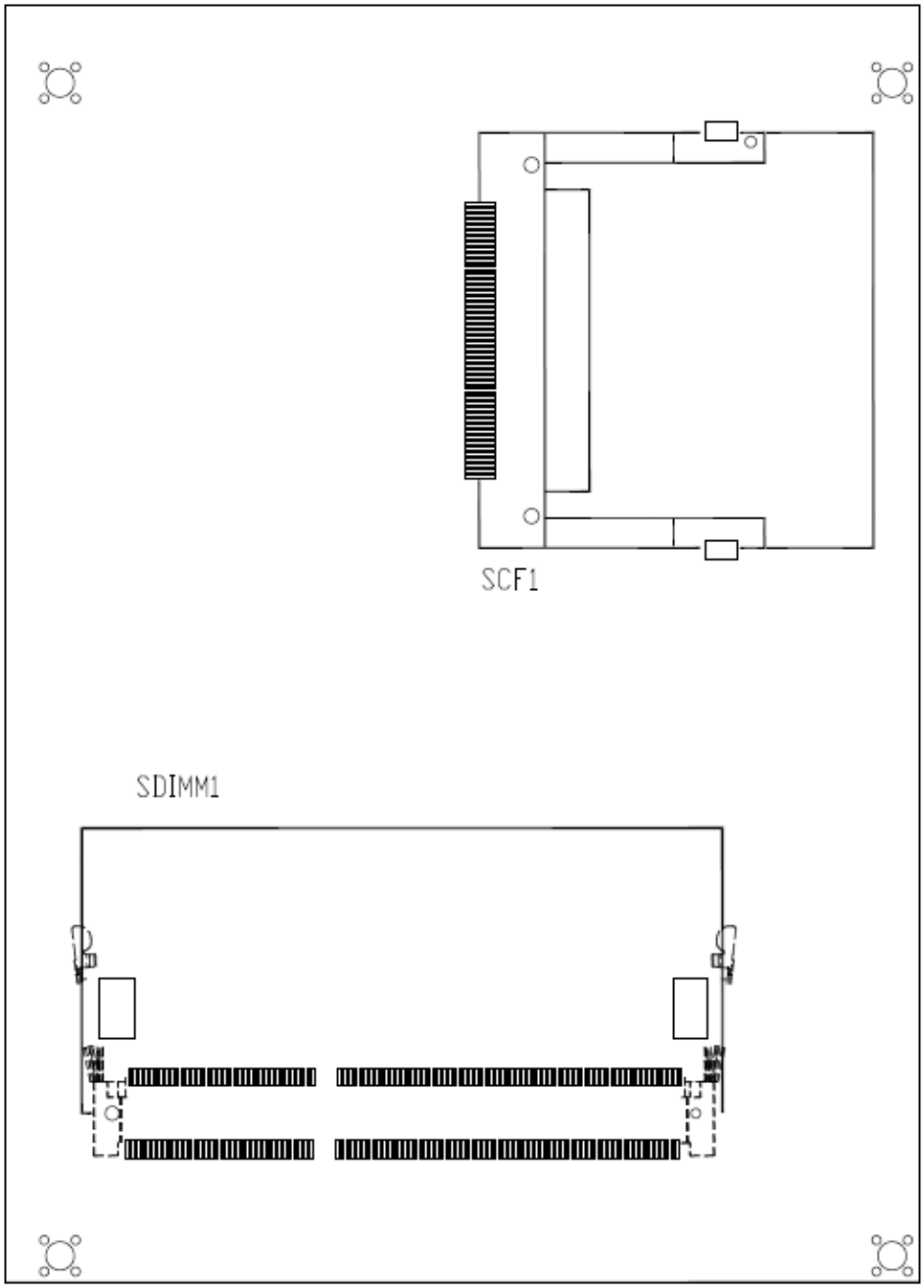


Side View

2.2 Board Layout



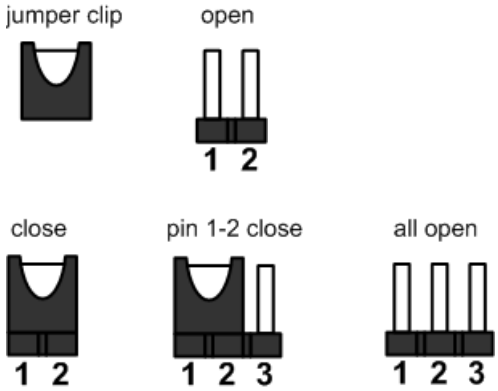
Top Side



Bottom Side

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 CAPA110/111 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.

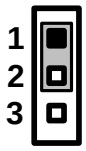
Note: Once the default jumper setting needs to be changed, it is suggested to be set under power-off.

Jumper	Description		Jumper Setting
JP1	Restore BIOS Optimal Defaults Default: Normal Operation		1-2 close
JP2	LVDS Voltage Selection Default: +3.3V		1-2 close
JP5	CompactFlash™ Voltage Selection Default: +3.3V		1-2 close
JP6	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
JP7	COM1 Data/Power Selection Default: RS-232 Data (CAPA111)	COM1 Pin 1: DCD	3-5 close
		COM1 Pin 9: RI	4-6 close
	CN8 Data/Power Selection Default: RS-232 Data (CAPA110)	CN8 Pin 1: DCD	3-5 close
		CN8 Pin 8: RI	4-6 close
JP8	COM3 Data/Power Selection Default: RS-232 Data	CN7 Pin 1: DCD	3-5 close
		CN7 Pin 8: RI	4-6 close
JP11	COM2 Data/Power Selection Default: RS-232 Data	CN9 Pin 1: DCD	3-5 close
		CN9 Pin 8: RI	4-6 close
JP12	COM4 Data/Power Selection Default: RS-232 Data	CN7 Pin 11: DCD	3-5 close
		CN7 Pin 18: RI	4-6 close
JP13	Audio Output Selection Default: Line Out		1-3, 2-4 close
JP15	Auto Power On Default: Disable		1-2 close
JP16 (Option)	LVDS Voltage Selection Default: +12V		1-2 close

2.3.1 Restore BIOS Optimal Defaults (JP1)

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

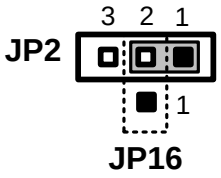


2.3.2 LVDS Voltage Selection (JP2 and JP16)

The board supports voltage selection for flat panel displays. JP2 is used to set LVDS connector (CN1) pin 1~6 VCCM to +3.3V or +5V voltage level. JP16 (option) is used to set LVDS connector (CN1) pin 1~6 VCCM to +12V voltage level.

Function	JP2 Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close

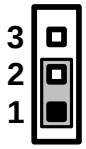
Function	JP16 Setting
+12V level (Option)	1-2 close



2.3.3 CompactFlash™ Voltage Selection (JP5)

This jumper is for CompactFlash™ voltage level selection. Use it to set CompactFlash™ connector (SCF1) pin 13 (VCC) and pin 38 (VCC) to +3.3.V or +5V.

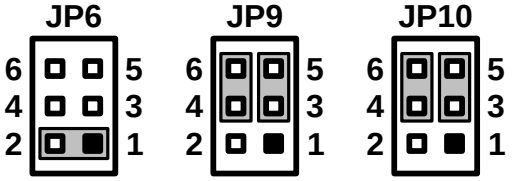
Function	Setting
+3.3V level (Default)	1-2 close
+5V level	2-3 close



2.3.4 COM1 RS-232/422/485 Mode Setting (JP6, 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 2.3.5)

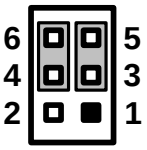
Function	Setting
RS-232 mode (Default)	JP6 1-2 close JP9 3-5, 4-6 close JP10 3-5, 4-6 close
RS-422 mode	JP6 3-4 close JP9 1-3, 2-4 close JP10 1-3, 2-4 close
RS-485 mode	JP6 5-6 close JP9 1-3, 2-4 close JP10 1-3, 2-4 close



2.3.5 COM1 Data/Power Selection (JP7)

The COM1 port has +5V level power capability on DCD and +12V level on RI by setting this jumper. When COM1 is set to +5V or +12V level, please make sure the communication mode is RS-232 (see section 2.3.4).

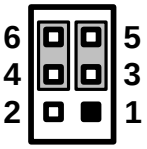
Function	Setting
Power: Set COM1 pin 1/CN8 pin 1 to +5V level	1-3 close
Data: Set COM1 pin 1/CN8 pin 1 to DCD (Default)	3-5 close
Power: Set COM1 pin 9/CN8 pin 8 to +12V level	2-4 close
Data: Set COM1 pin 9/CN8 pin 8 to RI (Default)	4-6 close



2.3.6 COM3 Data/Power Selection (JP8)

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

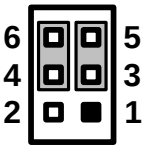
Function	Setting
Power: Set CN7 pin 1 to +5V level	1-3 close
Data: Set CN7 pin 1 to DCD (Default)	3-5 close
Power: Set CN7 pin 8 to +12V level	2-4 close
Data: Set CN7 pin 8 to RI (Default)	4-6 close



2.3.7 COM2 Data/Power Selection (JP11)

The COM2 port has +5V level power capability on DCD and +12V level on RI by setting this jumper.

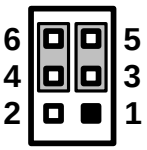
Function	Setting
Power: Set CN9 pin 1 to +5V level	1-3 close
Data: Set CN9 pin 1 to DCD (Default)	3-5 close
Power: Set CN9 pin 8 to +12V level	2-4 close
Data: Set CN9 pin 8 to RI (Default)	4-6 close



2.3.8 COM4 Data/Power Selection (JP12)

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

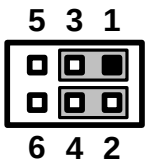
Function	Setting
Power: Set CN7 pin 11 to +5V level	1-3 close
Data: Set CN7 pin 11 to DCD (Default)	3-5 close
Power: Set CN7 pin 18 to +12V level	2-4 close
Data: Set CN7 pin 18 to RI (Default)	4-6 close



2.3.9 Audio Output Selection (JP13)

JP13 is to select line out or speaker out as source of audio output on audio connector CN10. When speaker out is used, it delivers 1W/channel continuous into 8 Ohm loads.

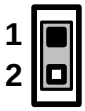
Function	Setting
Line out (Default)	1-3, 2-4 close
Speaker out	3-5, 4-6 close



2.3.10 Auto Power On (JP15)

If JP15 is enabled for AC power input, the system will be automatically power on without pressing soft power button. If JP15 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)	1-2 close
Enable auto power on	1-2 open



Note: ***This function is similar to the feature of power on after power failure, which is controlled by hardware circuitry instead of BIOS.***

2.4 Connectors

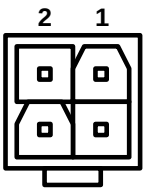
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
ATX1	Power Connector
CN1	LVDS Connector
CN2	Inverter Connector
CN3	DisplayPort (CAPA110)
CN4	VGA Connector
CN5	Digital I/O Port Connector
CN6	PCI-Express Mini Card Connector
CN7	COM3 and COM4 Connector
CN8	COM1 Connector (CAPA110)
CN9	COM2 Connector
CN10	Audio Connector
CN11	Front Panel Connector
CN12	CPU Fan Connector
CN13	SMBus Connector (Option)
CN14	Power Output Connector
CN16	USB Port 2 and 3
CN17	USB Port 4 and 5
COM1	COM1 Connector (CAPA111)
SATA1	Serial ATA1 Connector
SATA2	Serial ATA2 Connector
USB1	USB Port 0 and 1
SCF1	CompactFlash™ Socket
SDIMM1	DDRIII SO-DIMM Connector
LAN1	Ethernet Port 1
LAN2	Ethernet Port 2

2.4.1 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

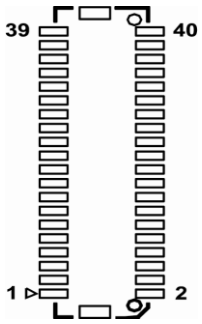


2.4.2 LVDS Connector (CN1)

This board has a 40-pin connector CN1 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 JP2 (see section 2.3.2).

18bits 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



24bits 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

18bits 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

24bits dual channel

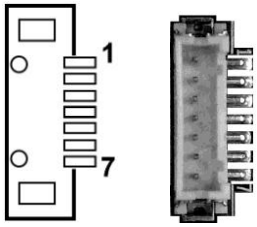
Pin	Signal	Pin	Signal
1	*VCCM*	*2*	*VCCM*
3	*VCCM*	*4*	*VCCM*
5	*VCCM*	*6*	*VCCM*
7	*N.C.*	*8*	*N.C.*
9	*GND*	*10*	*GND*
11	*Channel B D3-*	*12*	*Channel B D0-*
13	*Channel B D3+*	*14*	*Channel B D0+*
15	*GND*	*16*	*GND*
17	*Channel B CLK-*	*18*	*Channel B D1-*
19	*Channel B CLK+*	*20*	*Channel B D1+*
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*

Note: see section 4.5 for LVDS resolution setting in BIOS menu.

2.4.3 Inverter Connector (CN2)

The CN2 is DF13-7P-1.25V 7-pin connector for inverter. We strongly recommend you to use the matching DF13-7S-1.25C connector to avoid malfunction.

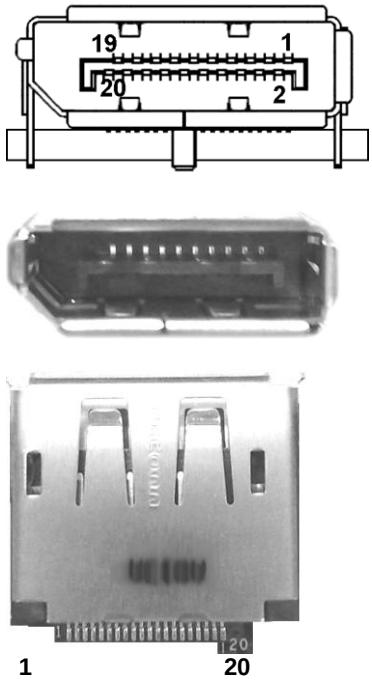
Pin	Signal
1	VBL1 (+12V level)
2	VBL1 (+12V level)
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND



2.4.4 DisplayPort Connector (CN3)

DisplayPort is a standard designed to replace digital (DVI) and analog component video (VGA) connectors in computer monitors and video cards, as well as replace internal digital LVDS links in computer monitor panels and TV panels. The CN3 is a DisplayPort (digital display interface standard) connector which is co-layout with a standard DB-9 connector (COM1).

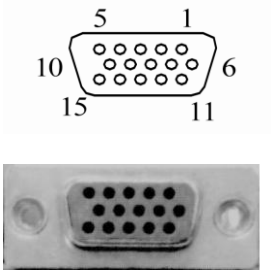
Pin	Signal
1	DPB_LANE0
2	GND
3	DPB_LANE0#
4	DPB_LANE1
5	GND
6	DPB_LANE1#
7	DPB_LANE2
8	GND
9	DPB_LANE2#
10	DPB_LANE3
11	GND
12	DPB_LANE3#
13	Detect Pin
14	GND
15	DPB_AUX
16	GND
17	DPB_AUX#
18	DPB_HPDE
19	GND
20	+3.3V



2.4.5 VGA Connector (CN4)

The CN4 is a standard 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.

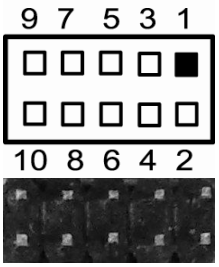
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	N.C.
5	GND	6	DETECT
7	GND	8	GND
9	VCC	10	GND
11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.4.6 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. The software application method is provided in Appendix B.

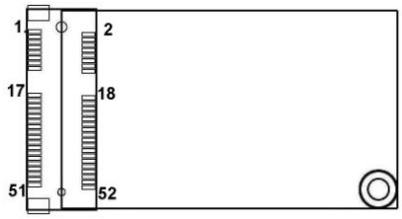
Pin	Signal	Pin	Signal
1	Digital Input 0	2	Digital Output 0
3	Digital Input 1	4	Digital Output 1
5	Digital Input 2	6	Digital Output 2
7	GND	8	Digital Output 3
9	GND	10	Digital Output 4



2.4.7 PCI-Express Mini Card Connector (CN6)

CN6 is a PCI-Express Mini Card connector which supports a PCI-Express x1 link and a USB 2.0 link. A PCI-Express Mini Card can be applied to either PCI-Express or USB 2.0. It complies with PCI-Express Mini Card spec v1.2.

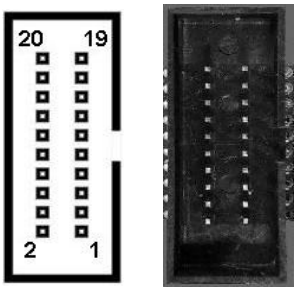
Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3	24	+3.3VSB
25	PE_RXP3	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3	32	SMB_DATA
33	PE_TXP3	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



2.4.8 COM3 and COM4 Connector (CN7)

Both COM 3 and COM 4 ports have +5V level power capability on DCD and 12V level on RI depending on the JP8 and JP12 jumper settings, respectively (see section 2.3.6 and 2.3.8). The pin assignments are listed on the following table.

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.

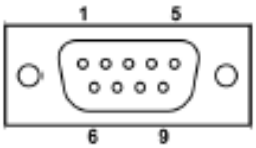


2.4.9 COM1 Connector (COM1/CN8)

The COM1 is a standard DB-9 connector (CAPA111 only). This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP7 (see section 2.3.5). The pin assignment of RS-232/RS-422/RS-485 is listed on the following table. If you need COM1 port to support RS-422 or RS-485 mode, please refer to section 2.3.4.

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

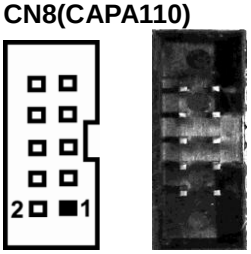
COM1(CAPA111)



The CN8 is a 2x5 pin box header (CAPA110 only). This connector is equipped with +5V level power capability on DCD and +12V level on RI by setting JP7 (see section 2.3.5). The pin assignment of RS-232/RS-422/RS-485 is listed on the following table. If you need COM1 port to support RS-422 or RS-485 mode, please refer to section 2.3.4.

Pin	Signal	Pin	Signal
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	N.C.

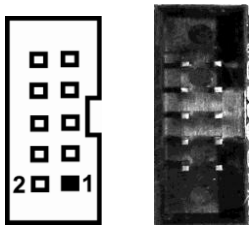
CN8(CAPA110)



2.4.10 COM2 Connector (CN9)

The COM2 port has +5V level power capability on DCD and +12V level on RI by setting JP11 (see section 2.3.7). The pin assignments are listed on the following table.

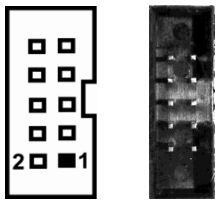
Pin	Signal	Pin	Signal
1	DCD2	2	DSR2
3	RXD2	4	RTS2
5	TXD2	6	CTS2
7	DTR2	8	RI2
9	GND	10	N.C.



2.4.11 Audio Connector (CN10)

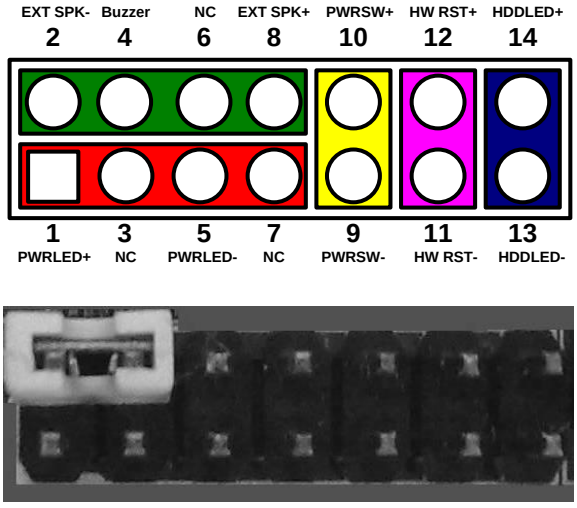
Pin 7 and pin 9 of CN10 can be set to different audio source by setting JP13 (see section 2.3.9).

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	N.C.



2.4.12 Front Panel Connector (CN11)

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 card 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(-).

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

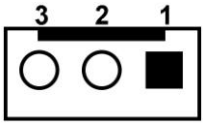
System Reset Switch
Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

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(+).

2.4.13 CPU Fan Connector (CN12)

The CN12 is a CPU fan interface. 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).

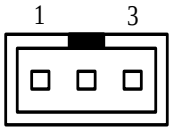
Pin	Signal
1	GND
2	+12V level
3	Fan speed feedback

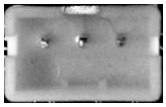


2.4.14 SMBus Connector (CN13) (Option)

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

Pin	Signal
1	CLK
2	DATA
3	GND

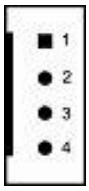




2.4.15 Power Output Connector (CN14)

Use CN14 for connecting to SATA 2.5" HDD power supply.

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

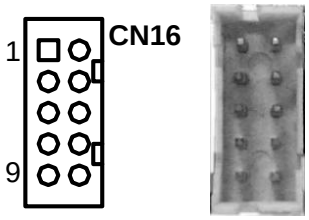


2.4.16 USB Connectors (CN16 and CN17)

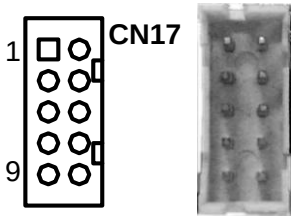
The 2x5 pin wafers are Universal Serial Bus (USB) connectors, CN16 and CN17. They are for installing versatile USB interface peripherals. The CN16 is designed with +5V level standby power which can provide power when system is in suspend mode.

CN16 carries USB port 2 and 3 while CN17 carries USB port 4 and 5.

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



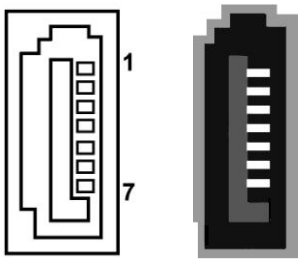
Pin	USB Port 4	Pin	USB Port 5
1	USB VCC (+5V level)	2	USB VCC (+5V level)
3	USB #4_D-	4	USB #5_D-
5	USB #4_D+	6	USB #5_D+
7	GND	8	GND
9	GND	10	GND



2.4.17 Serial ATA Connectors (SATA1 and SATA2)

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.

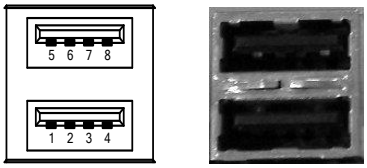
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.4.18 USB Connector (USB1)

The board features Universal Serial Bus (USB) connectors, compliant with USB 2.0 (480Mbps) that can be adapted to any USB peripherals, such as monitor, keyboard and mouse. This USB1 connector carries USB port 0 and 1.

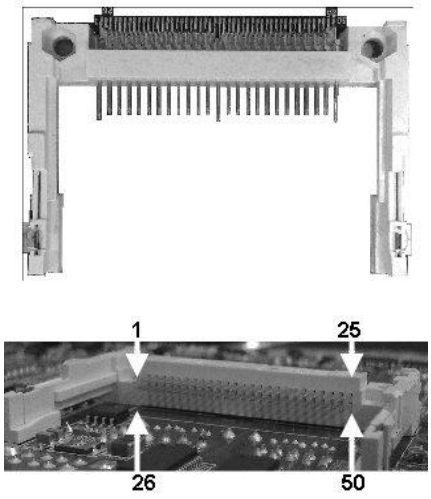
Pin	USB Port 0	Pin	USB Port 1
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #1_D-
3	USB #0_D+	7	USB #1_D+
4	GND	8	GND



2.4.19 CompactFlash™ Socket (SCF1)

The board is equipped with a CompactFlash™ disk type-II socket on the bottom side to support an IDE interface CompactFlash™ disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CompactFlash™ disk card. When installing or removing the CompactFlash™ disk card, please make sure the system power is off. Pin 13 and pin 38 power voltage can be configured by setting JP5 (see section 2.3.3).

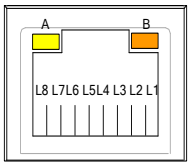
Pin	Signal	Pin	Signal
1	GND	26	CD1-
2	Data 3	27	Data 11
3	Data 4	28	Data 12
4	Data 5	29	Data 13
5	Data 6	30	Data 14
6	Data 7	31	Data 15
7	CS0#	32	CS1#
8	Address 10	33	VS1#
9	ATASEL	34	IORD#
10	Address 9	35	IOWR#
11	Address 8	36	WE#
12	Address 7	37	INTR
13	VCC	38	VCC
14	Address 6	39	CSEL#
15	Address 5	40	VS2#
16	Address 4	41	RESET#
17	Address 3	42	IORDY#
18	Address 2	43	DMAREQ
19	Address 1	44	DMAACK-
20	Address 0	45	DASP#
21	Data 0	46	PDIAG#
22	Data 1	47	Data 8
23	Data 2	48	Data 9
24	IOCS16#	49	Data 10
25	CD2#	50	GND

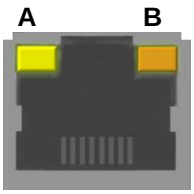


2.4.20 Ethernet Ports (LAN1 and LAN2)

Ethernet ports are RJ-45 connectors. Connection can be established by plugging one end of the ethernet cable into LAN1/LAN2 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)		





Chapter 3
Hardware Description

3.1 APU (Accelerated Processing Unit)

The CAPA110/111 series support AMD G-Series APU (Accelerated Processing Unit) T56N/T40E/T40R, which enables your system to operate under Windows® XP, Windows® 7 and Linux environments. The system performance depends on the APU.

3.2 BIOS

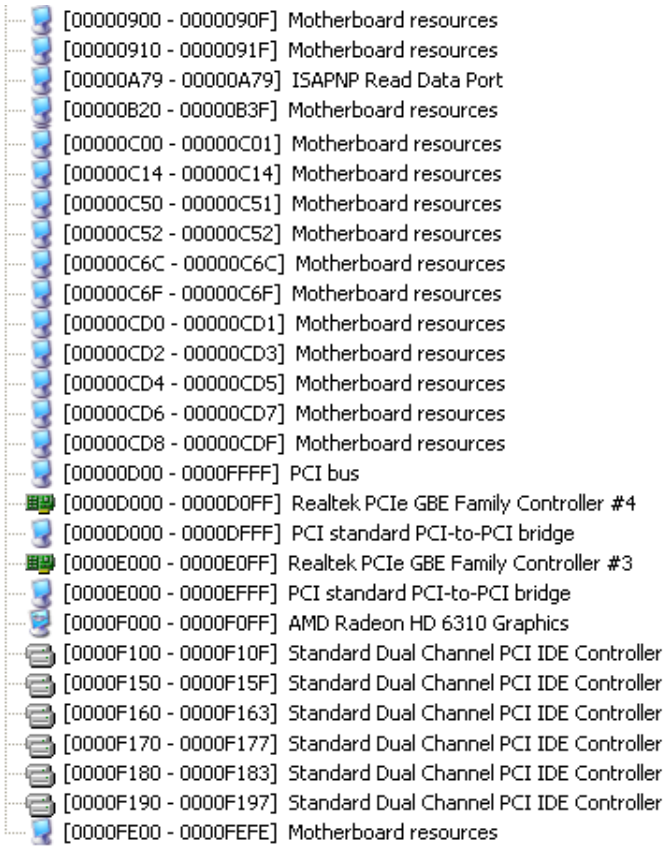
The CAPA110/111 series use AMI Plug and Play BIOS with a single 16Mbit SPI Flash.

3.3 System Memory

The CAPA110/111 series support one 204-pin DDR3 SO-DIMM sockets for a maximum memory of 4GB DDR3 SDRAMs. The memory module comes in sizes of 1GB, 2GB and 4GB.

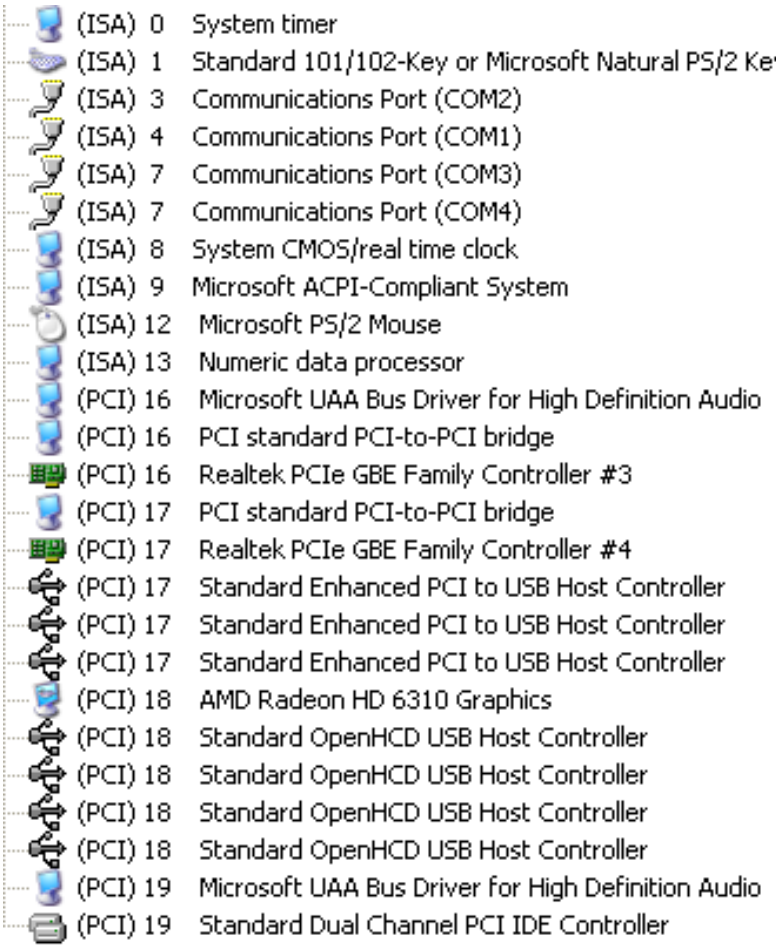
3.4 I/O Port Address Map

The AMD G-Series APU communicates via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.


[00000900 - 0000090F] Motherboard resources
[00000910 - 0000091F] Motherboard resources
[00000A79 - 00000A79] ISAPNP Read Data Port
[00000B20 - 00000B3F] Motherboard resources
[00000C00 - 00000C01] Motherboard resources
[00000C14 - 00000C14] Motherboard resources
[00000C50 - 00000C51] Motherboard resources
[00000C52 - 00000C52] Motherboard resources
[00000C6C - 00000C6C] Motherboard resources
[00000C6F - 00000C6F] Motherboard resources
[00000CD0 - 00000CD1] Motherboard resources
[00000CD2 - 00000CD3] Motherboard resources
[00000CD4 - 00000CD5] Motherboard resources
[00000CD6 - 00000CD7] Motherboard resources
[00000CD8 - 00000CDF] Motherboard resources
[00000D00 - 0000FFFF] PCI bus
[0000D000 - 0000D0FF] Realtek PCIe GBE Family Controller #4
[0000D000 - 0000DFFF] PCI standard PCI-to-PCI bridge
[0000E000 - 0000E0FF] Realtek PCIe GBE Family Controller #3
[0000E000 - 0000EFFF] PCI standard PCI-to-PCI bridge
[0000F000 - 0000F0FF] AMD Radeon HD 6310 Graphics
[0000F100 - 0000F10F] Standard Dual Channel PCI IDE Controller
[0000F150 - 0000F15F] Standard Dual Channel PCI IDE Controller
[0000F160 - 0000F163] Standard Dual Channel PCI IDE Controller
[0000F170 - 0000F177] Standard Dual Channel PCI IDE Controller
[0000F180 - 0000F183] Standard Dual Channel PCI IDE Controller
[0000F190 - 0000F197] Standard Dual Channel PCI IDE Controller
[0000FE00 - 0000FEFE] Motherboard resources

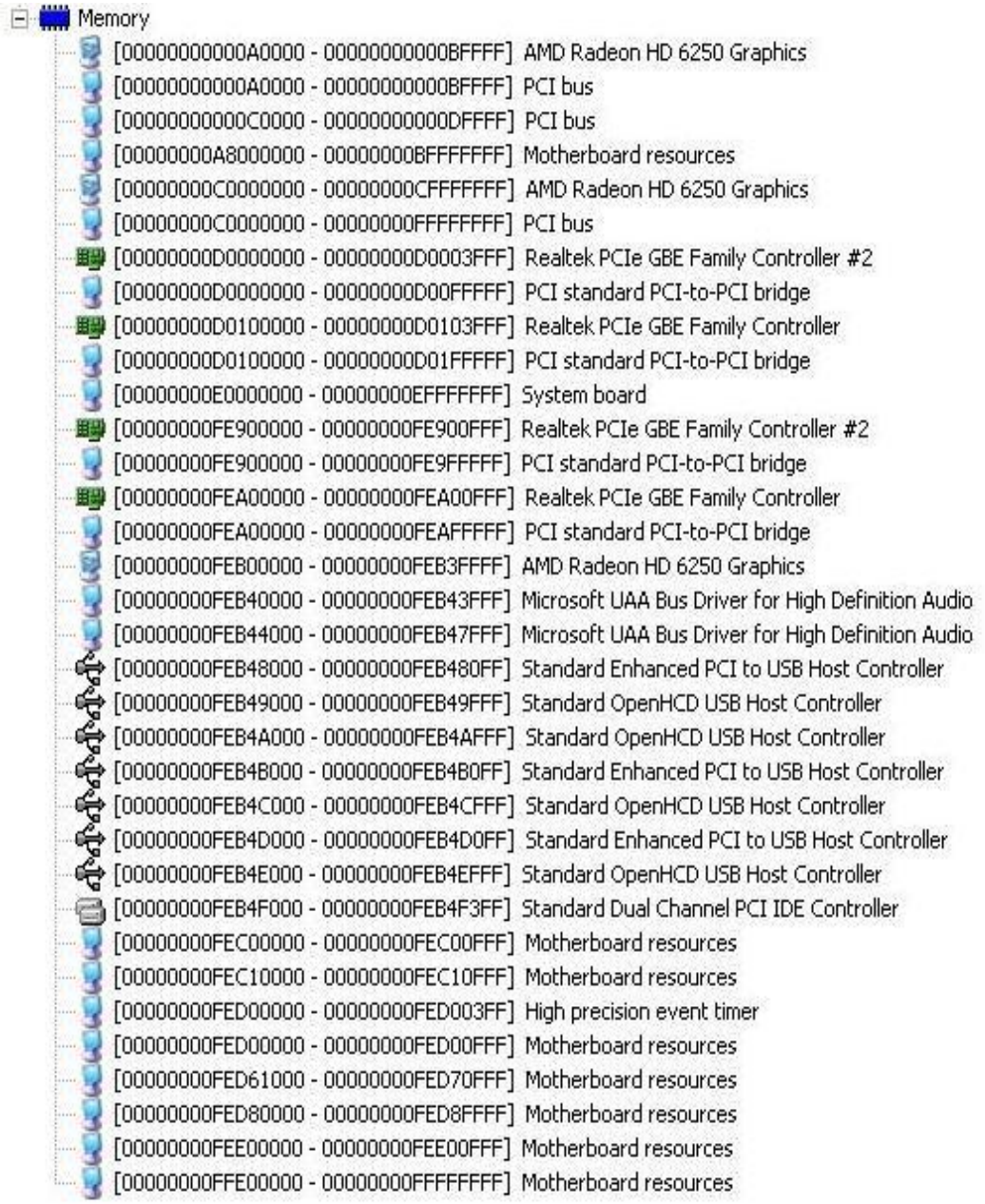
3.5 Interrupt Controller (IRQ) Map

The CAPA110/111 series are 100% PC compatible control boards which consist of 20 interrupt request lines. Four out of 20 can be programmable. The mapping list of the 20 interrupt request lines is shown as the following table.



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 16MB 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 JP1 (see section 2.3.1) .***

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

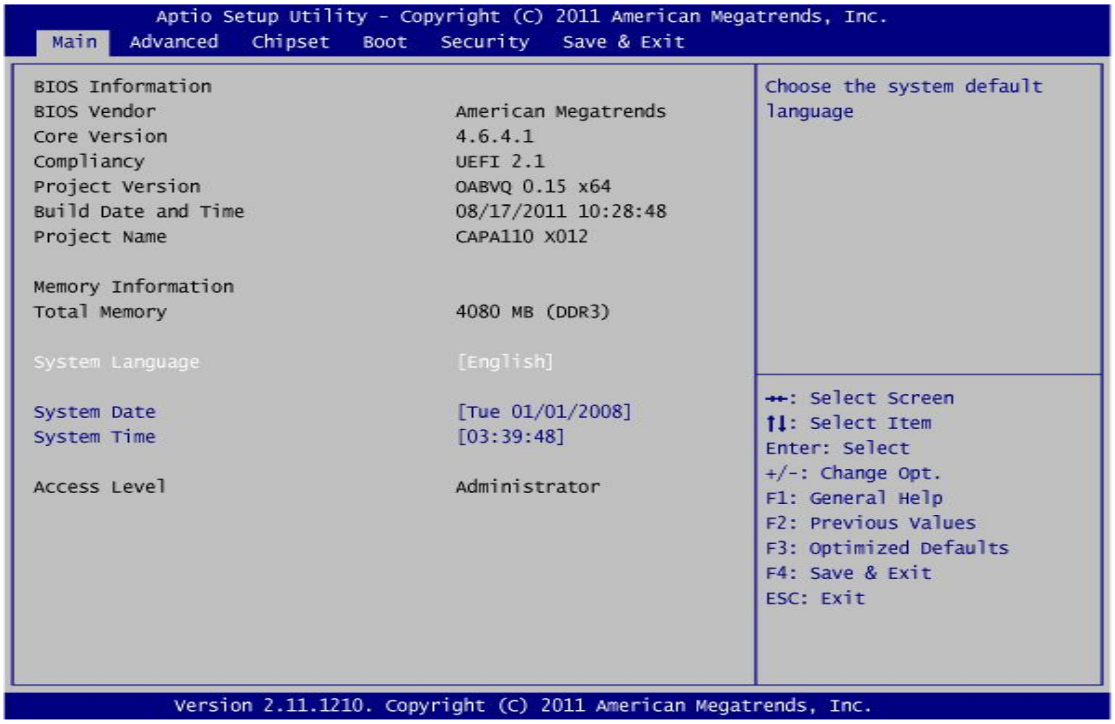
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

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 Language**
  Use this item to choose the system default language.

- **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.

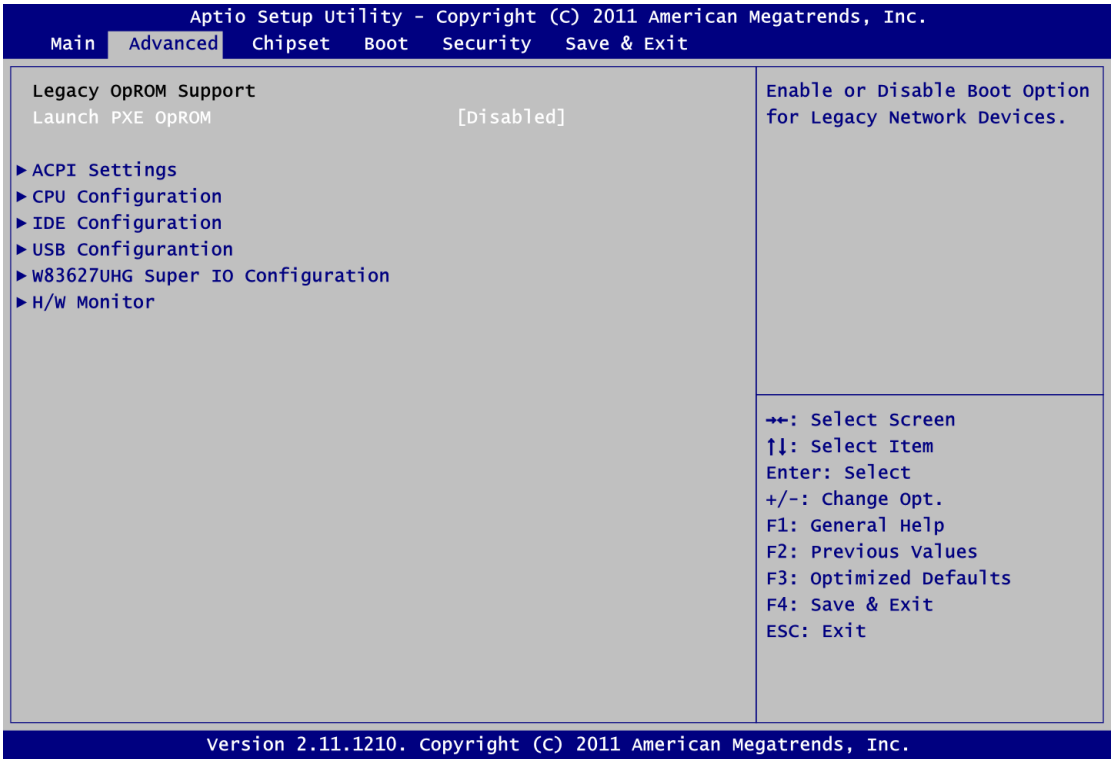
4.4 Advanced Menu

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

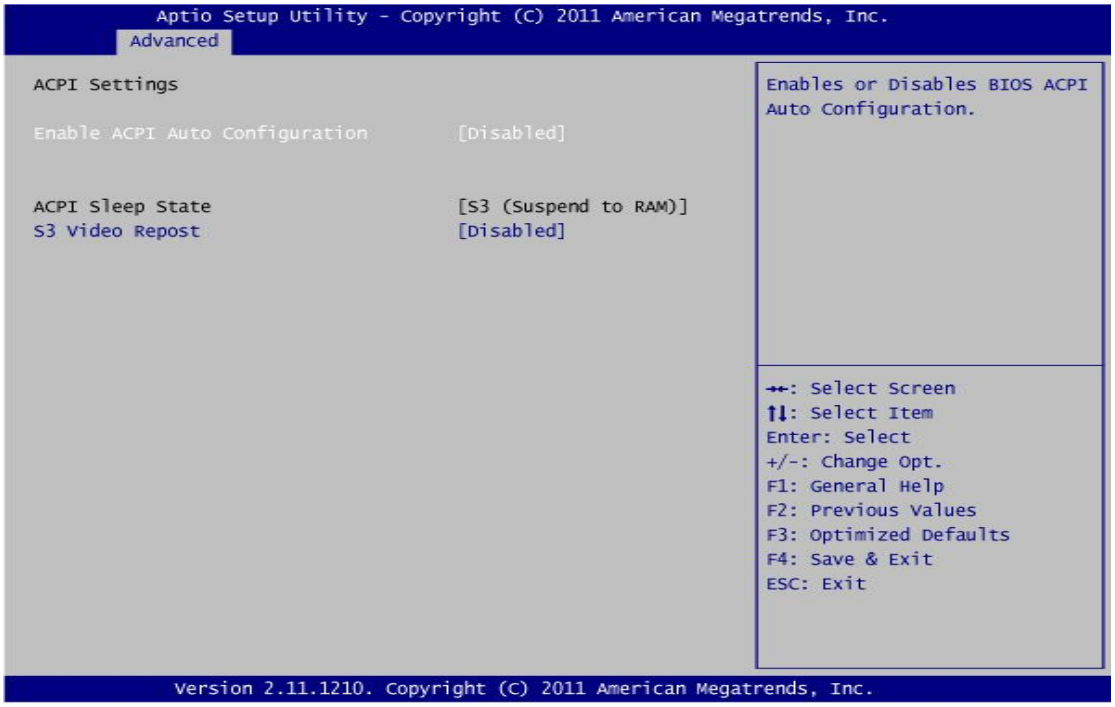
The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► ACPI Settings
- ► CPU Configuration
- ► IDE Configuration
- ► USB Configuration
- ► W83627UHG Super IO Configuration
- ► H/W Monitor

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



- **ACPI Settings**
  You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.

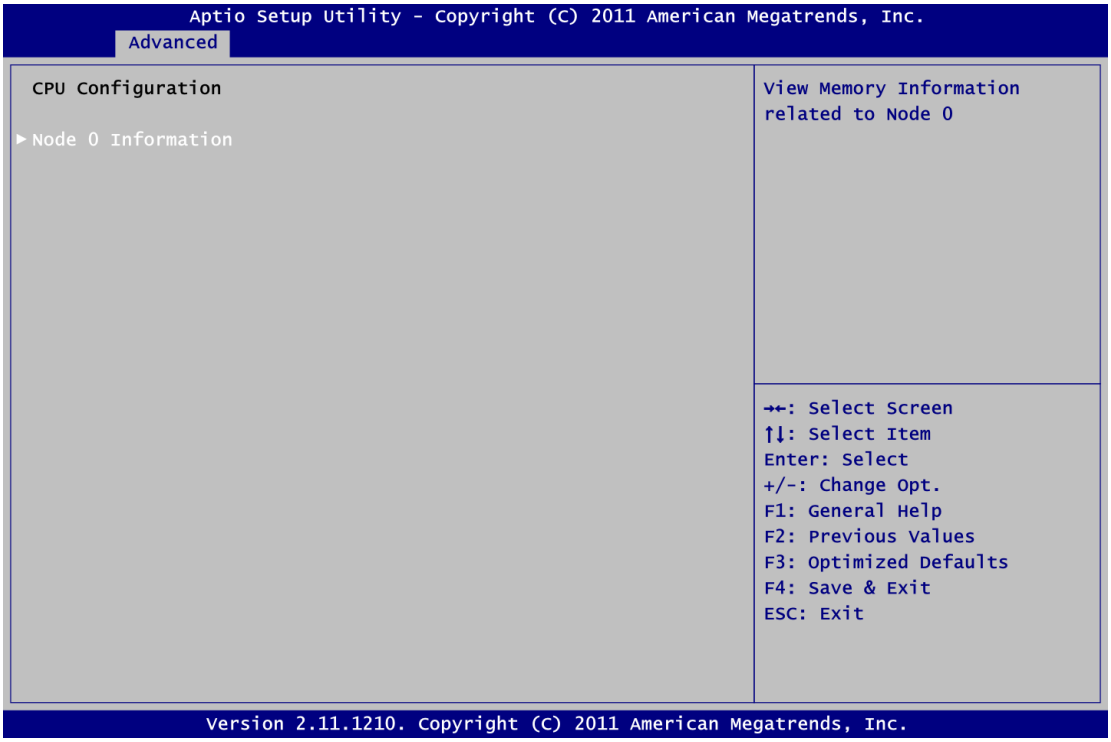


Enable ACPI Auto Configuration
Use this item to enable or disable BIOS ACPI auto configuration.

ACPI Sleep State
Default the Advanced Configuration and Power Interface (ACPI) state to be S3 (Suspend to RAM).

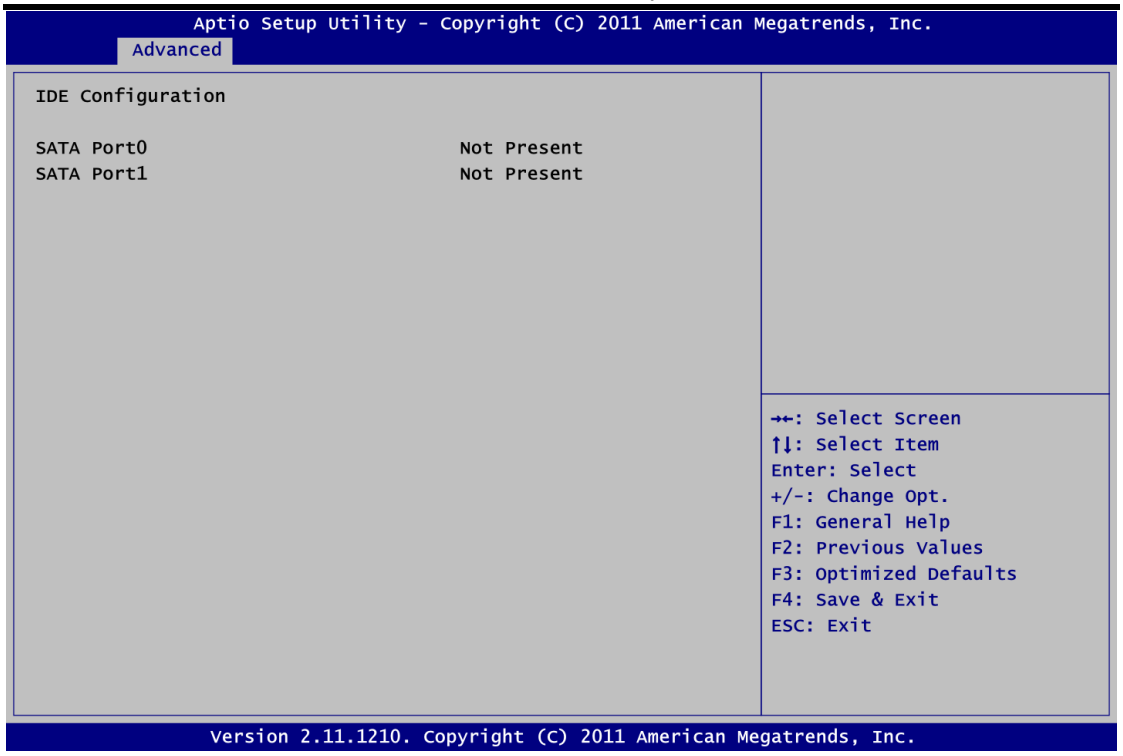
S3 Video Repost
Enable or disable S3 video repost.

- **CPU Configuration**
  This screen shows the CPU Configuration, and you can change the value of the selected option.

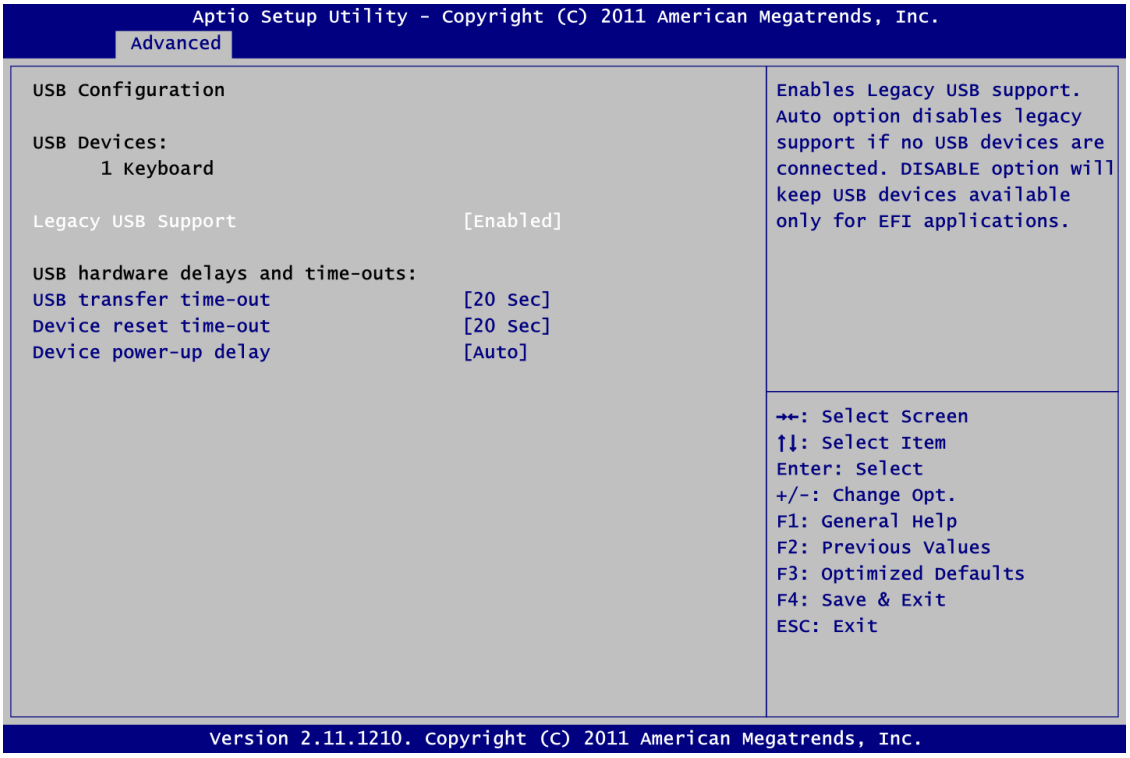


  Node 0 Information
  View memory information related to Node 0.

- **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.



- **USB Configuration**
  You can use this screen to select options for the USB Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.



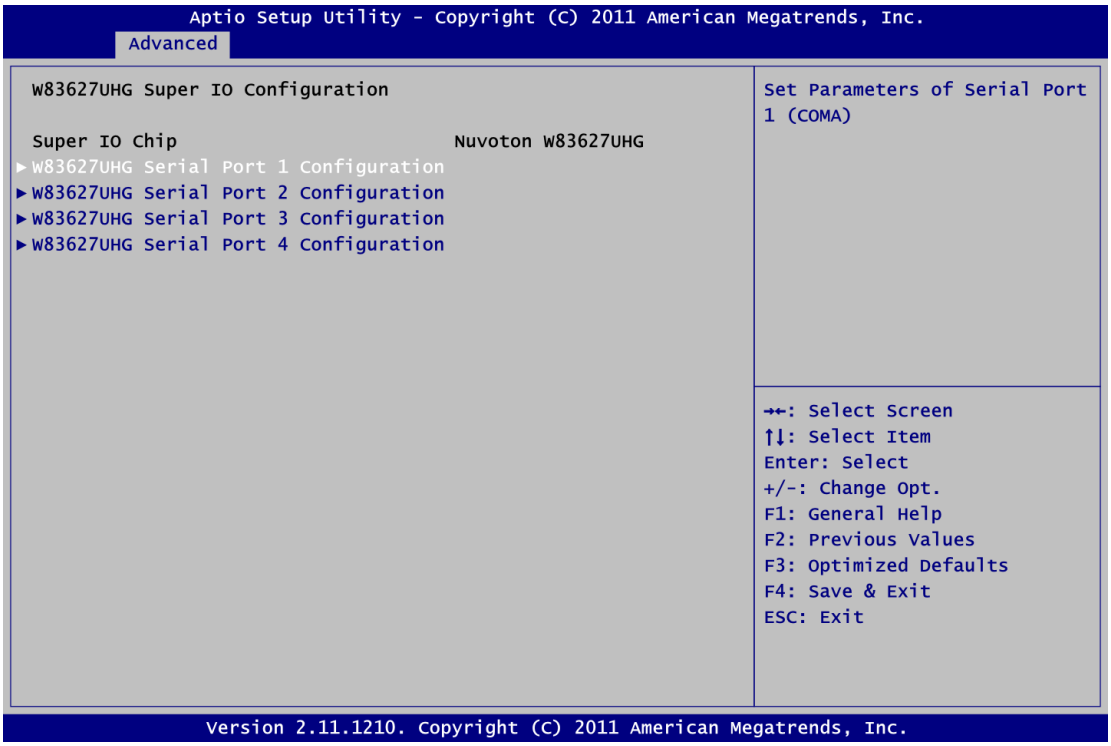
Legacy USB Support
Use this item to enable or disable support for USB device on legacy operating system. The default setting is Enabled. Auto option disables legacy support if no USB devices are connected. Disable option will keep USB devices available only for EFI applications.

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.

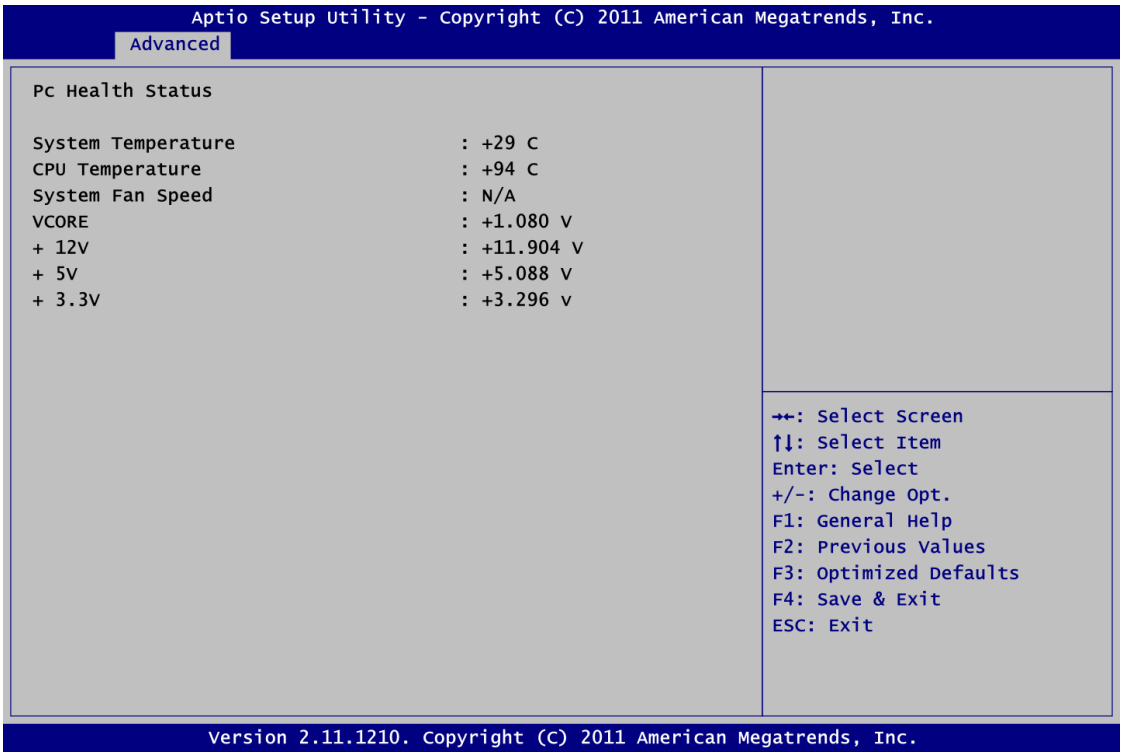
Device power-up delay
Maximum time the device will take before it properly reports itself to the host controller. “Auto” uses default value: for a root port it is 100ms, for a hub port the delay is taken from hub descriptor

- **W83627UHG Super IO Configuration**



W83627UHG Serial Port Configuration
The configuration of serial port 1~4 are set <Enabled> as default.

- **H/W Monitor**
  This screen monitors hardware health.



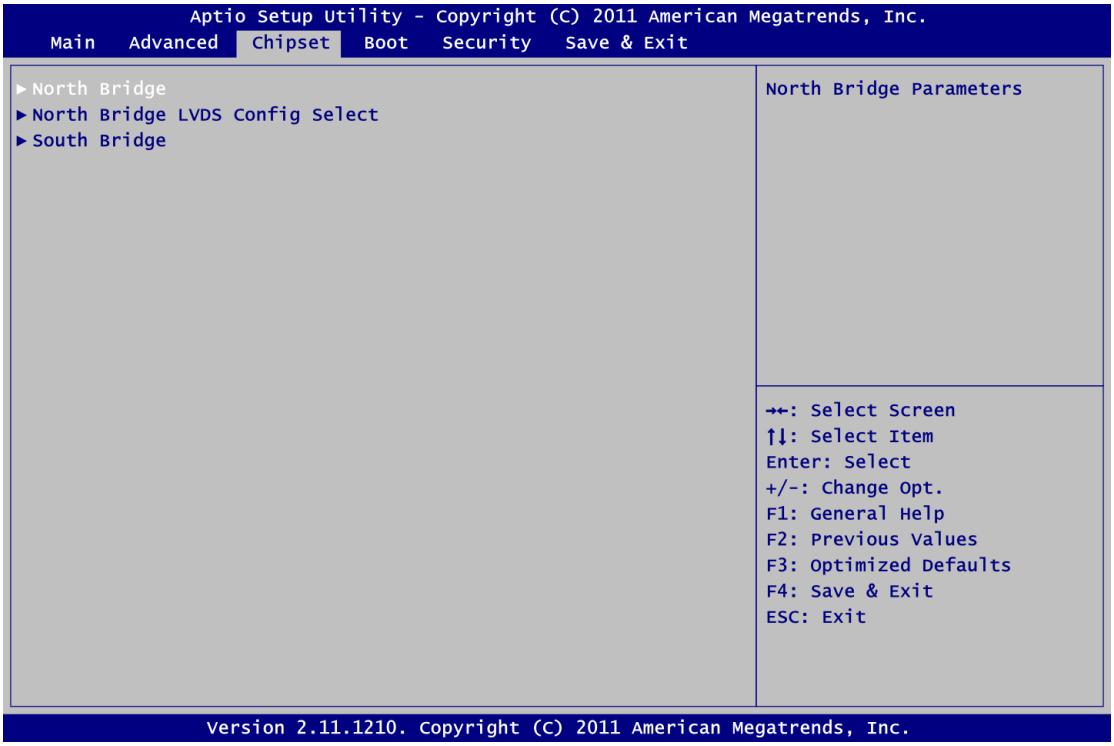
This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (VCORE, +12V, +5V and +3.3V).

4.5 Chipset Menu

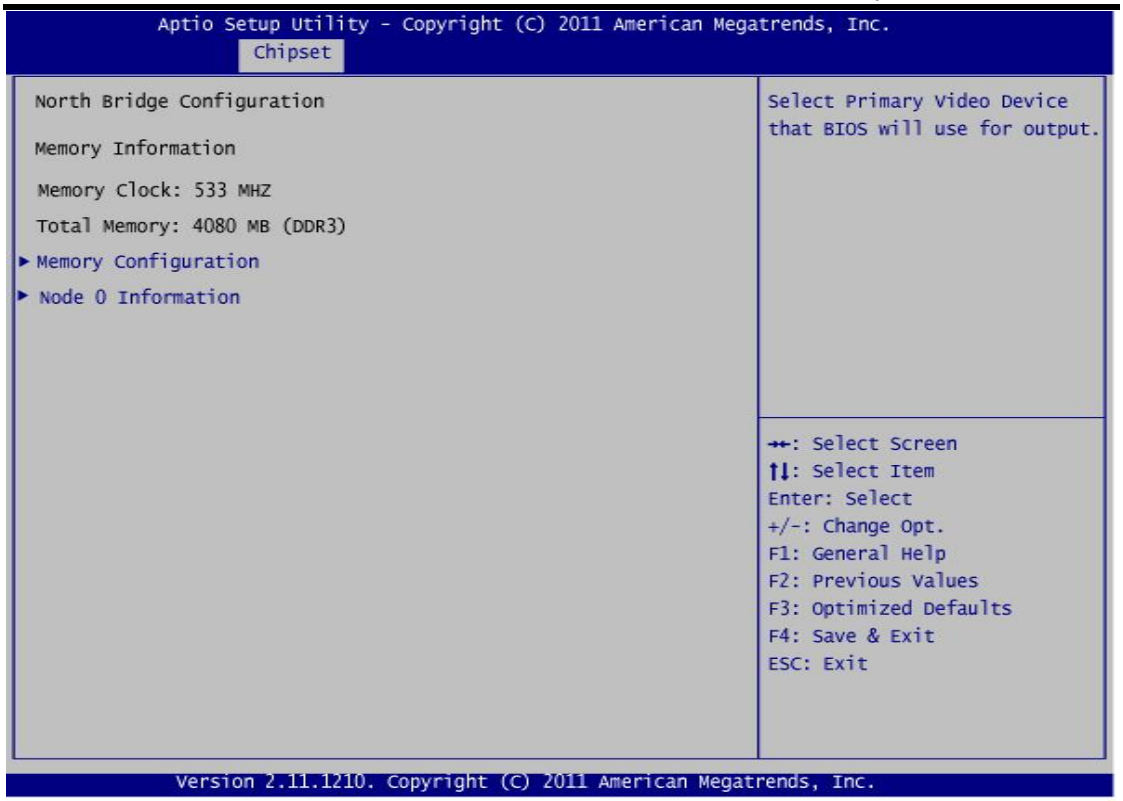
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► North Bridge
- ► North Bridge LVDS Config Select
- ► South Bridge

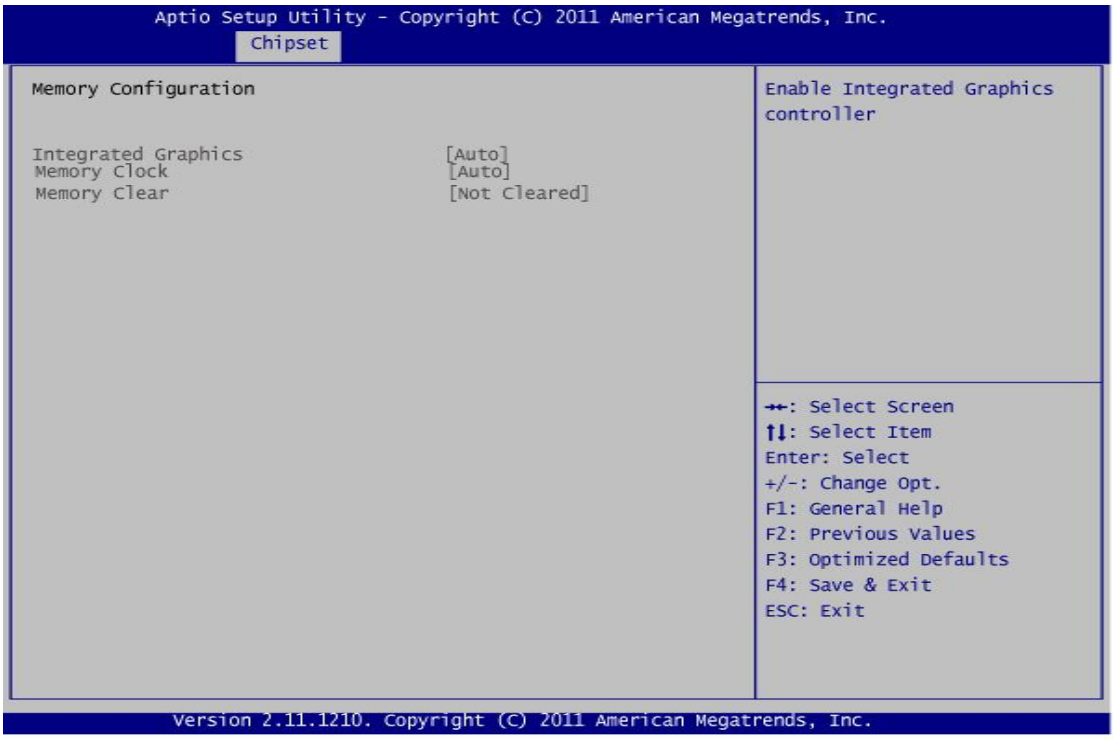
For items marked with "►", please press <Enter> for more options.



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


Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
Chipset
North Bridge Configuration
Memory Information
Memory Clock: 533 MHZ
Total Memory: 4080 MB (DDR3)
Memory Configuration
Node 0 Information
Select Primary Video Device that BIOS will use for output.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.11.1210. Copyright (C) 2011 American Megatrends, Inc.

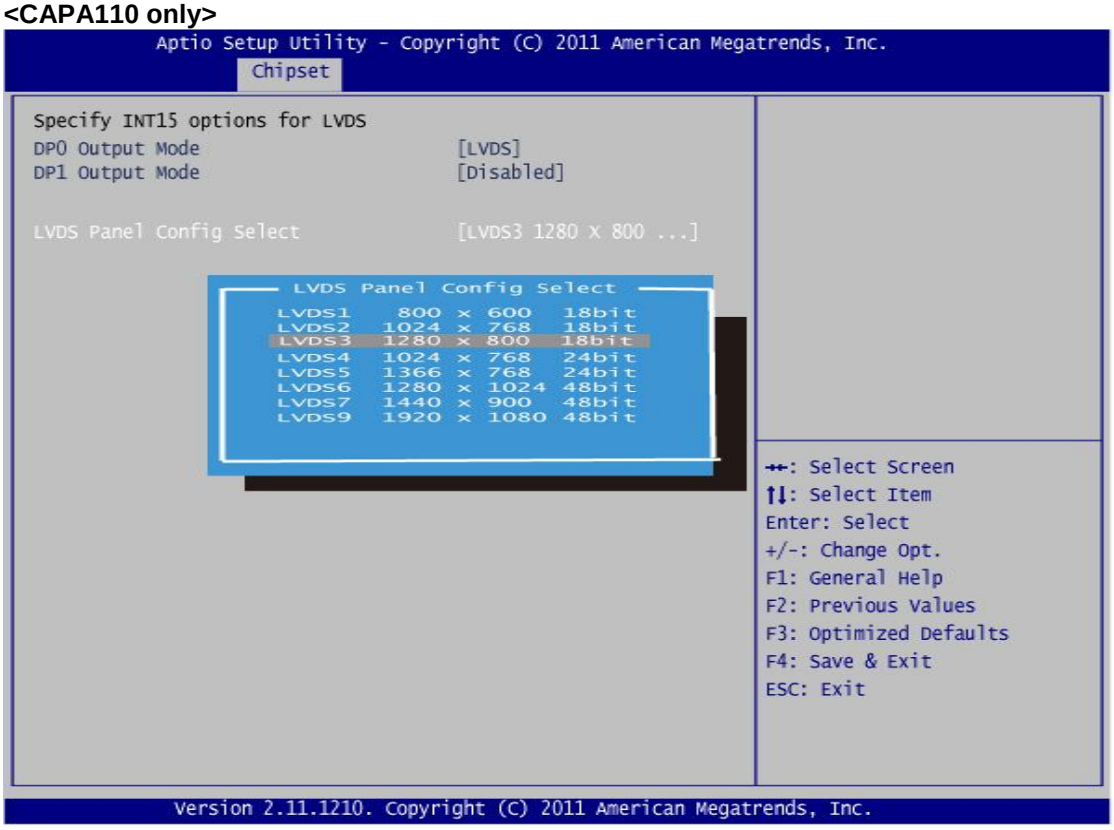
Memory Configuration
All of options are set Auto as default.



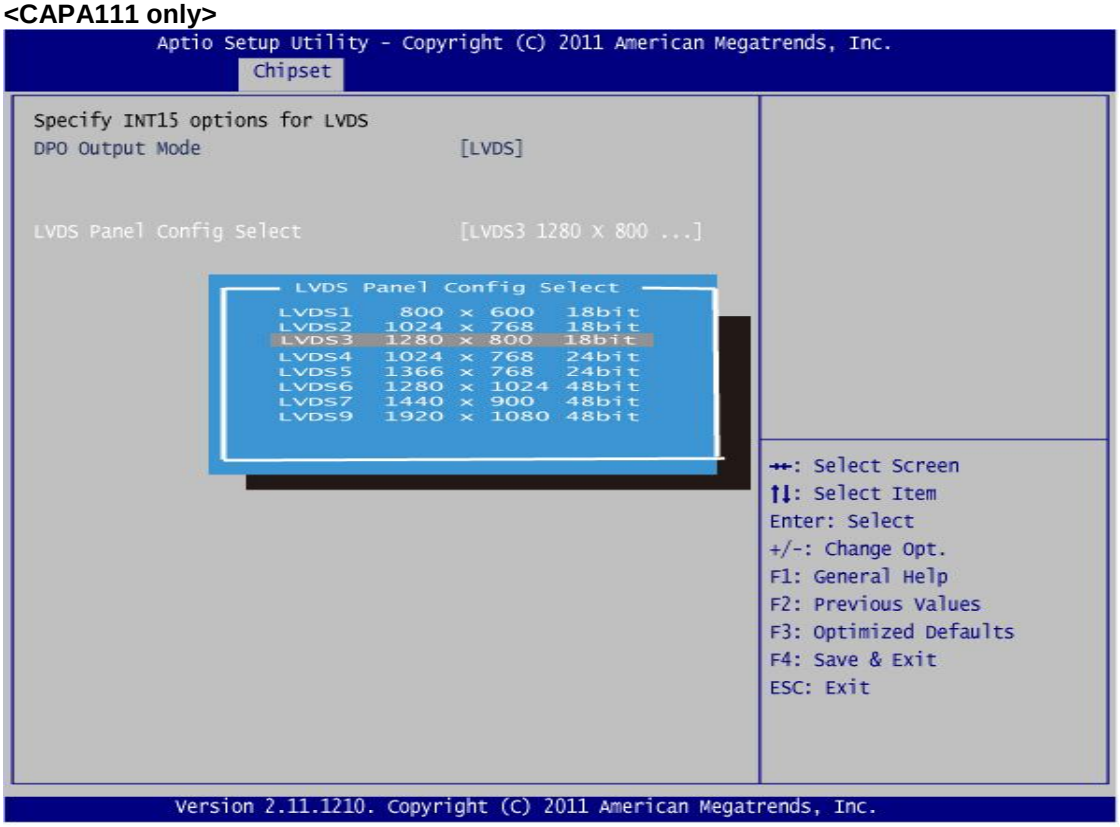
Node 0 Information
This item is to provide user with the information of current using DDRIII SDRAMs.

- **North Bridge LVDS Config Select**

<CAPA110 only>



<CAPA111 only>



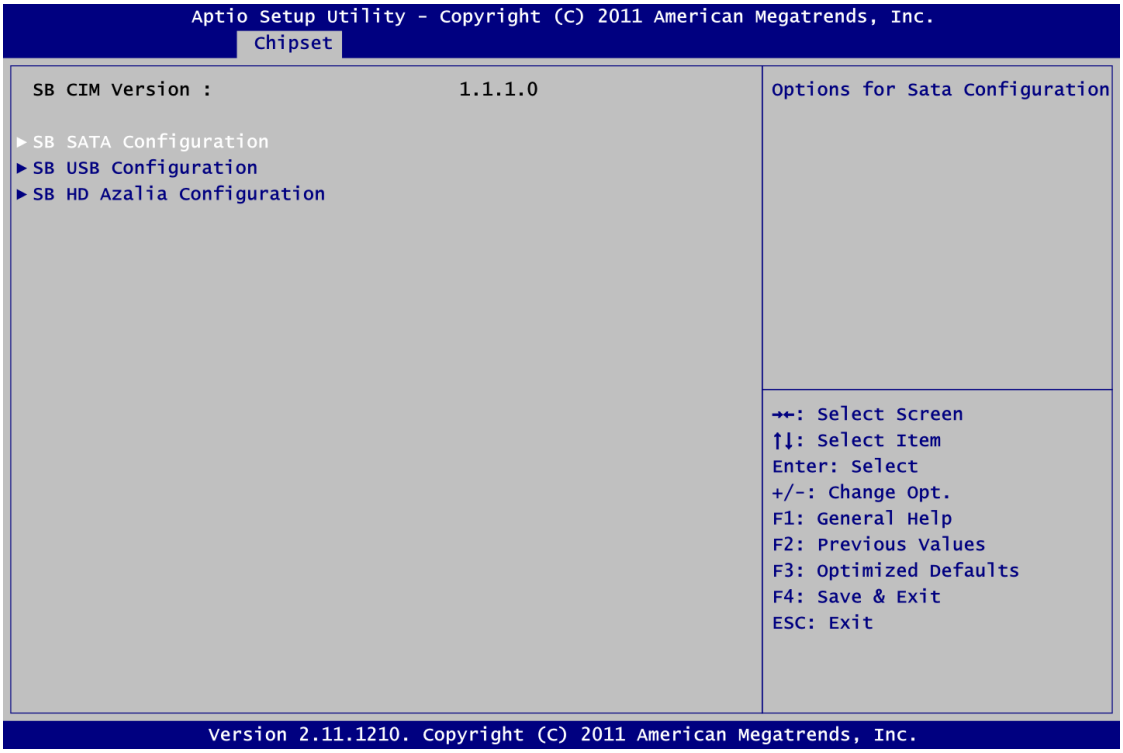
DP0 Output Mode
Use this item to enable LVDS.

DP1 Output Mode
Use this item to choose Display Port output or disable mode (CAPA110 only).

LVDS Panel Config Select
Use this item to select configuration for LVDS panel if DP0 enable LVDS.

- **South Bridge**
  This screen allows users to configure South Bridge chipset. For items marked with "►", please press <Enter> for more options.

  ► SB SATA Configuration
  ► SB USB Configuration
  ► SB HD Azalia Configuration



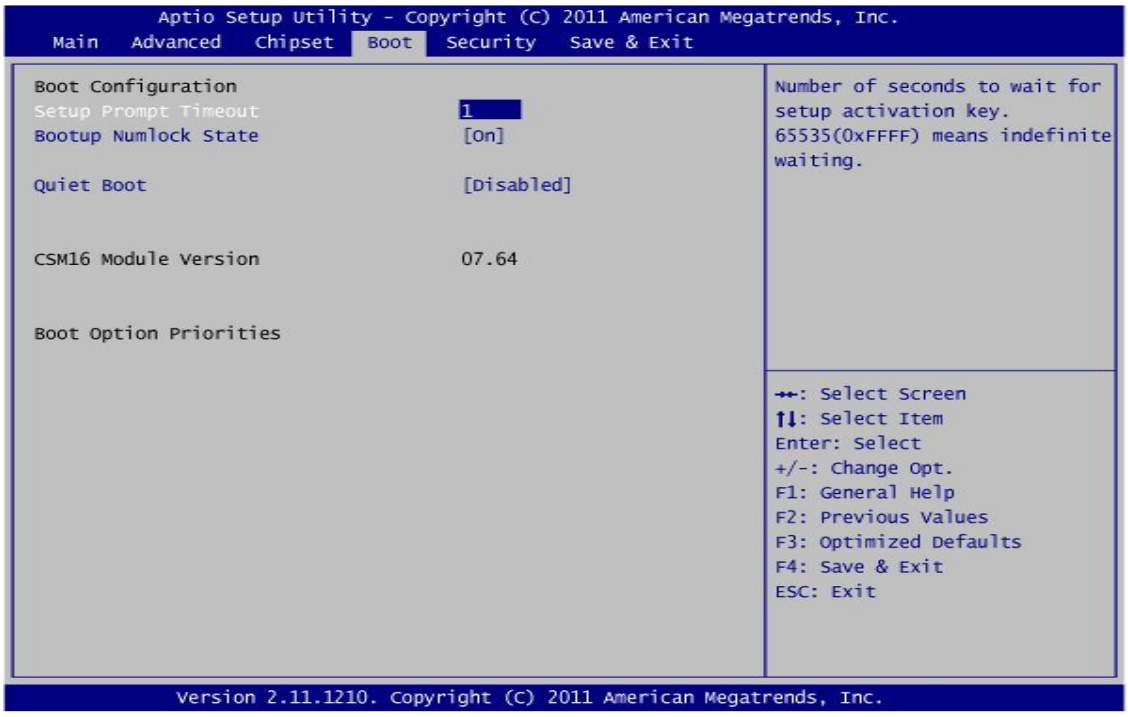
SB SATA Configuration
Use this item to select option for SATA configuration.

SB USB Configuration
Use this item for further setting USB port configuration.

SB HD Azalia Configuration
This item allows you to further control the HD audio device.

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**
  Enable or disable Quiet Boot option.

4.7 Security Menu

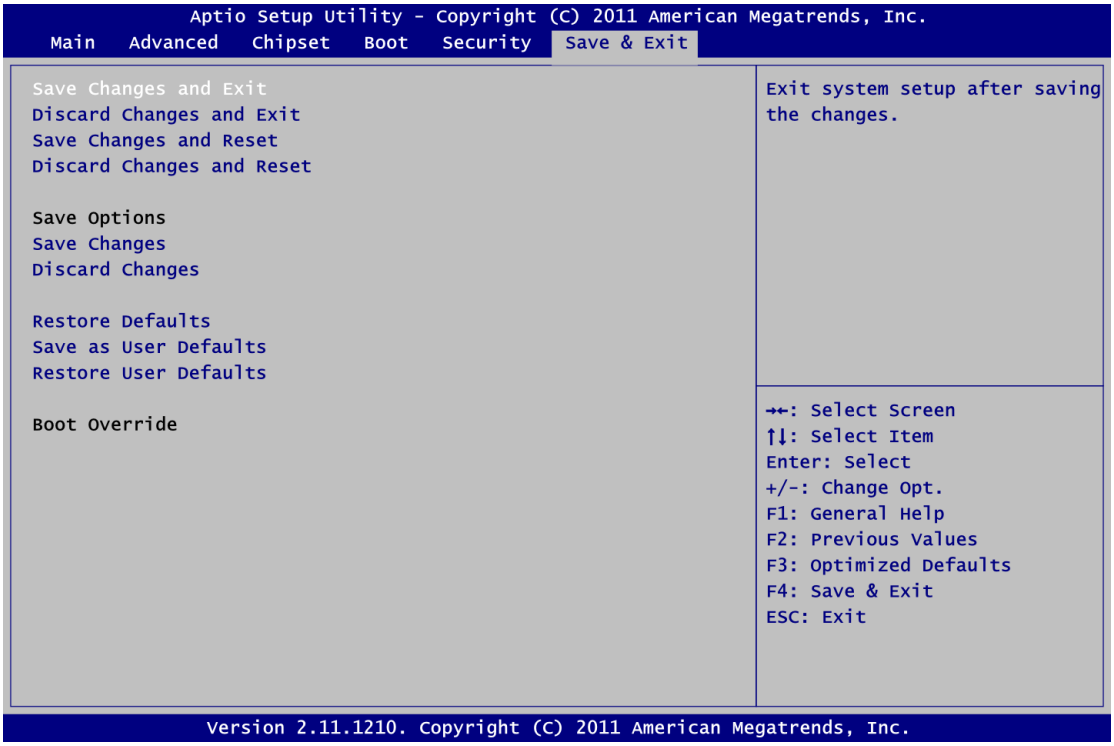
The Security menu allows users to change the security settings for the system.

- **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>.

Appendix A
Watchdog Timer

About Watchdog Timer

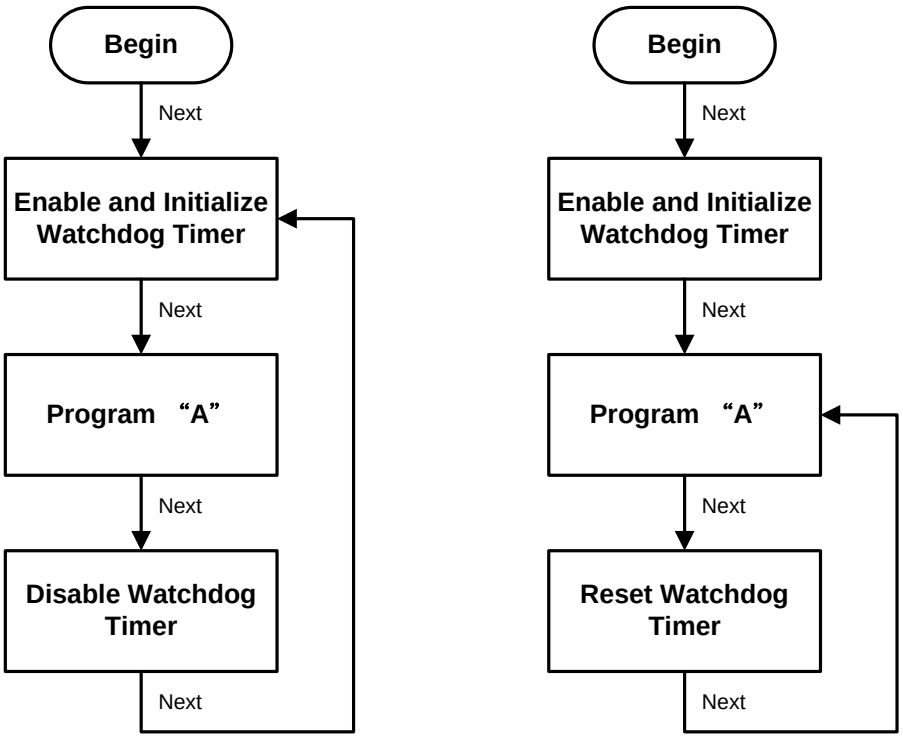
Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

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 2 minutes
03: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

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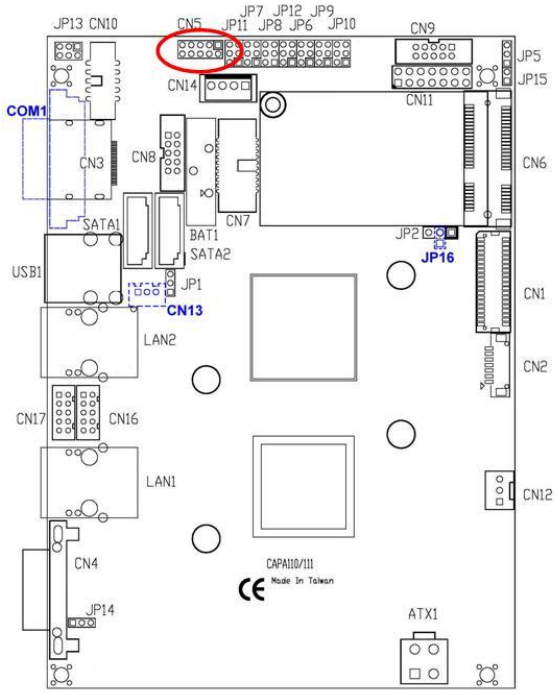
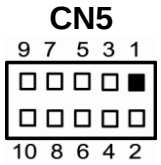
Appendix B
Digital I/O

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 Software 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*

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