COM-KB

AMD® Embedded G-series APU (SoC)

AMD® GX-420CA Quad-core 2.0GHz SOC

with AMD Radeon™ HD 8400E Graphics

AMD® GX-217GA Dual-core 1.65GHz SOC

with AMD Radeon™ HD 8280E Graphics

Gigabit Ethernet

2 SATA 6.0Gb/s

8 USB2.0, 2 USB3.0

5 PCI-E[x1]

COM Express CPU Module

COM-KB Manual 1st Ed.
February 21, 2014

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Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 4 M2.5 Screw
- 1 DVD-ROM for manual (in PDF format) and drivers
- 1 COM-KB

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

Contents

Chapter

1

General Information

1.1 Introduction

AAEON, a leading embedded board manufacturer, is pleased to announce the debut of their new generation COM Express Module--COM-KB. The COM-KB is a cutting-edge product that provides high performance and low power consumption in the embedded market.

COM-KB adopts the latest AMD embedded G-Series SoC processor. The system memory deploys with one SODIMM 204-pin DDR3/DDR3L-1600 memory up to 16 GB. In addition, Realtek RTL8111E supports Gigabit Ethernet that allows faster network connections. This model applies five PCI-Express[x1], one LPC bus and two SMBus. Moreover, two SATA 3.0Gb/s are configured on the COM-KB. COM-KB also equips eight USB2.0 (included two USB3.0) for flexible I/O expansions.

The display of COM-KB supports up to three independent displays simultaneously. This brand new COM Express Module is developed to cater to the requirements of Automation, Medical, ticket machine, transportation, gaming, KIOSK, and POS/POI applications.

1.2 Features

- AMD® Embedded G-Series SOC APU
- AMD® GX-415GA Quad-core 1.5GHz SOC with AMD Radeon™ HD 8330E Graphics
- AMD® GX-210HA Dual-core 1.0GHz SOC with AMD Radeon™ HD 8210E Graphics
- AMD® GX-420CA Quad-core 2.0GHz SOC with AMD Radeon™ HD 8400E Graphics
- AMD® GX-217GA Dual-core 1.65GHz SOC with AMD Radeon™ HD 8280E Graphics
- DDR3/DDR3L-1600 SODIMM, Max. 16GB
- Realtek RTL8111E Gigabit Ethernet
- HDMI x 1, DDI x 2, eDP x 1/ LVDS x 1 (18-bit Single-channel LVDS LCD; 24-bit Dual-channel LVDS LCD) (Shared Between eDP and LVDS)
- High Definition Audio Interface
- SATA 6.0Gb/s x 2
- USB2.0 x 8 (Included USB3.0 x 2)
- PCI-Express[x1] x 5; or PCI-Express[x4] x1 + PCI-Express [x1] x 4
- DC Input Range, +12V
- COM Express Basic Module, Pin-out Type 6, COM.0 Rev. 2.1

1.3 Specifications

System

Form Factor	COM Express Basic module, Pin-out Type 6, COM. 0 Rev. 2.1
Processor	Onboard AMD Embedded G-series APU (SoC) Processors
System Memory	DDR3 SODIMM x 1 Supports non-ECC DDR3 1866(1.5V), 1600(1.35V),1333(1.25V), Max. 16GB
Chipset	AMD® Embedded G-Series SoC APU
I/O Chipset	ITE 8518 (196-pin)
Ethernet	Realtek RTL8111E (Gigabit Ethernet)
TPM	N/A
BIOS	AMI BIOS SPI type, 8MB ROM
EEPROM	Atmel® AT24C02, save BIOS and configuration data
Wake On LAN	Yes
Watchdog Timer	ITE8518, 255 levels
H/W Status Monitoring	Supports CPU Temperature Monitoring
Expansion Interface	PCI-Express [x1] x 5 LPC bus x 1 1PEGx4 or x1 DDI1 & DDI2
Power Requirement	Nominal: +12V (ATX/AT)
Board Size	3.75" (L) x 3.75"(W) (95mm x 95mm)
Gross Weight	0.66lb (0.3kg)
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)

- **Storage Temperature** -40°F ~ 176°F (-40°C ~ 80°C)
- **Operating Humidity** 0% ~ 90% relative humidity, non-condensing
- **OS Support** Windows® 7, Windows® 8, Linux Fedora

Display

- **Chipset** AMD® GX-415GA Quad-core 1.5GHz SOC with AMD Radeon™ HD 8330E Graphics

  AMD® GX-210HA Dual-core 1.0GHz SOC with AMD Radeon™ HD 8210E Graphics

  AMD® GX-420CA Quad-core 2.0GHz SOC with AMD Radeon™ HD 8400E Graphics

  AMD® GX-217GA Dual-core 1.65GHz SOC with AMD Radeon™ HD 8280E Graphics
- **Memory** Shared system memory up to 512MB/ DVMT 5.0
- **Resolution** VGA: up to 1920x1200 from CH7511 HDMI: up to 1920x 1080
- **LCD Interface** HDMI x 1, DDI x 2, eDP x 1/ LVDS x 1 (18-bit Single-channel LVDS LCD; 24-bit Dual-channel LVDS LCD) (Shared Between eDP and LVDS)

I/O

- **Storage** SATA2/3 x 2 up to 6Gb/s
- **Serial Port** 2
- **USB** USB2.0 x 8 (included USB 3.0 x 2)
- **Audio** High definition audio
- **GPIO** 8, Shared with SD

Chapter

2

Quick Installation Guide

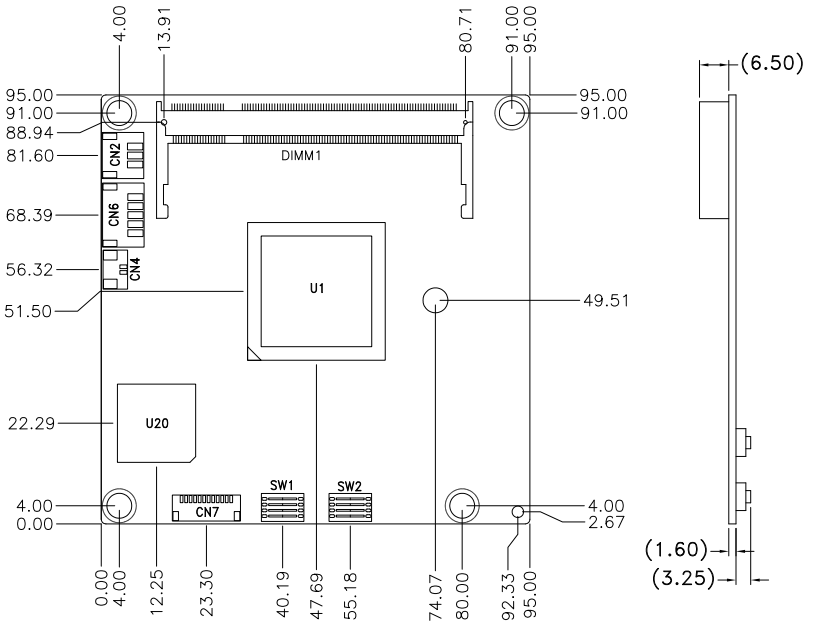
2.1 Safety Precautions

Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.

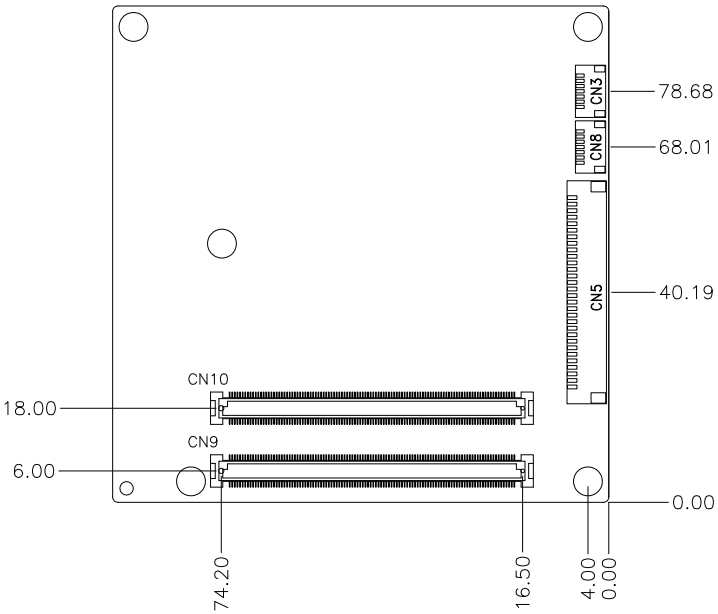
Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis

2.2 Location of Connectors and Jumpers

Component Side

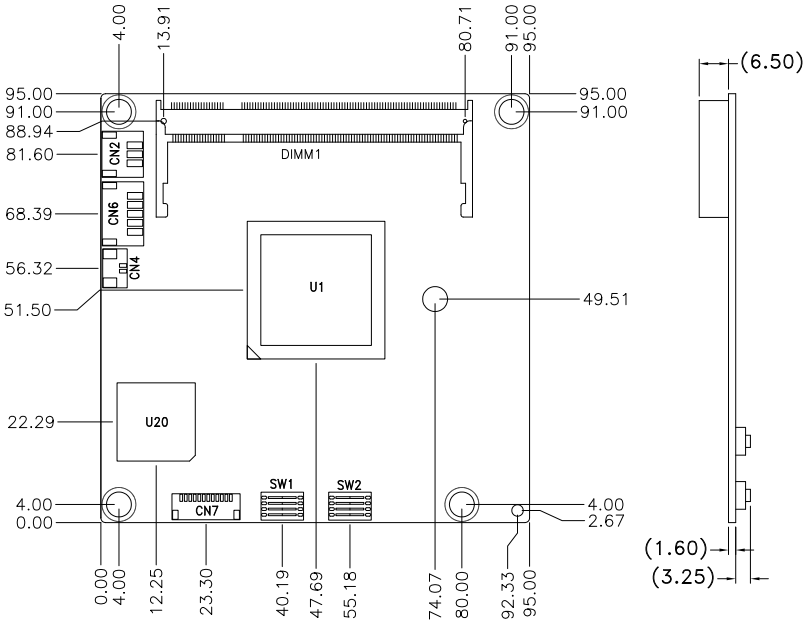


Solder Side

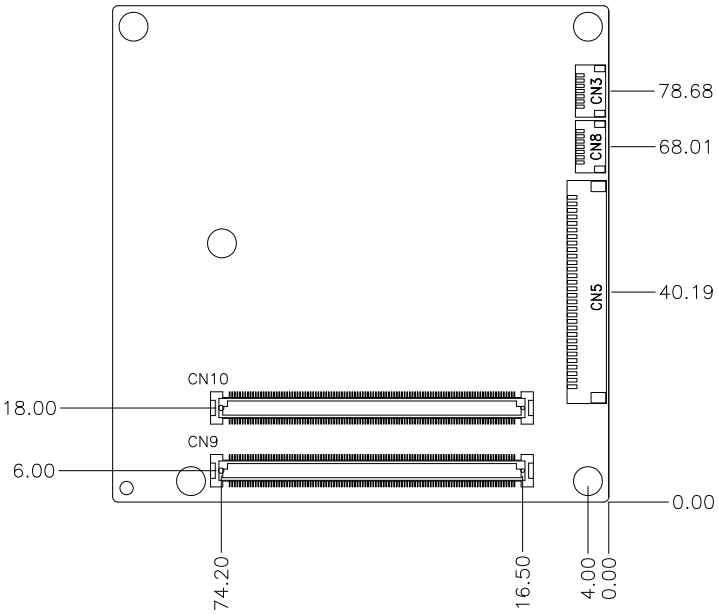

CN3
CN8
CN5
CN10
CN9
78.68
68.01
40.19
18.00
6.00
0.00
74.20
16.50
4.00
0.00

2.3 Mechanical Drawing

Component Side



Solder Side


CN3
CN8
CN5
CN10
CN9
78.68
68.01
40.19
18.00
6.00
0.00
74.20
16.50
4.00
0.00

2.4 List of Jumpers

The board has a number of jumpers that allow you to configure your system to suit your application.

The table below shows the function of each of the board's jumpers:

Jumpers

Label	Function
SW1	DP0 selection/DP1 selection
SW2	Power type selection/RTC Clear/DDR3 Voltage selection/LVDS backlight selection

2.5 List of Connectors

The board has a number of connectors that allow you to configure your system to suit your application. The table below shows the function of each board's connectors:

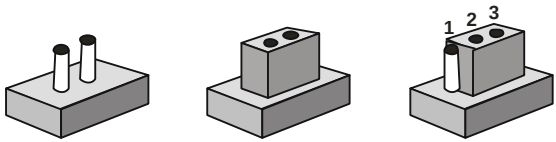
Connectors

Label	Function
CN1	AMD Debug Connector
CN2	FAN Connector
CN3	SPI BIOS Program Connector
CN4	Battery Connector
CN5	EDP/LVDS Connector
CN6	LVDS Backlight Connector
CN7	LPC Connector
CN8	SPI EC Program Connector
CN9	ROW_AB Connector
CN10	ROW_CD Connector
DIMM1	DDR3 SODIMM Connector

2.6 Setting Jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip.

To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



Open **Closed** **Closed 2-3**

A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

2.7 DP0 (DDI1) Selection/DP1 (DDI2) Selection (SW1)

DP0	Function: DP
1 Off	
2 Off	

DP0	Function: HDMI/DVI
1 Off	
2 On	

DP0	Function: eDP
1 On	
2 Off	

DP0	Function: 18 bit Single CH LVDS
1 On	
2 On	

DP1	Function: CH7511B (24 bit dual CH LVDS)
3 Off	
4 Off	

DP1	Function: DP
3 On	
4 Off	

DP1	Function: HDMI/DVI
3 On	
4 On	

2.8 Power Type Selection/RTC Clear/DDR3 Voltage Selection/LVDS Backlight Selection (SW2)

SW2	Function
1 On	ATX (Default)
1 Off	AT
2 On	RTC Clear
2 Off	RTC reserved (Default)
3 On	DDR3 +1.35V (Default)
3 Off	DDR3 +1.5V
4 On	18BIT LVDS PWM Control Backlight
4 Off	18BIT LVDS Voltage Control Backlight (Default)

2.9 AMD Debug Connector (CN1)

Reserved for advanced debug

2.10 FAN connector (CN2)

Pin	Signal
1	FAN_TACH0
2	FAN POWER (+12V)
3	GND

2.11 SPI BIOS Program connector (CN3)

Pin	Signal
1	SPI_DATAIN_F
2	GND
3	SPI_CLK_F
4	+3V3_SPI
5	SPI_DATAOUT_F

6	SPI_CS#_F
7	NC

2.12 Battery Connector (CN4)

Pin	Signal
1	+3V From battery
2	GND

2.13 EDP/18BIT LVDS Connector (CN5)

Pin	Signal
1	+3.3V with Fuse
2	+3.3V with Fuse
3	GND
4	GND
5	EDP_TX2_N (18BIT LVDS: L0N)
6	EDP_TX2_P (18BIT LVDS: L0P)
7	GND
8	EDP_TX1_N (18BIT LVDS: L1N)
9	EDP_TX1_P (18BIT LVDS: L1P)
10	GND
11	EDP_TX0_N (18BIT LVDS: L2N)
12	EDP_TX0_P (18BIT LVDS: L2P)
13	GND
14	EDP_TX3_N (18BIT LVDS: CLKN)
15	EDP_TX3_P (18BIT LVDS: CLKP)
16	GND
17	EDP_AUX_N (18BIT LVDS: NC)
18	EDP_AUX_P (18BIT LVDS: NC)

19	GND
20	PWM
21	VOL_CON
22	BLON
23	EDP_HPD
24	GND
25	GND
26	GND
27	+12V with Fuse
28	+12V with Fuse
29	+12V with Fuse
30	+12V with Fuse

2.14 18BIT LVDS Connector (CN6)

Pin	Signal
1	+12V with Fuse
2	VOL_PWM (SW2 POS 4)
3	GND
4	GND
5	BLON

2.15 LPC Connector (CN7)

Pin	Signal
1	LPC AD0
2	LPC AD1
3	LPC AD2
4	LPC AD3
5	+3.3V

6	LPC FRAME#
7	LPC_RST#
8	GND
9	LPC CLK1
10	LPC DRQ0
11	NC
12	SERIRQ

2.16 SPI EC Program connector (CN8)

Pin	Signal
1	FMISO_F
2	GND
3	FSCK_F
4	+3V3_EC
5	FMOSI_F
6	FSCE#_F
7	NC

2.17 ROW_AB connector (CN9)

COM Type 6 ROW AB Connector

2.18 ROW_CD connector (CN10)

COM Type 6 ROW CD Connector

2.19 DDR3 SODIMM Connector (DIMM1)

Standard DDR3 SODIMM Connector

Below Table for China RoHS Requirements
产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板及其电子组件	×	○	○	○	○	○
外部信号连接器及线材	×	○	○	○	○	○

O：表示该有毒有害物质在该部件所有均质材料中的含量均在 **SJT 11363-2006** 标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 **SJT 11363-2006** 标准规定的限量要求。

备注：此产品所标示之环保使用期限，系指在一般正常使用状况下。

Chapter

3

AMI BIOS Setup

3.1 System Test and Iinitialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors.

System configuration verification

These routines check the current system configuration stored in the CMOS memory and BIOS NVRAM. If system configuration is not found or system configuration data error is detected, system will load optimized default and re-boot with this default system configuration automatically.

There are four situations in which you will need to setup system configuration:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The system configuration is reset by Clear-CMOS jumper
4. The CMOS memory has lost power and the configuration information has been erased.

The COM-KB CMOS memory has an integral lithium battery backup for data retention. You have to replace the battery when it finally runs down.

3.2 AMI BIOS Setup

AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM and BIOS NVRAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press <Del>or <F2> immediately. This will allow you to enter Setup.

Main

Set the date, use tab to switch between date elements.

Advanced

Enable disable boot option for legacy network devices.

Chipset

Host bridge parameters.

Boot

Enables/disable quiet boot option.

Security

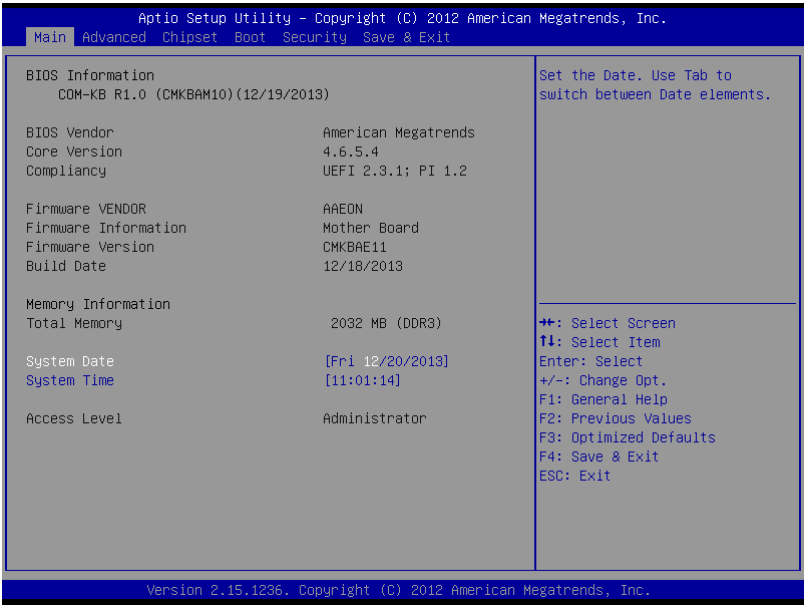
Set setup administrator password.

Save & Exit

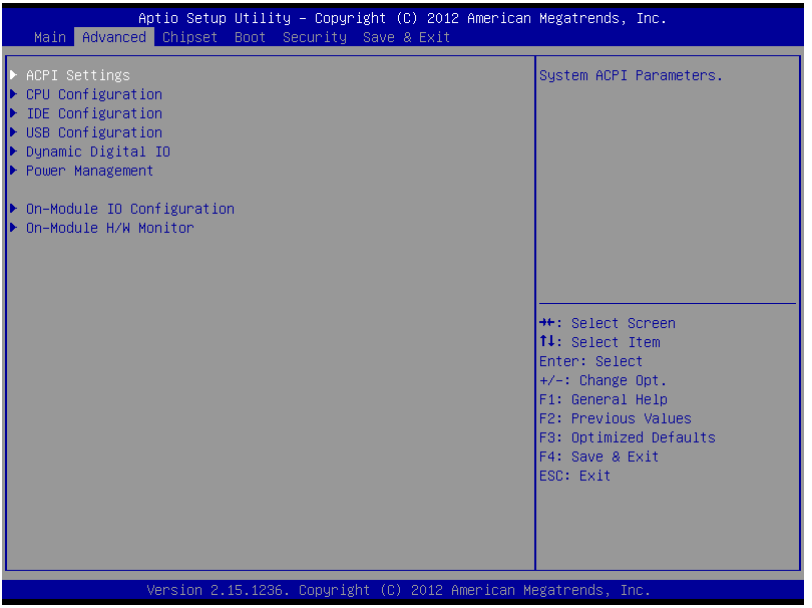
Exit system setup after saving the changes.

Setup Menu

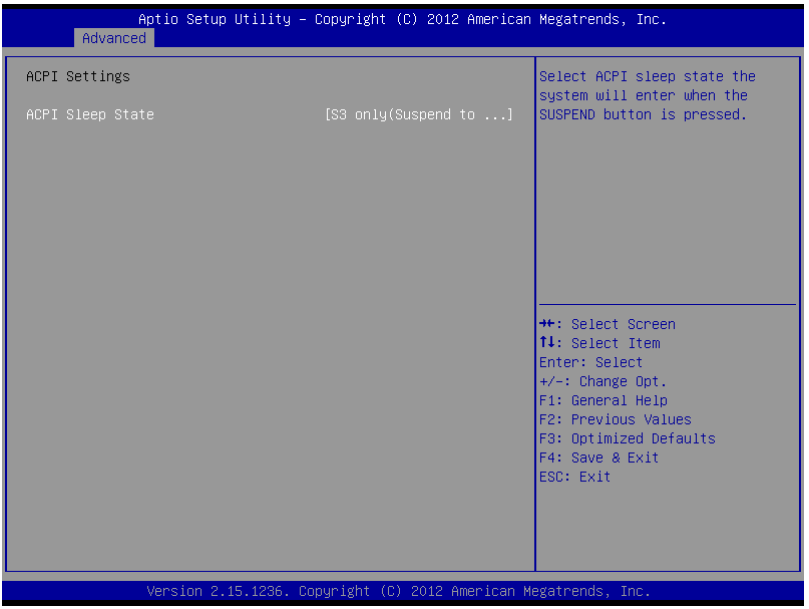
Setup submenu: Main



Setup submenu: Advanced



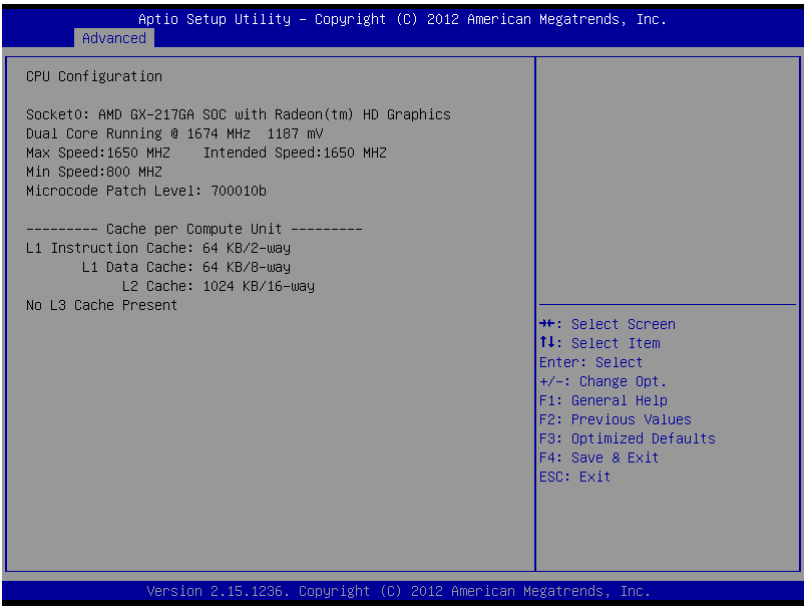
ACPI Settings



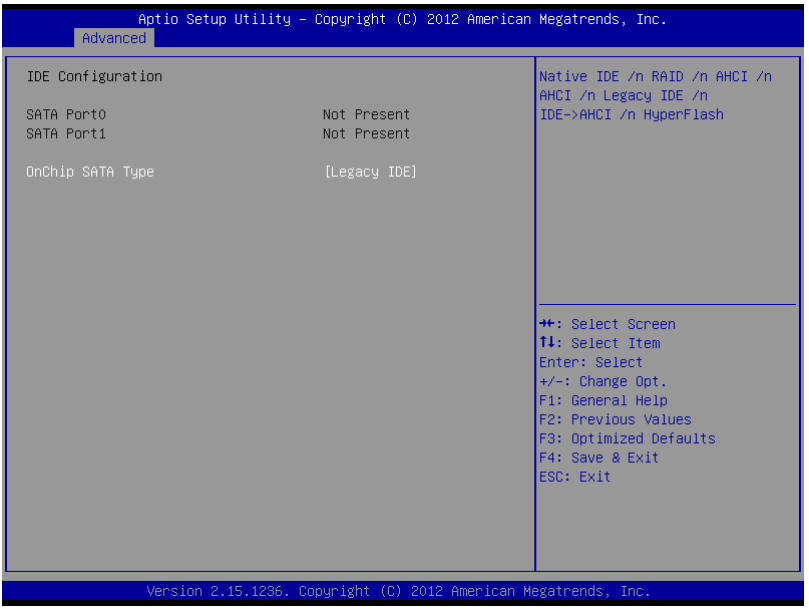
Options summary:

ACPI Sleep State	S3 only (Suspend to RAM)	Optimal Default, Failsafe Default
Select the ACPI state used for System Suspend		

CPU Configuration



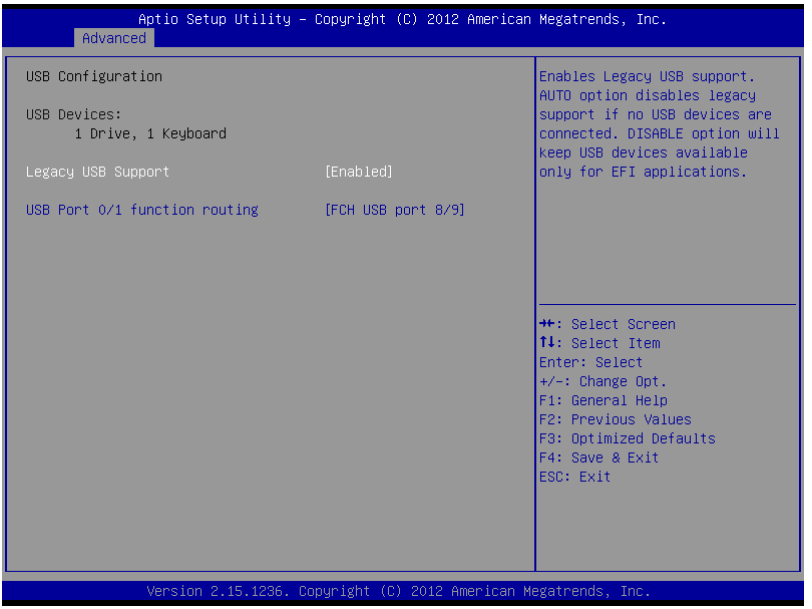
IDE Configuration (IDE)



Options summary:

OnChip SATA Type	Legacy IDE	Optimal Default, Failsafe Default
	AHCI	

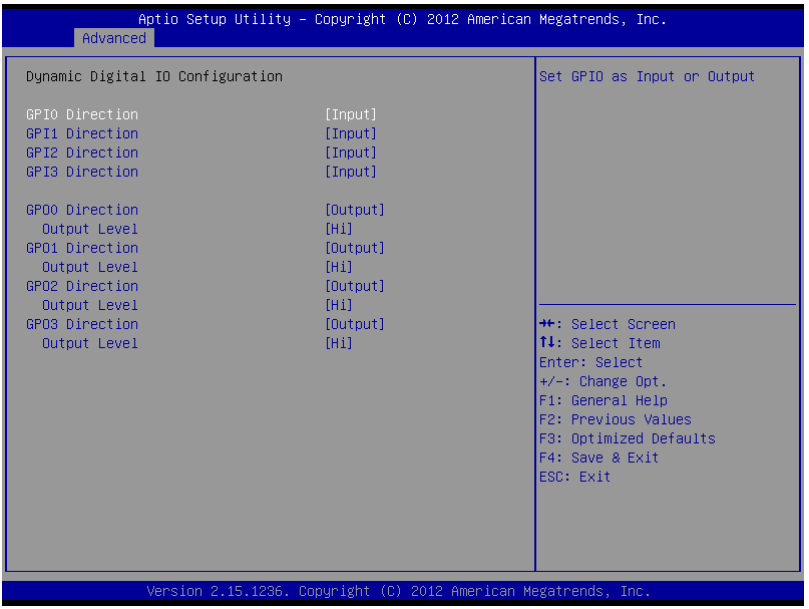
USB Configuration



Options summary:

Legacy USB Support	Enabled	Optimal Default, Failsafe Default
	Disabled	
	Auto	
Enables BIOS Support for Legacy USB Support. When enabled, USB can be functional in legacy environment like DOS. AUTO option disables legacy support if no USB devices are connected		
Device Name (Emulation Type)	Auto	Optimal Default, Failsafe Default
	Floppy	
	Forced FDD	
	Hard Disk	
	CDROM	
If Auto. USB devices less than 530MB will be emulated as Floppy and remaining as Floppy and remaining as hard drive. Forced FDD option can be used to force a HDD formatted drive to boot as FDD(Ex. ZIP drive)		
USB Port 0/1 function routing	FCH USB port 8/9	Optimal Default, Failsafe Default
	FCH USB port 0/1	

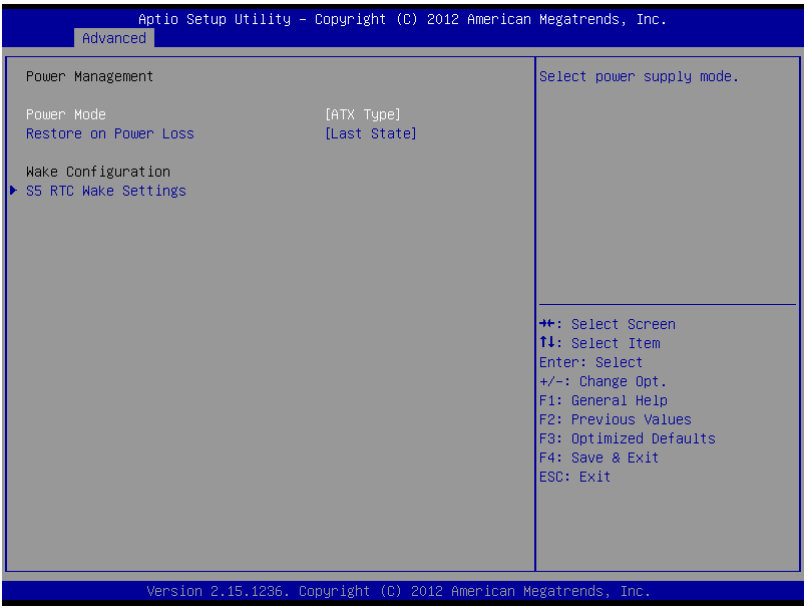
Dynamic Digital IO



Options summary:

GPI0~GPI3 Direction	Input	Optimal Default, Failsafe Default
	Output	
Set GPIO as Input or Output		
GPO0~GPI3 Direction	Input	Optimal Default, Failsafe Default
	Output	
Set GPIO as Input or Output		
Output Level	Hi	Optimal Default, Failsafe Default
	Low	
Set GPIO Output as Hi or Low		

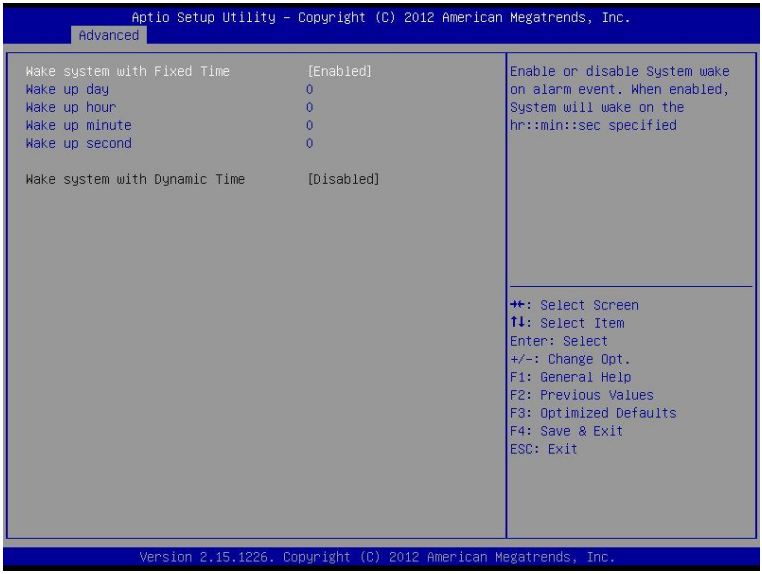
Power Management



Options summary:

Power Mode	ATX Type	Optimal Default, Failsafe Default
	AT Type	
Select power supply mode.		
Restore on Power Loss	Last State	Optimal Default, Failsafe Default
	Power On	
	Power Off	
Select power state when power is re-applied after a power failure.		

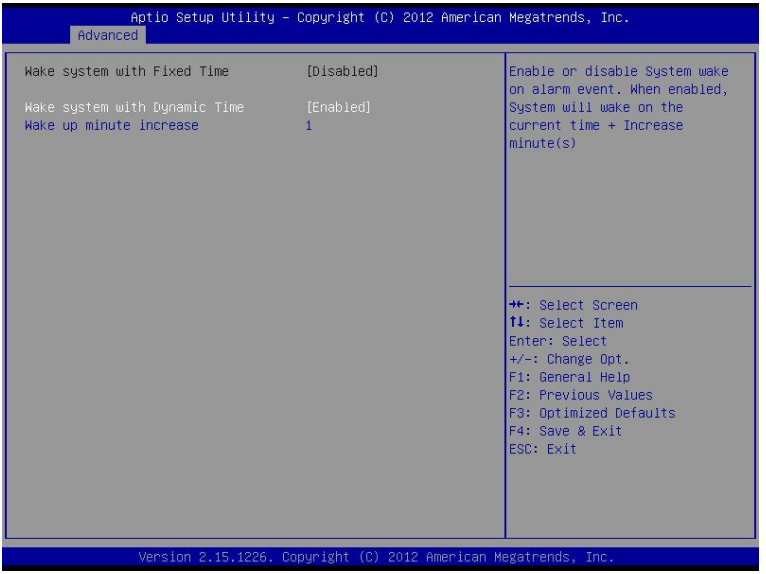
S5 RTC Wake Settings (Fixed Time)



Options summary:

Wake system with Fixed Time	Disabled	Optimal Default, Failsafe Default
	Enabled	
En/Disable System wake on alarm event. When enabled, System will wake on the hr:min:sec specified		
Wake up day	0-31	Default 0
Select 0 for daily system wake up, 1-31 for witch day of the moth that you would like the system to wake up.		
Wake up day	0-23	Default 0
Select 0-23 For example enter 3 for 3am and 15 for 3pm		
Wake up day	0-59	Default 0
Select 0-59		
Wake up day	0-59	Default 0
Select 0-59		

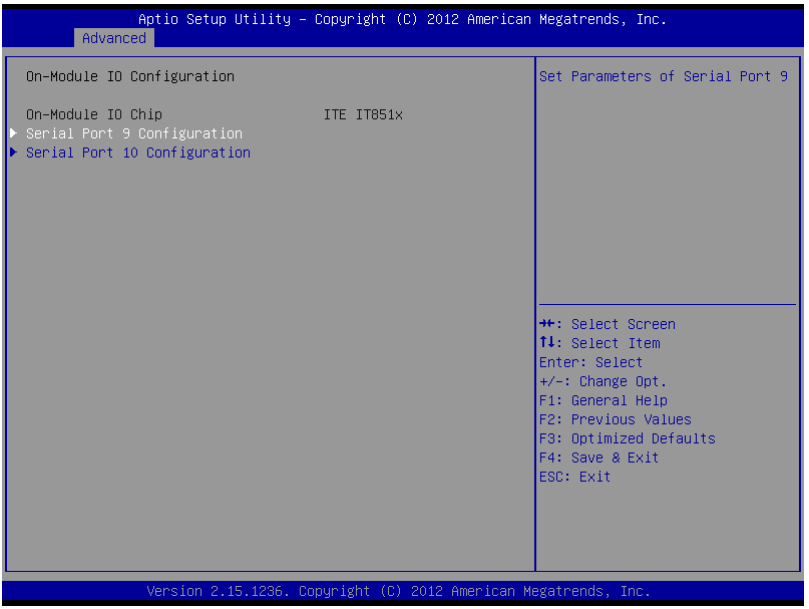
S5 RTC Wake Settings (Dynamic Time)



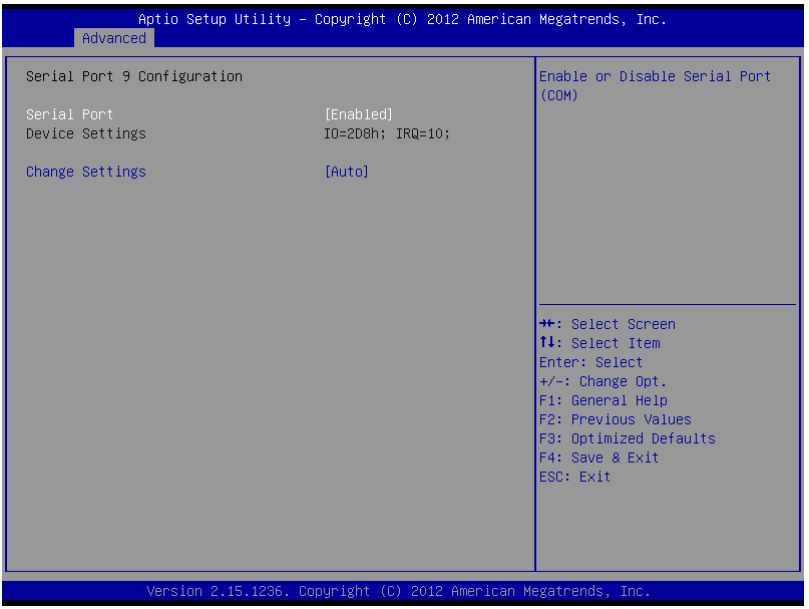
Options summary:

Wake system with Dynamic Time	Disabled	Optimal Default, Failsafe Default
	Enabled	
En/Disable System wake on alarm event. When enabled, System will wake on current time + Increases minutese(s)		
Wake up day	1-5	Default 1
Select 1-5		

On-Module IO Configuration



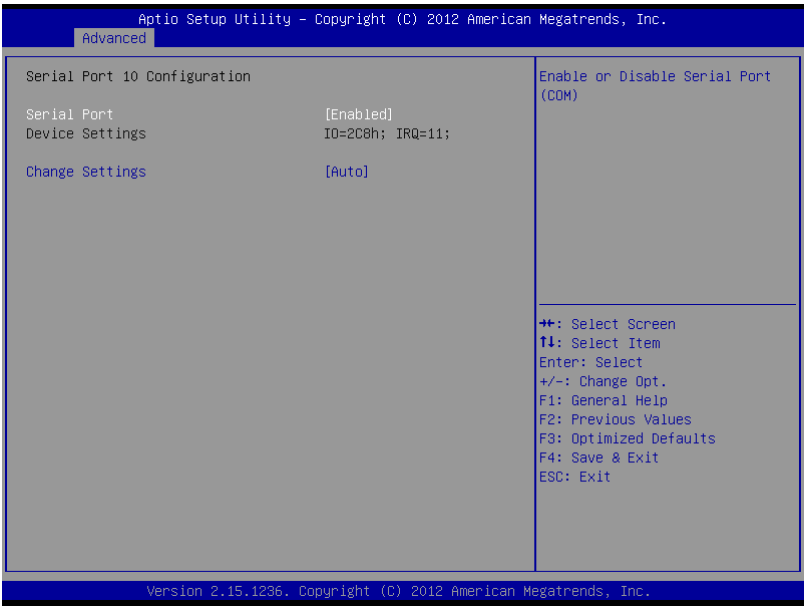
Serial Port 9 Configuration



Options summary:

Serial Port	Disabled	
	Enabled	Optimal Default, Failsafe Default
En/Disable Serial Port (COM)		
Change Settings	Auto	Optimal Default, Failsafe Default
	IO=2D8; IRQ=10;	
	IO=2C8; IRQ=11;	
Select an optimal setting for IO device		

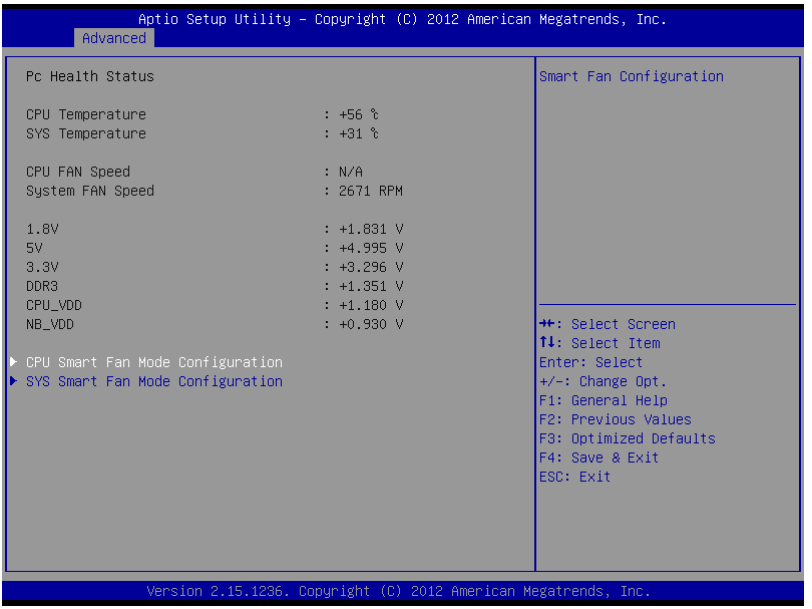
Serial Port 10 Configuration



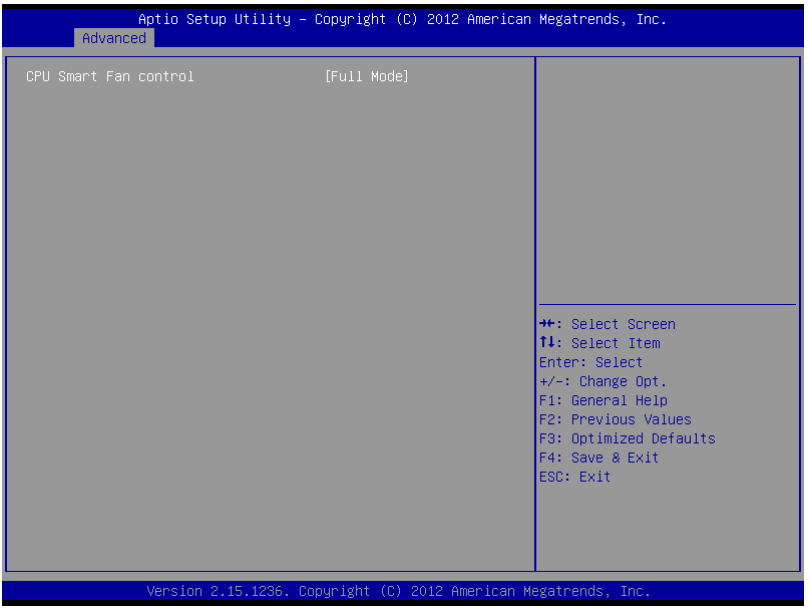
Options summary:

Serial Port	Disabled	
	Enabled	Optimal Default, Failsafe Default
En/Disable Serial Port (COM)		
Change Settings	Auto	Optimal Default, Failsafe Default
	IO=2C8; IRQ=11;	
	IO=2D8; IRQ=10;	
Select an optimal setting for IO device		

On-Module H/W Monitor



CPU Smart Fan Mode Configuration(Full Mode)



Options summary:

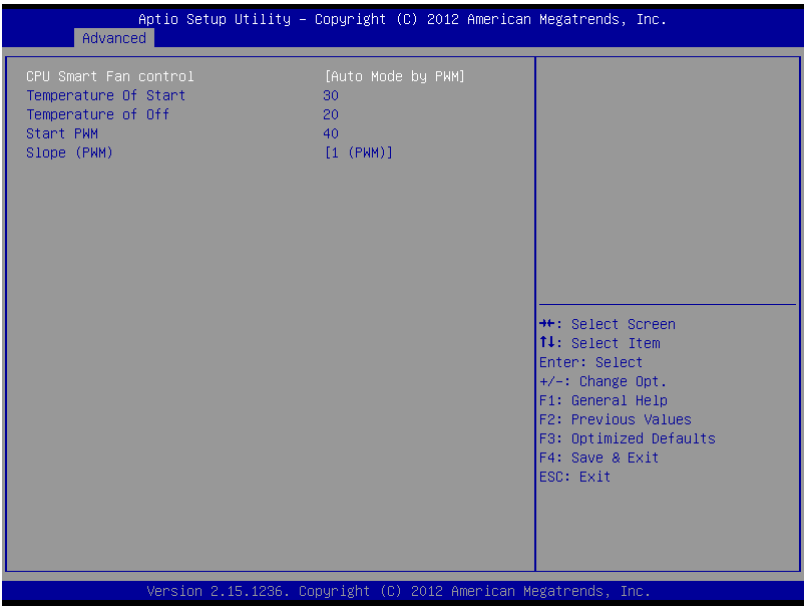
CPU Smart Fan control	Full Mode	Optimal Default, Failsafe Default
	Manual Mode by PWM	
	Auto Mode by PWM	

CPU Smart Fan Mode Configuration(Manual Mode by PWM)

Options summary:

Manual Setting	70	Optimal Default, Failsafe Default
	0 - 100	
Set Fan at fixed Duty-Cycle Min=0 Max=100 Please input Decimal number		

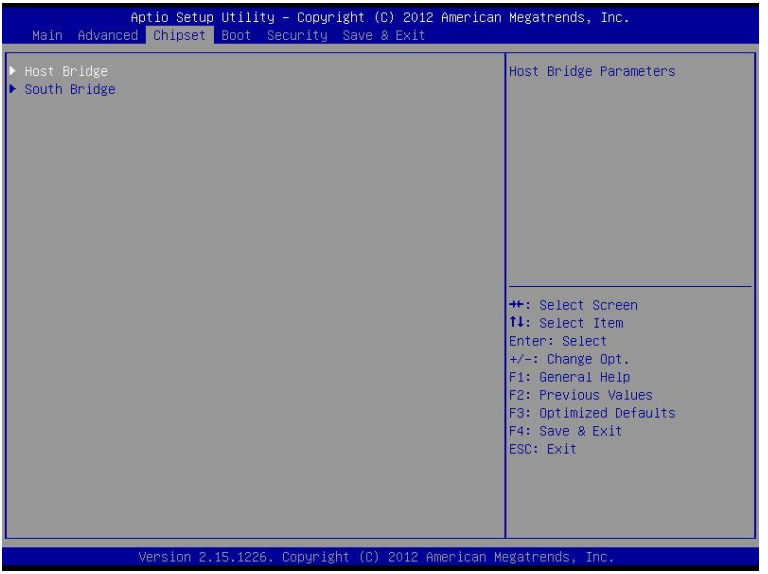
CPU Smart Fan Mode Configuration(Auto Mode by PWM)



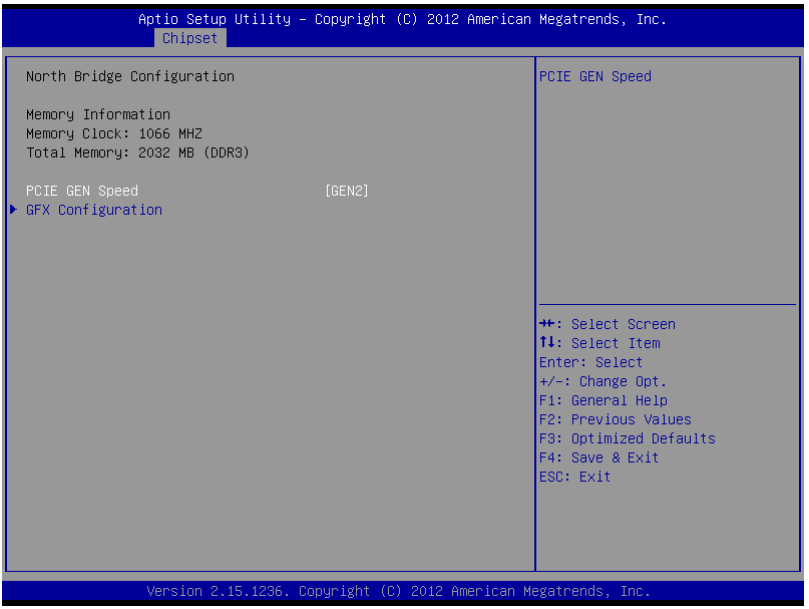
Options summary:

Temperature Of Start	30	Optimal Default, Failsafe Default
Temperature Of Off	20	Optimal Default, Failsafe Default
Start PWM	40	Optimal Default, Failsafe Default
Slop (PWM)	1 (PWM)	Optimal Default, Failsafe Default

Setup submenu: Chipset



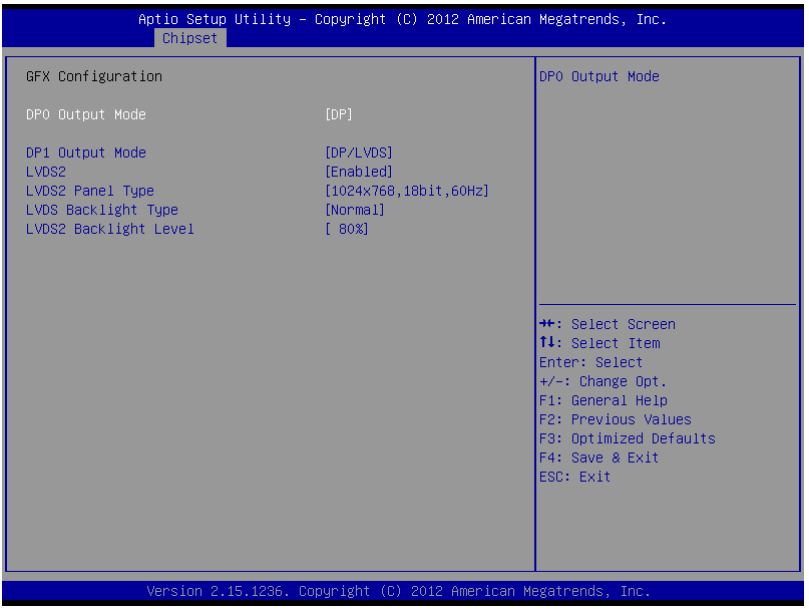
North Bridge



Options summary:

PCIE GEN Speed	GEN1	
	GEN2	Optimal Default, Failsafe Default
PCIE GEN speed		

GFX Configuration

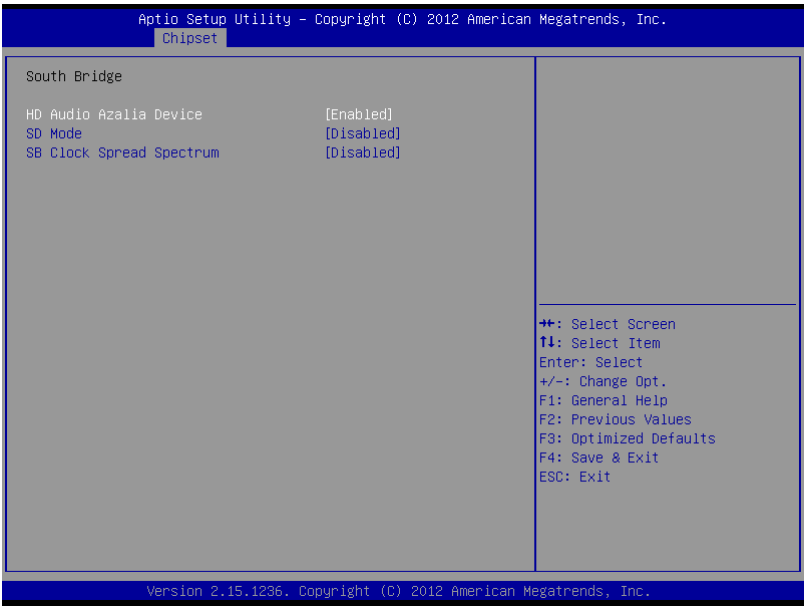


Options summary:

DP0 Output Mode	DP	Optimal Default, Failsafe Default
	eDP	
	Single Link DVI-D	
	HDMI	
	LVDS	
EDID Panel Support (When DP0 Output Mode set to LVDS)	Disabled	Optimal Default, Failsafe Default
	Enabled	
DP1 Output Mode	DP/LVDS	Optimal Default, Failsafe Default
	Single Link DVI-D	
	HDMI	

LVDS (LVDS2)	Disabled	
	Enabled	Optimal Default, Failsafe Default
LVDS (LVDS2) Panel Type	640x480,18bit,60Hz	
	800x480,18bit,60Hz	
	800x600,18bit,60Hz	
	1024x600,18bit,60Hz	
	1024x768,18bit,60Hz	Optimal Default, Failsafe Default
	1024x768,24bit,60Hz	
	1280x768,24bit,60Hz	
	1280x1024,48bit,60Hz	
	1366x768,24bit,60Hz	
	1440x900,48bit,60Hz	
	1600x1200,48bit,60Hz	
	1920x1080,48bit,60Hz	
	1920x1200,48bit,60Hz	
LVDS (LVDS2) Backlight Type	Normal	Optimal Default, Failsafe Default
	Inverted	
LVDS (LVDS2) Backlight Level	100%	
	90%	
	80%	Optimal Default, Failsafe Default
	70%	
	60%	
	50%	
	40%	
	30%	
	20%	
	10%	
	0%	

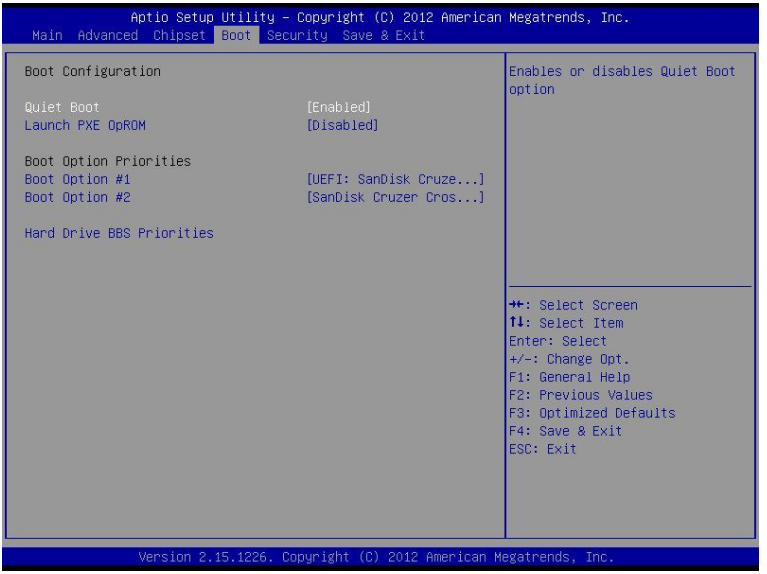
South Bridge



Options summary:

HD Audio Azalia Device	Enabled	Optimal Default, Failsafe Default
	Disabled	
SD Mode	Disabled	Optimal Default, Failsafe Default
	ADMA	
	DMA	
	PIO	
SB Clock Spread Spectrum	Disabled	Optimal Default, Failsafe Default
	Enabled	

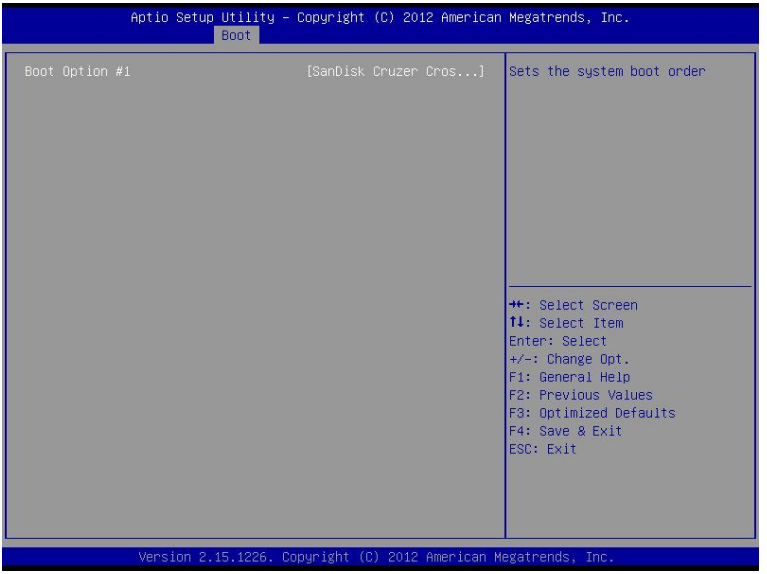
Setup submenu: Boot



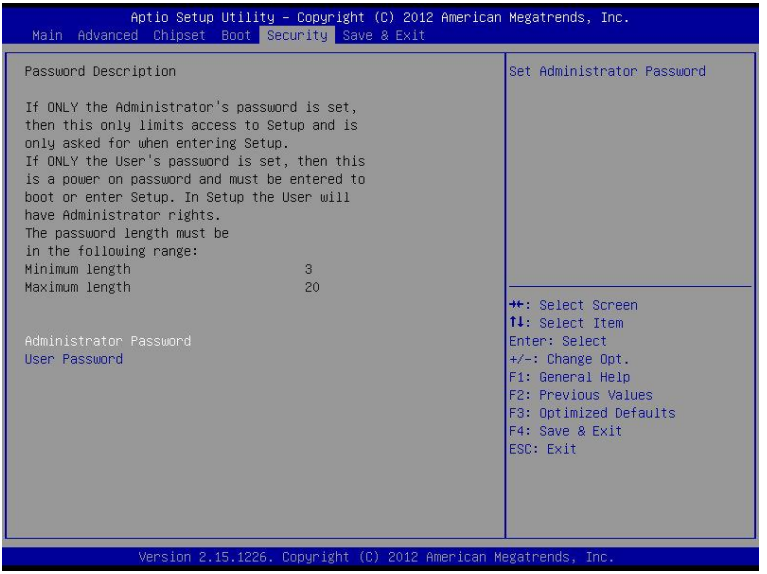
Options summary:

Bootup NumLock State	On	Default
	Off	
Select the keyboard NumLock state		
Quiet Boot	Disabled	
	Enabled	Default
En/Disable showing boot logo.		
Launch I82579LM PXE OpROM	Disabled	Default
	Enabled	
En/Disable Legacy Boot Option for I82579LM.		
Launch I82583V PXE OpROM	Disabled	Default
	Enabled	
En/Disable Legacy Boot Option for I82583V.		
Option ROM Messages	Force BIOS	Default
	Keep Current	
Set display mode for Option ROM.		
INT19 Trap Response	Immediate	Default
	Postponed	
BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE – execute the trap right away; POSTPONED – execute the trap during legacy boot.		

BBS Priorities



Security



Change User/Supervisor Password

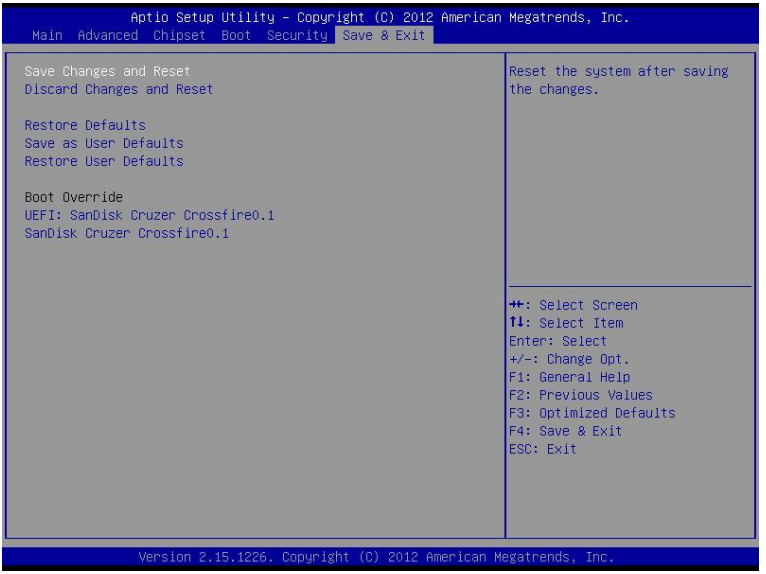
You can install a Supervisor password, and if you install a supervisor password, you can then install a user password. A user password does not provide access to many of the features in the Setup utility.

If you highlight these items and press Enter, a dialog box appears which lets you enter a password. You can enter no more than six letters or numbers. Press Enter after you have typed in the password. A second dialog box asks you to retype the password for confirmation. Press Enter after you have retyped it correctly. The password is required at boot time, or when the user enters the Setup utility.

Removing the Password

Highlight this item and type in the current password. At the next dialog box press Enter to disable password protection.

Setup submenu: Exit



Chapter

4

Driver Installation

.

The COM-KB comes with an AutoRun DVD-ROM that contains all drivers and utilities that can help you to install the driver automatically.

Insert the driver DVD, the driver DVD-title will auto start and show the installation guide. If not, please follow the sequence below to install the drivers.

Follow the sequence below to install the drivers:

Step 1 – Install Chipset & Display Driver

Step 2 – Install LAN Driver

Step 3 – Install Audio Driver

Step 4 – Install Serial Port Driver (Optional)

Please read instructions below for further detailed installations.

4.1 Installation:

Insert the COM-KB DVD-ROM into the DVD-ROM drive. And install the drivers from Step 1 to Step 4 in order.

Step 1 – Install Chipset & Display Driver

1. Click on the ***Step1 - Chipset & Display*** folder and select the OS folder your system is
2. Double click on the ***Setup.exe*** file
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

Step 2–Install LAN Driver

1. Click on the ***Step2- LAN*** folder and select the OS folder your system is
2. Double click on the ***Setup.exe*** file located in each OS folder
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

Step 3–Install Audio Driver

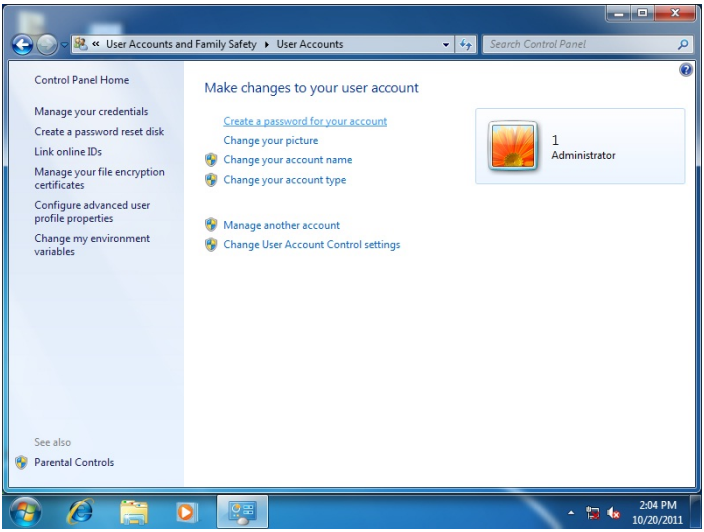
1. Click on the ***Step3- Audio*** folder and select the OS folder your system is
2. Double click on the ***Setup.exe*** file
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

Step 4– Install Serial Port Driver

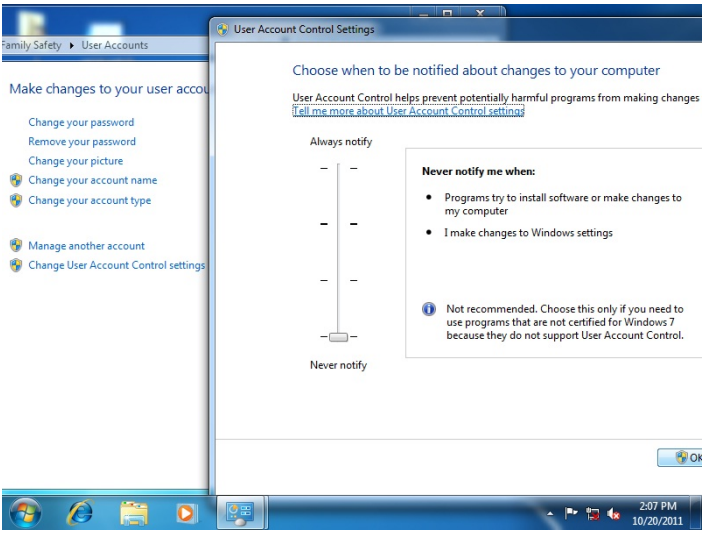
For Windows® XP 32-bit, select the folder of ***WINXP_32*** and double click on the ***patch.bat***

For Windows® 7, please refer to the installation procedures below.

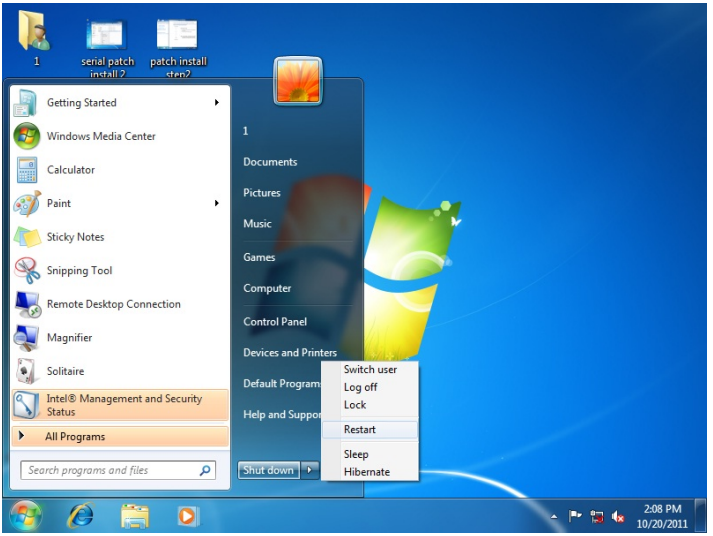
1. Create a password for Administrator account.



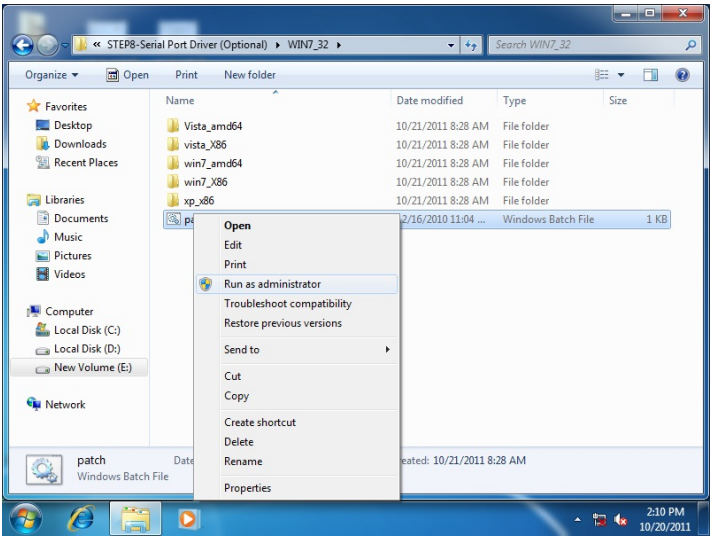
2. Change User Account Control Settings to [Never notify]

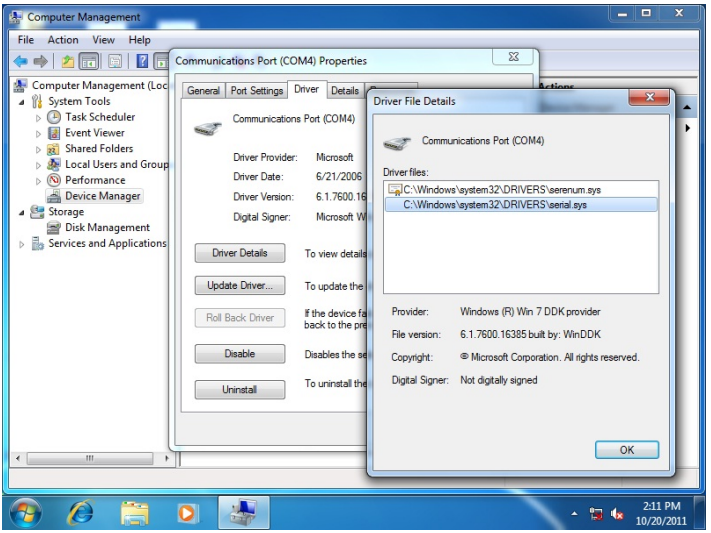


3. Reboot and Administrator login.



4. To run patch.bat with [Run as administrator].





Appendix

A

Programming the Watchdog Timer

A.1 Watchdog Timer Initial Program

Table 1 : Embedded BRAM relative register table		
	Default Value	**Note**
Index	**0x284**(Note1)	BRAM Index Register
Data	**0x285**(Note2)	BRAM Data Register
Logical Device Number	**0xA8**(Note3)	Watch dog Logical Device Number
Function and Device Number	**0x00**(Note4)	Watch dog Function/Device Number

Table 2 : Watchdog relative register table				
	Option Register	**BitNum**	**Value**	**Note**
Timer Counter	**0x00**(Note5)		(Note10)	Time of watchdog timer (0~255)
Counting Unit	**0x01**(Note6)	**0**(Note7)	**0**(Note11)	Select time unit. 0: second 1: minute
Watchdog RST pulse width	**0x01**(Note8)	**[3:2]**(Note9)	**0**(Note12)	0: 20ms 1: 60ms 2: 100ms 3: 250ms

```
**********************************************************************************
// Embedded BRAM relative definition (Please reference to Table 1)
#define byte    EcBRAMIndex    //This parameter is represented from Note1
#define byte    EcBRAMData     //This parameter is represented from Note2
#define byte    BRAMLDNReg     //This parameter is represented from Note3
#define byte    BRAMFnDataReg  //This parameter is represented from Note4
#define   void  EcBRAMWriteByte(byte Offset, byte Value);
#define   byte  EcBRAMReadByte(byte Offset);
#define   void  IOWriteByte(byte Offset, byte Value);
#define   byte  IOReadByte(byte Offset);
// Watch Dog relative definition (Please reference to Table 2)
#define byte    TimerReg    //This parameter is represented from Note5
#define byte    TimerVal    // This parameter is represented from Note10
#define byte    UnitReg     //This parameter is represented from Note6
#define byte    UnitBit     //This parameter is represented from Note7
#define byte    UnitVal     //This parameter is represented from Note11
#define byte    RSTReg      //This parameter is represented from Note8
#define byte    RSTBit      //This parameter is represented from Note9
#define byte    RSTVal      //This parameter is represented from Note12
**********************************************************************************
```

```
**********************************************************************************
VOID   Main(){
        // Procedure : AaeonWDTConfig
        // (byte)Timer : Time of WDT timer.(0x00~0xFF)
        // (boolean)Unit : Select time unit(0: second, 1: minute).
        AaeonWDTConfig();

        // Procedure : AaeonWDTEnable
        // This procudure will enable the WDT counting.
        AaeonWDTEnable();
}
**********************************************************************************
```

```
*********************************************************************************
// Procedure : AaeonWDTEnable
VOID   AaeonWDTEnable (){
        WDTEnableDisable(1);
}

// Procedure : AaeonWDTConfig
VOID   AaeonWDTConfig (){
        // Disable WDT counting
        WDTEnableDisable(0);
        // WDT relative parameter setting
        WDTParameterSetting();
}

VOID   WDTEnableDisable(byte Value){
        ECBRAMWriteByte(TimerReg , Value);
}

VOID   WDTParameterSetting(){
        Byte TempByte;

        // Watchdog Timer counter setting
        ECBRAMWriteByte(TimerReg , TimerVal);
        // WDT counting unit setting
        TempByte = ECBRAMReadByte(UnitReg);
        TempByte |= (UnitVal << UnitBit);
        ECBRAMWriteByte(UnitReg , TempByte);
        // WDT RST pulse width setting
        TempByte = ECBRAMReadByte(RSTReg);
        TempByte |= (RSTVal << RSTBit);
        ECBRAMWriteByte(RSTReg , TempByte);
}
*********************************************************************************
```

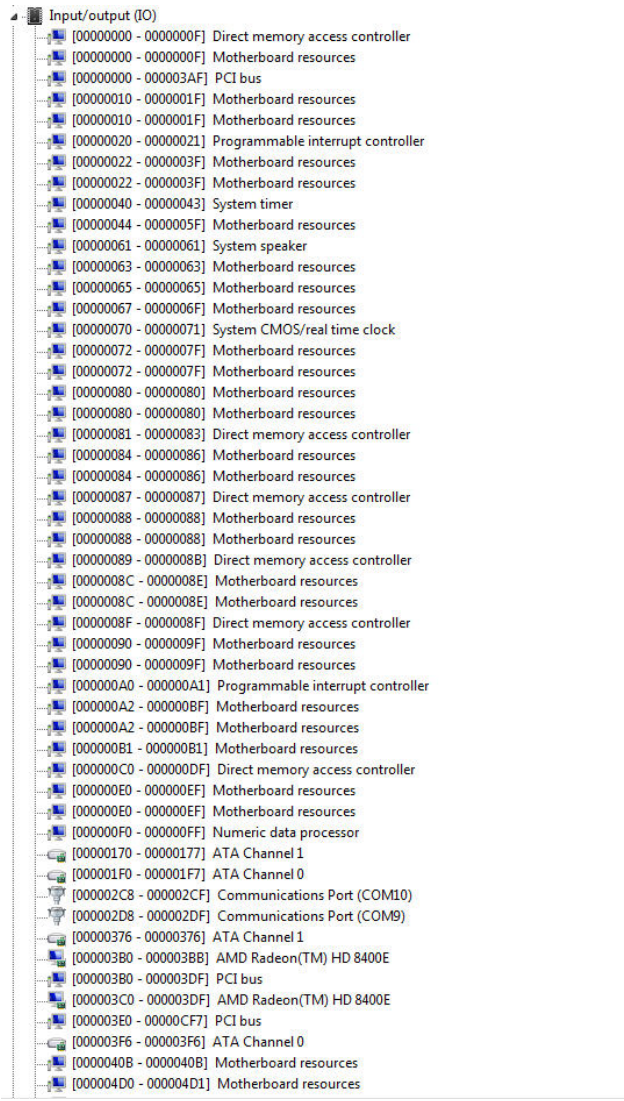
```
*****************************************************************************
VOID   ECBRAMWriteByte(byte OPReg, byte OPBit, byte Value){
         IOWriteByte(EcBRAMIndex, 0x10);
         IOWriteByte(EcBRAMData, BRAMLDNReg);
         IOWriteByte(EcBRAMIndex, 0x11);
         IOWriteByte(EcBRAMData, BRAMFnDataReg);

         IOWriteByte(EcBRAMIndex, 0x13 + OPReg);
         IOWriteByte(EcBRAMData, Value);

         IOWriteByte(EcBRAMIndex, 0x12);
         IOWriteByte(EcBRAMData, 0x30);          //Write start
}

Byte   ECBRAMReadByte(byte OPReg){
         IOWriteByte(EcBRAMIndex, 0x10);
         IOWriteByte(EcBRAMData, BRAMLDNReg);
         IOWriteByte(EcBRAMIndex, 0x11);
         IOWriteByte(EcBRAMData, BRAMFnDataReg);

         IOWriteByte(EcBRAMIndex, 0x12);
         IOWriteByte(EcBRAMData, 0x10);          //Read start

         IOWriteByte(EcBRAMIndex, 0x13 + OPReg);
         Return   IOReadByte(EcBRAMData, Value);
}
*****************************************************************************
```

Appendix

B

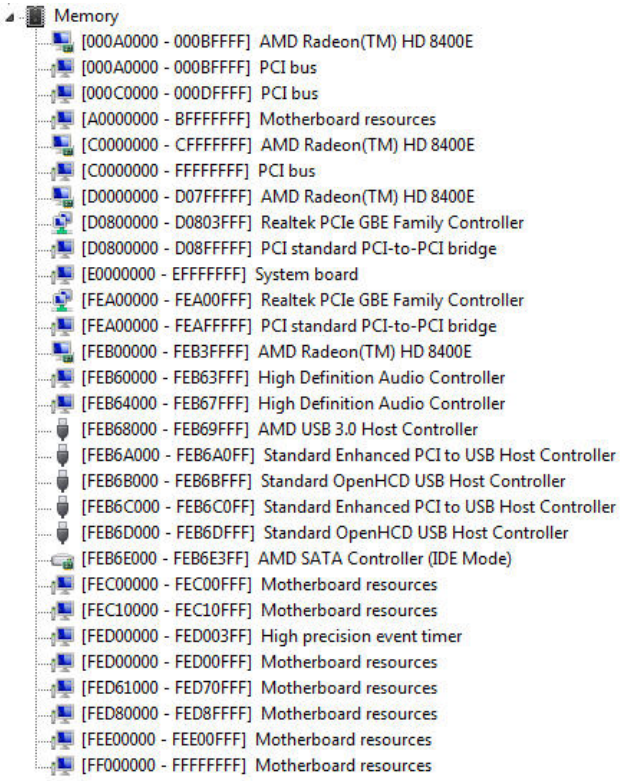
I/O Information

B.1 I/O Address Map

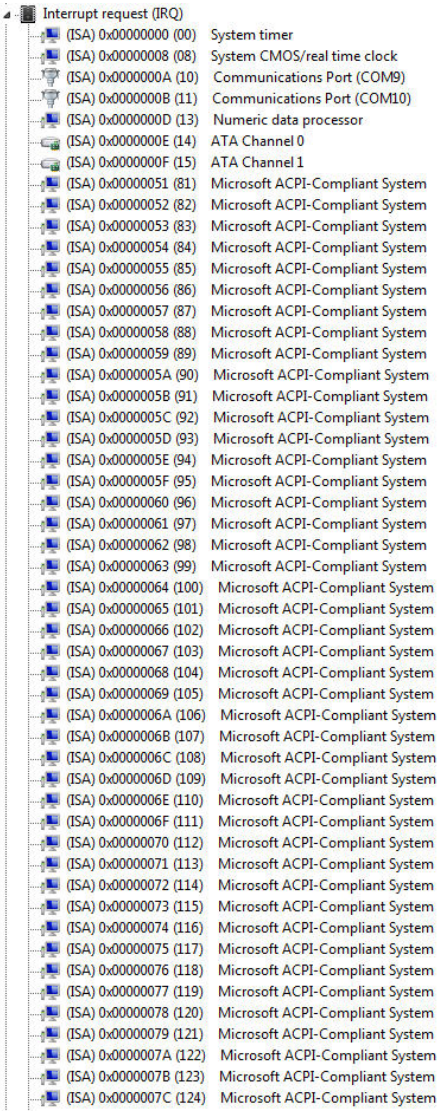


- [00000088 - 00000088] Motherboard resources
- [00000089 - 0000008B] Direct memory access controller
- [0000008C - 0000008E] Motherboard resources
- [0000008C - 0000008E] Motherboard resources
- [0000008F - 0000008F] Direct memory access controller
- [00000090 - 0000009F] Motherboard resources
- [00000090 - 0000009F] Motherboard resources
- [000000A0 - 000000A1] Programmable interrupt controller
- [000000A2 - 000000BF] Motherboard resources
- [000000A2 - 000000BF] Motherboard resources
- [000000B1 - 000000B1] Motherboard resources
- [000000C0 - 000000DF] Direct memory access controller
- [000000E0 - 000000EF] Motherboard resources
- [000000E0 - 000000EF] Motherboard resources
- [000000F0 - 000000FF] Numeric data processor
- [00000170 - 00000177] ATA Channel 1
- [000001F0 - 000001F7] ATA Channel 0
- [000002C8 - 000002CF] Communications Port (COM10)
- [000002D8 - 000002DF] Communications Port (COM9)
- [00000376 - 00000376] ATA Channel 1
- [000003B0 - 000003BB] AMD Radeon(TM) HD 8400E
- [000003B0 - 000003DF] PCI bus
- [000003C0 - 000003DF] AMD Radeon(TM) HD 8400E
- [000003E0 - 00000CF7] PCI bus
- [000003F6 - 000003F6] ATA Channel 0
- [0000040B - 0000040B] Motherboard resources
- [000004D0 - 000004D1] Motherboard resources
- [000004D0 - 000004D1] Motherboard resources
- [000004D6 - 000004D6] Motherboard resources
- [00000800 - 0000089F] Motherboard resources
- [00000900 - 0000090F] Motherboard resources
- [00000910 - 0000091F] Motherboard resources
- [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
- [0000E000 - 0000E0FF] Realtek PCIe GBE Family Controller
- [0000E000 - 0000EFFF] PCI standard PCI-to-PCI bridge
- [0000F000 - 0000F0FF] AMD Radeon(TM) HD 8400E
- [0000F100 - 0000F10F] AMD SATA Controller (IDE Mode)
- [0000FE00 - 0000FEFE] Motherboard resources

B.2 Memory Address Map



B.3 IRQ Mapping Chart



(ISA) 0x0000007C (124) Microsoft ACPI-Compliant System
(ISA) 0x0000007D (125) Microsoft ACPI-Compliant System
(ISA) 0x0000007E (126) Microsoft ACPI-Compliant System
(ISA) 0x0000007F (127) Microsoft ACPI-Compliant System
(ISA) 0x00000080 (128) Microsoft ACPI-Compliant System
(ISA) 0x00000081 (129) Microsoft ACPI-Compliant System
(ISA) 0x00000082 (130) Microsoft ACPI-Compliant System
(ISA) 0x00000083 (131) Microsoft ACPI-Compliant System
(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) 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) 0x00000010 (16) High Definition Audio Controller
(PCI) 0x00000011 (17) Standard Enhanced PCI to USB Host Controller
(PCI) 0x00000011 (17) Standard Enhanced PCI to USB Host Controller
(PCI) 0x00000012 (18) Standard OpenHCD USB Host Controller
(PCI) 0x00000012 (18) Standard OpenHCD USB Host Controller
(PCI) 0x00000018 (24) PCI standard PCI-to-PCI bridge
(PCI) 0x0000001B (27) PCI standard PCI-to-PCI bridge
(PCI) 0x0000002D (45) High Definition Audio Controller
(PCI) 0xFFFFFFF2 (-14) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF3 (-13) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF4 (-12) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF5 (-11) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF6 (-10) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF7 (-9) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF8 (-8) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFF9 (-7) AMD USB 3.0 Host Controller
(PCI) 0xFFFFFFFA (-6) Realtek PCIe GBE Family Controller
(PCI) 0xFFFFFFFB (-5) AMD Radeon(TM) HD 8400E
(PCI) 0xFFFFFFFC (-4) PCI standard PCI-to-PCI bridge
(PCI) 0xFFFFFFFD (-3) PCI standard PCI-to-PCI bridge
(PCI) 0xFFFFFFFE (-2) PCI standard PCI-to-PCI bridge

B.4 DMA Channel Assignments