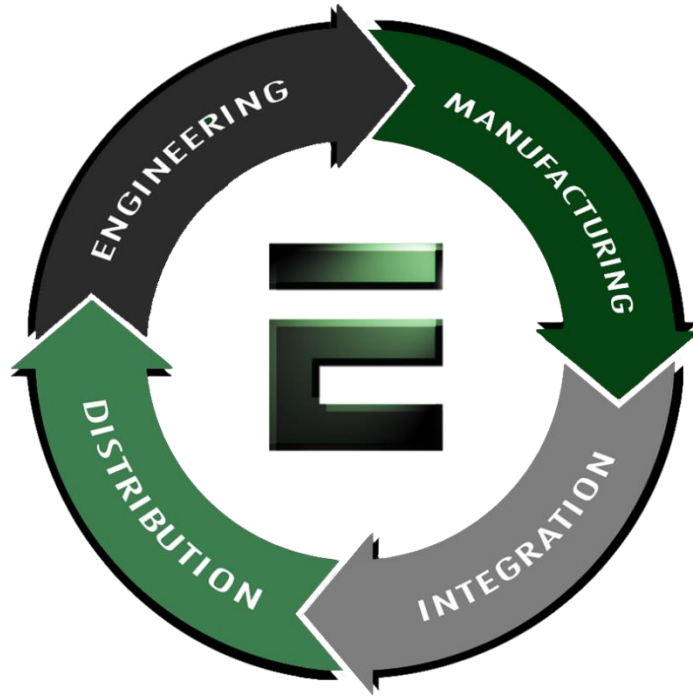


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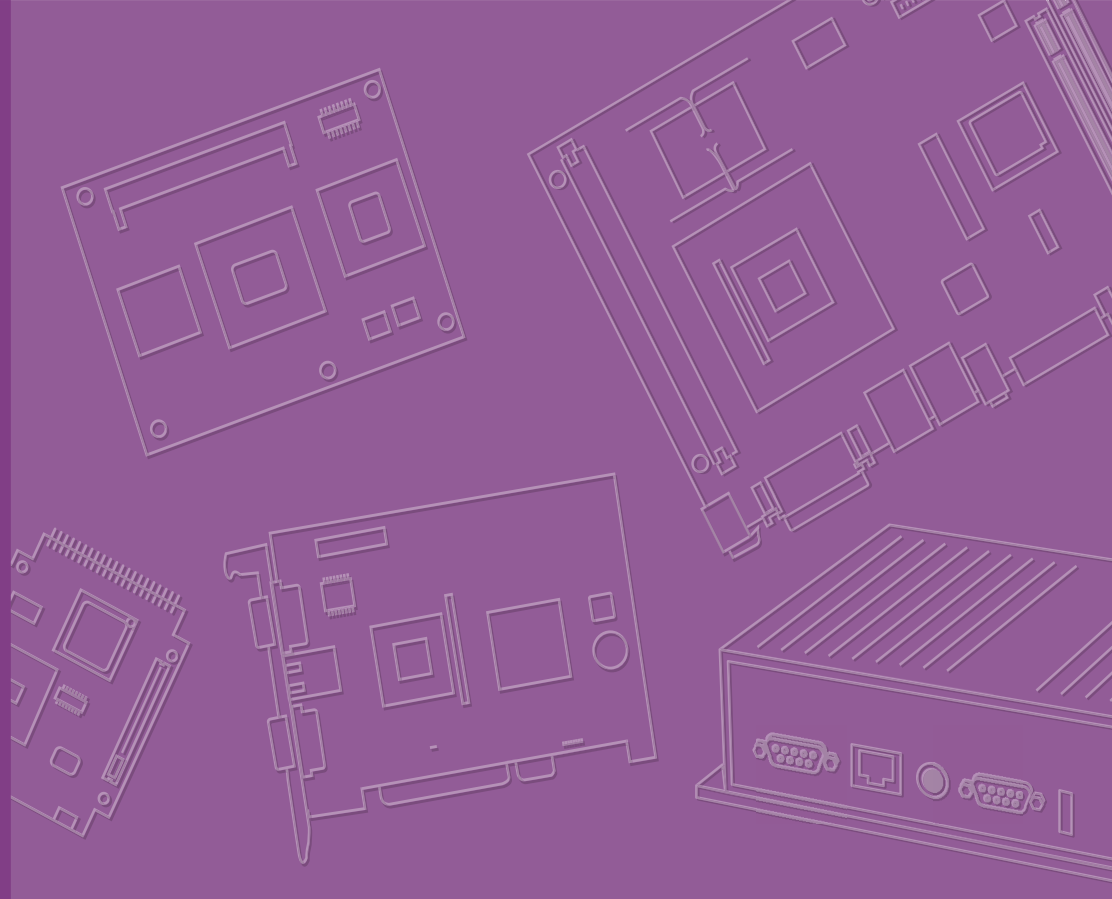


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AIMB-228

**AMD V-Series/R-Series Quad-Core
Mini-ITX with 4 x DP, 6 x USB, 6 x
COM, and 12 ~ 24V DC-In**

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This device complies with the requirements in part 15 of the FCC regulations:

Operation is subject to the following two conditions:

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- This device must accept any interference received, including interference that may cause undesired operation.

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 regulations. 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 instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference. In such cases, users are required to correct the interference at their own expense. However, users are advised that any equipment changes or modifications not expressly approved by the party responsible for compliance will void the compliance with the FCC regulations and, therefore, the user's authority to operate the equipment.

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Memory Compatibility

Normal RAM Test Data

Category	Speed	Capacity	Vendor	Module P/N	Chip P/N	Advantech P/N	ECC	Result
DDR4	2666	8GB	Advantech	SQR-SD4N8G2K6SNBCB	SEC 837 K4A8G08 5WC BCTD	SQR-SD4N8G2K6SNB CB	N	PASS
DDR4	2666	4GB	Advantech	SQR-SD4N4G2K6SNEEB	SEC 807 K4A4G08 5WE BCTD	SQR-SD4N4G2K6SNE EB	N	PASS
DDR4	2400	16GB	Advantech	SQR-SD4M16G2K4SNBB	SEC 749 K4A8G08 5WB BCRC	SQR-SD4M16G2K4SN BB	N	PASS
DDR4	2400	4GB	Advantech	SQR-SD4M4G2K4SNEEB	SEC 749 K4A4G08 5WE BCRC	SQR-SD4M4G2K4SNE EB	N	PASS
DDR4	2133	16GB	Advantech	AQD-SD4U16N21-SE	SEC 546 K4A8G08 5WB BCPB	AQD-SD4U16N21-SE	N	PASS
DDR4	2133	8GB	Advantech	AQD-SD4U8GN21-SG	SEC 552 BCPB K4A4G085 WD	AQD-SD4U8GN21-SG	N	PASS
DDR4	2400	8GB	Advantech	SQR-SD4N-8G2K4HBC	H5AN8G8 NAFR UHC 643V	SQR-SD4N-8G2K4HBC	N	PASS
DDR4	2400	16GB	Advantech	SQR-SD4N-16G2K4HBC	H5AN8G8 NAFR UHC 643V	SQR-SD4N-16G2K4HBC	N	PASS
DDR4	2400	16GB	Advantech	AQD-SD4U16N24-HE	H5AN8G8 NAFR UHC	AQD-SD4U16N24-HE	N	PASS
DDR4	3200	8GB	Micron	MTA8ATF1G64HZ-3G2E1	8AE77 D9WFL	N/A	N	PASS
DDR4	2666	8GB	Advantech	SQR-SD4N8G2K6SNBCB	SEC 837 K4A8G08 5WC BCTD	SQR-SD4N8G2K6SNB CB	N	PASS
DDR4	2666	4GB	Advantech	SQR-SD4N4G2K6SNEEB	SEC 807 K4A4G08 5WE BCTD	SQR-SD4N4G2K6SNE EB	N	PASS
DDR4	2400	16GB	Advantech	SQR-SD4M16G2K4SNBB	SEC 749 K4A8G08 5WB BCRC	SQR-SD4M16G2K4SN BB	N	PASS
DDR4	2400	4GB	Advantech	SQR-SD4M4G2K4SNEEB	SEC 749 K4A4G08 5WE BCRC	SQR-SD4M4G2K4SNE EB	N	PASS

DDR4	2133	16GB	Advantech	AQD-SD4U16N21-SE	SEC 546 K4A8G08 5WB BCPB	AQD-SD4U16N21-SE	N	PASS
DDR4	2133	8GB	Advantech	AQD-SD4U8GN21-SG	SEC 552 BCPB K4A4G085 WD	AQD-SD4U8GN21-SG	N	PASS
DDR4	2400	8GB	Advantech	SQR-SD4N-8G2K4HBC	H5AN8G8 NAFR UHC 643V	SQR-SD4N-8G2K4HBC	N	PASS
DDR4	2400	16GB	Advantech	SQR-SD4N-16G2K4HBC	H5AN8G8 NAFR UHC 643V	SQR-SD4N-16G2K4HBC	N	PASS
DDR4	2400	16GB	Advantech	AQD-SD4U16N24-HE	H5AN8G8 NAFR UHC	AQD-SD4U16N24-HE	N	PASS

ECC RAM Test Data

Category	Speed	Capacity	Vendor	Module P/N	Chip P/N	Advantech P/N	ECC	Result
DDR4	2133	16GB	Advantech	AQD-SD4U16E21-SE	SEC 543 K4A8G08 5WB BCPB	AQD-SD4U16E21-SE	ECC	PASS
DDR4	2400	8GB	Advantech	SQR-SD4N8G2K4SEEEB	SEC 749 K4A4G08 5WE BCRC	SQR-SD4N8G2K4SEE EB	ECC	PASS
DDR4	2400	16GB	Advantech	AQD-SD4U16E24-HE	H5AN8G8 NAFR	AQD-SD4U16E24-HE	ECC	PASS
DDR4	2400	8GB	Advantech	AQD-SD4U8GE24-HE	H5AN8G8 NAFR	AQD-SD4U8GE24-HE	ECC	PASS
DDR4	2666	4GB	Advantech	SQR-SD4N4G2K6SEEEB	SEC 807 K4A4G08 5WE BCTD	SQR-SD4N4G2K6SEE EB	ECC	PASS
DDR4	2666	16GB	Advantech	SQR-SD4N16G2K6SECB	SEC 801 K4A8G08 5WC BCTD	SQR-SD4N16G2K6SE CB	ECC	PASS

Ordering Information

Part Number	CPU	Display	TPM	LVDS	PCIe Slot	USB 3.1/2.0 GbE	SATA	COM	Thermal Solution	
AIMB-228VG2-00A1E	V1807B	DP/LVDS, DP, DP, DP	(1)	(1)	x8	2/4	2	2	6	Active
AIMB-228VG2-02A1E	V1605B	DP/LVDS, DP, DP, DP	(1)	(1)	x8	2/4	2	2	6	Active
AIMB-228VG2-03A1E	V1202B	DP/LVDS, DP, DP, DP	(1)	(1)	x8	2/4	2	2	6	Active
AIMB-228RG2-00A1E	R1606G	DP/LVDS, DP, DP	(1)	(1)	x4	2/4	2	2	6	Active
AIMB-228RG2-01A1E	R1505G	DP/LVDS, DP, DP	(1)	(1)	x4	2/4	2	2	6	Active

*() BOM options available on MP version.

Product Warranty (2 years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product is defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Initial Inspection

Before installing the motherboard, ensure that the following items are included with the product:

- 1 x AIMB-228 AMD V1000/R1000-series mini-ITX motherboard
- 1 x SATA HDD cable
- 1 x SATA power cable
- 2 x Serial port cable (1-to-1)
- 1 x I/O port bracket
- 1 x AIMB-228 User manual
- 1 x Warranty card
- 1 x CPU cooler

If any of the above items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the AIMB-228 mechanically and electrically before shipment. The product should be free of marks and scratches and in perfect working order upon receipt. While unpacking AIMB-228, check the product for signs of shipping damage (for example, damaged box, scratches, or dents). If there is damage or the product fails to meet the specifications, notify our service department or your local sales representative immediately. Additionally, please notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the unit.

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Chapter 1

General Information

1.1 Introduction

AIMB-228 is a mini-ITX motherboard based on the AMD Ryzen™ embedded V1000/R1000 series processor that delivers superior graphics and computing performance. Designed with comprehensive I/O and four display outputs, AIMB-228 is ideal for multi-display applications such as digital surveillance, digital signage, electronic gaming machines, and thin client operations. Equipped with Advantech's WISE-PaaS/DeviceOn remote management software, AIMB-228 provides the ideal platform that not only reduces development costs but also enhances management efficiency.

1.2 Features

- **Comprehensive I/O:** 4 x Displayports, 6 x serial ports, 4 x USB 2.0, 2 x USB 3.1, 2 x SATA III, 2 x GbE LAN, and 16-bit GPIO
- **Mini-ITX Form Factor:** AIMB-228 is a mini-ITX motherboard
- **Diverse Storage Devices:** SATA HDD, M.2 (2242) SSD
- **Optimized Integrated Graphics:** AMD Vega GPU (up to 11 CUs) graphics, H.265 decoder and encoder, VP9 decoder

1.3 Specifications

1.3.1 Processor

- **CPU:** AMD V and R-series, supports quad/dual-core CPU
- **Max. Speed:** Quad-core 3.8 GHz (V1807B)/3.6 GHz (V1605B)/dual-core 3.2 GHz (V1202B)/3.5 GHz (R1606G)/3.3 GHz (R1505G)
- **L2 Cache:** 2 MB (V-series)/1 MB (R-series)
- **BIOS:** AMI 128 Mbit SPI

1.3.2 Expansion

- **M.2 B Key:** 1 (3042)
- **M.2 E Key:** 1 (2230)
- **PCIe x16:** 1 (PCIe x8 signal)

1.3.3 Memory

- **Technology:** Dual-channel DDR4 2666 MHz
- **Max. Capacity:** 32 GB
- **Socket:** 2 x 260-pin SODIMM

1.3.4 Graphics Interface

- **Controller:** AMD Integrated Vega GCN
- **LVDS:** 1, supports dual-channel 48-bit, up to 1920 x colay DP 1.2 port (optional)
- **DP 1.2:** 4, supports DP++, up to 4096 x 2160 @ 60Hz resolution
- **Multiple Display:** 4 x independent displays via DP/LVDS

1.3.5 Ethernet Interface

- **Interface:** 10/100/1000 Mbps
- **Controller:** GbE: Realtek RTL8111G
- **Connector:** 2 x RJ-45

1.3.6 SATA Interface

- **Max. Data Transfer Rate:** 600 MB/s
- **Channel:** 2

1.3.7 Rear I/O

- **DP:** 4
- **Ethernet:** 2
- **USB:** 4 (2 x USB 2.0, 2 x USB 3.1)
- **Audio:** 2 (1 x Line-Out, 1 x Mic-In)
- **DC Jack:** 1

1.3.8 Internal Connector

- **LVDS & Inverter:** 1 (optional)
- **USB:** 2 (USB 2.0)
- **Serial:** 6 (5 x RS232, 1 x RS232/422/485; COM 2 supports RS232/422/485 auto-flow control; COM 4 supports 5v/12V via jumper selection; 1 x COM supports CCltalk; 1 x COM supports TTL)
- **SATA:** 2
- **SATA Power Connector:** 2
- **GPIO:** 16 bit
- **M.2:** 2 (1 x B-key 3042 supports SIM holder, 1 x E-key 2230)

1.3.9 Watchdog Timer

- **Output:** System reset
- **Interval:** Programmable 1 ~ 255 sec/min

1.3.10 Power Requirement

- **Typical:**
 - Wide voltage range: 12 ~ 24 V_{DC} input via 1 x 2.5φ connector or 1 x internal 2 x 2-pin power (12 V only)
 - AT/ATX supported by jumper
 - Max. power consumption: 58.4 W (16 GB DDR4 RAM)

1.3.11 Environment

- **Temperature:**
 - 0 ~ 60 °C (32 ~ 140 °F), operating
 - -40 ~ 85 °C (-40 ~ 185 °F), non-operating

1.3.12 Physical Characteristics

- **Dimensions:** 170 x 170 mm (6.69 x 6.69 in)

-

1.4 Jumpers and Connectors

The AIMB-228 motherboard features a number of jumpers and connectors that enable the integration of external devices, such as hard disk drives and a keyboard, and configuration according to specific applications.

The function of each board jumper and connector is listed in the tables below. Later sections in this chapter provide instructions for setting jumpers. Chapter 2 provides instructions for connecting external devices to the motherboard.

Table 1.1: Connector/Header List

	Description	Part Reference
1	Direct current input connector	DCIN1
2	Displayport1/2	DP12
3	Displayport3/4	DP34
4	Universal serial bus port 3.1 gen 1 #7/ #8	USB78
5	Universal serial bus port 3.1 gen 2 #1/ #2	USB12
6	RJ45 #1	LAN1
7	Universal serial bus port 3.1 gen 2 #3/ #4	USB34
8	RJ45 #2	LAN2
9	Universal serial bus port 3.1 gen 2 #6 (type C)	USB6
10	Universal serial bus port 3.1 gen 2 #5	USB5
11	HD audio interface (analog)	AUDIO1
12	Amplifier connector	AMP1
13	Front panel audio header	FPAUD1
14	CMOS mode selection	JCMOS1
15	PCI Express x16 slot	PCIEX16_1
16	Platform controller hub	PCH1
17	CMOS battery connector	BAT1
18	Case open selection pin header	JCASEOP_SW1
19	Case open connector	JCASE1
20	NGFF M.2 B-key connector for 2242/3042 module	M2B1
21	Universal serial bus port 3.1 gen 1 #9/ #10 box header	USB910
22	COM1 RI# selection pin header	JSETCOM1_V1
23	Serial ATA interface connector #1~#3	SATA1~SATA3
24	COM2 pin header (S1.27 mm)	COM2
25	EDP/LVDS backlight inverter power connector	INV1
26	COM1 pin header (S1.27 mm)	COM1
27	Low-pin-count interface connector	LPC1
28	Subscriber identity module connector	SIM1
29	LVDS VESA, JEIDA format selection pin header	JLVDS_VCON1
30	Low-voltage differential signaling interface/embedded displayport	LVDS_EDP1
31	Voltage selection for JLVDS connector	JLVDS1
32	System fan #1 connector/system fan #2 connector	SYSFAN1/2
33	Power LED and keyboard lock pin header	JFP2
34	Watchdog timer output and OBS beep	JWDT1+JOBS1
35	CPU fan connector	CPUFAN1
36	8-bit general purpose I/O pin header (S1.27 mm)	GPIO1
37	PWRBTN#/ RESET#/HDD LED/serial bus from HW monitor IC/ internal buzzer/external speaker header	JFP1

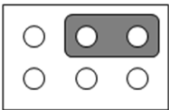
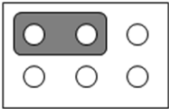
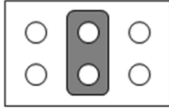
Table 1.1: Connector/Header List

38	CPU socket LGA1151 H4	CPU1
39	DDR4 SODIMM socket A1/DDR4 SODIMM socket B1	DIMMA1/ DIMMB1
40	SPI BIOS flash socket	SPI1
41	SPI pin header	SPI_CN1
42	Serial ATA interface power connector	SATA_PWR1/2
43	AT/ATX mode selection	PSON1
44	ATX supported 3-pin header on board	ATX_5VSB1
45	NGFF M.2 E-key connector for 2230 module	M2E1



Table 1.2: Jumper Setting List

	Description	Part Reference
1	Voltage selection for LVDS1/EDP1 connector	JLVDS1
2	RTC / CMOS clear	JCMOS1
3	PWRBTN#/RESET#/HDD LED/serial bus from HW monitor IC/internal buzzer/external speaker header	JFP1
4	Watchdog timer output and OBS beep	JWDT1+JOBS1
5	AT/ATX mode selection	PSON1
6	Case open selection pin header	JCASEOP_SW1
7	COM1_RI# pin selection pin header	JSETCOM1_V1
8	LVDS VESA, JEIDA format selection pin header	JLVDS_VCON1

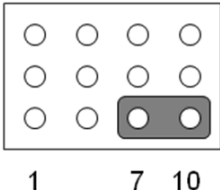
1. Voltage selection for LVDS1/EDP1 connector (JLVDS1)

Function	Jumper Setting
Jumper position for +3.3V (default)	2 4 6
	
Jumper position for +5V	1 3 5
	2 4 6
Jumper position for +12V	
	1 3 5
Jumper position for +12V	2 4 6
	
	1 3 5


2. CMOS clear (JCMOS1)

Function	Jumper Setting
Keep CMOS data (default)	<p>1 2 3</p> 
Clear CMOS data	<p>1 2 3</p> 

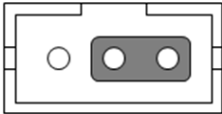
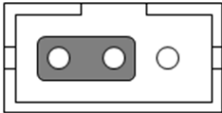
3. PWRBTN#/ RESET#/HDD LED/serial bus from HW monitor IC/internal buzzer/external speaker header (JFP1)

Function	Jumper Setting
Internal buzzer (default)	<p>3 12</p>  <p>1 7 10</p>



4. Watchdog timer output and OBS beep (JWDT1+ JOBS1)

Function	Jumper Setting
Watchdog timer output (2-3) (default) OBS BEEP(4-5) (default)	<p>1 2 3 4 5</p> 

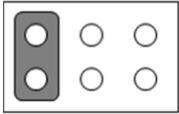
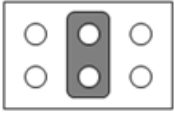
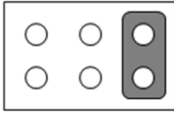
5. AT/ATX mode selection (PSON1)

Function	Jumper Setting
ATX mode (default)	 1 2 3
AT mode	 1 2 3



6. Case open selection pin header (JCASEOP_SW1)

Function	Jumper Setting
Normal close	1 2 3 
Normal open (default)	1 2 3 

7. COM1_RI# Pin RI#/5V/12V selection (JSETCOM1_V1)

Function	Jumper Setting
Jumper position for RI# (default)	2 4 6  1 3 5
Jumper position for +5V	2 4 6  1 3 5
Jumper position for +12V	2 4 6  1 3 5

8. LVDS VESA, JEIDA format selection pin header (JLVDS_VCON1)

Function	Jumper Setting
JEIDA mode (HI = +3.3V)	<p>1 2 3</p> 
VESA mode (Low = 0V) (default)	<p>1 2 3</p> 

1.5 Jumper and Connector Locations

Top Layer Overview

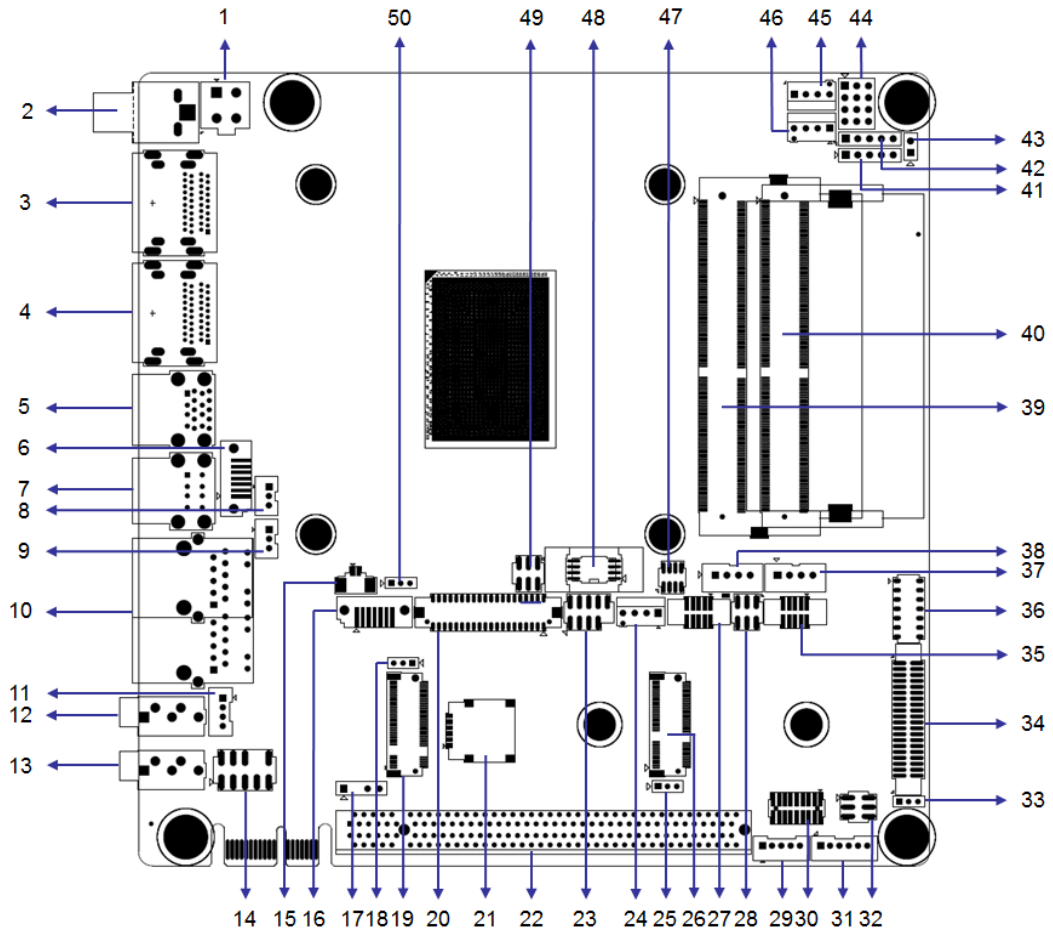


Figure 1.1 Jumper and Connector Locations (Top Side)

Bottom Layer Overview

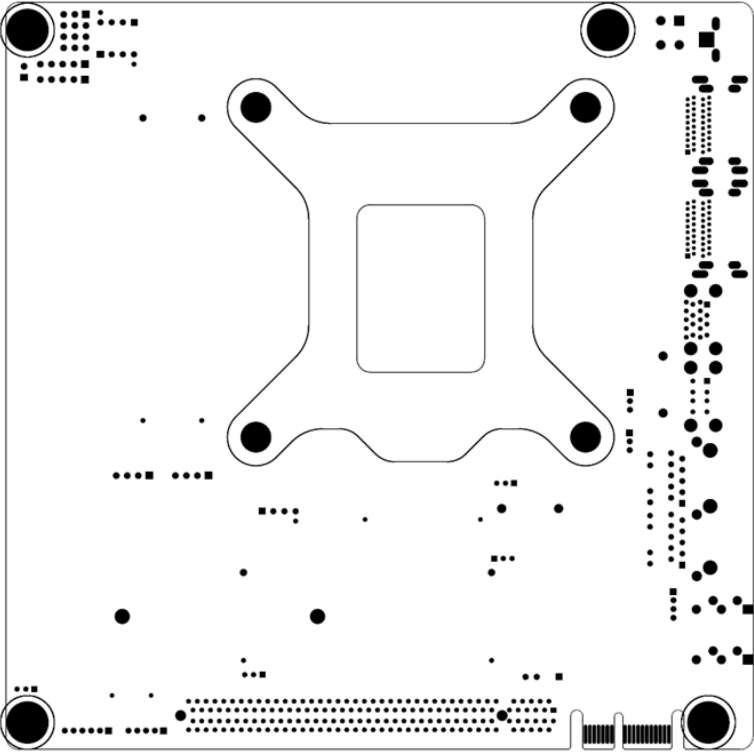


Figure 1.2 Jumper and Connector Locations (Bottom Side)

Connector / Header List

	Description	Part Reference
1	ATX 12V power supply connector	ATX12V1
2	DC input jack	DCIN1
3	DisplayPort #1 (up) + DisplayPort #2 (down) stack connector	DP1+DP2
4	DisplayPort #3 (up) + DisplayPort #4 (down) stack connector	DP3+DP4
5	USB 3.1 gen 2 stack connector	USB23
6	Serial ATA interface connector #1	SATA1
7	USB 2.0 stack connector	USB14
8	5VSB input connector	ATX_5VSB1
9	AT/ATX mode selection	PSON1
10	Dual-port RJ45 connector	LAN1+LAN2
11	Audio amplifier output pin header	AMP1
12	HD audio interface (Line-Out)	AUDIO1
13	HD audio interface (Mic-In)	AUDIO2
14	Front panel audio header	FPAUD1
15	Coin battery wafer box	BAT1
16	Serial ATA interface connector #2	SATA2
17	HD audio interface (digital)	SPDIF1
18	LVDS VESA, JEIDA format selection pin header	JLVDS_VCON1
19	M.2 B-key connector	NGFF_B1
20	Low-voltage differential signaling	LVDS1
21	Nano SIM card holder	SIM1
22	PCI Express x16 slot	PCIEX16_1
23	USB 2.0 front panel header	USB56
24	CPU fan #1 connector	CPUFAN1
25	25 USB power selection for USB 12/USB 34/USB 56	JUSBPWR1
26	M.2 E-key connector	NGFF_E1
27	COM2 box header	COM2
28	COM1 RI# selection pin header	JSETCOM1_V1
29	Inverter power connector	INV1
30	16-bit general purpose I/O pin header	GPIO1
31	PS2 keyboard/mouse connector	KBMS1
32	COM4 RI# selection pin header	JSETCOM4_V1
33	CCTALK voltage selection pin header	JCCT_VCON1
34	COM3 ~ COM6 box header	COM3456

35	COM1 box header	COM1
36	Low-pin-count interface connector	LPC1
37	Serial ATA power connector #1	SATA_PWR1
38	Serial ATA power connector #2	SATA_PWR2
39	DDR4 SODIMM socket	CH-A DIMMA1
40	DDR4 SODIMM socket	CH-B DIMMB1
41	Power LED and keyboard lock pin JFP2 header	
42	Watchdog timer output and OBS beep	JWDT1+JOBS1
43	Case open connector	JCASE1
44	PWRBTN#/RESET#/HDD LED/serial bus from HW monitor IC/internal buzzer/external speaker header	JFP1
45	System fan #2 connector	SYSFAN2
46	System fan #1 connector	SYSFAN1
47	SPI pin header	SPI1_CN1
48	SPI BIOS flash socket	SPI1
49	VDD select for LVDS1 panel	JLVDS1
50	COMS mode selection	JCMOS1

1.6 Board Diagram

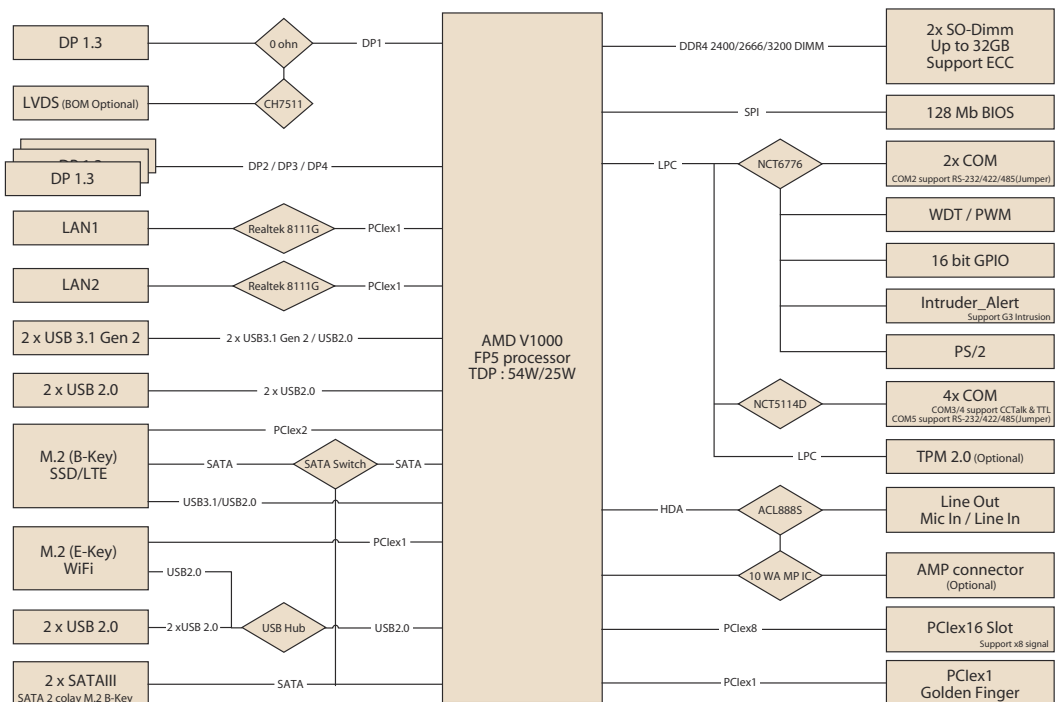


Figure 1.3 AIMB-228 Board Diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from the chassis before manual handling. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.*



Caution! *Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to electrostatic discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when not in the chassis.*



Caution! *The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*



Caution! *There is a danger of a new battery exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*





1.8 Jumper Settings

This section provides instructions on how to configure the motherboard by setting jumpers. The information also includes the motherboards' default settings and the options for each jumper.

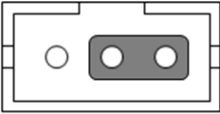
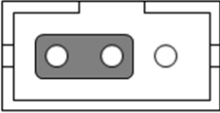
1.8.1 How to Set Jumpers

Users can configure the motherboard according to the specific application requirements by setting the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” (or turn on) a jumper, connect the pins with the clip. To “open” (or turn off) a jumper, remove the clip. Sometimes a jumper consists of a set of three pins, labeled 1, 2, and 3. In this case, connect either pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

1.8.2 CMOS Clear (JCOMS1)

Function	Jumper Setting
Normal (default)	<p>1 2 3</p> 
Clear CMOS data	<p>1 2 3</p> 

1.8.3 AT/ATX Mode Selection (PSON1)

Function	Jumper Setting
ATX mode (default)	 <p>1 2 3</p>
AT mode	 <p>1 2 3</p>

1.9 System Memory

AIMB-228 is equipped with two sockets for 260-pin SODIMM. These sockets are compatible with 1.2V unbuffered double-data-rate synchronous, low-voltage DRAM (DDR4 SDRAM). DRAM is available in capacities of 1, 2, 4, 8, and 16 GB. The socket supports any combination of DIMMs of any size, for a total memory size of 2 to 32 GB. AIMB-228 supports ECC (error checking and correction) memory.

1.10 Memory Installation

To install SODIMMs, first ensure that the handles of the SODIMM socket are in the “open” position (i.e., the handles lean outward). Slowly slide the SODIMM module along the plastic guides on both ends of the socket. Then gently press the SODIMM module into the socket until there is an audible click indicating that the two handles have locked the memory module into place. To remove the memory module, push both handles outward, and the memory module will be ejected.

Chapter 2

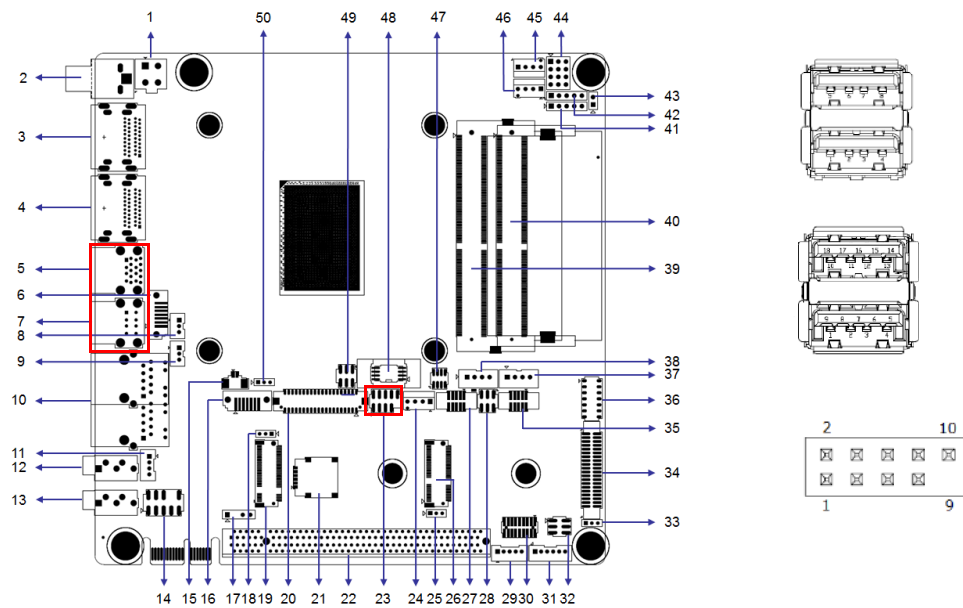
Connecting
Peripherals

2.1 Introduction

Most of the connectors can be accessed from the top of the board during installation. If a number of cards are installed or the chassis is packed, the board may need to be partially removed in order to make all the connections.

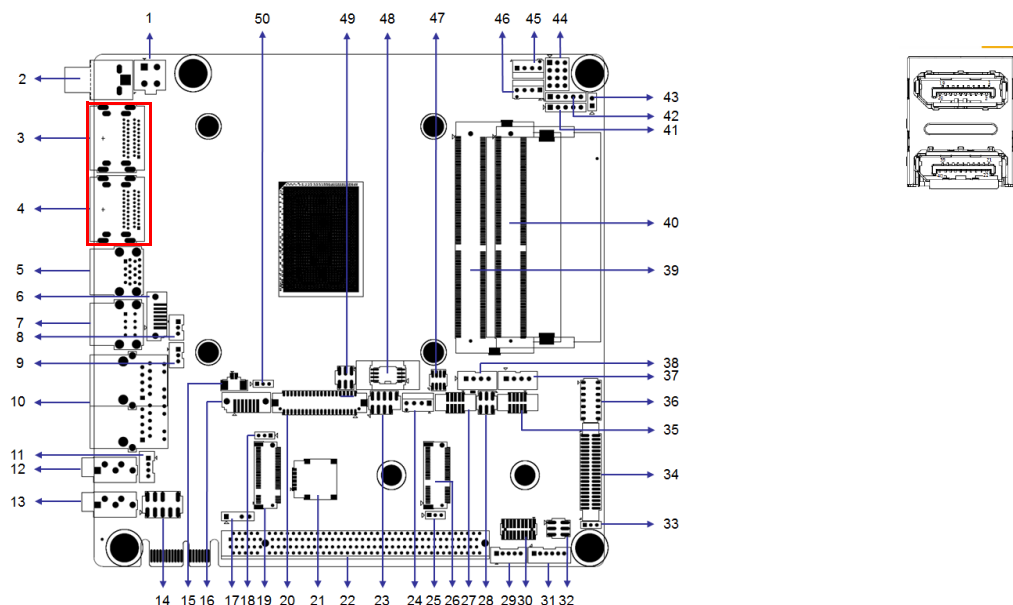
2.2 USB Ports (USB 23/14/56)

AIMB-228 provides up to six USB ports (2 x USB 3.1 and 2 x USB 2.0 on the rear side and 2 x USB 2.0 via the board pin header). The USB interface complies with USB Rev. 3.1 specifications and supports transmission rates of up to 10 Gbps. The USB interface can be disabled in the BIOS.

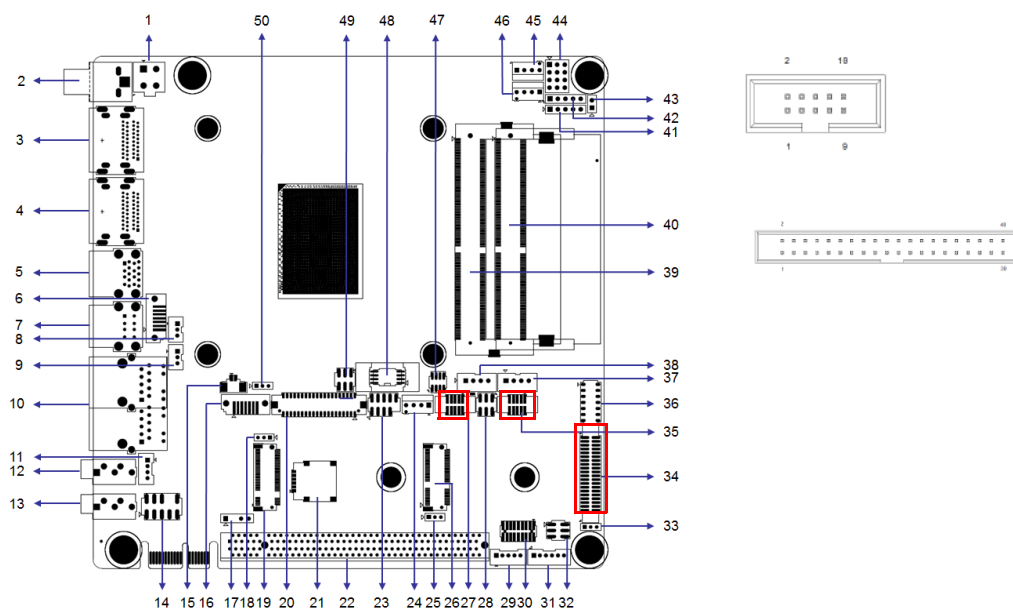


2.3 DisplayPort1/2/3/4 (DP12/DP34)

AIMB-228 features 4 x DP connectors.



2.4 Serial Ports (COM1~COM6)

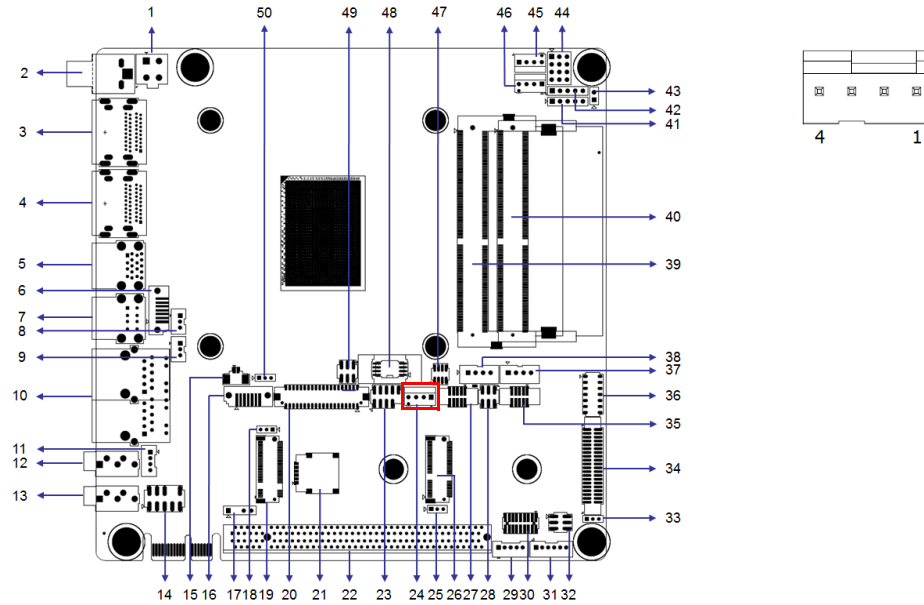


AIMB-228 supports six serial ports (COM1 and COM6 support RS-232 function, COM2 and COM5 support RS-232/422/485 function via jumper setting, COM3 colay CCTalk, and COM4 colay TTL).

These ports can be connected to serial devices, such as a mouse or printer, or a communications network. The IRQ and address ranges for both ports are fixed. However, users can disable the port or change the parameters via the BIOS. Different devices implement the RS-232 standards in different ways. If you have problems with a serial device, check the pin assignments for the connector.

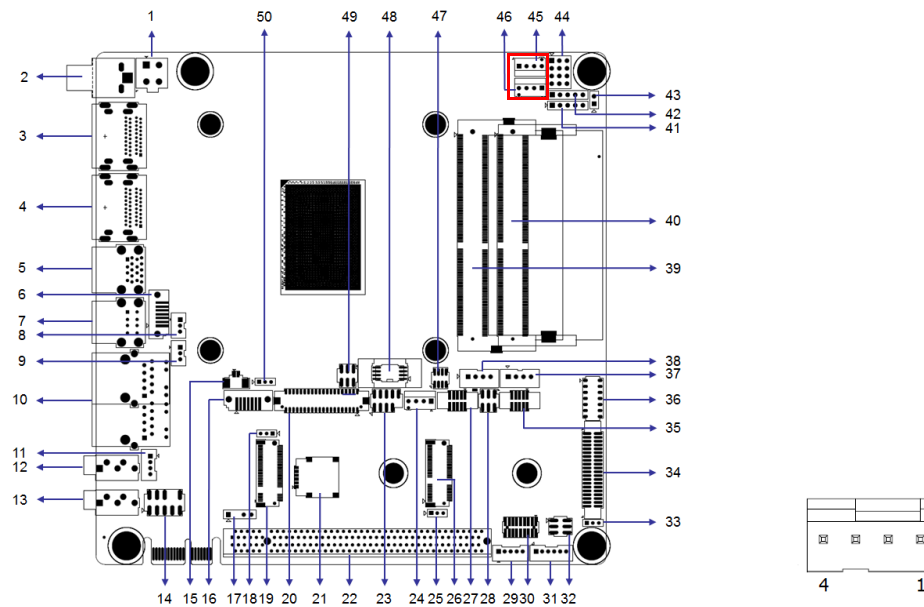
2.5 CPU Fan Connector (CPU_FAN1)

This connector supports cooling fans of 500 mA (6 W) or less.



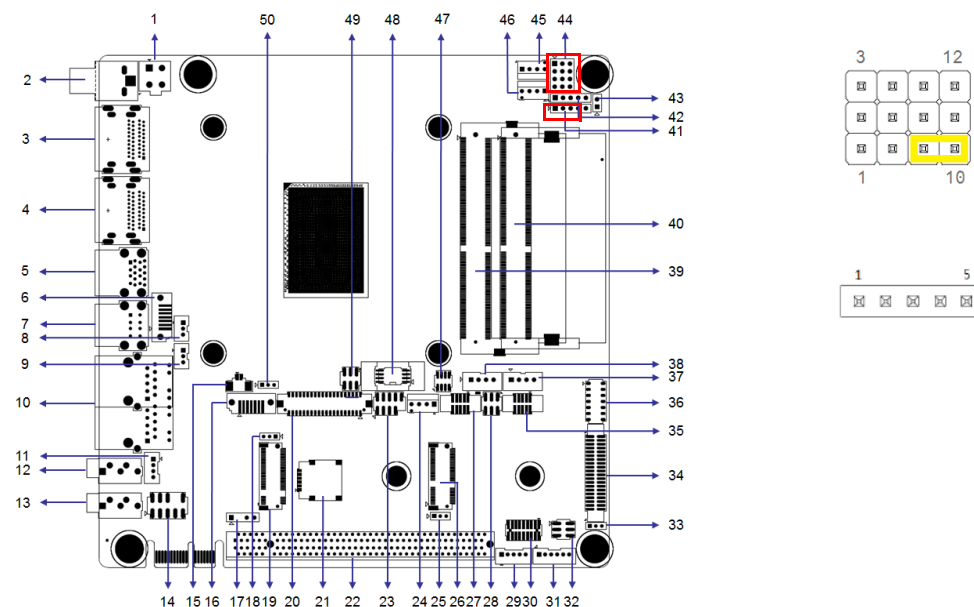
2.6 System Fan Connector (SYSFAN1/2)

This connector supports cooling fans of 500 mA (6 W) or less.



2.7 Power Switch/HDD LED/SMBUS/Speaker Pin Header (JFP1), Power LED, and Keyboard Lock Pin Header (JFP2)

There are several headers for monitoring and controlling the AIMB-228.



2.7.1 ATX Soft Power Switch (JFP1/PWR_SW)

If your computer case is equipped with an ATX power supply, connect the power on/off button on the computer case to JFP1/ PWR_SW for convenient operation.

2.7.2 Reset (JFP1/RESET)

Many computer cases offer the convenience of a reset button. Connect the wire for the reset button.

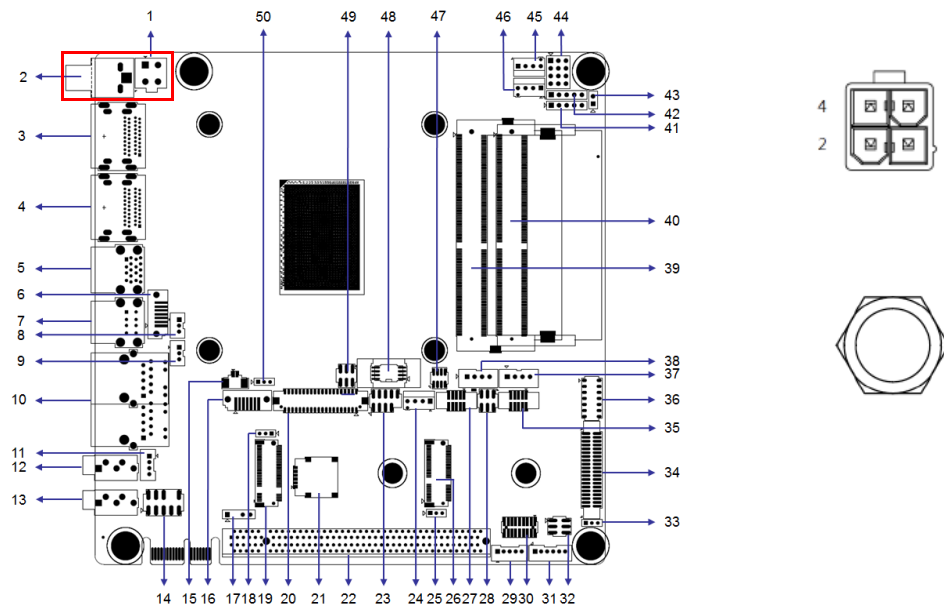
2.7.3 HDD LED (JFP1/HDDLED)

Connect an LED to JFP1/HDDLED to provide an indicator of when the HDD is active.

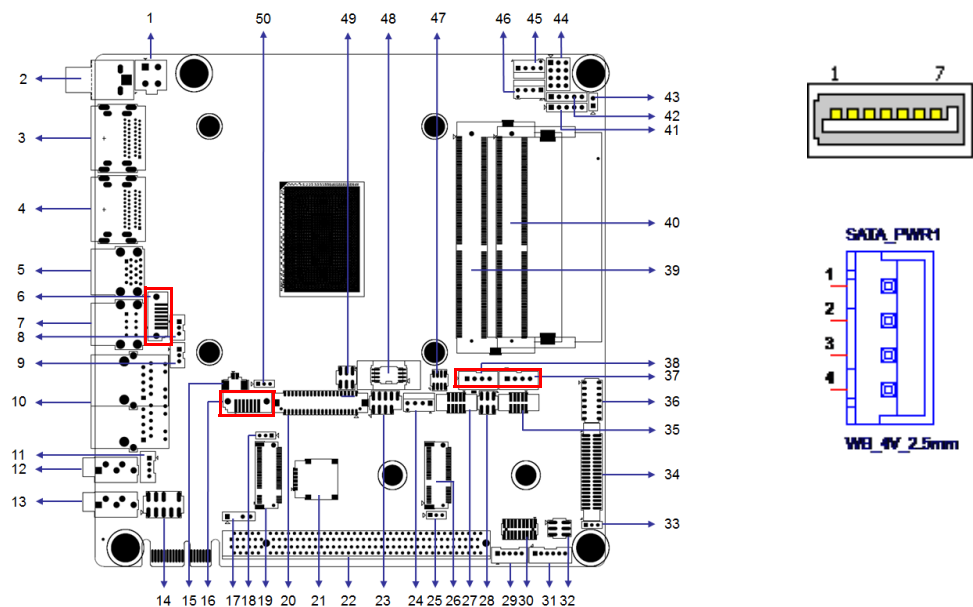
2.7.4 External Speaker (JFP1/SPEAKER)

JFP1/SPEAKER is a 4-pin connector for an external speaker. If there is no external speaker, AIMB-275 provides an onboard buzzer as an alternative. To enable the buzzer, set pins 7 and 10 as closed.

2.8 DC Input Jack and 4-Pin ATX Connector (DCIN1)



2.9 SATA Signal and Power Connector (SATA1~SATA2/SATA_PWR1~2)

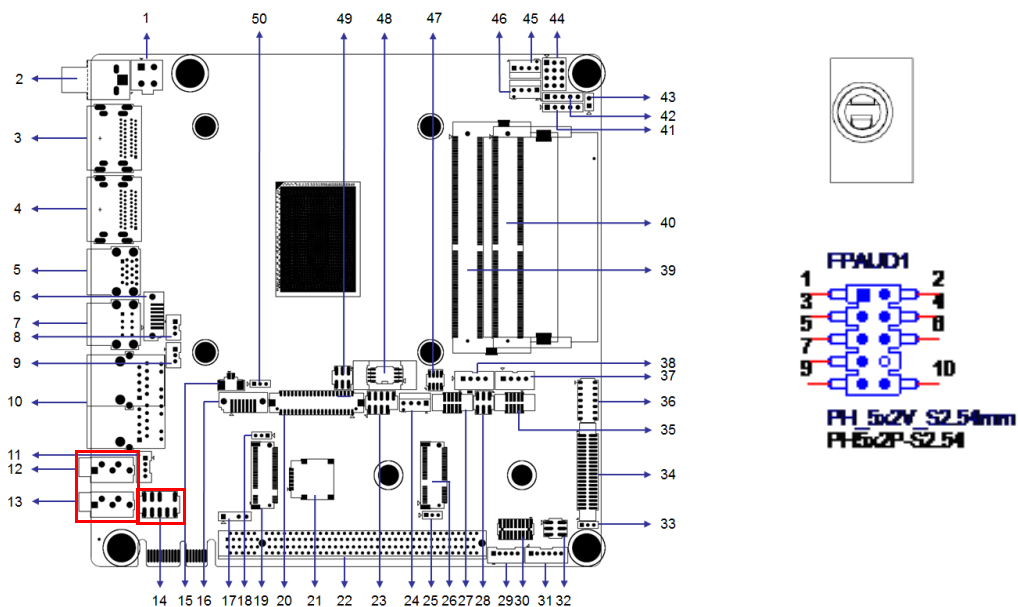


AIMB-228 features a high-performance serial ATA III interface (up to 600 MB/s) that supports thin space-saving cables to streamline hard drive cabling.

2.10 HD Analog Audio Interface (AUDIO1, AUDIO2, FPAUD1)

The FPAUD1 connector is for a chassis-mounted front-panel audio I/O module that supports either HD Audio or legacy AC'97 (optional) standard.

Connect this connector with the front-panel audio I/O module cable.

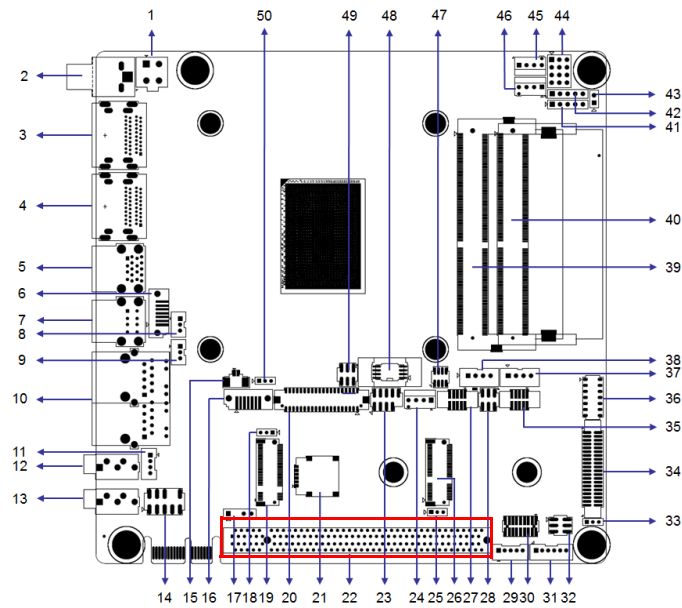


Note! *For motherboards with the optional HD Audio feature, we recommend connecting a high-definition front-panel audio module to this connector to take advantage of the motherboard's high-definition audio capability.*

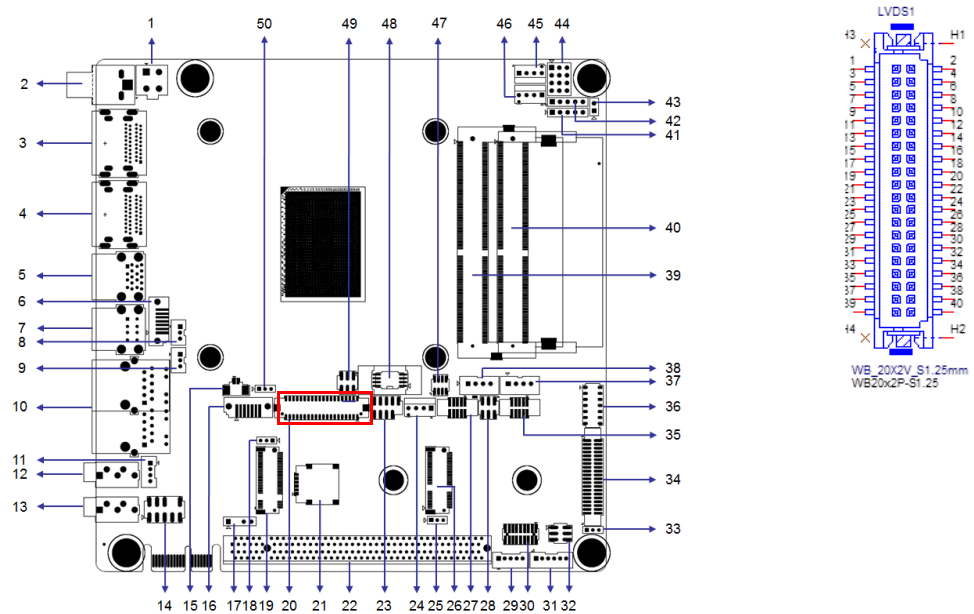


2.11 PCI-E x16 Slot (PCIEX16_1)

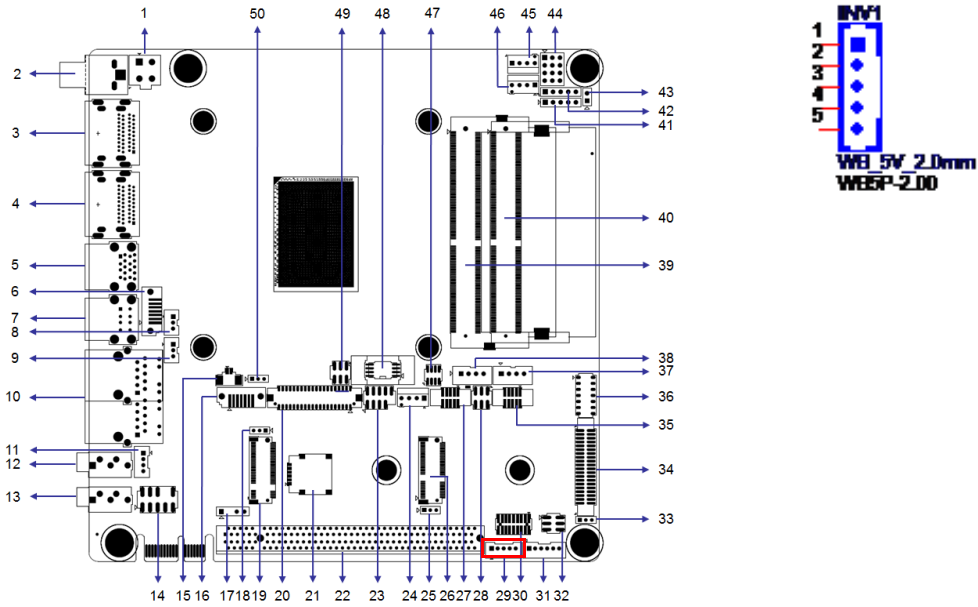
AIMB-228 provides 1 x PCI express x16 slot.



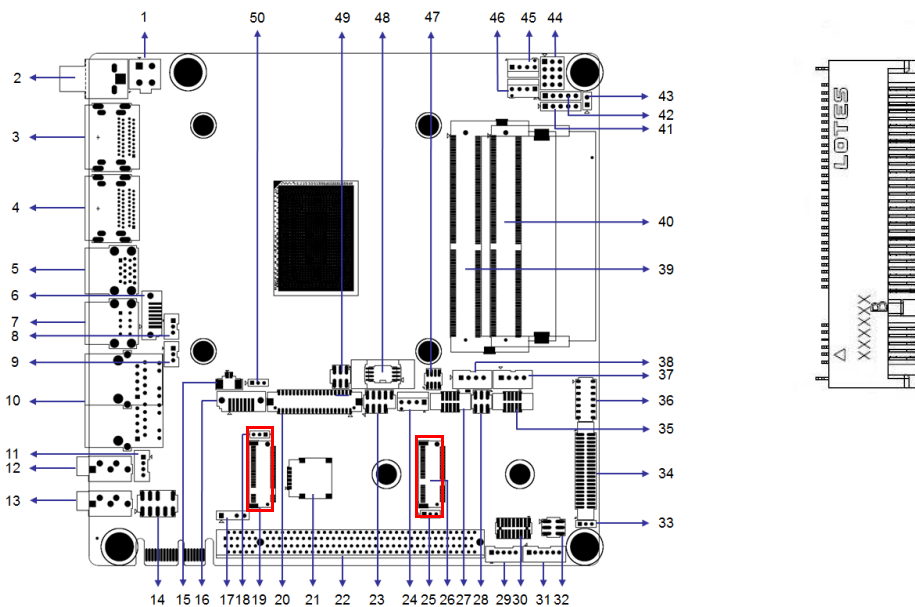
2.12 Low-Voltage Differential Signaling Interface (LVDS1)



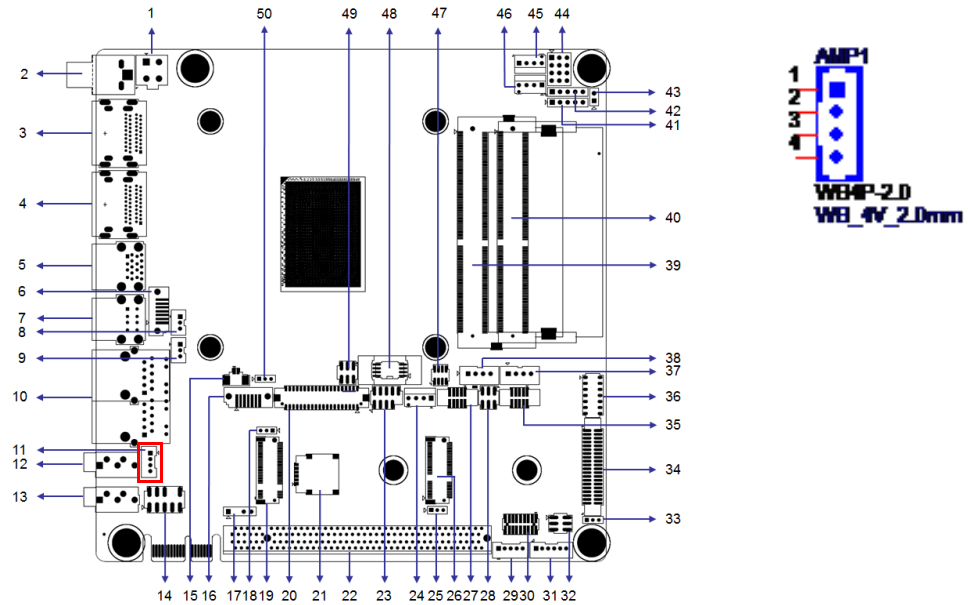
2.13 LVDS Backlight Inverter Power Connector (INV1)



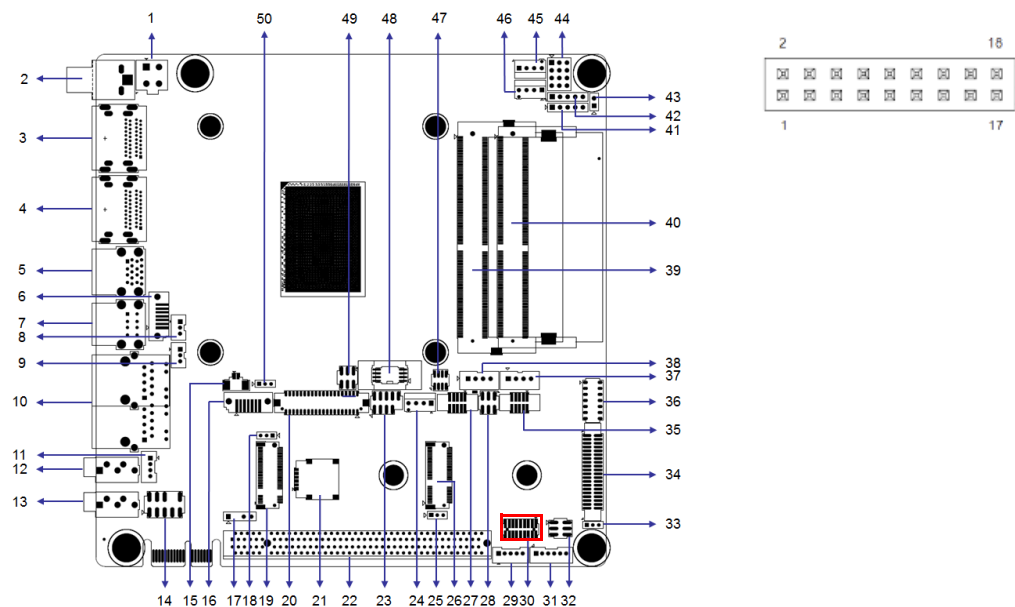
2.14 NGFF M.2 B-Key and E-Key Connector (M2B1 & M2E1)



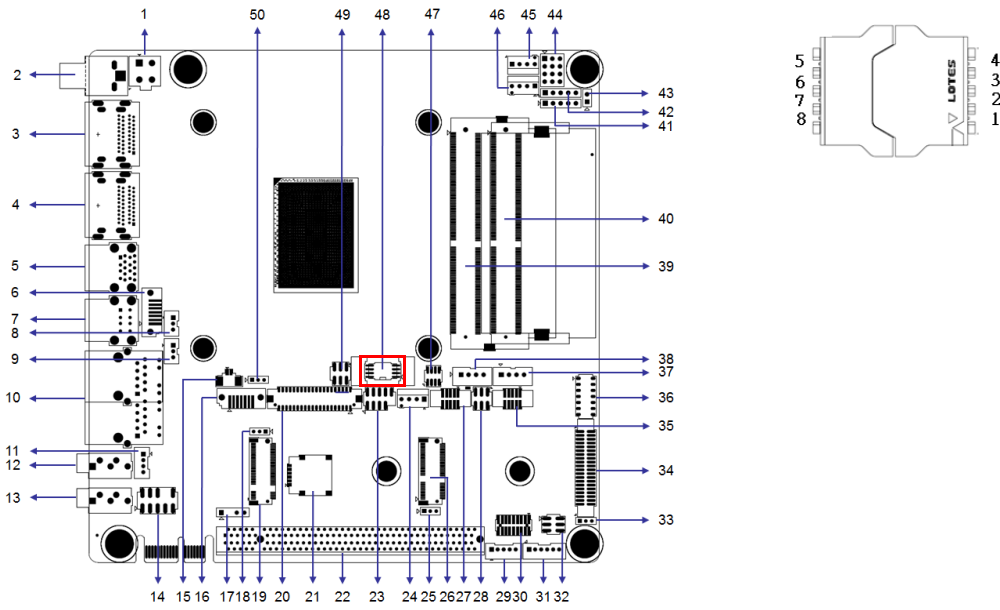
2.15 Audio Amplifier Output Connector (AMP1), BOM Optional



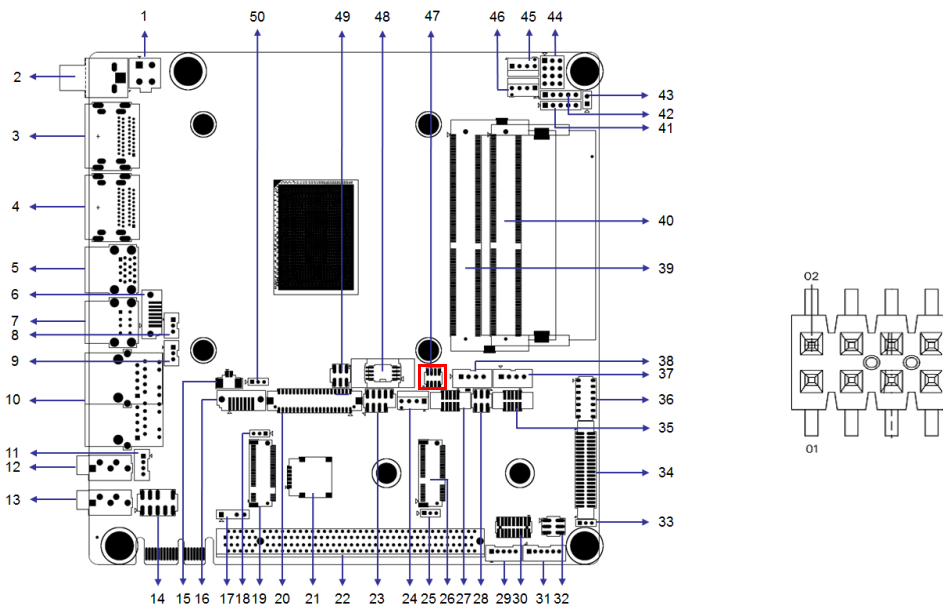
2.16 General Purpose I/O Pin Header (GPIO1)



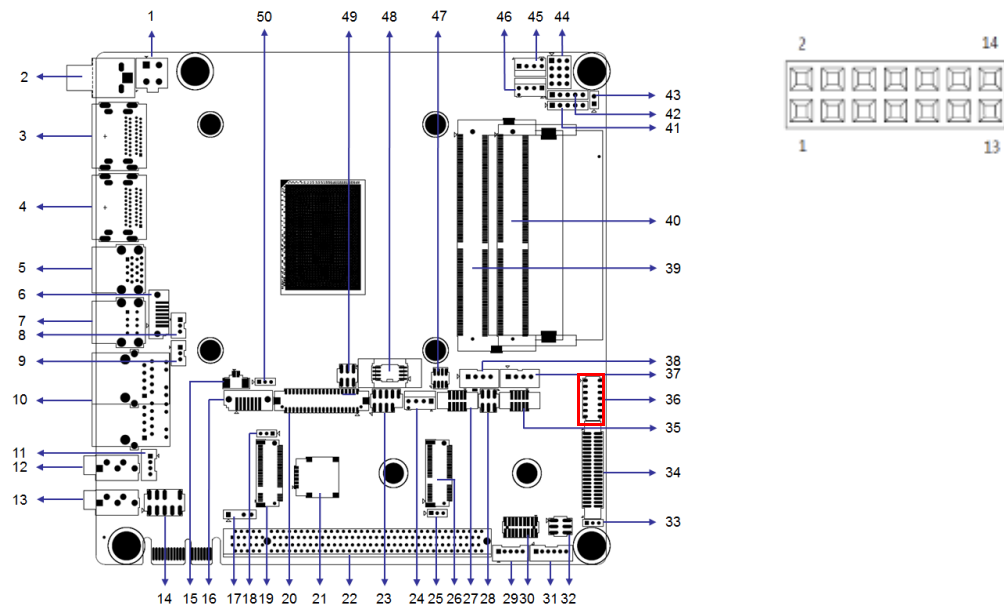
2.17 SPI BIOS Flash Socket (SPI1)



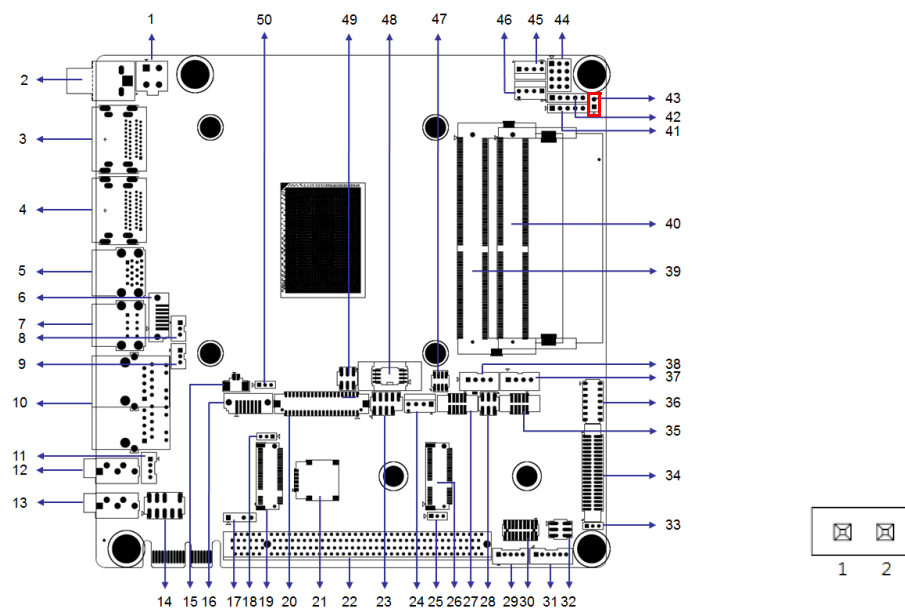
2.18 SPI Programming Pin Header (SPI_CN1)



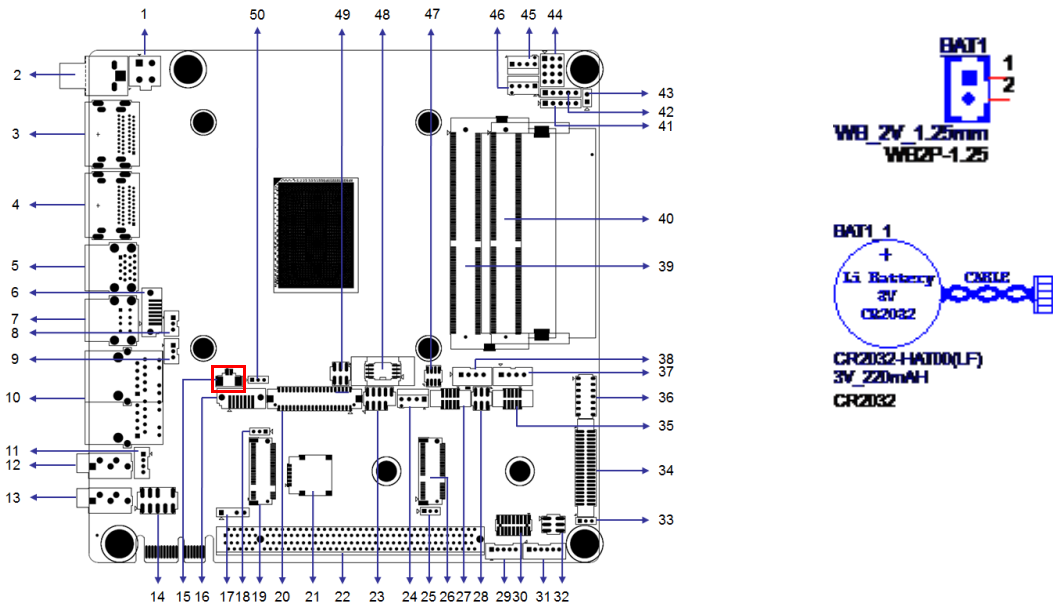
2.19 Low-Pin-Count Header (LPC1)



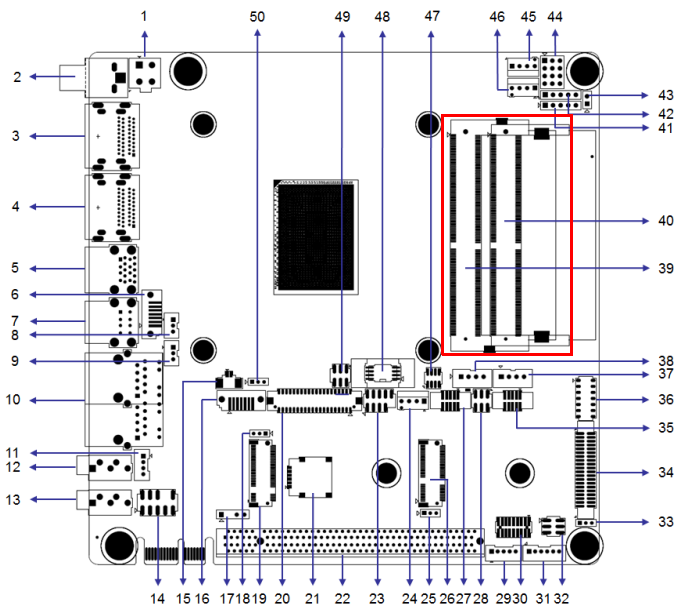
2.20 Case-Open Detect Connector (JCASE1)



2.21 CMOS Battery Connector (BAT1)



2.22 DDR4 SODIMM Socket (DIMMA1, DIMMB1)



Chapter 3

BIOS Operation

3.1 Introduction

With the AMI BIOS Setup program, users can modify the BIOS settings and control the device configuration. The Setup program features a number of menus for making changes and turning special features on or off. This chapter describes the basic navigation of the AIMB-228 BIOS menus.

3.2 BIOS Setup

The AIMB-228 system has AMI BIOS built in and features a CMOS SETUP utility that allows users to configure required settings or activate certain features. The CMOS SETUP saves the configuration in the CMOS RAM of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to preserve the CMOS RAM.

When the power is turned on, press the button during the BIOS POST (power-on self test) to access the CMOS SETUP screen.

Control Keys

< ↑ >< ↓ >< ← >< → >	Move to select item
<Enter>	Select Item
<Esc>	Main Menu - Quit and do not save changes to CMOS Sub Menu - Exit current page and return to Main Menu
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup sub menu
<F2>	Item help
<F5>	Load previous values
<F7>	Load setup defaults
<F10>	Save all CMOS changes

3.2.1 Main Menu

Press to enter the AMI BIOS CMOS Setup Utility. The Main menu will appear onscreen. Use the arrow keys to select an item and press <Enter> to accept or enter the sub-menu.



The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured, whereas options in blue can be configured. The right frame displays the key legend.

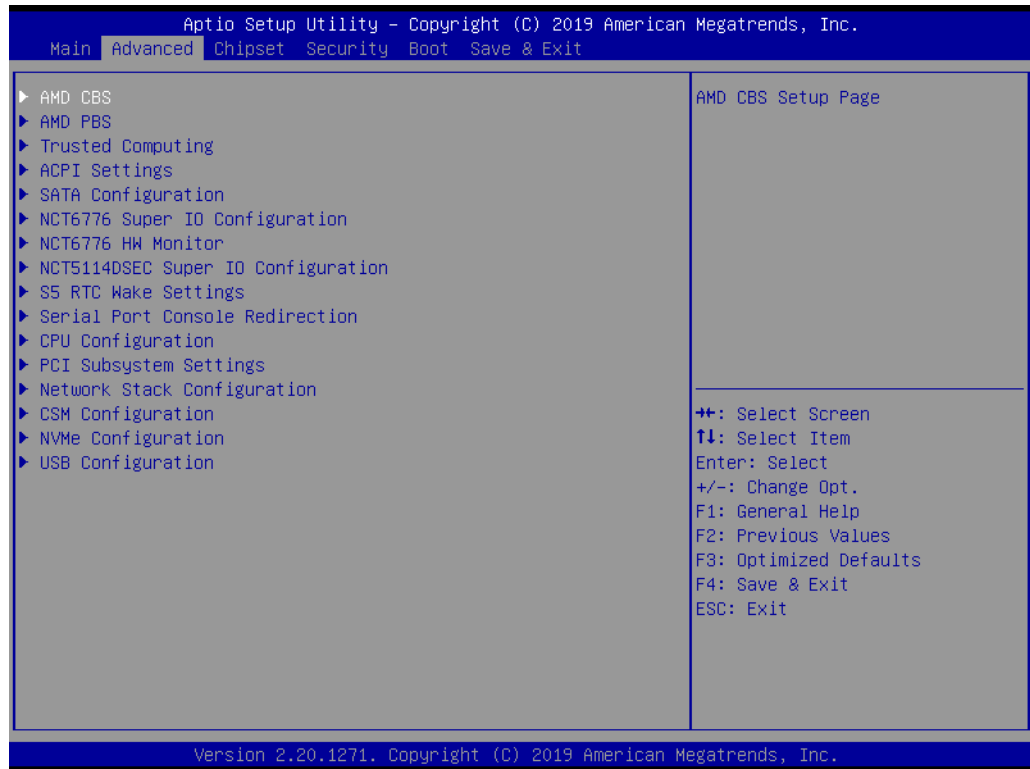
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values via the keyboard. Press the <Tab> or <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.2.2 Advanced BIOS Features

Select the Advanced tab from the BIOS setup menu to enter the Advanced BIOS setup screen. Users can select any of the items in the left frame of the screen, such as CPU Configuration, to access the sub-menu for that item. Display an Advanced BIOS setup option by highlighting it using the <Arrow> keys. All Advanced BIOS setup options are described in this section. The Advanced BIOS setup screen is shown below. The sub menus are described in the following sections.



3.2.2.1 Trusted Computing

This item allows users to enable/disable the TPM (TPM 2.0). The TPM (Trusted Platform Module) is a secure key generator and key cache management component that enables protected storage of encryption keys and authentication credentials for enhanced security.

- **Security Device Support [Disable]**

Note! *The TCG EFI protocol and INT1A interface will not be available.*

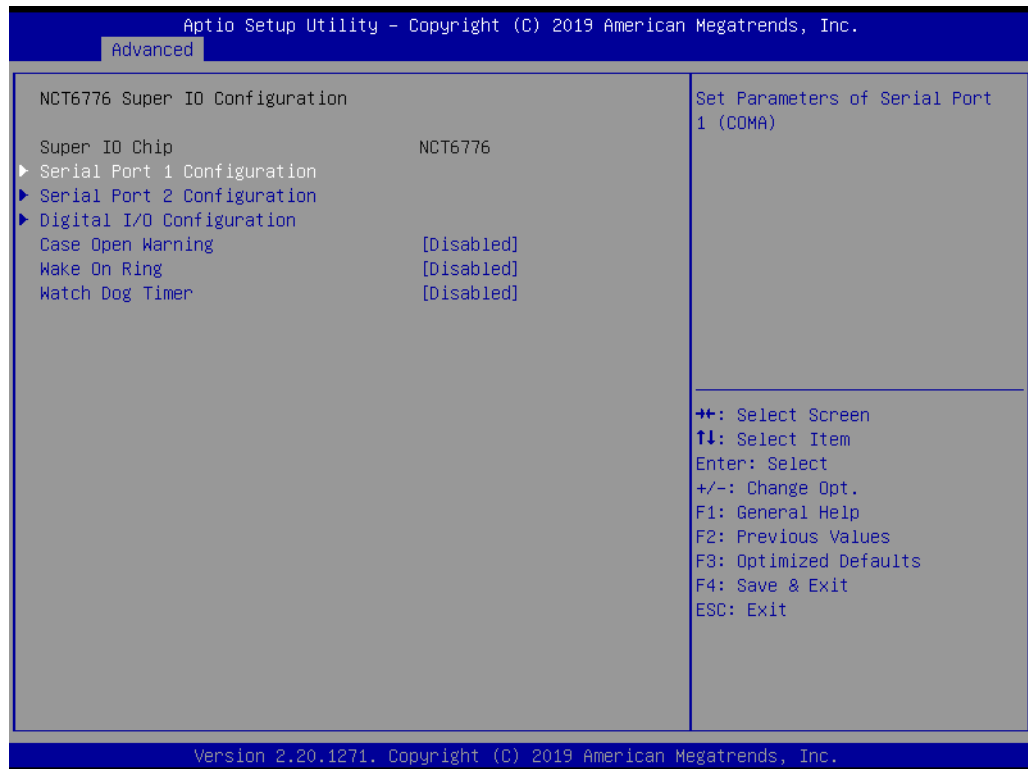


3.2.2.2 ACPI Settings

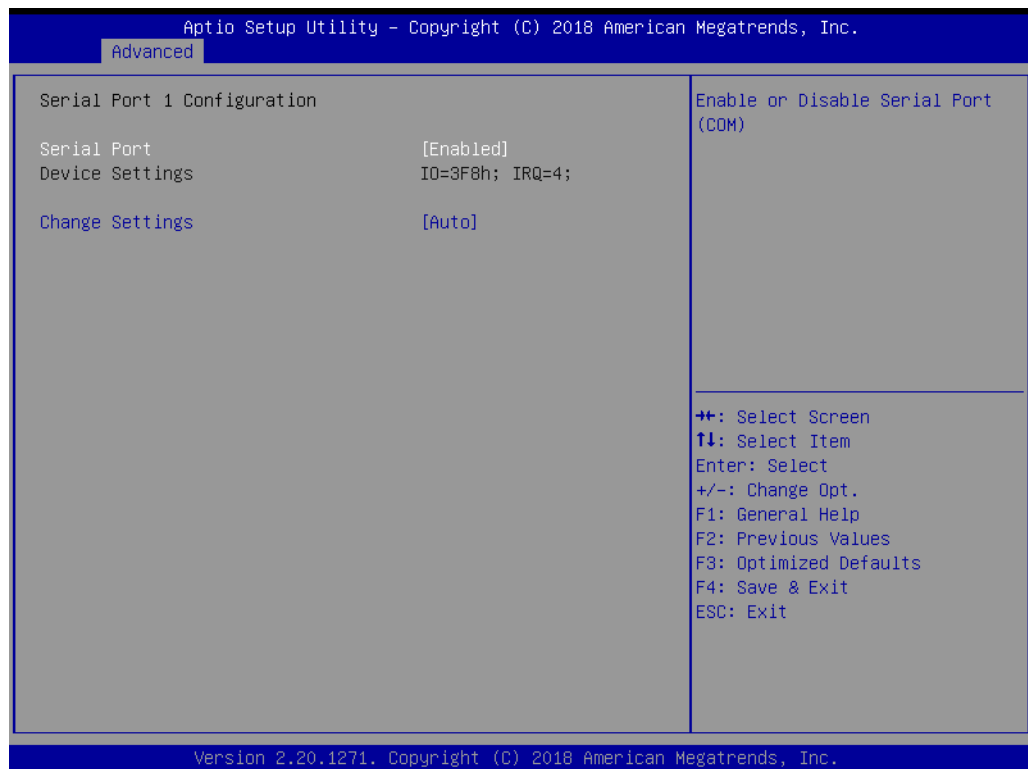


- **Enable ACPI Auto Configuration [Disabled]**
This item allows users to enable/disable BIOS ACPI auto configuration.
- **Enable Hibernation [Enabled]**
This item allows users to enable/disable the Hibernate (OS/S4 sleep state) function. This option may not be available with certain operating systems.
- **ACPI Sleep State [Auto]**
This item allows users to select the ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **Lock Legacy Resources [Disabled]**
This item allows users to enable/disable locking of legacy resources.

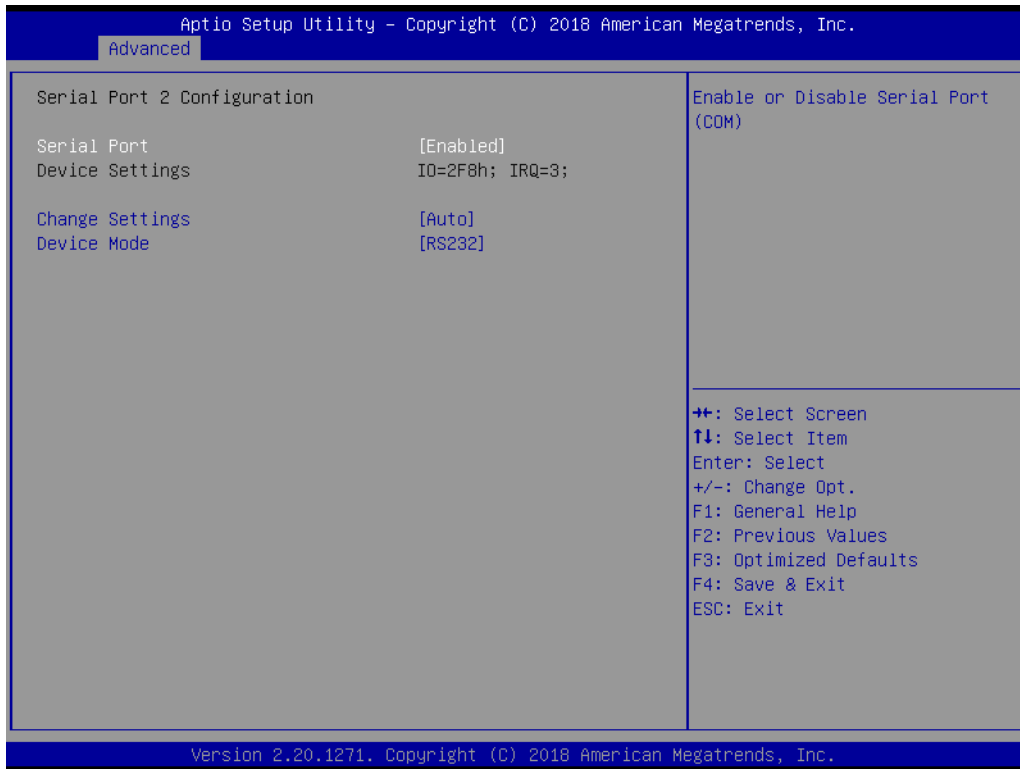
3.2.2.3 NCT6776 Super IO Configuration



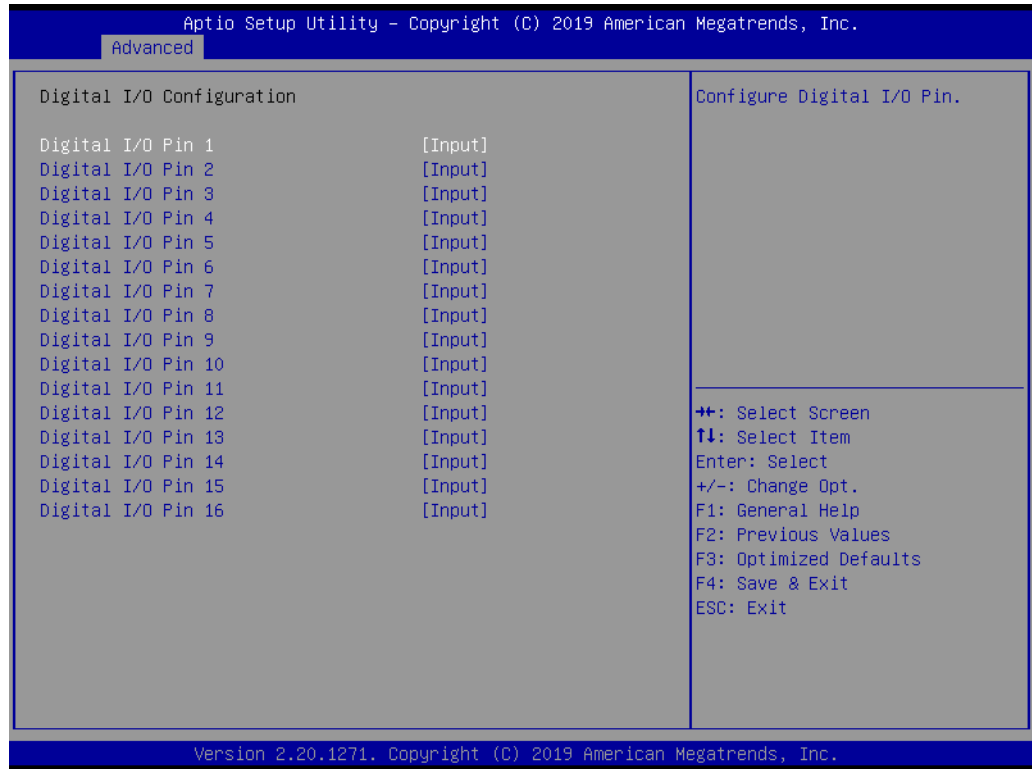
- Super IO Chip [NCT6776]
- Serial Port 1 Configuration



- **Serial Port [Enabled]**
 - **Device Settings: IO = 3F8h; IRQ = 4**
 - **Change Settings [Auto]**
 - This item allows users to select the optimal settings for serial port 1.
- **Serial Port 2 Configuration**

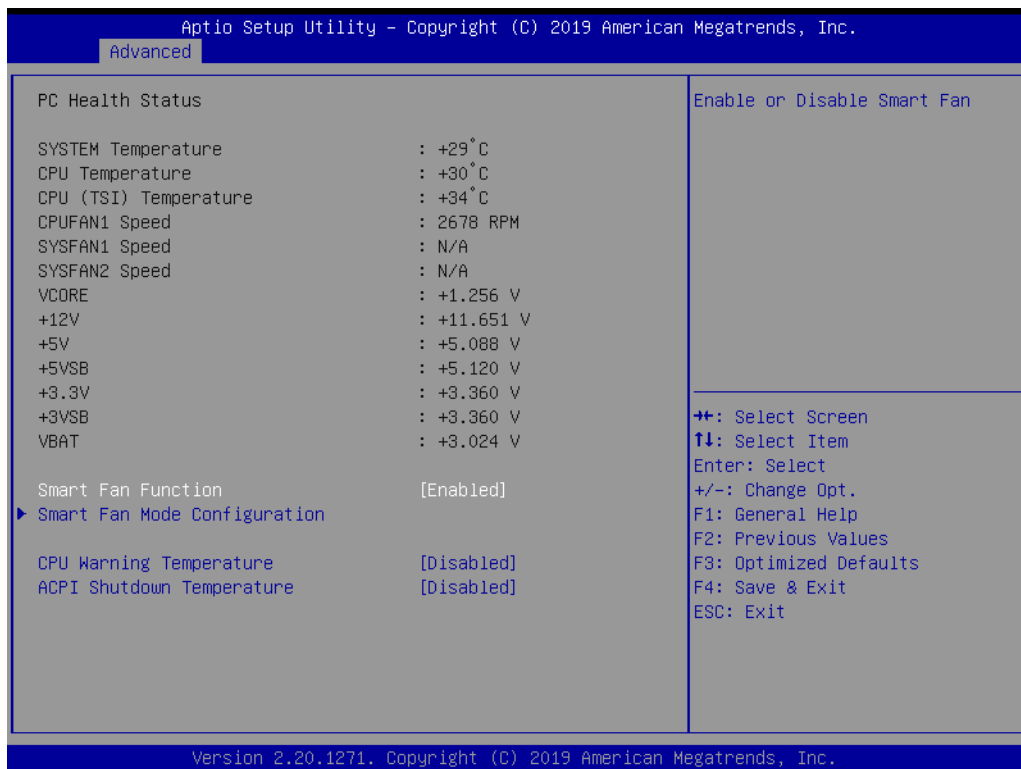


- **Serial Port [Enabled]**
 - **Device Settings: IO = 2F8h; IRQ = 3**
 - **Change Setting [Auto]**
 - This item allows users to select the optimal settings for serial port 2.
- **Digital I/O Configuration**



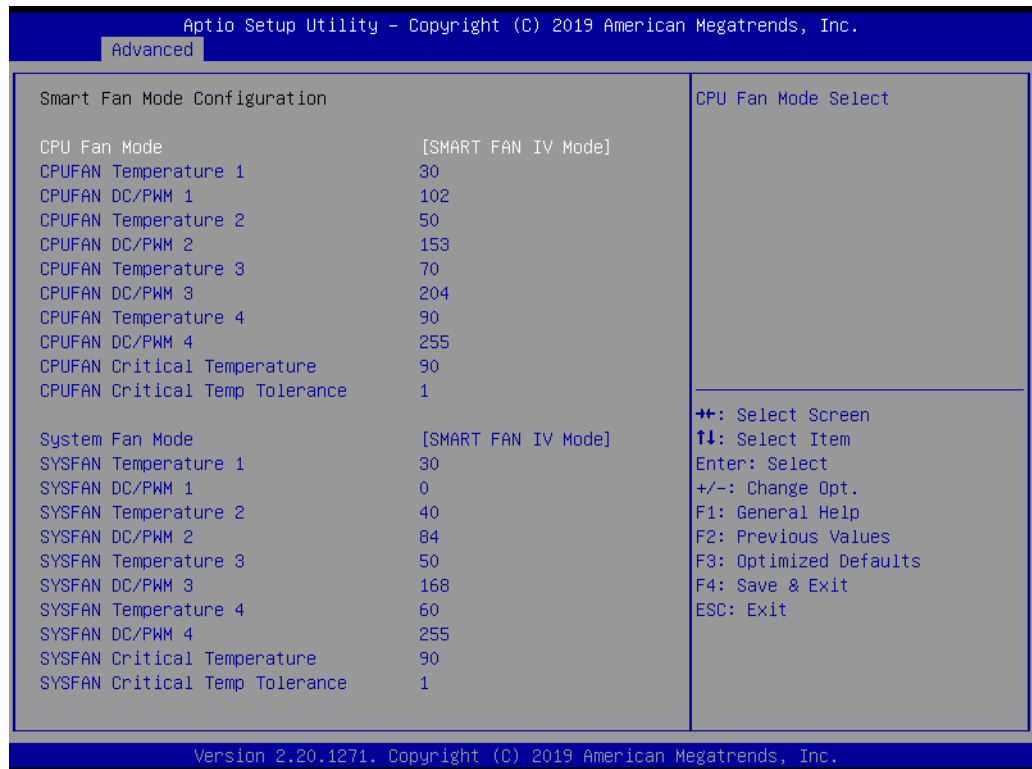
■ **Digital I/O Pin 1 - 16 [Input]**

3.2.2.4 NCT6776 HW Monitor



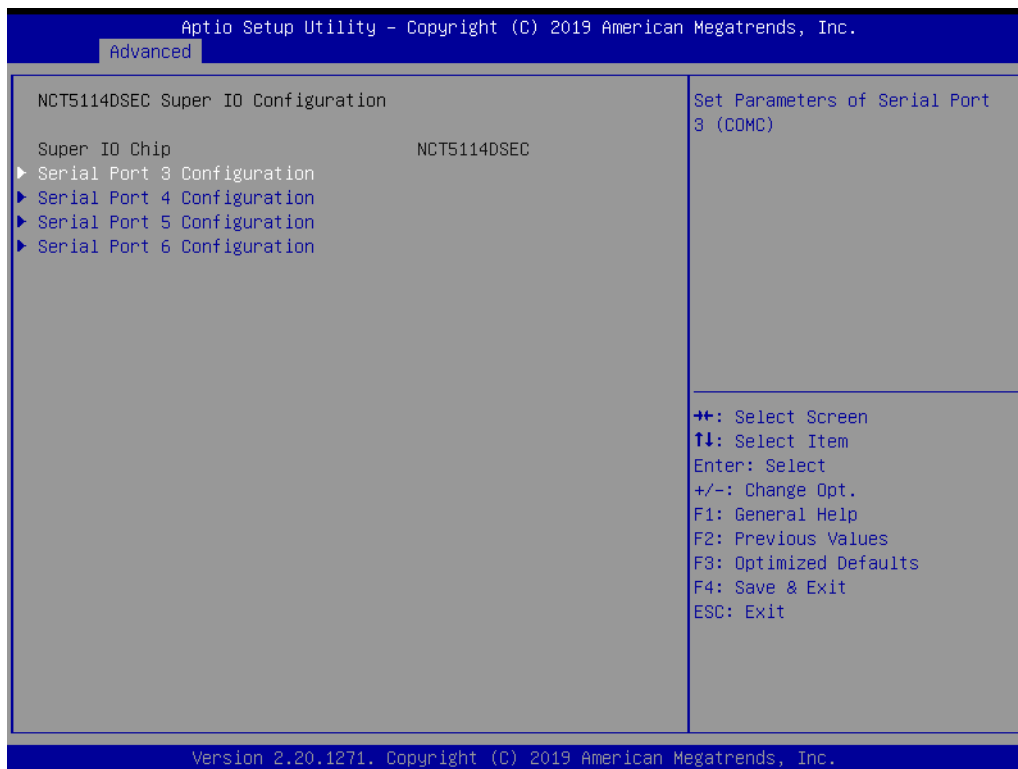
- **CPU Warning Temperature [Disabled]**
This item allows users to enable/disable the CPU warning temperature function and set the threshold value. When the system reaches the warning temperature, the system will emit an alarm.
- **ACPI Shutdown Temperature [Disabled]**
This item allows users to enable/disable the ACPI shutdown temperature function and set the threshold value. When the system reaches the shutdown temperature, it will automatically shut down to protect the system from overheating damage.

- **Smart Fan Mode Configuration**

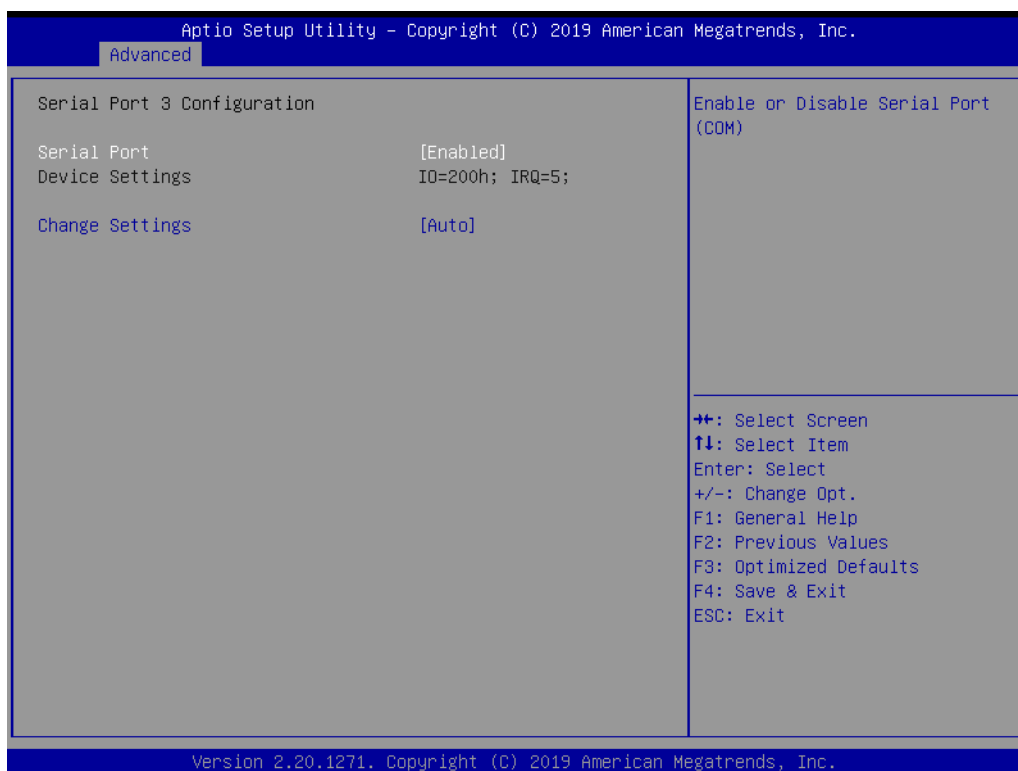


- **CPU Fan Mode [SMART FAN IV Mode]**
This item allows users to view the CPU temperature and fan speed (PWM) information.
- **SYS Fan Mode [SMART FAN IV Mode]**
This item allows users to view the system temperature and fan speed (PWM) information.

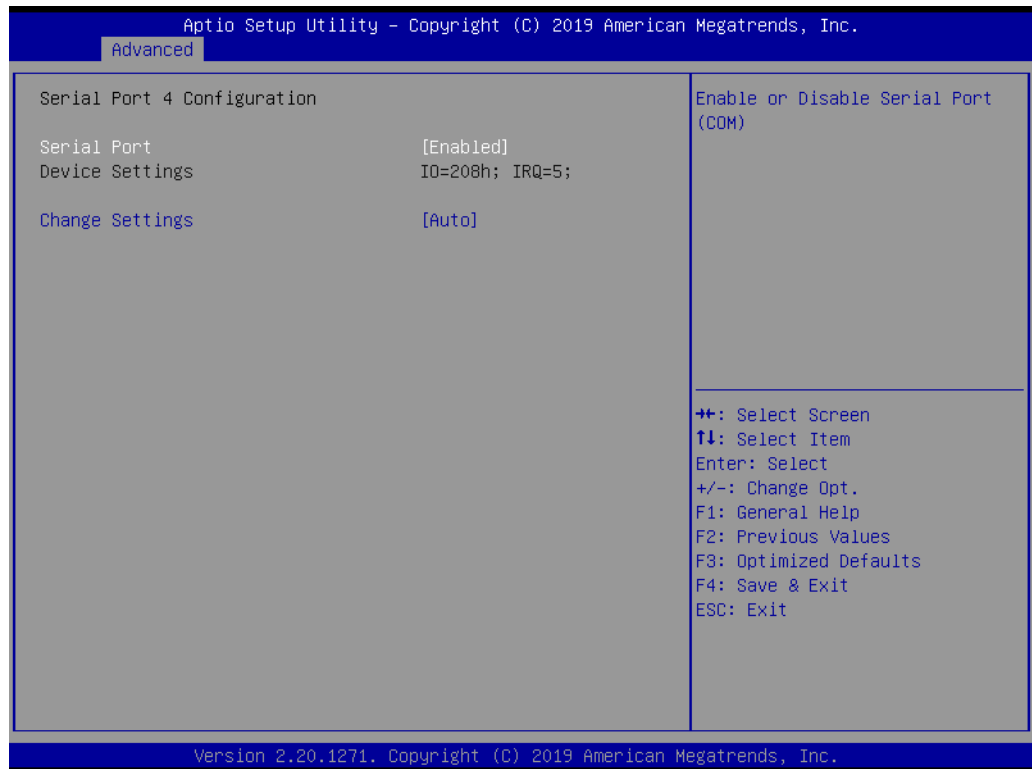
3.2.2.5 NCT5114D Super IO Configuration



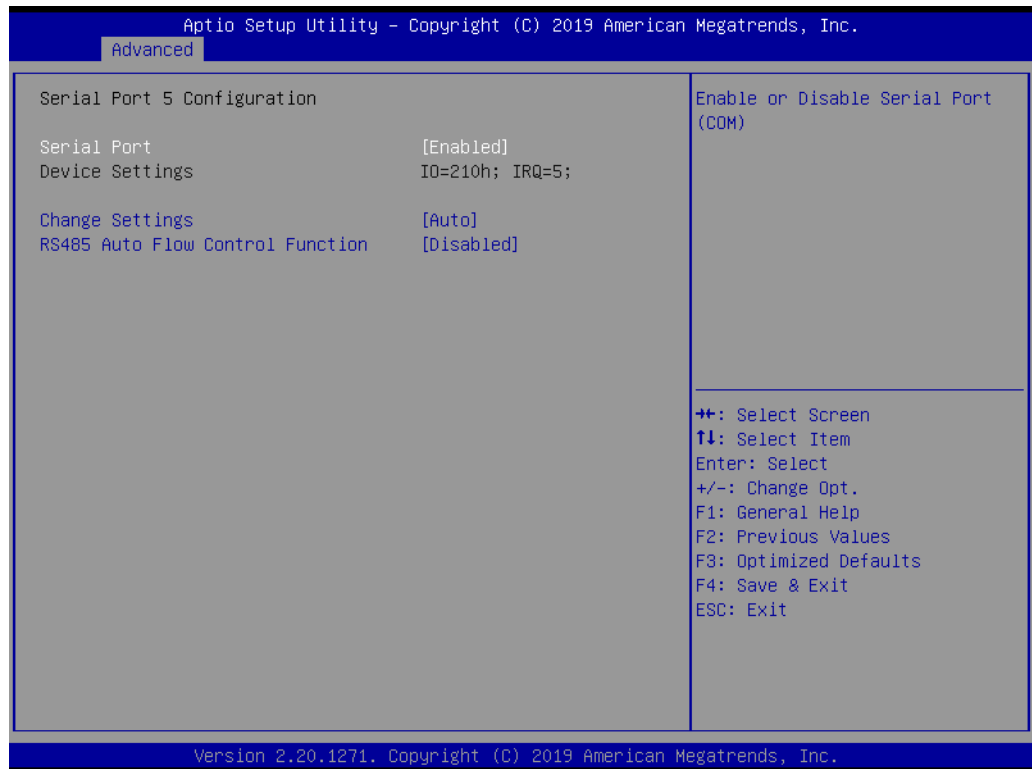
■ Serial Port 3 Configuration



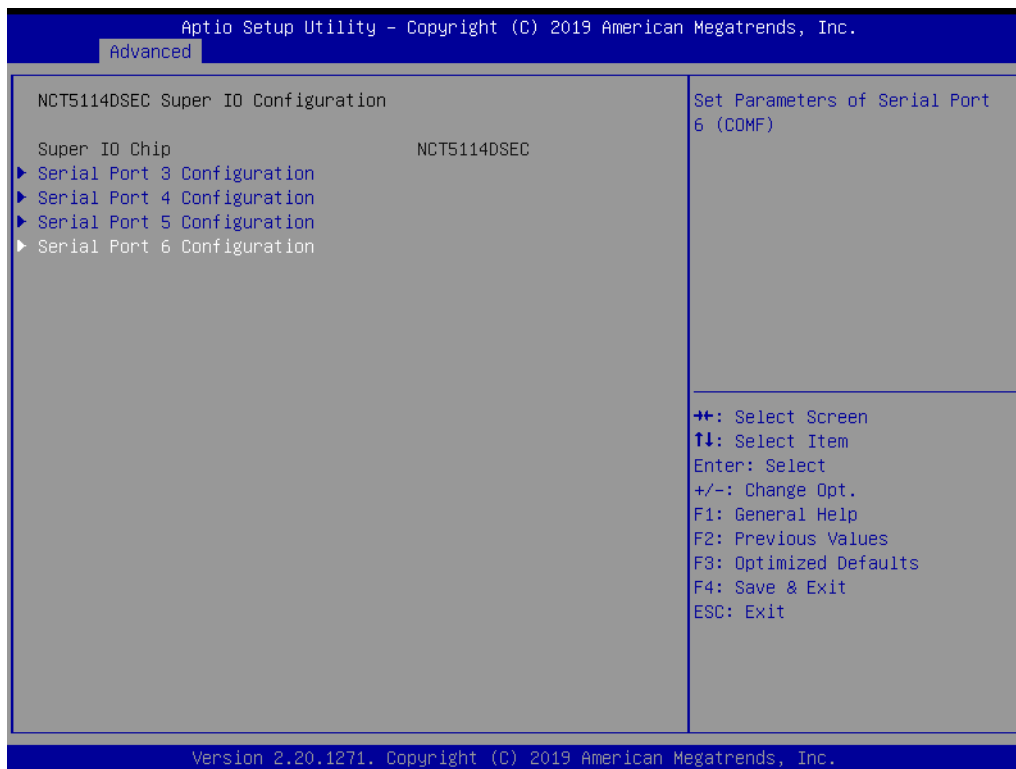
■ Serial Port 4 Configuration



■ Serial Port 5 Configuration

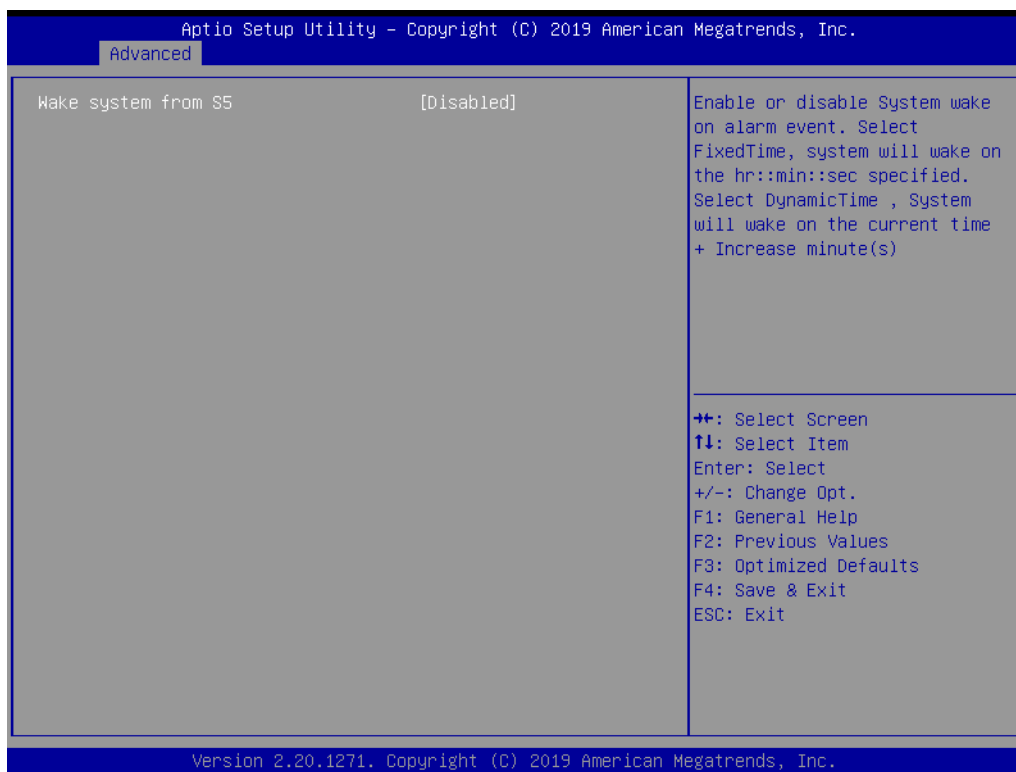


■ Serial Port 6 Configuration



3.2.2.6 S5 RTC Wake Settings

This item allows users to enable/disable the system-wake-on-alarm function.

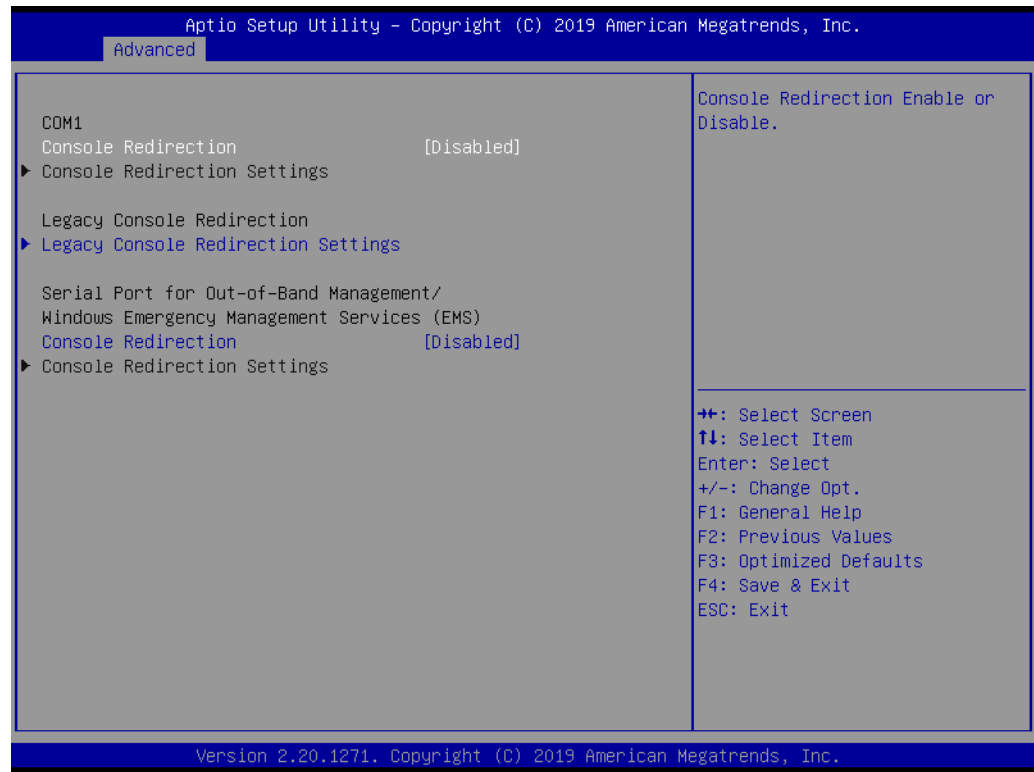


- **Wake System with Fixed Time [Disabled]**

Note! When enabled, the system will wake at the specified time.



3.2.2.7 Serial Port Console Redirection



- **Console Redirection [Enabled]**

This item allows users to enable/disable the console redirect function.

3.2.2.8 Network Stack Configuration [Disabled]

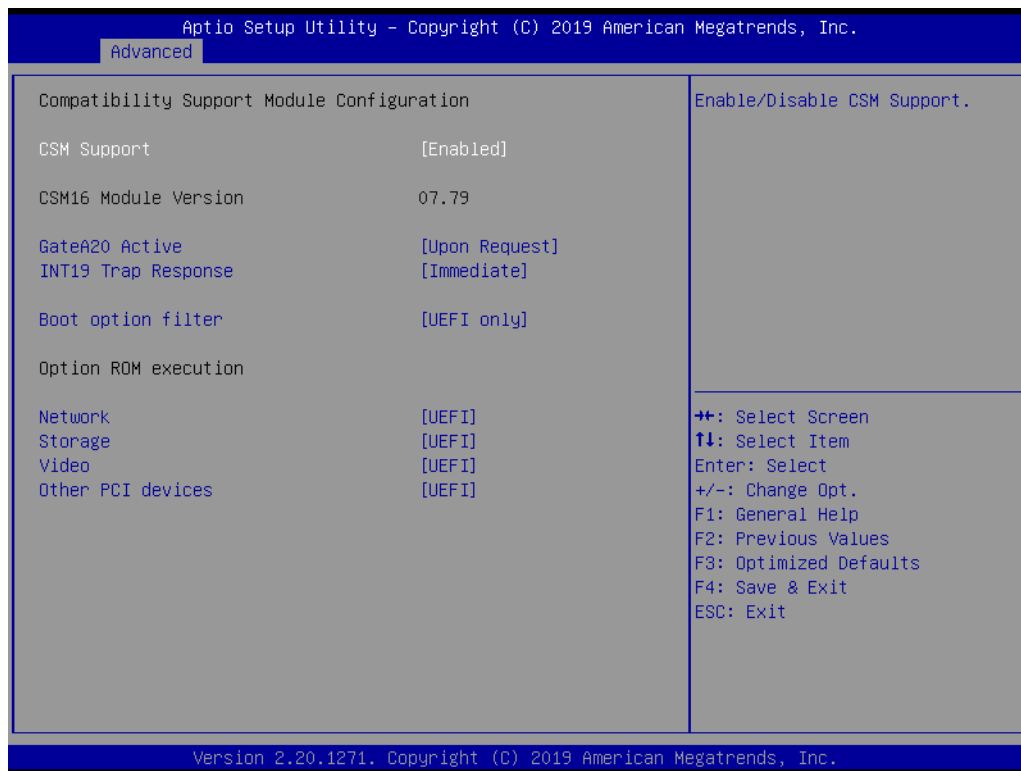


■ Network Stack [Disabled]

Note! *When the network stack function is enabled, the LANx PXE OpROM must be enabled.*



3.2.2.9 CSM Configuration



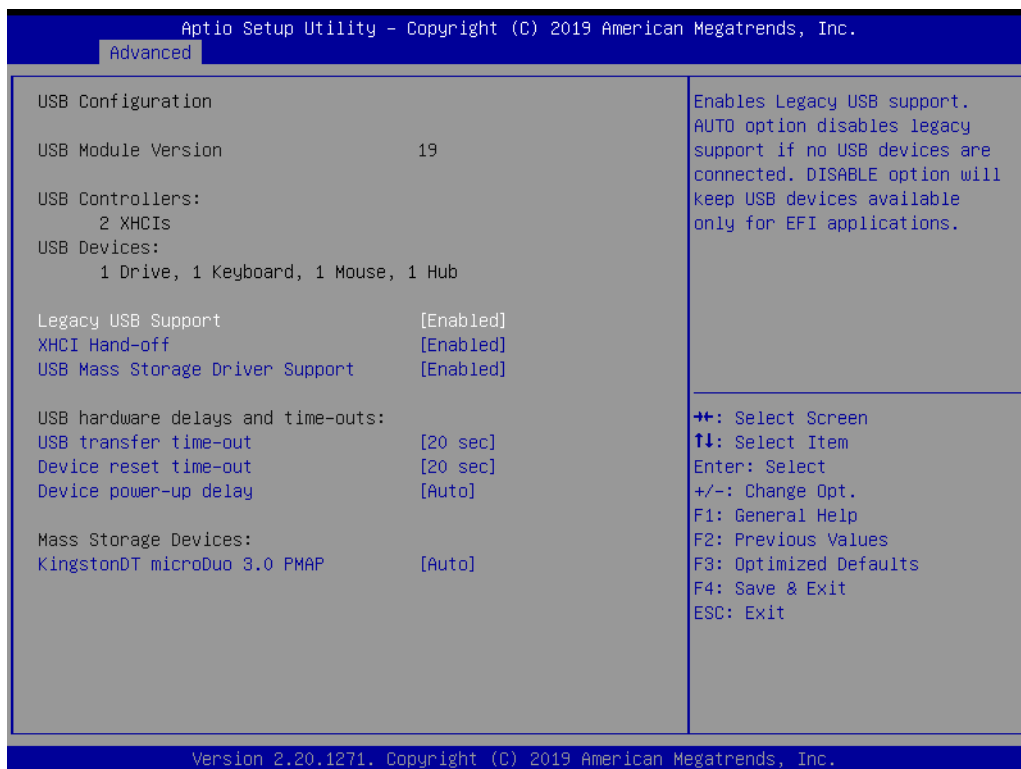
- **Boot Option Filter [UEFI only]**
- **Network [UEFI]**
- **Storage [UEFI]**
- **Video [UEFI]**
- **Other PCI Device [UEFI]**

Note! *If your HDD or other boot device is installed in Legacy mode, it may cause blue screen situation. There are 2 ways to solve this.*



1. *Re-install the OS in UEFI mode.*
2. *Change all of the above settings to Legacy mode.*
 - * *Boot option filter -> Legacy only*
 - * *Network -> Legacy*
 - * *Storage -> Legacy*
 - * *Video -> Legacy*
 - * *Other PCI devices -> Legacy*

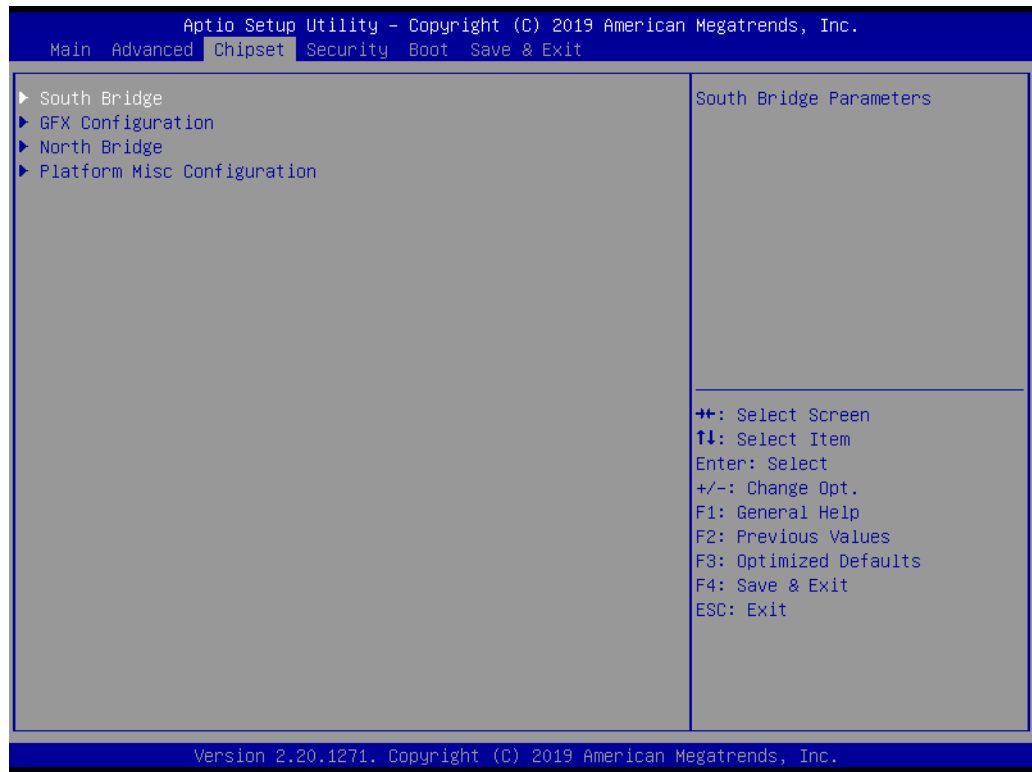
3.2.2.10 USB Configuration



- **Legacy USB Support [Enabled]**
This item allows users to enable/disable support for legacy USB. The “Auto” option disables legacy support if no USB devices are connected.
- **XHCI Hand-Off [Enabled]**
- **USB Mass Storage Driver Support [Enabled]**
- **USB Hardware Delays and Timeouts**
This item allows users to configure the USB device transfer and reset timeout and delay settings.
- **Mass Storage Devices [Auto]**
This item allows users to view USB mass storage device information.

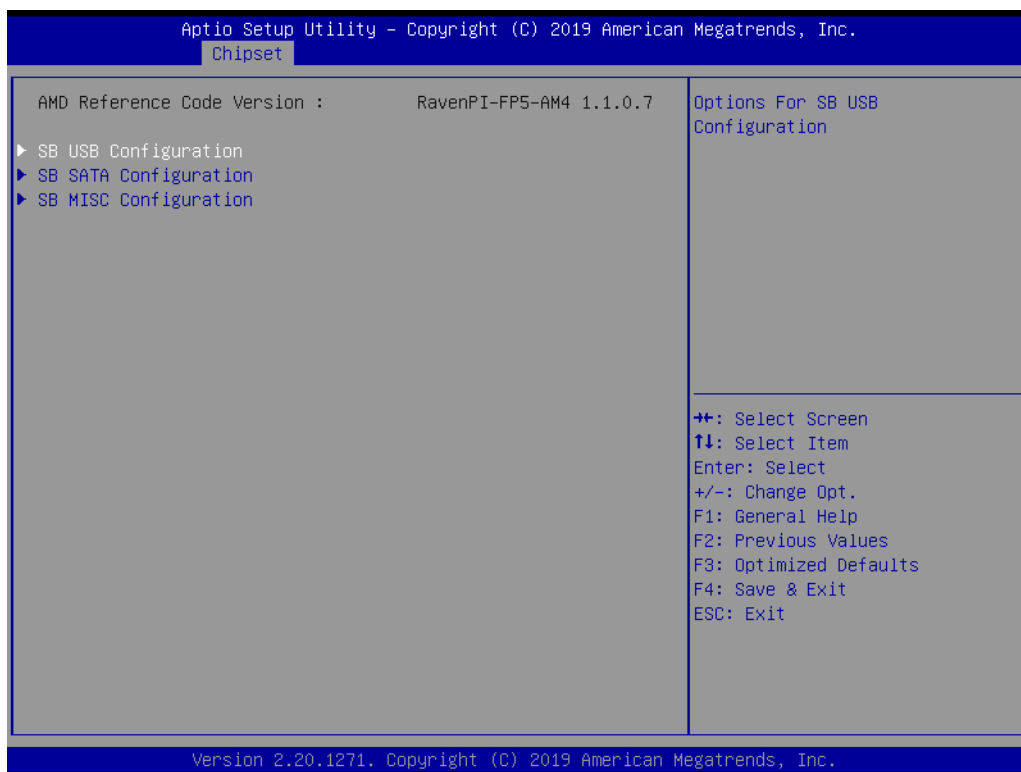
3.3 Chipset Configuration Setting

Select the Chipset tab from the BIOS setup menu to enter the Chipset Setup screen. Users can select any item in the left frame of the screen to access the sub-menu for that item. Users can display a Chipset setup option by highlighting it using the <Arrow> keys. All Chipset Setup options are described in this section. The Chipset Setup screens are shown below. The sub-menus are described in the following sections.



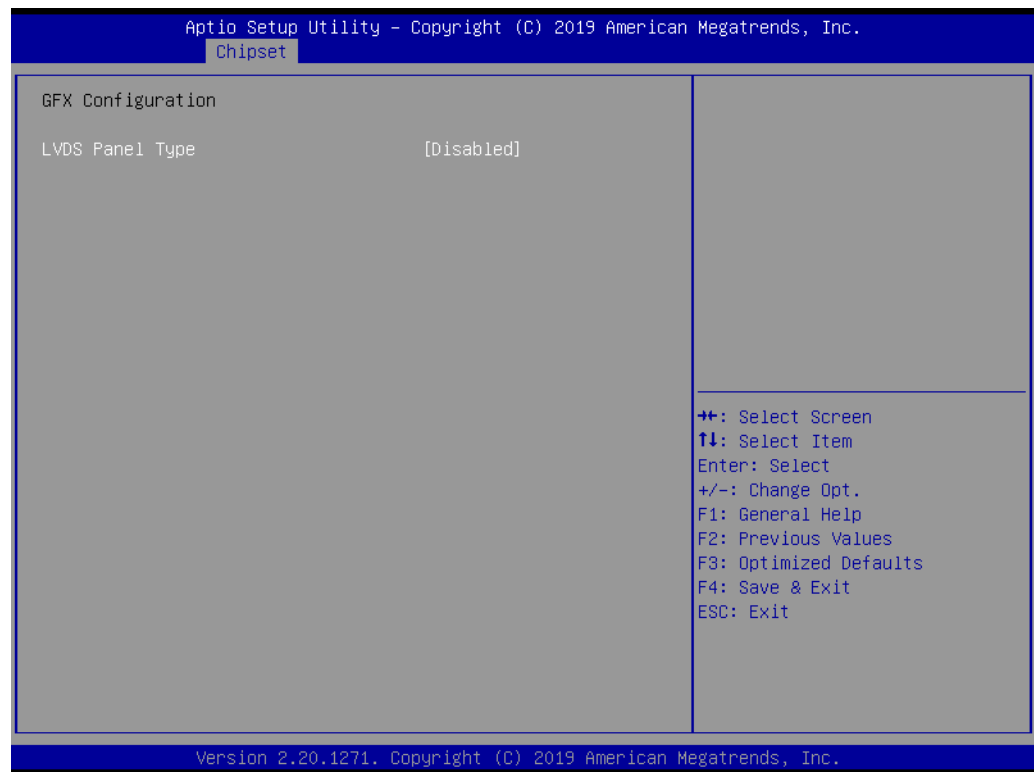
- **South Bridge Configuration**
This item allows users to configure the south bridge settings.
- **GFX Configuration**
This item allows users to view details of the display items.
- **North Bridge Configuration**
This item allows users to configure the north bridge settings.
- **Platform Misc Configuration**
This item allows users to view the platform configuration information.

3.3.1 South Bridge Configuration



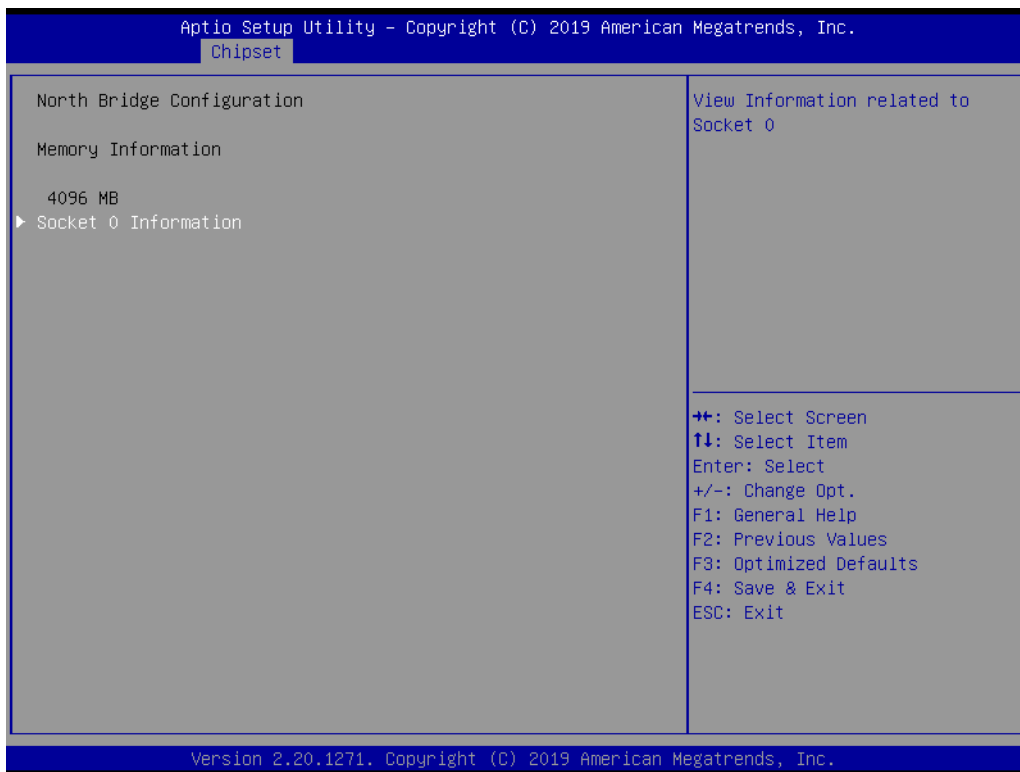
- **SB USB Configuration**
This item allows users to configure the USB settings.
- **SB SATA Configuration**
This item allows users to configure the SATA settings.
- **SB MSIC Configuration**
This item allows users to configure miscellaneous settings.

3.3.2 GFX Configuration

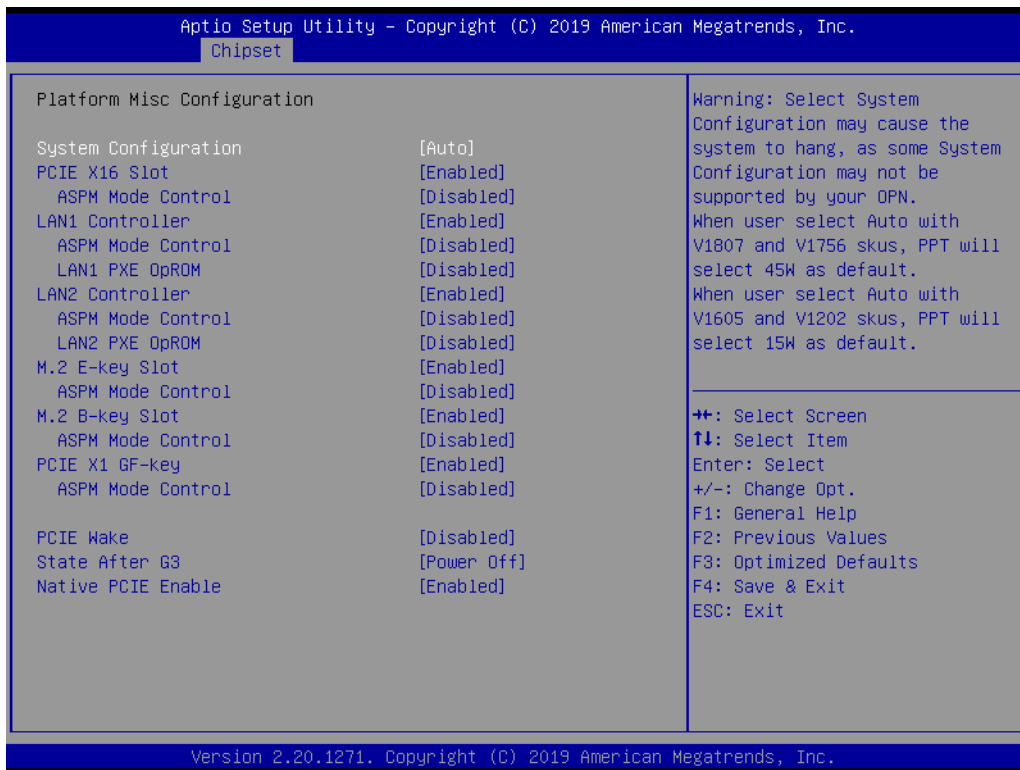


- **LVDS Panel Type [Disabled]**

3.3.3 North Bridge Configuration



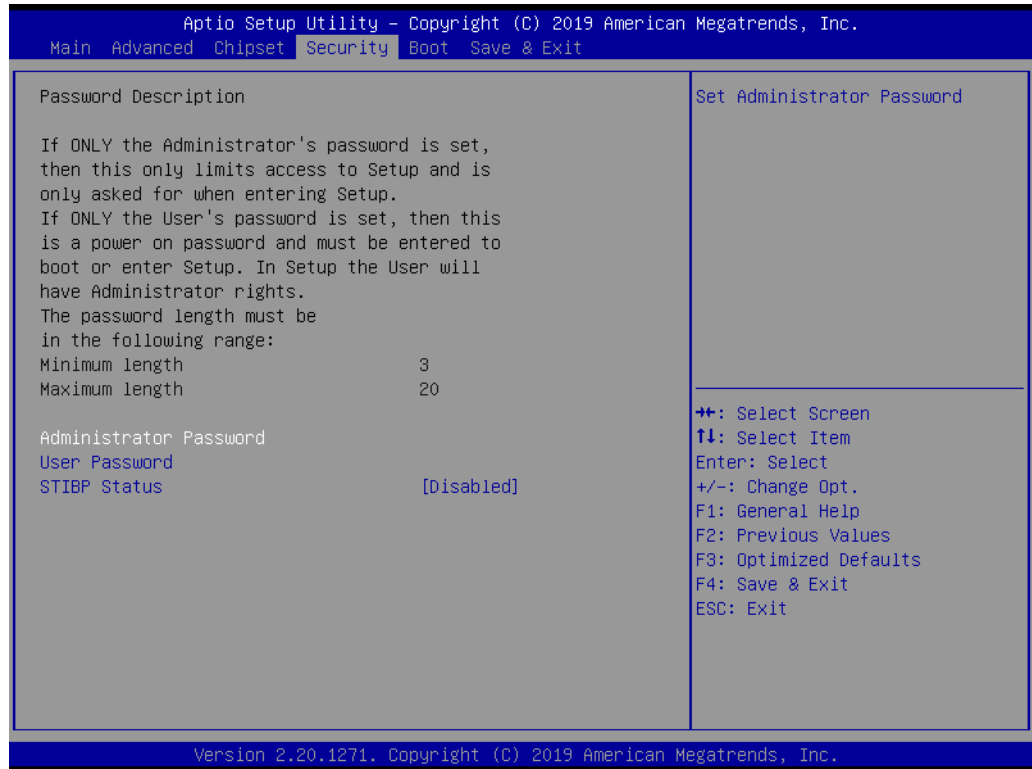
3.3.4 Platform Misc Configuration



- **System Configuration [Auto]**
- **PCIe x16 Slot [Enabled]**
- **LAN1 Controller [Enabled]**

- LAN2 Controller [Enabled]
- M.2 E-Key Slot [Enabled]
- M.2 B-Key Slot [Enabled]
- PCIE x1 GF-Key [Enabled]
- PCIE Wake [Disabled]

3.4 Security Settings



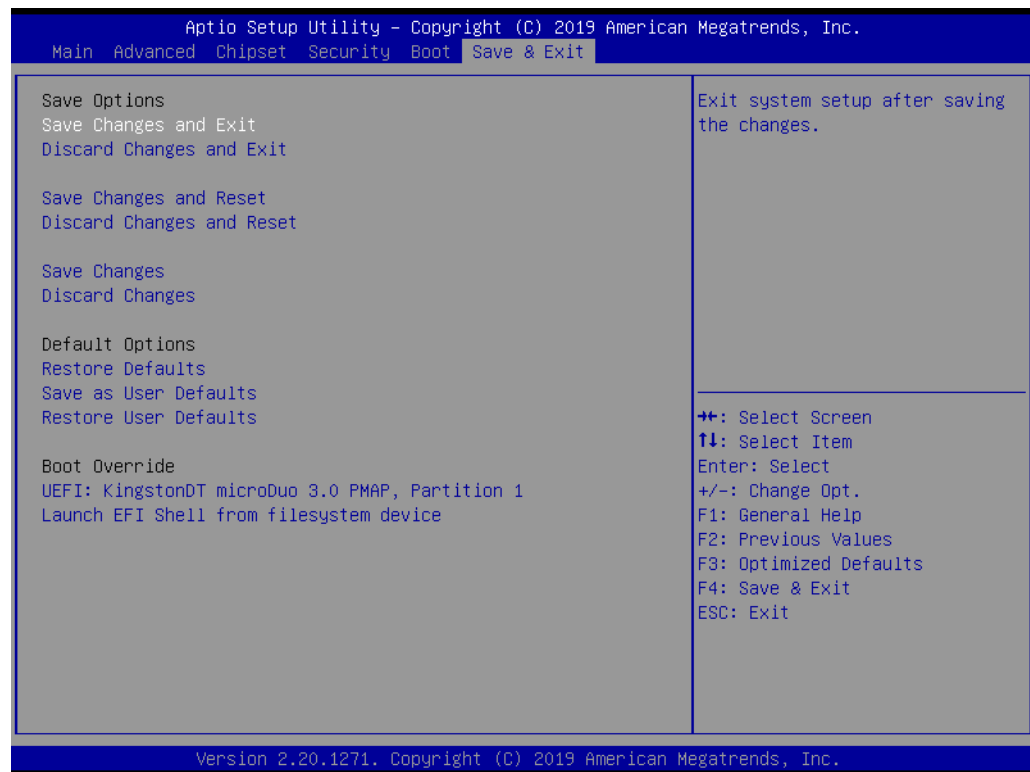
- **Administrator Password**
This item allows users to set the administrator password. Select this option and press <ENTER> to access the sub-menu. Then input the desired password.
- **User Password**
This item allows users to set the user password. Select this option and press <ENTER> to access the sub-menu. Then input the desired password.

3.5 Boot Setting



- **Setup Prompt Timeout**
This item allows users to set the setup prompt timeout value. Use the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.
- **Bootup NumLock State [Enabled]**
This item allows users to enable/disable the NumLock state on bootup.
- **Quiet Boot [Disabled]**
This item allows users to enable/disable quiet bootup. If this option is disabled, the BIOS will display normal POST messages. If enabled, an OEM logo is displayed instead of POST messages.
- **Boot Option #1/#2**
This item allows users to set the device bootup priority.

3.6 Save & Exit Configuration



■ Save Changes and Exit

This item allows users to save changes and exit the BIOS. After completing the system configuration, select this option to save changes and exit the BIOS setup menu.

1. Select Exit Save Changes from the Exit menu and press <Enter>. The following message will appear: Save configuration changes and exit now? [Ok] [Cancel]
2. Select ok or cancel.

■ Discard Changes and Exit

This item allows users to exit the BIOS without making changes to the system configuration.

1. Select Exit Discard Changes from the Exit menu and press <Enter>. The following message will appear: Discard changes and exit setup now? [Ok] [Cancel]
2. Select ok or cancel.

■ Save Changes and Reset

This item allows users to save changes and reset the system. After completing the system configuration, select this option to save changes, exit the BIOS setup menu, and reboot the computer for all system configuration settings to take effect.

1. Select Exit Save Changes from the Exit menu and press <Enter>. The following message appears: Save configuration changes and exit now? [Ok] [Cancel]
2. Select ok or cancel.

■ Discard Changes and Reset

This item allows users to discard changes and reset the system. Select this option to quit the BIOS without making changes to the system configuration.

1. Select Reset Discard Changes from the Exit menu and press <Enter>. The following message appears: Discard changes and exit setup now? [Ok] [Cancel]
2. Select ok or cancel.

- **Restore Default**
This item allows users to restore the system configuration to the default settings. Select Restore Defaults from the Exit menu and press <Enter>. When this option is selected, the BIOS automatically configures all the setup items to the optimal setting. Defaults are designed for maximum system performance, but may not be ideal for all applications. Do not use default settings if the computer is experiencing configuration problems.
- **Save as User Default**
This item allows users to save all current settings as the user default.
- **Restore User Default**
This item allows users to restore all settings to the user default values.

Chapter 4

Software and Services

4.1 Introduction

The mission of Advantech Embedded Software Services is to “enhance the user experience with Advantech platforms and Microsoft® Windows® embedded technology”. Windows® embedded software products are enabled on Advantech platforms to support the embedded computing community. This frees customers from the hassle of dealing with multiple vendors (hardware suppliers, system integrators, embedded OS distributors).

4.2 Value-Added Software Services

AIMB-228 is equipped with software APIs that define the ways by which application programs may request services from libraries and/or operating systems. Advantech provides the required drivers as well as a comprehensive set of user-friendly, intelligent, and integrated interfaces, which speed development, enhance security, and offer add-on value for Advantech platforms. These software APIs make Advantech embedded platforms easier and simpler to adopt and deploy for diverse applications.

4.2.1 Software API

4.2.1.1 Control

GPIO



General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. Allows users to monitor the level of signal input or set the output status to switch on/off the device.

Advantech’s API also offers programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

SMBus



SMBus is the System Management Bus defined by Intel® Corporation in 1995. It is used in personal computers and servers for low-speed system management communications. The SMBus API allows developers to interface an embedded system environment and transfer serial messages using SMBus protocols, enabling simultaneous control of multiple devices.

4.2.1.2 Display

Brightness Control



The Brightness Control API allows developers to access embedded devices and easily control brightness.

Backlight



The Backlight API allows developers to control the screen backlight (on/off) in embedded devices.

4.2.1.3 Monitor

Watchdog



A watchdog timer (WDT) is a device that performs a specific operation after a certain period of time if something goes wrong and the system does not recover on its own. A WDT can be programmed to perform a warm boot (system restart) after a certain number of seconds.

Hardware Monitor



The Hardware Monitor (HWM) API is a system health supervision API that monitors certain condition indexes, such as fan speed, temperature, and voltage.

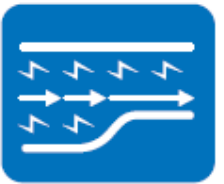
4.2.1.4 Power Saving

CPU Speed



Uses Intel® SpeedStep technology to reduce power consumption. The system will automatically adjust the CPU speed according to the system load.

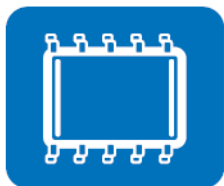
System Throttling



Refers to a series of methods for reducing power consumption by lowering the clock frequency. This API allows the user to adjust the clock from 87.5% to 12.5%.

4.2.2 Software Utility

BIOS Flash



The BIOS Flash utility allows customers to update the flash ROM BIOS version, or back up the current BIOS settings by copying the data from the flash chip to a file. The BIOS flash utility also provides a command line and API for rapid implementation in customized applications.

Embedded Security ID



Embedded applications contain valuable intellectual property, design knowledge, and innovation. But this information can be easily copied. The Embedded Security ID utility provides reliable security functions for securing application data within the embedded BIOS.

Monitoring



The Monitoring utility allows customers to monitor the system status and parameters, such as voltage, CPU temperature, and fan speed. If the critical errors occur and are not resolved quickly, permanent damage may result.

Flash Lock



Flash Lock is a mechanism to bind the board and CF card (SQFlash) together. User can lock/unlock the SQFlash card via the Flash Lock function in the BIOS setup menu after bootup. A locked SQFlash cannot be read by any card reader or boot from other platforms without a BIOS with the "Unlock Flash" option.

eSOS



The eSOS is a small OS stored in the BIOS ROM. In the event of a main OS crash, the eSOS will boot up. It will diagnose the hardware and send an e-mail to the designated administrator. The eSOS also supports remote connectivity via a Telnet or FTP server. However, this function must be configured in the BIOS.

Chapter 5

Chipset Software
Installation Utility

5.1 Before Beginning

To ensure problem-free installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for AIMB-228 can be downloaded from the Advantech website. Updates are provided via Microsoft service packs.

5.2 Introduction

The AMD Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- IDE Ultra ATA 100/66/33 and serial ATA interface support
- USB 1.1/2.0 support (the USB 2.0 driver must be installed separately for Win98)
- Identification of AMD chipset components in the Device Manager

Note! This utility supports the following versions of Windows, and must be installed **before** installing all other drivers:



- Windows 7

5.3 Windows 10 Driver Setup

1. Visit the Advantech website and search AIMB-228. The Chipset driver is provided for download.

[Support](#) / [Downloads](#) / [Driver](#) /

Document No. 1-3961709061			
Date Updated	10-08-2019	Date Created	10-08-2019
Document Type	Driver	Related OS	
Related Product	AIMB-228		

Win 10(64bits) Driver for AIMB-228

Solution : Win 10(64bits) Driver for AIMB-228

Download File	Released Date	Download Site	
AIMB-228_Audio_Win10(64bits).zip	2019-10-08	Primary	Secondary
AIMB-228_Realtek LAN_Win10(64bits).zip	2019-10-08	Primary	Secondary
AIMB-228_Chip_Win10(64bits).zip	2019-10-08	Primary	Secondary

Chapter 6

LAN Configuration

6.1 Introduction

AIMB-228 features dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (Realtek RTL8111G for LAN1&2) that offer bandwidth of up to 500 MB/sec, eliminating network bottlenecks and incorporating Gigabit Ethernet at 1000 Mbps.

6.2 Features

- Integrated 10/100/1000 Mbps transceiver
- 10/100/1000 Mbps triple-speed MAC
- High-speed RISC core with 24-KB cache
- On-chip voltage regulation
- Wake-on-LAN (WOL) support
- PCI Express x4 host interface

6.3 Installation

The AIMB-228's Realtek RTL8111G (LAN1&LAN2) Gigabit integrated controllers support all major network operating systems. However, the installation procedure varies from system to system. Please follow the instructions for the appropriate operating system.

6.4 Windows 10 Driver Setup

Visit the Advantech website to obtain the required drivers. Select the LAN folder then navigate to the directory for your OS.

[Support](#) / [Downloads](#) / [Driver](#) /

Document No. 1-3961709061			
Date Updated	10-08-2019	Date Created	10-08-2019
Document Type	Driver	Related OS	
Related Product	AIMB-228		

Win 10(64bits) Driver for AIMB-228

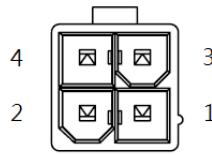
Solution : Win 10(64bits) Driver for AIMB-228

Download File	Released Date	Download Site	
AIMB-228_Audio_Win10(64bits).zip	2019-10-08	Primary	Secondary
AIMB-228_Realtek LAN_Win10(64bits).zip	2019-10-08	Primary	Secondary
AIMB-228_Chip_Win10(64bits).zip	2019-10-08	Primary	Secondary

Appendix **A**

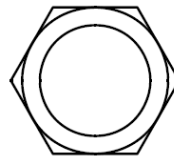
I/O Pin Assignments

A.1 ATX 12V Power Supply Connector (ATX12V1)



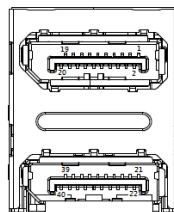
Pin	Signal
1	GND
2	GND
3	12V ~ 24V
4	12V ~ 24V

A.2 DC Input Jack (DCIN1)



Pin	Signal
1	VCC (Center)
2	GND

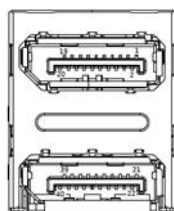
A.3 DisplayPort #1 (Up) + DisplayPort #2 (Down) Stack Connector (DP1+DP2)



Pin	Signal	Pin	Signal
1	ML_0+	2	GND
3	ML_0-	4	ML_1+
5	GND	6	ML_1-
7	ML_2+	8	GND
9	ML_2-	10	ML_3+
11	GND	12	ML_3-

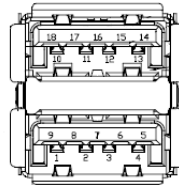
13	Config1	14	GND
15	AUX+	16	GND
17	AUX-	18	Hot plug detect
19	GND	20	VCC (+3.3V)
21	ML_0+	22	GND
23	ML_0-	24	ML_1+
25	GND	26	ML_1-
27	ML_2+	28	GND
29	ML_2-	30	ML_3+
31	GND	32	ML_3-
33	Config1	34	GND
35	AUX+	36	GND
37	AUX-	38	Hot plug detect
39	GND	40	VCC (+3.3V)

A.4 DisplayPort #3 (Up) + DisplayPort #4 (Down) Stack Connector (DP3+DP4)



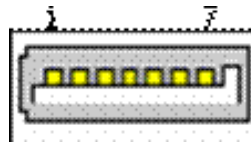
Pin	Signal	Pin	Signal
1	ML_0+	2	GND
3	ML_0-	4	ML_1+
5	GND	6	ML_1-
7	ML_2+	8	GND
9	ML_2-	10	ML_3+
11	GND	12	ML_3-
13	Config1	14	GND
15	AUX+	16	GND
17	AUX-	18	Hot plug detect
19	GND	20	VCC (+3.3V)
21	ML_0+	22	GND
23	ML_0-	24	ML_1+
25	GND	26	ML_1-
27	ML_2+	28	GND
29	ML_2-	30	ML_3+
31	GND	32	ML_3-
33	Config1	34	GND
35	AUX+	36	GND
37	AUX-	38	Hot plug detect
39	GND	40	VCC (+3.3V)

A.5 USB 3.1 Gen 2 Stack Connector (USB23)



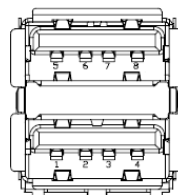
Pin	Signal	Pin	Signal
1	VBUS	2	D-
3	D+	4	GND
5	RX-	6	RX+
7	GND	8	TX-
9	TX+	10	VBUS
11	D-	12	D+
13	GND	14	RX-
15	RX+	16	GND
17	TX-	18	TX+

A.6 Serial ATA Interface Connector #1 (SATA1)



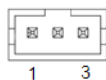
Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	Advantech defined

A.7 USB 2.0 Stack Connector (USB14)



Pin	Signal	Pin	Signal
1	VBUS	5	VBUS
2	D-	6	D-
3	D+	7	D+
4	GND	8	GND

A.8 5VSB Input Connector (ATX_5VSB1)



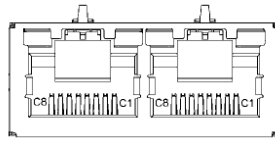
Pin	Signal
1	+5V AUX
2	GND
3	PS_ON#

A.9 AT/ATX Mode Selection (PSON1)



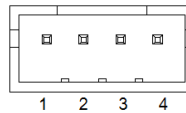
Pin	Signal
1	AT
2	+3.3V
3	ATX

A.10 Dual-Port RJ45 Connector (LAN12)



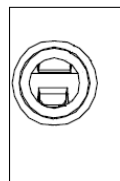
Pin	Signal
C1	MDI0+
C2	MDI0-
C3	MDI1+
C4	MDI1-
C5	MDI2+
C6	MDI2-
C7	MDI3+
C8	MDI3-

A.11 Audio Amplifier Output Pin Header (AMP1)



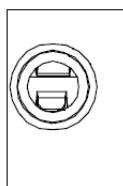
Pin	Signal
1	AMP OUT - R+
2	AMP OUT - R-
3	AMP OUT - L-
4	AMP OUT - L+

A.12 HD Audio Interface (Line-Out) (AUDIO1)



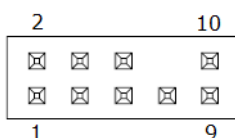
Pin	Signal
1	LINE OUT - L
2	LINE OUT - R

A.13 HD Audio Interface (Mic-In) (AUDIO2)



Pin	Signal
1	MIC IN - L
2	MIC IN - R

A.14 Front Panel Audio Header (FPAUD1)



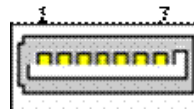
Pin	Signal	Pin	Signal
1	MIC IN - L	2	GND
3	MIC IN - R	4	FPAUD_DETECT#
5	LINE OUT - R	6	SENSE R1
7	SENSE	8	KEY
9	LINE OUT - L	10	SENSE R2

A.15 CMOS Battery Wafer Box (BAT1)



Pin	Signal
1	VCC
2	GND

A.16 Serial ATA Interface Connector #2 (SATA2)



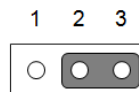
Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

A.17 HD Audio Interface (SPDIF1)



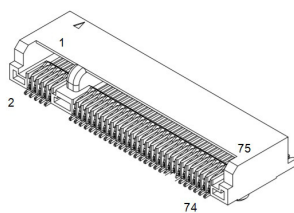
Pin	Signal
1	+5V
2	KEY
3	SPDIF OUT
4	GND

A.18 LVDS VESA, JEIDA Format Selection Pin Header (JLVDS_VCON1)



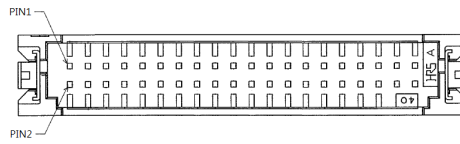
Pin	Signal
1	+3.3V
2	Advantech defined
3	GND

A.19 M.2 B-Key (NGFF_B1)



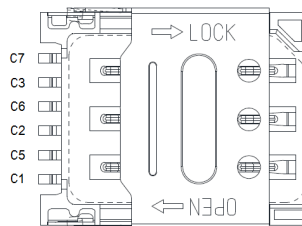
Pin	Signal	Pin	Signal
1	CONFIG_3	2	+3.3V AUX
3	GND	4	+3.3V AUX
5	GND	6	FULL_CARD_POWER_OFF#
7	USB_D+	8	W_DISABLE1#
9	USB_D-	10	LED1#
11	GND	12	Connector Key
13	Connector Key	14	Connector Key
15	Connector Key	16	Connector Key
17	Connector Key	18	Connector Key
19	Connector Key	20	NC
21	CONFIG_0	22	NC
23	WAKE_ON_WWAN#	24	NC
25	DPR	26	W_DISABLE2#
27	GND	28	NC
29	PERn1 / USB3.1-Rx-	30	UIM - RESET
31	PERp1 / USB3.1-Rx+	32	UIM - CLK
33	GND	34	UIM - DATA
35	PETn1 / USB3.1-Tx-	36	UIM - PWR
37	PETp1 / USB3.1-Tx+	38	NC
39	GND	40	NC
41	PERn0 / SATA-RX+	42	NC
43	PERp0 / SATA-RX-	44	NC
45	GND	46	NC
47	PETn0 / SATA-TX-	48	NC
49	PETp0 / SATA-TX+	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#
55	REFCLKp	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	RESET#	68	SUSCLK(32kHz)
69	CONFIG_1	70	+3.3V AUX
71	GND	72	+3.3V AUX
73	GND	74	+3.3V AUX
75	CONFIG_2		

A.20 Low-Voltage Differential Signaling (LVDS1)



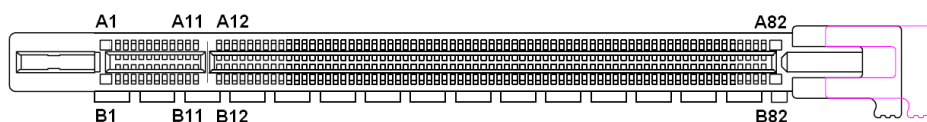
Pin	Signal	Pin	Signal
1	VDD	2	VDD
3	LVDS DETECT#	4	GND
5	VDD	6	VDD
7	OD0-	8	ED0-
9	OD0+	10	ED0+
11	GND	12	GND
13	OD1-	14	ED1-
15	OD1+	16	ED1+
17	GND	18	GND
19	OD2-	20	ED2-
21	OD2+	22	ED2+
23	GND	24	GND
25	OCK-	26	ECK-
27	OCK+	28	ECK+
29	GND	30	GND
31	DDC CLK	32	DDC DAT
33	GND	34	GND
35	OD3-	36	ED3-
37	OD3+	38	ED3+
39	LVDS ENBK L	40	LVDS VCON

A.21 SIM Card Holder (SIM1)



Pin	Signal
C1	SIM PWR
C2	SIM RESET
C3	SIM CLK
C5	GND
C6	SIM VPP
C7	SIM DATA

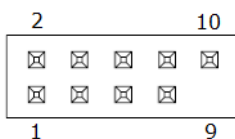
A.22 PCI Express x16 Slot (PCIEX16_1)



Pin	Signal	Pin	Signal
B1	+12V	A1	PRSNT1#
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	Reserved
B6	SMB_DATA	A6	Reserved
B7	GND	A7	Reserved
B8	+3.3V	A8	Reserved
B9	Reserved	A9	+3.3V
B10	+3.3VAUX	A10	+3.3V
B11	WAKE#	A11	PWRGD
B12	Reserved	A12	GND
B13	GND	A13	REFCLK+
B14	TX0+	A14	REFCLK-
B15	TX0-	A15	GND
B16	GND	A16	RX0+
B17	Advantech defined	A17	RX0-
B18	Advantech defined	A18	GND
B19	TX1+	A19	Reserved
B20	TX1-	A20	GND
B21	GND	A21	RX1+
B22	GND	A22	RX1-
B23	TX2+	A23	GND
B24	TX2-	A24	GND
B25	GND	A25	RX2+
B26	GND	A26	RX2-
B27	TX3+	A27	GND
B28	TX3-	A28	GND
B29	GND	A29	RX3+
B30	Reserved	A30	RX3-
B31	Reserved	A31	GND
B32	GND	A32	Reserved
B33	TX4+	A33	Reserved
B34	TX4-	A34	GND
B35	GND	A35	RX4+
B36	GND	A36	RX4-
B37	TX5+	A37	GND
B38	TX5-	A38	GND
B39	GND	A39	RX5+
B40	GND	A40	RX5-

B41	TX6+	A41	GND
B42	TX6-	A42	GND
B43	GND	A43	RX6+
B44	GND	A44	RX6-
B45	TX7+	A45	GND
B46	TX7-	A46	GND
B47	GND	A47	RX7+
B48	Reserved	A48	RX7-
B49	GND	A49	GND
B50	NC	A50	NC
B51	NC	A51	GND
B52	GND	A52	NC
B53	GND	A53	NC
B54	NC	A54	GND
B55	NC	A55	GND
B56	GND	A56	NC
B57	GND	A57	NC
B58	NC	A58	GND
B59	NC	A59	GND
B60	GND	A60	NC
B61	GND	A61	NC
B62	NC	A62	GND
B63	NC	A63	GND
B64	GND	A64	NC
B65	GND	A65	NC
B66	NC	A66	GND
B67	NC	A67	GND
B68	GND	A68	NC
B69	GND	A69	NC
B70	NC	A70	GND
B71	NC	A71	GND
B72	GND	A72	NC
B73	GND	A73	NC
B74	NC	A74	GND
B75	NC	A75	GND
B76	GND	A76	NC
B77	GND	A77	NC
B78	NC	A78	GND
B79	NC	A79	GND
B80	GND	A80	NC
B81	Reserved	A81	NC
B82	NC	A82	GND

A.23 USB 2.0 Front-Panel Header (USB56)



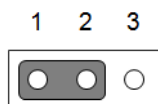
Pin	Signal	Pin	Signal
1	VBUS	2	VBUS
3	D-	4	D-
5	D+	6	D+
7	GND	8	GND
		10	NC

A.24 CPU Fan #1 Connector (CPUFAN1)



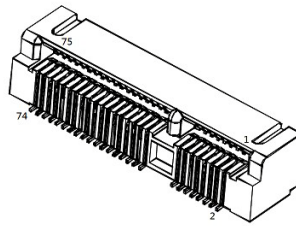
Pin	Signal
1	GND
2	CPU fan VCC
3	CPU fan speed
4	CPU fan PWM

A.25 USB Power Selection for USB12/34/56 (JUSBPWR1)



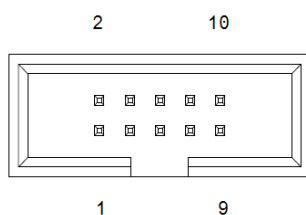
Pin	Signal
1	+5V AUX
2	Advantech defined
3	+5V

A.26 M.2 E-Key Connector (NGFF_E1)



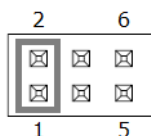
Pin	Signal	Pin	Signal
1	GND	2	+3.3V AUX
3	USB_D+	4	+3.3V AUX
5	USB_D-	6	Wi-Fi_LED#
7	GND	8	I2S SCK
9	NC	10	I2S WS
11	NC	12	I2S SD_IN
13	NC	14	I2S SD_OUT
15	NC	16	BT_LED#
17	NC	18	GND
19	NC	20	UART WAKE#
21	NC	22	UART RXD
23	NC	24	KEY
25	KEY	26	KEY
27	KEY	28	KEY
29	KEY	30	KEY
31	KEY	32	UART TXD
33	GND	34	UART CTS
35	PETp0	36	UART RTS
37	PETn0	38	NC
39	GND	40	NC
41	PERp0	42	NC
43	PERn0	44	NC
45	GND	46	NC
47	REFCLKp0	48	NC
49	REFCLKn0	50	SUSCLK
51	GND	52	PERST0#
53	CLKREQ0#	54	W_DISABLE2#
55	PEWAKE0#	56	W_DISABLE1#
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	+3.3V AUX
73	NC	74	+3.3V AUX
75	GND		

A.27 COM2 Box Header (COM2)



Pin	Signal	Pin	Signal
1	DCD# [2]	2	DSR# [2]
3	RXD [2]	4	RST# [2]
5	TXD [2]	6	CTS# [2]
7	DTR# [2]	8	RI# [2]
9	GND		

A.28 COM1 RI# Selection Pin Header (JSETCOM1_V1)



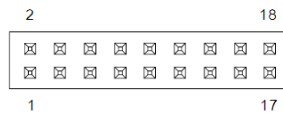
Pin	Signal	Pin	Signal
1	RI# [6]	2	Advantech defined
3	Advantech defined	4	+5V
5	+12V	6	Advantech defined

A.29 Inverter Power Connector (INV1)



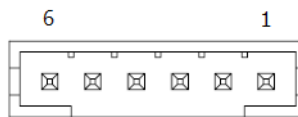
Pin	Signal
1	+12V
2	GND
3	BKL EN
4	BKL CTRL
5	+5V

A.30 16-bit General Purpose I/O Pin Header (GPIO1)



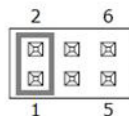
Pin	Signal	Pin	Signal
1	GPIO0	2	GPIO8
3	GPIO1	4	GPIO9
5	GPIO2	6	GPIO10
7	GPIO3	8	GPIO11
9	GPIO4	10	GPIO12
11	GPIO5	12	GPIO13
13	GPIO6	14	GPIO14
15	GPIO7	16	GPIO15
17	+5V AUX	18	GND

A.31 Keyboard and Mouse Connector (KBMS1)



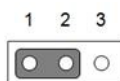
Pin	Signal
1	KB_CLK#
2	KB_DAT#
3	MS_CLK#
4	GND
5	+5V AUX
6	MS_DAT#

A.32 COM4 RI Selection Pin Header (JSETCOM4_V1)



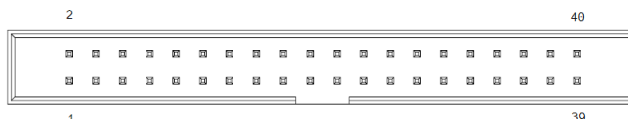
Pin	Signal	Pin	Signal
1	RI# [6]	2	Advantech defined
3	Advantech defined	4	+5V
5	+12V	6	Advantech defined

A.33 CCTALK Voltage Selection Pin Header (JCCT_VCON1)



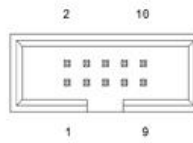
Pin	Signal
1	+12V
2	Advantech defined
3	+5V

A.34 COM3 ~ COM6 Box Header (COM3456)



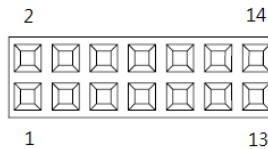
Pin	Signal	Pin	Signal
1	DCD# [3]	2	DSR# [3]
3	RXD [3]	4	RST# [3]
5	TXD [3]	6	CTS# [3]
7	DTR# [3]	8	RI# [3]
9	GND	10	GND
11	DCD# [4]	12	DSR# [4]
13	RXD [4]	14	RST# [4]
15	TXD [4]	16	CTS# [4]
17	DTR# [4]	18	RI# [4]
19	GND	20	GND
21	DCD# [5]	22	DSR# [5]
23	RXD [5]	24	RST# [5]
25	TXD [5]	26	CTS# [5]
27	DTR# [5]	28	RI# [5]
29	GND	30	GND
31	DCD# [6]	32	DSR# [6]
33	RXD [6]	34	RST# [6]
35	TXD [6]	36	CTS# [6]
37	DTR# [6]	38	RI# [6]
39	GND	40	GND

A.35 COM1 Box Header (COM1)



Pin	Signal	Pin	Signal
1	DCD# [1]	2	DSR# [1]
3	RXD [1]	4	RST# [1]
5	TXD [1]	6	CTS# [1]
7	DTR# [1]	8	RI# [1]
9	GND		

A.36 Low-Pin-Count Interface Connector (LPC1)



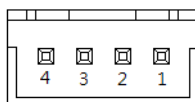
Pin	Signal	Pin	Signal
1	LPC CLK	2	LPC AD1
3	LPC RESET#	4	LPC AD0
5	LPC FRAME#	6	+3.3V
7	LPC AD3	8	GND
9	LPC AD2	10	SMB_CLK
11	LPC SERIRQ	12	SMB_DATA
13	+5V AUX	14	+5V

A.37 Serial ATA Power Connector #1 (SATA_PWR1)



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

A.38 Serial ATA Power Connector #2 (SATA_PWR2)



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

A.39 DDR4 SODIMM Socket CH-A (DIMMA1)

Please see JEDEC STANDARD.

A.40 DDR4 SODIMM Socket CH-B (DIMMB1)

Please see JEDEC STANDARD.

A.41 Power LED & Keyboard Lock Pin Header (JFP2)



Pin	Signal
1	Power LED
2	NC
3	GND
4	Keyboard Lock
5	GND

A.42 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)



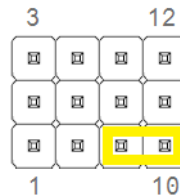
Pin	Signal
1	NC
2	WDT
3	RESET#
4	SIO BEEP
5	FRP BEEP

A.43 Case Open Connector (JCASE1)



Pin	Signal
1	Case Open
2	GND

A.44 PWRBTN#/RESET#/HDD LED/Serial Bus From HW Monitor IC/Internal Buzzer/External Speaker Header (JFP1)



Pin	Signal	Pin	Signal
1	+5V	2	HDD LED+
3	PWRBTN+	4	SPK_P2
5	HDD LED-	6	PWRBTN-
7	SPK_P3	8	SMB_DATA
9	RESET+	10	SPK_P4
11	SMB_CLK	12	RESET-

A.45 System Fan #2 Connector (SYSFAN2)



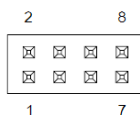
Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

A.46 System Fan #1 Connector (SYSFAN1)



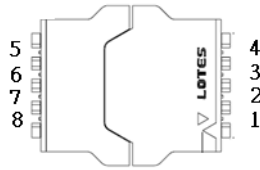
Pin	Signal
1	GND
2	SYSTEM FAN VCC
3	SYSTEM FAN SPEED
4	SYSTEM FAN PWM

A.47 SPI Pin Header (SPI_CN1)



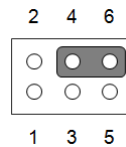
Pin	Signal	Pin	Signal
1	CS#	2	+1.8V
3	MISO	4	NC
5	NC	6	SCLK
7	GND	8	MOSI

A.48 SPI BIOS Flash Socket (SPI1)



Pin	Signal	Pin	Signal
1	CS#	5	MOSI
2	MISO	6	SCLK
3	WP#	7	HOLD#
4	GND	8	+3.3V

A.49 VDD Select for LVDS1 Panel (JLVDS1)



Pin	Signal	Pin	Signal
1	NC	2	+5V
3	+12V	4	VDD
5	NC	6	+3.3V

A.50 COMS Mode Selection (JCMOS1)





Pin	Signal
1	VBAT
2	RTC
3	GND

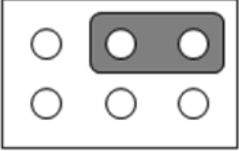
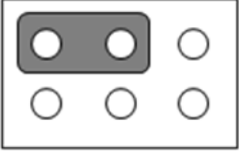
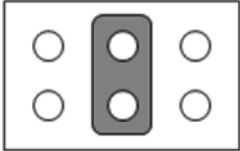
Jumper Setting List

	Description	Part Reference
1	USB power selection for USB 12/USB 34/USB 56	JUSBPWR1
2	VDD select for LVDS1 panel	JLVDS1
3	CMOS clear	JCOMS1
4	COM1_RI# pin selection	JSETCOM1_V1
5	COM4_RI# pin selection	JSETCOM4_V1
6	CCTALK selection pin header	JCCT_VCON1
7	AT/ATX mode selection	PSOEN1
8	PWRBTN#/RESET#/HDD LED/serial bus/internal buzzer/ external speaker header	JFP1
9	Watchdog timer output and OBS beep	JWDT1+JOBS1



A.51 USB Power Selection for USB12/34/56 (JUSBPWR1)

Function	Jumper Setting
Set USB VBUS as +5VSB (default)	<p>1 2 3</p> 
Set USB VBUS as +5V	<p>1 2 3</p> 

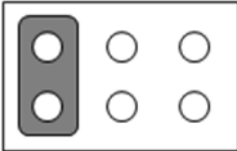

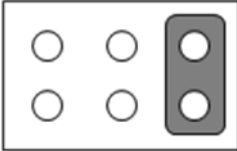
A.52 VDD Select for LVDS1 Panel (JLVDS1)

Function	Jumper Setting
Jumper position for +3.3V (default)	2 4 6 
Jumper position for +5V	1 3 5 2 4 6 
Jumper position for +12V	1 3 5 2 4 6 

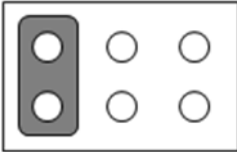

A.53 CMOS Clear (JCOMS1)

Function	Jumper Setting
Normal (default)	1 2 3 
Clear CMOS data	1 2 3 

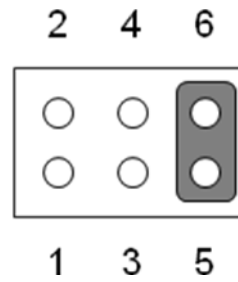
A.54 COM1_RI# Pin Selection (JSETCOM1_V1)

Function	Jumper Setting
Jumper position for RI# (default)	<p style="text-align: center;">2 4 6</p>  <p style="text-align: center;">1 3 5</p>
Jumper position for +5V	<p style="text-align: center;">2 4 6</p>  <p style="text-align: center;">1 3 5</p>
Jumper position for +12V	<p style="text-align: center;">2 4 6</p>  <p style="text-align: center;">1 3 5</p>

A.55 COM4_RI# Pin Selection (JSETCOM4_V1)

Function	Jumper Setting
Jumper position for RI# (default)	<p style="text-align: center;">2 4 6</p>  <p style="text-align: center;">1 3 5</p>
Jumper position for +5V	<p style="text-align: center;">2 4 6</p>  <p style="text-align: center;">1 3 5</p>

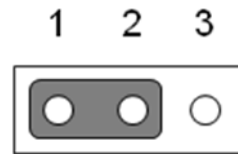
Jumper position for +12V



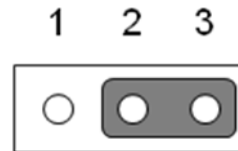
A.56 CCTALK Selection Pin Header (JCCT_VCON1)

Function	Jumper Setting
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CCTALK 12V (default)



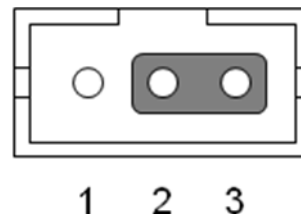
CCTALK 5V



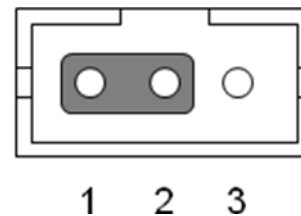
A.57 AT/ATX Mode Selection (PSON1)

Function	Jumper Setting
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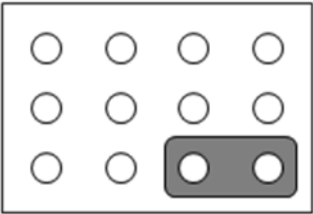
ATX mode (default)





AT mode



A.58 PWRBTN#/RESET#/HDD LED/Serial Bus/Internal Buzzer/External Speaker Header (JFP1)

Function	Jumper Setting
Internal buzzer (default)	<p>3 12</p>  <p>1 7 10</p>

A.59 Watchdog Timer Output and OBS Beep (JWDT1+JOBS1)

Function	Jumper Setting
Watchdog timer enable (2-3) (default) OBS beep (4-5) (default)	 <p>1 2 3 4 5</p>
Watchdog timer disable (1-2) OBS beep (4-5) (default)	 <p>1 2 3 4 5</p>

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