# TKS-G21-QM77B

Intel® 3rd Generation
Core™ i7/Celeron® Processor
10/100/1000Base-TX Ethernet
2 USB3.0, 2 USB 2.0, 3 COM
8-bit Digital I/O
2 SATA 3.0Gb/s
1 CFast™, 1 Mini Card, LPC

TKS-G21-QM77B Manual 1st Ed.
May 2013

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# Packing List

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

- 1 DVD-ROM for Manual (in PDF Format) and Drivers
- 1 TKS-G21-QM77B

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 ..... 1-2
1.2 Features ..... 1-3
1.3 Specifications ..... 1-4

## Chapter 2 Quick Installation Guide

2.1 Safety Precautions ..... 2-2
2.2 Mechanical Drawing of TKS-G21-QM77B ..... 2-3
2.3 A Quick Tour of the TKS-G21-QM77B ..... 2-4
2.4 Hard Disk Installation ..... 2-7
2.5 Accessory Installation ..... 2-11
2.6 Wallmount Kit Installation ..... 2-17
2.7 List of Jumpers ..... 2-18
2.8 List of Connectors ..... 2-19
2.9 Setting Jumpers ..... 2-21
2.10 Front Panel Connector (JP9) ..... 2-22
2.11 Clear CMOS (JP11) ..... 2-22
2.12 COM Port #2 RS-232/422/485 Selection (CN11) . 2-23
2.13 Digital I/O Connector (CN12) ..... 2-25

## Chapter 3 AMI BIOS Setup

3.1 System Test and Initialization. ..... 3-2
3.2 AMI BIOS Setup ..... 3-3

**Chapter 4 Driver Installation**

4.1 Installation……..4-3

**Appendix A Programming The Watchdog Timer**

A.1 Programming .....A-2

A.2 ITE8728F Watchdog Timer Initial Program .....A-6

**Appendix B I/O Information**

B.1 I/O Address Map .....B-2

B.2 Memory Address Map.....B-5

B.3 IRQ Mapping Chart.....B-6

B.4 DMA Channel Assignments…… .B-9

**Appendix C Mating Connector**

C.1 List of Mating Connectors and Cables..... C-2

**Appendix D RAID & AHCI Setting**

D.1 Setting RAID ..... D-2

D.2 Setting AHCI ..... D-12

**Appendix E Digital I/O Ports**

E.1 Electrical Specifications for I/O Ports.....E-2

E.2 DIO Programming .....E-3

E.3 Digital I/O Register.....E-4

E.4 Digital I/O Sample Program .....E-5

Chapter

1

# General Information

## 1.1 Introduction

The newest EmBox series TKS-G21-QM77B has been introduced by AAEON and it utilizes Intel® 3rd Generation Core™ processor. In this era of information explosion, the advertising of consumer products will not be confined to the family television, but will also be spread to high-traffic public areas, like department stores, the bus, transportation station, the supermarket etc. The advertising marketing industry will resort to every conceivable means to transmit product information to consumers. System integrators will need a multifunction device to satisfy commercial needs for such public advertising.

The TKS-G21-QM77B is designed for indoor environments due to the following reasons; first, the TKS-G21-QM77B offers high performance system that while operating in ambient temperatures ranging from 0° to 50°C. The TKS-G21-QM77B is a standalone high performance controller designed for long-life operation and with high reliability. It can replace traditional methods and become the mainstream controller for the multimedia entertainment market.

## 1.2 Features

- Intel® Core™ i7/Celeron® Processor
- Intel® QM77/HM76
- 204-pin DDR3 1600 MHz SODIMM x 1, Up to 8 GB
- Gigabit Ethernet x 2
- HDMI X 1, VGA x 1
- Line-Out, Mic-In
- SATA 3.0Gb/s x 2 (Optional RAID), CFast™ x 1
- USB3.0 x 2, USB2.0 x 2, COM x 3, 8-Bit Digital I/O
- Mini Card x 1
- +12V Only Operation
- Supports iAMT with Intel® QM77 and Core™ i7 Processors Only

## 1.3 Specifications

| | | |
|---|---|---|
| **CPU** | | Onboard Intel® Core™ i7-3555LE/Celeron® 847E BGA Processors less than 25W |
| **Chipset** | | Intel® QM77/HM76 PCH |
| **System Memory** | | 204-pin DDR3 1333/1600 MHz SODIMM x 1, Max. 8 GB |
| **Display Interface** | **VGA** | D-SUB 15 x 1 |
| | **HDMI** | HDMI x 1 |
| **Storage Device** | **SSD** | CFast™ x 1 |
| | **SATA** | SATA 3.0Gb/s x 2 (Optional RAID) |
| **Network** | **LAN** | Intel 82579LM Gigabit PHY x1 & Realtek RTL-8111E Gigabit x 1, RJ-45 x 2 |
| | **Wireless** | — |
| **Front I/O** | **USB Host** | USB Type A x 2 |
| | **Serial Port** | COM x 1 |
| | **Audio** | Line-out, Mic-in |
| **Rear I/O** | **USB Host** | USB3.0 Type A x 2 |
| | **LAN** | RJ-45 x 2 |
| | **Serial Port** | COM x 2 |
| | **DIO** | 8-bit (Programmable) x 1 |
| | **KB/MS** | Through USB port |
| **Expansion** | **Mini Card** | Mini Card x 1 (Internal) |
| **Indicator** | **Front** | Power LED x 1, HDD LED x 1 |
| **Power Requirement** | | +12V DC Input, ATX type |

| | | |
|---|---|---|
| **Thermal Solution** | | Fanless |
| **Mounting** | | Wallmount (optional) |
| **Operating Temperature** | | 32°F ~ 122°F (0°C ~ 50°C) |
| **Storage Temperature** | | -40°F ~ 176°F (-40°C ~ 80°C) |
| **Anti-Vibration** | | 5 g rms/ 5 ~ 500Hz/ random operation (CFast™)<br>1 g rms/ 5 ~ 500Hz/ random operation (Internal Hard Disk Drive active Module) |
| **Anti-Shock** | | 50 G peak acceleration (11 msec. duration) (CFast™)<br>20 G peak acceleration (11 msec. duration) (Hard Disk Drive Module) |
| **Certification** | **EMC** | CE/FCC Class A |
| **Dimension** | | 7.79" x 7.08"x 2.48"(198mm x 180mmx 63mm) |
| **Gross Weight** | | 4.85 lb (2.2 kg) (Heavy duty steel ) |
| **OS Support** | | Windows® XP Pro, Windows® 7, Windows® 8, Linux Fedora |

Chapter

2

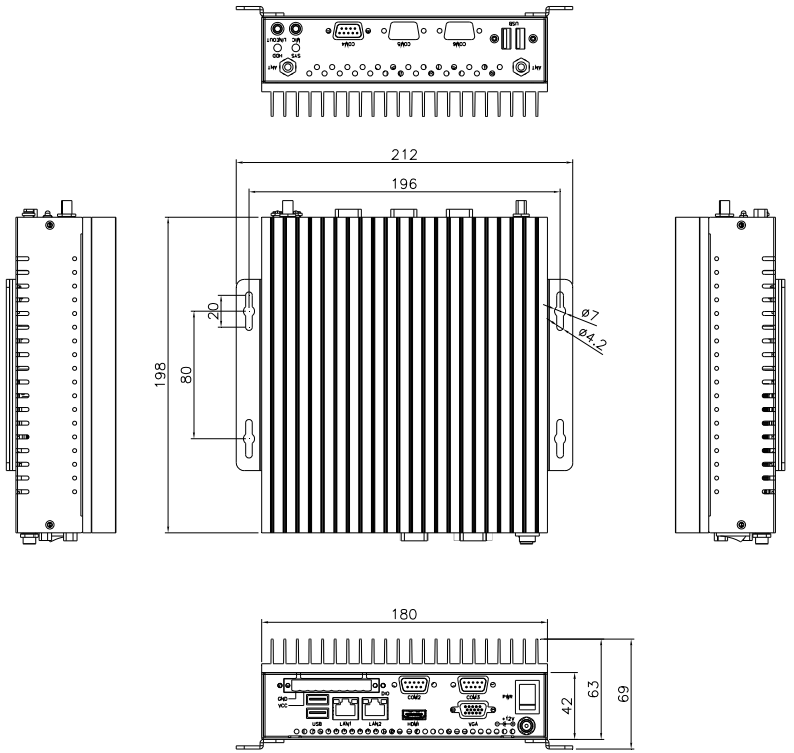
# Quick Installation Guide

## 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*

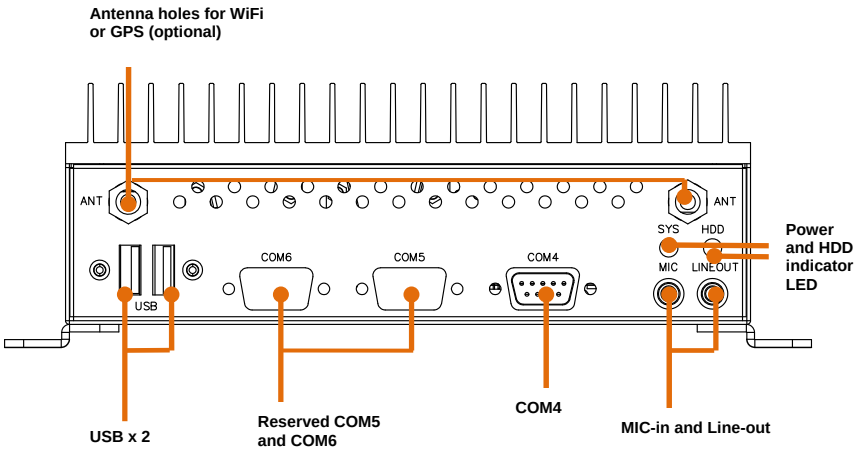
## 2.2 Mechanical Drawing of TKS-G21-QM77B



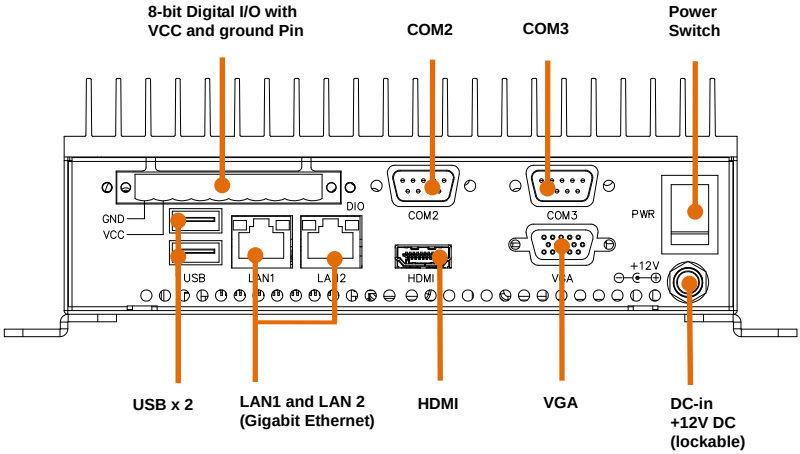

## 2.3 A Quick Tour of the TKS-G21-QM77B

Before you start to set up the TKS-G21-QM77B, take a moment to become familiar with the locations and purposes of the controls, drives, connections and ports, which are illustrated in the figures (Figure 2.1 to Figure 2.4) below.

**Figure 2.1 Front View of the TKS-G21-QM77B**



## Figure 2.2 Rear View of the TKS-G21-QM77B




## Figure 2.3 Top View of the TKS-G21-QM77B

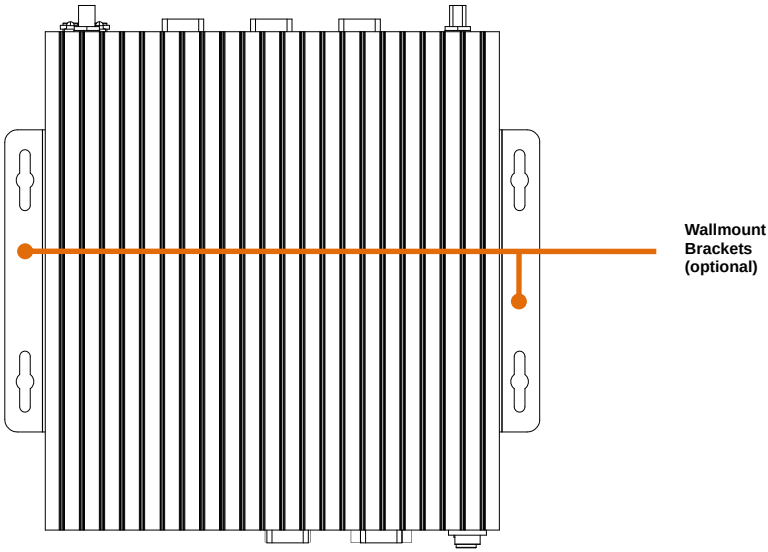
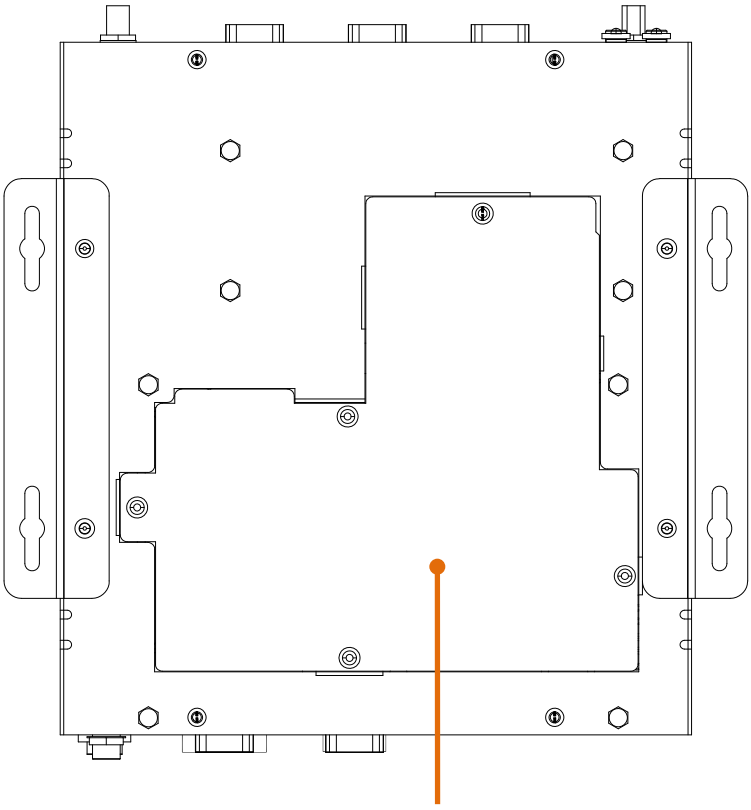


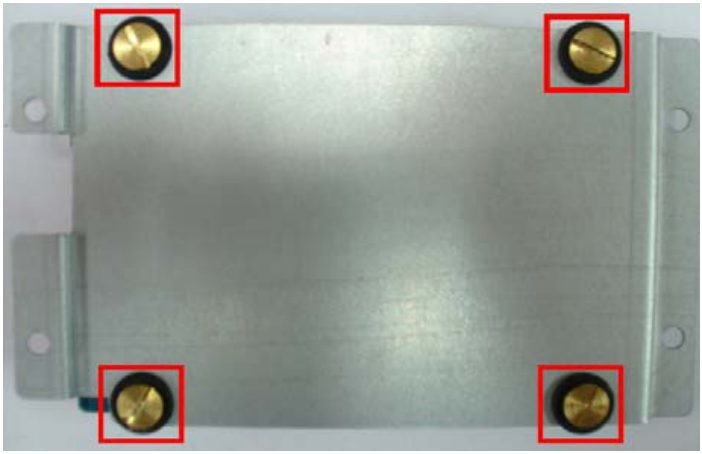
**Figure 2.4 Bottom View of the TKS-G21-QM77B**



## 2.4 Hard Disk Installation

Step 1: Unfasten the screws on the top of cover.

Step 2: Fasten the four HDD screws and black damper, and then you can put the HDD on the opposite side for screwing



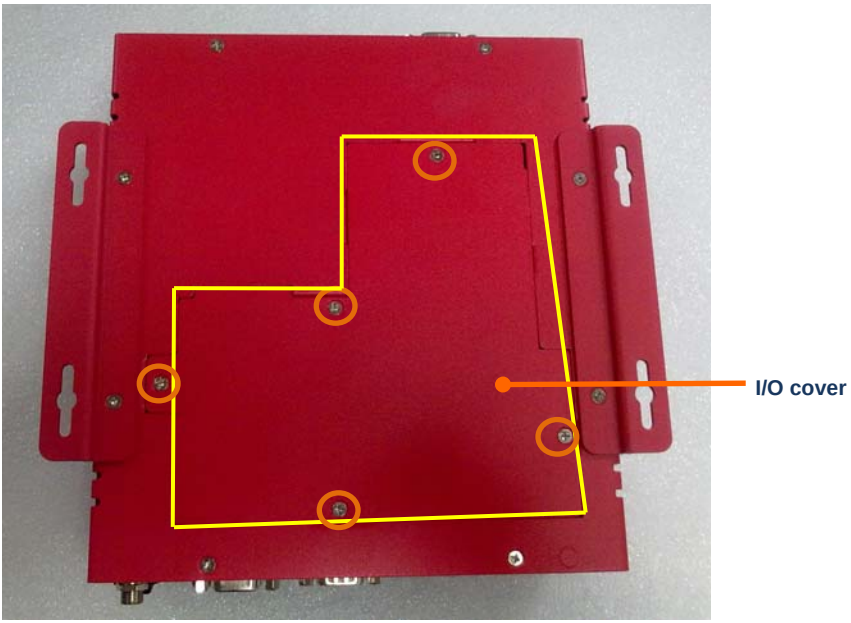
Step 3: Putting the HDD with the HDD bracket in by 45 degree height and make sure the bracket holes are matched with the chassis stand.

Step 4: Fasten the four screws of the HDD bracket and connect the HDD and power cables to the motherboard (GENE-GM77).

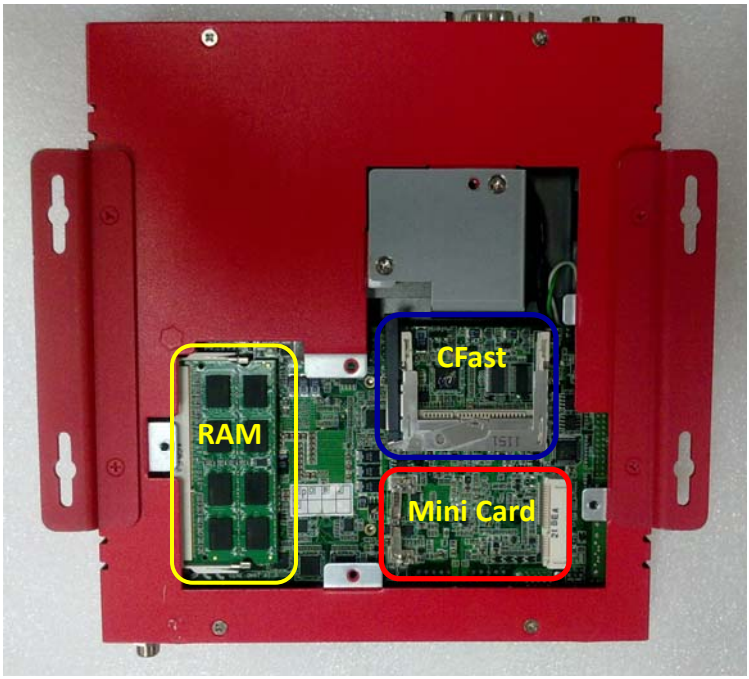
Step 5: Close the top cover and fasten the screws.

## 2.5 Accessory Installation

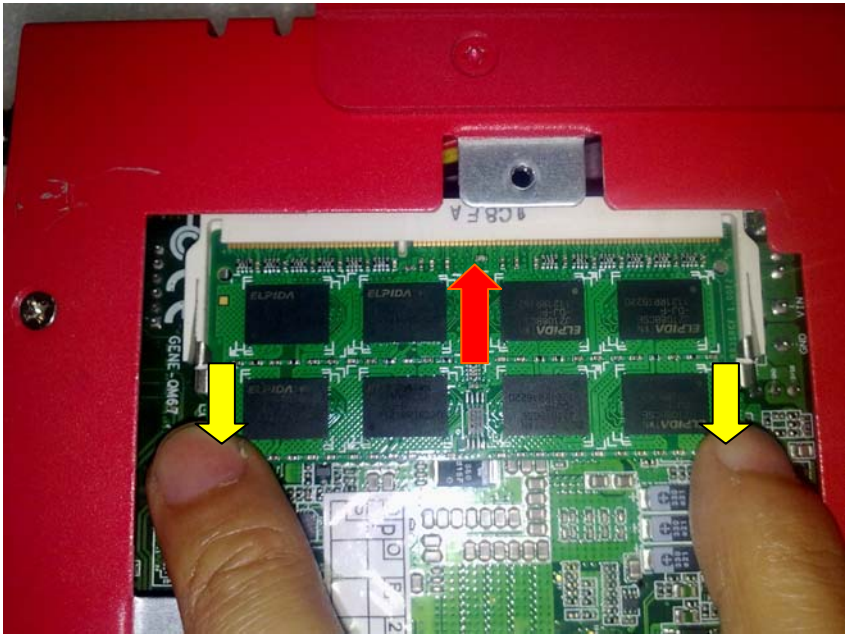
Step 1: Unfasten the 5 screws of I/O cover which is on the bottom of the chassis.



Step 2: Remove the I/O cover and you can see the inside placements of RAM, CFast card, Mini Card (Mini PCIe) slot for installation.



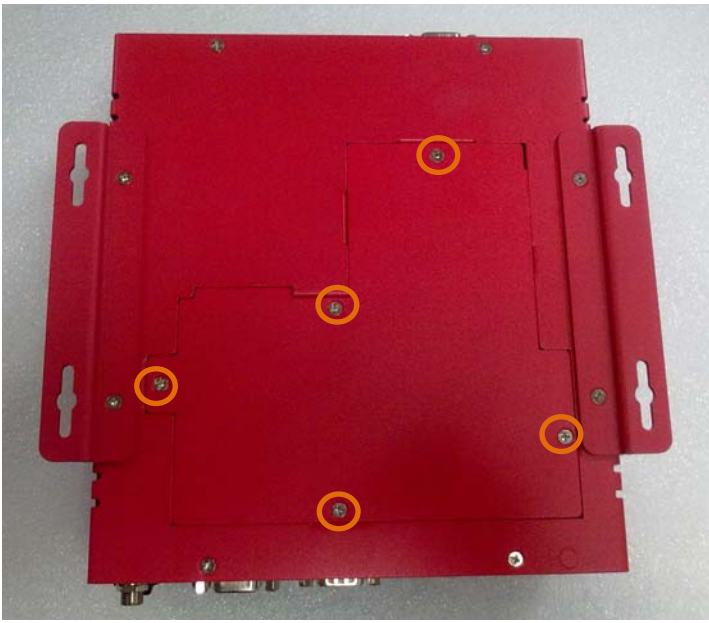
Step: 2-1: Insert the memory module to the Memory slot and push the module down until it has been locked by the two latches on the sides firmly.



Step 2-2: Insert the Mini Card module to the Mini Card slot. Push the module down until the module has been locked by two latches on the sides firmly.

Step 2-3: Insert the Compact-Fast card to CFast slot. Put the card bracket and fasten the screws.

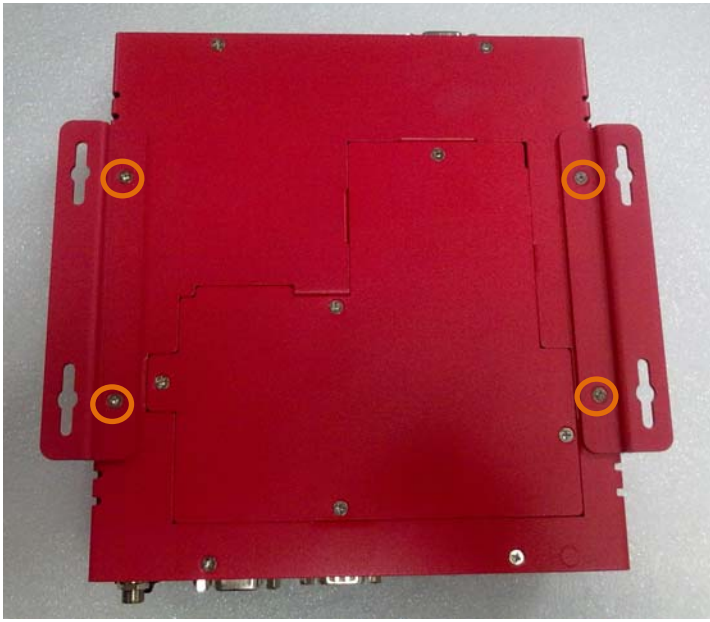
Step 3: Put I/O cover back to the bottom of the chassis and fasten 5 screws



## 2.6 Wallmount Kit Installation

Get the brackets ready and fasten appropriate four screws on brackets. After fastening the two brackets on the bottom lid, the wallmount kit installation has been finished.

**Note: the wallmount kit is optional.**



## 2.7 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:

| Label | Function |
|---|---|
| JP8 | COM2 Pin8 Function Selection |
| JP9 | Front Panel Connector |
| JP11 | Clear CMOS Jumper |
| JP12 | AT/ATX Power Supply Mode Selection |

## 2.8 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:

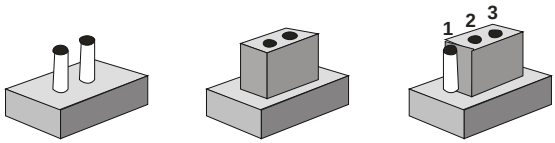
| Label | Function |
|---|---|
| CN2 | External +12V Input |
| CN3 | USB 2.0 Ports 7 and 8 |
| CN6 | External +5VSB Input |
| CN8 | Audio I/O Port |
| CN11 | COM Port 2 |
| CN12 | LPT / Digital I/O Port |
| CN13 | COM Port 3 |
| CN14 | LPC Port |
| CN15 | COM Port 4 |
| CN18 | +5VSB Output w/SMBus |
| CN20 | CPU FAN |
| CN21 | HDMI Port |
| CN22 | +5V Output for SATA HDD |
| CN23 | Realtek LAN (RJ-45) Port |
| CN24 | Intel LAN (RJ-45) Port |
| CN25 | USB Ports 1 and 2 |
| CN26 | VGA / DVI Ports (depend on hardware configuration) |
| CN28 | CFast Slot |
| CN29 | DDR3 SODIMM Slot |

| | |
|---|---|
| CN30 | Mini Card Slot |
| SATA1 | SATA Port1 Connector |
| SATA2 | SATA Port 2 Connector |

## 2.9 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.



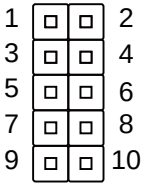

Open Closed Closed 2-3

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.

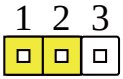
Generally, you simply need a standard cable to make most connections.

## 2.10 Front Panel Connector (JP9)

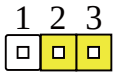



| Pin | Signal |
|---|---|
| 1 | PWR_BTN- |
| 2 | PWR_BTN+ |
| 3 | HDD_LED- |
| 4 | HDD_LED+ |
| 5 | SPEAKER- |
| 6 | SPEAKER+ |
| 7 | PWR_LED- |
| 8 | PWR_LED+ |
| 9 | H/W RESET- |
| 10 | H/W RESET+ |

## 2.11 Clear CMOS (JP11)




**Normal**




**Clear CMOS**

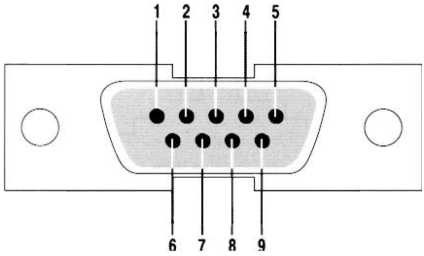
| JP11 | Function |
|---|---|
| 1-2 | Normal (Default) |
| 2-3 | Clear CMOS |

## 2.12 COM Port #2 RS-232/422/485 Selection (CN11)

COM2 RS-232/422/485 selection for AAEON TKS series is set in BIOS setting as following:

*Entering BIOS Setting Menu: Choose "Advanced→ Super IO Configuration → Serial Port 2 Configuration". (Default setting is at "RS-232")*

Different devices implement the RS-232/422/485 standard in different ways. If you have problems with a serial device, check the pin assignments below for the connector.




**RS-232 Mode**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | DCDB | 2 | DSRB |
| 3 | RXB | 4 | RTSB |
| 5 | TXB | 6 | CTSB |
| 7 | DTRB | 8 | RIB |
| 9 | Ground | 10 | N/C |

**RS-422 Mode**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | TXD- | 2 | N/C |

| | | | |
|---|---|---|---|
| 3 | RXD+ | 4 | N/C |
| 5 | TXD+ | 6 | N/C |
| 7 | RXD- | 8 | N/C |
| 9 | Ground | 10 | N/C |

**RS-485 Mode**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | TXD- | 2 | N/C |
| 3 | N/C | 4 | N/C |
| 5 | TXD+ | 6 | N/C |
| 7 | N/C | 8 | N/C |
| 9 | Ground | 10 | N/C |

**Note:**

**Issue: COM port limitation for the speed test during the communication.**

*Root Cause:*

In serial communication, data bits received at the serial port are bundled into a byte and transmitted into the serial port hardware buffer. From the buffer, the byte is sent into the CPU. If a new byte arrives before the byte in the buffer is moved into the CPU, a Hardware Overrun Error occurs.

*Solution:*

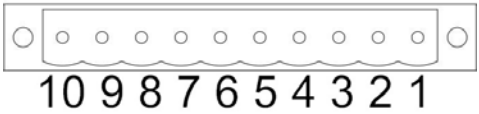
1. Try hardware handshaking.
2. See if the UART is an older un-buffered version or a new buffered UART (such as a 16550A or 16750). You should use a buffered UART for the reasons discussed above.
3. Change the Receive (Rx Trigger) buffer to 8, 4, or 1 (1 is a last resort).
4. For the product, the speed setting of Series Port (COM) is under 9600bps.

## 2.13 Digital I/O Connector (CN12)

This connector offers 4-pair of digital I/O function.

BIOS using the I2C Bus to read/write internal DIO registers and the Serial Bus address is 0xA06.

The pin definitions are illustrated below:




| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | DIO_IN0 | 2 | DIO_IN1 |
| 3 | DIO_IN2 | 4 | DIO_IN3 |
| 5 | DIO_OUT0 | 6 | DIO_OUT1 |
| 7 | DIO_OUT2 | 8 | DIO_OUT3 |
| 9 | +5 Volt. | 10 | Ground |

**Note:** The max. rating of Pin 1 ~ Pin 8 is 5V@8mA
The max. rating of Pin 9 is 5V@0.5A

| BIOS Setting | Connector Definition | Address (Register) | IT8728 GPIO Setting |
|---|---|---|---|
| GPIO1/DIO_IN0 | Pin 1 | Bit 0@A06h | U18 Pin 109 (GPIO 70) |
| GPIO2/DIO_IN1 | Pin 2 | Bit 1@A06h | U18 Pin 110 (GPIO 71) |
| GPIO3/DIO_IN2 | Pin 3 | Bit 2@A06h | U18 Pin 111 (GPIO 72) |
| GPIO4/DIO_IN3 | Pin 4 | Bit 3@A06h | U18 Pin 112 (GPIO 73) |
| GPIO5/DIO_OUT0 | Pin 5 | Bit 0@A07h | U18 Pin 113 (GPIO 74) |
| GPIO6/DIO_OUT1 | Pin 6 | Bit 1@A07h | U18 Pin 114 (GPIO 75) |
| GPIO7/DIO_OUT2 | Pin 7 | Bit 2@A07h | U18 Pin 115 (GPIO 76) |
| GPIO8/DIO_OUT3 | Pin 8 | Bit 3@A07h | U18 Pin 116 (GPIO 77) |

**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 | × | ○ | ○ | ○ | ○ | ○ |
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**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 **SJ/T 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 **SJ/T 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 Initialization

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 against the values stored in the CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

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

The TKS-G21-QM77B CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit 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 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**

Advanced BIOS Features Setup including TPM, ACPI, etc.

**Chipset**

Host bridge parameters.

**Boot**

Enables/disable quiet boot option.

**Security**

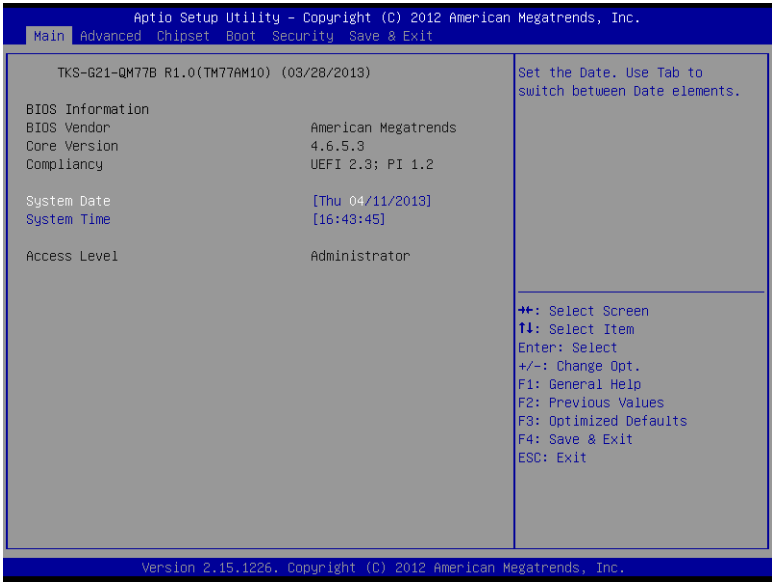
Set setup administrator password.

**Save&Exit**

Exit system setup after saving the changes.

## Setup Menu

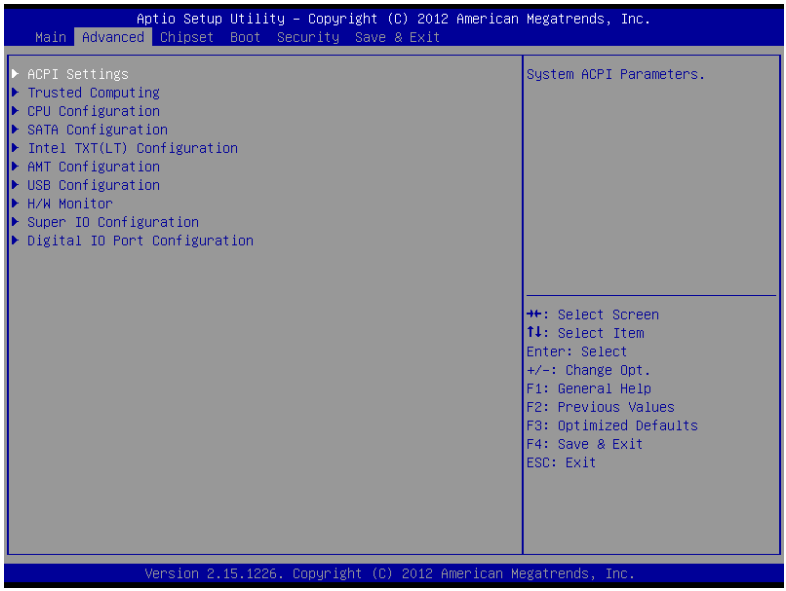
### Setup submenu: Main




Options summary: (***default setting***)

| | | |
|---|---|---|
| System Date | Day MM:DD:YYYY | |
| Change the month, year and century. The 'Day' is changed automatically. | | |
| System Time | HH : MM : SS | |
| Change the clock of the system. | | |

## Setup submenu: Advanced

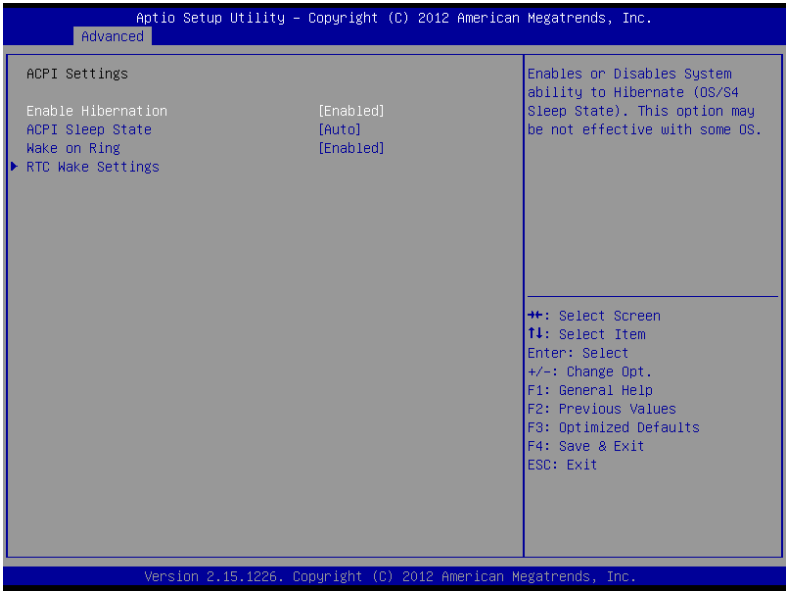



Options summary: (***default setting***)

| | | |
|---|---|---|
| ACPI Settings | | |
| System ACPI Parameters | | |
| Trusted Computing | | |
| Trusted Computing Settings | | |
| CPU Configuration | | |
| CPU Configuration Parameters | | |
| SATA Configuration | | |
| SATA Device Options Settings | | |
| AMT Configuration | | |

| | | |
|---|---|---|
| AMT Configuration Parameters | | |
| USB Configuration | | |
| USB Configuration Parameters | | |
| H/W Monitor | | |
| Monitor hardware status | | |
| Super IO Configuration | | |
| Super IO Configuration Parameters | | |
| Digital IO Port Configuration | | |
| DIO configuration | | |

## ACPI Settings

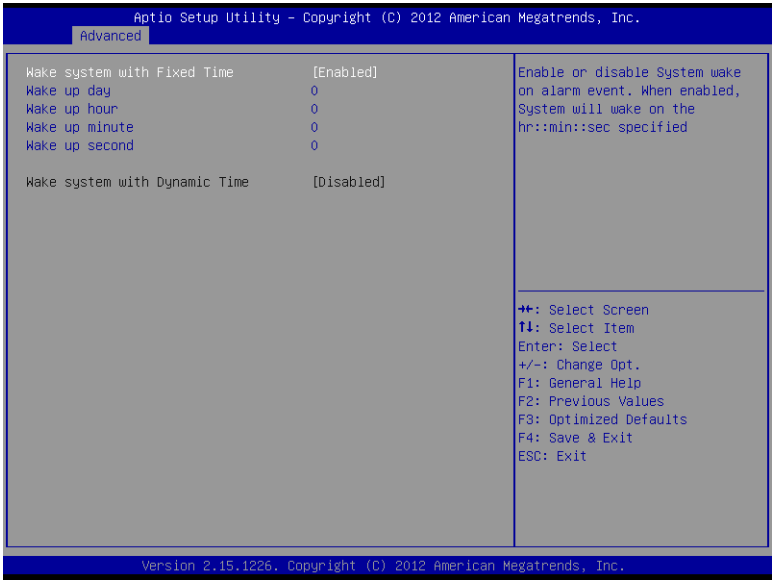



Options summary: (***default setting***)

| | | |
|---|---|---|
| Enable Hibernation | ***Enabled*** | |
| | Disabled | |
| Enabled or disabled hibernate (OS/S4 Sleep State). | | |
| ACPI Sleep State | Suspend Disabled | |
| | S1 only(CPU Stop Clock) | |
| | S3 only(Suspend to RAM) | |
| | ***Auto*** | |

| | | |
|---|---|---|
| Select the ACPI state used for System Suspend | | |
| Wake on Ring | ***Enabled*** | |
| | Disabled | |
| Enabled or disabled wake on ring function. | | |
| RTC Wake Settings | | |
| Enable system to wake from S5 using RTC alarm. | | |

## RTC Wake Settings

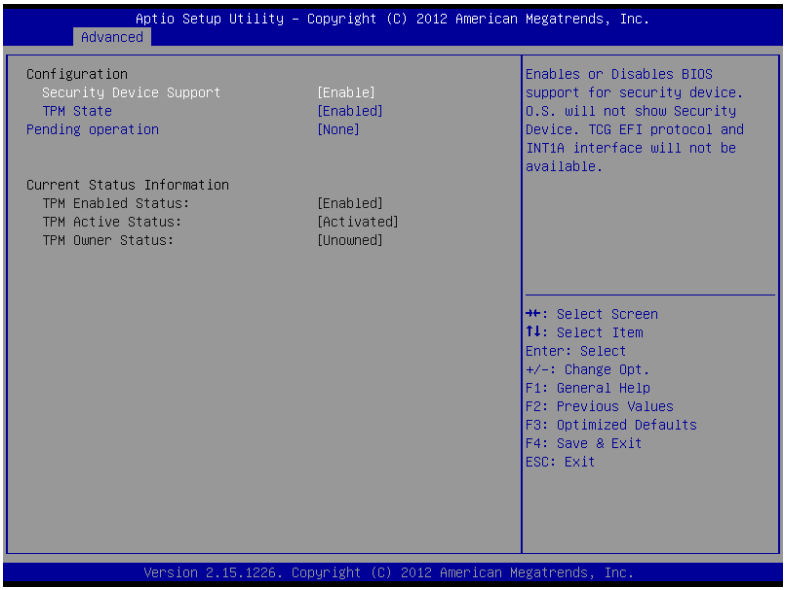



Options summary: (***default setting***)

| | | |
|---|---|---|
| Wake system with Fixed Time | ***Disabled*** | |
| | Enabled | |
| Enable or disable System wake on alarm event. Wake up time is setting by following settings. | | |
| Wake up day | 1-31 | |
| | | |
| Wake up hour | 0-23 | |
| | | |
| Wake up minute | 0-59 | |
| | | |

| | | |
|---|---|---|
| Wake up second | 0-59 | |
| | | |
| Wake system with Dynamic Time | ***Disabled*** | |
| | Enabled | |
| Enable or disable System wake on alarm event. Wake up time is current time + Increase minutes. | | |
| Wake up minute increase | 1-5 | |
| | | |

## Trusted Computing

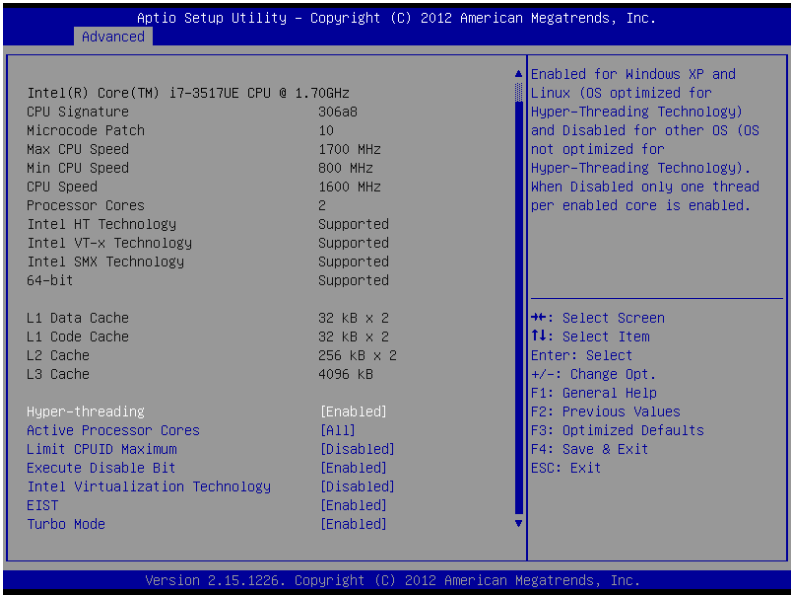



Options summary: (***default setting***)

| | | |
|---|---|---|
| Security Device Support | ***Disabled*** | |
| | Enabled | |
| En/Disable TPM support. | | |
| TPM State | ***Disabled*** | |
| | Enabled | |
| En/Disable TPM functionality. | | |
| Pending TPM | ***None*** | |

| | | |
|---|---|---|
| Operation | Enable Take Ownership | |
| | Disable Take Ownership | |
| | TPM Clear | |
| Select one-time TPM operation. Item value returns to 'None' after next POST. | | |

## CPU Configuration

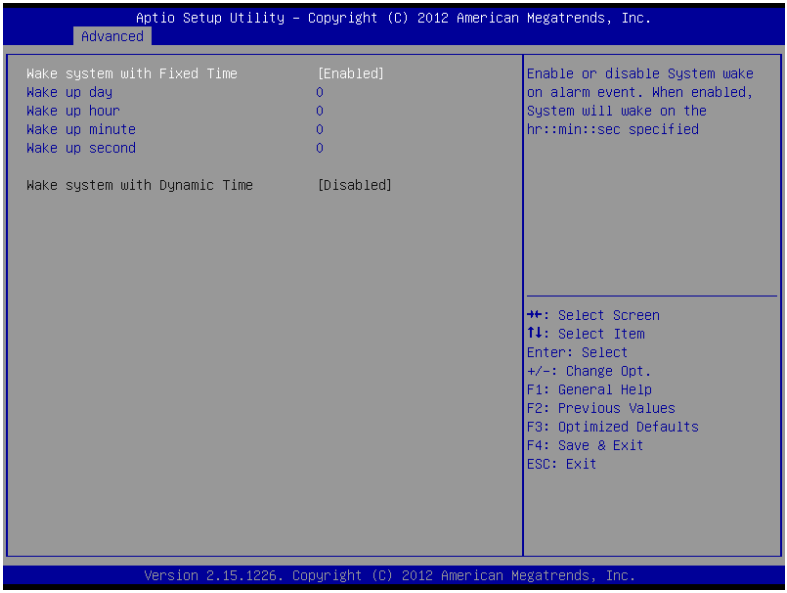



Options summary: (***default setting***)

| | | |
|---|---|---|
| Hyper-Threading | Disabled | |
| | ***Enabled*** | |
| En/Disable CPU Hyper-Threading function | | |
| Active Processor | ***ALL*** | |
| Cores | 1 to Max CPU cores | |
| Number of CPU cores to be active. | | |
| Limit CPUID | ***Disabled*** | |
| Maximum | Enabled | |
| Disabled for Windows XP | | |

| | | |
|---|---|---|
| Execute Disable Bit | Disabled | |
| | ***Enabled*** | |
| En/Disable XD bit for supporting OS | | |
| Intel Virtualization | ***Disabled*** | |
| Technology | Enabled | |
| En/Disable Intel VT-x function | | |
| EIST | Disabled | |
| | ***Enabled*** | |
| En/Disable Intel SpeedStep | | |
| Turbo Mode | Disabled | |
| | ***Enabled*** | |
| En/Disable Intel Turbo Mode | | |

## SATA Configuration

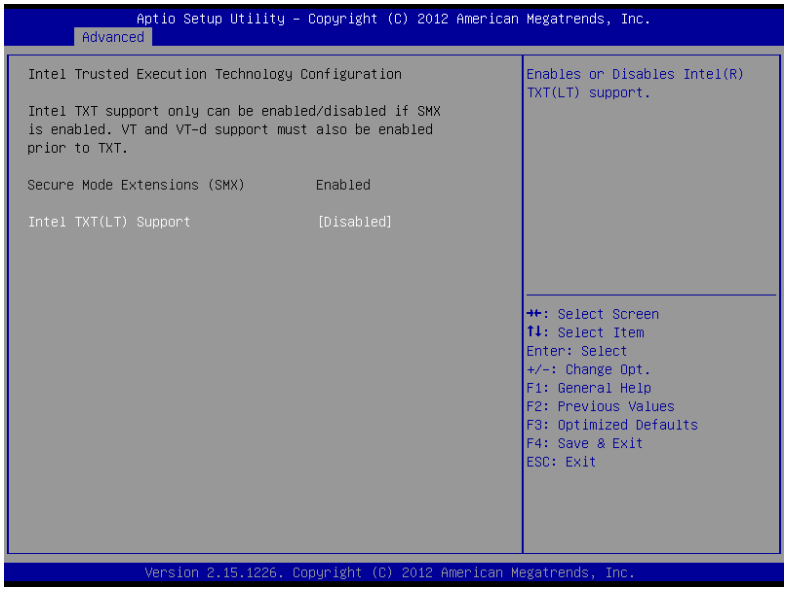



Options summary: (***default setting***)

| | | |
|---|---|---|
| SATA Controller(s) | Disabled | |
| | ***Enabled*** | |
| En/Disable SATA controller | | |
| Configure SATA as | ***IDE*** | |
| | AHCI | |
| | RAID | Available for QM77 Sku |
| Configure SATA controller operating as IDE/AHCI/RAID mode. | | |
| Port 1/Port 2/CFast Slot/Minicard Slot | Disabled | |
| | ***Enabled*** | |

| | | |
|---|---|---|
| En/Disable the selected port. | | |
| Hot Plug | ***Disabled*** | |
| | Enabled | |
| En/Disable Hot Plug feature for specified port. | | |

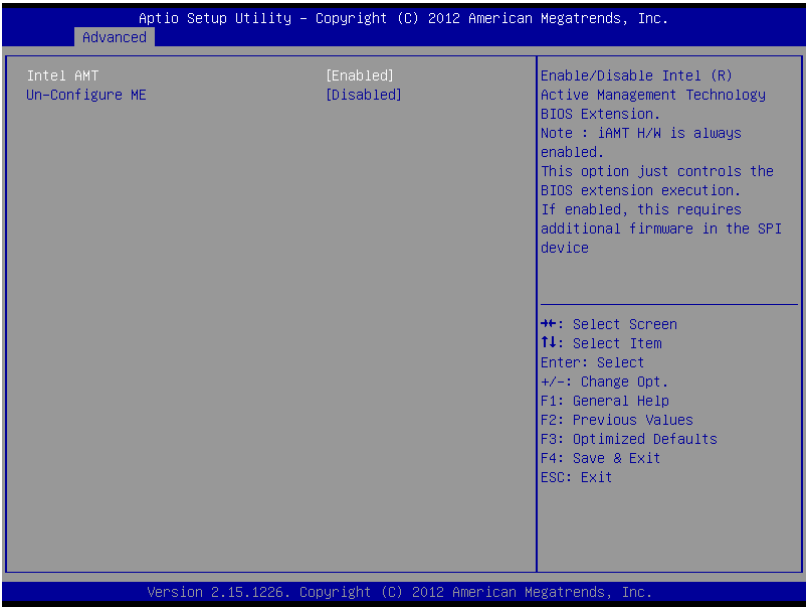
## Intel TXT(LT) Configuration




Options summary: (***default setting***)

| | | |
|---|---|---|
| Intel TXT(LT) Support | ***Disabled*** | |
| | Enabled | |
| En/Disable Intel TXT function. This function only can be enabled/disabled if SMX, VT-x and VT-d support are enabled prior to it. | | |

## AMT Configuration




Options summary: (***default setting***)

| | | |
|---|---|---|
| Intel AMT | ***Enabled*** | |
| | Disabled | |
| En/Disable Intel® Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device | | |
| Un-Configure ME | Enabled | |
| | ***Disabled*** | |
| OEMFlag Bit 15: Un-Configure ME without password | | |

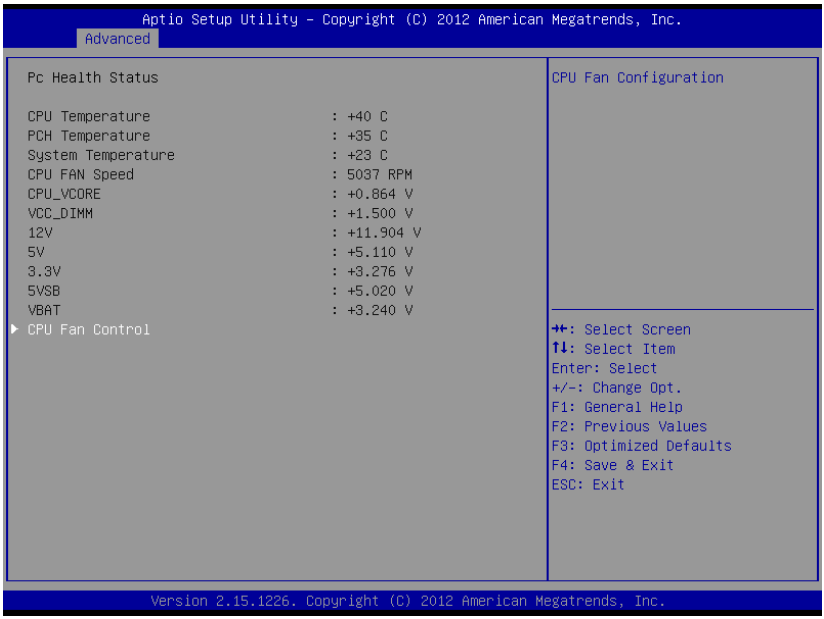
## USB Configuration

Options summary: (***default setting***)

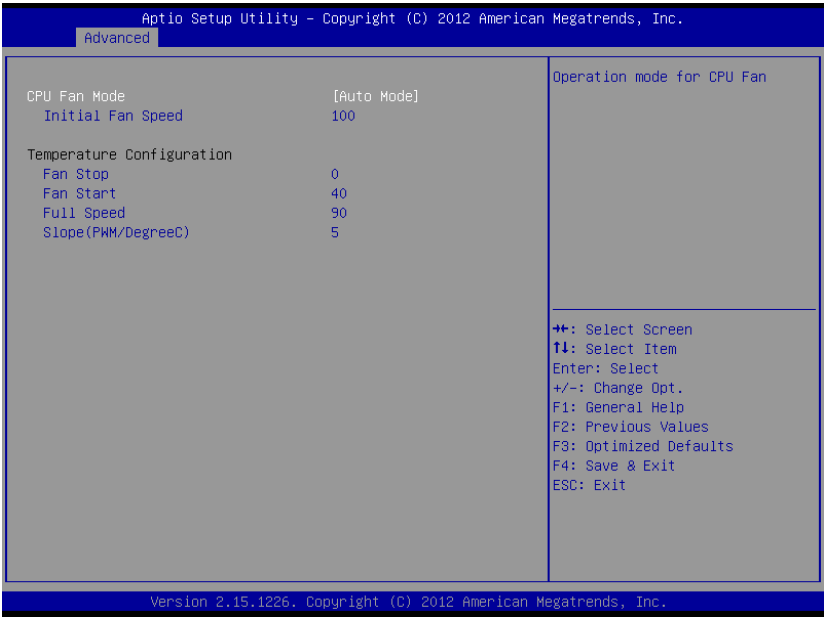
| | | |
|---|---|---|
| Legacy USB Support | ***Enabled*** | |
| | Disabled | |
| | Auto | |
| Enables BIOS Support for Legacy USB Support. When enabled, USB can be functional in legacy environment like DOS. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI application | | |
| USB3.0 Support | ***Enabled*** | |
| | Disabled | |

| | | |
|---|---|---|
| Enables BIOS Support for USB3.0 (XHCI). When disabled, PCH USB3.0 controller will also be disabled. | | |
| Device Name (Emulation Type) | **Auto** | |
| | Floppy | |
| | Forced FDD | |
| | Hard Disk | |
| | CD-ROM | |
| 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) | | |

## H/W Monitor


Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
Advanced
Pc Health Status
CPU Temperature : +40 C
PCH Temperature : +35 C
System Temperature : +23 C
CPU FAN Speed : 5037 RPM
CPU_VCORE : +0.864 V
VCC_DIMM : +1.500 V
12V : +11.904 V
5V : +5.110 V
3.3V : +3.276 V
5VSB : +5.020 V
VBAT : +3.240 V
CPU Fan Control
CPU Fan Configuration
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.

## CPU Fan Control

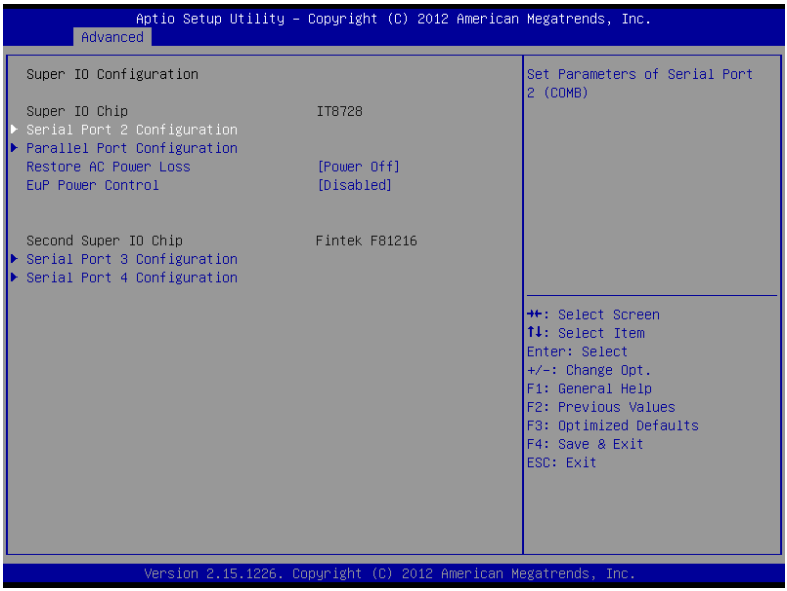



Options summary: (***default setting***)

| | | |
|---|---|---|
| CPU Fan Mode | ***Fixed Mode*** | |
| | Auto Mode | |
| Fixed Mode: Manually controlling the fan with a given control PWM.<br>Auto Mode: Automatically controlling the fan with given parameters. | | |
| Initial Fan Speed | 0 to 100, default is ***100*** | |
| Fan Speed value between 0(stop) to 100(full speed) | | |
| Fan Stop | 0 to 100, default is ***0*** | |

| | | |
|---|---|---|
| Fan stops when temperature is lower than the given value in Degree C | | |
| Fan Start | 0 to 100, default is ***40*** | |
| Fan starts when temperature is higher than the given value in Degree C | | |
| Full Speed | 0 to 100, default is ***90*** | |
| Fan runs in full speed when temperature is higher than the given value in Degree C | | |
| Slope(PWM/Degree C) | 0 to 15, default is ***5*** | |
| Slope[1-15] PWM/Degree C for Fan Speed Control | | |

## Super IO Configuration

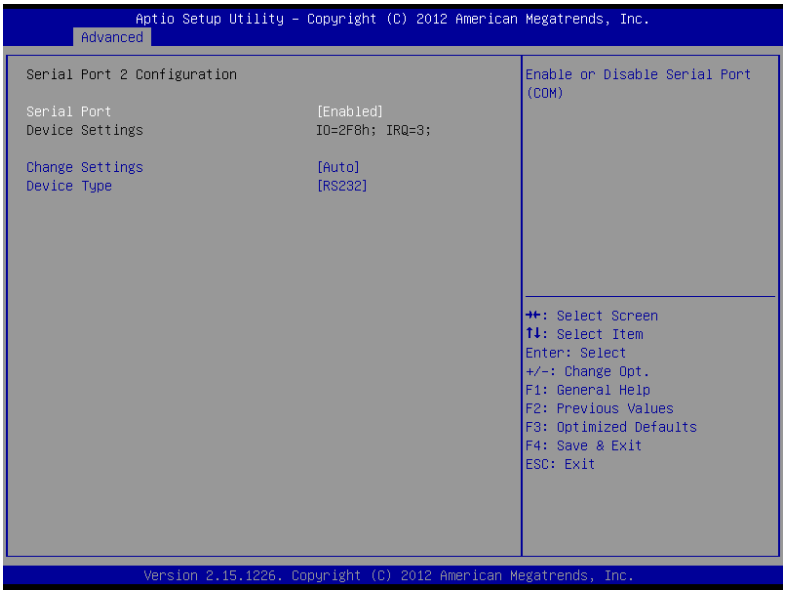



Options summary: (***default setting***)

| | | |
|---|---|---|
| Serial Port 2/3/4 Configuration | | |
| Set Parameters of Serial Port 2/3/4 | | |
| Parallel Port Configuration | | |
| Set Parameters of Parallel Port. | | |
| Restore AC Power Loss | ***Power Off*** | |
| | Power On | |

| | | |
|---|---|---|
| | Last State | |
| Select AC power state when power is re-applied after a power failure. | | |
| EuP Power Control | ***Disabled*** | |
| | Enabled | |
| Configure Energy-using Product(EuP) Power Control. | | |

### Serial Port 2 Configuration

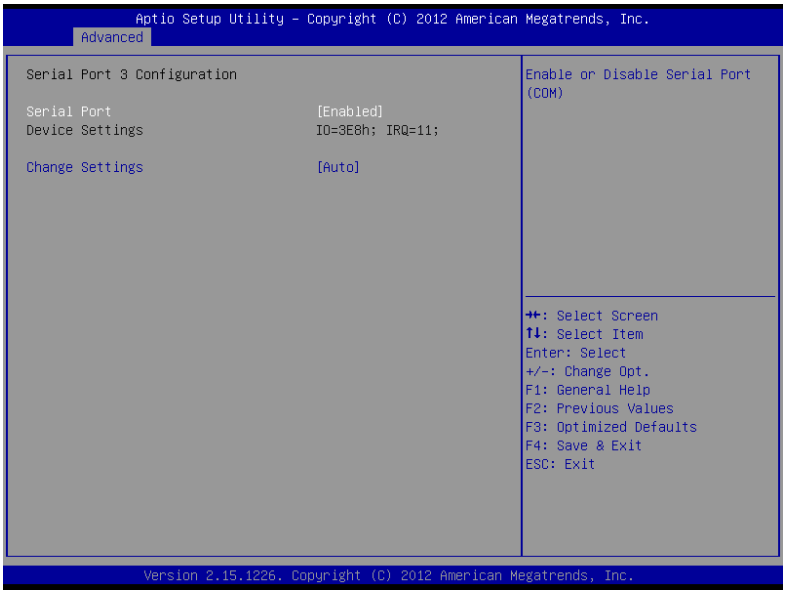



Options summary: (***default setting***)

| | | |
|---|---|---|
| Serial Port | Disabled | |

| | | |
|---|---|---|
| | ***Enabled*** | |
| En/Disable specified serial port. | | |
| Change Settings | ***Auto*** | |
| | IO=2F8h; IRQ=3; | |
| | IO=3F8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=2F8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=3E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=2E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| Select a resource setting for Super IO device. | | |
| Device Type | ***RS232*** | |
| | RS422 | |
| | RS485 | |
| Configure COM2 operated as RS232, RS422 or RS485. | | |

## Serial Port 3 Configuration

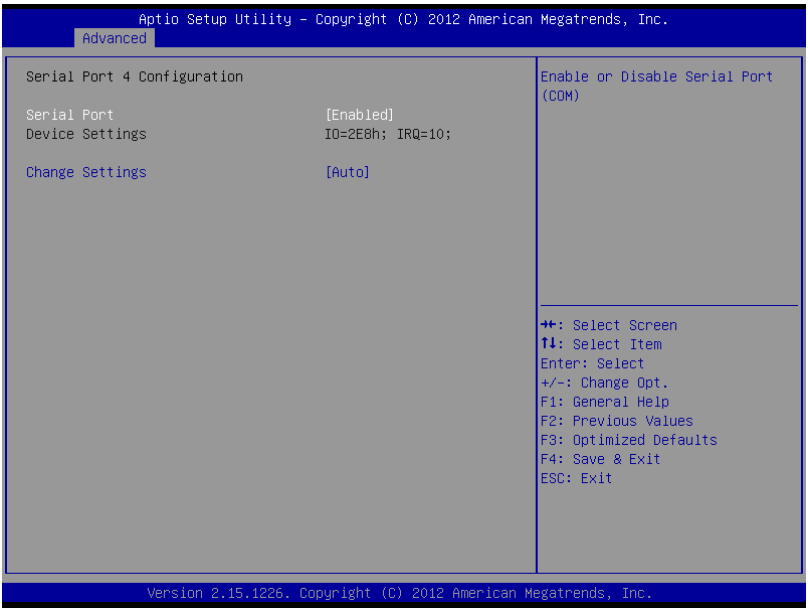



Options summary: (***default setting***)

| | | |
|---|---|---|
| Serial Port | Disabled | |
| | ***Enabled*** | |
| En/Disable specified serial port. | | |
| Change Settings | ***Auto*** | |
| | IO=3E8h; IRQ=11; | |
| | IO=3F8h;<br>IRQ=3,4,5,7,10,11,12; | |

| | | |
|---|---|---|
| | IO=2F8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=3E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=2E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| Select a resource setting for Super IO device. | | |

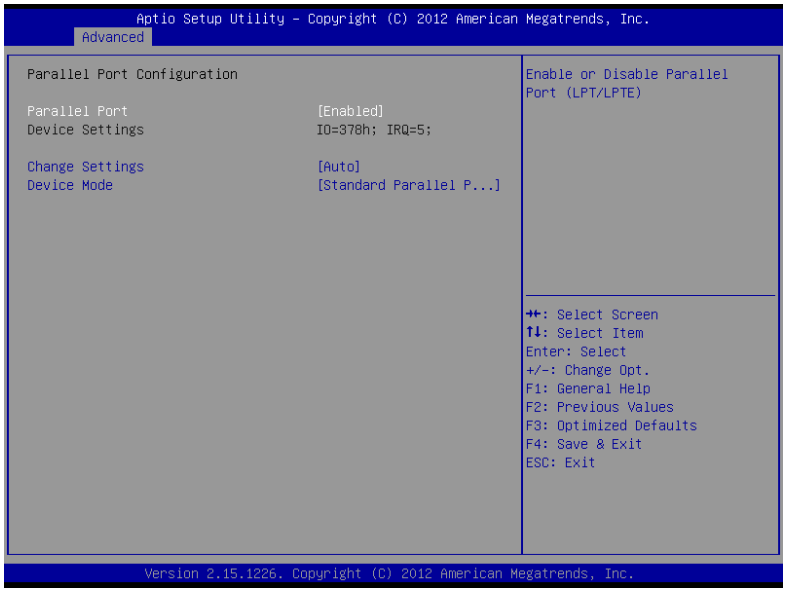
### Serial Port 4 Configuration




Options summary: (***default setting***)

| | | |
|---|---|---|
| Serial Port | Disabled | |
| | ***Enabled*** | |
| En/Disable specified serial port. | | |
| Change Settings | ***Auto*** | |
| | IO=2E8h; IRQ=10; | |
| | IO=3F8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=2F8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=3E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| | IO=2E8h;<br>IRQ=3,4,5,7,10,11,12; | |
| Select a resource setting for Super IO device. | | |

## Parallel Port Configuration

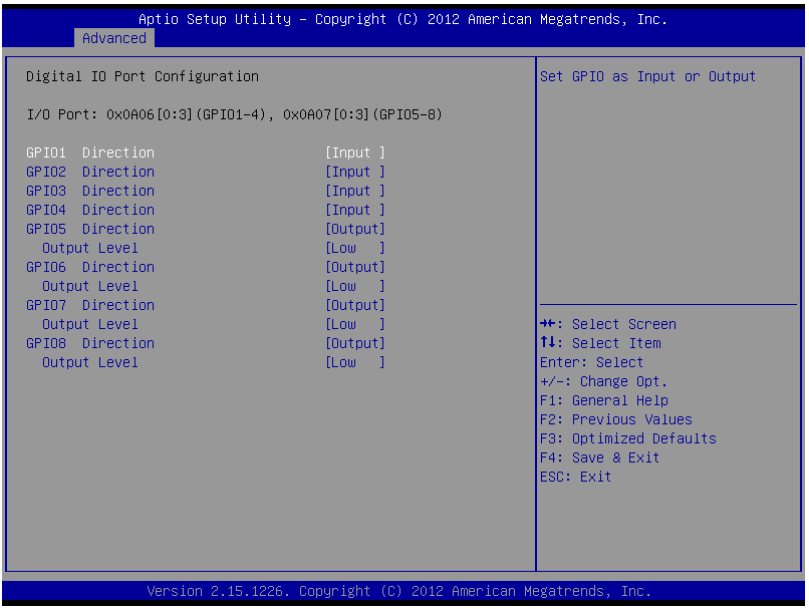



Options summary: (***default setting***)

| | | |
|---|---|---|
| Parallel Port | ***Disabled*** | |
| | Enabled | |
| En/Disable parallel port. | | |
| Change Settings | ***Auto*** | |
| | IO=378h; IRQ=5; | |
| | IO=378h; IRQ=5,7,10,11,12; | |

| | | |
|---|---|---|
| | IO=278h;<br>IRQ=5,7,10,11,12; | |
| | IO=3BCh;<br>IRQ=5,7,10,11,12; | |
| Select a resource setting for Super IO device. | | |
| Device Mode | ***Standard Parallel Port*** | |
| | EPP Mode | |
| | ECP Mode | |
| | EPP Mode & ECP Mode | |
| Change the Printer Port mode | | |

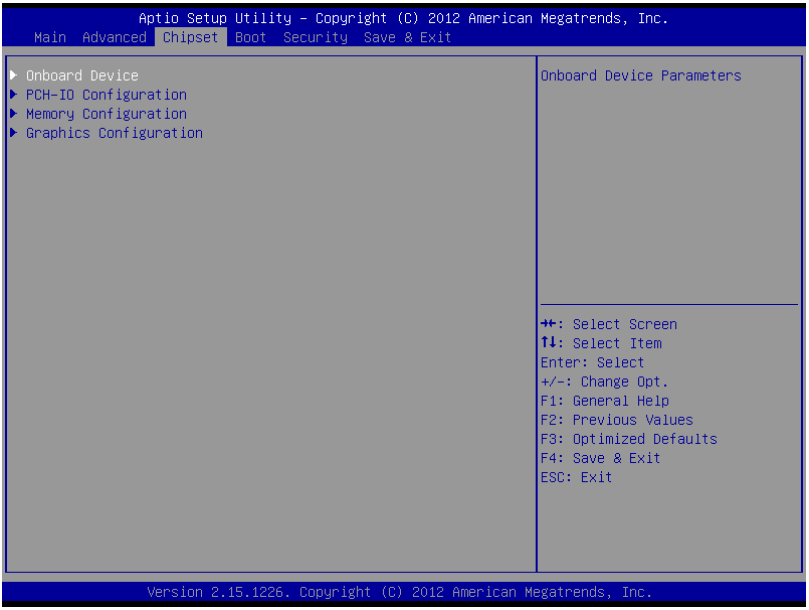
## Digital IO Port Configuration




Options summary: (***default setting***)

| | | |
|---|---|---|
| GPIO1-GPIO4 Direction | ***Input*** | |
| | Output | |
| Set GPIOx as Input or Output | | |
| GPIO5-GPIO8 Direction | Input | |
| | ***Output*** | |
| Set GPIOx as Input or Output | | |
| Output Level | Hi | |
| | ***Low*** | |
| Set GPIO output level when used as output pin | | |

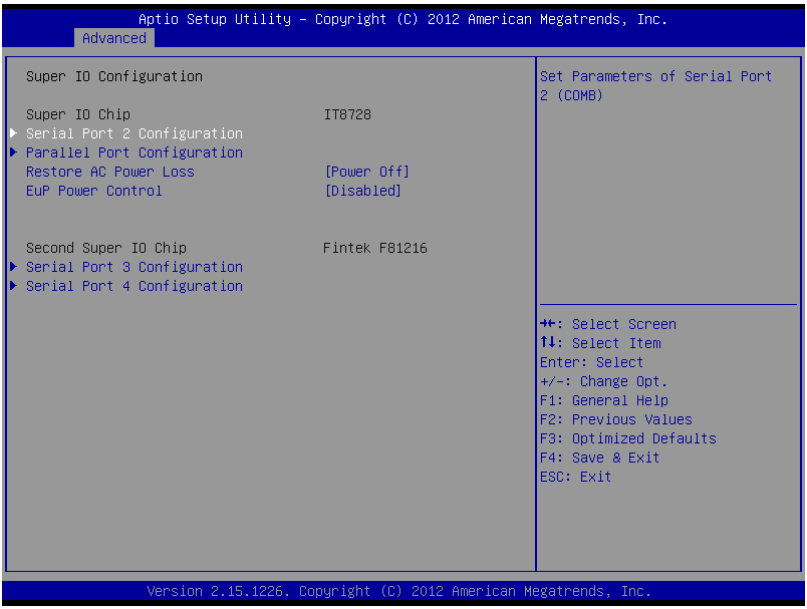
## Setup submenu: Chipset




Options summary: (***default setting***)

| | | |
|---|---|---|
| Onboard Device | | |
| Configure Onboard Devices | | |
| PCI-IO Configuration | | |
| South Bridge Parameters | | |
| Memory Configuration | | |
| Memory Parameters | | |
| Graphic Configuration | | |
| Graphic Parameters | | |

## Onboard Device

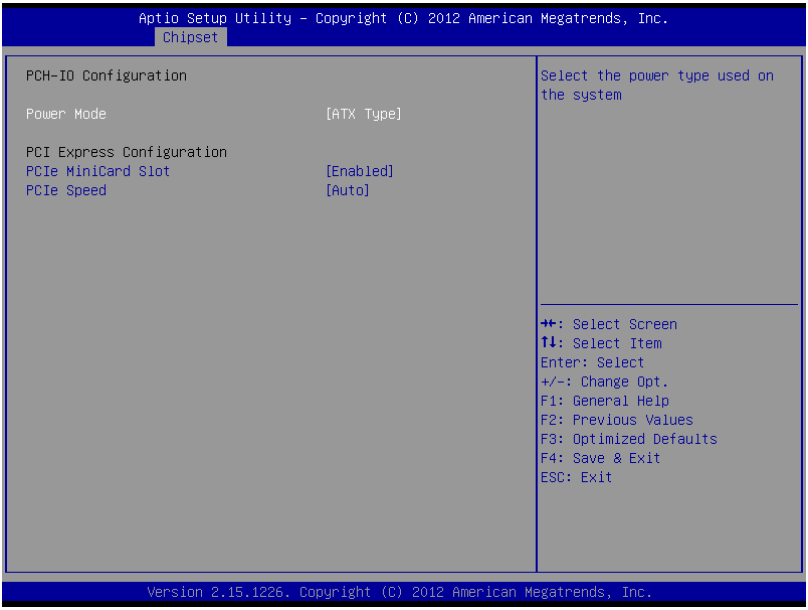



Options summary: (***default setting***)

| | | |
|---|---|---|
| Onboard HD Audio | Disabled | |
| | Enabled | |
| | ***Auto*** | |
| En/Disabled HD Audio controller. | | |
| HD Audio Internal HDMI Codec | ***Enabled*** | |
| | Disabled | |
| En/Disabled internal HDMI codec for HD Audio. | | |
| Intel LAN Controller | ***Enabled*** | |
| | Disabled | |

| | | |
|---|---|---|
| En/Disabled Intel i82579 NIC | | |
| Realtek LAN Controller | ***Enabled*** | |
| | Disabled | |
| En/Disabled Realtek RTL8111E NIC | | |

## PCH-IO Configuration




Options summary: (***default setting***)

| | | |
|---|---|---|
| Power Mode | ***128MB*** | |
| | 256MB | |
| Select the power type used on the system | | |
| PCIe MiniCard Slot | Disabled | |
| | ***Enabled*** | |
| Control the PCI Express Root Port. | | |
| PCIe Speed | ***Auto*** | |
| | Gen1 | |
| | Gen2 | |

Select PCI Express port speed. Some PCIe card must set to Gen1 for operation.

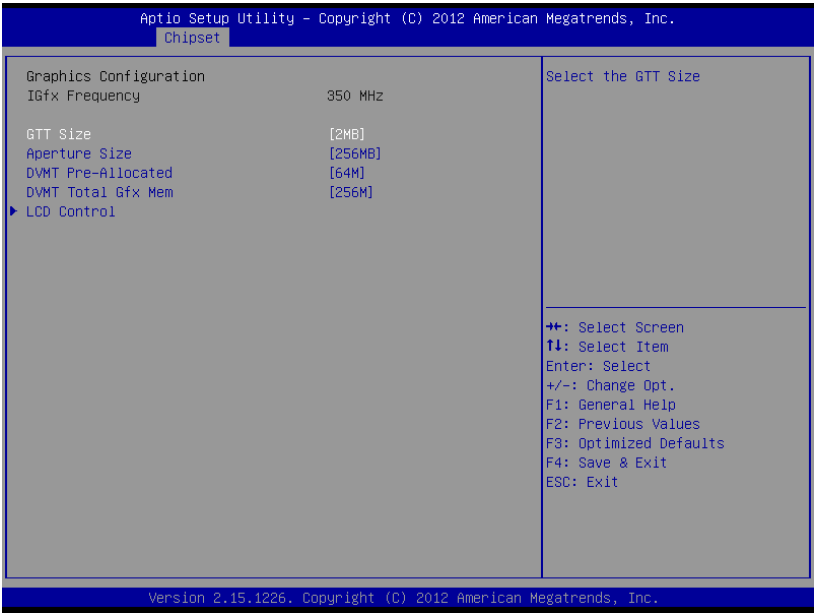
## Memory Configuration

Options summary: (***default setting***)

| | | |
|---|---|---|
| DIMM Profile | ***Default DIMM profile*** | |
| | XMP Profile 1 | |
| | XMP Profile 2 | |
| Select DIMM timing profile that should be used | | |
| Memory Frequency Limiter | ***Auto*** | |
| | 1067 | |
| | 1333 | |
| | 1600 | |

| Maximum Memory Frequency Selections in Mhz. | | |
|---|---|---|
| Max TOLUD | ***Dynamic*** | |
| | 1 GB | |
| | 1.25 GB | |
| | 1.5 GB | |
| | 1.75 GB | |
| | 2 GB | |
| | 2.25 GB | |
| | 2.5 GB | |
| | 2.75 GB | |
| | 3 GB | |
| | 3.25 GB | |
| Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of install graphic controller. | | |

## Graphic Configuration

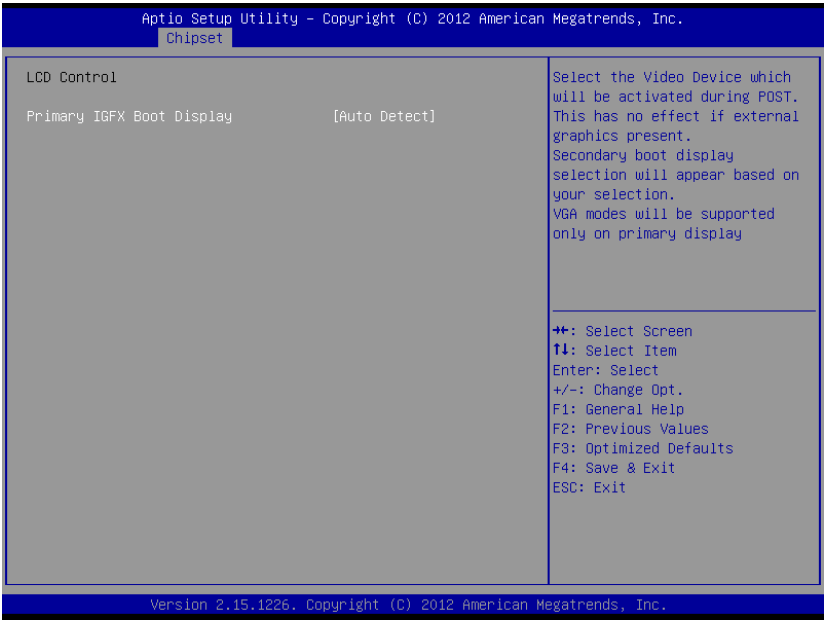



Options summary: (***default setting***)

| | | |
|---|---|---|
| GTT Size | 1MB | |
| | ***2MB*** | |
| Select the GTT Size | | |
| Aperture Size | 128MB | |
| | ***256MB*** | |
| | 512MB | |
| Select the Aperture Size | | |
| DVMT | ***64MB*** | |

| | | |
|---|---|---|
| Pre-Allocated | 32MB~1024MB | |
| Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. | | |
| DVMT Total Gfx Mem | 128MB | |
| | ***256MB*** | |
| | Max | |
| Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device. | | |

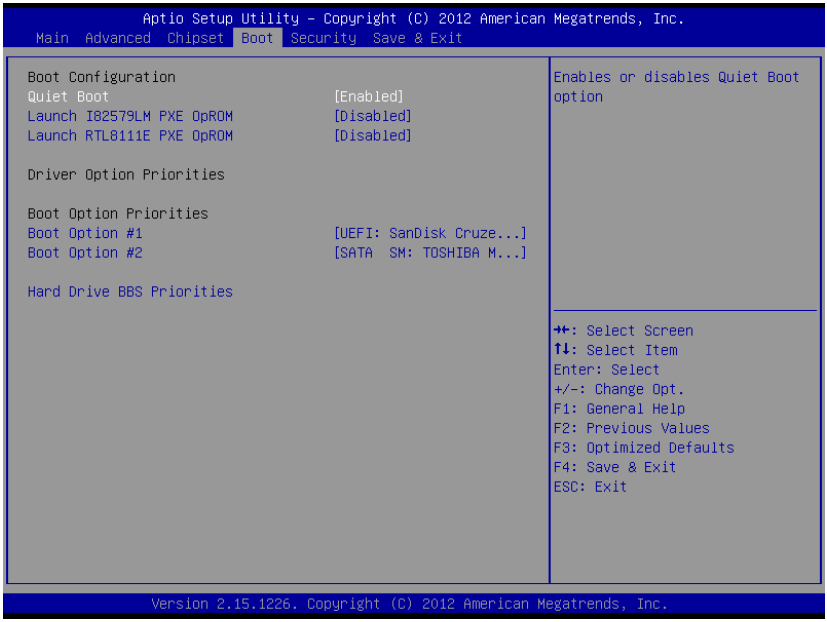
LCD Control




Options summary: (***default setting***)

| | | |
|---|---|---|
| Primary IGFX Boot Display | ***Auto Detect*** | |
| | CRT | |
| | DVI | |
| | CRT+LVDS1 | |
| Select Primary IGFX boot display device<br>Note: CRT, DVI and CRT+LVDS1 are not available on some Suk, | | |

## Setup submenu: Boot

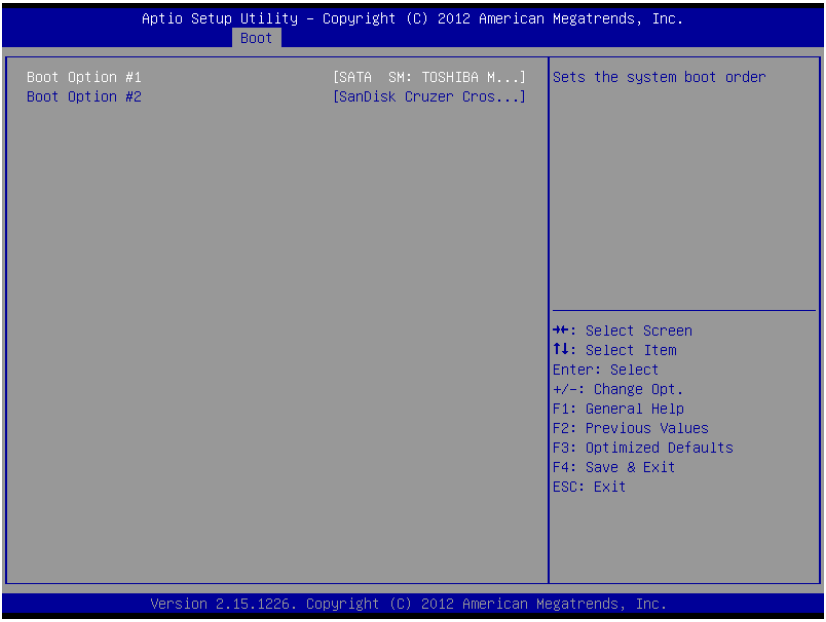



Options summary: (***default setting***)

| | | |
|---|---|---|
| Quiet Boot | Disabled | |
| | ***Enabled*** | |
| En/Disable showing boot logo. | | |
| Launch I82579LM/ RTL8111E PXE OpROM | ***Disabled*** | |
| | Enabled | |
| En/Disable PXE boot for I82579LM/RTL8111E LAN | | |

| | | |
|---|---|---|
| Boot Option #X/<br>XXXX Drive BBS<br>Priorities | | |
| The order of boot priorities. | | |

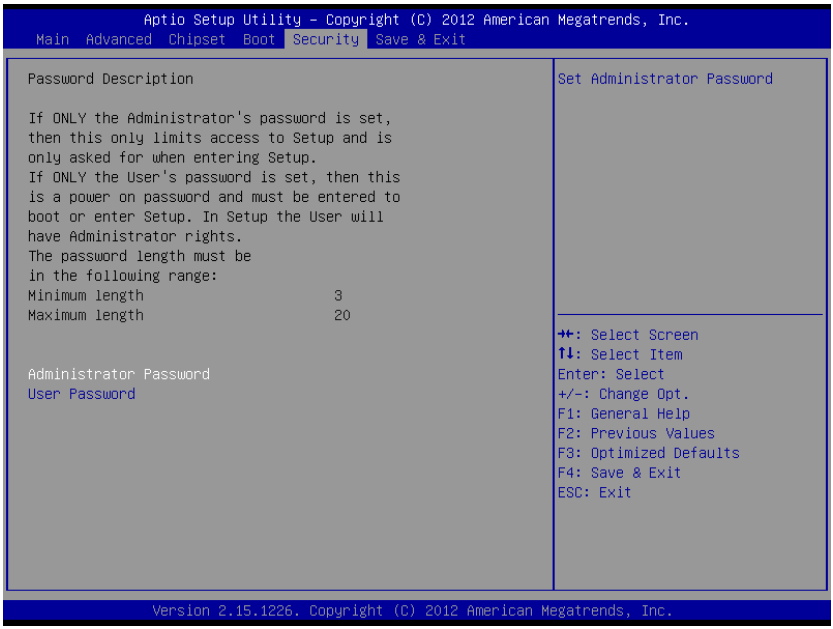
**BBS Priorities**




Options summary: (***default setting***)

| | | |
|---|---|---|
| Boot Option #x | Disabled | |
| | Device name | |
| Sets the system boot order | | |

## Setup submenu: Security




Options summary: (***default setting***)

| | | |
|---|---|---|
| Administrator Password/ User Password | ***Not set*** | |

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.

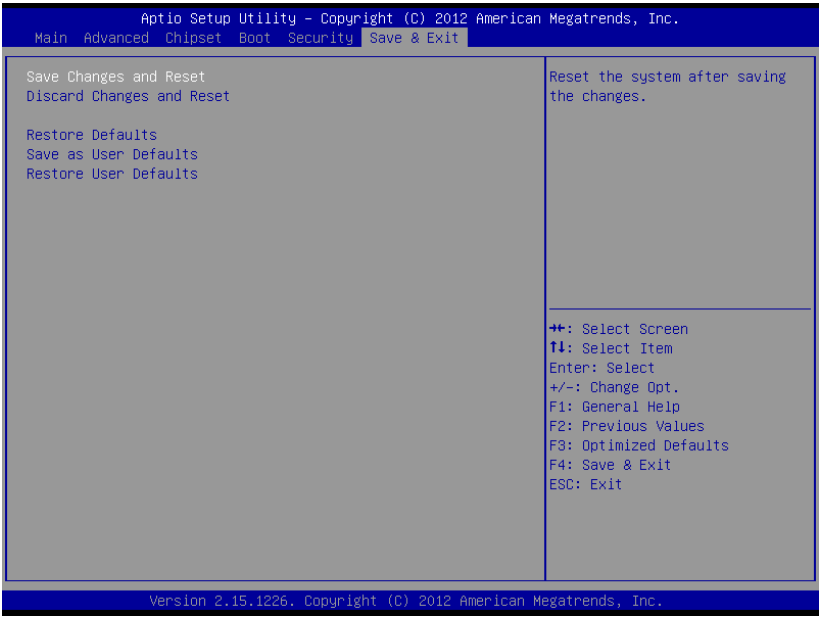
*Install the Password:*

Press Enter on this item, 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




Options summary: (***default setting***)

| | | |
|---|---|---|
| Save Changes and Reset | | |
| Reset the system after saving the changes | | |
| Discard Changes and Reset | | |
| Reset system setup without saving any changes | | |
| Restore Defaults | | |
| Restore/Load Default values for all the setup options. | | |
| Save as User Defaults | | |
| Save the changes done so far as User Defaults | | |
| Restore User Defaults | | |

Restore the User Defaults to all the setup options

Chapter

4

# Driver Installation

.

The TKS-G21-QM77B 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 Driver

Step 2 – Install VGA Driver

Step 3 – Install LAN1 Driver (Intel® LAN Chip)

Step 4 – Install LAN2 Driver (Realtek LAN Chip)

Step 5 – Install Audio Driver

Step 6 – Install ME Driver

Step 7 – Install RAID & AHCI Driver

Step 8 – Install TPM Driver

Step 9 – Install USB3.0 Driver

Please read instructions below for further detailed installations.

## 4.1 Installation:

Insert the TKS-G21-QM77B DVD-ROM into the DVD-ROM drive.

And install the drivers from Step 1 to Step 10 in order.

Step 1 – Install Chipset Driver

1. Click on the ***STEP 1-CHIPSET*** folder and select the OS folder your system is
2. Double click on the ***infinst_autol.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 2 – Install VGA Driver

1. Click on the ***STEP2-VGA*** 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

**Note 1:**

- This motherboard supports VGA and LVDS display devices. In Single Display mode, use the hot keys to switch between VGA to LVDS device or vice versa. By default, press **<Ctrl>+<Alt>+<F1>** to switch to VGA device and press **<Ctrl>+<Alt>+<F3>** to switch to LVDS device.
- Before removing the current display device, connect the display device that you want to use, and then press the hot keys to switch to that device.

**Note 2:** If the OS is Windows® XP, you have to install the driver of

dotNet Framework first. Simply click on ***dotnetfx35.exe*** located in ***dotNet Framwork*** folder.

Step 3 –Install LAN1 Driver (Intel® LAN Chip)

1. Click on the ***STEP3-LAN1(Intel)*** folder and select the OS folder your system is
2. Double click on the ***.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 4 –Install LAN2 Driver (Realtek LAN Chip)

1. Click on the ***STEP4-LAN2(Realtek)*** 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 5 –Install Audio Driver

1. Click on the ***STEP5-AUDIO*** 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 6 – Install ME Driver

1. Click on the ***STEP6-ME SW*** 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 7 – Install RAID & AHCI Driver

Please refer to the ***Appendix D RAID & AHCI Setting***

Step 8 – Install TPM Driver

1. Click on the ***STEP8-TPM*** 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

The system will help you install the driver automatically

Step 9 –Install USB3.0 Driver

1. Click on the ***STEP9-USB 3.0*** 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

Appendix

A

# Programming the Watchdog Timer

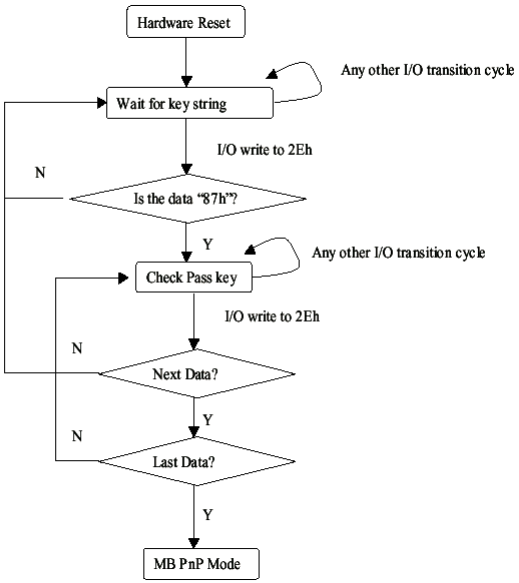
## A.1 Programming

TKS-G21-QM77B utilizes ITE IT8728F chipset as its watchdog timer controller.

Below are the procedures to complete its configuration and the AAEON intial watchdog timer program is also attached based on which you can develop customized program to fit your application.

### Configuring Sequence Description

After the hardware reset or power-on reset, the ITE 8728F enters the normal mode with all logical devices disabled except KBC. The initial state (enable bit ) of this logical device (KBC) is determined by the state of pin 121 (DTR1#) at the falling edge of the system reset during power-on reset.



There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

### (1) Enter the MB PnP Mode

To enter the MB PnP Mode, four special I/O write operations are to be performed during Wait for Key state. To ensure the initial state of the key-check logic, it is necessary to perform four write operations to the Special Address port (2EH). Two different enter keys are provided to select configuration ports (2Eh/2Fh) of the next step.

| | Address Port | Data Port |
|---|---|---|
| 87h, 01h, 55h, 55h: | 2Eh | 2Fh |

### (2) Modify the Data of the Registers

All configuration registers can be accessed after entering the MB PnP Mode. Before accessing a selected register, the content of Index 07h must be changed to the LDN to which the register belongs, except some Global registers.

### (3) Exit the MB PnP Mode

Set bit 1 of the configure control register (Index=02h) to 1 to exit the MB PnP Mode.

**WatchDog Timer Configuration Registers**

| LDN | Index | R/W | Reset | Configuration Register or Action |
|---|---|---|---|---|
| All | 02H | W | N/A | Configure Control |
| 07H | 71H | R/W | 00H | WatchDog Timer Control Register |
| 07H | 72H | R/W | 00H | WatchDog Timer Configuration Register |
| 07H | 73H | R/W | 00H | WatchDog Timer Time-out Value Register |

## Configure Control (Index=02h)

This register is write only. Its values are not sticky; that is to say, a hardware reset will automatically clear the bits, and does not require the software to clear them.

| Bit | Description |
|---|---|
| 7-2 | Reserved |
| 1 | Returns to the Wait for Key state. This bit is used when the configuration sequence is completed |
| 0 | Resets all logical devices and restores configuration registers to their power-on states. |

**WatchDog Timer Control Register (Index=71h, Default=00h)**

| Bit | Description |
|---|---|
| 7 | WDT is reset upon a CIR interrupt |
| 6 | WDT is reset upon a KBC (mouse) interrupt |
| 5 | WDT is reset upon a KBC (keyboard) interrupt |
| 4 | WDT is reset upon a read or a write to the Game Port base address |
| 3-2 | Reserved |
| 1 | Force Time-out. This bit is self-clearing |
| 0 | WDT Status |
| | 1: WDT value reaches 0. |
| | 0: WDT value is not 0 |

**WatchDog Timer Configuration Register (Index=72h, Default=00h)**

| Bit | Description |
|---|---|
| 7 | WDT Time-out value select |
| | 1: Second |
| | 0: Minute |
| 6 | WDT output through KRST (pulse) enable |
| 5-4 | Reserved |
| 3-0 | Select the interrupt level[Note] for WDT |

**WatchDog Timer Time-out Value Register (Index=73h, Default=00h)**

| Bit | Description |
|---|---|
| 7-0 | WDT Time-out value 7-0 |

## A.2 ITE8728F Watchdog Timer Initial Program

```
        .MODEL SMALL
        .CODE
Main:
        CALL Enter_Configuration_mode
        CALL Check_Chip
        mov cl, 7
        call Set_Logic_Device
        ;time setting
        mov cl, 10 ; 10 Sec
        dec al
Watch_Dog_Setting:
        ;Timer setting
        mov al, cl
        mov cl, 73h
        call Superio_Set_Reg
        ;Clear by keyboard or mouse interrupt
        mov al, 0f0h
        mov cl, 71h
        call Superio_Set_Reg
        ;unit is second.
        mov al, 0C0H
        mov cl, 72h
        call Superio_Set_Reg
```

```
; game port enable
mov cl, 9
call Set_Logic_Device

Initial_OK:
CALL Exit_Configuration_mode
MOV AH,4Ch
INT 21h

Enter_Configuration_Mode PROC NEAR
MOV SI,WORD PTR CS:[Offset Cfg_Port]

MOV DX,02Eh
MOV CX,04h
Init_1:
MOV AL,BYTE PTR CS:[SI]
OUT DX,AL
INC SI
LOOP Init_1
RET
Enter_Configuration_Mode ENDP

Exit_Configuration_Mode PROC NEAR
MOV AX,0202h
CALL Write_Configuration_Data
```

```
        RET
        Exit_Configuration_Mode ENDP

        Check_Chip PROC NEAR

        MOV AL,20h
        CALL Read_Configuration_Data
        CMP AL,87h
        JNE Not_Initial

        MOV AL,21h
        CALL Read_Configuration_Data
        CMP AL,12h
        JNE Not_Initial

Need_Initial:
        STC
        RET
Not_Initial:
        CLC
        RET
        Check_Chip ENDP
        Read_Configuration_Data PROC NEAR
        MOV DX,WORD PTR CS:[Cfg_Port+04h]
        OUT DX,AL
```

```
MOV DX,WORD PTR CS:[Cfg_Port+06h]
IN AL,DX
RET
Read_Configuration_Data ENDP

Write_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
OUT DX,AL
XCHG AL,AH
MOV DX,WORD PTR CS:[Cfg_Port+06h]
OUT DX,AL
RET
Write_Configuration_Data ENDP

Superio_Set_Reg proc near
push ax
MOV DX,WORD PTR CS:[Cfg_Port+04h]
mov al,cl
out dx,al
pop ax
inc dx
out dx,al
ret
Superio_Set_Reg endp.Set_Logic_Device proc near
Set_Logic_Device    proc    near
```

```
push ax
push cx
xchg al,cl
mov cl,07h
call Superio_Set_Reg
pop cx
pop ax
ret
Set_Logic_Device endp

;Select 02Eh->Index Port, 02Fh->Data Port
Cfg_Port DB 087h,001h,055h,055h

DW 02Eh,02Fh
```

## END Main

*Note: Interrupt level mapping*

0Fh-Dh: not valid

0Ch: IRQ12

.

.

03h: IRQ3

02h: not valid

01h: IRQ1

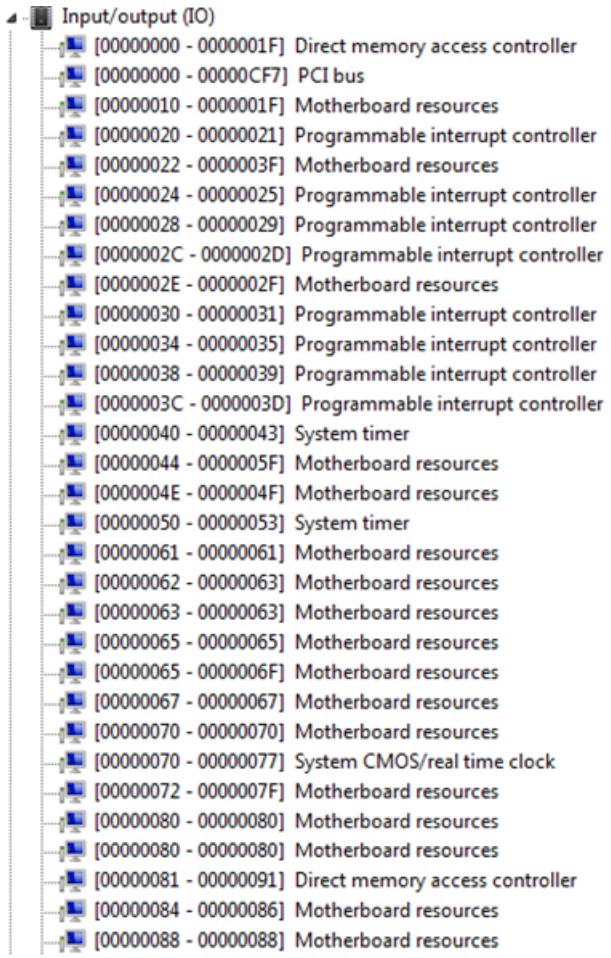
00h: no interrupt selected

Appendix

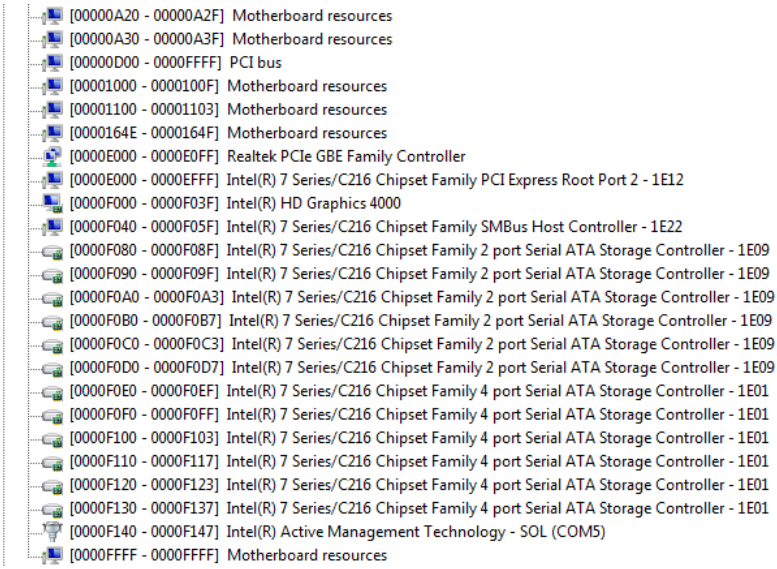
B

# I/O Information

## B.1 I/O Address Map



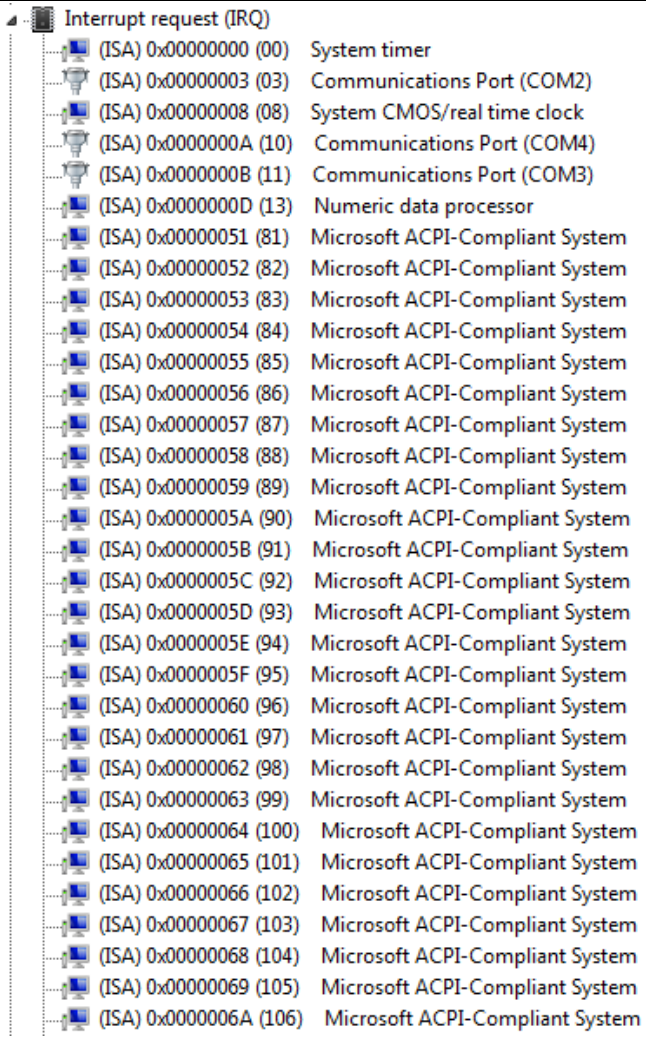
- [00000088 - 00000088] Motherboard resources
- [0000008C - 0000008E] Motherboard resources
- [00000090 - 0000009F] Motherboard resources
- [00000092 - 00000092] Motherboard resources
- [00000093 - 0000009F] Direct memory access controller
- [000000A0 - 000000A1] Programmable interrupt controller
- [000000A2 - 000000BF] Motherboard resources
- [000000A4 - 000000A5] Programmable interrupt controller
- [000000A8 - 000000A9] Programmable interrupt controller
- [000000AC - 000000AD] Programmable interrupt controller
- [000000B0 - 000000B1] Programmable interrupt controller
- [000000B2 - 000000B3] Motherboard resources
- [000000B4 - 000000B5] Programmable interrupt controller
- [000000B8 - 000000B9] Programmable interrupt controller
- [000000BC - 000000BD] Programmable interrupt controller
- [000000C0 - 000000DF] Direct memory access controller
- [000000E0 - 000000EF] Motherboard resources
- [000000F0 - 000000FF] Numeric data processor
- [000002E8 - 000002EF] Communications Port (COM4)
- [000002F8 - 000002FF] Communications Port (COM2)
- [000003B0 - 000003BB] Intel(R) HD Graphics 4000
- [000003C0 - 000003DF] Intel(R) HD Graphics 4000
- [000003E8 - 000003EF] Communications Port (COM3)
- [00000400 - 00000453] Motherboard resources
- [00000454 - 00000457] Motherboard resources
- [00000458 - 0000047F] Motherboard resources
- [000004D0 - 000004D1] Motherboard resources
- [000004D0 - 000004D1] Programmable interrupt controller
- [00000500 - 0000057F] Motherboard resources
- [00000680 - 0000069F] Motherboard resources
- [00000A00 - 00000A1F] Motherboard resources
- [00000A20 - 00000A2F] Motherboard resources


[00000A20 - 00000A2F] Motherboard resources
[00000A30 - 00000A3F] Motherboard resources
[00000D00 - 0000FFFF] PCI bus
[00001000 - 0000100F] Motherboard resources
[00001100 - 00001103] Motherboard resources
[0000164E - 0000164F] Motherboard resources
[0000E000 - 0000E0FF] Realtek PCIe GBE Family Controller
[0000E000 - 0000EFFF] Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 2 - 1E12
[0000F000 - 0000F03F] Intel(R) HD Graphics 4000
[0000F040 - 0000F05F] Intel(R) 7 Series/C216 Chipset Family SMBus Host Controller - 1E22
[0000F080 - 0000F08F] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F090 - 0000F09F] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F0A0 - 0000F0A3] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F0B0 - 0000F0B7] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F0C0 - 0000F0C3] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F0D0 - 0000F0D7] Intel(R) 7 Series/C216 Chipset Family 2 port Serial ATA Storage Controller - 1E09
[0000F0E0 - 0000F0EF] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F0F0 - 0000F0FF] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F100 - 0000F103] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F110 - 0000F117] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F120 - 0000F123] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F130 - 0000F137] Intel(R) 7 Series/C216 Chipset Family 4 port Serial ATA Storage Controller - 1E01
[0000F140 - 0000F147] Intel(R) Active Management Technology - SOL (COM5)
[0000FFFF - 0000FFFF] Motherboard resources

## B.2 Memory Address Map

- Memory
  - [000A0000 - 000BFFFF] Intel(R) HD Graphics 4000
  - [000A0000 - 000BFFFF] PCI bus
  - [000D0000 - 000D3FFF] PCI bus
  - [000D4000 - 000D7FFF] PCI bus
  - [000D8000 - 000DBFFF] PCI bus
  - [000DC000 - 000DFFFF] PCI bus
  - [000E0000 - 000E3FFF] PCI bus
  - [000E4000 - 000E7FFF] PCI bus
  - [20000000 - 201FFFFF] System board
  - [40004000 - 40004FFF] System board
  - [DFA00000 - DFA00FFF] Motherboard resources
  - [DFA00000 - FEAFFFFF] PCI bus
  - [E0000000 - EFFFFFFF] Intel(R) HD Graphics 4000
  - [F0000000 - F0003FFF] Realtek PCIe GBE Family Controller
  - [F0000000 - F00FFFFF] Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 2 - 1E12
  - [F7800000 - F7BFFFFF] Intel(R) HD Graphics 4000
  - [F7C00000 - F7C00FFF] Realtek PCIe GBE Family Controller
  - [F7C00000 - F7CFFFFF] Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 2 - 1E12
  - [F7D00000 - F7D1FFFF] Intel(R) 82579LM Gigabit Network Connection
  - [F7D20000 - F7D2FFFF] Intel(R) USB 3.0 eXtensible Host Controller
  - [F7D30000 - F7D33FFF] High Definition Audio Controller
  - [F7D35000 - F7D350FF] Intel(R) 7 Series/C216 Chipset Family SMBus Host Controller - 1E22
  - [F7D36000 - F7D363FF] Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E26
  - [F7D37000 - F7D373FF] Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E2D
  - [F7D38000 - F7D38FFF] Intel(R) 82579LM Gigabit Network Connection
  - [F7D39000 - F7D39FFF] Intel(R) Active Management Technology - SOL (COM5)
  - [F7D3B000 - F7D3B00F] Intel(R) Management Engine Interface
  - [F8000000 - FBFFFFFF] Motherboard resources
  - [FED00000 - FED003FF] High precision event timer
  - [FED10000 - FED17FFF] Motherboard resources
  - [FED18000 - FED18FFF] Motherboard resources
  - [FED19000 - FED19FFF] Motherboard resources
  - [FED19000 - FED19FFF] Motherboard resources
  - [FED1C000 - FED1FFFF] Motherboard resources
  - [FED20000 - FED3FFFF] Motherboard resources
  - [FED40000 - FED44FFF] System board
  - [FED45000 - FED8FFFF] Motherboard resources
  - [FED90000 - FED93FFF] Motherboard resources
  - [FEE00000 - FEEFFFFF] Motherboard resources
  - [FF000000 - FFFFFFFF] Intel(R) 82802 Firmware Hub Device
  - [FF000000 - FFFFFFFF] Motherboard resources

## B.3 IRQ Mapping Chart



(ISA) 0x0000006A (106) Microsoft ACPI-Compliant System
(ISA) 0x0000006B (107) Microsoft ACPI-Compliant System
(ISA) 0x0000006C (108) Microsoft ACPI-Compliant System
(ISA) 0x0000006D (109) Microsoft ACPI-Compliant System
(ISA) 0x0000006E (110) Microsoft ACPI-Compliant System
(ISA) 0x0000006F (111) Microsoft ACPI-Compliant System
(ISA) 0x00000070 (112) Microsoft ACPI-Compliant System
(ISA) 0x00000071 (113) Microsoft ACPI-Compliant System
(ISA) 0x00000072 (114) Microsoft ACPI-Compliant System
(ISA) 0x00000073 (115) Microsoft ACPI-Compliant System
(ISA) 0x00000074 (116) Microsoft ACPI-Compliant System
(ISA) 0x00000075 (117) Microsoft ACPI-Compliant System
(ISA) 0x00000076 (118) Microsoft ACPI-Compliant System
(ISA) 0x00000077 (119) Microsoft ACPI-Compliant System
(ISA) 0x00000078 (120) Microsoft ACPI-Compliant System
(ISA) 0x00000079 (121) Microsoft ACPI-Compliant System
(ISA) 0x0000007A (122) Microsoft ACPI-Compliant System
(ISA) 0x0000007B (123) Microsoft ACPI-Compliant System
(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) 0x0000008A (138) Microsoft ACPI-Compliant System
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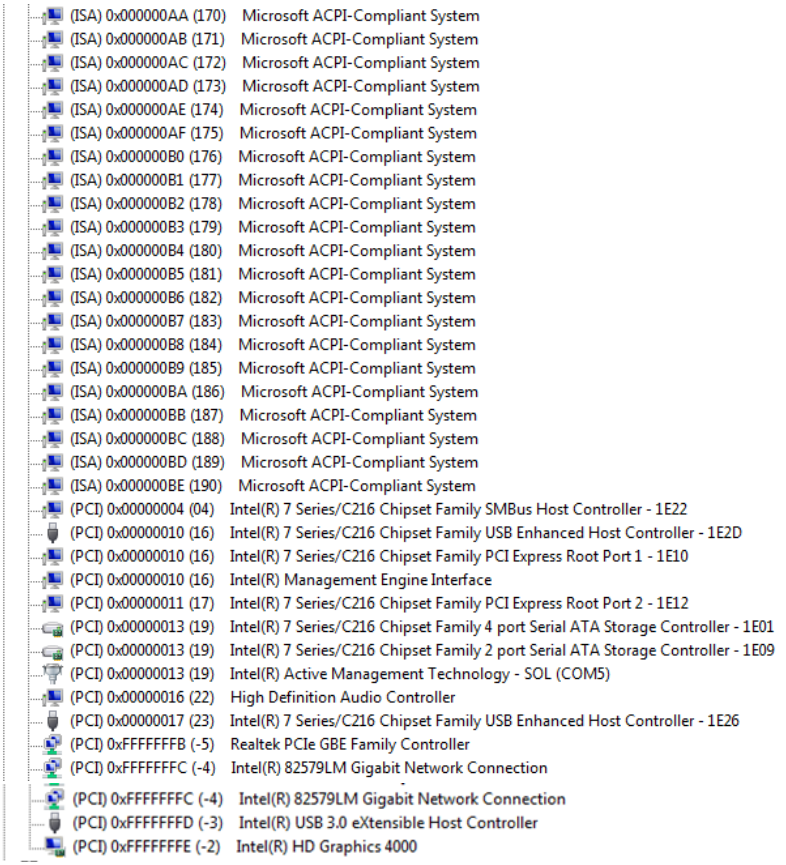
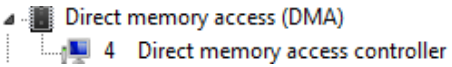
(ISA) 0x0000008C (140) Microsoft ACPI-Compliant System
(ISA) 0x0000008D (141) Microsoft ACPI-Compliant System
(ISA) 0x0000008E (142) Microsoft ACPI-Compliant System
(ISA) 0x0000008F (143) Microsoft ACPI-Compliant System
(ISA) 0x00000090 (144) Microsoft ACPI-Compliant System
(ISA) 0x00000091 (145) Microsoft 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




## B.4 DMA Channel Assignments



Appendix

C

# Mating Connector

## C.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

| Connector Label | Function | Mating Connector | | Available Cable | Cable P/N |
|---|---|---|---|---|---|
| | | Vendor | Model number | | |
| CN1 | LVDS#1 Inverter Connector | JST | PHR-5 | N/A | N/A |
| CN2 | +12V Vin Connector | N/A | N/A | Power Cable | 1702002010 |
| CN3 | USB Port #7, #8 Connector | Molex | 51110-1050 | USB Cable | 1709100201 |
| CN4 | USB Port #5, #6 Connector | Molex | 51110-1050 | USB Cable | 1709100201 |
| CN5 | USB Port #3, #4 Connector | Molex | 51110-1050 | USB Cable | 1709100201 |
| CN6 | External +5VSB Power Input and PS_ON# | JST | XHP-3 | ATX Cable | 170220020B |
| CN7 | LVDS#2 Inverter Connector | JST | PHR-5 | N/A | N/A |
| CN8 | Audio Connector | Molex | 51021-1000 | Audio Cable | 1709100254 |
| CN9 | LVDS#1 Connector | HIROSE | DF13-30DS-1.25C | N/A | N/A |
| CN10 | LVDS#2 Connector | HIROSE | DF13-30DS-1.25C | N/A | N/A |
| CN11 | COM Port 2 Connector | Molex | 51021-0900 | Serial Port Cable | 1701090150 |
| CN12 | LPT / Digital IO Port | Molex | 51110-2650 | Parallel Port Cable | 1701260200 |
| CN13 | COM Port 3 Connector | Molex | 51021-0900 | Serial Port Cable | 1701090150 |

| | | | | | |
|---|---|---|---|---|---|
| CN14 | LPC Port | JST | SHR-12V-S-B | AAEON LPC Cable | 1703120130 |
| CN15 | COM Port 4 Connector | Molex | 51021-0900 | Serial Port Cable | 1701090150 |
| CN16 | UIM Connector | Molex | 51021-0600 | N/A | N/A |
| CN17 | P/S2 KB/MS Connector | JST | PHDR-06VS | P/S2 KB/MS Cable | 1700060152 |
| CN18 | External AUX Power and PS_ON# | JST | PHR-6 | N/A | N/A |
| CN19 | Touch Screen Connector | JST | SHR-9V-S-B | N/A | N/A |
| CN20 | CPU Fan Connector | Molex | 22-01-2035 | N/A | N/A |
| CN22 | +5Vout Connector | JST | PHR-2 | 2 Pins For HDD Power | 1702150155 |
| BAT1 | External RTC Connector | Molex | 51021-0200 | Battery Cable | 175011901C |

Appendix

D

# RAID & AHCI Settings

## D.1 Setting RAID

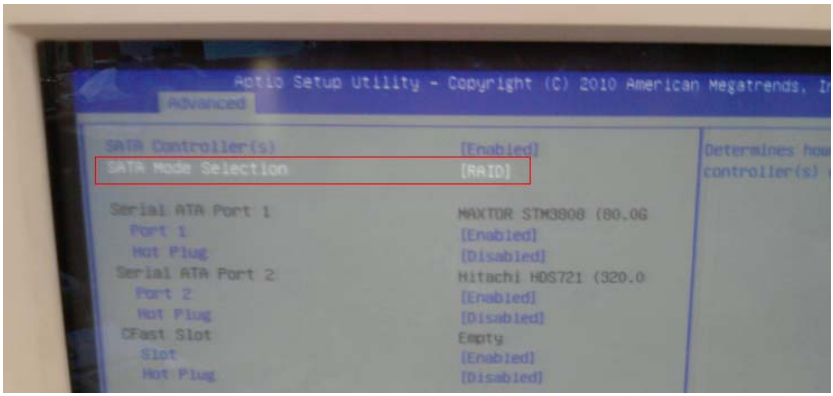
OS installation to setup RAID mode

Step 1: Copy the files below from the Driver CD:

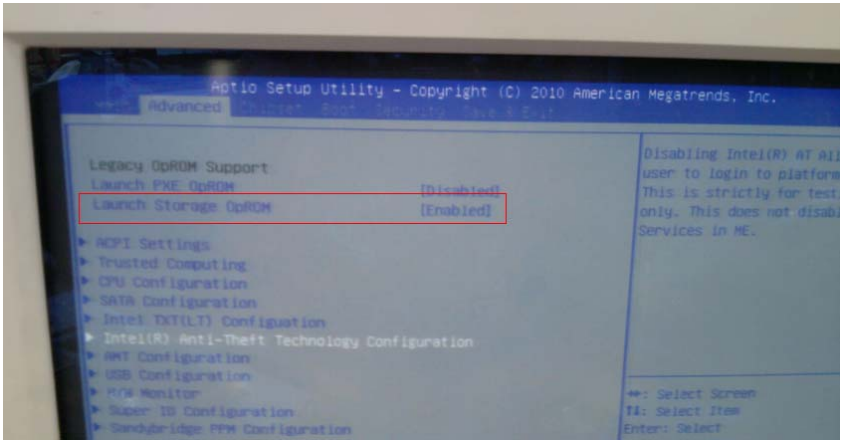
***STEP7-RAID&AHCI\WINXP_32*** to Disk.

Step 2: Connect the USB Floppy (Disk with the RAID&AHCI files) to the board.

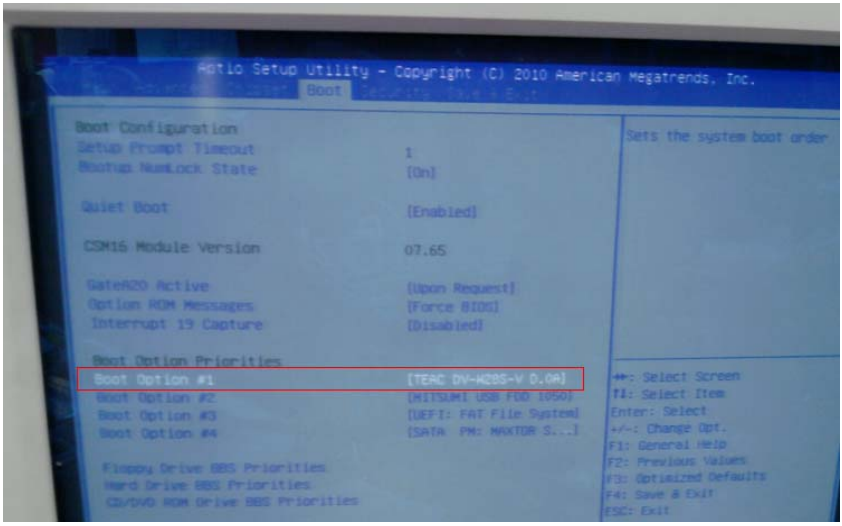
Step 3: The setting procedures "**In BIOS Setup Menu**": Select **Advanced -> SATA Configuration -> SATA Mode Selection -> RAID**



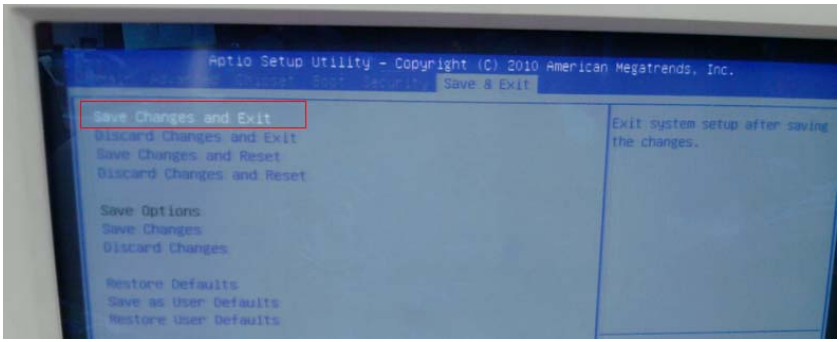

Step 4: Select **Advanced** -> **Launch Storage OpROM** -> **Enabled**



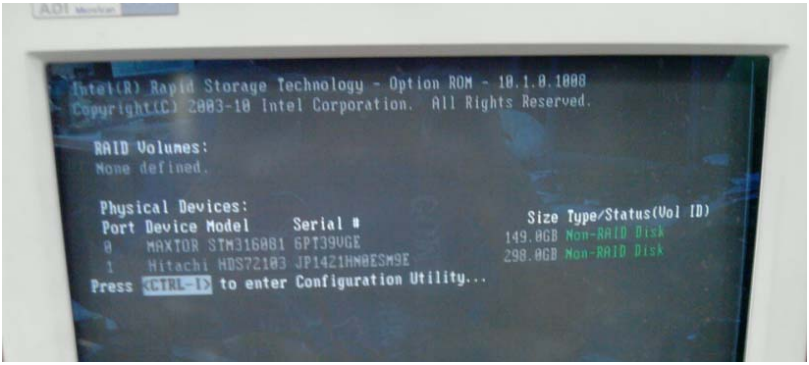
Step 5: Select **Boot** -> **Boot Option #1** -> **DVD ROM Type**



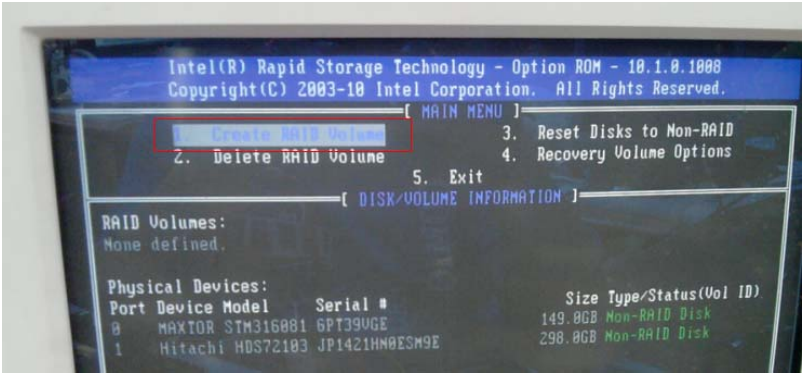

Step 6: Select **Save & Exit** -> **Save Changes and Exit**



Step 7: Press “**Ctrl-I”** to enter MAIN MENU

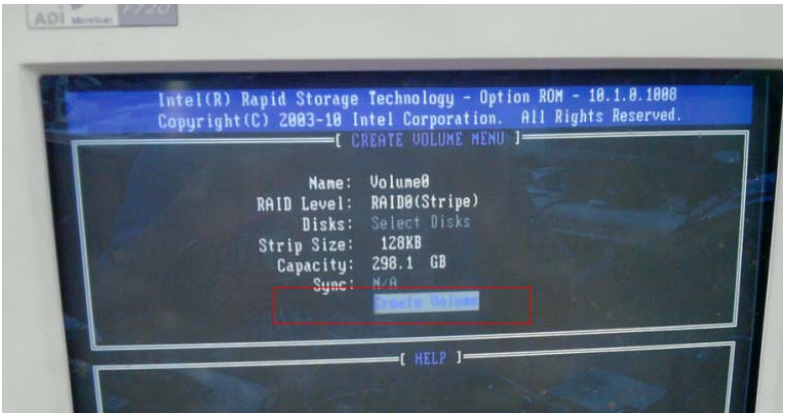



Step 8: Select “**1. Create RAID Volume**”



Step 9: Select **RAID Level -> RAID0(Stripe)**

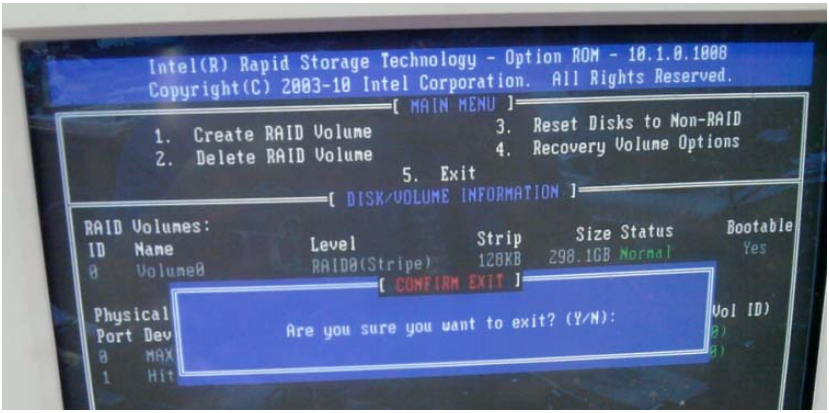
Step 10: Select "**Create Volume**"



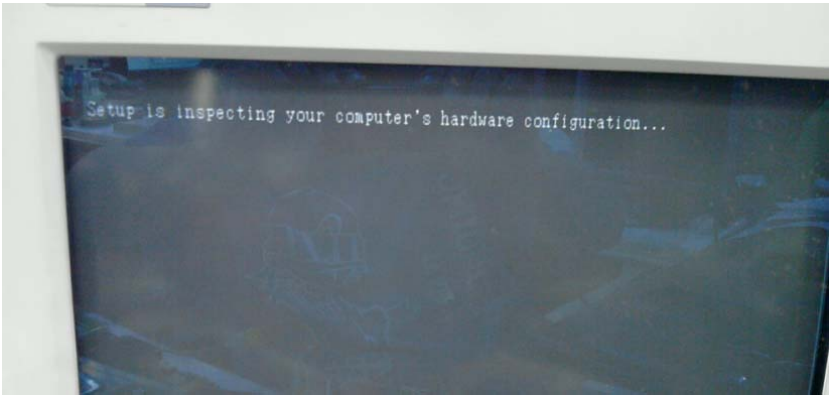
Step 11: Type "**Y**" for confirmation

Step 12: Select "**5. Exit**"

Step 13: Choose "**Y**"

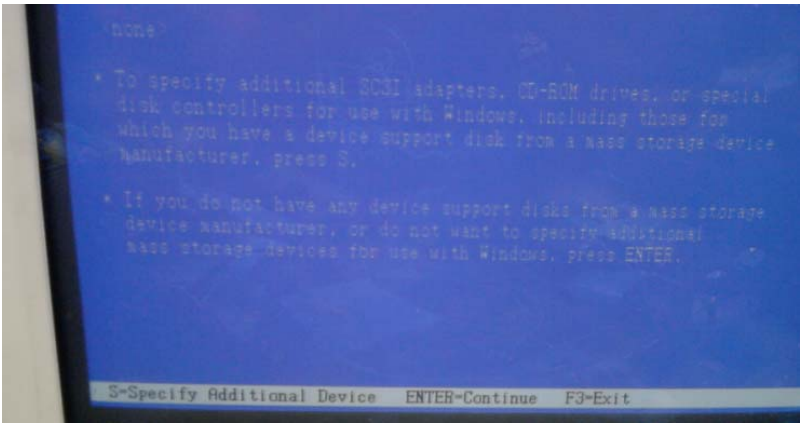



Step 14: Setup OS

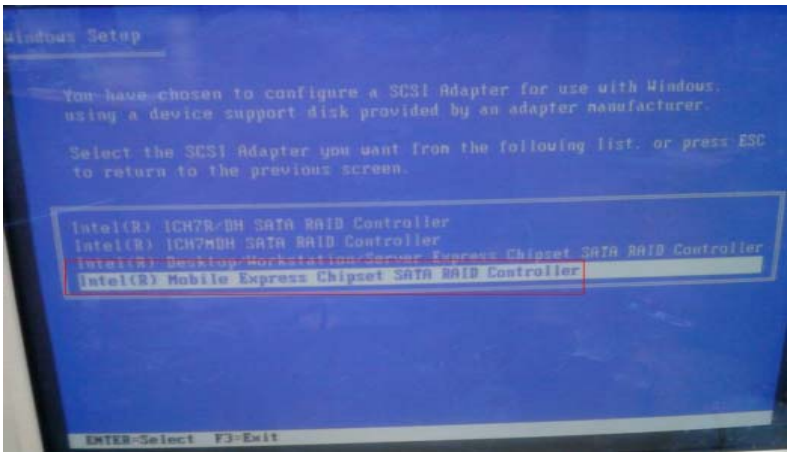


Step 15: Press “**F6**”

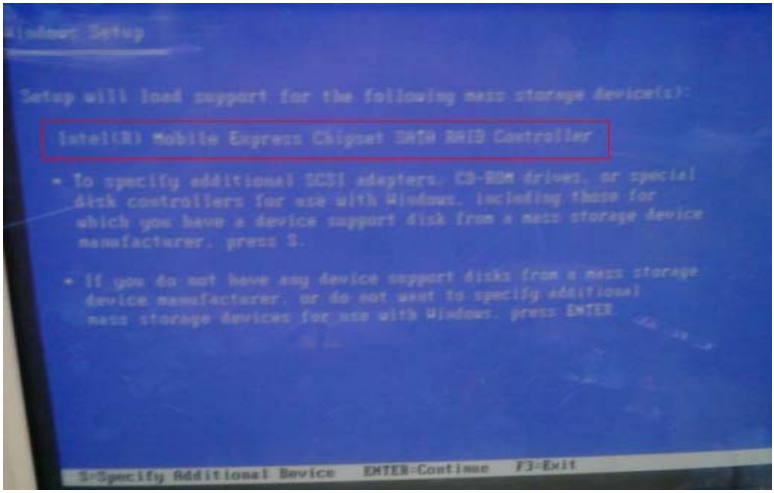
Step 16: Choose “**S**”



Step 17: Select the "**Intel® Mobile Express Chipset SATA RAID Controller**"




Step 18: Select "ENTER" after choosing the model number.



Step 19: Setup is loading files.

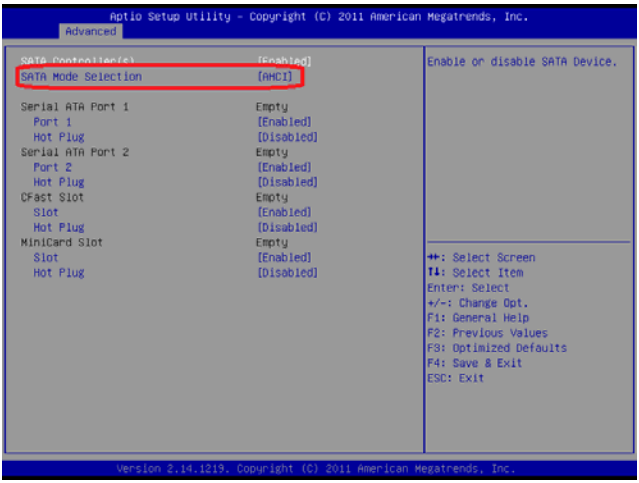
## D.2 Setting AHCI

OS installation to SETUP AHCI Mode

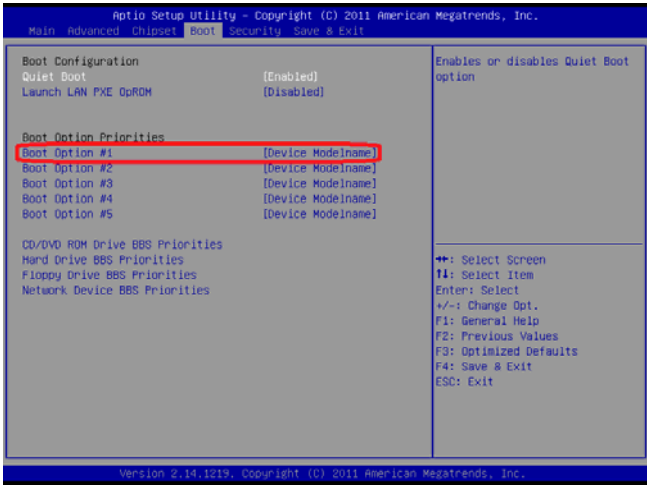
Step 1: Copy below files from “Driver CD -> STEP7 - AHCI\WinXP_32” and to diskette.

Step 2: Connect the USB Floppy drive to the system and insert the diskette from previous step.

Step 3: Configure SATA Controller to AHCI mode in **BIOS SETUP Menu: Advanced -> SATA Configuration -> SATA Mode Selection-> AHCI Mode**



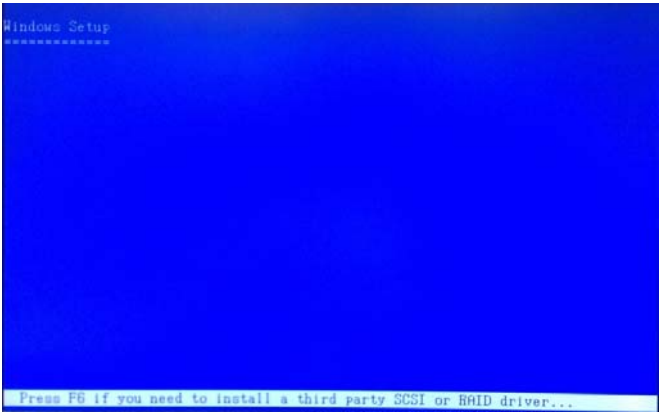
Step 4: Configure DVD/CD-ROM drive as the first boot device.



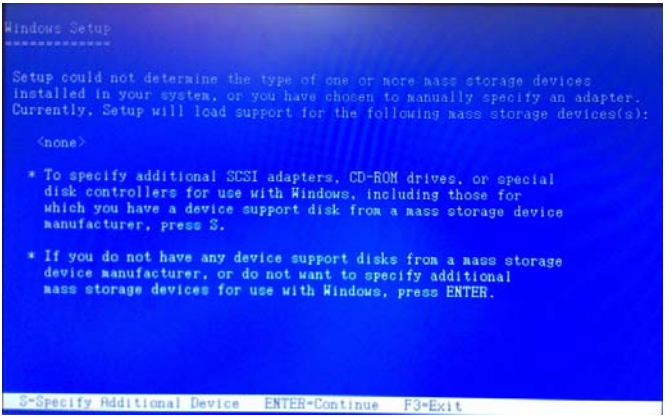

Step 5: Save changes and exit BIOS SETUP

Step 6 – Boot to DVD/CD-ROM device to install OS

Step 7 – Press **"F6"** to install AHCI driver




Step 8 – Press **"S"** to install AHCI driver




Step 9 – Choose **"Intel(R) 7 Series Chipset Family SATA AHCI Controller"**

Step 10 – Windows Setup will display the controller name you selected in previous step and continue to install OS when **"ENTER"** pressed.

Appendix

E

# Digital I/O Ports

## E.1 Electrical Specifications for Digital I/O Ports

| Table 1 : Digital Input/Output Pin Electrical Specification | | | | | | |
|---|---|---|---|---|---|---|
| Pin | Type | Input Threshold Voltage | | Output Voltage | | Note |
| | | Low | High | Low | High | |
| DIO1 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO2 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO3 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO4 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO5 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO6 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO7 | I/O | 0.8 | 2.2 | 0 | 3.3 | |
| DIO8 | I/O | 0.8 | 2.2 | 0 | 3.3 | |

Note: All DIO pins are ***not*** 5V tolerance in input mode.

## E.2 DIO Programming

TKS-G21-QM77B utilizes ITE IT8728F chipset as its Digital I/O controller. Below are the procedures to complete its configuration and the AAEON initial DIO program is also attached based on which you can develop customized program to fit your application. There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

## E.3 Digital I/O Register

| Table 2 : SuperIO relative register table | | |
|---|---|---|
| | Default Value | Note |
| Index | 0x2E | SIO MB PnP Mode Index Register 0x2E or 0x4E |
| Data | 0x2F | SIO MB PnP Mode Data Register 0x2F or 0x4F |

| Table 3 : Digital Input/Output relative register table | | | | |
|---|---|---|---|---|
| | LDN | Register | BitNum | Note |
| GPIO1 Direction | 0x07 | 0xCE | 0 | 0:input, 1: output |
| GPIO2 Direction | 0x07 | 0xCE | 1 | |
| GPIO3 Direction | 0x07 | 0xCE | 2 | |
| GPIO4 Direction | 0x07 | 0xCE | 3 | |
| GPIO5 Direction | 0x07 | 0xCF | 0 | |
| GPIO6 Direction | 0x07 | 0xCF | 1 | |
| GPIO7 Direction | 0x07 | 0xCF | 2 | |
| GPIO8 Direction | 0x07 | 0xCF | 3 | |

| Table 4: Digital Input/Output relative IO address table | | | |
|---|---|---|---|
| | IO Address | BitNum | Note |
| GPIO1 State | 0x0A06 | 0 | 0:input, 1: output |
| GPIO2 State | 0x0A06 | 1 | |
| GPIO3 State | 0x0A06 | 2 | |
| GPIO4 State | 0x0A06 | 3 | |
| GPIO5 State | 0x0A07 | 0 | |
| GPIO6 State | 0x0A07 | 1 | |
| GPIO7 State | 0x0A07 | 2 | |
| GPIO8 State | 0x0A07 | 3 | |

## E.4 Digital I/O Sample Program

```
*****************************************************************************
// SuperIO relative definition (Please reference to Table 2)
#define  SIOIndex  0x2E
#define  SIOData   0x2F
#define  DIOLDN    0x07
IOWriteByte(byte IOPort, byte Value);
IOReadByte(byte IOPort);
// DIO relative definition (Please reference to Table 3)
#define  DirReg1      0xCE       // GPIO1-GPIO4
#define  DirReg2      0xCF       // GPIO5-GPIO8
    #define  InputPin     0x00
    #define  OutputPin    0x01
#define  StatusReg1    0xA06       // GPIO1-GPIO4
#define  StatusReg2    0xA07       // GPIO5-GPIO8
    #define  PinLow       0x00
    #define  PinHigh      0x01
#define  Pin1Bit      0x00
#define  Pin2Bit      0x01
#define  Pin3Bit      0x02
#define  Pin4Bit      0x03
#define  Pin5Bit      0x04
#define  Pin6Bit      0x05
#define  Pin7Bit      0x06
#define  Pin8Bit      0x07
*****************************************************************************

*****************************************************************************
VOID  Main(){
      Boolean PinStatus ;

      // Procedure : AaeonReadPinStatus
      // Input :
      //     Example, Read Digital I/O Pin 3 status
      // Output :
```

```
        //     InputStatus :
        //           0: Digital I/O Pin level is low
        //           1: Digital I/O Pin level is High
        PinStatus = AaeonReadPinStatus(Pin3Bit);

        // Procedure : AaeonSetOutputLevel
        // Input :
        //     Example, Set Digital I/O Pin 2 to high level
        AaeonSetOutputLevel(Pin2Bit, PinHigh);
}
*****************************************************************************

*****************************************************************************
Boolean  AaeonReadPinStatus(byte PinBit){
        Boolean PinStatus ;
        If (PinBit < Pin4Bit) {
            PinStatus = IoBitRead(StatusReg1, PinBit);
        } else
        {
            PinStatus = IoBitRead(StatusReg2, PinBit - PinBit4);
        }
        Return PinStatus ;
}
VOID  AaeonSetOutputLevel(byte PinBit, byte Value){
        ConfigDioMode(PinBit, OutputPin);
        If (PinBit < Pin4Bit) {
            IoBitSet (StatusReg1, PinBit, Value);
        } else
        {
            IoBitSet (StatusReg1, PinBit - PinBit4, Value);
        }
}
*****************************************************************************

*****************************************************************************VOI
D  SIOEnterMBPnPMode(){
        IOWriteByte(SIOIndex, 0x87);
```

```
        IOWriteByte(SIOIndex, 0x01);
        IOWriteByte(SIOIndex, 0x55);
        IOWriteByte(SIOIndex, 0x55);
}

VOID  SIOExitMBPnPMode(){
        IOWriteByte(SIOIndex, 0x02);
        IOWriteByte(SIOData, 0x01);
}

VOID  SIOSelectLDN(byte LDN){
        IOWriteByte(SIOIndex, 0x07); // SIO LDN Register Offset = 0x07
        IOWriteByte(SIOData, LDN);
}
********************************************************************************

********************************************************************************Boo
lean  IoBitRead(byte Address, byte BitNum){
        Byte TmpValue;

        TmpValue = IOReadByte(Address);
        TmpValue &= (1 << BitNum);
        If(TmpValue == 0)
                Return 0;
        Return 1;
}
Boolean  IoBitSet(byte Address, byte BitNum, Byte Value){
        Byte TmpValue;

        TmpValue = IOReadByte(Address);
        TmpValue &= ~(1 << BitNum);
        TmpValue |= (Value & 0x01) << BitNum;
        IOWriteByte(Address, TmpValue);

        Return 1;
}
VOID  ConfigDioMode(byte PinBit, byte Mode){
```

```
    Byte TmpValue;

    SIOEnterMBPnPMode();
    SIOSelectLDN(DIOLDN);
    If (PinBit < Pin4Bit) {
        IOWriteByte(SIOIndex, DirReg1);
        TmpValue = IOReadByte(SIOData);
        TmpValue &= (1 << PinBit);
        TmpValue |= (Mode << PinBit);
        IOWriteByte(SIOData, DirReg1);
    } else
    {
        IOWriteByte(SIOIndex, DirReg2);
        TmpValue = IOReadByte(SIOData);
        TmpValue &= ~(1 << (PinBit - Pin4Bit));
        TmpValue |= (Mode << (PinBit - Pin4Bit));
        IOWriteByte(SIOData, DirReg2);
    }
    SIOExitMBPnPMode();
}
*****************************************************************************
```