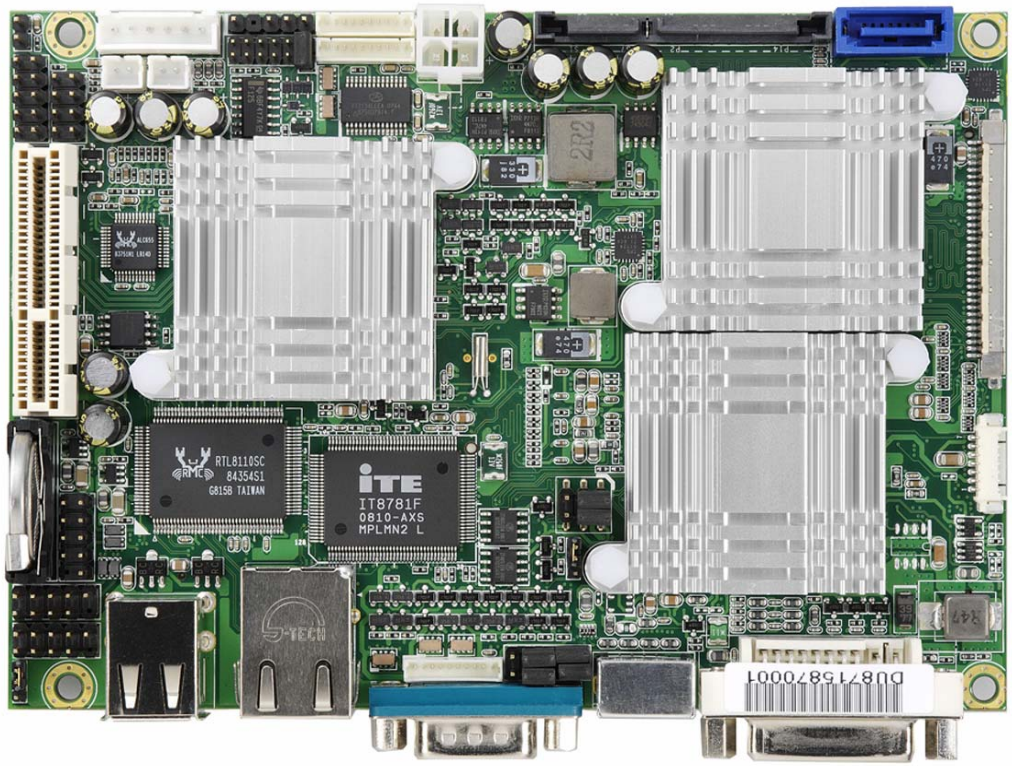
KEEX-2030

Industrial 3.5" Embedded SBC with Intel® Atom N270

User's Guide



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Revision	Date	Edited by	Changes
1.0	10/02/2008	SLee	Initial Release
1.1	10/28/2008	SLee	JP2 Correction
1.2	11/07/2008	SLee	COM2/3/4 Correction
1.3	04/21/2009	SLee	Table 12 updated
1.4	12/16/2009	SLee	Correct RS232/422/485 pin assignment
1.5	01/26/2010	SLee	Updated LVDS pin-out
1.6	06/29/2010	Zack	Update Appendix DIO and Watchdog Timer Sample Code
1.7	07/13/2010	Zack	Update DIO sample Code
1.8	10/21/2010	Zack	Update Table 4 Default Setting
1.9	01/29/2011	Zack	Add Remark on Table 3 about clear CMOS setting.

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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 overvoltage 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 unit s 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-2030 is an 3.5” Form Factor embedded single board computer (SBC) that combines the high performance and low power consumption of the Intel® Atom™ processor with Intel® 945GSE/ ICH7M chipset and supports DDR2 400/533 SODIMM up to 2GB. This SBC offers the latest performance, features and I/O interfaces at an extremely attractive price/performance ratio and measures 102mm x 146mm, a 75 percent space reduction over micro-ATX boards. The KEEX-2030 features DVI and 18-bit dual channel LVDS panel support, SATA, RS-232/422/485 serial port, Digital I/O, Gb/s Ethernet, USB 2.0, keyboard/mouse, and AC97” audio. PCIe x4 support provides expansion capability.

Checklist

- SATA cable
- Y cable for keyboard & mouse
- Driver/ Manual CD
- Quick Installation Guide
- KEEX-2030 3.5” motherboard

Features

- Intel® Atom Processor N270
- Intel® 945GSE / ICH7-M
- DDR2 SO-DIMM Socket, total up to 2 GB
- SATA, PCIe x4 slot, CompactFlash socket
- Gb/s Ethernet, 8x USB 2.0 ports, 4x COM ports, DVI-I supported
- Watchdog Timer, Hardware Monitor, TPM 1.2

■ Product Specifications

CPU Support	Intel® Atom™ N270
Chipset	Intel® 945GSE + ICH7-M
Memory	1x DDR2 400/533 SO-DIMM Socket, up to 2GB
BIOS	AMI Plug & Play BIOS – 8Mb SPI ROM
Display	Integrated on Intel® 945GSE Chipset 18-bit Dual channel LVDS support 1x DVI-I
LAN	1x RJ-45, Gigabit Ethernet (Realtek 8110SC Controller for KEEX-2030) 1x RJ-45, Fast Ethernet (Realtek 8100SC Controller for KEEX-2031)
Audio	AC'97 ALC655 Codec with 2W Audio Amplifier Supports Line-in, Line-out & Microphone
Peripheral Support	2x SATA (one with onboard power connector) 1x CompactFlash socket 8x USB 2.0 4x COMs with Power Selection 4x DI/DO 1x Mini-Din PS/2 KB/ MS
TPM	TPM 1.2
Power Connector	ATX-4P
Expansion	1x PCIe x4 slot
Watchdog Timer	1-255 step, can be set with software on Super I/O
Hardware Monitor	Operating voltage, CPU temperature and fan speed
Dimensions	3.5" Embedded Board (102 x 146 mm)
Environmental Factors	Operation Temp: 0ºC - 60ºC Storage Temp.: -10ºC - 85ºC Humidity: 0% - 90%
Certifications	CE, FCC Class A

Table 1 KEEX-2030 Specification

■ System Block Diagram

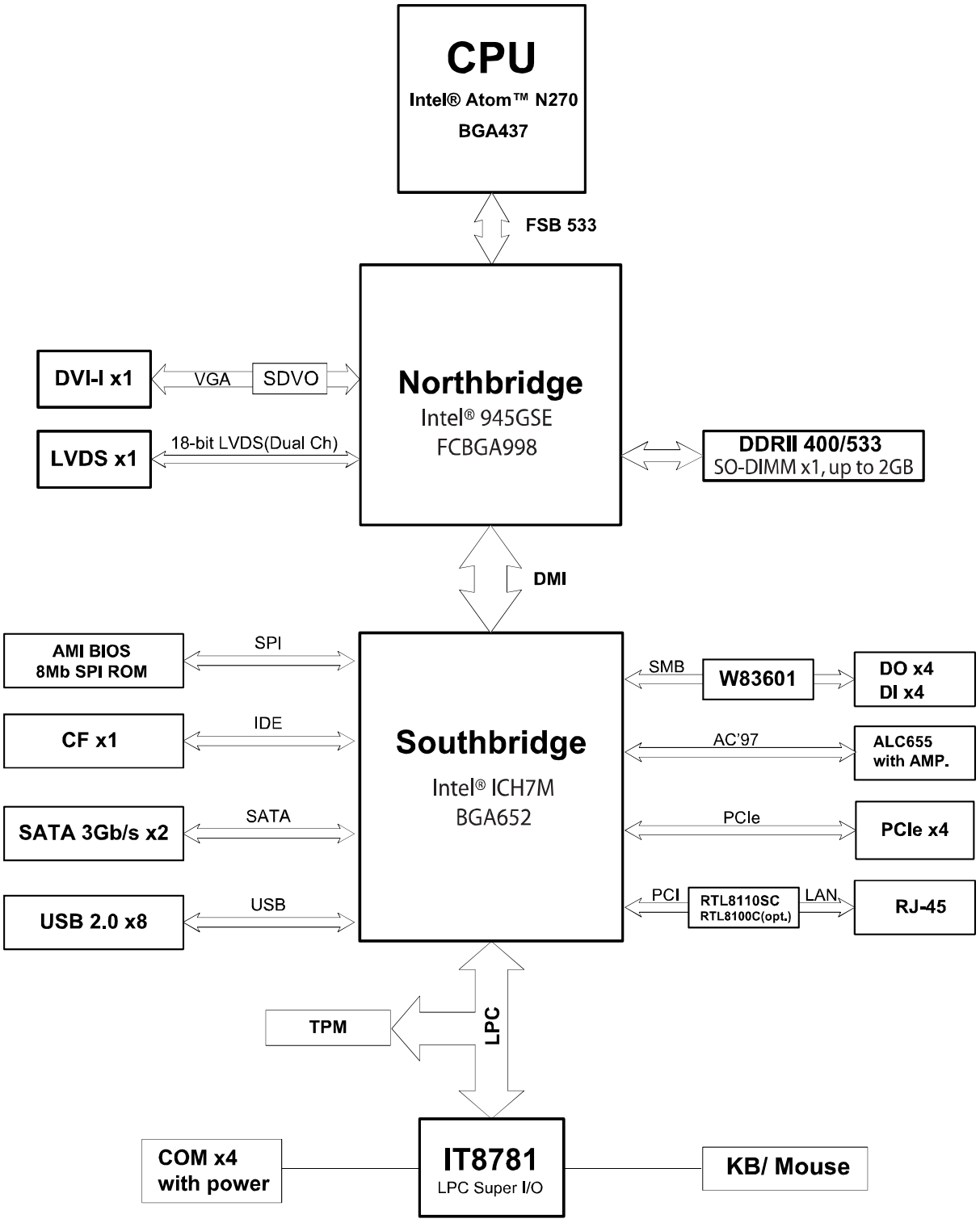


Figure 1 Block Diagram

■ Mechanical Dimensions

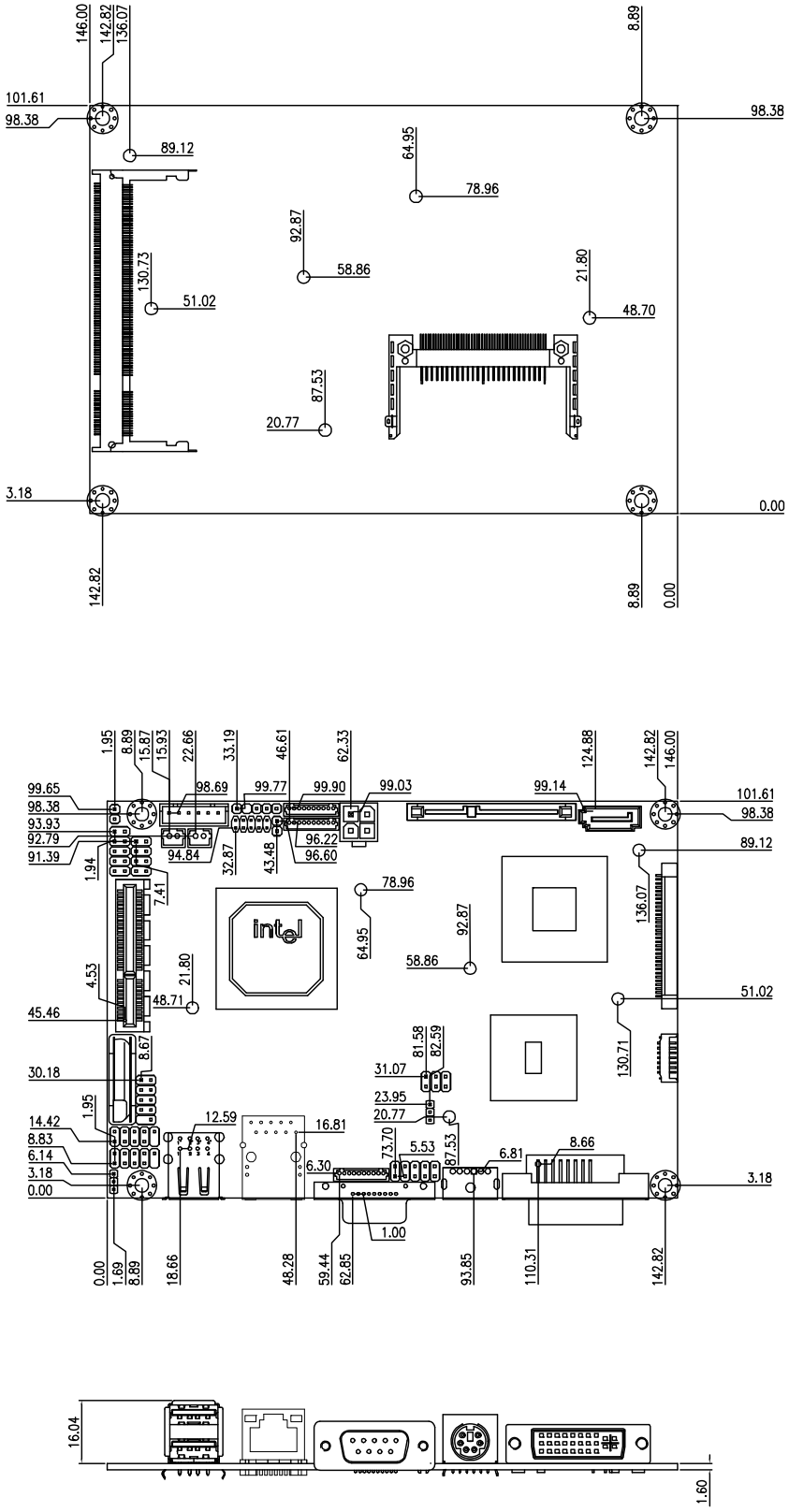


Figure 2 Mechanical Dimensions

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.

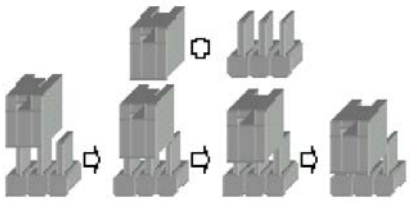


Figure 3 Jumper Connector

For a three-pin jumper (see *figure above*), 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.

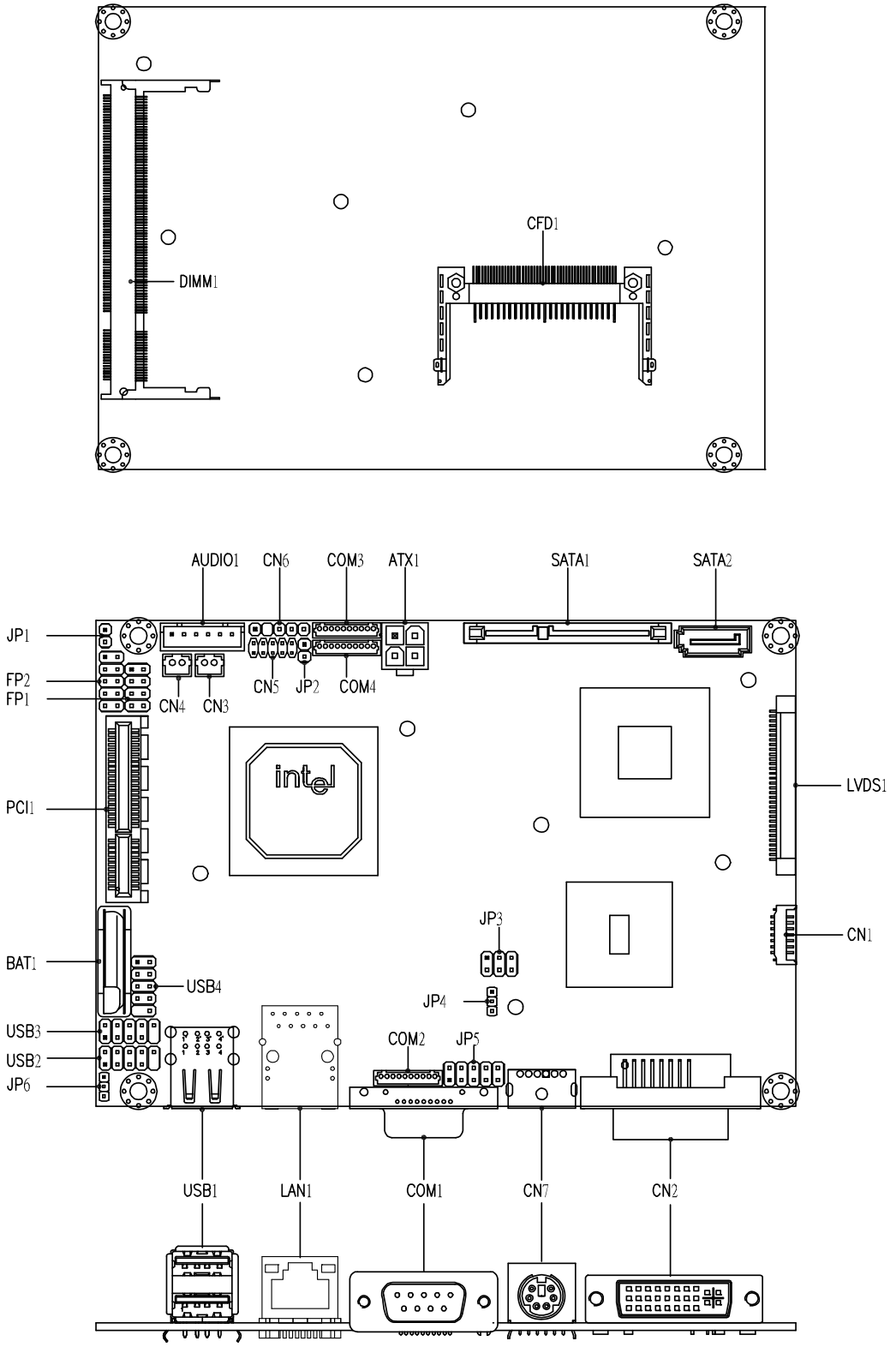


Figure 4 Jumper and Connector Locations

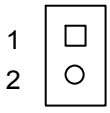
Jumper Settings

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	*Clear CMOS Selection*
JP2	*Power Mode Selection*
JP3	*Backlight & Panel Power Selection*
JP4	*Backlight Enable Selection*
JP5	*KB/MS Connector Selection*
JP6	*USB POWER SELECT*

Table 3 JP1 Clear CMOS Selection

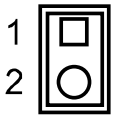


Jumper	Status
Open	Normal Operation (Default)
Short	Clear CMOS

Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]

Remark: You must go to **BIOS EXIT menu to do "**Load Optimal Defaults" after clear CMOS. Please refer to table 48.

Table 4 JP2 Power Mode Selection

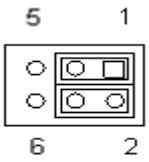


Jumper	Status
Open	ATX Mode (Default)
Short	AT Mode

Pitch:2.54mm [YIMTEX 3321*02SAGR(6T)]

Remark: Please remove jumper if you are using ATX mode.

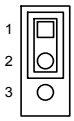
Table 5 JP3 Backlight & Panel Power Selection



Jumper	Setting	Status
1	1-3	Backlight Power = +12V (Default)
	3-5	Backlight Power = +5V
2	2-4	Panel Power = +3.3V (Default)
	4-6	Panel Power = +5V

Pitch:2.54mm [YIMTEX 3362*03SAGR]

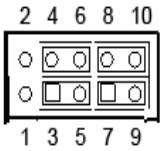
Table 6 JP4 Backlight Enable Selection



Jumper	Status
1-2	Active High (Default)
2-3	Active Low

Pitch:2.0mm [YIMTEX 3291*03SAGR(6T)]

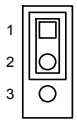
Table 7 JP5 KB/MS Connector Selection



Pin	Signal	Pin	Signal
1	+5VSB	2	GND
3	KBCLK_SIO	4	KBDAT_ SIO
5	KBCLK_CN7	6	KBDAT_CN7
7	MSCLK_SIO	8	MSDAT_SIO
9	MSCLK_CN7	10	MSDAT_CN7

Pitch:2.54mm [YIMTEX 3322*05SAGR(6T]

Table 8 JP6 USB POWER SELECT



Jumper	Status
1-2	+5VSB (Default)
2-3	+5V

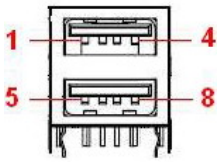
Pitch:2.0mm [YIMTEX 3291*03SAGR(6T)]

Rear Panel Pin Assignments

Table 9 Rear Panel Connector Descriptions

Label	Function
USB1	USB2.0 Port 0, 1 Type A Connector
LAN1	10/100/1000 Ethernet RJ-45 Connector
COM1	RS-232/422/485 Port A DB-9 Connector
CN7	PS/2 KB/MS Mini-DIN Connector
CN2	DVI Connector

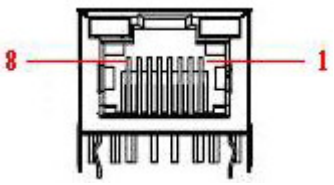
Table 10 USB1 2-Stack USB2.0 Type A Connector



Pin	Signal Name	Pin	Signal Name
1	+5V	5	+5V
2	USB1-	6	USB0-
3	USB1+	7	USB0+
4	GND	8	GND

USB DIP 4*2P 90D 1~3u [KUON YI KS-002-ANB-L]

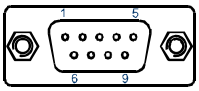
Table 11 LAN1 10/100/1000 Ethernet RJ-45 Connector



Pin	Signal	Pin	Signal
1	Tx+	5	NC
2	Tx-	6	Rx-
3	Rx+	7	NC
4	NC	8	NC

RJ45+TFM+LED 10/100/1000 14P DIP 90° [Speed Tech P26@P0C-4AM7(XA)]

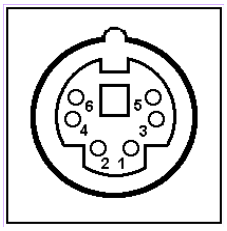
Table 12 COM1 RS-232/422/485 DB-9 Connector



Pin	RS232	RS422 (COM1*)	RS485 Half Duplex (COM1*)
1	DCD, Data carrier detect	TX-	DATA-
2	RXD, Receive data	RX+	N/A
3	TXD, Transmit data	TX+	DATA+
4	DTR, Data terminal ready	RX-	N/A
5	GND, ground	GND	GND
6	DSR, Data set ready	N/A	N/A
7	RTS, Request to send	N/A	N/A
8	CTS, Clear to send	N/A	N/A
9	RI, Ring indicator	N/A	N/A

D-SUB 9MR 9P MALE [SM1001P01012PN]

Table 13 CN7 PS/2 KB/MS Mini-DIN Connector



Pin	Signal
1	KBDAT
2	MSDAT
3	GND
4	+5V
5	KBCLK
6	MSCLK

MINI DIN DIP 6P RIGHT ANGLE FEMALE BLACK METAL SHIELD

[Kuon Yi DN-508I-6B3-L]

Table 14 CN2 DVI-I Connector

Pin	Signal Name	Pin	Signal Name
1	TX2N	2	TX2P
3	GND	4	TX5N
5	TX5P	6	SD_CLK
7	SD_DATA	8	VSYNC
9	TX1N	10	TX1P
11	GND	12	TX4N
13	TX4P	14	VGA_PWR
15	VGA_EN	16	HPD
17	TX0N	18	TX0P
19	GND	20	TX6N
21	TX6P	22	GND
23	TCLP	24	TXLN

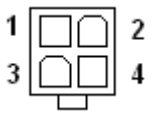
DVI 29P DIP (F) 90D H/D CONNECTOR WHITE [WIN WIN WDVI-29ABNW11U]

Main Board Pin Assignments

Table 15 Connector List

Label	Function
ATX1	+12V Power Input Connector
CFD1	CF Type II Connector
CN1	Panel Backlight Wafer
CN3,4	Audio AMP Output Wafer
CN5	Digital Input / Output Pin Header
CN6	IR Pin Header
DIMM1	DDR2 Memory SO-DIMM Socket
FP1	Front Panel 1 Pin Header
FP2	Front Panel 2 Pin Header
LVDS1	LVDS Panel Connector
PCIE1	PCIE x 4 Slot
SATA1	Serial ATA & HDD Power Connector
SATA2	Serial ATA Connector
USB2	USB2.0 Port 2, 3 Pin Header
USB3	USB2.0 Port 4, 5 Pin Header
USB4	USB2.0 Port 6, 7 Pin Header
COM2	RS-232 Port B With Power Wafer
COM3	RS-232 Port C With Power Wafer
COM4	RS-232 Port D With Power Wafer
AUDIO1	AUDIO OUT Wafer

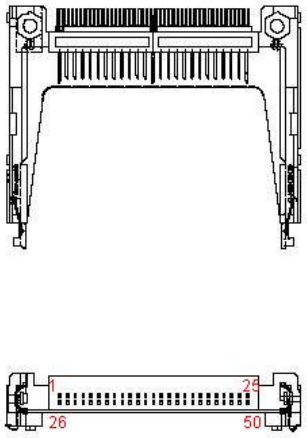
Table 16 ATX1 +12V Power Input Connector



Pin	Signal Name
1	GND
2	GND
3	+12V
4	+12V

[YIMTEX 576MWA2*02STR]

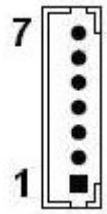
Table 17 CFD1 CF Type II Connector



Pin	Signal Name	Pin	Signal Name
1	GND	26	GND
2	IDE Data 3	27	IDE Data 11
3	IDE Data 4	28	IDE Data 12
4	IDE Data 5	29	IDE Data 13
5	IDE Data 6	30	IDE Data 14
6	IDE Data 7	31	IDE Data 15
7	IDE Chip select 1#	32	IDE Chip select 3#
8	GND	33	GND
9	GND	34	IDEIOR#
10	GND	35	IDEIOW#
11	GND	36	+5V
12	GND	37	IDEIRQ
13	+5V	38	+5V
14	GND	39	PCSEL
15	GND	40	NC
16	GND	41	Reset IDE
17	GND	42	IDEIORDY
18	SDA2	43	DREQ
19	IDE Address 1	44	DACK#
20	IDE Address 0	45	IDE activity
21	IDE Data 0	46	PDIAG#
22	IDE Data 1	47	IDE Data 8
23	IDE Data 2	48	IDE Data 9
24	IOIS16#	49	IDE Data 10
25	GND	50	GND

CF1A-71041-00E01

Table 18 CN1 Panel Backlight Wafer



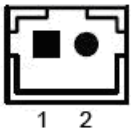
Pin	Signal Name
1	NC
2	BL_ADJ
3	GND
4	+5V / +12V **
5	+5V / +12V **
6	GND
7	BL_EN / BL_EN# *

*Selected by JP4

** Selected by JP3

Pitch:1.25mm [YIMTEX 501MW1*07MTRR]

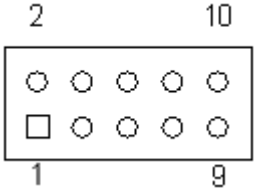
Table 19 CN3,4 Audio AMP Output Wafer



Pin	Signal Name
1	Speaker+
2	Speaker-

Pitch=2.0mm WAFER [YIMTEX 503PW1*02STR]

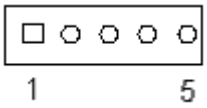
Table 20 CN5 Digital Input / Output Pin Header



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:2.0mm [YIMTEX 3292*05SAGR(6T)]

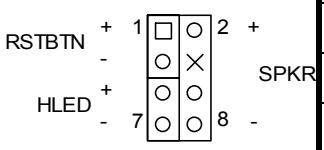
Table 21 CN6 IrDA Connector



Pin	Signal Name
1	+5V
2	NC
3	RXDB
4	GND
5	TXDB

Pitch:2.54mm [YIMTEX 3321*05SAGR-02]

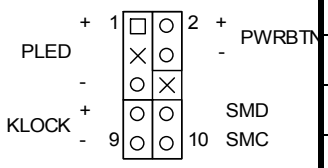
Table 22 FP1 Front Panel 1 Pin Header



Pin	Signal	Pin	Signal
1	Reset Button +	2	Speaker +
3	Reset Button -	4	NC
5	HDD LED +	6	NC
7	HDD LED -	8	Speaker -

Pitch:2.54mm [YIMTEX 3322*04SAGR(6T)]

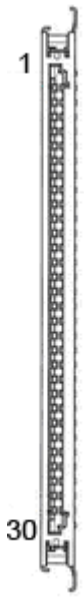
Table 23 FP2 Front Panel 2 Pin Header



Pin	Signal	Pin	Signal
1	Power LED +	2	Power Button +
3	NC	4	Power Button -
5	Power LED -	6	NC
7	Keyboard Lock	8	SMBus Data
9	GND	10	SMBus Clock

Pitch:2.54mm [YIMTEX 3322*05SAGR(6T]

Table 24 LVDS1 LVDS Panel Connector

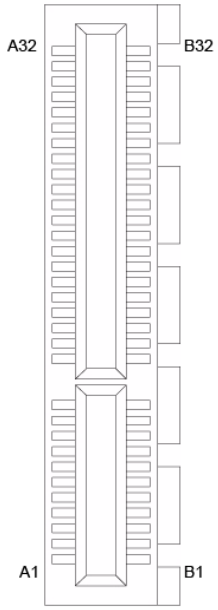


Pin	Signal Name	Pin	Signal Name
1	LVDS_A0-	16	LVDS_B1+
2	LVDS_A0+	17	GND
3	LVDS_A1-	18	LVDS_B2-
4	LVDS_A1+	19	LVDS_B2+
5	LVDS_A2-	20	LVDSBCLK-
6	LVDS_A2+	21	LVDS_BCLK+
7	GND	22	NC
8	LVDS_ACLK-	23	NC
9	LVDS_ACLK+	24	GND
10	NC	25	DCC_DAT
11	NC	26	VDDEN
12	LVDS_B0-	27	DCC_CLK
13	LVDS_B0+	28	+3.3V / +5V *
14	GND	29	+3.3V / +5V *
15	LVDS_B1-	30	+3.3V / +5V *

* Selected by JP3

Pitch:1mm [JAE FI-X30SSL-HF]

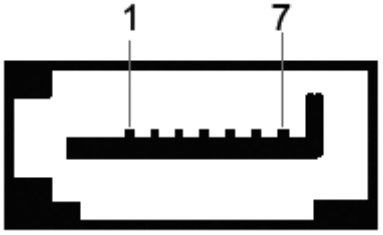
Table 25 PCIE1 PCIE x 4 Slot



PIN	SIGNAL	PIN	SIGNAL
A32	RESERVED	B32	GND
A31	GND	B31	PRSNT2#
A30	PERN3	B30	RESERVED
A29	PERP3	B29	GND
A28	GND	B28	PETN3
A27	GND	B27	PETP3
A26	PERN2	B26	GND
A25	PERP2	B25	GND
A24	GND	B24	PETN2
A23	GND	B23	PETP2
A22	PERN1	B22	GND
A21	PERP1	B21	GND
A20	GND	B20	PETN1
A19	RESERVED	B19	PETP1
A18	GND	B18	GND
A17	PERN0	B17	PRSNT2#
A16	PERP0	B16	GND
A15	GND	B15	PETN0
A14	REFCLK+	B14	PETP0
A13	REFCLK-	B13	GND
A12	GND	B12	RESERVED
A11	PERST#	B11	WAKE#
A10	+3.3V	B10	+3.3VAUX
A9	+3.3V	B9	JTAG1
A8	JTAG5	B8	+3.3V
A7	JTAG4	B7	GND
A6	JTAG3	B6	SMDATA
A5	JTAG2	B5	SMCLK
A4	GND	B4	GND
A3	+12V	B3	RESERVED
A2	+12V	B2	+12V
A1	PRSNT1#	B1	+12V

PCI 32*2P EXPRESS 180D(F) [WIN WIN WPES-064AN43B22UWS]

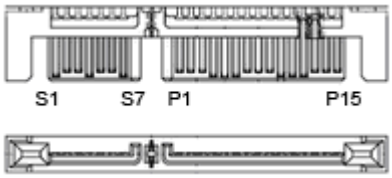
Table 26 SATA2: SATA Connector



Pin	Signal Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

7P 180D SATA CONNECTOR BLUE [FOXCONN LD1807V-S52U]

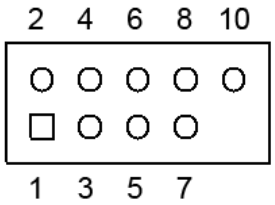
Table 27 SATA1 Serial ATA & HDD Power Connector



Pin	Signal Name	Pin	Signal Name
S1	GND	P5	GND
S2	TX+	P6	GND
S3	TX-	P7	+5V
S4	GND	P8	+5V
S5	RX-	P9	+5V
S6	RX+	P10	GND
S7	GND	P11	GND
P1	+3.3V	P12	GND
P2	+3.3V	P13	+12V
P3	+3.3V	P14	+12V
P4	GND	P15	+12V

7P+15P MALE 180D SATA CONNECTOR BLACK [WIN WIN WATH-22DLBGU4]

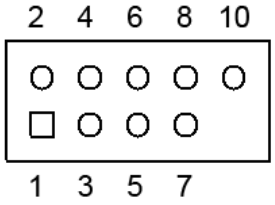
Table 28 USB2 USB2.0 Port 2, 3 Pin Header



Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	USB2-	4	USB3-
5	USB2+	6	USB3+
7	GND	8	GND
9	KEY	10	GND

Pitch:2.54mm [YIMTEX 3322*05SAGR(6T) -09]

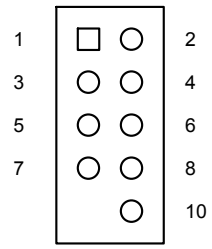
Table 29 USB3 USB2.0 Port 4, 5 Pin Header



Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	USB4-	4	USB5-
5	USB4+	6	USB5+
7	GND	8	GND
9	KEY	10	GND

Pitch:2.54mm [YIMTEX 3322*05SAGR(6T) -09]

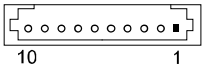
Table 30 USB4 USB2.0 Port 6, 7 Pin Header



Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	USB6-	4	USB7-
5	USB6+	6	USB7+
7	GND	8	GND
9	KEY	10	GND

Pitch:2.54mm [YIMTEX 3322*05SAGR(6T) -09]

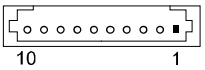
Table 31 COM2 RS-232 Port B Wafer



Pin	Signal
1	DCD, Data carrier detect
2	DSR, Data set ready
3	RXD, Receive data
4	RTS, Request to send
5	TXD, Transmit data
6	CTS, Clear to send
7	DTR, Data terminal ready
8	RI, Ring indicator
9	GND, ground
10	+5V

Pitch: 1.25mm WAFER [YIMTEX 501MW1*10STR]

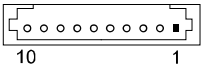
Table 32 COM3 RS-232 Port B Wafer



Pin	Signal
1	DCD, Data carrier detect
2	DSR, Data set ready
3	RXD, Receive data
4	RTS, Request to send
5	TXD, Transmit data
6	CTS, Clear to send
7	DTR, Data terminal ready
8	RI, Ring indicator
9	GND, ground
10	+5V

Pitch: 1.25mm WAFER [YIMTEX 501MW1*10STR]

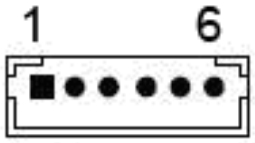
Table 33 COM4 RS-232 Port B Wafer



Pin	Signal
1	DCD, Data carrier detect
2	DSR, Data set ready
3	RXD, Receive data
4	RTS, Request to send
5	TXD, Transmit data
6	CTS, Clear to send
7	DTR, Data terminal ready
8	RI, Ring indicator
9	GND, ground
10	+5V

Pitch: 1.25mm WAFER [YIMTEX 501MW1*10STR]

Table 34 AUDIO1 Audio Output Wafer



Pin	Signal
1	LOUT_R
2	GND
3	LOUT_L
4	LIN_R
5	MIC
6	LIN_L

Pitch:2.5mm WAFER [YIMTEX 510XW1*06STR]

Chapter 3

System Installation

■ 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.

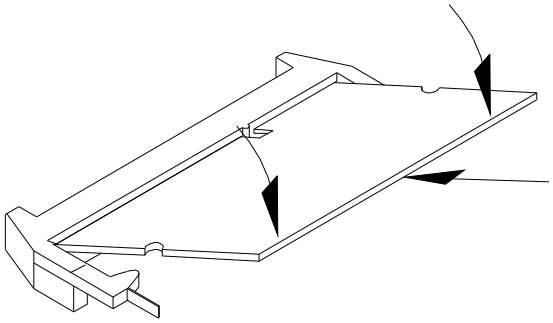


Figure 5 Align the SO-DIMM Memory Module with the onboard socket

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

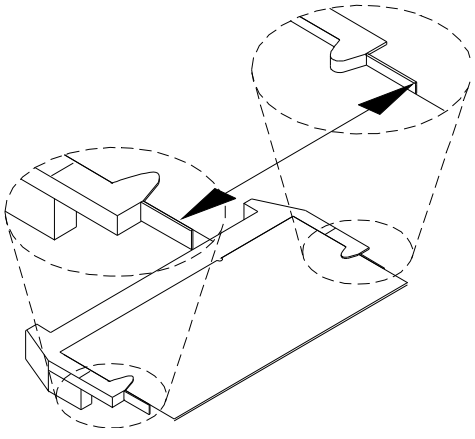


Figure 6 Press down on the SO-DIMM Memory Module to lock it in place

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 35 BIOS Main Menu

BIOS SETUP UTILITY		
Main Advanced Boot Chipset Power Security Exit		
System Date	[Mon 01/21/2008]	Use [ENTER], [TAB] or [SHIFT-TAB] to select a field.
System Time	[10:18:15]	
> Primary IDE Master	:[Not Detected]	Use [+] or [-] to configure system Time.
> Primary IDE Slave	:[Not Detected]	
> Secondary IDE Master	:[Not Detected]	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
> System Information		
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Below table is described for Primary IDE Master, Primary IDE Slave, Secondary IDE Master, Secondary IDE Slave setting.

Table 36 IDE Device Setting Menu

BIOS SETUP UTILITY		
Main		
Primary Master		Disable: Disables LBA Mode. Auto: Enables LBA Mode if the device supports it and the device is not already formatted with LBA Mode disabled.
Device	:Not Detected	
LBA/ Large Mode	**[Auto]**	
DMA Mode	[Auto]	
S.M.A.R.T	[Auto]	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
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LBA/ Large Mode

Enables or disables the LBA (Logical Block Addressing)/ Large mode. Setting to Auto enables the LBA mode if the device supports this mode, and if the device was not previously formatted with LBA mode disabled. Options: Disabled, Auto

DMA Mode

Options: Auto, SWDMA, MWDMA, UDMA mode

S.M.A.R.T

SMART stands for Smart Monitoring, Analysis, and Reporting Technology. It allows AMIBIOS to use the SMART protocol to report server system information over a network. Options: Auto, Disabled, Enabled

Table 37 System Information

BIOS SETUP UTILITY	
Main	
AMIBIOS Version : 1.0 Build Date: :08/20/08 Processor Genuine Intel® CPU N270 @ 1.60GHz Speed :1600MHz Count :1 System Memory Size :1016MB	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
V02.61 (C)Copyright 1985-2006, American Megatrends, Inc.	

■ Advanced Menu

Table 38 Advanced Menu

BIOS SETUP UTILITY	
Main **Advanced** Boot Chipset Power Security Exit	
Advanced Settings **Warning: Setting wrong values in below sections may cause system to malfunction.** > I/O Configuration > OnBoard Peripherals Configuration > Trusted Computing > Hardware Health Configuration	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
V02.61 (C)Copyright 1985-2006, American Megatrends, Inc.	

Press <Enter> to select a sub-menu for detailed options.

Table 39 Onboard I/O Configuration

BIOS SETUP UTILITY		
Advanced		
Onboard I/O Configuration		Allow BIOS to Select Serial Port1 Base Address.
COM1 Address	**[3F8]**	
COM1 IRQ	[4]	
COM1 Function Type	[RS232]	
COM1 Pin9 Voltage	[Normal]	
COM2 Address	[2F8]	
COM2 IRQ	[4]	<> Select Screen
COM2 Pin9 Voltage	[Normal]	↑↓ Select Item
COM3 Address	[3E8]	+- Change Field
COM3 IRQ	[11]	Tab Select Field
COM3 Mode	[Normal]	F1 General Help
COM3 Pin9 Voltage	[Normal]	F10 Save and Exit
COM4 Address	[2E8]	ESC Exit
COM4 IRQ	[11]	
COM4 Mode	[Normal]	
COM4 Pin9 Voltage	[Normal]	
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COM1 Address

Options: Disabled, 3F8, 3E8, 2E8

COM1 IRQ

Options: 3, 4, 10, 11

COM1 Function Type

Options: RS232, RS422, RS485

COM1 Pin9 Voltage

Options: Normal, 5V, 12V

COM2 Address

Options: Disabled, 2F8, 3E8, 2E8

COM 2 IRQ

Options: 3, 4, 10, 11

COM2 Pin9 Voltage

Options: Normal, 5V, 12V

COM3 Address

Options: Disabled, 3F8, 2F8, 3E8, 2E8, 2F0, 2E0

COM3 IRQ

Options: 3, 4, 10, 11

COM3 Mode

Options: Normal, IrDA, ASK IR, Smart Card Reader

COM3 Pin9 Voltage

Options: Normal, 5V, 12V

COM4 Address

Options: Disabled, 3F8, 2F8, 3E8, 2E8, 2F0, 2E0

COM4 IRQ

Options: 3, 4, 10, 11

COM4 Mode

Options: Normal, IrDA, ASK IR, Smart Card Reader

COM4 Pin9 Voltage

Options: Normal, 5V, 12V

Table 40 OnBoard Peripherals Configuration Settings

BIOS SETUP UTILITY		
Advanced		
OnBoard Peripherals Configuration Settings		Options
USB Controller	**[Enable]**	
USB Device Legacy Support	**[Enable]**	Disabled
Audio Controller	**[Enable]**	Enabled
Onboard LAN Controller	**[Enable]**	
Onboard LAN OPTROM	**[Enable]**	<> Select Screen
		↑↓ Select Item
		+- Change Field
		Tab Select Field
		F1 General Help
		F10 Save and Exit
		ESC Exit
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USB Controller

Options: Enabled, Disabled

USB Device Legacy Support

Options: Enabled, Disabled, Auto

Audio Controller

Options: Enabled, Disabled

Onboard LAN Controller

Options: Enabled, Disabled

Onboard LAN OPTROM

Options: Enabled, Disabled

Table 41 Trusted Computing

BIOS SETUP UTILITY		
Advanced		
Trusted Computing		Enable/ Disable TPM TCG (TPM 1.1/1.2) supp in BIOS
TCG/TPM SUPPORT	**[NO]**	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
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TCG/TPM SUPPORT

Options: No, Yes

Table 42 Hardware Health Configuration

BIOS SETUP UTILITY		
Advanced		
Hardware Health Configuration		
CPU Warning Temperature	[Disabled]	
CPU Shutdown Temperature	[Disabled]	
Temperature Sensor #1	:89°C/ 192°F	
Temperature Sensor #1	:54°C/ 129°F	
+VCORE	:1.136 V	<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit
+1.05V	:1.040 V	
+3.3V	:3.166 V	
+5V	:4.958 V	
+12V	:11.182 V	
+1.8v	:1.758 V	
+VCC RTC	:3.365 V	
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■ Boot Menu

Table 43 Boot Menu

BIOS SETUP UTILITY						
Main	Advanced	**Boot**	Chipset	Power	Security	Exit

Boot Settings		Allow BIOS to Skip certain tests while booting. This will decrease the time needed to boot the system.
> Quick Boot	**[Enabled]**	
> Bootup Num-Lock	[ON]	
> Wait For 'F1' If Error	[Enabled]	
> Hit 'DEL'Message Display	[Enabled]	
		<> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit

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Quick Boot

Enabling this item allows BIOS to skip some Power On Self Tests (POST) while booting to decrease the time needed to boot the system. When set to [Disabled], BIOS performs all the POST items.

Options: Disabled, Enabled

Bootup Num-Lock [On]

Allow you to select the power-on state for the NumLock.

Options: Off, On

Wait for 'F1' If Error [Enabled]

When set to Enabled, the system waits for F1 key to be pressed when error occurs.

Options: Disabled, Enabled

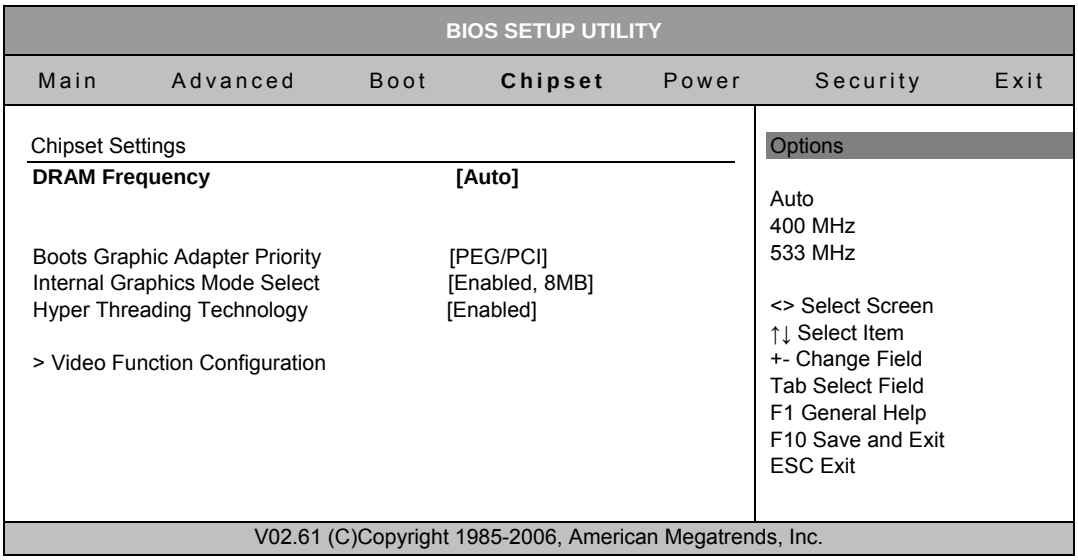
Hit 'DEL' Message Display [Enabled]

When set to Enabled, the system displays the message 'Press DEL to run Setup' during POST.

Options: Disabled, Enabled

■ Chipset Menu

Table 44 Chipset Menu



DRAM Frequency

Options: Auto, 400 MHz, 533MHz

Boots Graphic Adapter Priority

Select which graphics controller to use as the primary boot device.

Options: IGD, PCI/IGD, PCI/PEG, PEG/IGD, PEG/PCI

Internal Graphics Mode Select

Select the amount of system memory used by the Internal graphics device.

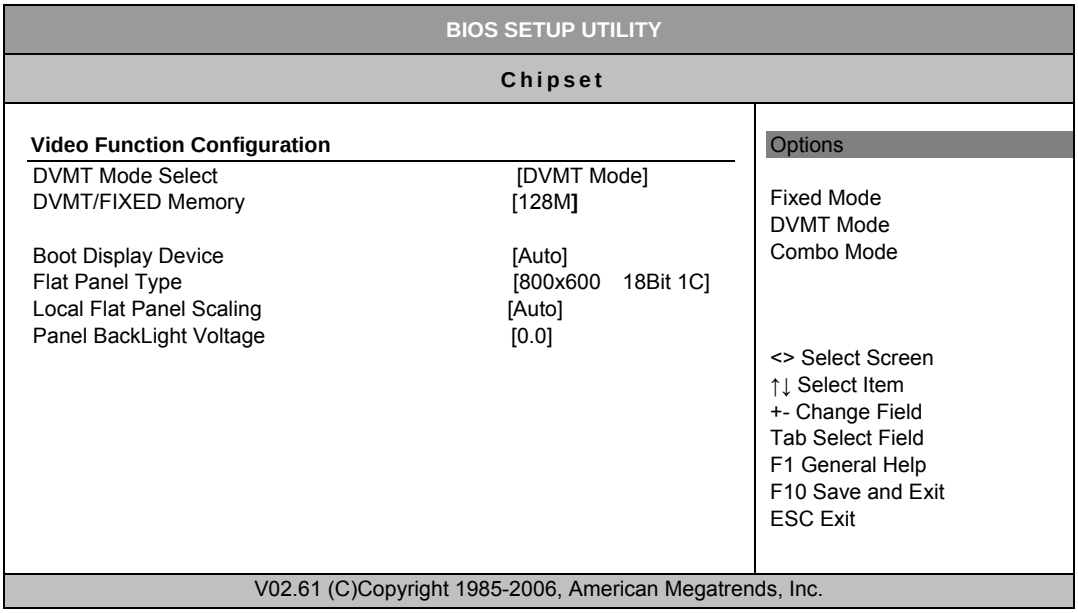
Options: Disabled, Enabled 1MB, Enabled 8M

Hyper Threading Technology

Options: Disabled, Enabled

■ Video Function Configuration

Table 45 Video Function Configuration



DVMT Mode Select

Options: Fixed Mode, DVMT Mode, Combo Mode

DVMT/FIXED Memory

Options: 64MB, 128MB, Maximum DVMT

Boot Display Device

Options: VGA, DVI, LVDS, VGA+LVDS

Flat Panel Type

Options:

640x480 18Bit 1CH,

800x600 18Bit 1CH,

1024x768 18Bit 1CH,

1280x800 18Bit 1Ch

Local Flat Panel Scaling

Options: Auto, Forced Scaling, Disabled

Panel BackLight Voltage

Options: Min 0.0V, Max: 5.0V

■ Power Menu

Table 46 Power Menu

BIOS SETUP UTILITY						
Main	Advanced	Boot	Chipset	**Power**	Security	Exit

Power Management Setting		Select the ACPI state used for System Suspend
ACPI Function	[Enabled]	
Suspend mode	**[S1 (POS)]**	<> Select Screen
Repost Video on S3 Resume	**[No]**	↑↓ Select Item
Suspend Time Out	[Disabled]	+- Change Field
Restore on AC Power Loss	[Last State]	Tab Select Field
Resume By USB Device	[Disabled]	F1 General Help
Resume On PME#	[Disabled]	F10 Save and Exit
Resume On RTC Alarm	[Disabled]	ESC Exit

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ACPI Function

Enable/ Disable ACPI support for Operating System.

ENABLE: If OS supports ACPI, DISABLE: IF OS Does not support ACPI.

Suspend mode

Options: S1 (POS), S3 (STR)

Repost Video on S3 Resume

Determines whether to invoke VGA BIOS post on S3/STR resume.

Options: No, Yes

Suspend Time Out

Options: Disabled, 1 Min, 2 Min, 4 Min, 8 Min, 10 Min, 20 Min, 30 Min, 40 Min, 50 Min, 60 Min

Restore on AC Power Loss

Options: Power OFF, Power ON, Last State

Resume By USB Device

Options: Disabled, Enabled

Resume On PME#

Options: Disabled, Enabled

Resume On RTC Alarm

Options: Disabled, Enabled

■ Security Menu

Table 47 Security Menu

BIOS SETUP UTILITY						
Main	Advanced	Boot	Chipset	Power	**Security**	Exit

Security Setting	Install or Change the password.
Supervisor Password :Not Installed	
User Password :Not Installed	
Change Supervisor Password	<> Select Screen
Change User Password	↑↓ Select Item
	+- Change Field
	Tab Select Field
	F1 General Help
	F10 Save and Exit
	ESC Exit

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Change Supervisor Password

Select this item to set or change the supervisor password. The Supervisor Password item on top of the screen displays the default Not Installed. After you have set a password, this item displays Installed.

Change User Password

Select this item to set or change the user password. The User Password item on top of the screen displays the default Not Installed. After you have set a password, this item displays Installed.

■ Exit Menu

Table 48 Exit Menu

BIOS SETUP UTILITY						
Main	Advanced	Boot	Chipset	Power	Security	**Exit**
Exit Setting					Exit System Setup after saving the changes.	
Save Changes and Exit Discard Changes and Exit Discard Changes Load Optimal Defaults Load Failsafe Defaults					F10 key can be used for this operation. <> Select Screen ↑↓ Select Item +- Change Field Tab Select Field F1 General Help F10 Save and Exit ESC Exit	
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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-2030 does 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 ATX Power Switch and install the desired operating system. You can download the drivers for the KEEX-2030 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>+<F3>** simultaneously to show the image on screen.

Appendix A

System Resources

Interrupt Request (IRQ) Lines

IRQ #	Used For	Comment
0	Timer0	
1	keyboard controller	
2	Cascade	
3	COM2	Note (1)
4	COM1	Note (1)
5	Free	
6	Floppy disk controller	Note (1)
7	Free	
8	Real Time Clock	
9	ACPI-Compliant System	
10	Free	
11	COM3&4	Note (1)
12	PS/2 Mouse	Note (1)
13	Floating point unit (FPU / NPU / Math coprocessor)	
14	Primary IDE channel	Note (1)
15	Secondary IDE channel	Note (1)

Note: If the “Used For” device is disabled in setup, the corresponding interrupt is available for other devices.

DMA Channels

DMA #	Used For	Comment
0	Memory Refresh	
1	Sound	Note (1)
2	Floppy disk controller	Note (1)
3	free	Unavailable if LPT used in ECP mode.
4	Cascade	
5	Sound	Note (1)
6	free	
7	free	

Note: If the "Used For" device is disabled in setup, the corresponding interrupt is available for other devices.

Memory Mapping

Upper Memory	Used For	Comment
C0000h - CBFFFh	VGA BIOS	No
CC000h - CFFFFh CD000h - CDFFFh	LAN Option ROM	Yes
E0000h - FFFFFh	System BIOS	No

PCI Devices

PCI Device	PCI Interrupt	Comment
LAN	INTA	AD20

PCI Express Devices

PCIe Device	PCIe Interrupt	Comment
PCIe x1 Slot 1	INTC	

Inter-IC Bus (I2C)

I2C Address	Used For	Comment
A0h	DDR2-RAM DIMM Socket 0 Address	

I/O Address Map

I/O Address	Used For	Comment
00h – 0Fh C0h – DFh	8237DMA Controller	
20h, 21h	8259A PIC	
2Eh, 2Fh	SuperIO Access Port	
A0h, A1h	8259A PIC	
40h – 43h (XT/AT) 44h – 47h (PS/2)	8254PIT	
60h – 64h	KeyBoard Controller	
90h – 96h	PS/2 P OS	
F0h – FFh	Math Co-Processor, X87 Unit	
170h – 177h	Secondary IDE	
1F0h – 1F7h	Primary IDE	
200h – 22Fh	GAME I/O	
220h – 22Fh	Sound Blaster / AD Lib	
279h, A79h	Plug and Play Configuration Register	
A15h, A16h	HW Monitor Access Port	
2E8h – 2EFh	COM4	
2F8h – 2FFh	COM2	
378h – 37Ah	Parallel Printer Port	
3B0h – 3BFh	MDA / MGA	
3C0h – 3CFh	EGA / VGA	
3D4h – 3D9h	CGA/CRT Register, Controller and Palette Register	
3F0h – 3F7h	Floppy Diskette	
3F6h, 3F7h	Enhanced IDE	
3E8h – 3EFh	COM3	
3F8h – 3FFh	COM1	
0CF8h	PCI Configuration Register/address	
0CFCh	PCI Configuration Register/data	

ISA I/O Port

I2C Address	Used For	Comment
2Eh	Super I/O	
2Eh	WatchDog Timer	Reference register in Super I/O

Hardware Monitor Parameters

IT8781F Pin Name	Voltage/Temperature	Function/Comments
VIN0	+VCORE	Processor core voltage

VIN1	+1.05V	+/- 5%
VIN2	+3.3V	+/- 5%
VIN3	+5V	+/- 5%
VIN4	+12V	+/- 5%
VIN5	Chip core 1.5V	+/- 5%
VIN6	DDR 1.8V	+/- 5%
5VSB	5VSB	+/- 5%
SYS_TEMP	System Temperature	
CPU_TEMP	CPU Temperature	
PRDCHOT#		CPU over temperature shutdown output
BEEP		Beep function for hardware monitor

Appendix B

DIO (Digital I/O) Sample Code

```
//=========================================
//KEEX-2030 DOS DIO sample program
//Please compile with Turbo C 3.0 to utilized the program
//=========================================

#include <stdio.h>
#include <conio.h>
#include <dos.h>

#define SMBus_Port 0x00000400
int WaitReady(int base)
{
        int STATUS;
        do{
                STATUS= inp(base);
        }while((STATUS&0x01)!=0);
        return 1;
}

/* ================ This Routine is Check the SMBus is Ready
================ */
void Chk_SMBUS_Ready()
{
        int status=0;
        int flag=0, errorcount=0;
        status = inp(SMBus_Port);
        while((status | status) != 0)
        {
                while((status & 0x04) != 0)
                {
                        flag=1;
                        outportb(SMBus_Port,status);
                        delay(5);
                        status = inp(SMBus_Port);
                }
                if(flag == 1)
                {
```

```
                printf(" The Error Code is 0x00E0 !!! \n");
                break;
            }
            else
            {
                delay(25);
                outportb(SMBus_Port,status);
                errorcount++;
                if(errorcount > 10) {
                    printf("CHECK SMBUS ERROR\n");
                    break;
                }
            }
            status = inp(SMBus_Port);
        }
}

int SMBUS_Read_Byte(int offset,int DEVID)
{
        int RetVal=0;
        outportb(SMBus_Port,0x0fe);
        outportb(SMBus_Port+0x04,DEVID+1);
        outportb(SMBus_Port+0x03,offset+0);
        outportb(SMBus_Port+0x02,0x48);
        delay(200);
        if(WaitReady(SMBus_Port))
        {
            RetVal = inp(SMBus_Port+0x05);
        }
        return RetVal;
}

/* =============== This Routine is Write the Device Reg Value
=============== */
void   SMBUS_Write_Byte(int Dev_id,int Reg_index,int Value)
{
        outportb(SMBus_Port+0x04,Dev_id);
        delay(5);
        Chk_SMBUS_Ready();
        outportb(SMBus_Port+0x03,Reg_index);
        delay(5);
        outportb(SMBus_Port+0x05,(Value & 0xFF));
        delay(5);
        outportb(SMBus_Port+0x02,0x48);
        delay(25);
        Chk_SMBUS_Ready();
}
int reading(){
        int RetVal=0;
        RetVal=SMBUS_Read_Byte(0,0x30);
```

```
        RetVal=((RetVal&0x78)>>3);
        printf("The current reading of the input are(Pin 8,6,4,2): %x\n",RetVal);
        return RetVal;
}

void SetPin(int PinNum, int value)
{
        int RetVal;
        switch(PinNum)
        {
        case 0:
                RetVal=SMBUS_Read_Byte(0x09,0x30);
                if (value==0)
                        RetVal=RetVal&0xF7;
                else
                        RetVal=RetVal|0x08;
                SMBUS_Write_Byte(0x30,0x09,RetVal);
                break;
        case 1:
                RetVal=SMBUS_Read_Byte(0x01,0x30);
                if (value==0)
                        RetVal=RetVal&0xFE;
                else
                        RetVal=RetVal|0x01;
                SMBUS_Write_Byte(0x30,0x01,RetVal);
                break;
        case 2:
                RetVal=SMBUS_Read_Byte(0x01,0x30);
                if (value==0)
                        RetVal=RetVal&0xFD;
                else
                        RetVal=RetVal|0x02;
                SMBUS_Write_Byte(0x30,0x01,RetVal);
                break;
        case 3:
                RetVal=SMBUS_Read_Byte(0x01,0x30);
                if (value==0)
                        RetVal=RetVal&0xFB;
                else
                        RetVal=RetVal|0x04;
                SMBUS_Write_Byte(0x30,0x01,RetVal);
                break;
        default:
                break;
        }
}

int main()
{
        int i,RetVal;
```

```
        printf("init smbus");
        SMBUS_Write_Byte(0x30,0x01,0x07);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x02,0);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x03,0x78);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x04,0);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x09,0x08);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x0A,0);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x0B,0);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x0C,0);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x12,0xFF);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x13,0x3F);
        putchar('.');
        SMBUS_Write_Byte(0x30,0x14,0x80);
        putchar('.');

        for (i=0;i<=3;i++)
                SetPin(i,0);
        printf("Set Output to all 0 \n");
        system("pause");

        if(reading()!=0x00) {
                printf("TEST FAIL");
                return 1;
        }

        for (i=0;i<=3;i++)
                SetPin(i,1);
        printf("Set Output to all 1 \n");
        system("pause");

        if(reading()!=0x0f) {
                printf("TEST FAIL");
                return 1;
        }

        printf("TEST OKAY!!\n");
        return 0;

}
```

Appendix C

WatchDog Timer Sample Code

```
//===========================================
//KEEX-2030 DOS Watchdog sample program
//Please compile with Turbo C 3.0 to utilized the program
//===========================================
int main()
{
//Initialized the WDT program
  outp(0x2e,0x87);
  outp(0x2e,0x01);
  outp(0x2e,0x55);
  outp(0x2e,0x55);


//Setting Logical Device Number to 0x07
  outp(0x2e,0x07);
  outp(0x2f,0x07);

//Set Timer Value(0x73 is LSB while 0x74 is MSB)
  outp(0x2e,0x73);
  outp(0x2f,0x14);//set to 20 sec (0x14)

//Set Timer Unit to Second/Minute(Bit 7 equal to 1 is second/0 is minute)
//Enable WDT (Bit 6 equal to 1 is enable/0 is disable)
  outp(0x2e,0x72);
  outp(0x2f,0xC0);//The unit is set as second
  return 0;
}
```