TKS-G50-QM77

Intel® 3rd Generation
Core™ i7/ i5/ i3/ Celeron® Processor
10/100/1000Base-TX Ethernet
2 USB3.0, 2 USB 2.0, 4 COM
8-bit Digital I/O
2 SATA 3.0Gb/s
1 CFast™, 1 Mini Card, LPC

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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-G50-QM77

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

The newest EmBox series TKS-G50-QM77 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-G50-QM77 is designed for indoor environments due to the following reasons; first, the TKS-G50-QM77 offers high performance system that while operating in ambient temperatures ranging from 0° to 50°C. The TKS-G50-QM77 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/i5/i3/Celeron®Processor
- Intel® QM77/HM76
- 204-pin DDR3 1600 MHz SODIMM x 1, Up to 8 GB
- Gigabit Ethernet x 2
- VGA Output x 1
- Line-Out, Mic-In
- SATA 6.0Gb/s x 2 (Optional RAID), CFast™ x 1
- USB3.0 x 2, USB2.0 x 2, COM x 4, 8-Bit Digital I/O, Mini PCIe x 1
- Mini Card x 1
- +12V Only Operation
- Supports iAMT with Intel® QM77 and Core™ i7/ i5 Processors Only

1.3 Specifications

CPU		Onboard Intel® Core™ i7/i5/i3/Celeron® processor
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
Storage Device	SSD	CFast™ x 1
	HDD	2.5" Hard Disk Drive Bayx1
Network	LAN	Intel® 82579LM & Realtek RTL 8111E, 10/100/1000 Base-TX Ethernet
	Wireless	802.11b/g/n WiFi (Optional)
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 3
	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
System Cooling		Easy Fan function support

	1. Fix Mode: Full Speed 2. Auto Mode: Full Speed (CPU temperature $\geqq 55^{\circ}$C) and Low Speed (CPU temperature $< 55^{\circ}$C)
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	1 g rms/ 5 ~ 500Hz/ random operation
Anti-Shock	20 G peak acceleration (11 msec. duration)
Certification **EMC**	CE/FCC Class A
Dimension	7.80" x 7.09" x 1.77" (198mm x 180mm x 45mm)
Gross Weight	3.92 lb (1.78 kg) (Heavy duty steel)
OS Support	Windows® XP Pro, Windows® 7, Linux Fedora

Chapter

2

Quick Installation Guide

2.1 Safety Precautions

Warning!

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.

Caution!

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-G50-QM77

2.3 A Quick Tour of the TKS-G50-QM77

Before you start to set up the TKS-G50-QM77, 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-G50-QM77
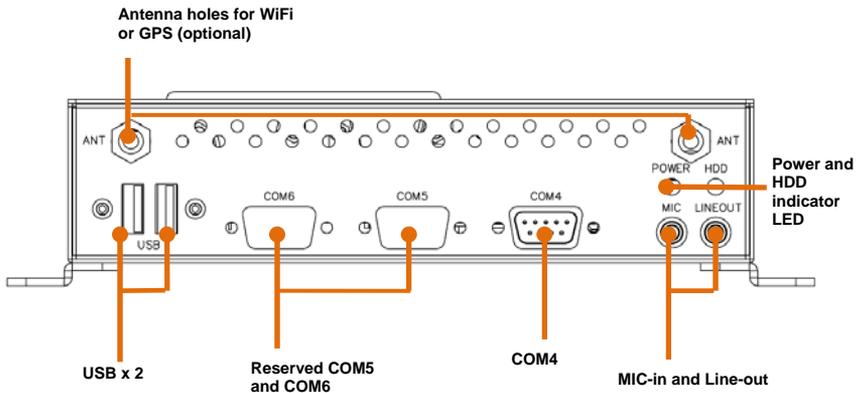
Figure 2.2 Rear View of the TKS-G50-QM77

8-bit Digital I/O with VCC and ground Pin

Power Switch

USB x 2

LAN1 and LAN 2 (Gigabit Ethernet)

COM1, COM2 and COM3

VGA

DC-in +12V DC (lockable)
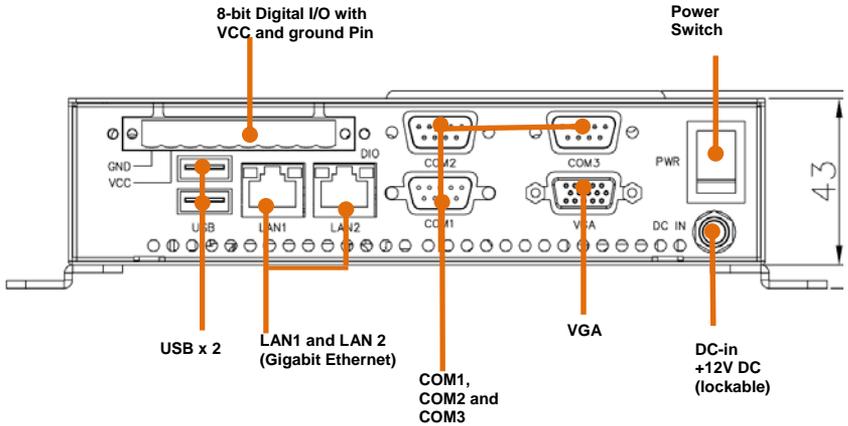
Figure 2.3 Top View of the TKS-G50-QM77

Wallmount Brackets (optional)

CPU Fan
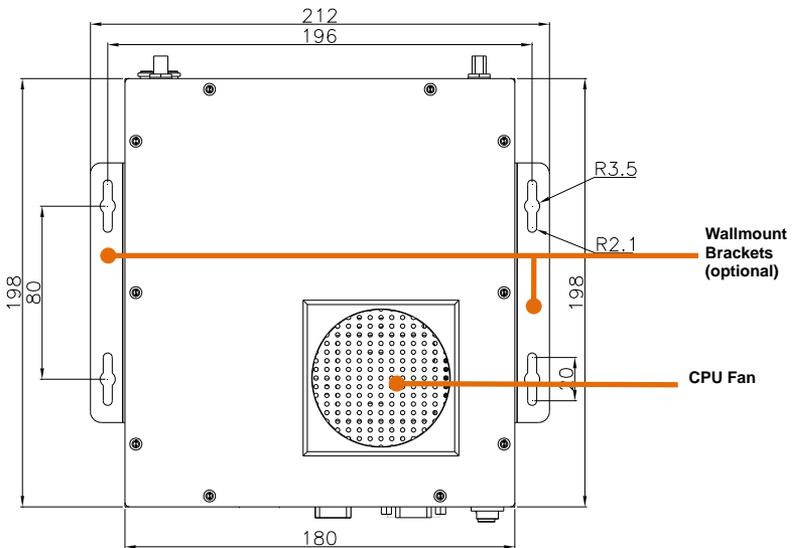
Figure 2.4 Bottom View of the TKS-G50-QM77

I/O cover for RAM, CFast and optional Mini Card
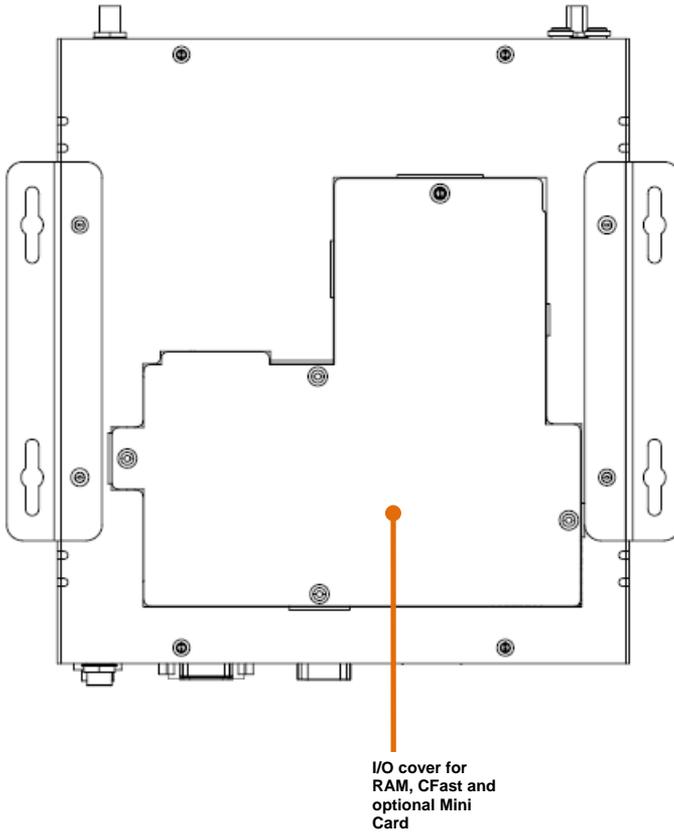
2.4 Hard Disk Installation

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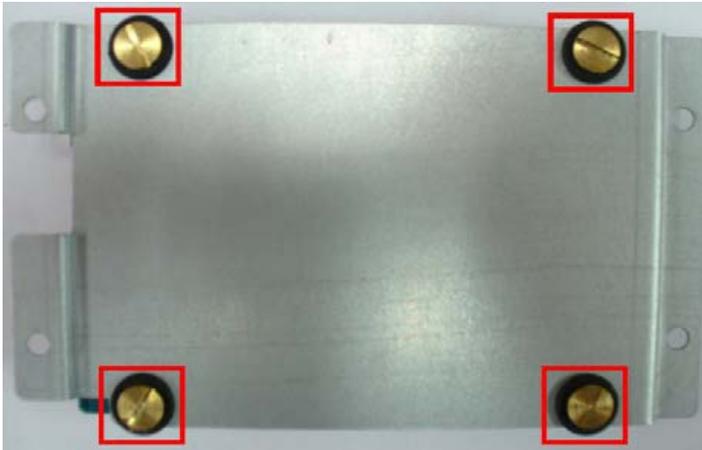
Step 3: Putting the HDD with the HDD bracket in by 45 degree height and make sure the bracket holes are matched with the chassis stand.

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.
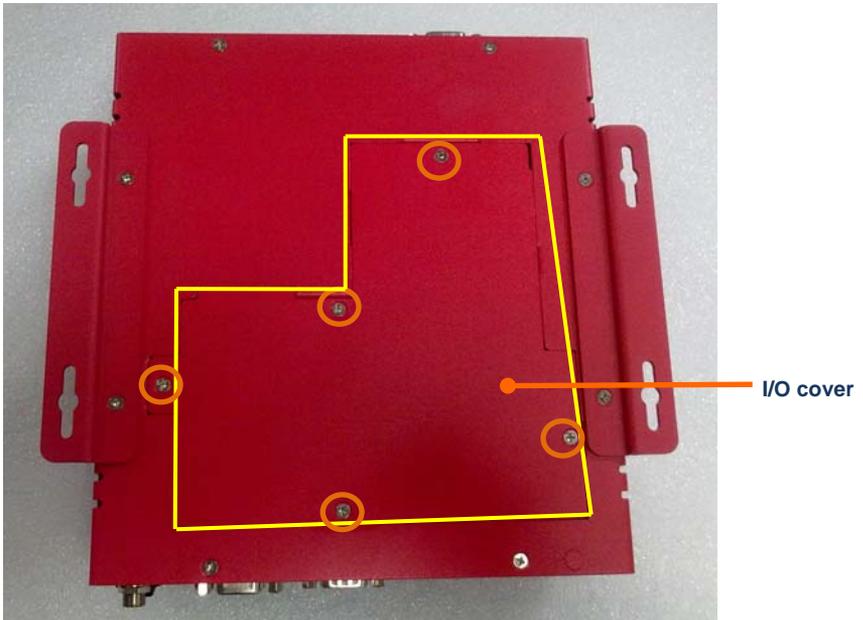
I/O cover

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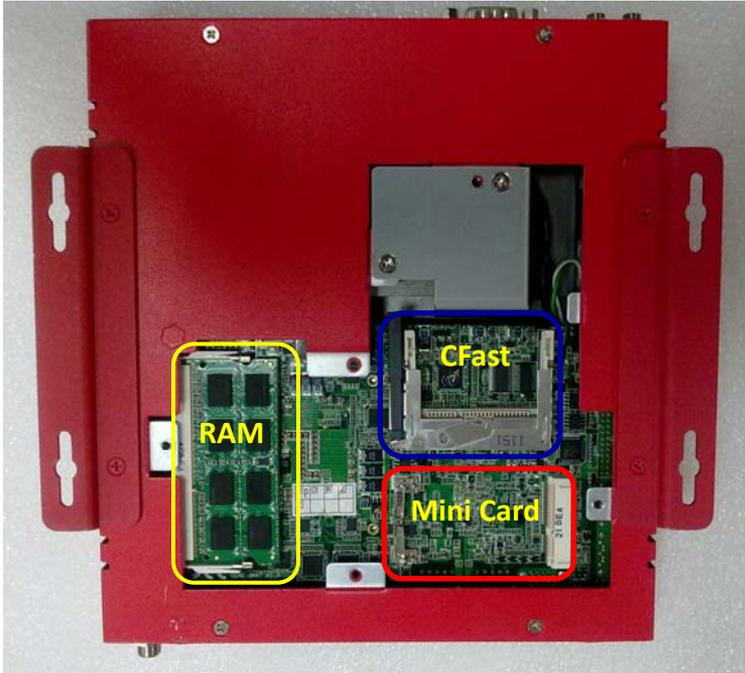
Step: 2-1: Insert the memory module to the Memory slot and push the module down until it has been locked by the two latches on the sides firmly.
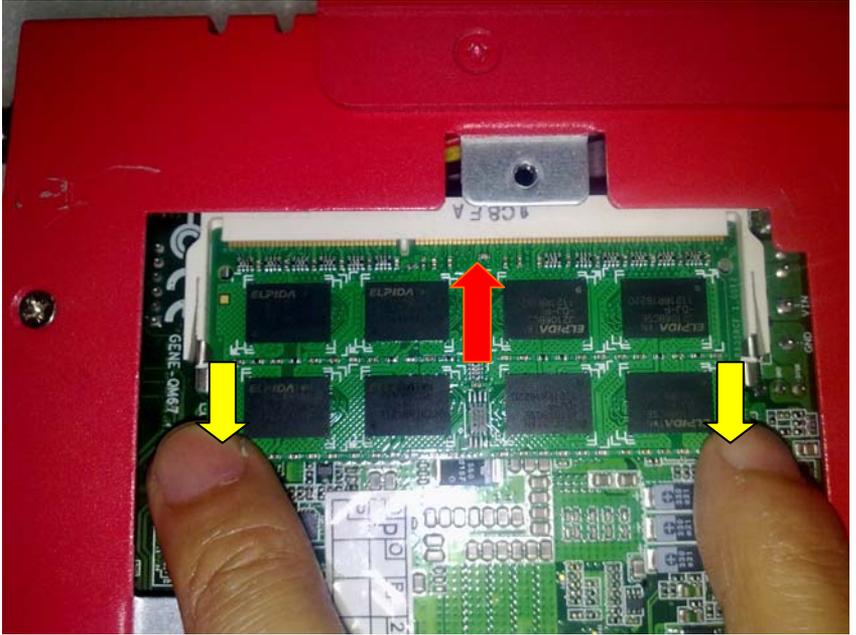
Step 2-2: Insert the Mini Card module to the Mini Card slot. Push the module down until the module has been locked by two latches on the sides firmly.

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
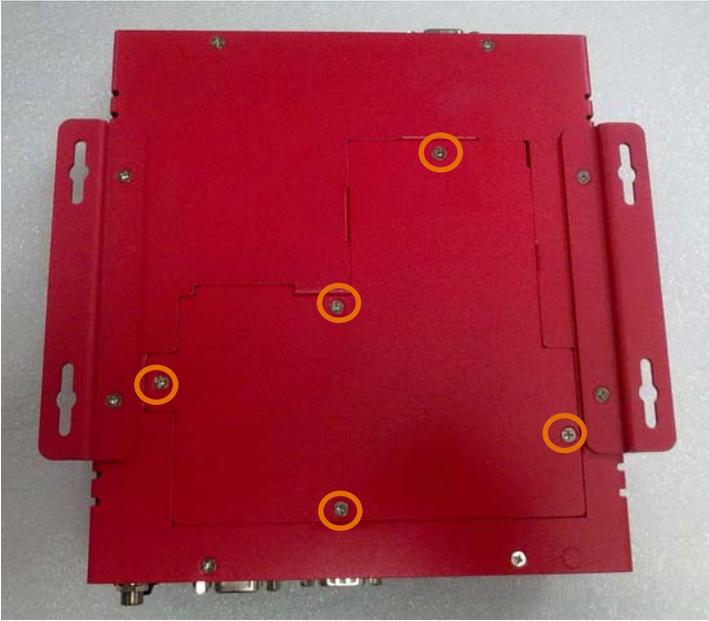
2.6 Wallmount Kit Installation

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.
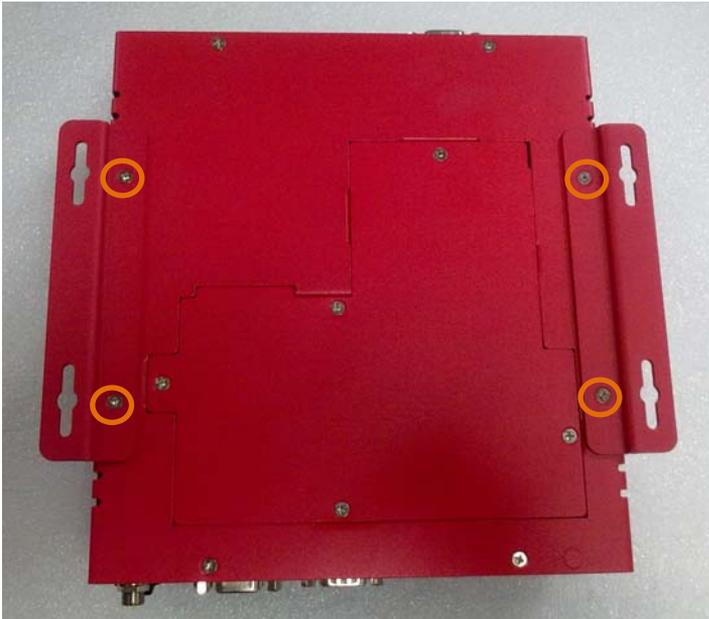
2.7 List of Jumpers

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
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)
CN27	COM Port 1 (D-SUB 9)
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**
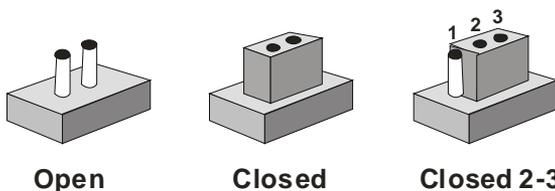
A pair of needle-nose pliers may be helpful when working with jumpers.

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)

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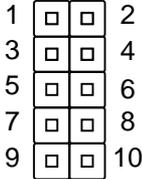
Pin	Signal
1	PWR_BTN-
2	PWR_BTN+
3	HDD_LED-
4	HDD_LED+
5	SPEAKER-
6	SPEAKER+
7	PWR_LED-
8	PWR_LED+
9	H/W RESET-
10	H/W RESET+

2.11 Clear CMOS (JP11)

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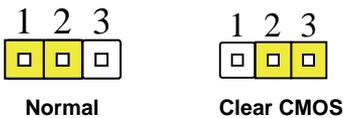
JP11	Function
1-2	Normal (Default)
2-3	Clear CMOS

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.
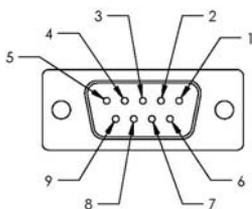
RS-232 Mode

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

Embedded Box		TKS-G50-QM77	
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:
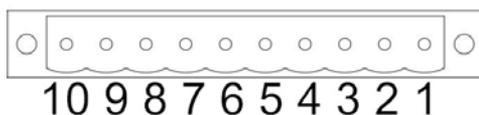
Pin	Signal	Pin	Signal
1	DIO_IN0	2	DIO_IN1
3	DIO_IN2	4	DIO_IN3
5	DIO_OUT0	6	DIO_OUT1
7	DIO_OUT2	8	DIO_OUT3
9	+5 Volt.	10	Ground

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	×	○	○	○	○	○

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-G50-QM77 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.

<u>**Setup Menu**</u>

Setup submenu: Main

```
         Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

   BIOS Information                                    Set the Date. Use Tab to
      TKS-G50-QM77 R1.0(TG77AM10) (07/03/2012)         switch between Date elements.

   BIOS Vendor                 American Megatrends
   Core Version                4.6.5.3
   Compliancy                  UEFI 2.3; PI 1.2

   System Date                 [Tue 07/03/2012]
   System Time                 [17:24:16]

   Access Level                Administrator

                                                    ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit

         Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

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

```
                Aptio Setup Utility — Copyright (C) 2011 American Megatrends, Inc.
      Main  Advanced  Chipset  Boot  Security  Save & Exit

  ▶ ACPI Settings                                          System ACPI Parameters.
  ▶ CPU Configuration
  ▶ SATA Configuration
  ▶ AMT Configuration
  ▶ USB Configuration
  ▶ H/W Monitor
  ▶ Super IO Configuration
  ▶ Digital IO Port Configuration

                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/−: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit

                Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Options summary: (*default setting*)

ACPI Settings		
System ACPI Parameters		
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

```
         Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
      Advanced

  ACPI Settings                                    Enables or Disables System
                                                   ability to Hibernate (OS/S4
  Enable Hibernation          [Enabled]            Sleep State). This option may
  ACPI Sleep State            [S3 only(Suspend to...]  be not effective with some OS.
  Wake on Ring                [Enabled]
► RTC Wake Settings



                                                   ↔: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit



         Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

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)	
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

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Advanced

   Wake system with Fixed Time          [Enabled]          Enable or disable System wake
   Wake up day                          0                   on alarm event. When enabled,
   Wake up hour                         0                   System will wake on the
   Wake up minute                       0                   hr::min::sec specified
   Wake up second                       0

   Wake system with Dynamic Time        [Disabled]
   Wake up minute increase              1

                                                            →←: 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.
```

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	0-31	
Select 0 for daily system wake up 1-31 for which day of the month that you would like the system to wake up		
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	

CPU Configuration

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Advanced

     Intel(R) Core(TM) i7-3610QE CPU @ 2.30GHz        │ Enabled for Windows XP and
     CPU Signature                306a9               │ Linux (OS optimized for
     Microcode Patch              12                  │ Hyper-Threading Technology)
     Max CPU Speed                2300 MHz            │ and Disabled for other OS (OS
     Min CPU Speed                1200 MHz            │ not optimized for
     CPU Speed                    2300 MHz            │ Hyper-Threading Technology).
     Processor Cores              4                   │ When Disabled only one thread
     Intel HT Technology          Supported           │ per enabled core is enabled.
     Intel VT-x Technology        Supported
     Intel SMX Technology         Supported
     64-bit                       Supported
                                                      │
     L1 Data Cache                32 kB x 4           │
     L1 Code Cache                32 kB x 4           │ →←: Select Screen
     L2 Cache                     256 kB x 4          │ ↑↓: Select Item
     L3 Cache                     6144 kB             │ Enter: Select
                                                      │ +/-: Change Opt.
     Hyper-threading              [Enabled]           │ F1: General Help
     Active Processor Cores       [All]               │ F2: Previous Values
     Limit CPUID Maximum          [Disabled]          │ F3: Optimized Defaults
     Execute Disable Bit          [Enabled]           │ F4: Save & Exit
     Intel Virtualization Technology [Disabled]       │ ESC: Exit
     EIST                         [Enabled]
     Turbo Mode                   [Enabled]         ▼

              Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

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

```
           Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
         Advanced

   SATA Controller(s)              [Enabled]            Enable or disable SATA Device.
   SATA Mode Selection             [AHCI]

   Serial ATA Port 1               Empty
     Port 1                        [Enabled]
     Hot Plug                      [Disabled]
   Serial ATA Port 2               Empty
     Port 2                        [Enabled]
     Hot Plug                      [Disabled]
   CFast Slot                      Empty
     Slot                          [Enabled]
     Hot Plug                      [Disabled]
   MiniCard Slot                   Empty
     Slot                          [Enabled]
     Hot Plug                      [Disabled]           →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/–: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit


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```

Options summary: (*default setting*)

SATA Controller(s)	Disabled	
	Enabled	
En/Disable SATA controller		
Configure SATA as	IDE	
	AHCI	
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.		

AMT Configuration

```
          Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
     Advanced

  Intel AMT                         [Enabled]           Enable/Disable Intel (R)
  Un-Configure ME                   [Disabled]          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


                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/–: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

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

```
              Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
        Advanced

   USB Configuration                                        Enables Legacy USB support.
                                                            AUTO option disables legacy
   USB Devices:                                             support if no USB devices are
        1 Drive, 1 Keyboard, 1 Mouse, 1 Point               connected. DISABLE option will
                                                            keep USB devices available
   Legacy USB Support                    [Enabled]          only for EFI applications.
   USB3.0 Support                        [Enabled]

   Mass Storage Devices:
    USB Device Modelname                 [Auto]

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/–: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit

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```

 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) 2011 American Megatrends, Inc.
     Advanced

    Pc Health Status                                        Operation mode for Fan

    CPU Temperature              : +53 C
    PCH Temperature              : +43 C
    System Temperature           : +30 C
    CPU FAN Speed                : 2896 RPM
    CPU_VCORE                    : +0.876 V
    VCC_DIMM                     : +1.512 V
    12V                          : +11.701 V
    5V                           : +5.110 V
    3.3V                         : +3.276 V
    5VSB                         : +5.020 V
    VBAT                         : +3.024 V
                                                        →←: Select Screen
    Easy Fan Mode                [Auto Mode]            ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

Easy Fan Mode	Fixed Mode	
	Auto Mode	
Fix Mode: Full Speed.		
Auto Mode: Full Speed (≧55℃) and Low Speed (＜55℃)		

COM Port Configuration

```
             Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
        Advanced

   Super IO Configuration                                    Set Parameters of Serial Port
                                                             1 (COMA)
   Super IO Chip                    IT8728
 ▶ Serial Port 1 Configuration
 ▶ Serial Port 2 Configuration
   Restore AC Power Loss            [Power Off]
   EuP Power Control                [Disabled]


   Second Super IO Chip             Fintek F81216
 ▶ Serial Port 3 Configuration
 ▶ Serial Port 4 Configuration
                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/–: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit

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```

Options summary: (*default setting*)

Serial Port 1/2/3/4 Configuration		
Set Parameters of Serial Port 1/2		
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 1 Configuration

Options summary: (*default setting*)

Serial Port	Disabled	
	Enabled	
En/Disable specified serial port.		
Change Settings	***Auto***	
	IO=3F8h; IRQ=4;	
	IO=3F8h; IRQ=3,4,5,7,10,11,12;	
	IO=2F8h; IRQ=3,4,5,7,10,11,12;	

	IO=3E8h; IRQ=3,4,5,7,10,11,12;	
	IO=2E8h; IRQ=3,4,5,7,10,11,12;	
Select a resource setting for Super IO device.		

Serial Port 2 Configuration

```
            Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
      Advanced

  Serial Port 2 Configuration                                    Enable or Disable Serial Port
                                                                 (COM)
  Serial Port                        [Enabled]
  Device Settings                    IO=2F8h; IRQ=3;

  Change Settings                    [Auto]
  Device Type                        [RS232]




                                                                 →←: Select Screen
                                                                 ↑↓: Select Item
                                                                 Enter: Select
                                                                 +/-: Change Opt.
                                                                 F1: General Help
                                                                 F2: Previous Values
                                                                 F3: Optimized Defaults
                                                                 F4: Save & Exit
                                                                 ESC: Exit



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```

Options summary: (*default setting*)

Serial Port	Disabled	
	Enabled	
En/Disable specified serial port.		
Change Settings	*Auto*	
	IO=2F8h; IRQ=3;	
	IO=3F8h; IRQ=3,4,5,7,10,11,12;	
	IO=2F8h; IRQ=3,4,5,7,10,11,12;	

	IO=3E8h;	
	IRQ=3,4,5,7,10,11,12;	
	IO=2E8h;	
	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

```
          Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
          Advanced

  Serial Port 3 Configuration                          Enable or Disable Serial Port
                                                       (COM)
  Serial Port                    [Enabled]
  Device Settings                IO=3E8h; IRQ=11;

  Change Settings                [Auto]




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

 Options summary: (*default setting*)

Serial Port	Disabled	
	Enabled	
En/Disable specified serial port.		
Change Settings	*Auto*	
	IO=3E8h; IRQ=11;	
	IO=3F8h; IRQ=3,4,5,7,10,11,12;	
	IO=2F8h; IRQ=3,4,5,7,10,11,12;	

	IO=3E8h;	
	IRQ=3,4,5,7,10,11,12;	
	IO=2E8h;	
	IRQ=3,4,5,7,10,11,12;	
Select a resource setting for Super IO device.		

Serial Port 4 Configuration

```
          Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
          Advanced

  Serial Port 4 Configuration                                Enable or Disable Serial Port
                                                             (COM)
  Serial Port                      [Enabled]
  Device Settings                  IO=2E8h; IRQ=10;

  Change Settings                  [Auto]




                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



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```

Options summary: (*default setting*)

Serial Port	Disabled	
	Enabled	
En/Disable specified serial port.		
Change Settings	***Auto***	
	IO=2E8h; IRQ=10;	
	IO=3F8h;	
	IRQ=3,4,5,7,10,11,12;	
	IO=2F8h;	
	IRQ=3,4,5,7,10,11,12;	

	IO=3E8h;
	IRQ=3,4,5,7,10,11,12;
	IO=2E8h;
	IRQ=3,4,5,7,10,11,12;

Select a resource setting for Super IO device.

Digital IO Port Configuration

```
          Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
    Advanced

  Digital IO Port Configuration                           Set GPIO as Input or Output

  I/O Port: 0x0A06[0:3](GPIO1-4), 0x0A07[0:3](GPIO5-8)

  GPIO1  Direction                [Input ]
  GPIO2  Direction                [Input ]
  GPIO3  Direction                [Input ]
  GPIO4  Direction                [Input ]
  GPIO5  Direction                [Output]
    Output Level                  [Low  ]
  GPIO6  Direction                [Output]
    Output Level                  [Low  ]
  GPIO7  Direction                [Output]
    Output Level                  [Low  ]                ↔: Select Screen
  GPIO8  Direction                [Output]               ↑↓: Select Item
    Output Level                  [Low  ]                Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




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```

Options summary: (*default setting*)

GPIO1/GPIO2/GPIO3/	*Input*	
GPIO4 Direction	Output	
Set GPIO1/GPIO2/GPIO3/GPIO4 as Input or Output		
GPIO5/GPIO6/GPIO7/	Input	
GPIO8 Direction	*Output*	
Set GPIO5/GPIO6/GPIO7/GPIO8 as Input or Output		
Output Level	Hi	
	Low	
Set GPIO Level when used as Output		

Setup submenu: Chipset

```
          Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

  ▶ Onboard Device                                      Onboard Device Parameters
  ▶ PCH-IO Configuration
  ▶ Memory Configuration
  ▶ Graphics Configuration




                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

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

```
              Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
               Chipset

   Onboard Device Configuration                        Control Detection of the
                                                       Onboard HD Audio device.
   Onboard HD Audio               [Auto]               Disabled = Device will be
   Intel LAN Controller          [Enabled]             unconditionally disabled
   Realtek LAN Controller        [Enabled]             Enabled = Device will be
                                                       unconditionally Enabled
                                                       Auto = Device will be enabled
                                                       if present, disabled otherwise.


                                                       ──────────────────────────
                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/–: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit




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```

Options summary: (*default setting*)

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

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

PCH-IO Configuration

```
                Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                  Chipset

    PCH-IO Configuration                                      Select the power type used on
                                                             the system
    Power Mode                       [ATX Type]

    PCI Express Configuration
    PCIe MiniCard Slot               [Enabled]
    PCIe Speed                       [Auto]



                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit


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```

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.

Host Bridge

```
            Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
                  Chipset

  Memory Information                                      Select DIMM timing profile
                                                          that should be used.
  Memory Frequency              1333 Mhz
  Total Memory                  4096 MB (DDR3)
  XMP Profile 1                 Not Supported
  XMP Profile 2                 Not Supported

  DIMM profile                  [Default DIMM profile]
  Memory Frequency Limiter      [Auto]
  Max TOLUD                     [Dynamic]

                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/–: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit

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```

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

```
          Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
            Chipset

  Graphics Configuration                                    Select the GTT Size
  IGfx Frequency                 350 MHz

  GTT Size                       [2MB]
  Aperture Size                  [256MB]
  DVMT Pre-Allocated             [64M]
  DVMT Total Gfx Mem             [256M]




                                                      ←→: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/–: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit



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```

 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.

Setup submenu: Boot

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
        Main   Advanced   Chipset   Boot   Security   Save & Exit

    Boot Configuration                                      Enables or disables Quiet Boot
    Quiet Boot                        [Enabled]             option
    Launch I82579LM PXE OpROM         [Disabled]
    Launch RTL8111E PXE OpROM         [Disabled]

    Boot Option Priorities
    Boot Option #1                    [Device Modelname]
    Boot Option #2                    [Device Modelname]
    Boot Option #3                    [Device Modelname]
    Boot Option #4                    [Device Modelname]
    Boot Option #5                    [Device Modelname]

    CD/DVD ROM Drive BBS Priorities
    Hard Drive BBS Priorities                               ────────────────────────────
    Floppy Drive BBS Priorities                             →←: Select Screen
    Network Device BBS Priorities                           ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit


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```

Options summary: (*default setting*)

Quiet Boot	Disabled	
	Enabled	
En/Disable showing boot logo.		
Launch LAN PXE	*Disabled*	
OpROM	Enabled	
En/Disable PXE boot for RTL8111E LAN		
Boot Option #X/ XXXX Drive BBS Priorities		
The order of boot priorities.		

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BBS Priorities

```
              Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
                        Boot

     Boot Option #1              [Device Modelname]        Sets the system boot order
     Boot Option #2              [Device Modelname]
     Boot Option #3              [Device Modelname]
     Boot Option #4              [Device Modelname]
     Boot Option #5              [Device Modelname]
     Boot Option #6              [Device Modelname]




                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/–: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit




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```

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

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

Setup submenu: Security

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

 Password Description                                    Set Administrator Password

 If ONLY the Administrator's password is set,
 then this only limits access to Setup and is
 only asked for when entering Setup.
 If ONLY the User's password is set, then this
 is a power on password and must be entered to
 boot or enter Setup. In Setup the User will
 have Administrator rights.
 The password length must be
 in the following range:
 Minimum length                   3
 Maximum length                   20
                                                        →←: Select Screen
                                                        ↑↓: Select Item
 Administrator Password                                 Enter: Select
 User Password                                          +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit


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```

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

```
                Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
    Main   Advanced   Chipset   Boot   Security   Save & Exit

   Save Changes and Reset                          Reset the system after saving
   Discard Changes and Reset                       the changes.

   Restore Defaults
   Save as User Defaults
   Restore User Defaults




                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/–: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit


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```

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-G50-QM77 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 (Realtek LAN Chip)
>
> Step 4 – Install LAN2 Driver (Intel$^{®}$ LAN Chip)
>
> Step 5 – Install Audio Driver
>
> Step 6 – Install ME Driver
>
> Step 7 – Install AHCI Driver
>
> Step 8 – Install USB3.0 Driver
>
> Step 9 – Install Wireless LAN Driver (Optional)
>
> Step 10 – Install Bluetooth Driver (Optional)

Please read instructions below for further detailed installations.

4.1 Installation:

Insert the TKS-G50-QM77 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

<u>**Note 1:**</u>
- 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.

<u>**Note 2:**</u> 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 (Realtek Chip)

1. Click on the **STEP3-LAN1(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 4 –Install LAN2 Driver (Intel® LAN Chip)

1. Click on the **STEP4-LAN2(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 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 AHCI Driver

Please refer to the *Appendix D AHCI Setting*

Step 8 –Install USB3.0 Driver

1. Click on the *STEP8-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

Step 9 –Install Wireless LAN Driver (Optional)

1. Click on the *STEP9-WIRELESS LAN(Option)* folder and select the OS folder your system is

2. Select the *Install_CD* folder located in each OS folder and 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 10 –Install Bluetooth Driver (Optional)

1. Click on the *STEP10-Bluetooth(Option)* 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

Appendix

A

Programming the Watchdog Timer

A.1 Programming

TKS-G50-QM77 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.
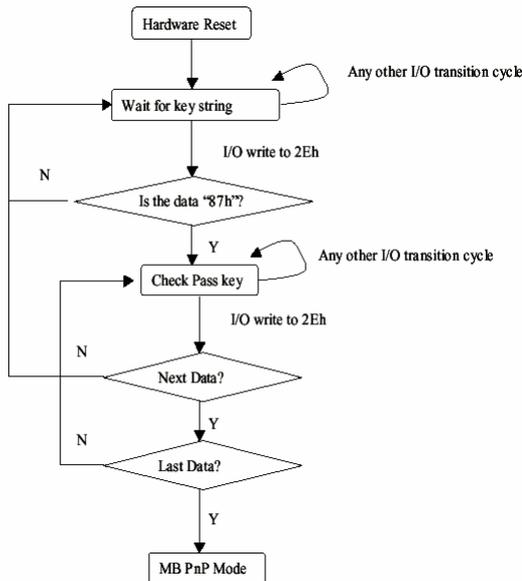
There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

(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

```
Input/output (IO)
    [00000000 - 0000001F]  Direct memory access controller
    [00000000 - 00000CF7]  PCI Bus
    [00000010 - 0000001F]  Motherboard resources
    [00000020 - 00000021]  Programmable interrupt controller
    [00000022 - 0000003F]  Motherboard resources
    [00000024 - 00000025]  Programmable interrupt controller
    [00000028 - 00000029]  Programmable interrupt controller
    [0000002C - 0000002D]  Programmable interrupt controller
    [0000002E - 0000002F]  Motherboard resources
    [00000030 - 00000031]  Programmable interrupt controller
    [00000034 - 00000035]  Programmable interrupt controller
    [00000038 - 00000039]  Programmable interrupt controller
    [0000003C - 0000003D]  Programmable interrupt controller
    [00000040 - 00000043]  System timer
    [00000044 - 0000005F]  Motherboard resources
    [0000004E - 0000004F]  Motherboard resources
    [00000050 - 00000053]  System timer
    [00000060 - 00000060]  Standard PS/2 Keyboard
    [00000061 - 00000061]  Motherboard resources
    [00000062 - 00000063]  Motherboard resources
    [00000063 - 00000063]  Motherboard resources
    [00000064 - 00000064]  Standard PS/2 Keyboard
    [00000065 - 00000065]  Motherboard resources
    [00000065 - 0000006F]  Motherboard resources
    [00000067 - 00000067]  Motherboard resources
    [00000070 - 00000070]  Motherboard resources
    [00000070 - 00000077]  System CMOS/real time clock
    [00000072 - 0000007F]  Motherboard resources
    [00000080 - 00000080]  Motherboard resources
    [00000080 - 00000080]  Motherboard resources
    [00000081 - 00000091]  Direct memory access controller
    [00000084 - 00000086]  Motherboard resources
    [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
[00000200 - 0000020F] Motherboard resources
[000002E8 - 000002EF] Communications Port (COM4)
[000002F8 - 000002FF] Communications Port (COM2)
[00000378 - 0000037F] Printer Port (LPT1)
[000003B0 - 000003BB] Intel(R) HD Graphics 4000
[000003C0 - 000003DF] Intel(R) HD Graphics 4000
[000003E8 - 000003EF] Communications Port (COM3)
[000003F8 - 000003FF] Communications Port (COM1)
[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
[00000A30 - 00000A3F] Motherboard resources
[00000D00 - 0000FFFF] PCI Bus
[00001000 - 00001003] 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
[0000F060 - 0000F07F] Intel(R) 7 Series Chipset Family SATA AHCI Controller
[0000F0A0 - 0000F0A3] Intel(R) 7 Series Chipset Family SATA AHCI Controller
[0000F0B0 - 0000F0B7] Intel(R) 7 Series Chipset Family SATA AHCI Controller
[0000F0C0 - 0000F0C3] Intel(R) 7 Series Chipset Family SATA AHCI Controller
[0000F0D0 - 0000F0D7] Intel(R) 7 Series Chipset Family SATA AHCI Controller
[0000F0E0 - 0000F0E7] 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 - F7D367FF]  Intel(R) 7 Series Chipset Family SATA AHCI Controller
    [F7D37000 - F7D373FF]  Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E26
    [F7D38000 - F7D383FF]  Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E2D
    [F7D39000 - F7D39FFF]  Intel(R) 82579LM Gigabit Network Connection
    [F7D3A000 - F7D3AFFF]  Intel(R) Active Management Technology - SOL (COM5)
    [F7D3C000 - F7D3C00F]  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
    [FED1C000 - FED1FFFF]  Motherboard resources
    [FED20000 - FED3FFFF]  Motherboard resources
    [FED40000 - FED44FFF]  Trusted Platform Module 1.2
    [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

```
Interrupt request (IRQ)
    (ISA) 0x00000000 (00)    System timer
    (ISA) 0x00000001 (01)    Standard PS/2 Keyboard
    (ISA) 0x00000003 (03)    Communications Port (COM2)
    (ISA) 0x00000004 (04)    Communications Port (COM1)
    (ISA) 0x00000008 (08)    System CMOS/real time clock
    (ISA) 0x0000000A (10)    Communications Port (COM4)
    (ISA) 0x0000000B (11)    Communications Port (COM3)
    (ISA) 0x0000000C (12)    Microsoft PS/2 Mouse
    (ISA) 0x0000000D (13)    Numeric data processor
    (PCI) 0x0000000F (15)    Intel(R) 7 Series/C216 Chipset Family SMBus Host Controller - 1E22
    (PCI) 0x00000010 (16)    Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E2D
    (PCI) 0x00000010 (16)    Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 1 - 1E10
    (PCI) 0x00000010 (16)    Intel(R) Management Engine Interface
    (PCI) 0x00000011 (17)    Intel(R) 7 Series/C216 Chipset Family PCI Express Root Port 2 - 1E12
    (PCI) 0x00000013 (19)    Intel(R) Active Management Technology - SOL (COM5)
    (PCI) 0x00000016 (22)    High Definition Audio Controller
    (PCI) 0x00000017 (23)    Intel(R) 7 Series/C216 Chipset Family USB Enhanced Host Controller - 1E26
    (PCI) 0xFFFFFFFA (-6)    Realtek PCIe GBE Family Controller
    (PCI) 0xFFFFFFFB (-5)    Intel(R) 82579LM Gigabit Network Connection
    (PCI) 0xFFFFFFFC (-4)    Intel(R) USB 3.0 eXtensible Host Controller
    (PCI) 0xFFFFFFFD (-3)    Intel(R) HD Graphics 4000
    (PCI) 0xFFFFFFFE (-2)    Intel(R) 7 Series Chipset Family SATA AHCI Controller
```

B.4 DMA Channel Assignments

```
Direct memory access (DMA)
    4    Direct memory access controller
```

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

AHCI Setting

D.1 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
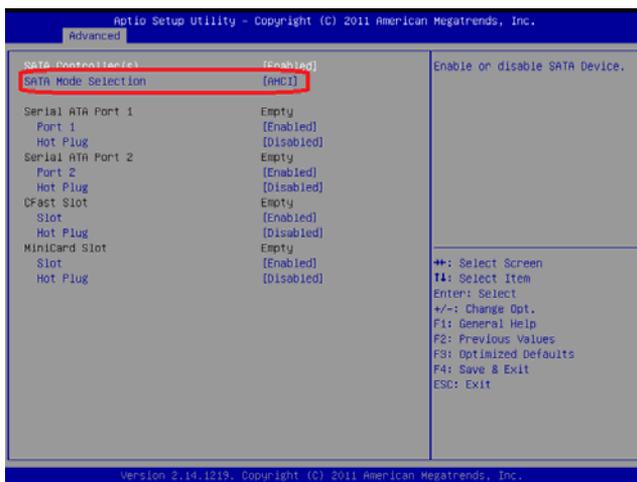
Step 4: Configure DVD/CD-ROM drive as the first boot device.
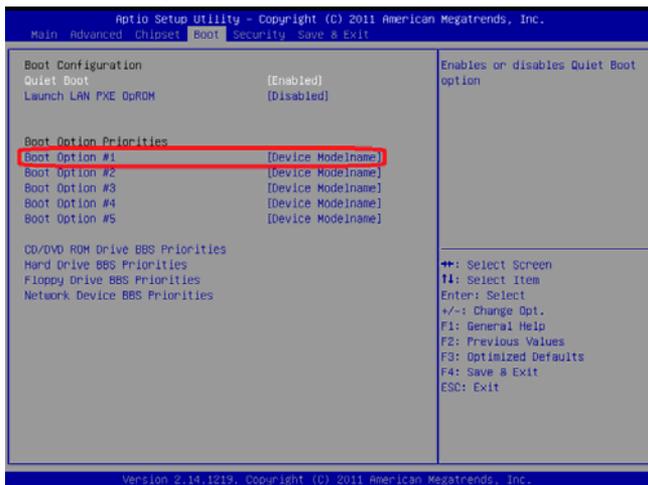
Step 5: Save changes and exit BIOS SETUP
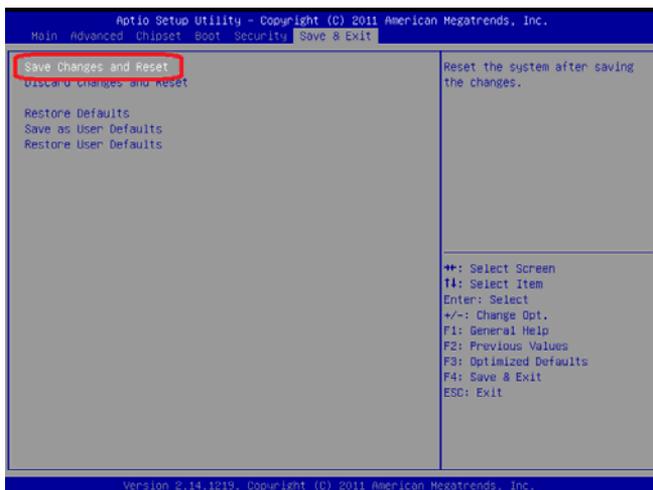
Step 6 – Boot to DVD/CD-ROM device to install OS

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

Step 8 – Press **"S"** to install AHCI driver
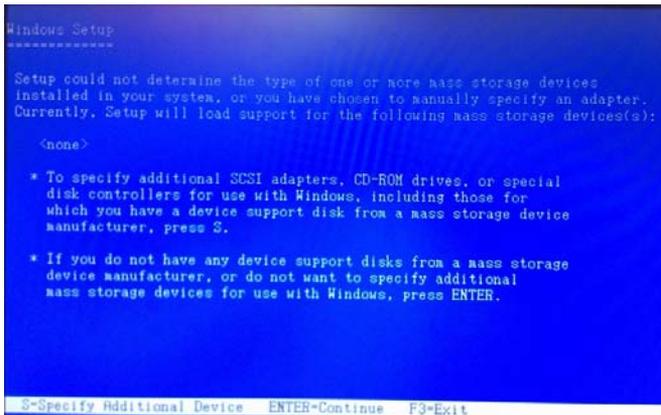
Step 9 – Choose **"Intel(R) 7 Series Chipset Family SATA AHCI**

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-G50-QM77 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();
}
****************************************************************************
```