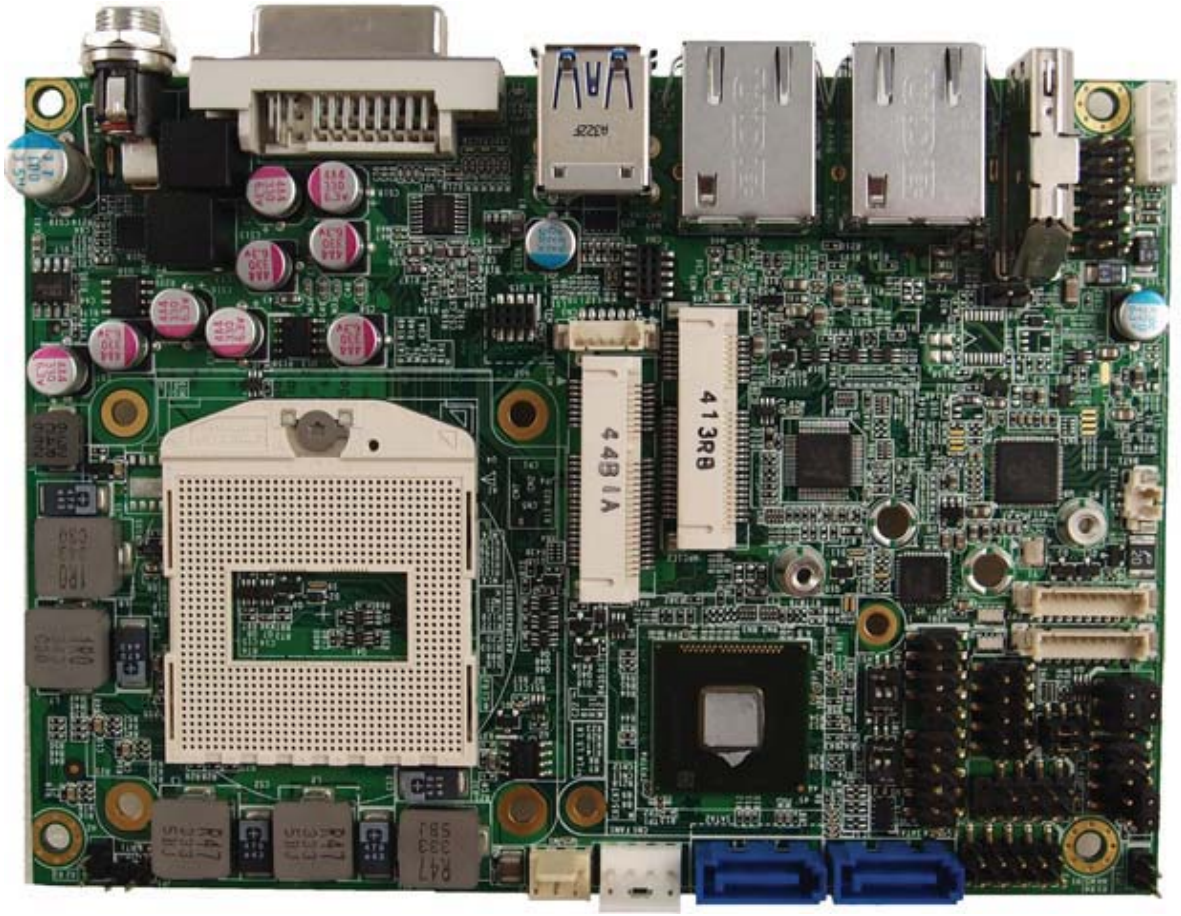
KEEX-810A

Extended Temperature Industrial Motherboard in Intel® Embedded Compact Extended Form Factor with Intel® Celeron / Core i processor

User's Guide



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Safety Instructions

■ Before You Begin

Before handling the product, read the instructions and safety guidelines on the following pages to prevent damage to the product and to ensure your own personal safety. Refer to the "Advisories" section in the Preface for advisory conventions used in this user's guide, including the distinction between Warnings, Cautions, Important Notes, and Notes.

- Always use caution when handling/operating a computer. Only qualified, experienced, authorized electronics service personnel should access the interior of a computer. The power supplies produce high voltages and energy hazards, which can cause bodily harm.
- Use extreme caution when installing or removing components. Refer to the installation instructions in this user's guide for precautions and procedures. If you have any questions, please contact Quanmax Post-Sales Technical Support.

WARNING

High voltages are present inside the chassis when the unit's power cord is plugged into an electrical outlet. Turn off system power, turn off the power supply, and then disconnect the power cord from its source before removing the chassis cover. Turning off the system power switch does not remove power to components.

■ When Working Inside a Computer

Before taking covers off a computer, perform the following steps:

1. Turn off the computer and any peripherals.
2. Disconnect the computer and peripherals from their power sources or subsystems to prevent electric shock or system board damage. This does not apply when hot swapping parts.

3. Follow the guidelines provided in “Preventing Electrostatic Discharge” on the following page.
4. Disconnect any telephone or telecommunications lines from the computer.

In addition, take note of these safety guidelines when appropriate:

- To help avoid possible damage to system boards, wait five seconds after turning off the computer before removing a component, removing a system board, or disconnecting a peripheral device from the computer.
- When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs. If you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before connecting a cable, make sure both connectors are correctly oriented and aligned.

CAUTION

Do not attempt to service the system yourself except as explained in this user’s guide. Follow installation and troubleshooting instructions closely.

Preventing Electrostatic Discharge

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedure to reduce the risk of damage to components. Quanmax strongly encourages you to follow proper ESD procedure, which can include wrist straps and smocks, when servicing equipment.
You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component’s antistatic packing material until you are ready to install the component in a computer. Just before unwrapping the antistatic packaging, be sure you are at an ESD workstation or grounded. This will discharge any static electricity that may have built up in your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components at an ESD workstation. If possible, use antistatic floor pads and workbench pads.
- Handle components and boards with care. Don't touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.
- Do not handle or store system boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

Preface

■ How to Use This Guide

This guide is designed to be used as step-by-step instructions for installation, and as a reference for operation, troubleshooting, and upgrades.

NOTE

Driver downloads and additional information are available under Downloads on our web site: www.quanmax.com.

■ Unpacking

When unpacking, follow these steps:

1. After opening the box, save it and the packing material for possible future shipment.
2. Remove all items from the box. If any items listed on the purchase order are missing, notify Quanmax customer service immediately.
3. Inspect the product for damage. If there is damage, notify Quanmax customer service immediately. Refer to “Warranty Policy” for the return procedure.

■ Regulatory Compliance Statements

This section provides the FCC compliance statement for Class A devices.

FCC Compliance Statement for Class A Devices

The product(s) described in this user’s guide has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user’s guide, may cause harmful interference to radio communications. Operation of this equipment in a residential

area (domestic environment) is likely to cause harmful interference, in which case the user will be required to correct the interference (take adequate measures) at their own expense.
Changes or modifications not expressly approved by Quanmax could void the user's authority to operate the equipment.

NOTE

The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interference or to be noncompliant with the appropriate standards for its intended use.

■ Warranty Policy

Limited Warranty

Quanmax Inc.'s detailed Limited Warranty policy can be found under Support at www.quanmax.com. Please consult your distributor for warranty verification.
The limited warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Quanmax or its authorized agent; or if the failure is caused by accident, acts of God, or other causes beyond the control of Quanmax or the manufacturer. Neglect, misuse, and abuse shall include any installation, operation, or maintenance of the product other than in accordance with the user's guide.
No agent, dealer, distributor, service company, or other party is authorized to change, modify, or extend the terms of this Limited Warranty in any manner whatsoever. Quanmax reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.

Return Procedure

For any Limited Warranty return, please contact Support at www.quanmax.com and login to obtain a Return Material Authorization (RMA) Number. If you do not have an account, send an email to support@quanmax.com to apply for one.
All product(s) returned to Quanmax for service or credit must be accompanied by a Return Material Authorization (RMA) Number. Freight on all returned items must be prepaid by the customer who is responsible for any loss or damage caused by common carrier in transit. Returns for Warranty must include a Failure Report for each unit, by serial number(s), as well as a copy of the original invoice showing the

date of purchase.
To reduce risk of damage, returns of product must be in a Quanmax shipping container. If the original container has been lost or damaged, new shipping containers may be obtained from Quanmax Customer Service at a nominal cost. Quanmax owns all parts removed from repaired products. Quanmax uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Quanmax repairs or replaces a product, its warranty term is not extended.
Shipments not in compliance with this Limited Warranty Return Policy will not be accepted by Quanmax.

Limitation of Liability

In no event shall Quanmax be liable for any defect in hardware, software, loss, or inadequacy of data of any kind, or for any direct, indirect, incidental, or consequential damages in connection with or arising out of the performance or use of any product furnished hereunder. Quanmax's liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Quanmax or its authorized agent.

■ Maintaining Your Computer

Environmental Factors

- **Temperature**

  The ambient temperature within an enclosure may be greater than room ambient temperature. Installation in an enclosure should be such that the amount of air flow required for safe operation is not compromised. Consideration should be given to the maximum rated ambient temperature. Overheating can cause a variety of problems, including premature aging and failure of chips or mechanical failure of devices.
  If the system has been exposed to abnormally cold temperatures, allow a two-hour warm-up period to bring it up to normal operating temperature before turning it on. Failure to do so may cause damage to internal components, particularly the hard disk drive.

- **Humidity**

  High-humidity can cause moisture to enter and accumulate in the system. This moisture can cause corrosion of internal components and degrade such

properties as electrical resistance and thermal conductivity. Extreme moisture buildup inside the system can result in electrical shorts, which can cause serious damage to the system.

Buildings in which climate is controlled usually maintain an acceptable level of humidity for system equipment. However, if a system is located in an unusually humid location, a dehumidifier can be used to maintain the humidity within an acceptable range. Refer to the "Specifications" section of this user's guide for the operating and storage humidity specifications.

- **Altitude**

  Operating a system at a high altitude (low pressure) reduces the efficiency of the cooling fans to cool the system. This can cause electrical problems related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or perform at reduced efficiency.

Power Protection

The greatest threats to a system's supply of power are power loss, power spikes, and power surges caused by electrical storms, which interrupt system operation and/or damage system components. To protect your system, always properly ground power cables and one of the following devices.

- **Surge Protector**

  Surge protectors are available in a variety of types and usually provide a level of protection proportional with the cost of the device. Surge protectors prevent voltage spikes from entering a system through the AC power cord. Surge protectors, however, do not offer protection against brownouts, which occur when the voltage drops more than 20 percent below the normal AC line voltage level.

- **Line Conditioner**

  Line conditioners go beyond the over voltage protection of surge protectors. Line conditioners keep a system's AC power source voltage at a fairly constant level and, therefore, can handle brownouts. Because of this added protection, line conditioners cost more than surge protectors. However, line conditioners cannot protect against a complete loss of power.

- **Uninterruptible Power Supply**

  Uninterruptible power supply (UPS) systems offer the most complete protection against variations on power because they use battery power to keep the server running when AC power is lost. The battery is charged by the AC power while it is available, so when AC power is lost, the battery can provide power to the system for a limited amount of time, depending on the UPS system.

  UPS systems range in price from a few hundred dollars to several thousand dollars, with the more expensive units allowing you to run larger systems for a longer period of time when AC power is lost. UPS systems that provide only 5 minutes of battery power let you conduct an orderly shutdown of the system, but are not intended to provide continued operation. Surge protectors should be used with all UPS systems, and the UPS system should be Underwriters Laboratories (UL) safety approved.

Chapter 1

Introduction

■ Overview

The KEEX-810A is an extended temperature Intel® embedded compact extended form factor single board computer (SBC) that is equipped with Intel® Haswell Processor with QM87 Express Chipset. Featured are DDR3/L SO-DIMM, 2x GbE, 1x LVDS, 1x DVI-I, 1x HDMI, 4x USB3.0, 2x USB2.0, DIO, and 2x COM.

Checklist

- Driver/ Manual CD
- Quick Installation Guide
- KEEX-810A main board
- 1x SATA Cable (7+15P)

Features

- Intel® Haswell Processor
- Intel® QM87 Express Chipset
- 1x DDR3/L SO-DIMM Socket
- 1x 18/24-bit, 1/2-channel LVDS, 1x DVI-I, 1x HDMI
- 2x SATA, 2x mSATA (mixed w/ mPCIe), 2x GbE, 4x USB3.0, 2x USB 2.0
- 2x mPCIe Sockets (SIM card support)
- 8-bit Digital I/O supported (4-bit input/4-bit output)
- Watchdog Timer, Hardware Monitor, TPM, iAMT
- Extended operating temperature range: -20ºC ~ 70ºC

■ Product Specifications

Model Name	▪ KEEX-810A
Form Factor	▪ ECX
PCB Size	▪ 146 x 105 x 1.5 mm
Processor /Chipset	▪ Intel® QM87 Express Chipset
Memory	▪ 1x DDR3/L SO-DIMM Socket
Features	▪ Display supported ● 1x DVI-I ● 1x HDMI ● 1x 18/24 bit, 1/2 ch LVDS ▪ Audio supported ● 1x header for Line-In, Line-Out and Mic-In ● 2x Wafers for Stereo Speaker output ▪ LAN supported ● 2x RJ-45 Connectors for Dual GbE LAN support ▪ USB supported ● 4x USB3.0 ● 2x USB2.0 ▪ Storage supported ● 2x SATA Connectors ● 2x mSATA Socket (Optional) ▪ Extension supported ● 2x mini-PCIe socket ● 1x wafer for SIM card support ▪ Super I/O supported ● 2x COM ports support (support RS-232/422/485) ▪ SMbus supported ▪ TPM supported ● TPM support ▪ Digital I/O supported ● 1x DIO (4-bit in and 4-bit out)
BIOS	▪ AMI uEFI BIOS ▪ 1x 64Mb SPI flash ROM onboard
Hardware Monitor	▪ Voltages monitoring ▪ Temperature monitoring
Watchdog	▪ Programable WDT to generate System reset event
Real Time Clock	▪ Pather Point intergrated RTC
Power	▪ 1x lockable DC Jack on rear I/O for +12VDC input only ▪ 1x Wafer for HDD Power supply ▪ 1x Wafer for Panel Power supply ▪ ATX/AT Mode & ACPI 4.0a support
Operation Temp.	▪ -20°C ~ 70°C
Certifications	▪ CE, FCC Class A

Table 1 KEEX-810A Specification

■ System Block Diagram

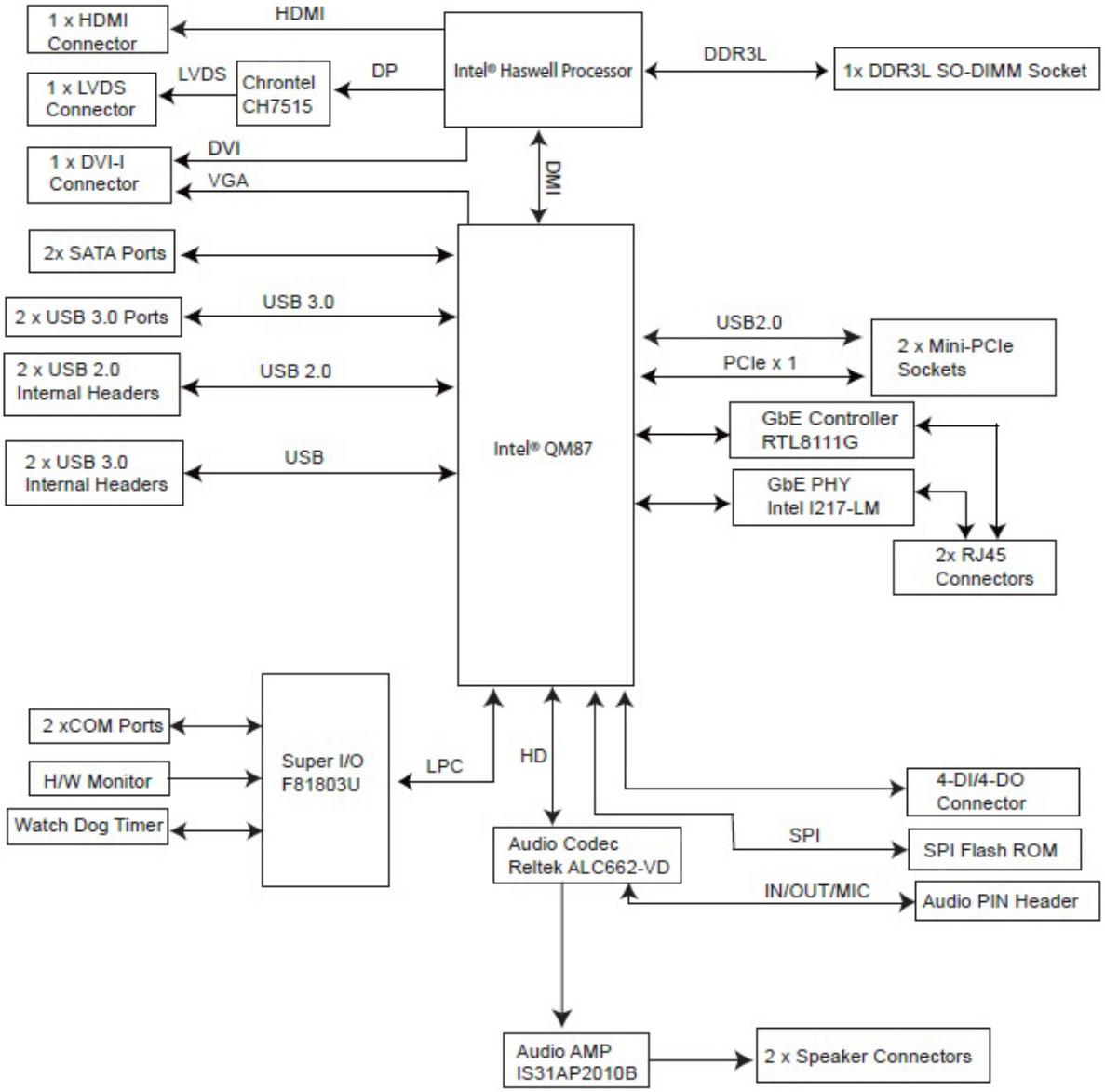


Figure 1 Block Diagram

■ Mechanical Dimensions

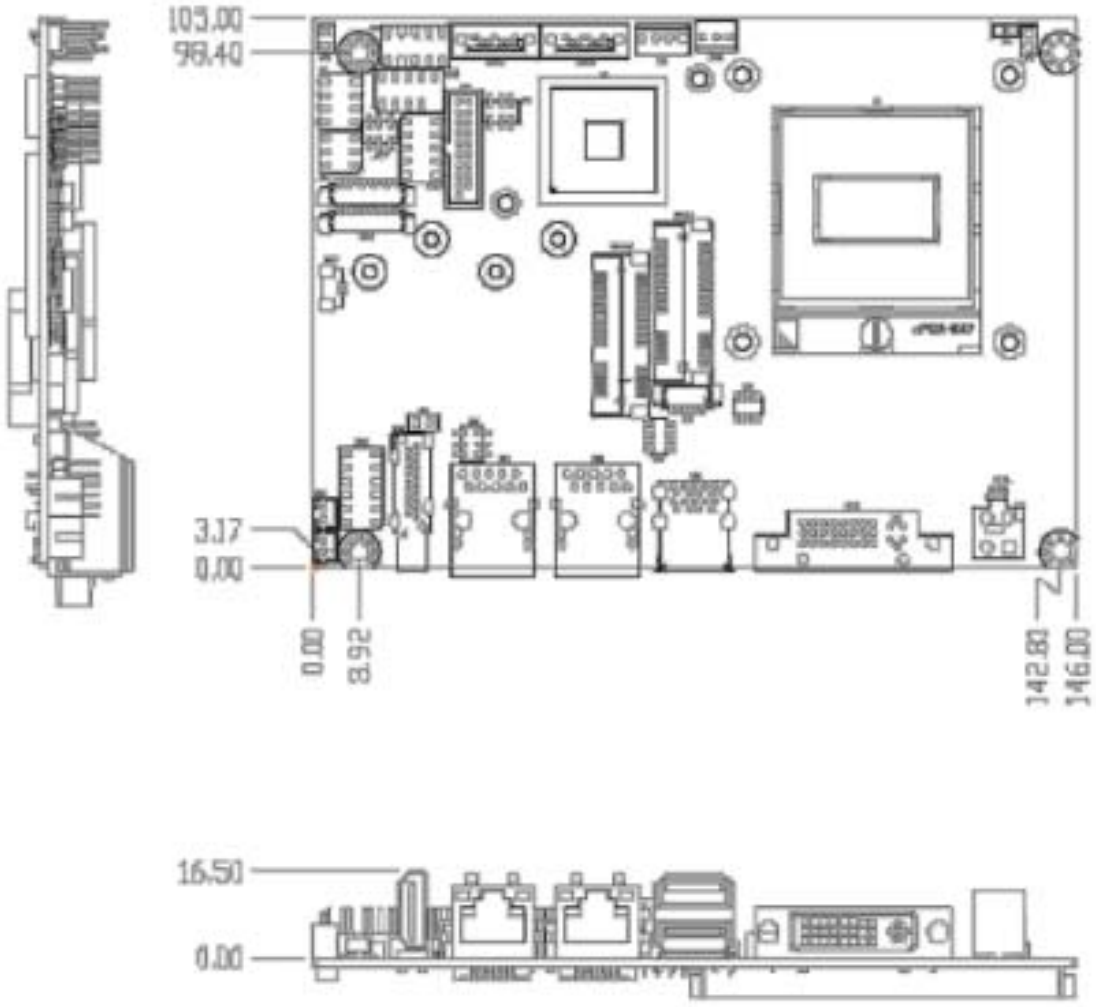


Figure 2 Mechanical Dimensions

Chapter 2

Hardware Settings

■ Overview

This chapter provides the definitions and locations of jumpers, headers, and connectors.

Jumpers

The product has several jumpers which must be properly configured to ensure correct operation.

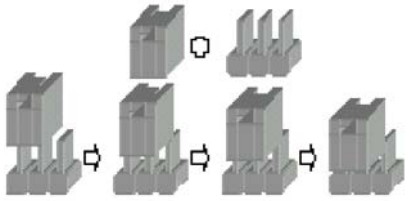


Figure 3 Jumper Connector

For a three-pin jumper (see *Figure 3*), the jumper setting is designated “1-2” when the jumper connects pins 1 and 2. The jumper setting is designated “2-3” when pins 2 and 3 are connected and so on. You will see that one of the lines surrounding a jumper pin is thick, which indicates pin No.1.
To move a jumper from one position to another, use needle-nose pliers or tweezers to pull the pin cap off the pins and move it to the desired position.

■ Jumper Settings and Pin Definitions

For jumper and connector locations, please refer to the diagrams below.

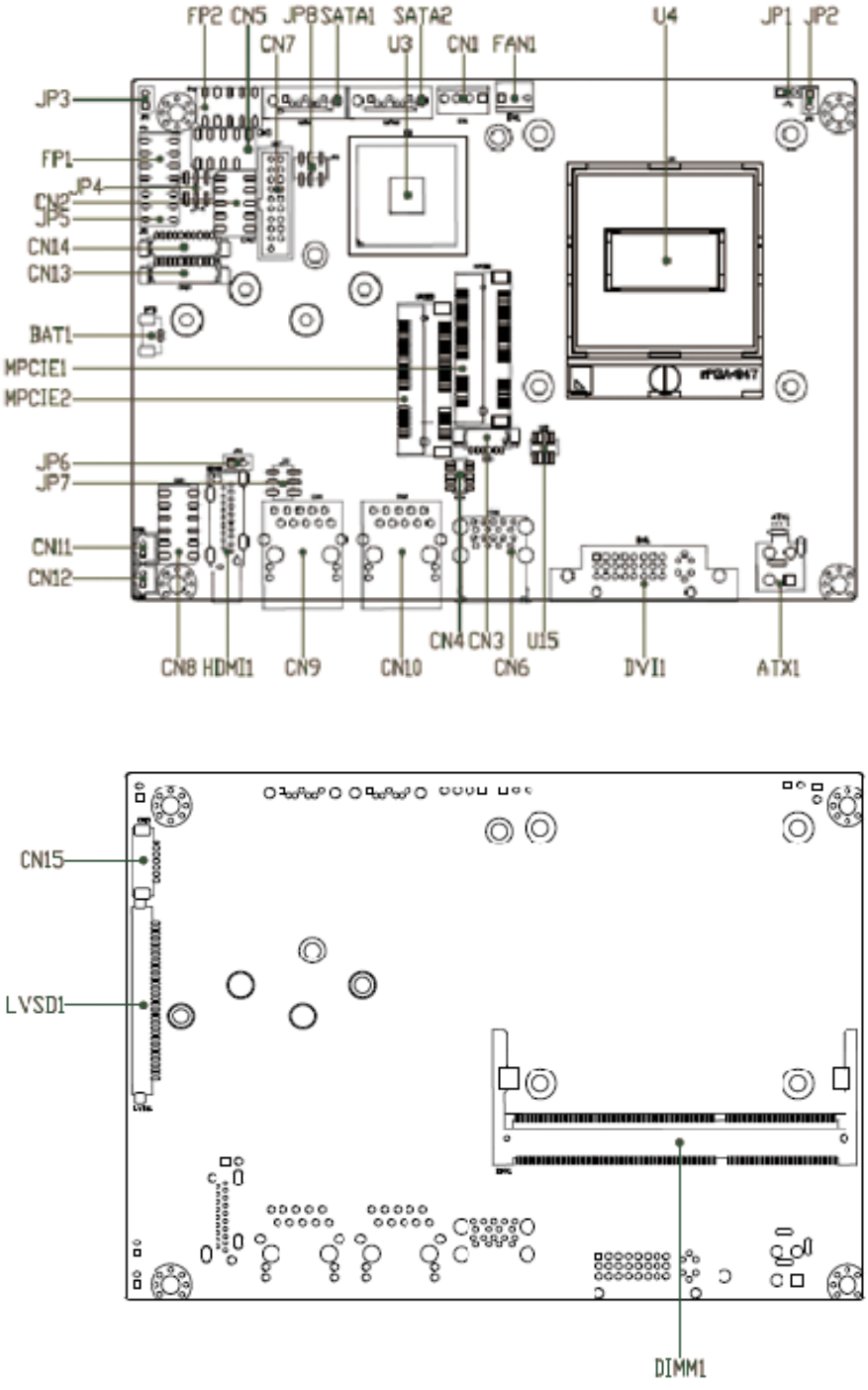


Figure 4 Jumper and Connector Locations

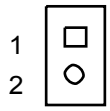
Jumper Settings

To ensure correct system configuration, the following section describes how to set the jumpers to enable/disable or change functions. For jumper descriptions, please refer to the table below.

Table 2 Jumper List

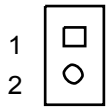
Label	Function
JP1	*MPCIE Activity LED Indication*
JP2	*SRTC Reset Selection*
JP3	*RTC Reset Selection*
JP4	*Backlight Power Enable Selection for LVDS1*
JP5	*Panel & Backlight Power Selection for LVDS1*
JP6	*Flash Description Security Over-ride*
JP7	*AT_ATX Mode / USB POWER Selection*
JP8	*MPCIE1 / MPCIE2 mSATA / mPCIE Selection*

Table 3 JP1 MPCIE Activity LED Indication



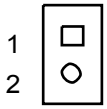
Jumper	Status
1	LED+
2	LED-
DIP 2P 1R MALE STRAIGHT TYPE Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]	

Table 4 JP2 SRTC Reset Selection



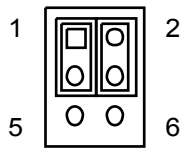
Jumper	Status
1-2 Open	Normal Operation
1-2 Short	Clear ME Registers
Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]	

Table 5 JP3 RTC Reset Selection



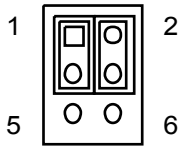
Jumper	Status
1-2 Open	Normal Operation
1-2 Short	Clear RTC CMOS
Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]	

Table 6 JP4 Backlight Power Enable Selection for LVDS1



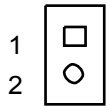
Jumper	Setting	Status
1	1-3	Backlight *Enable* Voltage = +3.3V
	3-5	Backlight *Enable* Voltage = +5V
2	2-4	Active High
	4-6	Active Low
P-2.54mm [YIMTEX 3362*03SAGR]		

Table 7 JP5 Panel & Backlight Power Selection for LVDS1



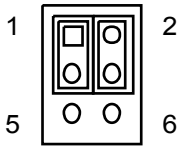
Jumper	Setting	Status
1	1-3	Backlight Power = +12V
	3-5	Backlight Power = +5V
2	2-4	Panel Power = +3.3V
	4-6	Panel Power = +5V
Pitch:2.54mm [YIMTEX 3362*03SAGR]		

Table 8 JP6 Flash Description Security Over-ride



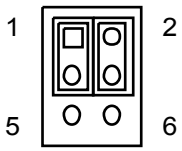
Jumper	Status
1-2 Open	Disabled
1-2 Short	Enabled
Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]	

Table 9 JP7 AT_ATX Mode / USB POWER Selection



Jumper	Setting	Status
1	1-3	ATX Mode (Default)
	3-5	AT Mode
2	2-4	USB power will be cut off in S4 & S5 state (Default)
	4-6	USB power is always supply.

Table 10 JP8 *MPCIE1 / MPCIE2 mSATA / mPCIE Selection*



Jumper	Setting	Status
1	1-3	MPCIE1 mSATA Selected (Default)
	3-5	MPCIE1 mPCIE Selected
2	2-4	MPCIE2 mSATA Selected (Default)
	4-6	MPCIE2 mPCIE Selected

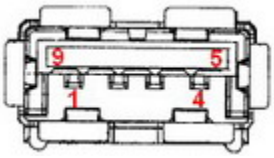
Rear Panel Pin Assignments

Figure 5 Rear Panel IO

Table 11 Rear Panel Connector List

Label	Function
CN6	*USB3.0 Port 1,2 Connector*
CN9	*GbE LAN1 RJ-45 Connector*
CN10	*GbE LAN2 RJ-45 Connector*
HDMI1	*HDMI Connector*
DVI1	*DVI-I Connector*

Table 12 CN6 USB3.0 *Connector*

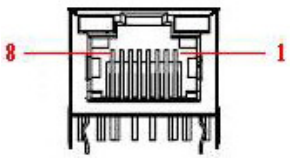


Pin	Signal Name	Pin	Signal Name
1	+USBVCC *	5	USB_RX-
2	USB_D-	6	USB_RX+
3	USB_D+	7	GND
4	GND	8	USB_TX-
		9	USB_TX+

USB3.0 Receptacle, 30u" Au Plated, Blue, Tray [WIN WIN WDU3R-18F3B4PBUW3]

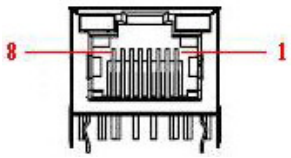
* : The power source of +USBVCC can be selected by JP7

Table 13 CN9 GbE LAN1 RJ-45 Connector



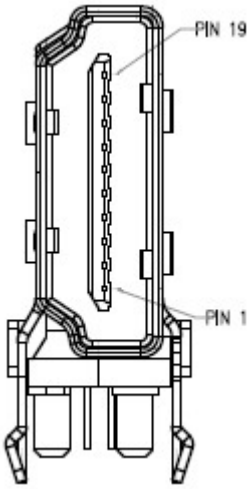
Pin	Signal Name	Pin	Signal Name
1	TX1+	5	TX3-
2	TX1-	6	TX2-
3	TX2+	7	TX4+
4	TX3+	8	TX4-
RJ45+TFM+LED 10/100/1000 14P DIP 90° [UDE RT7-174AAM1A(XA)]			

Table 14 CN10 GbE LAN2 RJ-45 Connector



Pin	Signal Name	Pin	Signal Name
1	TX1+	5	TX3-
2	TX1-	6	TX2-
3	TX2+	7	TX4+
4	TX3+	8	TX4-
RJ45+TFM+LED 10/100/1000 14P DIP 90° [UDE RT7-174AAM1A(XA)]			

Table 15 HDMI1 HDMI Connector



Pin	Signal Name
1	TMDS Data2+
2	Ground
3	TMDS Data2–
4	TMDS Data1+
5	Ground
6	TMDS Data1–
7	TMDS Data0+
8	Ground
9	TMDS Data0–
10	TMDS Clock+
11	Ground
12	TMDS Clock–
13	Reserved
14	Reserved
15	DDC_CLK
16	DDC_DATA
17	Ground
18	+5 V Power
19	Hot Plug Detect
[ARGOSY HDMIV-A1915-DK2R]	

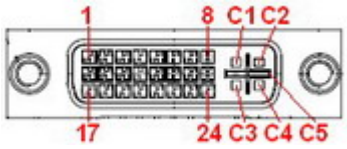


Table 16 DVI1 DVI-I Connector

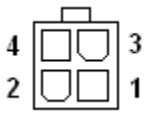
Pin	Signal	Pin	Signal	Pin	Signal
1	TX2-	13	NC	C1	R
2	TX2+	14	+5V	C2	G
3	GND	15	GND	C3	B
4	NC	16	HTPLG	C4	HSYNC
5	NC	17	TX0-	C5	GND
6	DDC_CLK	18	TX0+		
7	DDC_DATA	19	GND		
8	VSYNC	20	NC		
9	TX1-	21	NC		
10	TX1+	22	GND		
11	GND	23	TXC+		
12	NC	24	TXC-		

Main Board Pin Assignments

Table 17 Internal Connector List

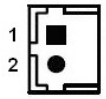
Label	Function
J1	*Power Input Connector*
BAT1	*CR2032 Battery Power Input Wafer*
BZ1	*Onboard Buzzer*
CN1	*SATA HDD Power Output Wafer*
CN2	*Digital Input / Output Pin Header*
CN3	*SIM Interface Wafer for MPCIE2*
CN4	*P80_Header*
CN5	*USB2.0 Port 10, 11 Pin Header*
CN7	*USB3.0 Port 3, 4 Box Header*
CN8	*Audio Pin Header*
CN11	*Right Channel 3W Audio AMP Output Wafer*
CN12	*Left Channel 3W Audio AMP Output Wafer*
CN13	*RS-232 / 422 / 485 Port 1 Wafer*
CN14	*RS-232 / 422 / 485 Port 2 Wafer*
CN15	*Backlight Power Output Wafer for LVDS1*
DIMM1	*DDR3 Memory SO-DIMM Socket*
FAN1	*CPU FAN Wafer*
FP1	*Front Panel 1 Pin Header*
FP2	*Front Panel 2 Pin Header*
LVDS1	*Primary 24-bit, 2-channel LVDS Panel Connector*
MPCIE1	*Mini-PCIE Express v1.2 Socket*
MPCIE2	*Mini-PCIE Express v1.2 Socket*
SATA1	*Serial ATA Port 0 Connector*
SATA2	*Serial ATA Port 1 Connector*

Table 18 J1 Power Input Connector



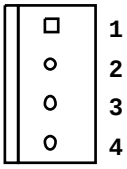
Pin	Signal Name
1	GND
2	GND
3	+12V
4	+12V
DIP 4P 2R MALE 90° Pitch:4.2mm	

Table 19 BAT1 CR2032 Battery Power Input Wafer



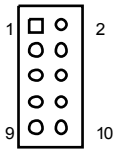
Pin	Signal Name
1	+VBAT
2	GND
Pitch:1.25mm [Pinrex 712-73-02TWR0]	

Table 20 CN1 SATA HDD Power Output Wafer



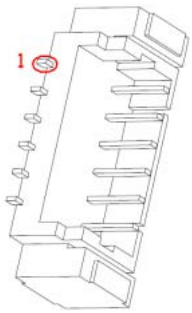
Pin	Signal Name
1	+12V
2	GND
3	GND
4	+5V
Pitch:2.5mm [YIMTEX 512CW4ST-2R]	

Table 21 CN2 Digital Input / Output Pin Header



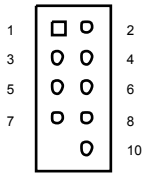
Pin	Signal	Pin	Signal
1	Digital Output 0	2	Digital Input 0
3	Digital Output 1	4	Digital Input 1
5	Digital Output 2	6	Digital Input 2
7	Digital Output 3	8	Digital Input 3
9	+5V	10	GND
Pitch:2.54mm [YIMTEX 3362*05SANGR]			

Table 22 CN3 SIM Interface Wafer for MPCIE1



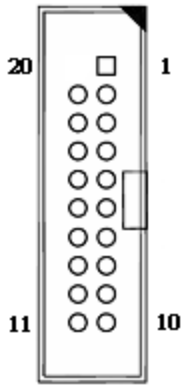
Pin	Signal Name
1	UIM_PWR
2	UIM_DATA
3	UIM_RESET
4	UIM_VPP
5	UIM_CLK
6	GND
Pitch:1.25mm [Pinrex 712-73-06TWB0]	

Table 23 CN5 USB2.0 Port 10, 11 Pin Header



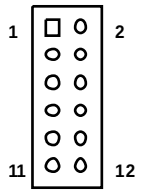
Pin	Signal Name	Pin	Signal Name
1	+USBVCC	2	+USBVCC
3	USB_A-	4	USB_B-
5	USB_A+	6	USB_B+
7	GND	8	GND
9	KEY	10	GND
Pitch:2.54mm [YIMTEX 3362*05SANGR-09] * : The power source of +USBVCC can be selected by JP7			

Table 24 CN7 USB3.0 Port 3,4 Box Header



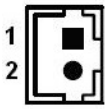
Pin	Signal Name	Pin	Signal Name
1	+USBVCC	20	NC
2	USB3_RX5N	19	+USBVCC
3	USB3_RX5P	18	USB3_RX6N
4	GND	17	USB3_RX6P
5	USB3_TX5N	16	GND
6	USB3_TX5P	15	USB3_TX6N
7	GND	14	USB3_TX6P
8	USB_A-	13	GND
9	USB_A+	12	USB_B-
10	NC	11	USB_B+
DIP 20P 2R 180D P-2.0mm * : The power source of +USBVCC can be selected by JP7			

Table 25 CN8 Audio Pin Header



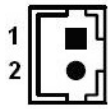
Pin	Signal Name	Pin	Signal Name
1	MIC_IN_L	2	MIC_IN_R
3	MIC_IN_JD	4	GND
5	LINE_IN_L	6	LINE_IN_R
7	LINE_IN_JD	8	GND
9	LINE_OUT_L	10	LINE_OUT_R
11	LINE_OUT_JD	12	GND
Pitch:2.54mm [PINREX 212-92-06GB01]			

Table 26 CN11 Right Channel 2W Audio AMP Output Wafer



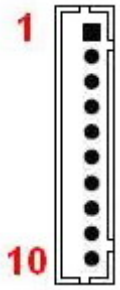
Pin	Signal Name
1	Speaker+
2	Speaker-
Pitch:2.0mm [YIMTEX 503PW1*02STR]	

Table 27 CN12 Left Channel 2W Audio AMP Output Wafer



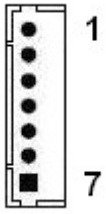
Pin	Signal Name
1	Speaker+
2	Speaker-
Pitch:2.0mm [YIMTEX 503PW1*02STR]	

Table 28 CN13,14 RS-232/422/485 Port Wafer



Pin	RS-232	RS-422	Half Duplex RS-485	Full Duplex RS-485
1	DCD	TX-	DATA-	TX-
2	DSR	N/A	N/A	N/A
3	RXD	TX+	DATA+	TX+
4	RTS	N/A	N/A	N/A
5	TXD	RX+	N/A	RX+
6	CTS	N/A	N/A	N/A
7	DTR	RX-	N/A	RX-
8	RI	N/A	N/A	N/A
9	GND	GND	GND	GND
10	+5V	+5V	+5V	+5V
SMD 10P1R180D MALE P=1.25mm, Tin Plated, NY46, White Insulator [Pinrex 712-73-10TWB0]				

Table 29 CN15 Backlight Power Output Wafer for LVDS1



Pin	Signal Name
1	BL_ADJ_PWM *
2	BL_ADJ_VOL *
3	GND
4	+5V / +12V **
5	+5V / +12V **
6	GND
7	BL_EN***

Pitch:1.25mm [YIMTEX 501MW1X07MTR-1R]

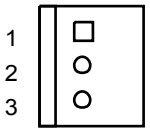
* : BL_ADJ can be setting in BIOS setup.

** : Backlight Power can be selected by JP5.

*** : BL_EN can be selected by JP4.

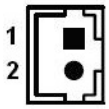
Table 30 DIMM1 DDR3 Memory SO-DIMM Socket
Height:7.0mm [LINKTEK DDRRK-20401-TP7B]

Table 31 FAN1 CPU FAN Wafer



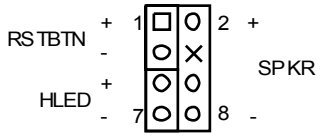
Pin	Signal Name
1	GND
2	+12V*
3	FAN_RPM
Pitch:2.54mm [YIMTEX 521AW1*03STR]	
* : PWM Fan control supported.	

Table 32 CN13 Right Channel 2W Audio AMP Output Wafer



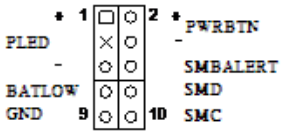
Pin	Signal Name
1	Speaker+
2	Speaker-
Pitch=2.0mm WAFER [YIMTEX 503PW1*02STR & 503PW1*02ST-1R]	

Table 33 FP1 Front Panel 1 Pin Header



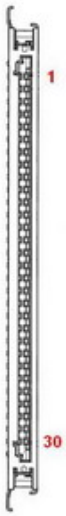
Pin	Signal	Pin	Signal
1	Reset Button +	2	Speaker +
3	Reset Button -	4	NC
5	HDD LED +	6	Internal Speaker-
7	HDD LED -	8	Speaker -
Pitch:2.54mm [YIMTEX 3362*04SANGR]			
Note : Internal Buzzer is enabled when Pin6-8 is shorted.			

Table 34 FP2 Front Panel 2 Pin Header



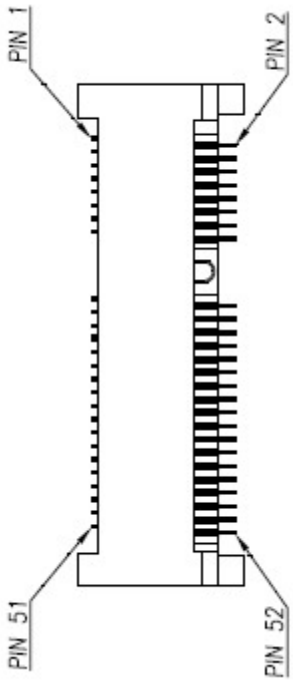
Pin	Signal	Pin	Signal
1	Power LED +	2	Power Button +
3	NC	4	Power Button -
5	Power LED -	6	SMBALERT#
7	BATLOW#	8	SMBus Data
9	GND	10	SMBus Clock
Pitch:2.54mm [YIMTEX 3362*05SANGR]			

Table 35 LVDS1 Primary 24-bit, 2-channel LVDS Panel Connector



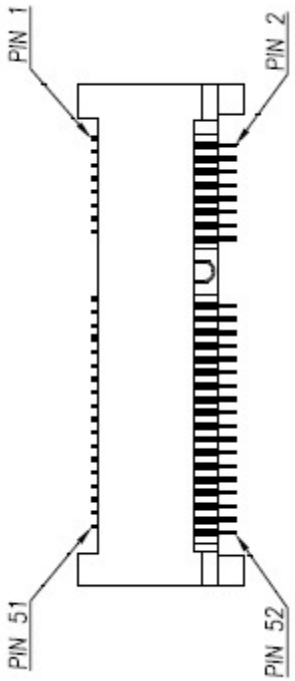
Pin	Signal Name	Pin	Signal Name
1	LVDS_A0-	16	LVDS_B1+
2	LVDS_A0+	17	GND
3	LVDS_A1-	18	LVDS_B2-
4	LVDS_A1+	19	LVDS_B2+
5	LVDS_A2-	20	LVDSBCLK-
6	LVDS_A2+	21	LVDS_BCLK+
7	GND	22	LVDS_B3-/NC
8	LVDS_ACLK-	23	LVDS_B3+/NC
9	LVDS_ACLK+	24	GND
10	LVDS_A3-/NC	25	DDC_DATA
11	LVDS_A3+/NC	26	VDDEN
12	LVDS_B0-	27	DDC_CLK
13	LVDS_B0+	28	+3.3V / +5V *
14	GND	29	+3.3V / +5V *
15	LVDS_B1-	30	+3.3V / +5V *
Pitch:1.0mm [JAE FI-X30SSL-HF] * : Panel Power can be selected by JP5.			

Table 36 MPCIE1 Mini-PCIE Express v1.2 Socket



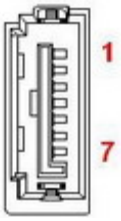
Signal	Pin	Pin	Signal
WAKE#	1	2	+3.3VSB
Reserved	3	4	Ground
Reserved	5	6	+1.5V
CLKREQ#	7	8	NC
Ground	9	10	NC
REFCLK-	11	12	NC
REFCLK+	13	14	NC
Ground	15	16	NC
Reserved	17	18	Ground
Reserved	19	20	W_Disable#
Ground	21	22	PERST#
PERn0	23	24	+3.3VSB
PERp0	25	26	Ground
Ground	27	28	+1.5V
Ground	29	30	SMB_CLK
PETn0	31	32	SMB_DATA
PETp0	33	34	Ground
Ground	35	36	USB_D-
Ground	37	38	USB_D+
+3.3VSB	39	40	Ground
+3.3VSB	41	42	LED_WWAN#
Ground	43	44	LED_WLAN#
Reserved	45	46	LED_WPAN#
Reserved	47	48	+1.5V
Reserved	49	50	Ground
Reserved	51	52	+3.3VSB
MINI PCI-Express Connector, H:9.9mm, 10u Gold Plating, Tape Reel [FOXCONN AS0B226-S99Q-7H]			

Table 37 MPCIE2 Mini-PCIE Express v1.2 Socket



Signal	Pin	Pin	Signal
WAKE#	1	2	+3.3VSB
Reserved	3	4	Ground
Reserved	5	6	+1.5V
CLKREQ#	7	8	UIM_PWR*
Ground	9	10	UIM_DATA*
REFCLK-	11	12	UIM_CLK*
REFCLK+	13	14	UIM_RESET*
Ground	15	16	UIM_VPP*
Reserved	17	18	Ground
Reserved	19	20	W_Disable#
Ground	21	22	PERST#
PERn0	23	24	+3.3VSB
PERp0	25	26	Ground
Ground	27	28	+1.5V
Ground	29	30	SMB_CLK
PETn0	31	32	SMB_DATA
PETp0	33	34	Ground
Ground	35	36	USB_D-
Ground	37	38	USB_D+
+3.3VSB	39	40	Ground
+3.3VSB	41	42	LED_WWAN#
Ground	43	44	LED_WLAN#
Reserved	45	46	LED_WPAN#
Reserved	47	48	+1.5V
Reserved	49	50	Ground
Reserved	51	52	+3.3VSB
MINI PCI-Express Connector, H:5.6mm, Gold Flash, Tape Reel [FOXCONN AS0B221-S56Q-7H] *** : These pins are connected to CN3 directly.**			

Table 38 SATA1 Serial ATA Port 0 Connector



Pin	Signal Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
[FOXCONN LD1807V-S52U]	

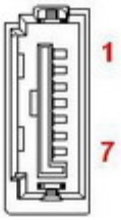


Table 39 Serial ATA Port 1 Connector

Pin	Signal Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
[FOXCONN LD1807V-S52U]	

Chapter 3

System Installation

■ Expansion Interfaces

- 2x full size mini-PCIe slot supported
- 1x connector onboard for SIM card signals supported

NOTE

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

■ Memory Module Installation

Carefully follow the steps below in order to install the DIMMs:

1. To avoid generating static electricity and damaging the SO-DIMM, ground yourself by touching a grounded metal surface or use a ground strap before you touch the SO-DIMM.
2. Do not touch the connectors of the SO-DIMM. Dirt or other residue may cause a malfunction.
3. Hold the SO-DIMM with its notch aligned with the memory socket of the board and insert it at a 30-degree angle into the socket.

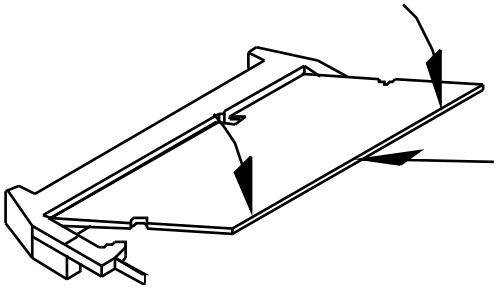


Figure 6 Align the SO-DIMM Memory Module with the onboard socket

4. Fully insert the module into the socket until a “click” is heard.
5. Press down on the SO-DIMM so that the tabs of the socket lock on both sides of the module

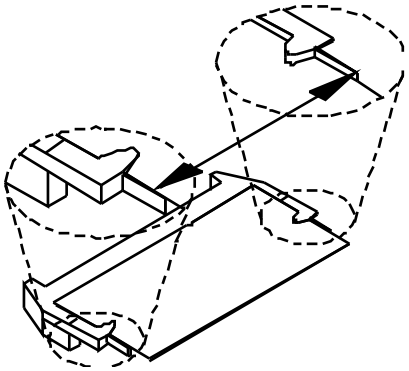


Figure 7 Press down on the SO-DIMM Memory Module to lock it in place

Removing a DIMM:

To remove the SO-DIMM, use your fingers or a small screwdriver to carefully push away the tabs that secure either side of the SO-DIMM. Lift it out of the socket. Make sure you store the SO-DIMM in an anti-static bag. The socket must be populated with memory modules of the same size and manufacturer.

Chapter 4

AMI BIOS Setup

■ Overview

This chapter provides a description of the AMI BIOS. The BIOS setup menus and available selections may vary from those of your product. For specific information on the BIOS for your product, please contact Quanmax.

NOTE: The BIOS menus and selections for your product may vary from those in this chapter. For the BIOS manual specific to your product, please contact Quanmax

AMI's ROM BIOS provides a built-in Setup program, which allows the user to modify the basic system configuration and hardware parameters. The modified data will be stored in a battery-backed CMOS, so that data will be retained even when the power is turned off. In general, the information saved in the CMOS RAM will not need to be changed unless there is a configuration change in the system, such as a hard drive replacement or when a device is added.

It is possible for the CMOS battery to fail, which will cause data loss in the CMOS only. If this happens you will need to reconfigure your BIOS settings.

■ Main Menu

The BIOS Setup is accessed by pressing the DEL key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins. Once you enter the BIOS Setup Utility, the Main Menu will appear on the screen. The Main Menu provides System Overview information and allows you to set the System Time and Date. Use the “<” and “>” cursor keys to navigate between menu screens.

Table 40 BIOS Main Menu

BIOS SETUP UTILITY					
Main	Advanced	Boot	Security	Save & Exit	
Product Information					
Product Name		KEEX-810A			
BIOS Version		0.03 (x64)			
BIOS Build Date		10/28/2014			
ME FW Version		9.0.30.1482			
CPU Information					
Intel® Core ™ i7-4810MQ CPU @ 2.80GHz					
Microcode Revision		17		→ ← Select Screen	
Processor Cores		4		↑↓ Select Item	
				Enter: Select	
Memory Information				+- Change Opt.	
				F1: General Help	
Total Size		8192 MB (DDR3)		F2: Previous Values	
Frequency		1600 MHz		F3: Optimized Defaults	
System date		[Mon 12/01/2014]		F4 Save & Exit	
System time		[15:03:02]		ESC Exit	
Access Level		Administrator			
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.					

■ Advanced Menu

Table 41 Advanced Menu

BIOS SETUP UTILITY		
Main **Advanced** Boot Security Server Mgmt Save & Exit		
Onboard LAN1 Controller	[Enabled]	
Onboard LAN1 Boot	[Disabled]	
Onboard LAN2 Controller	[Enabled]	→ ← Select Screen
Onboard LAN2 Boot	[Disabled]	↑↓ Select Item
Audio Controller	[Enabled]	Enter: Select
		+- Change Opt.
> Display Configuration		F1: General Help
> Power Management Configuration		F2: Previous Values
> CPU Advanced Configuration		F3: Optimized Defaults
> AMT Configuration		F4 Save & Exit
> Trusted Computing		ESC Exit
> SATA Configuration		
> Intel(R) Rapid Start Technology		
>Intel TXT(LT) Configuration		
>USB Configuration		
>DIO Configuration		
>Super IO Configuration		
>H/W Monitor		
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.		

Onboard LAN 1 Controller

Options: Disabled, Enabled

Onboard LAN 1 Boot

Options: Disabled, Enabled

Onboard LAN 2 Controller

Options: Disabled, Enabled

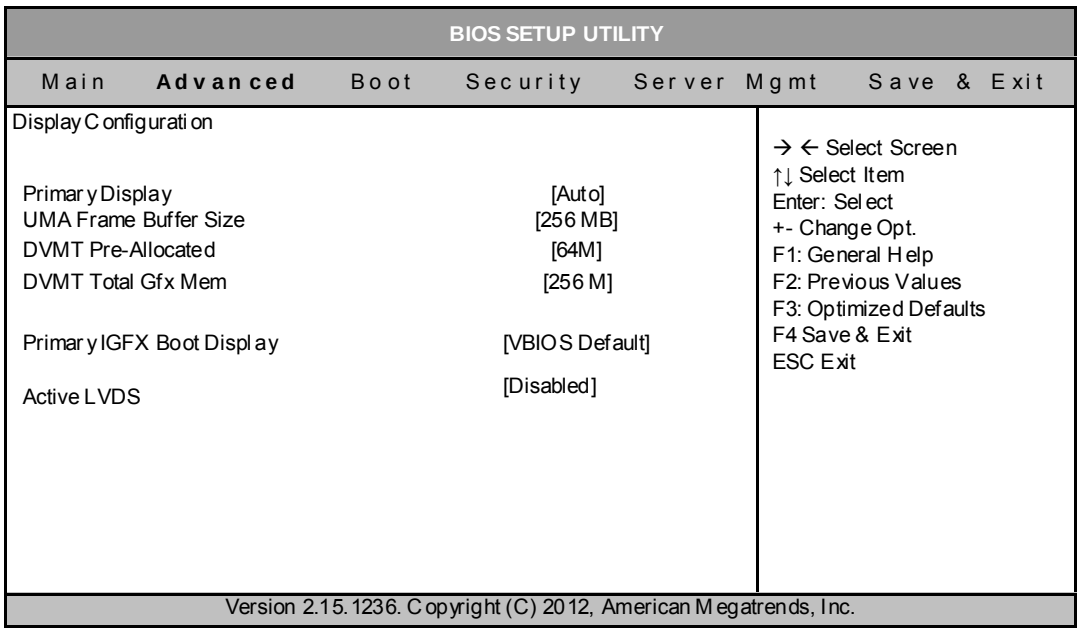
Onboard LAN 2 Boot

Options: Disabled, Enabled

Audio Controller

Options: Disabled, Enabled

Table 42 Advanced Menu – Display Configuration



UMA Frame Buffer Size

Options: 128MB, 256MB, 512MB

DVMT Pre-Allocated

Options:32M, 64M, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M, 1024M

DVMT Total Gfx Mem

Options: 128M, 256M, MAX

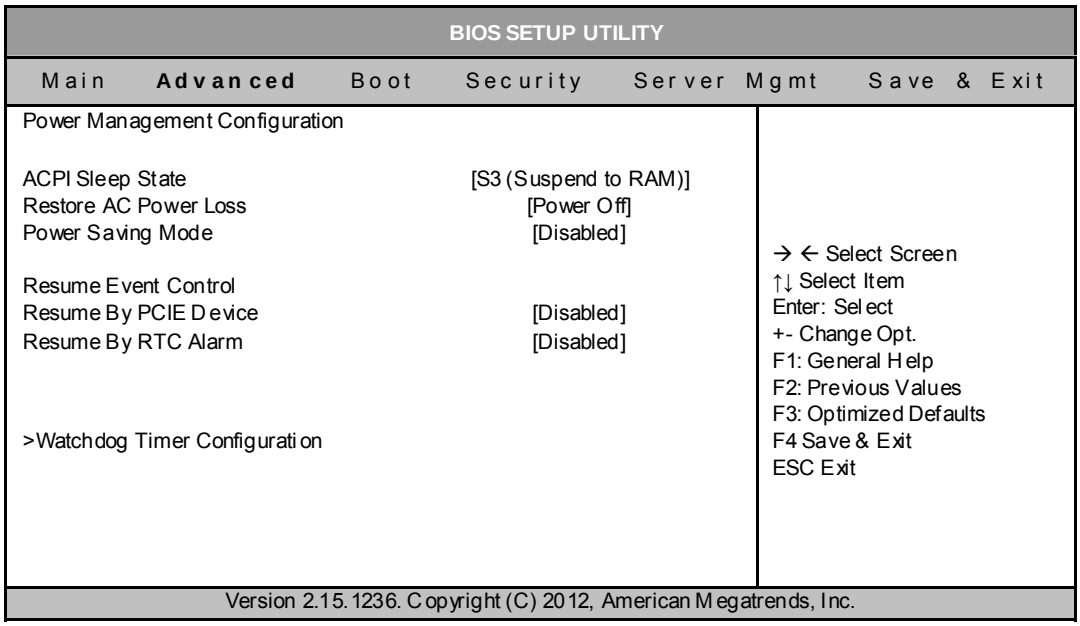
IGFX – Boot Type

Options: VBIOS Default, CRT,DP1, LVDS1, HDMI, DP 2

Active LVDS

Options: Disabled, Enabled

Table 43 Advanced Menu –Power Management Configuration



ACPI Sleep State

Options: Suspend Disabled, S3 (Suspend to RAM)

Restore AC Power Loss

Options: Power Off, Power On, Last State

Power Saving Mode

Options: Disabled, EUP Enabled , DeepSx Enabled

Resume By PCIE Device

Options: Disabled, Enabled

Resume By RTC Alarm

Options: Disabled, Enabled

Watchdog Timer Configuration

Options: Disabled, EUP Enabled , DeepSx Enabled

Table 44 Advanced Menu –CPU Advanced Configuration

BIOS SETUP UTILITY					
Main	**Advanced**	Boot	Security	Save & Exit	
CPU Advanced Configuration					
EIST		[Enabled]		→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit	
Turbo Mode		[Enabled]			
Hyper Treading		[Enabled]			
VT-d		[Enabled]			
Active Processor Cores		[All]			
Limit CPUID Maximum		[Disabled]			
Execute Disable Bit		[Enabled]			
Intel ® Virtualization Tech		[Disabled]			
Intel ® TXT(LT) Support		[Disabled]			
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EIST

Options: Disabled, Enabled

Turbo Mode

Options: Disabled, Enabled

Hyper Threading

Options: Disabled, Enabled

VT-d

Options: Disabled, Enabled

Active Processor Cores

Options: All, 1,2,3

Limit CPUID Maximum

Options: Disabled, Enabled

Execute Disable Bit

Options: Disabled, Enabled

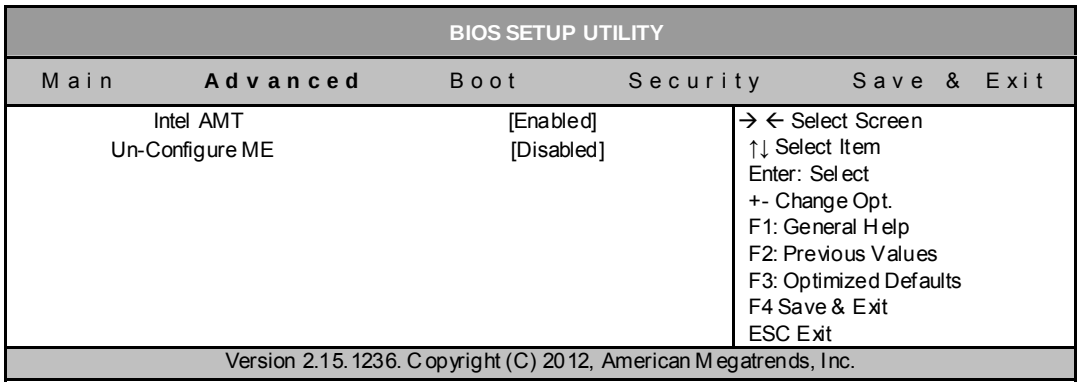
Intel ® Virtualization Tech

Options: Disabled, Enabled

Intel ® TXT(LT) Support

Options: Disabled, Enabled

Table 45 Advanced Menu –AMT Configuration



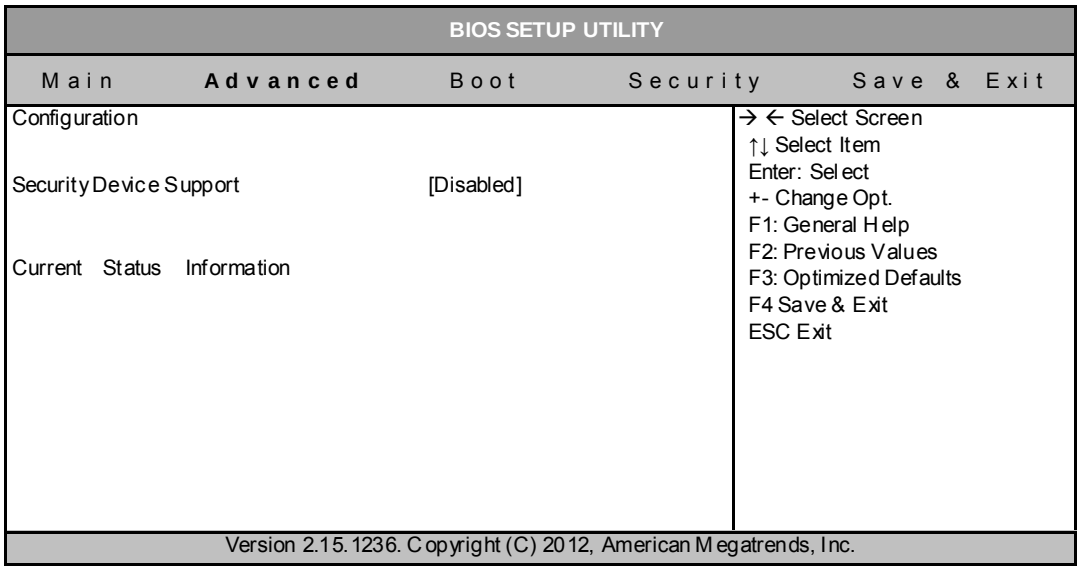
Intel AMT

Options: Disabled, Enabled

Un-Configure ME

Options: Disabled, Enabled

Table 46 Advanced Menu –Trusted Computing



Security Device Support

Options: Disabled, Enabled

Table 47 Advanced Menu –SATA Configuration

BIOS SETUP UTILITY					
Main	**Advanced**	Boot	Security	Save & Exit	
SATA Controller(s)	[Enabled]	→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit			
SATA Mode Selection	[AHCI]				
SATA Controller Speed	[Default]				
Serial ATA Port 1	Empty				
Port 1	[Enabled]				
Serial ATA Port 2	Empty				
Port 2	[Enabled]				
mSATA Port 1	Empty				
Port 1	[Enabled]				
mSATA Port 2	Unknown				
Port 2	[Enabled]				
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SATA Controller(s)

Options: Disabled, Enabled

SATA Mode Selection

Options: IDE, AHCI, RAID

SATA Controller Speed

Options: Default, Gen 1, Gen 2, Gen 3

Port

Options: Disabled, Enabled

Table 48 Advanced Menu – Intel Rapid Start Technology

BIOS SETUP UTILITY		
Main **Advanced** Boot Security Server Mgmt Save & Exit		
Intel® Rapid Start Technology	[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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Intel® Rapid Start Technology

Options: Disabled, Enabled

Table 49 Advanced Menu –USB Configuration

BIOS SETUP UTILITY					
Main	**Advanced**	Boot	Security	Save & Exit	
USB Configuration				→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit	
USB Devices: 1 Keyboard, 1 Mouse, 2 Hubs					
Legacy USB Support		[Enabled]			
USB 3.0 Support		[Enabled]			
XHCI hand-off		[Enabled]			
EHCI Hand-off		[Disabled]			
USB Mass Storage Driver Support		[Enabled]			
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Legacy USB Support

Options: Disabled, Enabled, Auto

USB 3.0 Support

Options: Disabled, Enabled

XHCI hand-off

Options: Disabled, Enabled

EHCI hand-off

Options: Disabled, Enabled

USB Mass Storage Driver Support

Options: Disabled, Enabled

Table 50 Advanced Menu –DIO Configuration

BIOS SETUP UTILITY					
Main	**Advanced**	Boot	Security	Save & Exit	
DIO Configuration				→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit	
User Configuration		[Disabled]			
DI_1	1				
DI_2	1				
DI_3	1				
DI_4	1				
DO_1	1				
DO_2	1				
DO_3	1				
DO_4	1				
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User Configuration

Options: Disabled, Enabled

Table 51 Advanced Menu – Super IO Configuration

BIOS SETUP UTILITY						
Main	**Advanced**	Boot	Security	Server Mgmt	Save & Exit	
Super IO Configuration >Serial Port 1 Configuration >Serial Port 2 Configuration						
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.						

Table 52 Advanced Menu –Super IO Configuration – Serial Port 1 Configuration

BIOS SETUP UTILITY						
Main	**Advanced**	Boot	Security	Server Mgmt	Save & Exit	
Serial Port 1 Configuration					→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit	
Serial Port		[Enabled]				
Device Settings		IO=3F8h; IRQ=4				
Change Settings		[Auto]				
Serial Port 1 Type		[RS232]				
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.						

Serial Port

Options: Disabled, Enabled

Change Settings

Options: Auto,

IO=3F8h; IRQ=4;

IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

Serial Port Type

Options: RS232, RS422, RS485

Table 53 Advanced Menu –Super IO Configuration – Serial Port 2 Configuration

BIOS SETUP UTILITY						
Main	**Advanced**	Boot	Security	Server Mgmt	Save & Exit	
Serial Port 2 Configuration						
Serial Port			[Enabled]			
Device Settings			IO=2F8h; IRQ=3			
Change Settings			[Auto]			
Serial Port 2 Type			[RS232]			
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.						

Serial Port

Options: Disabled, Enabled

Change Settings

Options: Auto,

IO=2F8h; IRQ=3;

IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

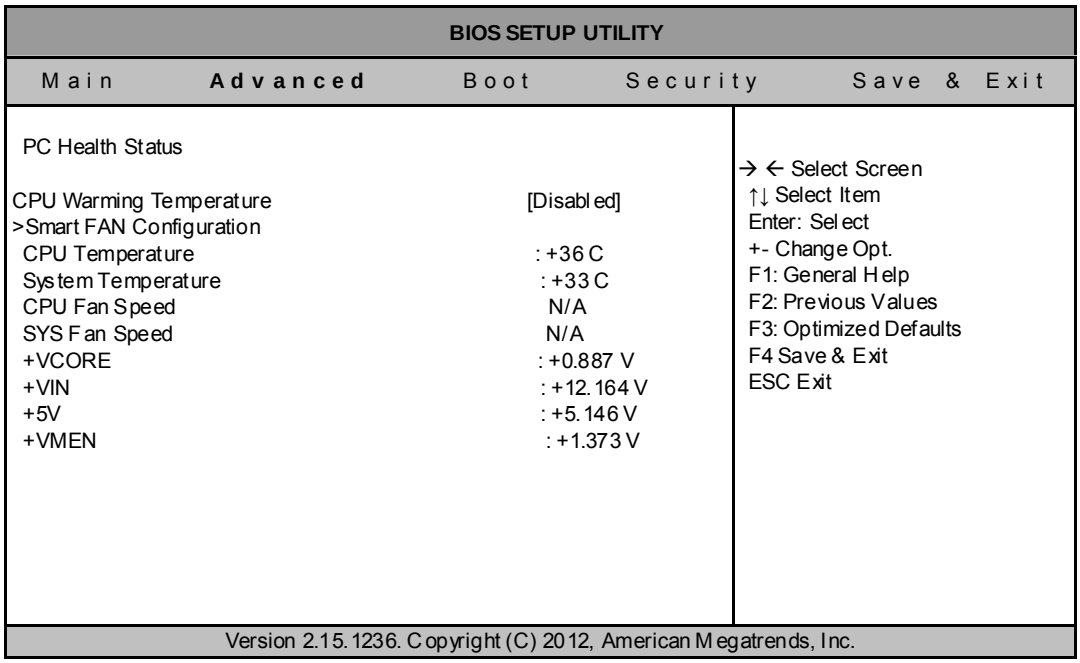
IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

Serial Port Type

Options: RS232, RS422, RS485

Table 54 Advanced Menu –H/W Monitor



CPU Warning Temperature

Options: Disabled, 80, 85, 90, 95

Smart FAN Configuration

CPU FAN Setting [Manual Mode]

Options: Manual Mode, Smart Mode

Manual Duty 255

FAN Setting [Manual Mode]

Options: Manual Mode, Smart Mode

Manual Duty 255

■ Boot Menu

Table 55 Boot Menu

BIOS SETUP UTILITY				
Main	Advanced	**Boot**	Security	Save & Exit
Boot Configuration				
Full Screen LOGO Display	[Disabled]			→ ← Select Screen
Setup Prompt Timeout	1			↑↓ Select Item
Bootup NumLock State	[On]			Enter: Select
				+- Change Opt.
CSM Support	[Enabled]			F1: General Help
Boot Option Filter	[Legacy only]			F2: Previous Values
DIMM Voltage Warning	[Enabled]			F3: Optimized Defaults
				F4 Save & Exit
Boot Option Priorities				ESC Exit
Boot Option #1	[P1: SandiskSSD U11]			
Boot Option Priorities				
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.				

Full Screen LOGO Display

Options: Disabled, Enabled

Bootup Numlock State

Options: On, Off

UEFI Boot

Options: Disabled, Enabled

CSM Support

Options: Disabled, Enabled

Boot Option Filter

Options: UEFI and Legacy, Legacy only, UEFI only

DIMM Voltage Warning

Options: Disabled, Enabled

Boot Option #1

Options: P1: Sandisk SSD U110 64GB, Disabled

■ Security Menu

Table 56 Security Menu

BIOS SETUP UTILITY				
Main	Advanced	Boot	**Security**	Save & Exit
Password Description 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 Administrator Password User Password				→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.				

■ Save & Exit Menu

Table 57 Save & Exit Menu

BIOS SETUP UTILITY				
Main	Advanced	Boot	Security	**Save & Exit**
Save Changes and Reset Discard Changes and Reset Save Options Save Changes Discard Changes Restore Defaults				→ ← Select Screen ↑↓ Select Item Enter: Select +- Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4 Save & Exit ESC Exit
Version 2.15.1236. Copyright (C) 2012, American Megatrends, Inc.				

Save Changes and Exit

Exit system setup after saving the changes. Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an onboard backup battery and stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select [Yes] to save changes and exit.

Discard Changes and Exit

Exit system setup without saving any changes. Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than system date, system time, and password, the BIOS asks for a confirmation before exiting.

Discard Changes

Discards changes done so far to any of the setup values. This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select [Yes] to discard any changes and load the previously saved values.

Load Optimal Defaults

Load Optimal Default values for all the setup values. This option allows you to load optimal default values for each of the parameters on the Setup menus, which will provide the best performance settings for your system. The F9 key can be used for this operation.

Load Failsafe Defaults

Load Optimal Default values for all the setup values. This option allows you to load failsafe default values for each of the parameters on the Setup menus, which will provide the most stable performance settings. The F8 key can be used for this operation.

Chapter 5

Driver Installation

If your KEEX-810Adoes not come with an operating system pre-installed, you will need to install an operating system and the necessary drivers to operate it. After you have finished assembling your system and connected the appropriate power source, power it up using the power supply and install the desired operating system.
You can download the drivers for the KEEX-810A from the Quanmax website at www.quanmax.com and install as instructed there. For other operating systems, please contact Quanmax.

NOTE

When the system reboots without connecting the CRT, there might be no image on screen when you insert the CRT/VGA cable. Please pressing **<Ctrl>+<Alt>+<F1>** simultaneously to show the image on screen.

Appendix A

DIO (Digital I/O) Sample Code

```
//************************************************************
//KEEX-810ADOS DIO sample program
//Please compile with Turbo C 3.0 to utilized the program
//0:Low 1:High
//DI_1: IOport 0x50C bit2    DO_1: IOport 0x539 bit4
//DI_2: IOport 0x50C bit3    DO_2: IOport 0x539 bit5
//DI_3: IOport 0x50C bit4    DO_3: IOport 0x539 bit6
//DI_4: IOport 0x50C bit5    DO_4: IOport 0x53B bit0
//************************************************************

int main()
{
    int RetVal;

    //Clear DO_1~4
    RetVal=inp(0x539);//IO Port: 0x539
    RetVal=(RetVal&0x8F);//DO_1 is bit 4
                         //DO_2 is bit 5
                         //DO_3 is bit 6
    outp(0x539,RetVal);

    RetVal=inp(0x53B);//IO Port: 0x53B
    RetVal=(RetVal&0xFE);//DO_4 is bit 0
    outp(0x53B,RetVal);

    system("pause");

    //Setting DO_1~4
    RetVal=inp(0x539);//IO Port: 0x539
    RetVal=(RetVal|0x70);//DO_1 is bit 4
```

```
                    //DO_2 is bit 5
                    //DO_3 is bit 6
    outp(0x539,RetVal);

    RetVal=inp(0x53B);//IO Port: 0x53B
    RetVal=(RetVal|0x01);//DO_4 is bit 0
    outp(0x53B,RetVal);

    system("pause");

    //Reading DI_1~4
    RetVal=inp(0x50C);//IO Port: 0x50C
    RetVal=(RetVal&0x3C);//DI_1 is bit 2
                    //DI_2 is bit 3
                    //DI_3 is bit 4
                    //DI_4 is bit 5
    printf("DI_= %d\n",RetVal);
    system("pause");

    return 0;
}
```

Appendix B

WatchDog Timer Sample Code

```
//==========================================
//KEEX-810ADOS Watchdog sample program
//Please compile with Turbo C 3.0 to utilized the program
//==========================================

#include<stdio.h>
int main()
{
  int value;
//Initialized the WDT program
  outp(0x2E,0x87);
  outp(0x2E,0x87);

//Setting Logical Device Number to 0x07
  outp(0x2E,0x07);
  outp(0x2F,0x07);

//0xF5 bit6
//If watchdog timeout event occurs, this bit will be set to 1.
//Write a 1 to this bit will clear it to 0.
  outp(0x2F,0xF5);
  value=inp(0x2F);
  outp(0x2F,(value | 0x40));

//Set Timer unit
//(0xF5 bit3(0: 1sec, 1: 60 sec) of watchdog timer by setting this bit)
  outp(0x2E,0xF5);
  value=inp(0x2F);
  outp(0x2F,(value & 0xF7));//set unit sec.

//Set Timer Value(0xF6 Time of watchdog timer)
  outp(0x2E,0xF6);
  outp(0x2F,0x14);//set to 20 sec (0x14)

//Enable WDT
  outp(0x2E,0xF5);
  value=inp(0x2F);
  outp(0x2F,(value | 0x30));//
```

```
  outp(0x2E,0xF0);
  outp(0x2F,0x81);//bit7 WDTRST# output is enabled

  return 0;
}
```