ITX-a55E3

AMD Fusion G-T56N/G-T40N
Mini-ITX Industrial Motherboard

User's Manual

Version 1.1

2014.05

Revision History

Version	Date	Description
1.0	2013/05/17	initial release
1.1	2014/05/07	Revise P.21 LVDS1 Pin definition.

Table of Contents

Copyright Notice

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1)This device may not cause harmful interference, and

(2)This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to

which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Warning

Single Board Computers and their components contain very delicate Integrated Circuits (IC). To protect the Single Board Computer and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Single Board Computer from the power source when you want to work on the inside.

2. Hold the board by the edges and try not to touch the IC chips, leads or circuitry.

3. Use a grounded wrist strap when handling computer components.

4. Place components on a grounded antistatic pad or on the bag that comes with the Single Board Computer, whenever components are separated from the system.

Replacing the Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash-can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at: ftp://ftp.arbor.com.tw/pub/manual
Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

http://www.arbor.com.tw
E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

Chapter 1

Introduction

1.1 The Product

ITX-a55E3 is built on standard form factor to allow system upgrade without much of the concern on compatibility. The Industrial Motherboard coming with mounting holes and a piece of I/O bracket is designed to reduce cabling and total cost. For those who need industrial features such as longevity, reliability and manageability, ITX-a55E3 is ideal alternate for commercial off-the-shelf product. There are successful cases of implementing ITX-a55E3 for industrial automation, digital signage, medical computing, and so on because of these features:

- **Ultra Low Profile (16.8mm Height)**
- Dual Gigabit Ethernet Ports
- Soldered Onboard PenMount Touch Controller
- Support Dual Independent Dispalys
- Additional PCIe x1 Slot for PCI Expansion (need riser card)
- Integrate SIM Socket to Support Mobile Telecommunication
- Highly Integrated Communication Interfaces
- **Wide Range DC Power Input 9 ~36V**
- **Extended Operating Temp.: -20 ~ 70°C**
- **UPS Function Support**

1.2 About This Manual

This user's manual provides general information and installation instructions about the product. This User's Manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this booklet. please consult your vendor before further handling.

1.3 Specifications

System	
CPU	Soldered onboard AMD Fusion G-T56N 1.65GHz or G-T40N 1.0 GHz processor
Memory	Soldered onboard 2GB DDR3 SDRAM
Chipset	AMD FCH A55E
BIOS	AMI Flash BIOS
Watchdog Timer	1~255 levels reset
I/O	
I/O Chip	Fintek F81866D-I
Serial Port	4 x RS-232 port
	2 x RS-232/485 selectable ports w/ RS-485 auto-flow control
USB Port	8 x USB 2.0 ports
KB/MS	1 x 6-pin wafer connector for Keyboard and Mouse (PS/2 interface via Y-cable)
Digital I/O	8-bit programmable Digital Input/Output
Expansion Bus	1 x PCI slot
	1 x PCIe x1 slot (Non-standard offset, used with riser card)
	1 x Mini-card socket interconnected with SIM for WiFi or HSPA+ connectivity
	1 x SIM card socket
Storage	2 x Serial ATA ports with 600MB/s HDD transfer rate
	1 x mSATA socket (white Mini-card socket)
Ethernet Chipset	2 x Realtek RTL8111 PCIe Gigabit Ethernet controllers
Audio Interface	Realtek ALC662 HD Audio Codec, Mic-in/Line-in/ Line-out (Line-out w/ 1 x 3.5mm phone jack on rear I/O)
Display	
Graphics Chipset	Integrated AMD Radeon™ HD6320 w/ G-T56N or HD6250 w/ G-T40N

Graphics Interface	1 x DVI-I connector (default) or selectable Analog RGB, DVI-I connector supports either Analog RGB or DVI, resolution up to 2048 x 1536 for Analog RGB and 1920 x 1200 for TMDS
	support Dual Channels 24-bit LVDS, resolution up to 1920 x 1080
Touch Screen Interface	
Mode	PenMount C8051F321, supporting 5-wire Resistive Touch, USB interface
Mechanical & Environmental	
Power Requirement	Wide range DC power input 9~36V
Power Consumption	2.34A@+12V for G-T56N (Typical)
	1.43A@+12V for G-T40N (Typical)
Operating Temp.	-20~70°C (-4~ 158°F)
Operating Humidity	10 ~ 95% @ 70ºC (non-condensing)
Dimensions (L x W)	170 x 170 mm (6.7" x 6.7")

1.4 Inside the Package

Before you begin installing your Industrial motherboard, make sure the following materials have been shipped:

1 x ITX-a55E3 Mini-ITX industrial motherboard

1 x Driver CD
1 x Quick Installation Guide

1 x DVI cable (DVI-29M to DVI-29F+DB-15F)

If any of the above items is damaged or missing, contact your vendor immediately.

1.5 Ordering Information

ITX-a55E3-T56N	AMD G-T56N Embedded Mini-ITX motherboard
ITX-a55E3-T40N	AMD G-T40N Embedded Mini-ITX motherboard

1.5.1 Optional Accessories

SCDB-5190	PCIe x1 Riser Card
CBK-11-55E3-00	Cable kit • 2 x USB cables • 2 x Two ports COM cables • 2 x COM port RJ-45 cables • 1 x KB & MS cable • 1 x Audio cable • 1 x SATA Power cable • 2 x SATA cables

1.6 The Installation Paths of CD Driver

The industrial motherboard supports Windows XP and Windows 7. Find the necessary drivers on the CD that comes with your purchase. For different OS, the driver installation may vary slightly, but generally they are similar. **DO** follow the sequence **Net Framework 4.0→CHIPSET** to install the two drivers before the rest three to prevent errors. Find the drivers on CD by the following paths:

Windows 7

Driver	Path
CHIPSET	\ITX-a55E3\Win7\Chipset
LAN	\ITX-a55E3\Win7\Ethernet
AUDIO	\ITX-a55E3\Win7\Audio
Touch Panel	\ITX-a55E3\Win7\Touch Panel
Net Framework 4.0	\ITX-a55E3\Win7\Net framework 4.0

Windows XP

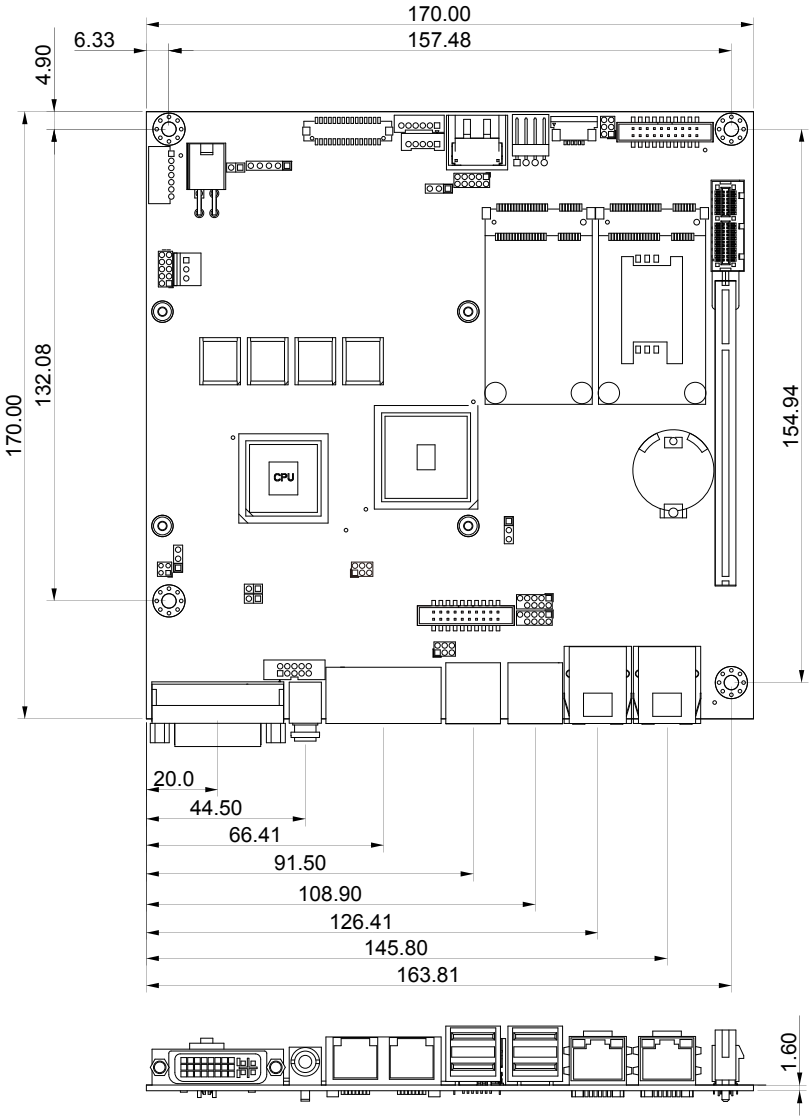
Driver	Path
CHIPSET	\ITX-a55E3\WinXP\Chipset
LAN	\ITX-a55E3\WinXP\Ethernet
AUDIO	\ITX-a55E3\WinXP\Audio
Touch Panel	\ITX-a55E3\WinXP\Touch Panel\WinXP
Net Framework 4.0	\ITX-a55E3\WinXP\Net framework 4.0

Chapter 2

Board Overview

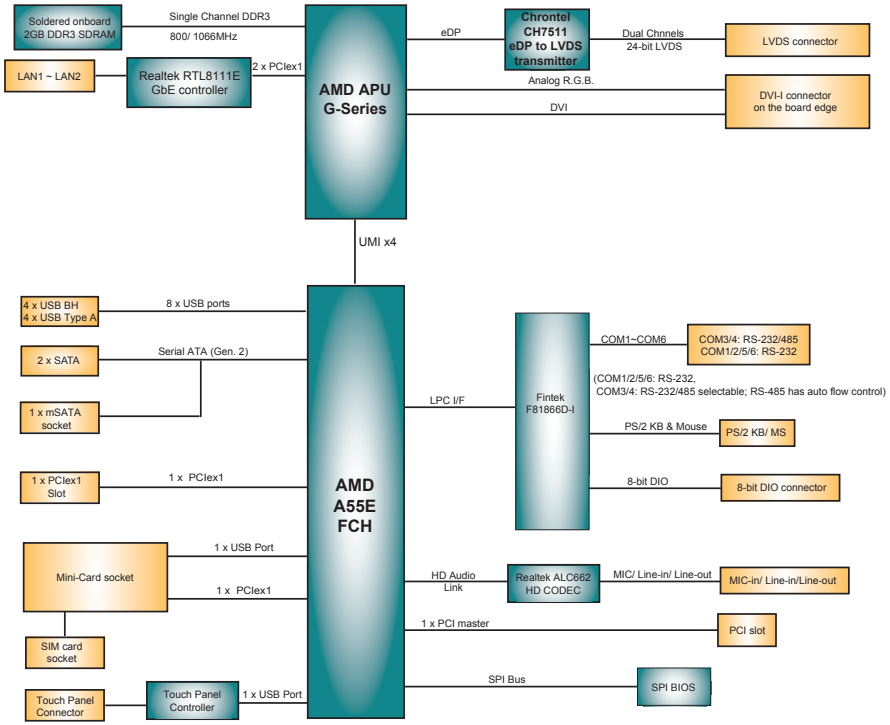
2.1 Board Dimensions

The following illustration shows the dimension of ITX-a55E3, with the measurements in width, depth, and height called out.



Unit: mm

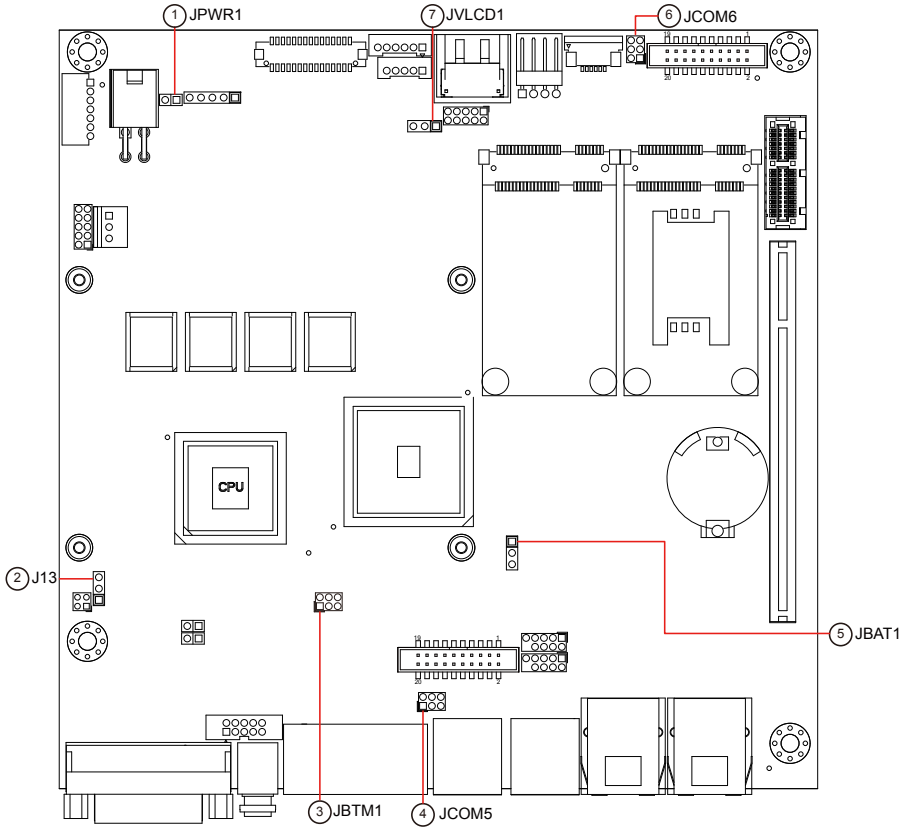
2.2 Block Diagram



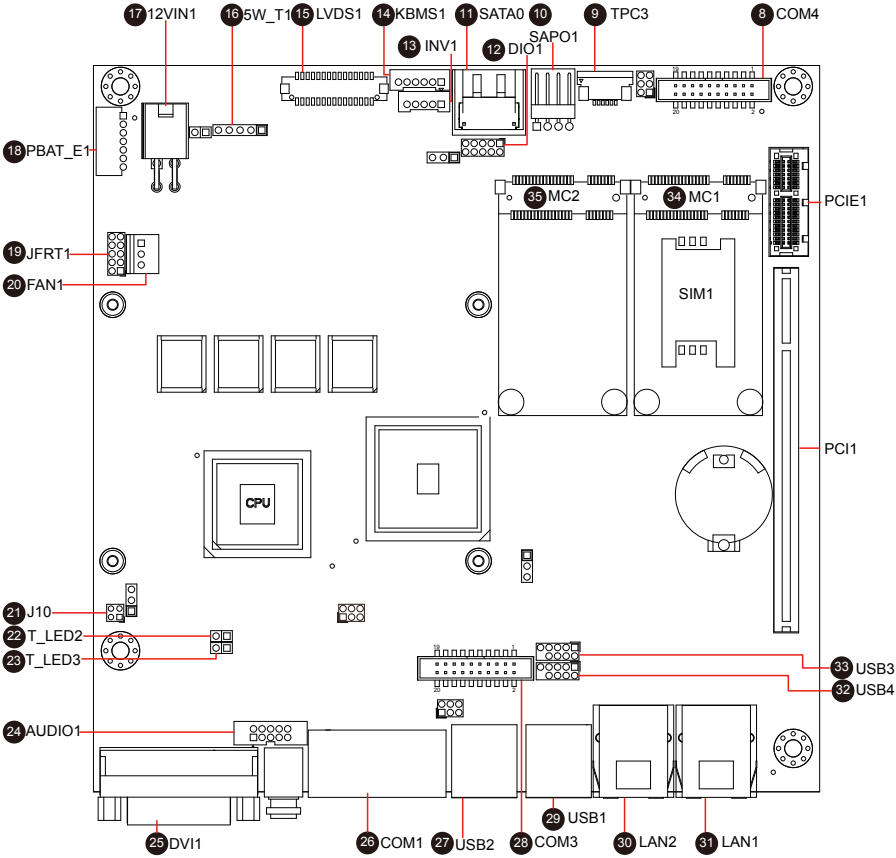
2.3 Jumpers and Connectors

2.3.1 Location

Jumpers Location



Connectors Location



2.3.2 Jumpers

The jumper is “short” (closed) when the jumper cap is placed on pins. If not, that means the jumper is “open.” The following in this section will explicate each of the components one-by-one.


Pin open


Pin short (closed)

Pin 2-3 short (closed)

Pin 1-2 short (closed)

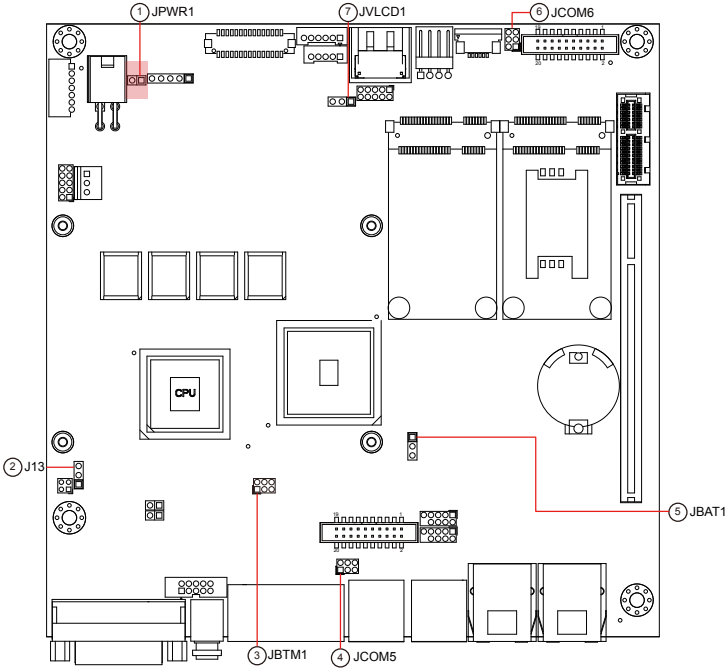
JPWR1 (1)

Function: AT/ATX Power Selection

Jumper type: 2.54mm pitch 1x3-pin header

Setting:

Pin	Mode	
Short	AT Mode (default)	1 2
Open	ATX Mode	1 2



J13 (2)

Function: Back Light Brightness Setting

Jumper type: 2.54mm pitch 1x3-pin header

Setting:

Pin	Mode	
1-2	For LED Panel (default)	
2-3	For CCFL Panel	

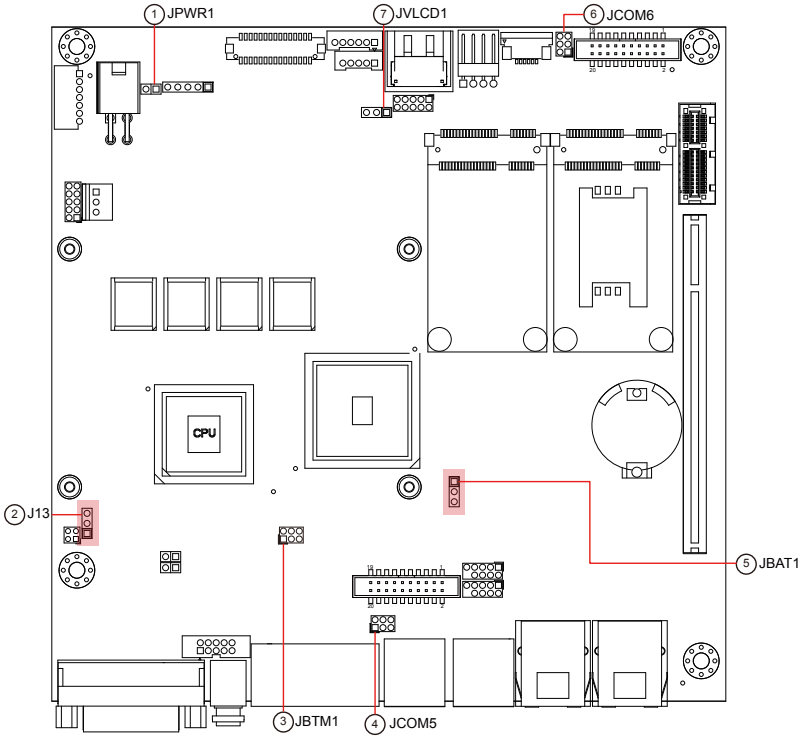
JBAT1 (5)

Function: Clear CMOS Select Jumper

Jumper type: 2.54mm pitch 1x3-pin header

Setting:

Pin	Mode	
1-2	Keep CMOS data (default)	
2-3	Clear CMOS data	



JBTM1 (3)

Function: AC Down Mode Selection

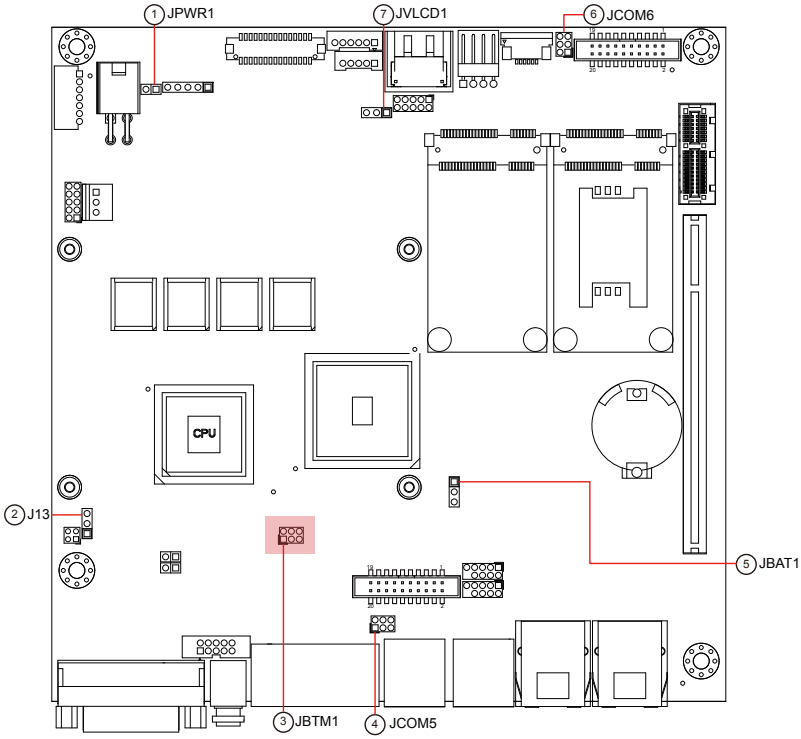
Jumper type: 2.00mm pitch 2x3-pin header

Setting:

Pin	Mode	
1-3	Shut down as external AC is off and battery power remains less than 20% (default).	
3-5	Instantly shut down after external AC is off for 10 seconds.	

Pin 2/4/6 are used only for updating firmware. General user doesn't need to set them.

Long-press power button to force entering shutdown when external ACC is off but battery still supplies power.



JVLCD1 (7)

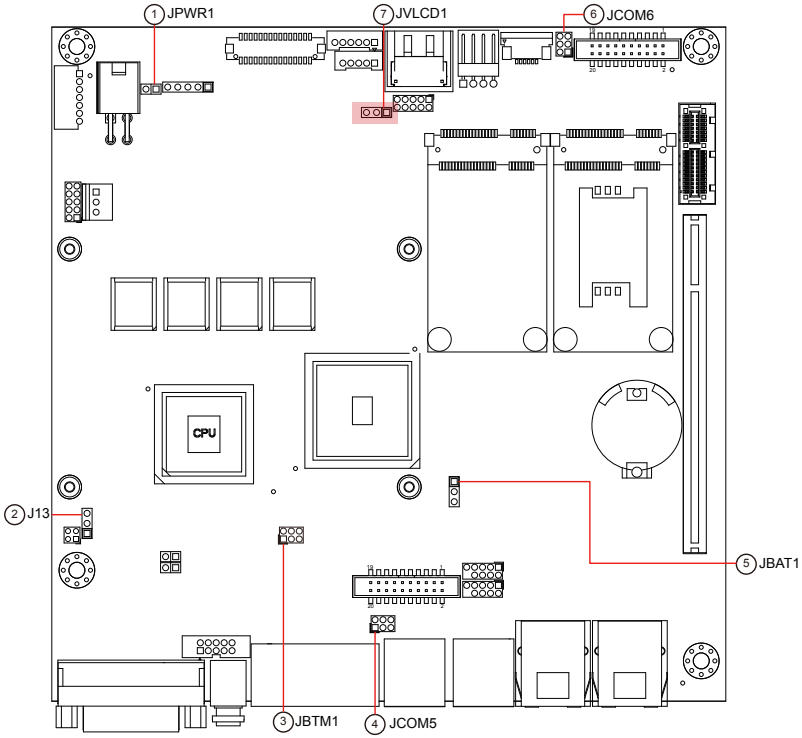
Function: LCD Panel Voltage Selection

The voltage of LCD panel is selected by JVLCD.

Jumper type: 2.54mm pitch 1x3-pin header

Setting:

Pin	Mode	
1-2	VCC_LCD=5V	
2-3	VCC_LCD=3.3V (default)	



JCOM5 (4) & JCOM6 (6)

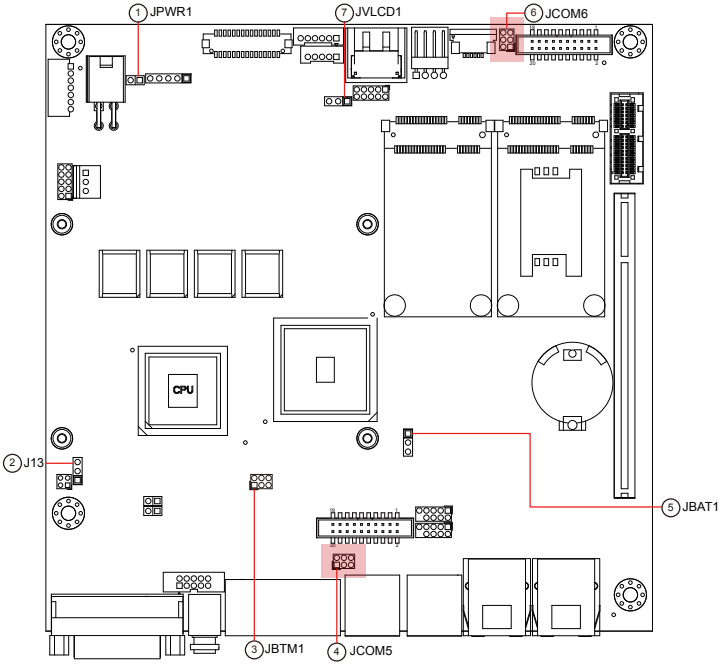
Function: 5V/12V (Pin 10) Selection for COM Port 1/2/5/6

JCOM5 controls COM Port 1/2; JCOM6 controls COM Port 5/6.

Jumper type: 2.00mm pitch 2x3-pin header

Setting:

Pin	Mode	
1-3	COM Port 1 or 5 supports outputting 5V power (default)	
3-5	COM Port 1 or 5 supports outputting 12V power	
2-4	COM Port 2 or 6 supports outputting 5V power (default)	
4-6	COM Port 2 or 6 supports outputting 12V power	



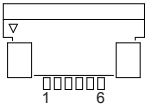
2.3.3 Connectors

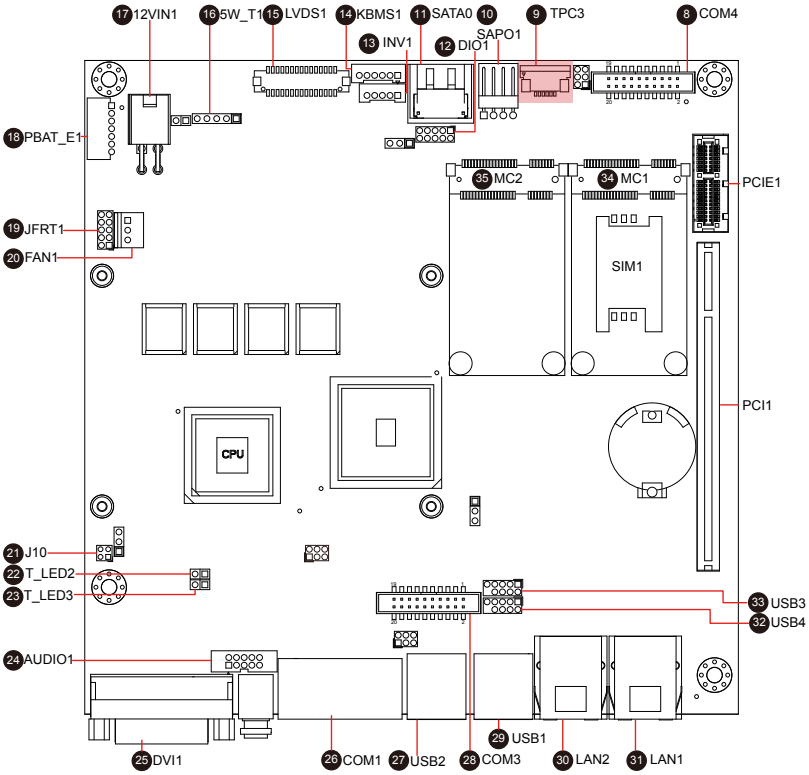
TPC3 (9)

Function: Touch Panel Membrane Connector

Connector type: 2.54mm pitch 1x6-pin header

Pin	Description
1	Backlight Decrement
2	Backlight Increment
3	Power Button
4	Green Battery Charging
5	Red Battery Low
6	GND



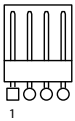


SAPO1 (10)

Function: Serial ATA Power Connector

Connector type: 2.54mm pitch 1x4-pin wafer one wall 90D connector

Pin	Description
1	+5V
2	GND
3	GND
4	+12V

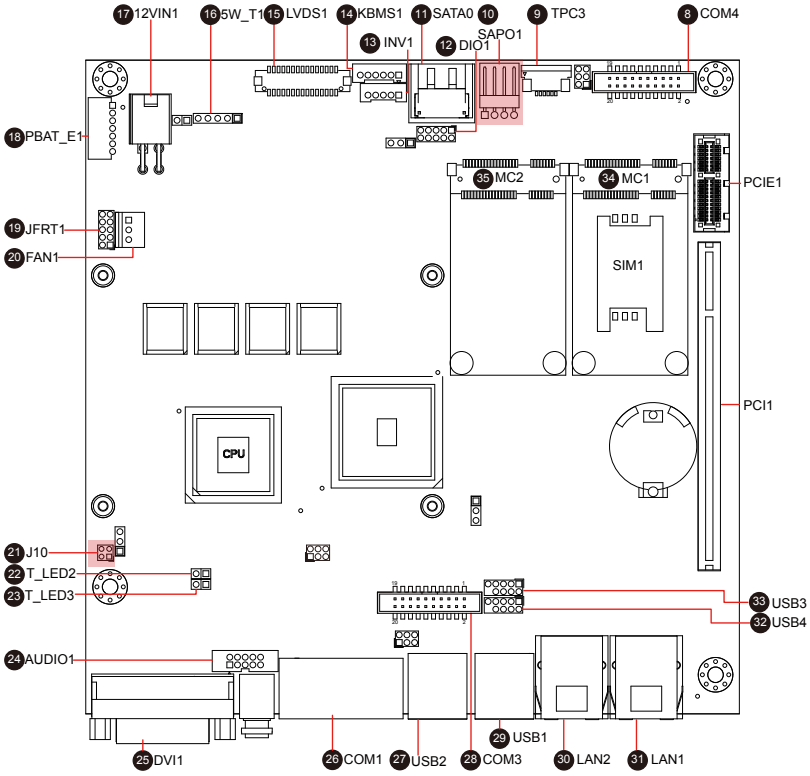


J10 (21)

Function: Power Button & Reset Button

Connector type: 2.00mm pitch 2x2-pin header

Pin	Description
1	Reset Button
2	
3	Power Button
4	



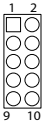
DIO11 (12)

Function: DIO Connector

DIO1 is a 8-bit DIO connector w/ on-board 10-pin headers connector, supports programmable Input and Output.

Connector type: 2.00 mm pitch 2x5-pin headers

Pin	Desc.	Pin	Desc.
1	DIO0	2	DIO1
3	DIO2	4	DIO3
5	DIO4	6	DIO5
7	DIO6	8	DIO7
9	+5V	10	GND

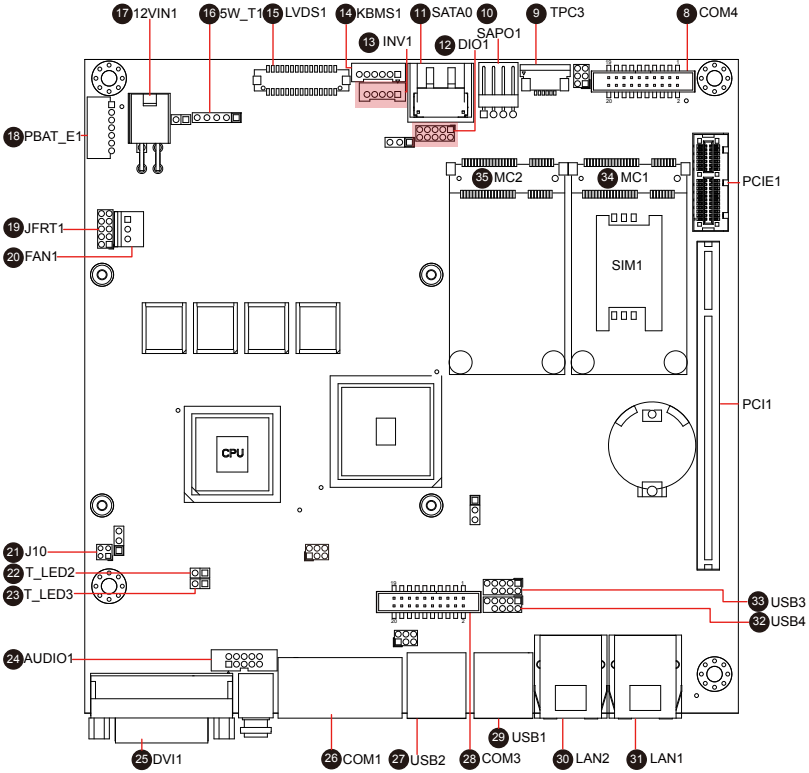


INV1 (13)

Function: LVDS Invertor Connector

Connector type: 2.00mm pitch 1x5 box wafer connector

Pin	Description
1	+12V
2	GND
3	Backlight on/off
4	Brightness control
5	GND



KBMS1 (14)

Function: PS/2 Keyboard and Mouse

Connector type: 2.0mm pitch 1x6-pin box wafer connector

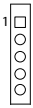
Pin	Description
1	KB_DATA
2	GND
3	MS_DATA
4	KB_CLK
5	PS2_VCC
6	MS_CLK

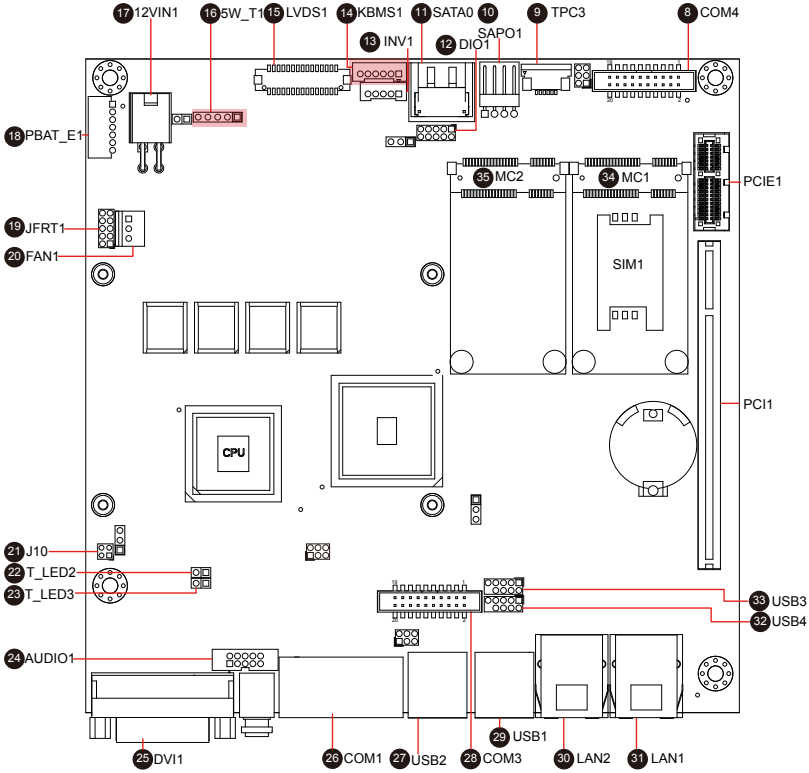
5W_T1 (16)

Function: 5 Wire Touch Panel Connector

Connector type: 2.54mm pitch 1x5-pin header

Pin	Description
1	UL
2	UR
3	PROBE
4	LR
5	LL



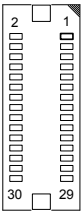


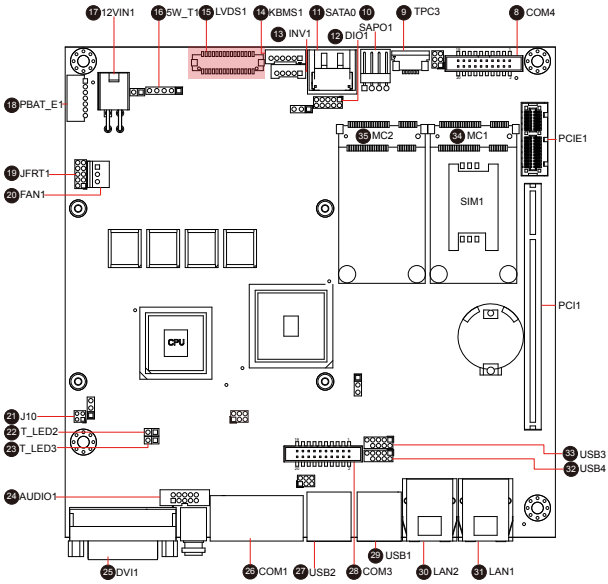
LVDS1 (15)

Function: LVDS Connector

Connector type: DF-13-30DP-1.25V connector

Pin	Desc.	Pin	Desc.
2	VDD	1	VDD
4	TX2CLK+	3	TX1CLK+
6	TX2CLK-	5	TX1CLK-
8	GND	7	GND
10	TX2D0+	9	TX1D0+
12	TX2D0-	11	TX1D0-
14	GND	13	GND
16	TX2D1+	15	TX1D1+
18	TX2D1-	17	TX1D1-
20	GND	19	GND
22	TX2D2+	21	TX1D2+
24	TX2D2-	23	TX1D2-
26	GND	25	GND
28	TX2D3+	27	TX1D3+
30	TX2D3-	29	TX1D3-





12VIN1 (17)

Function: 9~36V Power Input 12INV1 supplies the CPU operation ATX +9~36V (Vcore).

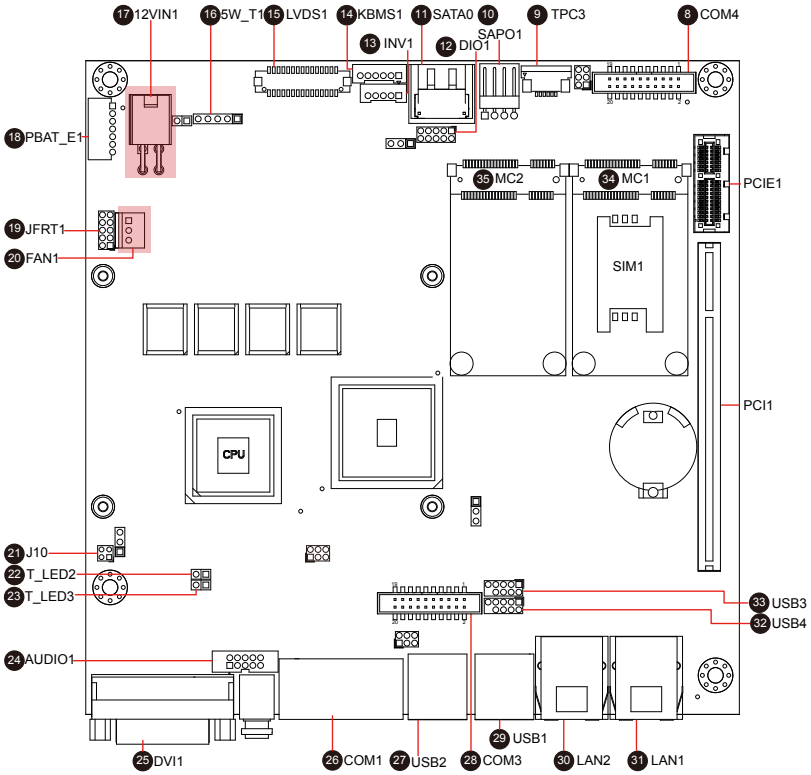
Pin	Desc.	Pin	Desc.
2	GND	1	GND
4	9~36V Power Input	3	9~36V Power Input

FAN1 (20)

Function: CPU Fan Connector

Connector type: 2.54mm pitch 1x3 box wafer connector

Pin	Description
1	GND
2	+12V
3	SPEED

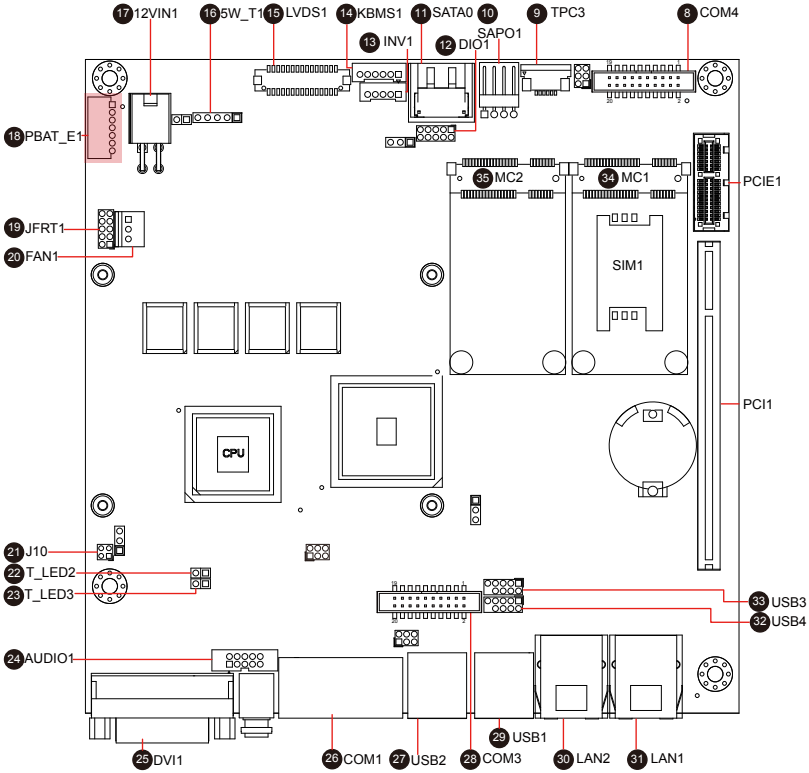


PBAT_E1 (18)

Function: Battery Connector

Connector type: 2.0mm pitch 1x7-pin box wafer connector

Pin	Description
1	GND
2	GND
3	Battery Temperature Detect
4	SMBus_DATA
5	SMBus_Clock
6	Battery Power
7	Battery Power



T_LED2 (22)

Function: Green Charging LED Connector

Connector type: 2.54mm pitch 1x2-pin header

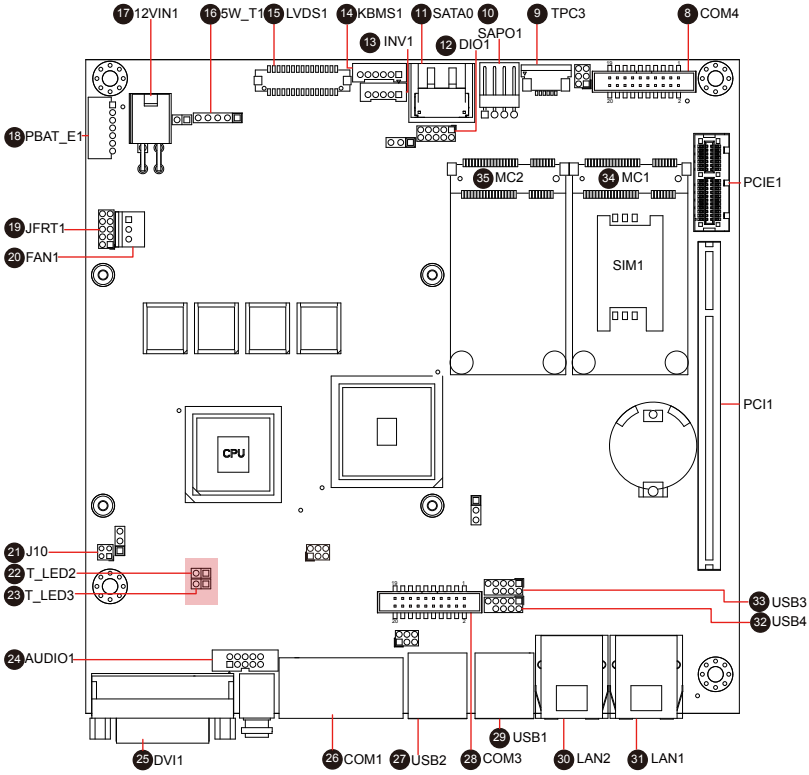
Pin	Desc.	Pin	Desc.
2	Charging LED -	1	Charging LED +

T_LED3 (23)

Function: Red Battery Failure LED Connector

Connector type: 2.54mm pitch 1x2-pin header

Pin	Desc.	Pin	Desc.
2	Battery Failure LED -	1	Battery Failure LED +

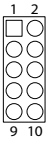


JFRT1 (19)

Function: Front Panel Connector

Connector type: 2.00mm pitch 2x5-pin header

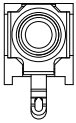
Pin	Desc.	Pin	Desc.
1	RESET+	2	RESET-
3	POWER LED+	4	POWER LED-
5	HDD LED+	6	HDD LED-
7	Speak+	8	Speak-
9	PS_ON#	10	GND



AUDIO1 (24)

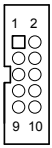
Function: Audio output

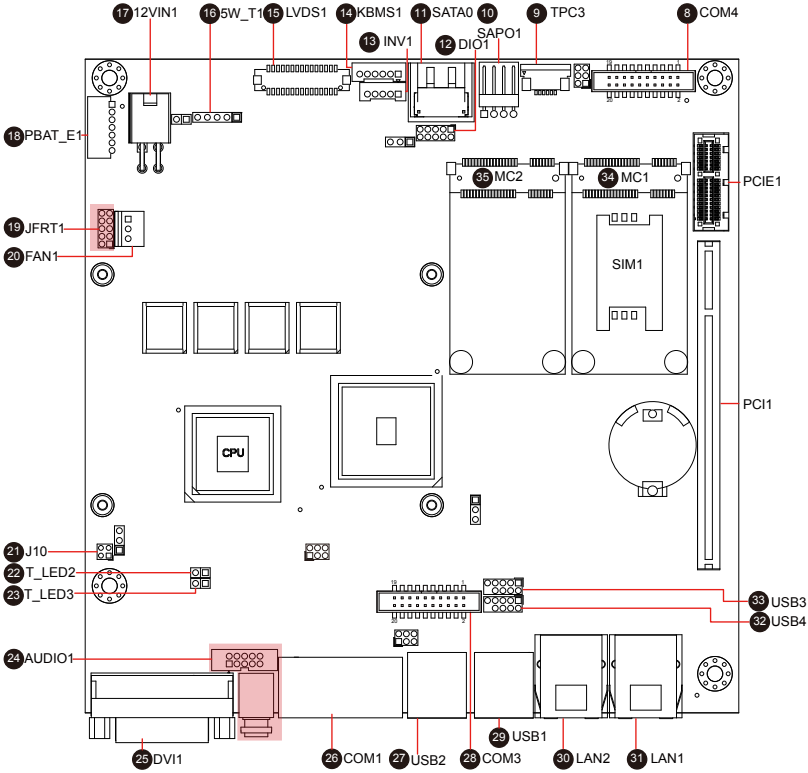
External connector: Black 3.5mmφ 3-pin line-out jack



Connector type: 2.00mm pitch 2x5-pin box header

Pin	Desc.	Pin	Desc.
1	Line_In_Left	2	Line_In_Right
3	GND	4	GND
5	MIC L	6	MIC R
7	GND	8	GND
9	Line-out 2 L	10	Line-out 2 R



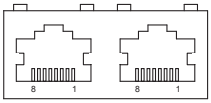


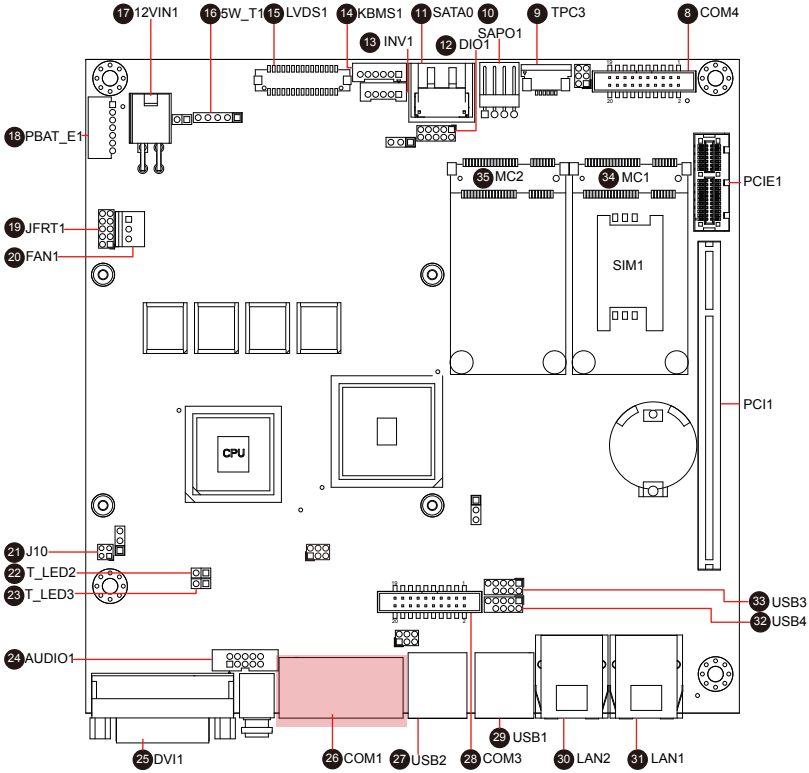
COM1 (26)

Function: RS-232/RS-485 (COM Port 3/4)

Connector type: RJ-45 jack

Pin	COM Port 3	COM Port 4
1	DSR3 / D3-	DSR4 / D4-
2	DCD3 / D3+	DCD4 / D4+
3	DTR#3	DTR#4
4	GND	GND
5	RXD3	RXD4
6	TXD3	TXD4
7	CTS3	CTS4
8	RTS3	RTS4



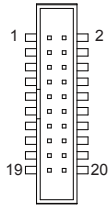


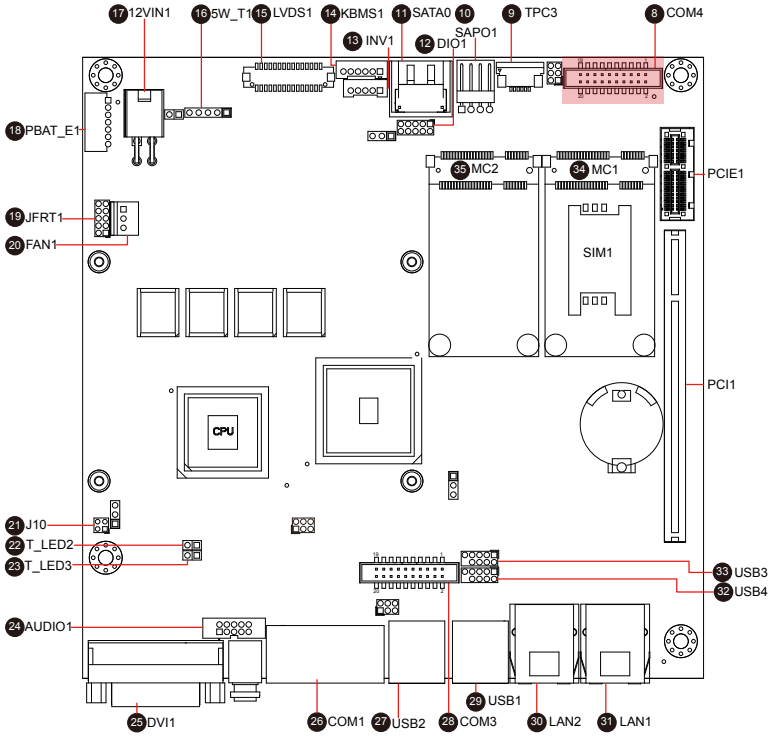
COM4 (8)

Function: RS-232 (COM Port 5/6)

Connector type: 2.00mm pitch 2x10-pin header

Pin	Description	Pin	Description
1	DCD#5	2	RXD5
3	TXD5	4	DTR#5
5	GND	6	DSR#5
7	RTS#5	8	CTS#5
9	RI#5	10	+5V/ +12V
11	DCD#6	12	RXD6
13	TXD6	14	DTR#6
15	GND	16	DSR#6
17	RTS#6	18	CTS#6
19	RI#6	20	+5V/ +12V



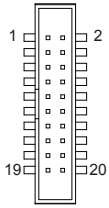


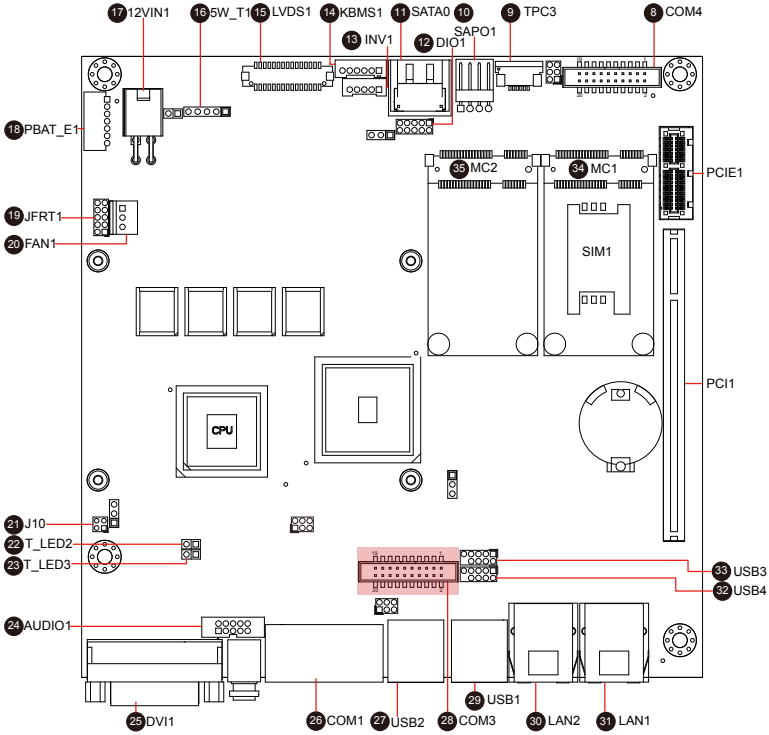
COM3 (28)

Function: RS-232 (COM Port 1/2)

Connector type: 2.00mm pitch 2x10-pin header

Pin	Description	Pin	Description
1	DCD#1	2	RXD1
3	TXD1	4	DTR#1
5	GND	6	DSR#1
7	RTS#1	8	CTS#1
9	RI#1	10	+5V/ +12V
11	DCD#2	12	RXD2
13	TXD2	14	DTR#2
15	GND	16	DSR#2
17	RTS#2	18	CTS#2
19	RI#2	20	+5V/ +12V



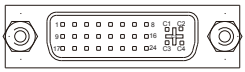


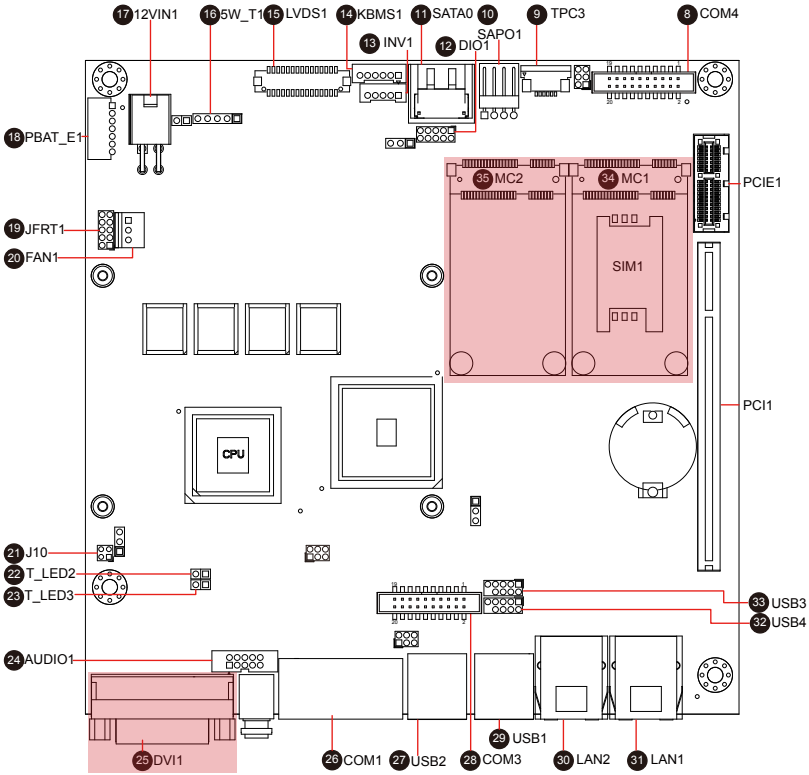
MC1~2 (34~35)

Function: Mini-Card Socket

DVI1 (25)

Function: DVI-I Connector



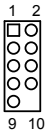


USB3 (33)

Function: USB Port 5/6

Connector type: 2.00mm pitch 2x5-pin headers

Pin	Desc.	Pin	Desc.
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	GND	10	N/C (Key)

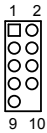


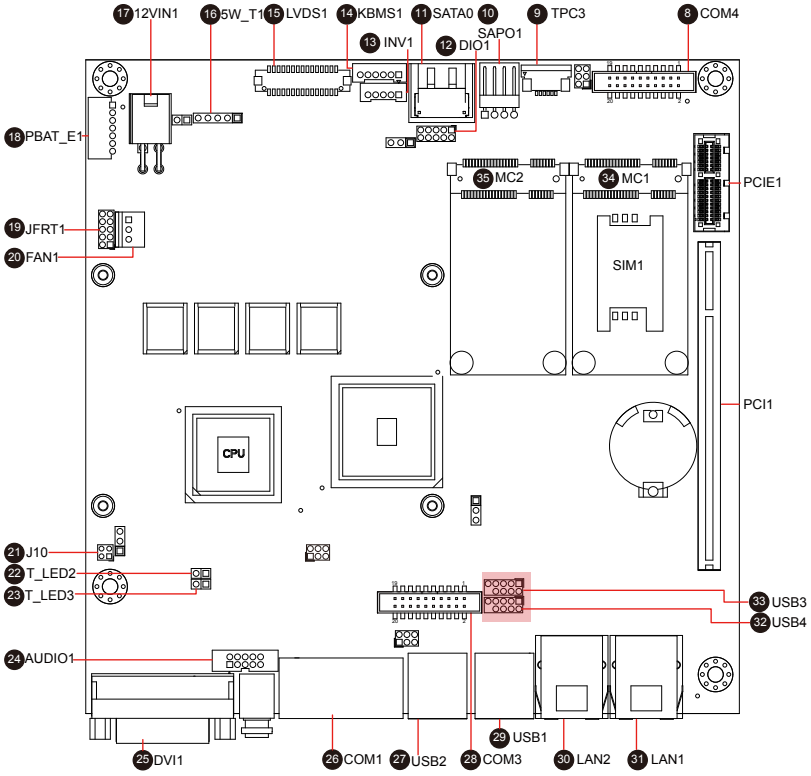
USB4 (32)

Function: USB Port 10/11

Connector type: 2.00mm pitch 2x5-pin headers

Pin	Desc.	Pin	Desc.
1	+5V	2	+5V
3	USBD-	4	USBD-
5	USBD+	6	USBD+
7	GND	8	GND
9	GND	10	N/C (Key)

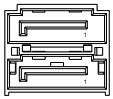




SATA0 (11)

Function: Double Stacked Serial ATA Connector

High speed transfer rates (300MB/s)

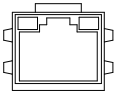


LAN1~2 (31, 30)

Function: Ethernet Connectors

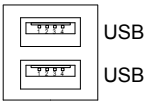
Support 10/100/1000 Mbps fast Ethernet.

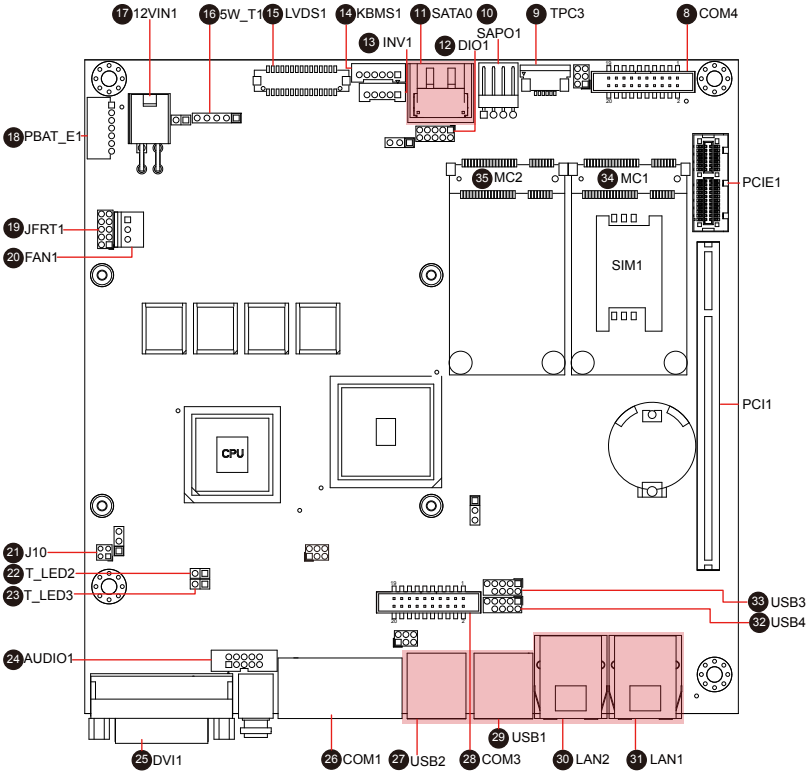
Connector type: RJ-45



USB1~2 (29, 27)

Function: Double Stacked USB type A Connectors





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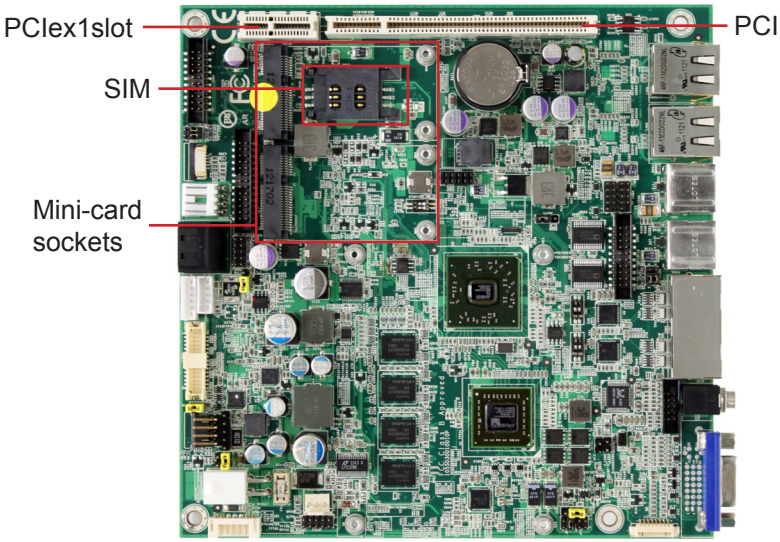
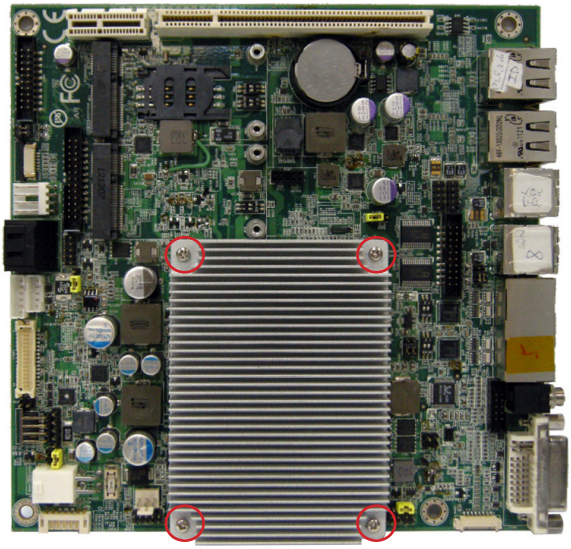
Chapter 3

Hardware Installation

3.1 Installing the Heatsink

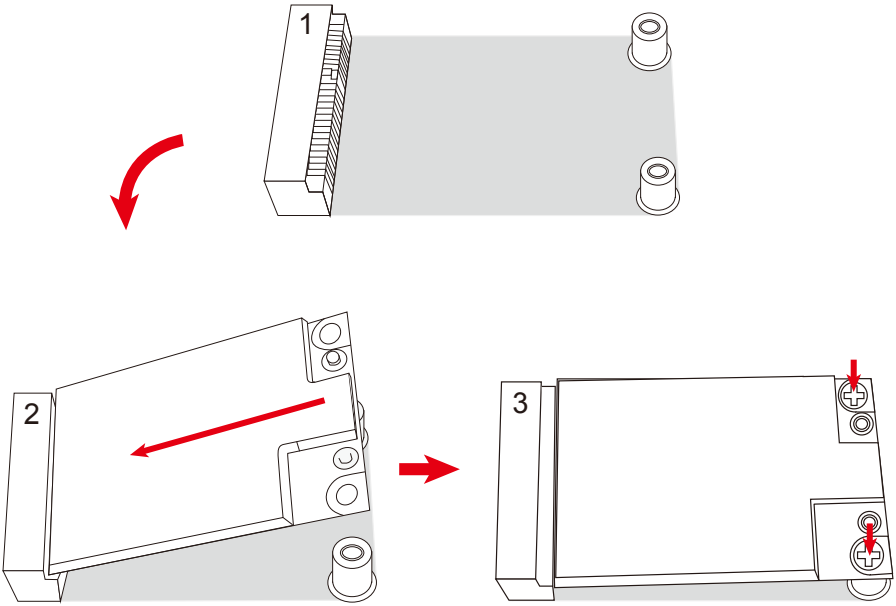
1. Find the heatsink accomanied with the board.
2. Screw the heatsink to ITX-a55E3 as shown at red circles.





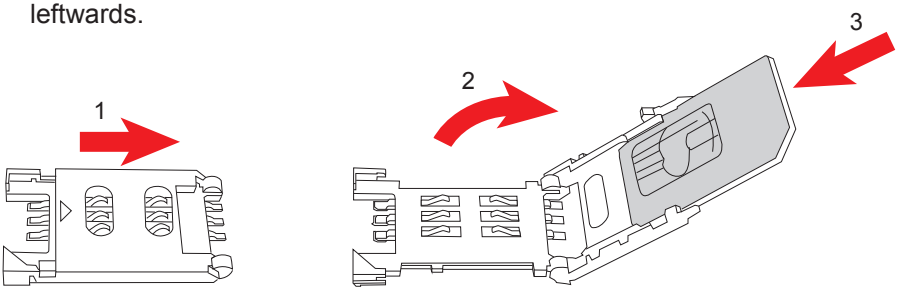
3.2 Installing Mini-card

1. Locate Mini-card socket.
2. Insert Mini-card into its slot at an angle. Remember to align the notch with the break on slot.
3. Press down the Mini-card and fix it in place using two screws.



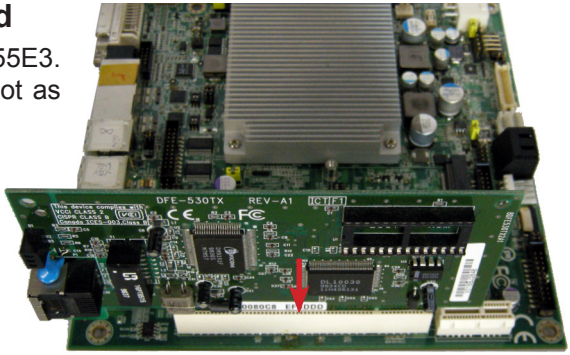
3.3 Installing SIM Card

1. Position SIM card socket on ITX-a55E3.
2. Slightly press SIM socket lid and move it rightards. Lift socket lid.
3. Slip SIM card along grooves on lid's inside as below, close it and move leftwards.



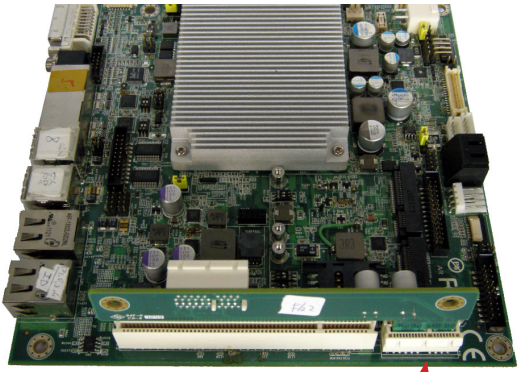
3.4 Installing PCI Card

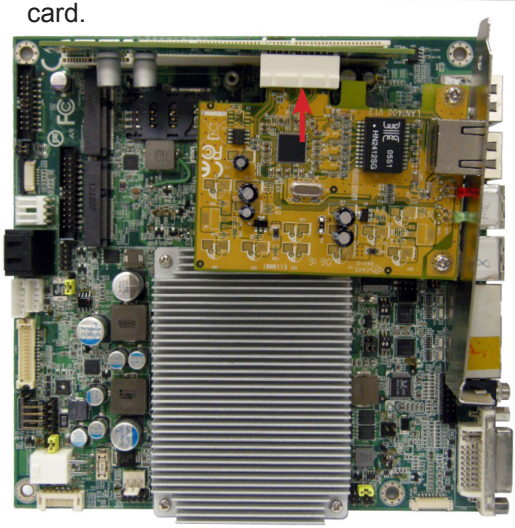
1. Position PCI slot on ITX-a55E3.
2. Insert PCI card into its slot as illustration.

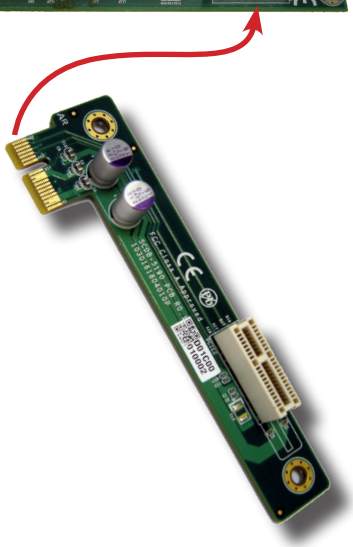


3.5 Installing PCIe Card

1. To Install PCIex1 card, you need to purchase another riser card included in optional items. (1.5.1 Optional Accessories on page 5) Position PCIe slot on ITX-a55E3.
2. Insert riser card into its slot as below, and then plug PCIex1 card into the riser card.







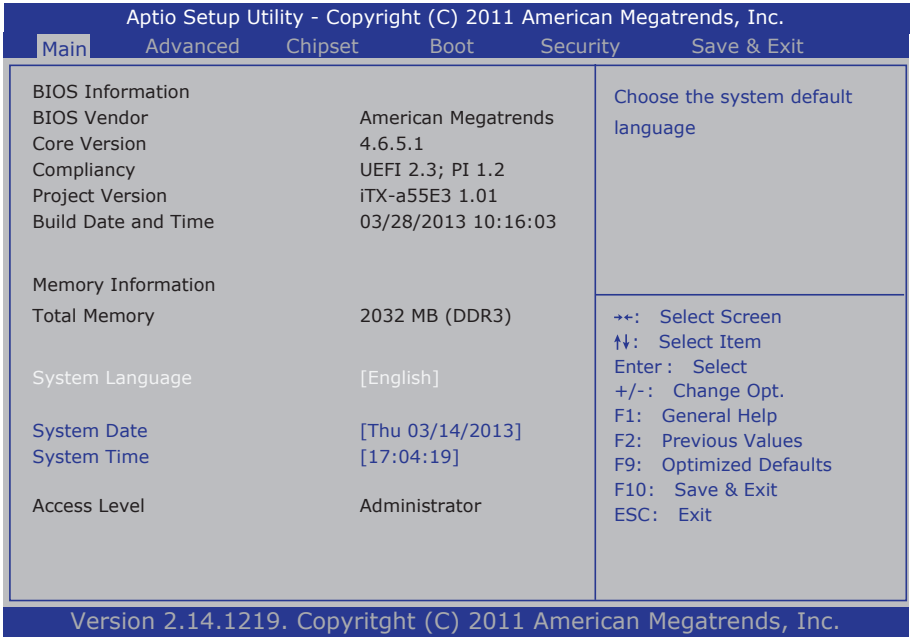
Chapter 4

BIOS

4.1 Main

The AMI BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS RAM of the system stores the Setup utility and configurations. When you turn on the computer, the AMI BIOS is immediately activated. To enter the BIOS SETUP UTILITY, press **"Delete"** once the power is turned on. When the computer is shut down, the battery on the motherboard supplies the power for BIOS RAM.

The **Main Setup** screen lists the following information:



Item	Description
System Language	Choose the system default language
System Date	Set the system date. Use Tab to switch between Data elements. Note that the 'Day' automatically changes when you set the date. ► The date format is: **Day:** Sun to Sat **Month:** 1 to 12 **Date:** 1 to 31 **Year:** 1998 to 2099

System Time	Set the system time. Use Tab to switch between Time elements. ► The time format is: **Hour:** 00 to 23 **Minute:** 00 to 59 **Second:** 00 to 59

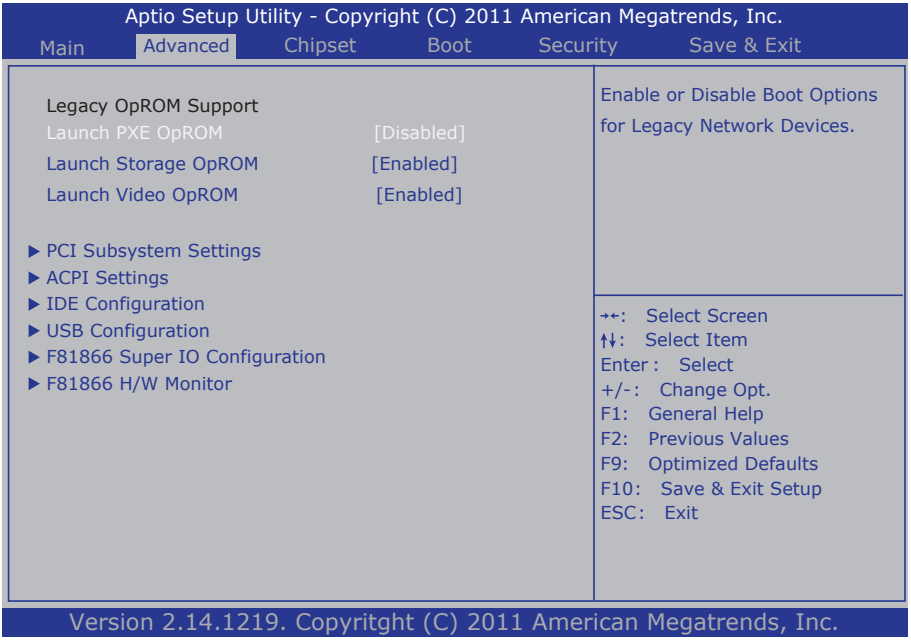
Key Commands

BIOS Setup Utility is mainly a key-based navigation interface. Please refer to the following key command instructions for navigation process.

Keystroke	Function
◄ ►	Move to highlight a particular configuration screen from the top menu bar / Move to highlight items on the screen
▼ ▲	Move to highlight previous/next item
Enter	Select and access a setup item/field
Esc	On the Main Menu – Quit the setup and not save changes into CMOS (a message screen will display and ask you to select “OK” or “Cancel” for exiting and discarding changes. Use “←” and “→” to select and press “Enter” to confirm) On the Sub Menu – Exit current page and return to main menu
Page Up / +	Increase the numeric value on a selected setup item / make change
Page Down -	Decrease the numeric value on a selected setup item / make change
F1	Activate “General Help” screen
F10	Save the changes that have been made in the setup and exit. (a message screen will display and ask you to select “OK” or “Cancel” for exiting and saving changes. Use “←” and “→” to select and press “Enter” to confirm)

4.2 Advanced

The “Advanced” setting page provides you the options to configure the details of your hardware, such as PCI, ACPI, IDE, USB and Super IO.



Item	Description
PCI Settings	4.2.1 PCI Subsystem Settings on page 41
ACPI Configuration	4.2.2 ACPI Settings on page 43
IDE Configuration	4.2.3 IDE Configuration on page 44
USB Configuration	4.2.4 USB Configuration on page 45
F81866 Super IO Configuration	4.2.5 F81866 Super IO Configuration on page 46
F81866 H/M Monitor	4.2.6 F81866 H/W Monitor on page 48

4.2.1 PCI Subsystem Settings

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Advanced

PCI Bus Driver Version	V 2.05.01	In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.
PCI Option ROM Handling		
PCI ROM Priority	[Legacy ROM]	
▶ PCI Express Settings		

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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Item	Description
PCI ROM Priority	In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch. ► Options: **Legacy ROM** (default), **EFI Compatible ROM**
PCI Express Settings	See next page.

PCI Express Settings

```
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Advanced

PCI Express Device Register Settings                Set the ASPM Level: Force L0s -
                                                    Force all links to L0s State: AUTO
PCI Express Link Register Settings                  - BIOS auto configure: DISABLE
ASPM Support                    [Disabled]          - Disables ASPM
WARNING: Enabling ASPM may cause some
         PCI-E devices to fail

                                                    →←:   Select Screen
                                                    ↑↓:   Select Item
                                                    Enter :   Select
                                                    +/-:   Change Opt.
                                                    F1:   General Help
                                                    F2:   Previous Values
                                                    F9:   Optimized Defaults
                                                    F10:   Save & Exit Setup
                                                    ESC:   Exit

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```

Item	Description
ASPM Support	Set the ASPM Level: Force L0s - Force all links to L0s State: AUTO - BIOS auto configure: DISABLE - Disables ASPM ► Options: **Disabled** (default), **Auto**, **Force L0s**

4.2.2 ACPI Settings

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Advanced

ACPI Settings		Enables or Disables BIOS ACPI Auto Configuration.
Enable ACPI Auto Configuration	[Disabled]	
Enable Hibernation	[Enabled]	
ACPI Sleep State	[S3 (Suspend to RAM)]	

→←: Select Screen
↑↓: Select Item
Enter : Select
+/- : Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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Item	Description
Enable ACPI Auto Configuration	**Enables** or **Disables** (default) BIOS ACPI Auto Configuration.
Enable Hibernation	**Enable** (default) or **Disable** system ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: **Suspend Disabled**, **S3 (Suspend to RAM)** (default).

4.2.3 IDE Configuration

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Advanced

IDE Configuration

SATA Port0	Not Present
SATA Port1	Not Present
SATA Port2	Not Present

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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4.2.4 USB Configuration

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Advanced

USB Configuration

USB Devices:
1 Keyboard, 1 Mouse, 1 Point

Legacy USB Support [Enabled]
EHCI Hand-off [Disabled]

Enable Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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Item	Description
Legacy USB Support	**Enables** (default) Legacy USB support. **AUTO** option disables legacy support if no USB devices are connected. **DISABLE** option will keep USB devices available only for EFI applications.
EHCI Hand-off	This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver. ► Options: **Disabled** (default) and **Enabled**

4.2.5 F81866 Super IO Configuration

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Advanced

F81866 Super IO Configuration

F81866 Super IO Chip F81866
▶ Serial Port 0 Configuration
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration
▶ Serial Port 4 Configuration
▶ Serial Port 5 Configuration

Set Parameters of Serial Port 0 (COMA)

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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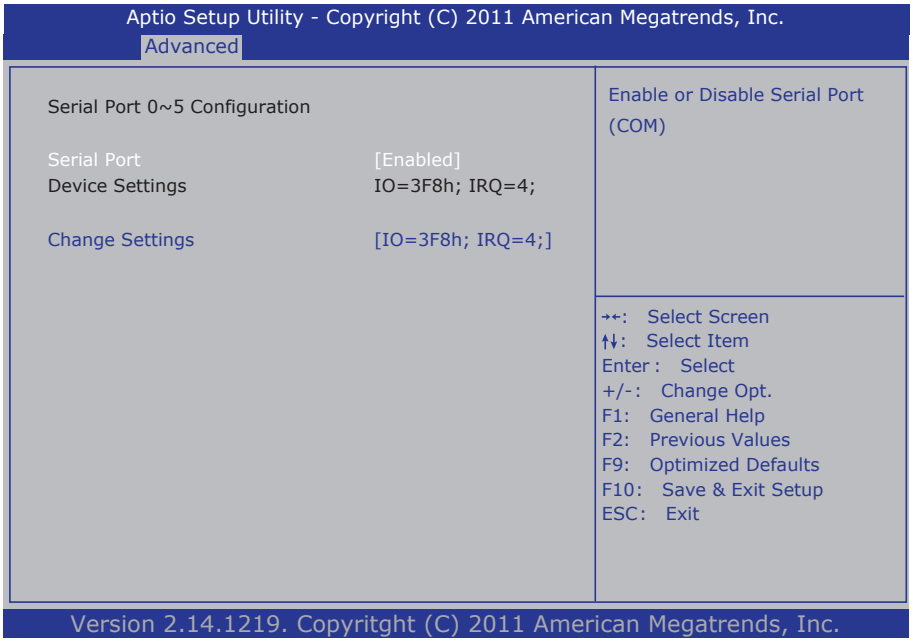
Item	Description
Serial Port 0~5 Configuration	See next page.

Serial Port 0~5 Configuration



Item	Description
Serial Port	**Enable** (default) or **Disable** Serial Port (COM).
Change Settings	Select an optimal setting for Super IO device. ► Options: **IO=3F8h; IRQ=4**,/ **IO=3F8h; IRQ=3,4,5,6,7,10,11,12/** **IO=2F8h; IRQ=3,4,5,6,7,10,11,12/** **IO=3E8h; IRQ=3,4,5,6,7,10,11,12/** **IO=2E8h; IRQ=3,4,5,6,7,10,11,12/** **IO=220h; IRQ=3,4,5,6,7,10,11,12/** **IO=228h; IRQ=3,4,5,6,7,10,11,12/**

4.2.6 F81866 H/W Monitor

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Advanced

Pc Health Status

CPU temperature	: +39°C
System temperature	: +33°C
Fan1 Speed	: 6493 RPM
VCORE	: +1.344 V
5VALW	: +5.087 V
5V	: +5.129 V
12V	: +11.968 V

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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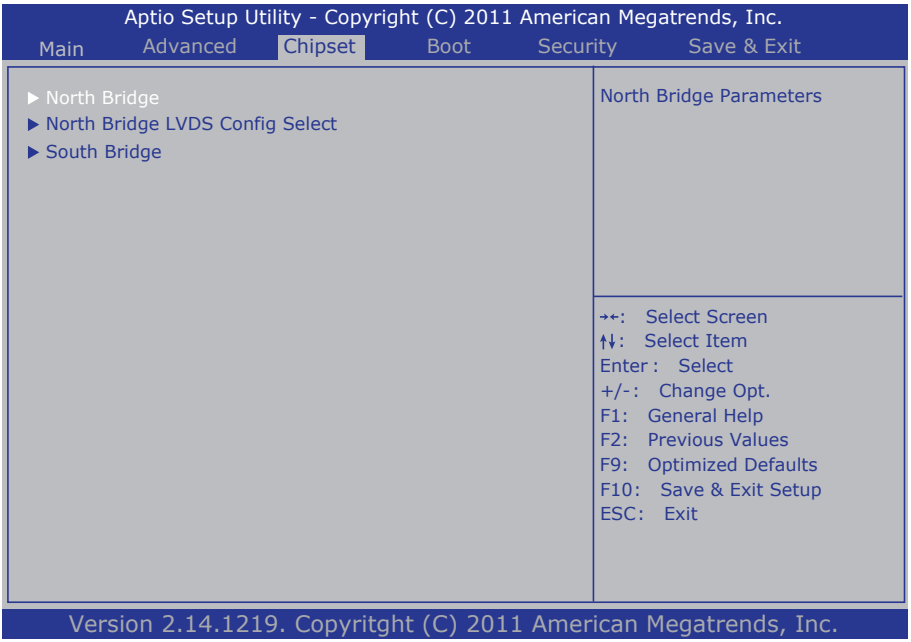
4.3 Chipset



Item	Description
North Bridge	4.3.1 North Bridge on page 50
North Bridge LVDS Config Select	4.3.2 North Bridge LVDS Config Select on page 51
South Bridge	4.3.3 South Bridge on page 52

4.3.1 North Bridge

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Chipset

North Bridge Configuration

Primary Video Device [IGD Video]

Memory Information
Memory Clock: 533 MHz
Total Memory: 2032 MB (DDR3)

Select Primary Video Device that BIOS will use for output.

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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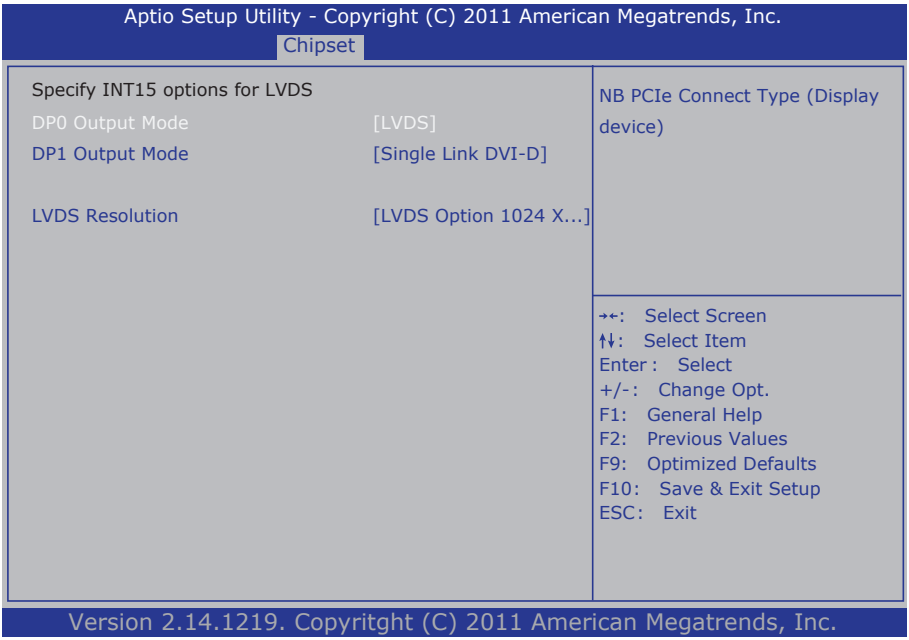
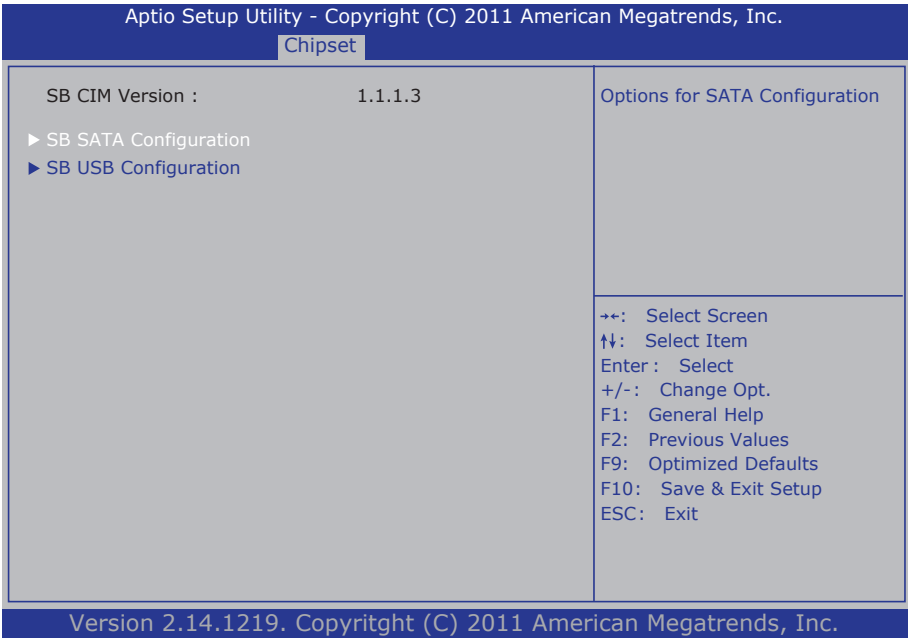
Item	Description
Primary Video Device	Select Primary Video Device that BIOS will use for output. ► Options: **IGD Video** (default), **NB PCIe slot Video** ,and **SB PCIe slot Video**

4.3.2 North Bridge LVDS Config Select



Item	Description
DP0 Output Mode	NB PCIe Connect Type (Display device) ► Options: **LVDS** (default) and **Disabled**
DP1 Output Mode	NB PCIe Connect Type (Display device) ► Options: **Single Link DVI-D** (default) and **Disabled**
LVDS Resolution	LVDS Resolution ► Options: **LVDS Option 800 X 600 18Bit Single** (default); **LVDS Option 1024 X 768 24Bit Single**; **LVDS Option 1024 X 1024 24Bit Dual**; **LVDS Option 1920 X 1080 24Bit Dual**

4.3.3 South Bridge



Item	Description
SB SATA Configuration	See SB SATA Configuration on page 53
SB USB Configuration	See SB USB Configuration on page 54

SB SATA Configuration

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Chipset

OnChip SATA Channel	[Enabled]	Enable or Disable Serial ATA
OnChip SATA Type	[Legacy IDE]	
SATA IDE Combined Mode	[Enabled]	
Combined Mode Option	[SATA as primary]	

→←: Select Screen
↑↓: Select Item
Enter : Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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Item	Description
OnChip SATA Channel	**Enable** (default) or **Disable** Serial ATA.
OnChip SATA Type	Native IDE /n RAID /n AHCI /n AHCI /n Legacy IDE /n IDE->AHCI /n HyperFlash ► Options: **RAID**, **AHCI**, and **Legacy IDE** (default)
SATA IDE Combined Mode	**Enable** (default) or **Disable** SATA IDE Combined Mode.
Combined Mode Option	Combined Mode Option ► Options: **SATA as primary** (default), **SATA as secondary**

SB USB Configuration

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Chipset

OHCI HC (Bus 0 Dev 18 Fn 0)	[Enabled]	Enable or Disable OHCI HC (Bus 0 Dev 18 Fn 0)
OHCI HC (Bus 0 Dev 19 Fn 0)	[Enabled]	
OHCI HC (Bus 0 Dev 22 Fn 0)	[Enabled]	
OHCI HC (Bus 0 Dev 20 Fn 5)	[Enabled]	

→←: Select Screen
↑↓: Select Item
Enter : Select
+/- : Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit Setup
ESC: Exit

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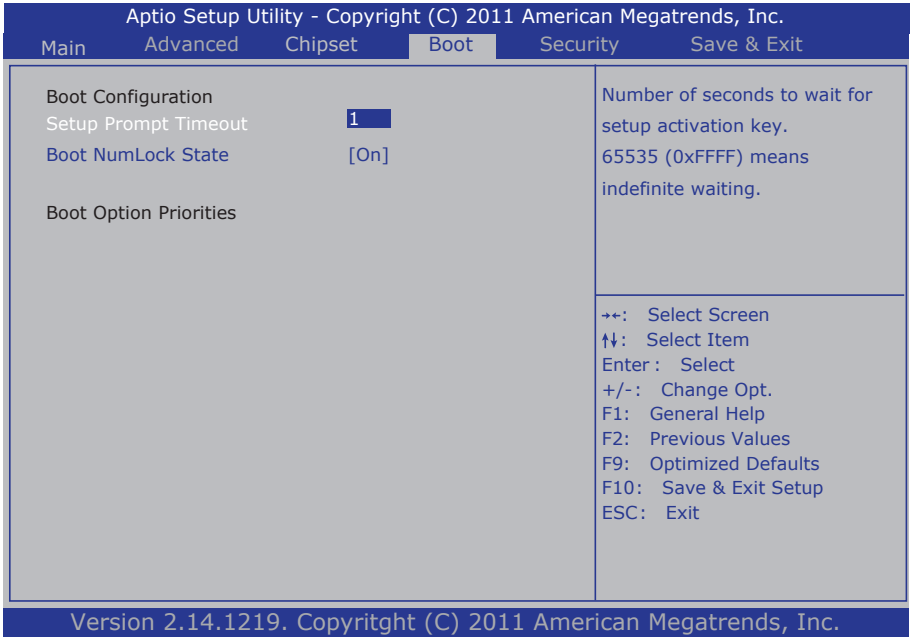
Item	Description
OHCI HC (Bus 0 Dev 18/19/22/20 Fn 0/5)	► Options: **Disabled** and **Enabled** (default)

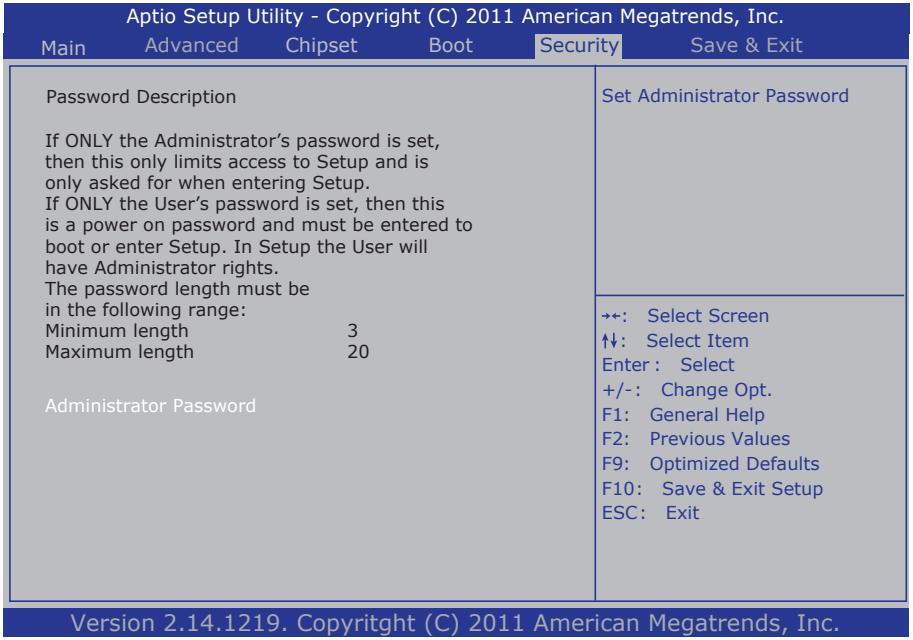
4.4 Boot



Item	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Boot NumLock State	Select the keyboard NumLock state ► Options: **On** (default) and **Off**.

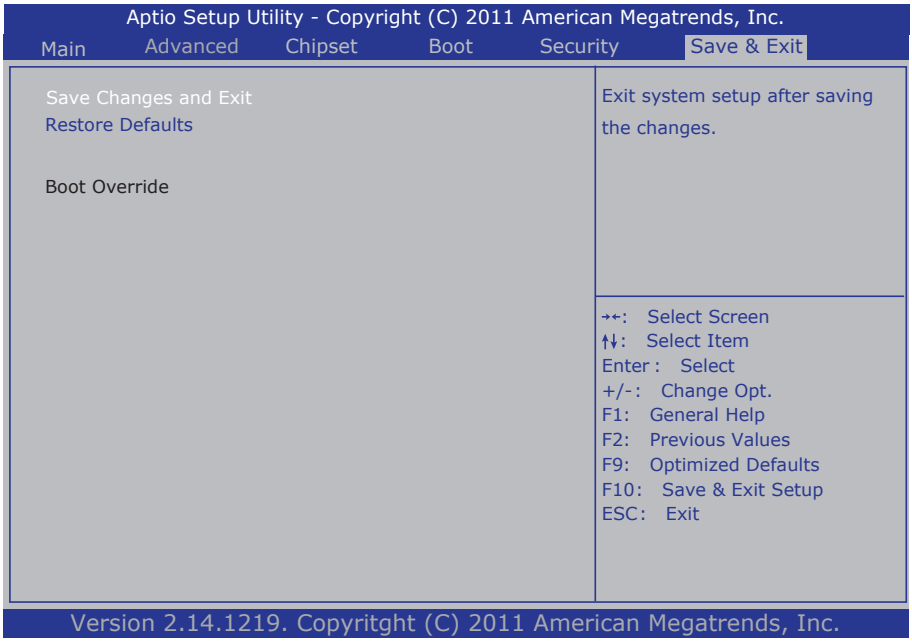
4.5 Security

The **Security** menu sets up the administrator password. Once an administrator password is set up, this BIOS SETUP utility is limited to access and will ask for the password each time any access is attempted.



Item	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. The screen then pops up an **Create New Password** dialog. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.

4.6 Save & Exit



Item	Description
Save Changes and Exit	Exit system setup after saving the changes. ► Enter the item and then a dialog box pops up: **Save configuration and exit? (Yes/ No)**
Restore Defaults	Restore/Load default values for all the setup options. ► Enter the item and then a dialog box pops up: **Load Optimized Defaults? (Yes/ No)**

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Appendix

Appendix A: I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device.
The following table lists the I/O port addresses used.

Address	Device Description
0x00000000-0x0000000F	Direct memory access controller
0x00000000-0x0000000F	PCI bus
0x00000000-0x0000000F	Motherboard resources
0x00000081-0x00000083	Direct memory access controller
0x00000087-0x00000087	Direct memory access controller
0x00000089-0x0000008B	Direct memory access controller
0x0000008F-0x0000008F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller
0x00000060-0x00000060	Standard PS / 2 Keyboard
0x00000064-0x00000064	Standard PS / 2 Keyboard
0x0000F140-0x0000F147	Standard Dual Channel PCI IDE Controller
0x0000F130-0x0000F133	Standard Dual Channel PCI IDE Controller
0x0000F120-0x0000F127	Standard Dual Channel PCI IDE Controller
0x0000F110-0x0000F113	Standard Dual Channel PCI IDE Controller
0x0000F100-0x0000F10F	Standard Dual Channel PCI IDE Controller
0x0000E000-0x0000E0FF	Realtek PCIe GBE Family Controller #3
0x0000E000-0x0000E0FF	PCI standard PCI-to-PCI bridge
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x0000D000-0x0000D0FF	Realtek PCIe GBE Family Controller #2
0x0000D000-0x0000D0FF	PCI standard PCI-to-PCI bridge
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000220-0x00000227	Communications Port (COM5)
0x00000228-0x0000022F	Communications Port (COM6)
0x0000F000-0x0000F0FF	AMD Radeon HD 6250 Graphics
0x000003B0-0x000003BB	AMD Radeon HD 6250 Graphics

0x000003B0-0x000003BB	PCI bus
0x000003C0-0x000003DF	AMD Radeon HD 6250 Graphics
0x00000061-0x00000061	System speaker
0x000003E0-0x00000CF7	PCI bus
0x00000D00-0x0000FFFF	PCI bus
0x00000070-0x00000071	System CMOS/real time clock
0x00000010-0x0000001F	Motherboard resources
0x00000022-0x0000003F	Motherboard resources
0x00000044-0x0000005F	Motherboard resources
0x00000062-0x00000063	Motherboard resources
0x00000065-0x0000006F	Motherboard resources
0x00000072-0x0000007F	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000084-0x00000086	Motherboard resources
0x00000088-0x00000088	Motherboard resources
0x0000008C-0x0000008E	Motherboard resources
0x00000090-0x0000009F	Motherboard resources
0x000000A2-0x000000BF	Motherboard resources
0x000000E0-0x000000EF	Motherboard resources
0x000004D0-0x000004D1	Motherboard resources
0x00000580-0x0000058F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000E00-0x00000E0F	Motherboard resources
0x000001F0-0x000001F7	ATA Channel 0
0x000003F6-0x000003F6	ATA Channel 0
0x0000040B-0x0000040B	Motherboard resources
0x000004D6-0x000004D6	Motherboard resources
0x00000C00-0x00000C01	Motherboard resources
0x00000C14-0x00000C14	Motherboard resources
0x00000C50-0x00000C51	Motherboard resources
0x00000C52-0x00000C52	Motherboard resources

0x00000C6C-0x00000C6C	Motherboard resources
0x00000C6F-0x00000C6F	Motherboard resources
0x00000CD0-0x00000CD1	Motherboard resources
0x00000CD2-0x00000CD3	Motherboard resources
0x00000CD4-0x00000CD5	Motherboard resources
0x00000CD6-0x00000CD7	Motherboard resources
0x00000CD8-0x00000CDF	Motherboard resources
0x00000800-0x0000089F	Motherboard resources
0x00000B20-0x00000B3F	Motherboard resources
0x00000900-0x0000090F	Motherboard resources
0x00000910-0x0000091F	Motherboard resources
0x0000FE00-0x0000FEFE	Motherboard resources
0x00000170-0x00000177	ATA Channel 1
0x00000376-0x00000376	ATA Channel 1
0x000000F0-0x000000FF	Numeric data processor
0x0000F150-0x0000F15F	Standard Dual Channel PCI IDE Controller
0x00000020-0x00000021	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x00000040-0x00000043	System timer

Appendix B: Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System timer
IRQ 1	Standard PS / 2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Communications Port (COM5)
IRQ 7	Communications Port (COM6)
IRQ 8	System CMOS/real time clock
IRQ 10	Communications Port (COM3)
IRQ 11	Communications Port (COM4)
IRQ 12	Microsoft PS/2 Mouse
IRQ 13	Numeric data processor
IRQ 14	ATA Channel 0
IRQ 15	ATA Channel 1

Appendix C: BIOS Memory Mapping

Address	Device Description
0xD0104000-0xD0104FFF	Realtek PCIe GBE Family Controller #3
0xD0100000-0xD0103FFF	Realtek PCIe GBE Family Controller #3
0xD0100000-0xD0103FFF	PCI standard PCI-to-PCI bridge
0xFEB4D000-0xFEB4D0FF	Standard Enhanced PCI to USB Host Controller
0xD0004000-0xD0004FFF	Realtek PCIe GBE Family Controller #2
0xD0000000-0xD0003FFF	Realtek PCIe GBE Family Controller #2
0xD0000000-0xD0003FFF	PCI standard PCI-to-PCI bridge
0xFEB44000-0xFEB47FFF	High Definition Audio Controller
0xFEB4B000-0xFEB4B0FF	Standard Enhanced PCI to USB Host Controller
0xC0000000-0xCFFFFFFF	AMD Radeon HD 6250 Graphics

0xFEB00000-0xFEB3FFFF	AMD Radeon HD 6250 Graphics
0xA0000-0xBFFFF	AMD Radeon HD 6250 Graphics
0xA0000-0xBFFFF	PCI bus
0xC0000-0xDFFFF	PCI bus
0x7F000000-0xFFFFFFFF	PCI bus
0xFEB40000-0xFEB43FFF	High Definition Audio Controller
0xFEB48000-0xFEB480FF	Standard Enhanced PCI to USB Host Controller
0xE0000000-0xEFFFFFFF	System board
0xFEB4E000-0xFEB4EFFF	Standard OpenHCD USB Host Controller
0x67000000-0x7EFFFFFF	Motherboard resources
0xFEC00000-0xFEC00FFF	Motherboard resources
0xFEE00000-0xFEE00FFF	Motherboard resources
0xFED80000-0xFED8FFFF	Motherboard resources
0xFED61000-0xFED70FFF	Motherboard resources
0xFEC10000-0xFEC10FFF	Motherboard resources
0xFED00000-0xFED00FFF	Motherboard resources
0xFED00000-0xFED00FFF	High Precision Event Timer, HPET
0xFFC00000-0xFFFFFFFF	Motherboard resources
0xFEB4C000-0xFEB4CFFF	Standard OpenHCD USB Host Controller
0xFEB4F000-0xFEB4F3FF	Standard Dual Channel PCI IDE Controller
0xFEB49000-0xFEB49FFF	Standard OpenHCD USB Host Controller
0xFEB4A000-0xFEB4AFFF	Standard OpenHCD USB Host Controller

Appendix D: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and reset the system automatically to avoid abnormal operation.

This board supports 255 levels watchdog timer by software programming I/O ports. Below are the source codes written in C, please take them as WDT application example.

```
/*-----        Include Header Area -----*/
#include “math.h”
#include “stdio.h”
#include “dos.h”

#define SIO_INDEX      0x2E            /* or index = 0x4E */
#define SIO_DATA       0x2F            /* or data  = 0x4F */

/*-----        routing, sub-routing -----*/
void main()
{
        outportb(SIO_INDEX, 0x87);          /* SIO - Enable */
        outportb(SIO_INDEX, 0x87);

        outportb(SIO_INDEX, 0x07);          /* LDN - WDT */
        outportb(SIO_DATA,  0x07);

        outportb(SIO_INDEX, 0x30);          /* WDT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF6);          /* WDT - Timeout Value : 5sec */
        outportb(SIO_DATA,  0x05);

        outportb(SIO_INDEX, 0xFA);          /* WDOUT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF5);          /* WDT - Configuration */
        outportb(SIO_DATA,  0x31);

        outportb(SIO_INDEX, 0xAA);          /* SIO - Disable */
}
```

Appendix E: Digital I/O Setting

Below are the source codes written in C, please take them for Digital I/O application examples. The default I/O address is 6Eh.

```
/*-----        Include Header Area -----*/
#include “math.h”
#include “stdio.h”
#include “dos.h”

#define SIO_INDEX     0x2E            /* or index = 0x4E */
#define SIO_DATA      0x2F            /* or data  = 0x4F */

unsigned char DIO_Set(unsigned char oMode, unsigned char oData);

/*-----        routing, sub-routing -----*/
void main()
{
        DIO_Set(0xFF,0xFF);
        delay(2000);

        DIO_Set(0xFF,0x00);
        delay(2000);

        DIO_Set(0xFF,0x55);
        delay(2000);

        DIO_Set(0xFF,0xAA);
        delay(2000);

}

unsigned char DIO_Set(unsigned char oMode, unsigned char oData)
{
   unsigned char iData;

        outportb(SIO_INDEX, 0x87);          /* SIO - Enable */
        outportb(SIO_INDEX, 0x87);

        outportb(SIO_INDEX, 0x07);          /* LDN - GPIO */
        outportb(SIO_DATA,  0x06);

        outportb(SIO_INDEX, 0x30);          /* GPIO - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0x88);          /* GPIO8 - Output */
        outportb(SIO_DATA,  oMode);

        outportb(SIO_INDEX, 0x89);          /* GPIO8 - Data */
        outportb(SIO_DATA,  oData);

        outportb(SIO_INDEX, 0x8A);          /* GPIO8 - Status */
        iData = inportb(SIO_DATA);

        outportb(SIO_INDEX, 0xAA);          /* SIO - Disable */

        return iData;
}
```

Digital IO usage table (Super IO chipset Fintek F81866D-I)

Pin	Description	Chipset Pin #	Chipset Pin description
1	DIO1	111	GPIO80
2	DIO2	112	GPIO81
3	DIO3	113	GPIO82
4	DIO4	114	GPIO83
5	DIO5	115	GPIO84
6	DIO6	116	GPIO85
7	DIO7	117	GPIO86
8	DIO8	118	GPIO87