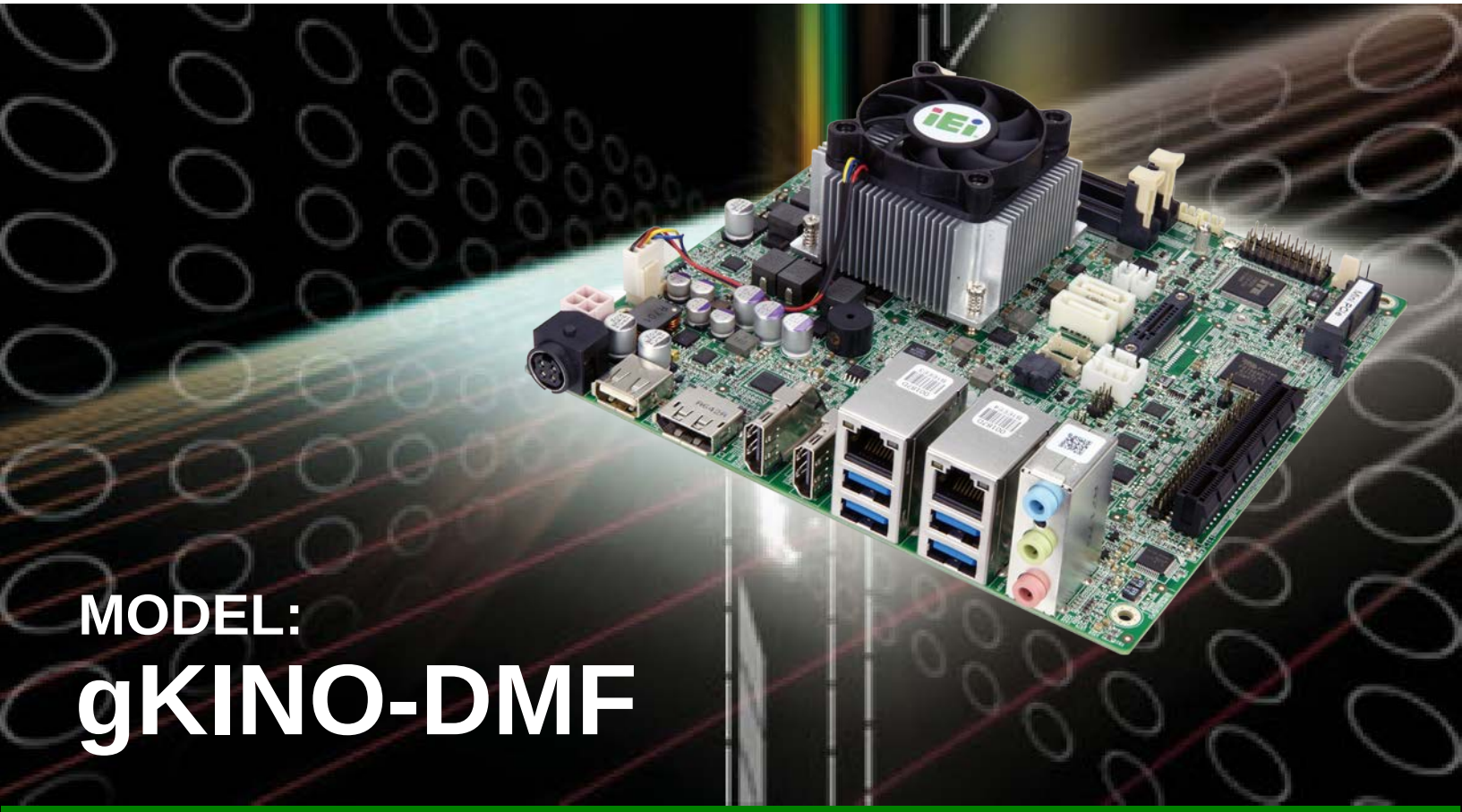
IEI Integration Corp.



MODEL:

gKINO-DMF

Mini-ITX SBC with AMD Embedded R-Series On-board SoC, DisplayPort++, Dual PCIe GbE, USB 3.0, PCIe Mini, M.2, PCIe x8, SATA 6Gb/s, RS-232/422/485, ccTalk, Audio, TPM and RoHS

User Manual

Rev. 1.02 - January 19, 2018

RoHS Lead Free

Revision

Date	Version	Changes
January 19, 2018	1.02	Updated Section 1.5 (Dimensions) and product photos
October 16, 2017	1.01	Minor update
June 29, 2017	1.00	Initial release

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Manual Conventions

WARNING

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

CAUTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.

NOTE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.

HOT SURFACE

This symbol indicates a hot surface that should not be touched without taking care.

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Chapter

1

Introduction

1.1 Introduction

Figure 1-1: gKINO-DMF

The gKINO-DMF series is a Mini-ITX form factor single bard computer. It has an on-board AMD RX-421BD or RX-216GD processor, and supports two 260-pin 2400 MHz dual-channel DDR4 unbuffered SDRAM SO-DIMM slots with up to 64.0 GB of memory.

The gKINO-DMF series includes two external HDMI 1.4 connectors and one external Dual-mode DisplayPort (DisplayPort++) connector for triple independent display which support up to 4K resolution.

Expansion and I/O include one PCIe x8 slot, one PCIe Mini slot, one M.2 B-key slot for expansion, four USB 3.0 connectors on the rear panel, four USB 2.0 connectors by pin header and two SATA 6Gb/s connectors. Serial device connectivity is provided by two internal RS-232 connectors, two internal RS-232/422/485 connectors and two ccTalk connectors. Two RJ-45 GbE connectors provide the system with smooth connections to an external LAN.

1.2 Model Variations

The model variations of the gKINO-DMF series are listed below.

Model No.	SoC
gKINO-DMF-421	AMD RX-421BD on-board SoC (2.1 GHz, quad-core, 2 MB cache, TDP=35 W)
gKINO-DMF-216	AMD RX-216GD on-board SoC (1.6 GHz, quad-core, 1 MB cache, TDP=15 W)

Table 1-1: gKINO-DMF Model Variations

1.3 Features

Some of the gKINO-DMF motherboard features are listed below:

- Mini-ITX motherboard supports AMD RX-421BD or RX-216GD on-board SoC
- Triple independent display via HDMI 1.4 and DP++
- Two 2400 MHz DDR4 SO-DIMM slots support up to 64 GB of memory
- Two SATA 6Gb/s connectors with 5 V power output
- Full-size/half-size PCIe Mini card slot for expansion
- M.2 B-key modules supported
- Support microSD card for data storage
- One PCIe x8 slot for expansions
- Four USB 3.0 external connectors
- Two RS-232 connectors and two RS-232/422/485 connectors
- IEI One Key Recovery solution allows you to create rapid OS backup and recovery

1.4 Connectors

The connectors on the gKINO-DMF are shown in the figures below.

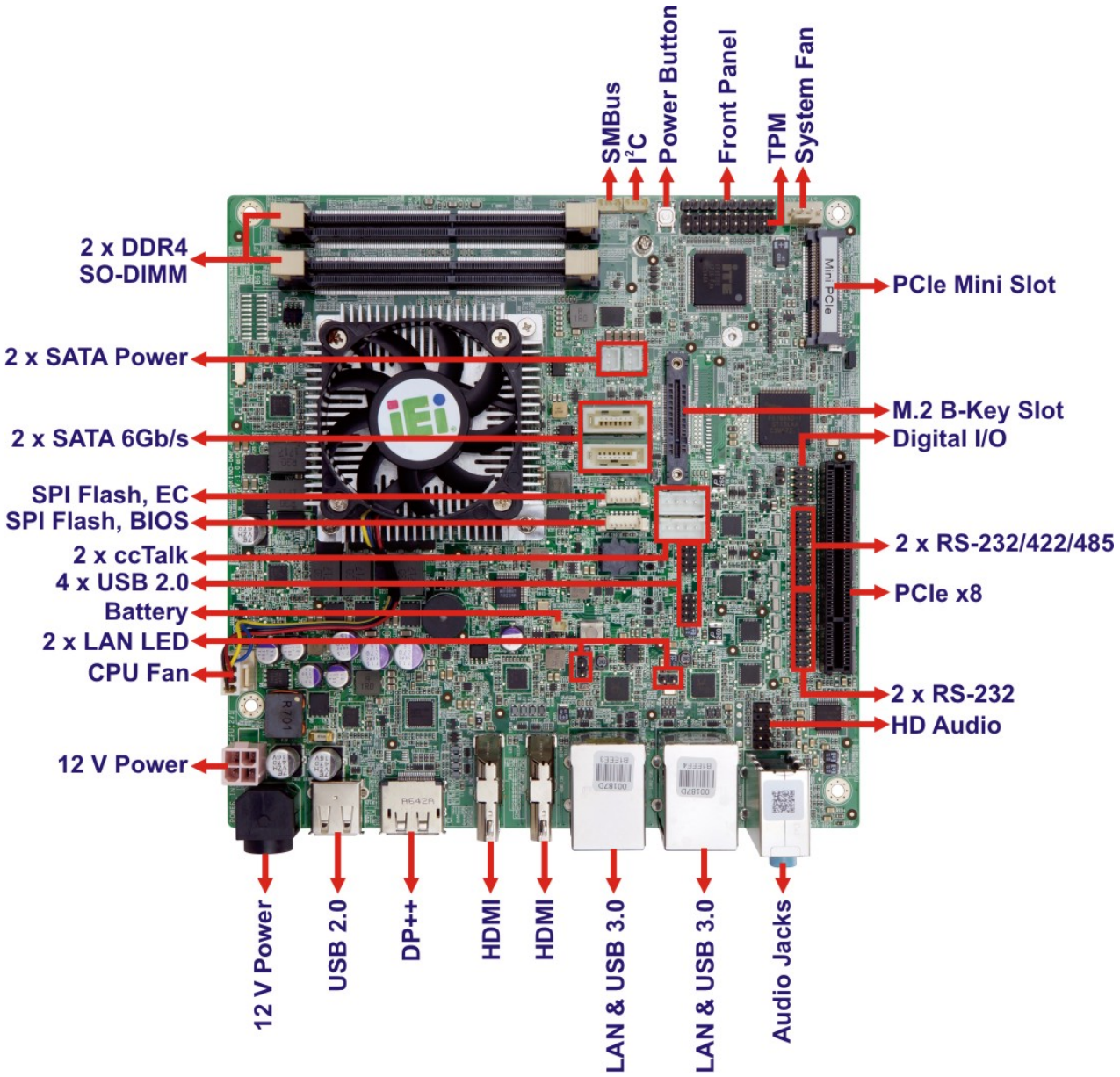


Figure 1-2: Connectors (Front Side)

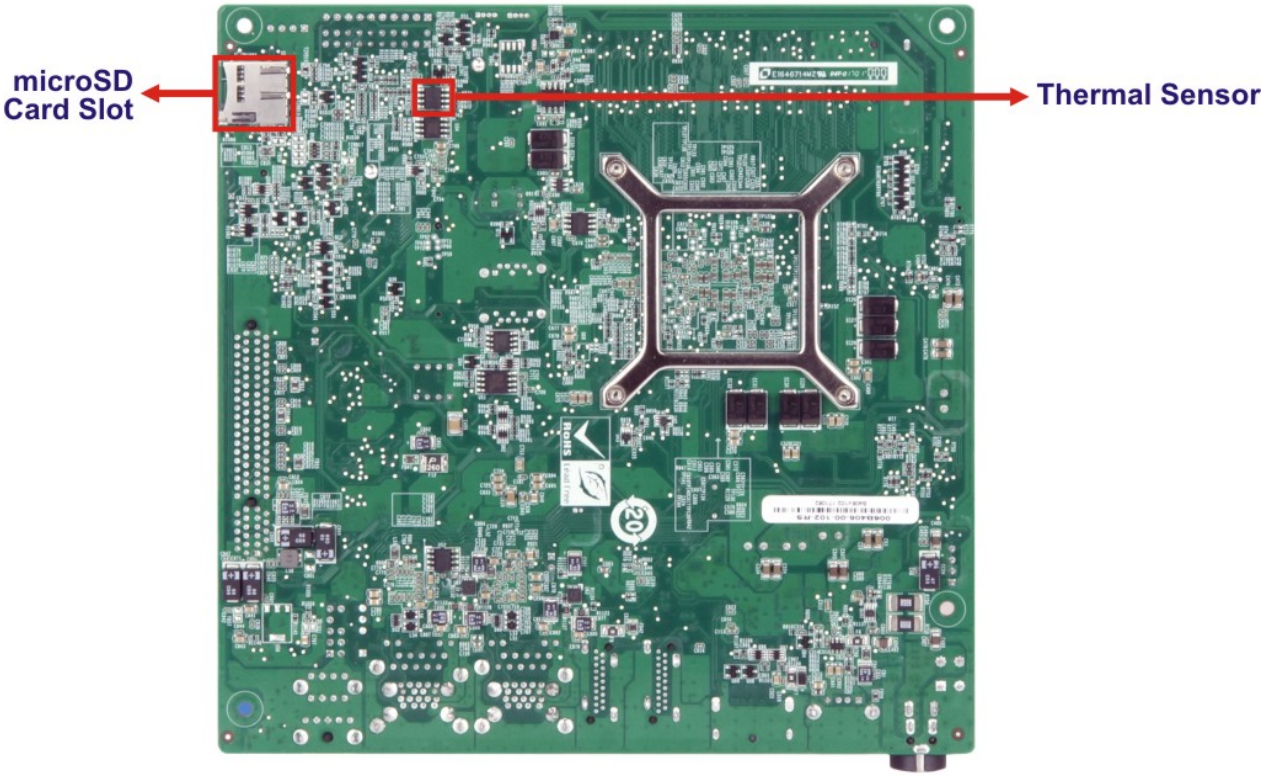


Figure 1-3: Connectors (Solder Side)

1.5 Dimensions

The dimensions of the board are listed below:

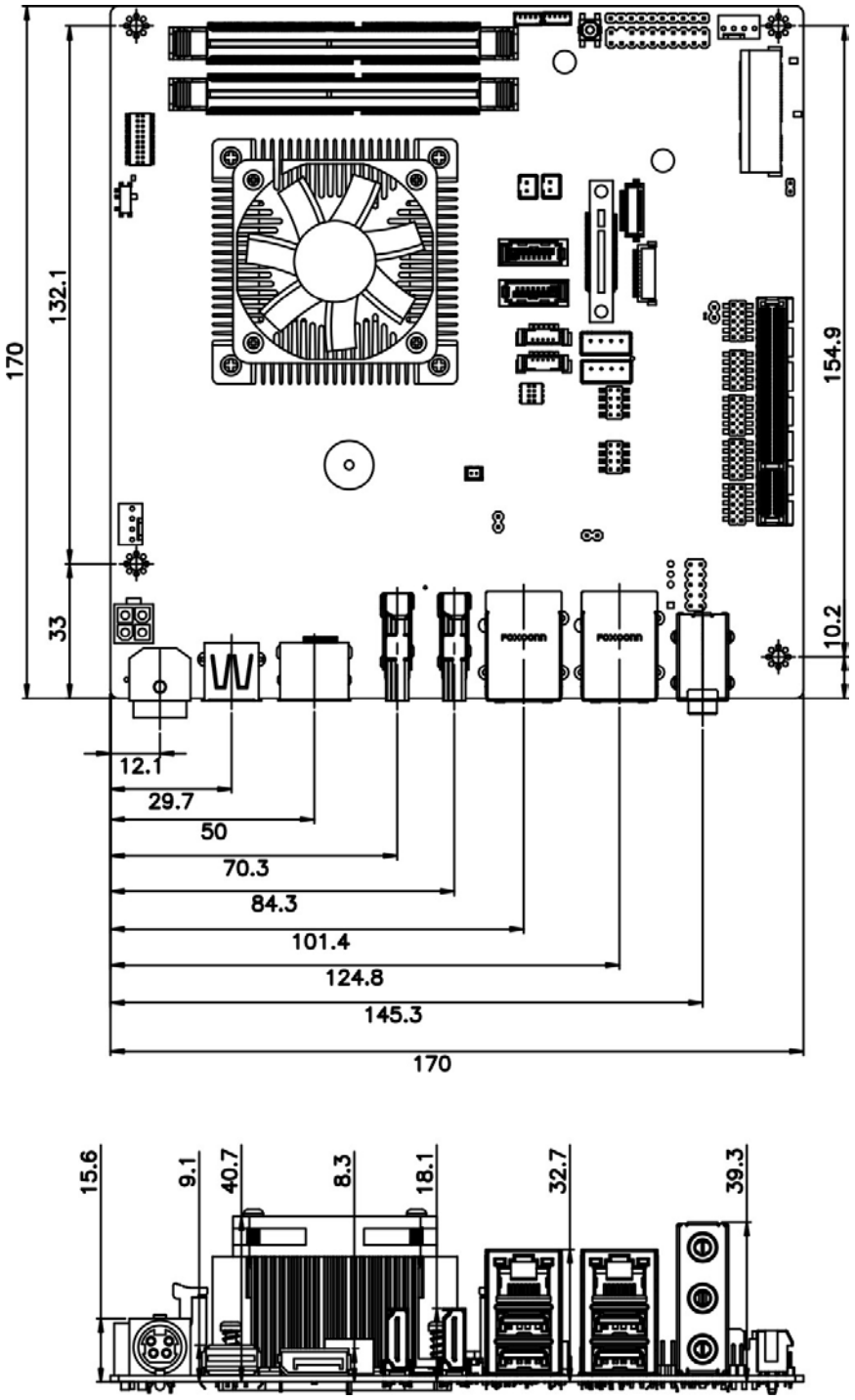


Figure 1-4: Dimensions (mm)

1.6 Data Flow

Figure 1-5 shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

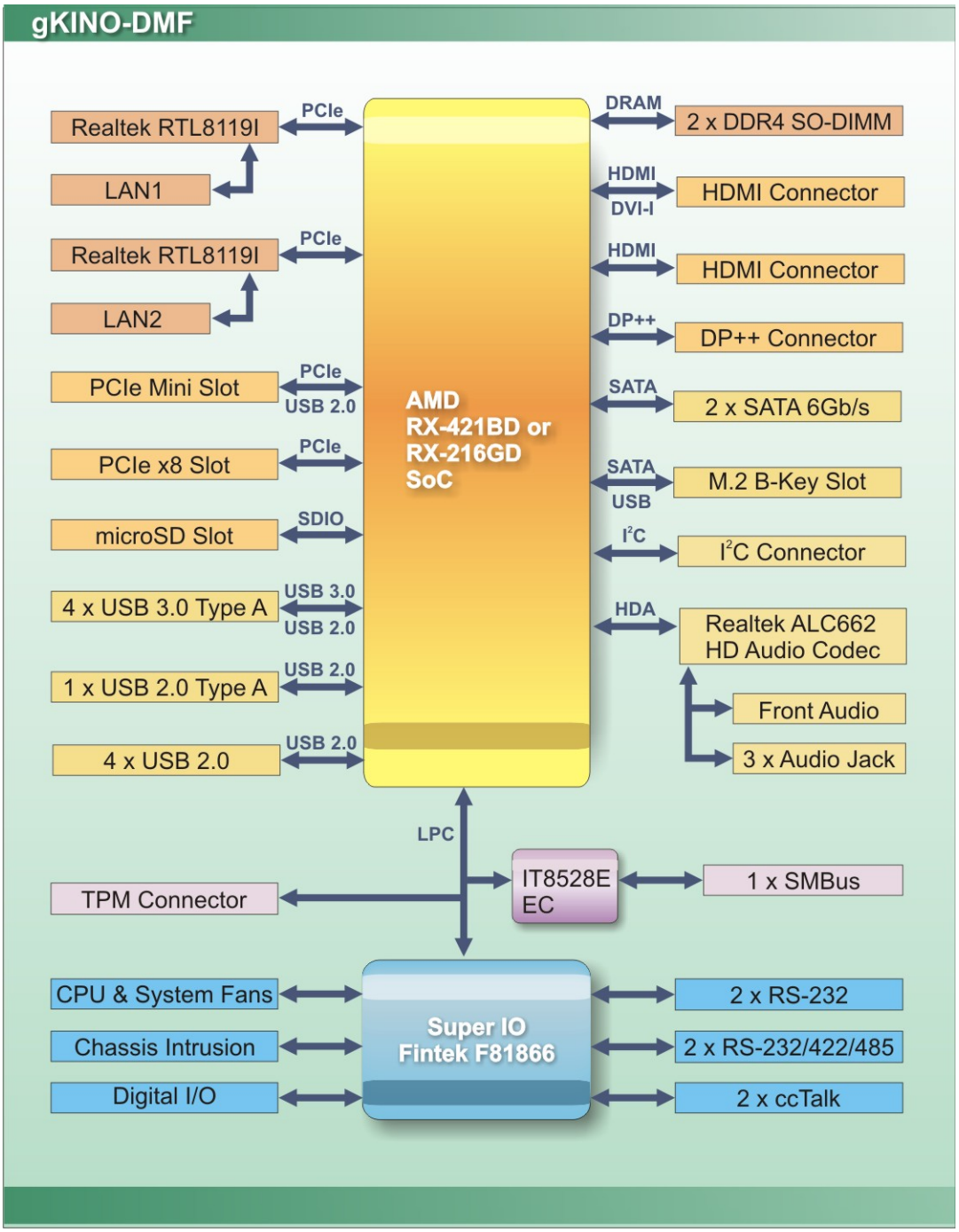


Figure 1-5: Data Flow Diagram

1.7 Technical Specifications

gKINO-DMF technical specifications are listed below.

Specification	gKINO-DMF
Form Factor	Mini-ITX
SoC	AMD RX-421BD on-board SoC (2.1 GHz, quad-core, 2 MB cache, TDP=35 W) AMD RX-216GD on-board SoC (1.6 GHz, quad-core, 1 MB cache, TDP=15 W)
BIOS	AMI UEFI BIOS
Memory	Two 260-pin 2400 MHz dual-channel DDR4 unbuffered SDRAM SO-DIMM slots (system max. 64 GB)
Graphics	AMD Radeon HD 10000 graphics, 3rd Gen. graphics core, supporting DX 12, HSA 2.0 UVD v6 decode for H.265 MPEG2/4, VC-1, MVC VCE v3.1 encode for H.254 VCE
Display Output	Triple independent display 2 x HDMI 1.4 (up to 4096x2160 @ 24Hz) 1 x DisplayPort++ (up to 3840x2160 @ 60Hz)
Ethernet	Dual Realtek RTL8119I PCIe GbE controller
Digital I/O	8-bit digital I/O by 10-pin (2x5) header
Super IO	Fintek F81866
Audio	Realtek ALC662 HD audio codec
Watchdog Timer	Software programmable support 1~255 sec. system reset
I/O Interface	
Audio Connector	3 x Audio jack (line-in, line-out and mic-in) 1 x Front audio connector by 10-pin (2x5) header
Ethernet	2 x RJ-45 GbE port

Specification	gKINO-DMF
Serial Ports	2 x RS-232/422/485 by 10-pin (2x5) header 2 x RS-232 by 10-pin (2x5) header 2 x RS-232 (supports ccTalk, TTL) by 4-pin (1x4) wafer
USB Ports	4 x USB 3.0 on rear I/O 1 x USB 2.0 on rear I/O 4 x USB 2.0 by 8-pin (2x4) header
Front Panel	1 x Front panel connector by 10-pin (1x10) header for power LED, HDD LED, power button and reset button
LAN LED	2 x LAN link LED connector by 2-pin header
Fan	1 x CPU smart fan connector by 4-pin (1x4) wafer 1 x System smart fan connector by 4-pin (1x4) wafer
SMBus	1 x SMBus connector by 4-pin (1x4) wafer
I^2C	1 x I^2C connector by 4-pin (1x4) wafer
TPM	1 x TPM connector by 20-pin (2x10) header
Chassis Intrusion Detection	1 x Chassis intrusion connector by 2-pin (1x2) header
Storage	2 x SATA 6Gb/s with 5 V SATA power connectors 1 x M.2 slot (B key, SATA 2 port + USB 2.0 signal) 1 x microSD socket
Expansion	1 x Full-size/Half-size PCIe Mini card slot 1 x PCIe x8 slot
Environmental and Power Specifications	
Power Supply	12 V DC input (AT/ATX support)
Power Connector	1 x External DC power jack (4-pin DIN) 1 x Internal power connector by 4-pin (2x2) connector
Power Consumption	+12 V @ 5.54 A (AMD RX-421BD 2.1GHz CPU with 2400 MHz 16GB DDR4 memory)
Operating Temperature	0°C ~ 60°C

Specification	gKINO-DMF
Storage Temperature	-10°C ~ 70°C
Humidity	5% ~ 95%, non-condensing
Physical Specifications	
Dimensions	170 mm x 170 mm
Weight GW/NW	1100 g / 700 g

Table 1-2: Technical Specifications

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING!

Static electricity can destroy certain electronics. Make sure to follow the ESD precautions to prevent damage to the product, and injury to the user.

Make sure to adhere to the following guidelines:

- ***Wear an anti-static wristband***: Wearing an anti-static wristband can prevent electrostatic discharge.
- ***Self-grounding***: Touch a grounded conductor every few minutes to discharge any excess static buildup.
- ***Use an anti-static pad***: When configuring any circuit board, place it on an anti-static mat.
- ***Only handle the edges of the PCB***: Don't touch the surface of the motherboard. Hold the motherboard by the edges when handling.

2.2 Unpacking Precautions

When the gKINO-DMF is unpacked, please do the following:

- Follow the antistatic guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.

2.3 Packing List

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the gKINO-DMF was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The gKINO-DMF is shipped with the following components:

Quantity	Item and Part Number	Image
1	gKINO-DMF single board computer	
1	SATA cable	
1	I/O shielding	
1	Utility CD	
1	One Key Recovery CD	

1	Quick Installation Guide	

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
Dual USB cable (with bracket), 300mm, P=2.0 (**P/N**: CB-USB02A-RS)	
RS-232 cable, 300mm, P=2.0 (**P/N:** 19800-000300-100-RS)	
Infineon TPM module, 20-pin, firmware v3.17 (**P/N**: TPM-IN01-R20)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 gKINO-DMF Layout

The figures below show all the connectors and jumpers.

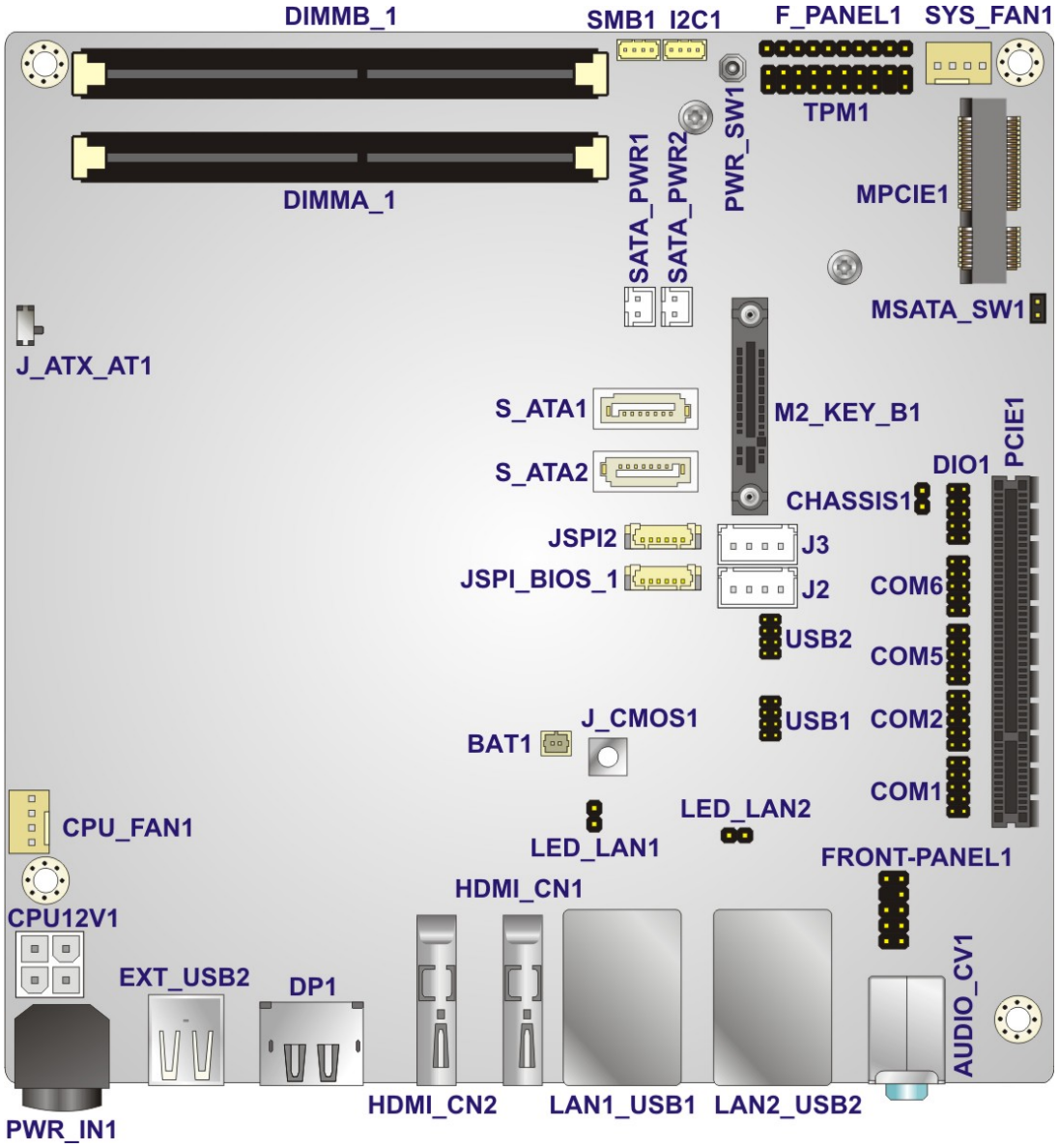


Figure 3-1: Connector and Jumper Locations (Front)

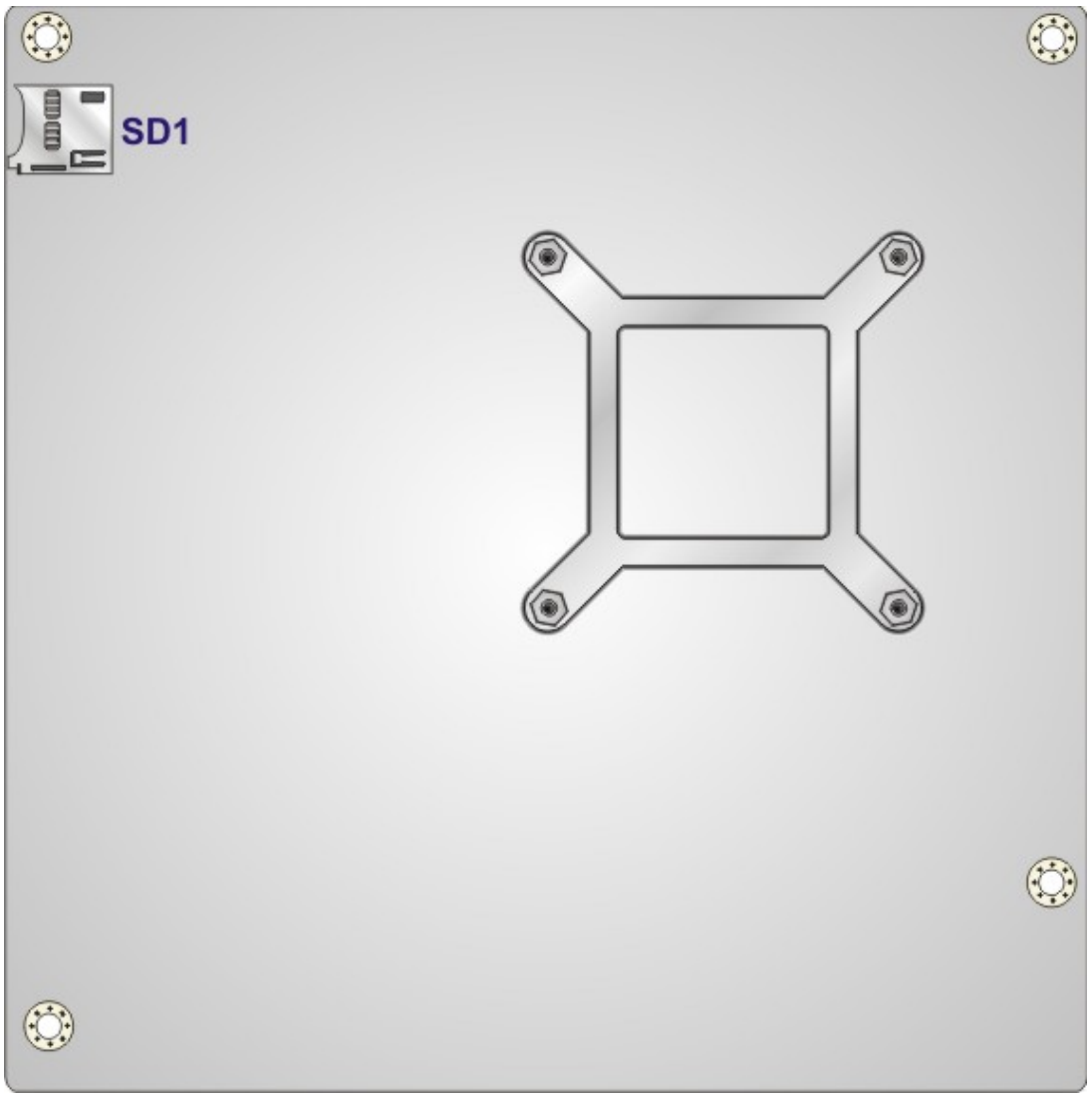


Figure 3-2: Connector and Jumper Locations (Rear)

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
12 V DC-IN power connector	4-pin Molex	CPU12V1
Audio connector	10-pin header	FRONT-PANEL1
Battery connector	2-pin wafer	BAT1
ccTalk connectors	4-pin wafer	J2, J3
Chassis intrusion connector	2-pin header	CHASSIS1
Digital I/O connector	10-pin header	DIO1
Fan connector, CPU	4-pin wafer	CPU_FAN1
Fan connector, system	4-pin wafer	SYS_FAN1
Front panel connector	10-pin header	F_PANEL1
I^2C connector	4-pin wafer	I2C1
LAN LED connectors	2-pin header	LED_LAN1, LED_LAN2
M.2 slot	M.2 B-key slot	M2_KEY_B1
Memory slot	260-pin DDR4 SO-DIMM	DIMMA_1, DIMMB_1
microSD slot (solder side)	microSD slot	SD1
PCIe Mini card slot	PCIe Mini slot	MPCIE1
PCIe x8 slot	PCIe x8 slot	PCIE1
Power button	On-board power button	PWR_SW1
RS-232 serial port connectors	10-pin header	COM1, COM2
RS-232/422/485 serial port connectors	10-pin header	COM5, COM6

SATA 6Gb/s drive connectors	7-pin SATA connector	S_ATA1, S_ATA2
SATA power connectors	2-pin wafer	SATA_PWR1, SATA_PWR2
SMBus connector	4-pin wafer	SMB1
SPI flash connector, BIOS	6-pin wafer	JSPI_BIOS_1
SPI flash connector, EC	6-pin wafer	JSPI2
TPM connector	20-pin header	TPM1
USB 2.0 connector	8-pin header	USB1, USB2

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

The table below lists the connectors on the external I/O panel.

Connector	Type	Label
12 V DC-IN power jack	Power jack	PWR_IN1
Audio jacks	Audio jack	AUDIO_CV1
DisplayPort++ connector	DisplayPort	DP1
HDMI connectors	HDMI	HDMI_CN1, HDMI_CN2
LAN and USB 3.0 combo connectors	RJ-45	LAN1_USB1, LAN2_USB2
USB 2.0 connector	USB 2.0	EXT_USB2

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the gKINO-DMF.

3.2.1 12 V DC-IN Power Connector

CN Label: **CPU12V1**

CN Type: 4-pin Molex, p=4.2 mm

CN Location: See **Figure 3-3**

CN Pinouts: See **Table 3-3**

The connector supports the 12 V power supply.

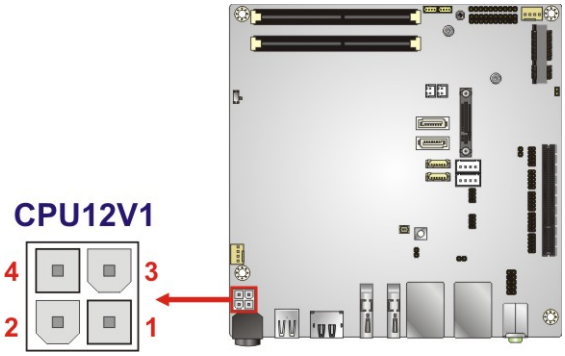


Figure 3-3: DC-IN Power Connector Location

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

Table 3-3: DC-IN Power Connector Pinouts

3.2.2 Audio Connector

CN Label:	**FRONT-PANEL1**
CN Type:	10-pin header, p=2.54 mm
CN Location:	See **Figure 3-4**
CN Pinouts:	See **Table 3-4**

The audio connector supporting High-Definition Audio is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.

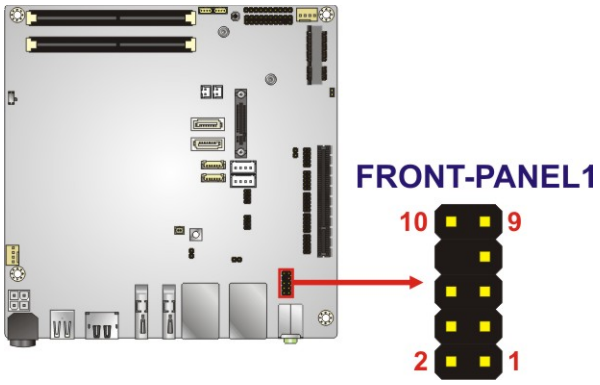


Figure 3-4: Audio Connector Location

Pin	Description	Pin	Description
1	LMIC2-L	2	GND
3	LMIC2-R	4	Pre-Sense#
5	LLINE2-R	6	MIC2-JD
7	FRONT-IO	8	NC
9	LLINE2-L	10	LINE2-JD

Table 3-4: Audio Connector Pinouts

3.2.3 Battery Connector

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

CN Label:	**BAT1**
CN Type:	2-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-5**
CN Pinouts:	See **Table 3-5**

The battery connector is connected to the system battery. The battery provides power to the system clock to retain the time when power is turned off.

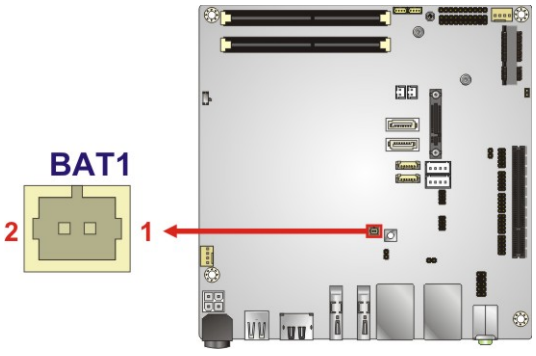


Figure 3-5: Battery Connector Location

Pin	Description
1	RTC Battery+
2	RTC Battery-

Table 3-5: Battery Connector Pinouts

3.2.4 ccTalk Connectors

CN Label: **J2, J3**

CN Type: 4-pin wafer, p=2.5 mm

CN Location: See **Figure 3-6**

CN Pinouts: See **Table 3-6**

The connectors provide ccTalk connections.

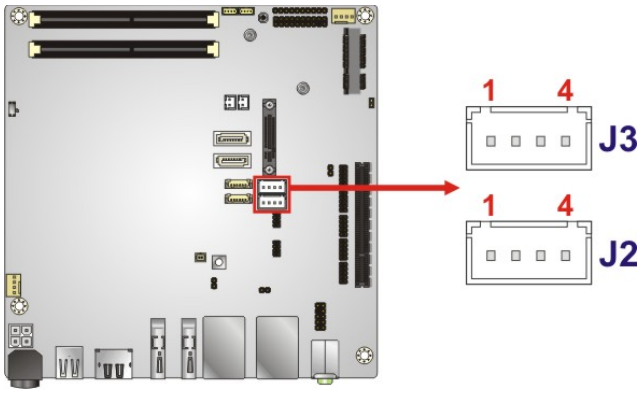


Figure 3-6: ccTalk Connector Locations

Pin	Description
1	+12V
2	NC
3	GND
4	DATA

Table 3-6: ccTalk Connector Pinouts

3.2.5 Chassis Intrusion Connector

CN Label: **CHASSIS1**

CN Type: 2-pin header, p=2.54 mm

CN Location: See **Figure 3-7**

CN Pinouts: See **Table 3-7**

The chassis intrusion connector is for a chassis intrusion detection sensor or switch that detects if a chassis component is removed or replaced.

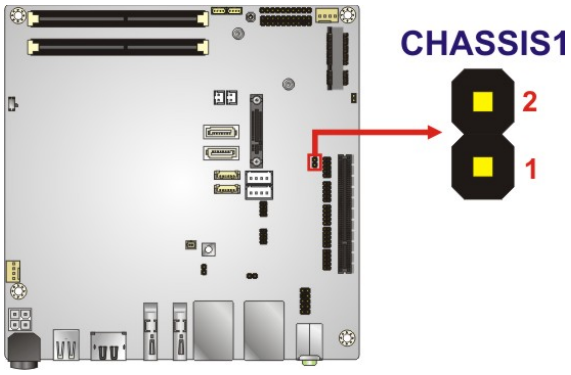


Figure 3-7: Chassis Intrusion Connector Location

Pin	Description
1	+V3.3VSB
2	CHASSIS OPEN

Table 3-7: Chassis Intrusion Connector Pinouts

3.2.6 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin header, p=2.00 mm

CN Location: See **Figure 3-8**

CN Pinouts: See **Table 3-8**

The 8-bit digital I/O connector provides programmable input and output for external devices.

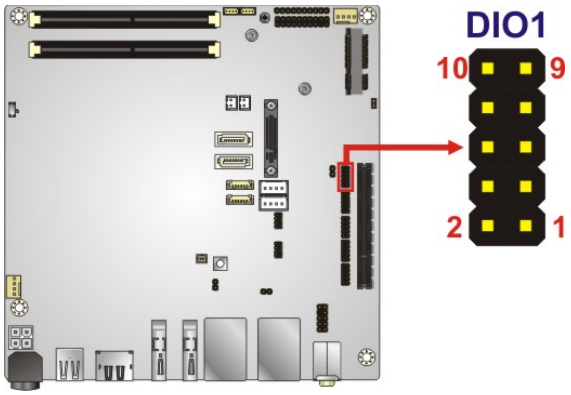


Figure 3-8: Digital I/O Connector Location

Pin	Description	Pin	Description
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 3-8: Digital I/O Connector Pinouts

3.2.7 Fan Connectors

CN Label:	**CPU_FAN1, SYS_FAN1**
CN Type:	4-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-9**
CN Pinouts:	See **Table 3-9**

The fan connector attaches to a cooling fan.

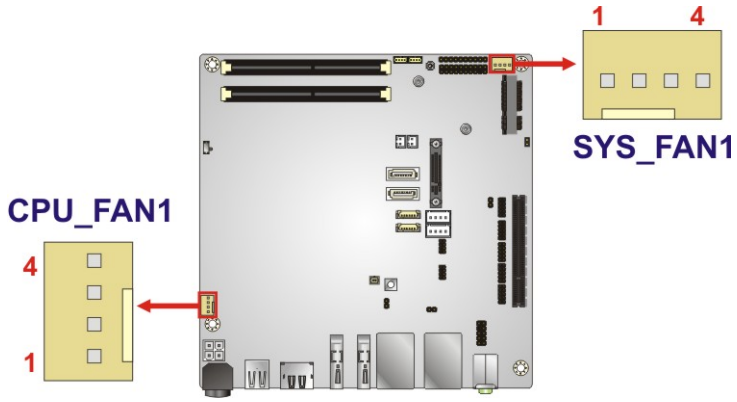


Figure 3-9: Fan Connector Locations

Pin	Description
1	GND
2	12V
3	FAN_IO
4	PWM

Table 3-9: Fan Connector Pinouts

3.2.8 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 10-pin header, p=2.54 mm

CN Location: See **Figure 3-10**

CN Pinouts: See **Table 3-10**

The front panel connector connects to the indicator LEDs and buttons on the system front panel.

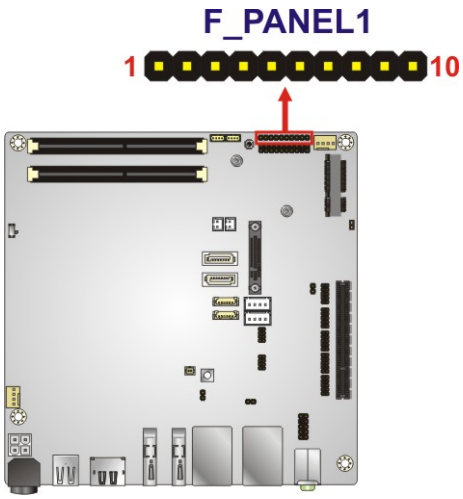


Figure 3-10: Front Panel Connector Location

Pin	Description	Pin	Description
1	NC	6	PWR_LED+
2	PWR_BTN+	7	PWR_LED+
3	PWR_BTN-	8	PWR_LED-
4	HDD_LED+	9	RESET+
5	HDD_LED-	10	RESET-

Table 3-10: Front Panel Connector Pinouts

3.2.9 I²C Connector

CN Label:	**I2C1**
CN Type:	4-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-11**
CN Pinouts:	See **Table 3-11**

The I²C connector is used to connect I²C-bus devices to the mainboard.

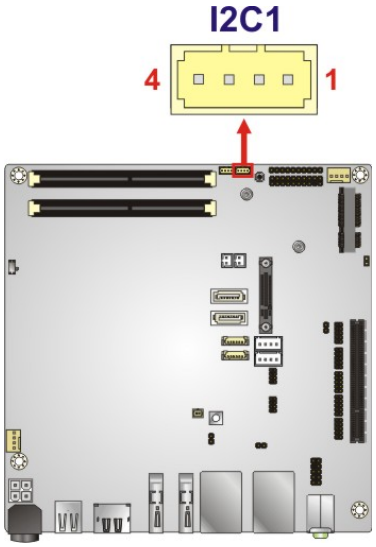


Figure 3-11: I²C Connector Location

Pin	Description
1	GND
2	I2C_DAT
3	I2C_CLK
4	+5V

Table 3-11: I²C Connector Pinouts

3.2.10 LAN LED Connectors

CN Label:	**LED_LAN1, LED_LAN2**
CN Type:	2-pin header, p=2.54 mm
CN Location:	See **Figure 3-12**
CN Pinouts:	See **Table 3-12**

The LAN LED connectors connect to the LAN link LEDs on the system.

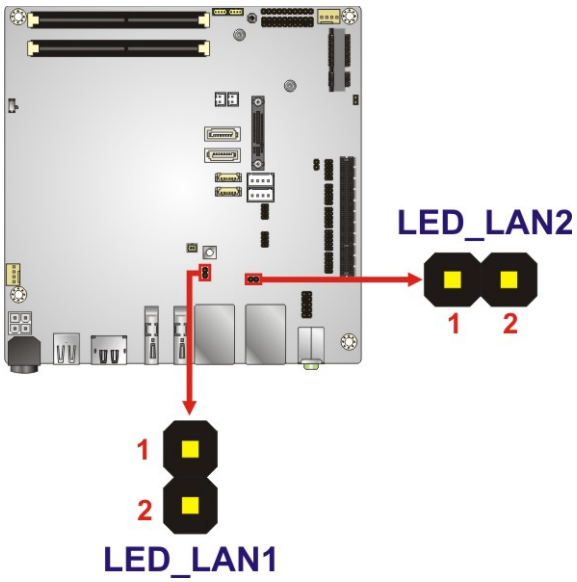


Figure 3-12: LAN LED Connector Locations

Pin	Description
1	+3.3V
2	LAN_LED_LNK#_ACT

Table 3-12: LAN LED Connector Pinouts

3.2.11 M.2 Slot

CAUTION:

If an M.2 module is installed in the M.2 slot (M2_KEY_B1), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the M.2 module for storage.

CN Label:	**M2_KEY_B1**
CN Type:	M.2 B-key slot
CN Location:	See **Figure 3-13**

The M.2 slot is keyed in the B position. The M.2 slot supports SATA and USB 2.0 interfaces only. The optional M.2 module especially designed for the gKINO-DMF can be installed into this M.2 slot vertically.

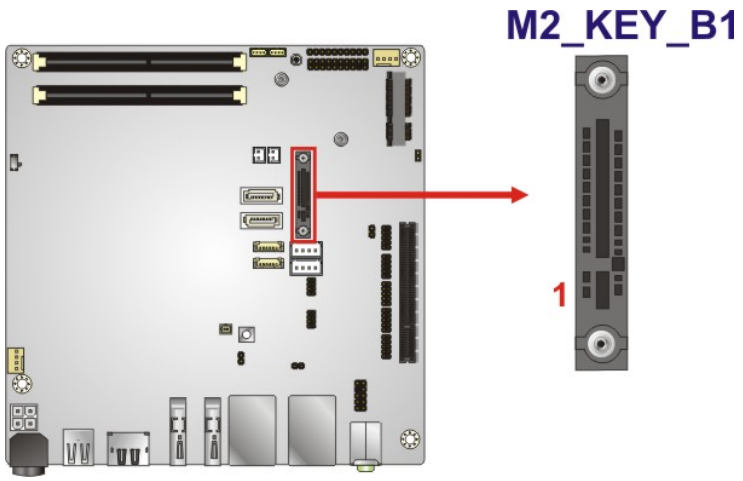


Figure 3-13: M.2 Slot Location

3.2.12 microSD Slot

CN Label: **SD1**

CN Type: microSD card slot

CN Location: See **Figure 3-14**

The microSD card slot on the solder side accepts a microSD card for storage.

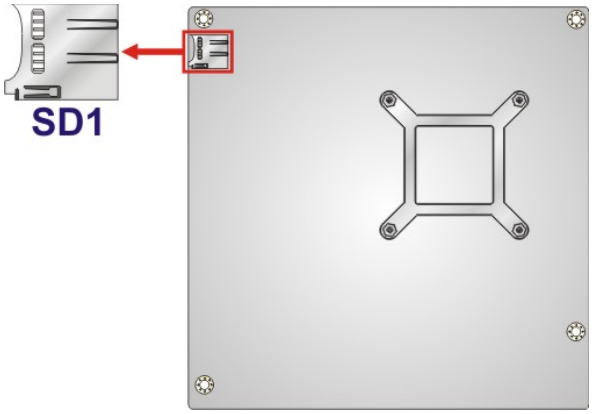


Figure 3-14: microSD Card Slot Location

3.2.13 PCIe Mini Card Slot

CN Label: **MPCIE1**

CN Type: Half-size/Full-size PCIe Mini card slot

CN Location: See **Figure 3-15**

CN Pinouts: See **Table 3-13**

The PCIe Mini card slot is for installing a full-size or half-size PCIe Mini expansion card.

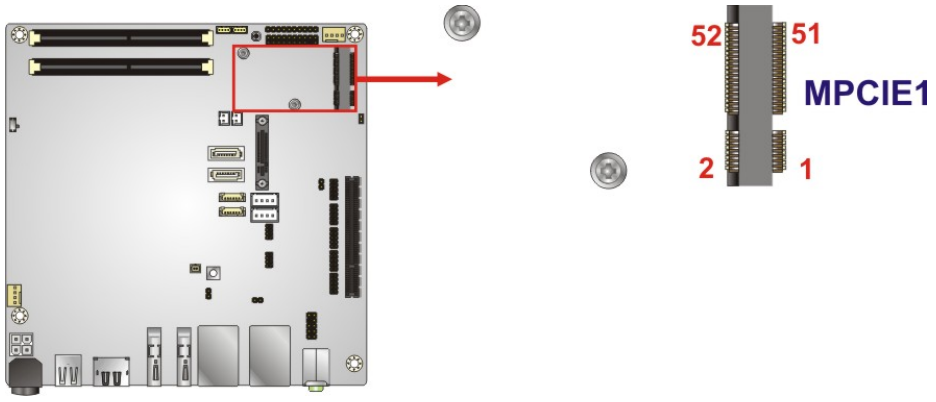


Figure 3-15: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	+3.3V
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	MSATA_CLK#	12	N/C
13	MSATA _CLK	14	N/C
15	GND	16	N/C
17	PLTRST_N	18	GND
19	N/C	20	+3.3V
21	GND	22	PLTRST_N
23	MINI_RXN	24	+3.3V
25	MINI_RXP	26	GND
27	GND	28	1.5V
29	GND	30	SMB_CLK
31	MINI_TXN	32	SMB_DATA
33	MINI_TXP	34	GND
35	GND	36	USB_DATA-
37	GND	38	USB_DATA+
39	+3.3V	40	GND
41	+3.3V	42	N/C

Pin	Description	Pin	Description
43	+3.3V	44	N/C
45	CLINK_CLK	46	N/C
47	CLINK_DATA	48	1.5V
49	CLINK_RST#	50	GND
51	MSATA_DET	52	+3.3V

Table 3-13: PCIe Mini Card Slot Pinouts

3.2.14 PCIe x8 Card Slot

CN Label: **PCIE1**

CN Type: PCIe x8 slot

CN Location: See **Figure 3-16**

The PCIe x8 slot is for PCIe x8 expansion cards.

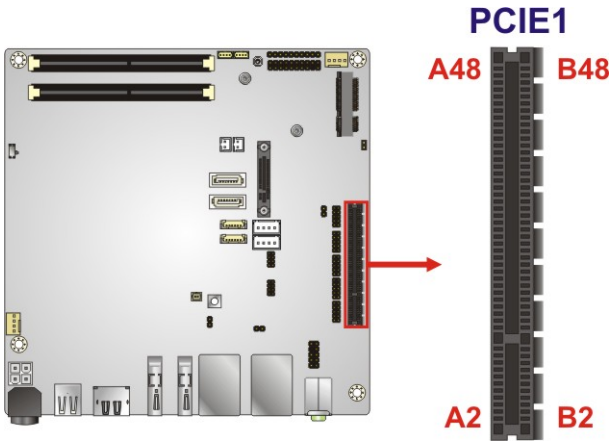


Figure 3-16: PCIe x1 Slot Location

3.2.15 RS-232 Serial Port Connectors

CN Label:	**COM1, COM2**
CN Type:	10-pin header, p=2.00 mm
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-14**

The serial connectors provide RS-232 connections.

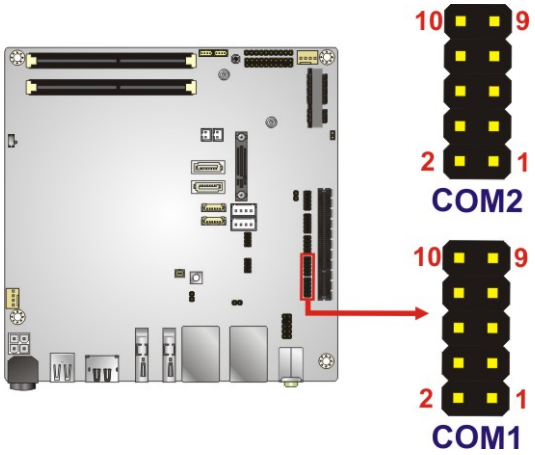


Figure 3-17: RS-232 Serial Port Connector Locations

Pin	Description	Pin	Description
1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	GND

Table 3-14: RS-232 Serial Port Connector Pinouts

3.2.16 RS-232/422/485 Serial Port Connectors

CN Label:	**COM5, COM6**
CN Type:	10-pin header, p=2.00 mm
CN Location:	See **Figure 3-18**
CN Pinouts:	See **Table 3-15**

These two connectors provide RS-232, RS-422 or RS-485 communications. The default mode is set to RS-232. To configure the connectors as RS-422 or RS-485, please refer to **Section 5.3.4.1.5** and **Section 5.3.4.1.6**.

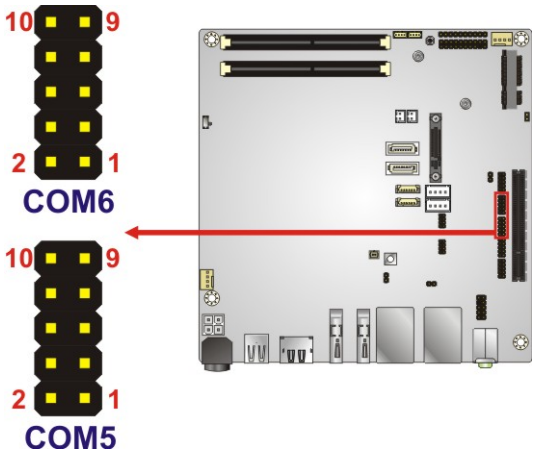


Figure 3-18: RS-232/422/485 Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	GND

Table 3-15: RS-232/422/485 Connector Pinouts

Use the optional RS-232/422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.

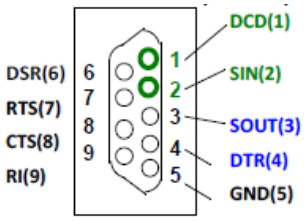
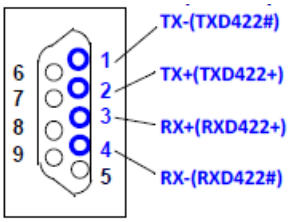
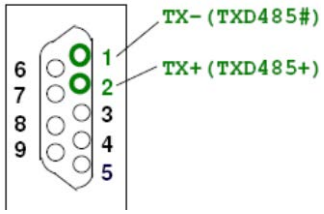
RS-232 Pinouts	RS-422 Pinouts	RS-485 Pinouts
		

Table 3-16: DB-9 RS-422/485 Pinouts

3.2.17 SATA 6Gb/s Drive Connectors

CN Label: **S_ATA1, S_ATA2**

CN Type: 7-pin SATA connector

CN Location: See **Figure 3-19**

The SATA 6Gb/s drive connector is connected to a SATA 6Gb/s drive. The SATA 6Gb/s drive transfers data at speeds as high as 6Gb/s.

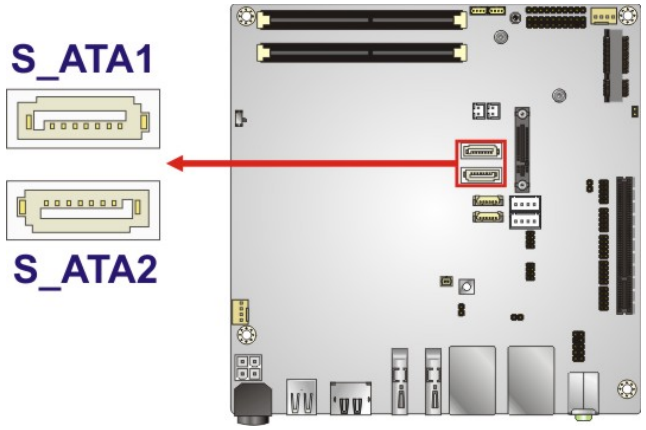


Figure 3-19: SATA 6Gb/s Drive Connectors Locations

3.2.18 SATA Power Connectors

CN Label: **SATA_PWR1, SATA_PWR2**

CN Type: 2-pin wafer, p=2.00 mm

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-17**

The SATA power connector provides +5 V power output to the SATA connector.

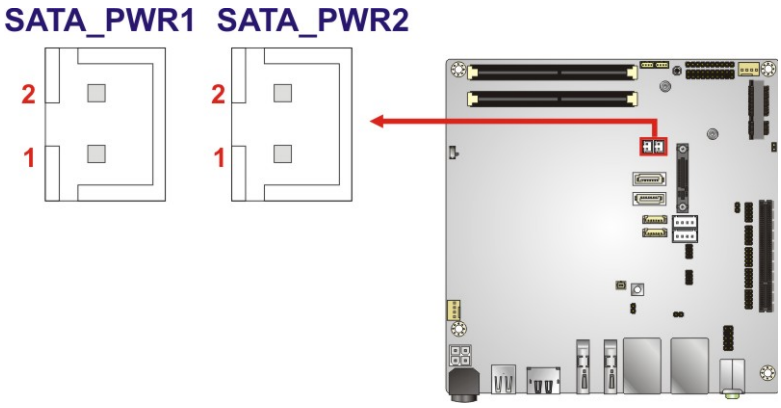


Figure 3-20: SATA Power Connector Locations

Pin	Description
1	+5V
2	GND

Table 3-17: SATA Power Connector Pinouts

3.2.19 SMBus Connector

CN Label:	**SMB1**
CN Type:	4-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-21**
CN Pinouts:	See **Table 3-18**

The SMBus (System Management Bus) connector provides low-speed system management communications.

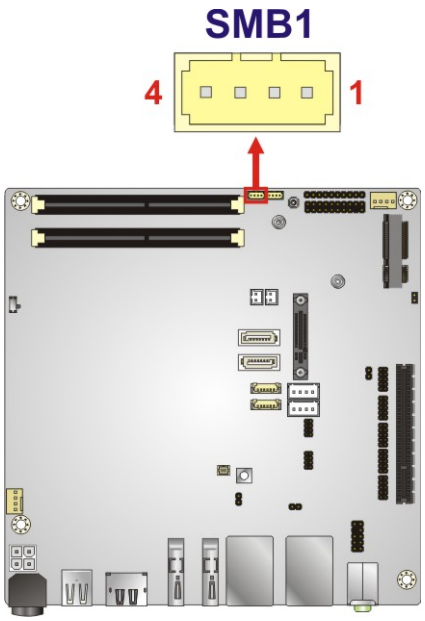


Figure 3-21: SMBus Connector Location

Pin	Description
1	GND
2	SMB_DATA
3	SMB_CLK
4	+5V

Table 3-18: SMBus Connector Pinouts

3.2.20 SPI Flash Connector, BIOS

CN Label:	**JSPI_BIOS_1**
CN Type:	6-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-22**
CN Pinouts:	See **Table 3-19**

The 6-pin SPI Flash connector is used to flash the BIOS.

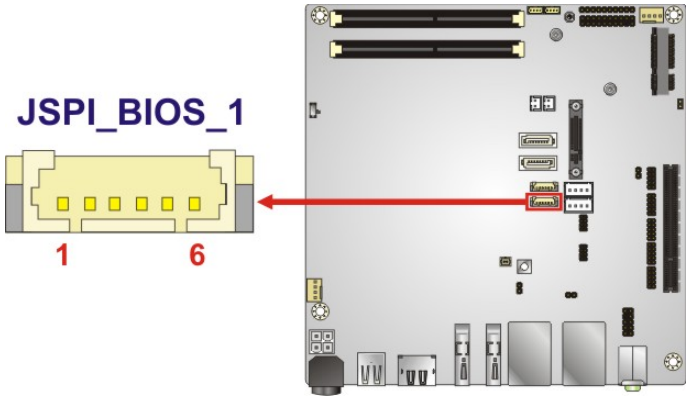


Figure 3-22: SPI Flash Connector Location

Pin	Description
1	+1.8V
2	SPI_CS#
3	SPI_SO
4	SPI_CLK
5	SPI_SI
6	GND

Table 3-19: SPI Flash Connector Pinouts

3.2.21 SPI Flash Connector, EC

CN Label:	**JSPI2**
CN Type:	6-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-23**
CN Pinouts:	See **Table 3-20**

The 6-pin SPI Flash connector is used to flash the EC.

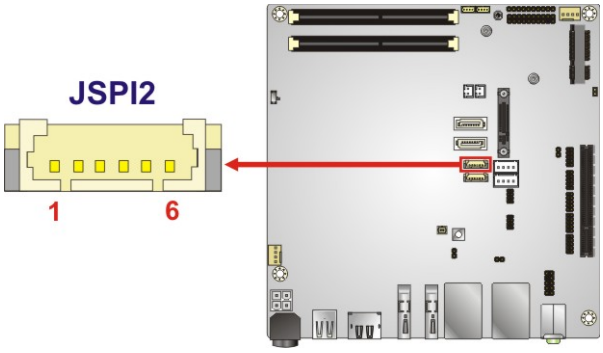


Figure 3-23: SPI Flash Connector Location

Pin	Description
1	+1.8V
2	SPI_CS#
3	SPI_SO
4	SPI_CLK
5	SPI_SI
6	GND

Table 3-20: SPI Flash Connector Pinouts

3.2.22 TPM Connector

CN Label: **TPM1**

CN Type: 20-pin header, p=2.54 mm

CN Location: See **Figure 3-24**

CN Pinouts: See **Table 3-21**

The Trusted Platform Module (TPM) connector secures the system on bootup.

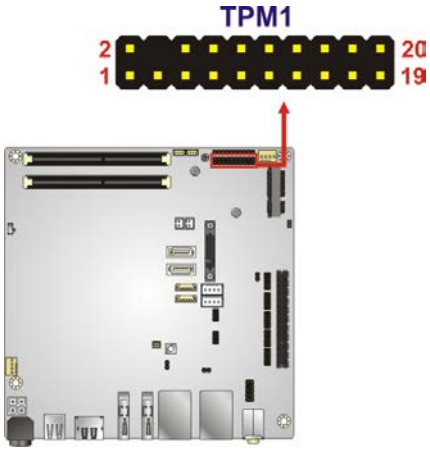


Figure 3-24: TPM Connector Location

Pin	Description	Pin	Description
1	LCLK	2	GND
3	LFRAME#	4	KEY
5	LRERST#	6	+5V
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SCL	14	SDA
15	SB3V	16	SERIRQ
17	GND	18	CLKRUN#
19	LPCPD#	20	LDRQ#

Table 3-21: TPM Connector Pinouts

3.2.23 USB 2.0 Connectors

CN Label:	**USB1, USB2**
CN Type:	8-pin header, p=2.0 mm
CN Location:	See **Figure 3-25**
CN Pinouts:	See **Table 3-22**

The USB connectors provide four USB 2.0 ports by dual-port USB cable.

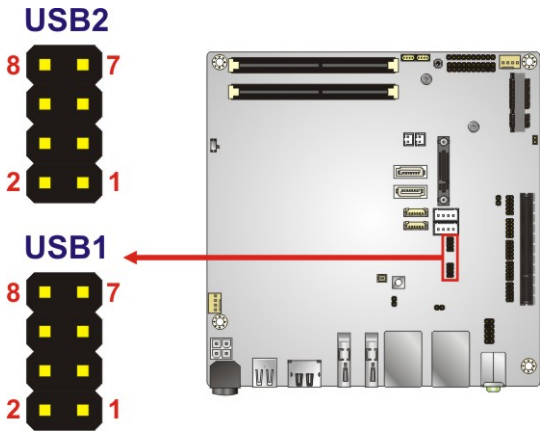


Figure 3-25: USB Connector Locations

Pin	Description	Pin	Description
1	+5V	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	+5V

Table 3-22: USB Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-26 shows the gKINO-DMF external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

- 3 x Audio jack (AUDIO_CV1)
- 1 x DC-in power jack (PWR_IN1)
- 1 x DisplayPort++ connector (DP1)
- 2 x GbE and USB 3.0 combo connector (LAN1_USB1, LAN2_USB2)
- 2 x HDMI connector (HDMI_CN1, HDMI_CN2)
- 1 x USB 2.0 connector (EXT_USB2)

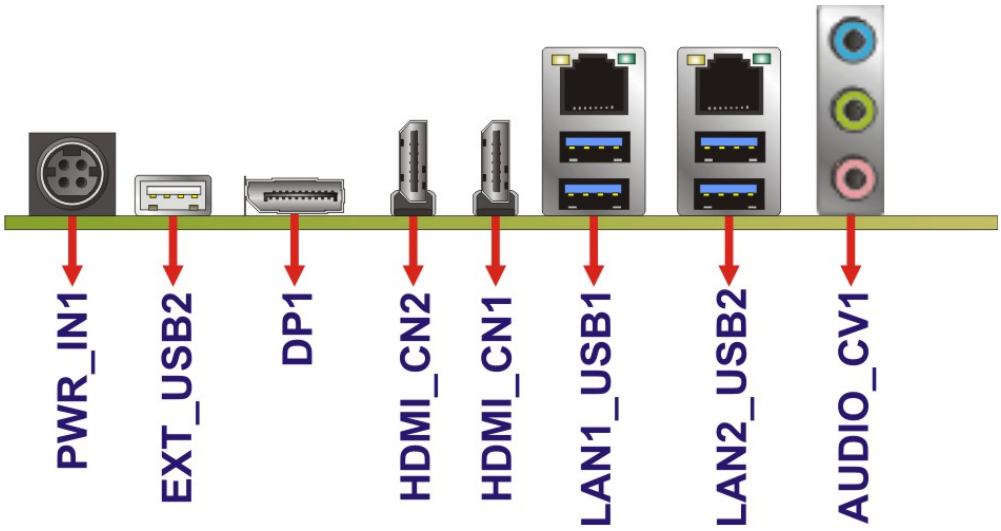


Figure 3-26: External Peripheral Interface Connector

3.3.1 Audio Jacks

CN Label:	**AUDIO_CV1**
CN Type:	Audio jack
CN Location:	See **Figure 3-26**

The audio jacks connect to external audio devices.

- **Line In port (Light Blue):** Connects a CD-ROM, DVD player, or other audio devices.

- **Line Out port (Lime):** Connects to a headphone or a speaker. With multi-channel configurations, this port can also connect to front speakers.
- **Microphone (Pink):** Connects a microphone.

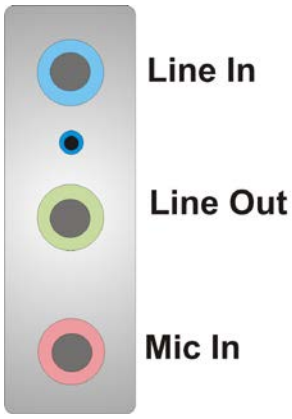


Figure 3-27: Audio Connector

3.3.2 DisplayPort++ Connector

CN Label: **DP1**

CN Type: DisplayPort connector

CN Location: See **Figure 3-26**

CN Pinouts: See **Table 3-23**

The DisplayPort++ connector can connect to a DisplayPort device, or the user can use a passive adapter to convert DisplayPort signals to single-link HDMI or DVI.

Pin	Description	Pin	Description
1	+5V	11	AUXP
2	LANE1N	12	AUXN
3	LANE1P	13	GND
4	GND	14	LANE2P
5	LANE3N	15	LANE2N
6	LANE3P	16	GND
7	GND	17	LANE0P
8	AUX_CTRL_DET_D	18	LANE0N
9	GND	19	+3.3V

Pin	Description	Pin	Description
10	HPD		

Table 3-23: DisplayPort++ Connector Pinouts

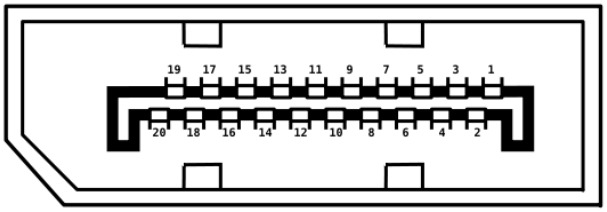


Figure 3-28: DisplayPort++ Connector Pinout Locations

3.3.3 HDMI Connectors

CN Label: **HDMI_CN1, HDMI_CN2**

CN Type: 23-pin HDMI port

CN Location: See **Figure 3-26**

CN Pinouts: See **Table 3-24**

The HDMI connector can connect to an HDMI device.

Pin	Description	Pin	Description
1	HDMI_DATA2	13	N/C
2	GND	14	N/C
3	HDMI_DATA2#	15	HDMI_SCL
4	HDMI_DATA1	16	HDMI_SDA
5	GND	17	GND
6	HDMI_DATA1#	18	+5V
7	HDMI_DATA0	19	HDMI_HPD
8	GND	20	HDMI_GND
9	HDMI_DATA0#	21	HDMI_GND
10	HDMI_CLK	22	HDMI_GND
11	GND	23	HDMI_GND
12	HDMI_CLK#		

Table 3-24: HDMI Connector Pinouts

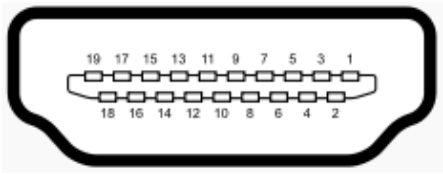


Figure 3-29: HDMI Connector

3.3.4 LAN and USB 3.0 Combo Connectors

CN Label: **LAN1_USB1, LAN2_USB2**

CN Type: RJ-45 and USB 3.0 combo

CN Location: See **Figure 3-26**

CN Pinouts: See **Table 3-25** and **Table 3-27**

A 10/100/1000 Mb/s connection can be made to a Local Area Network.

Pin	Description	Pin	Description
1	LAN1_MDI0P	5	LAN1_MDI2P
2	LAN1_MDI0N	6	LAN1_MDI2N
3	LAN1_MDI1P	7	LAN1_MDI3P
4	LAN1_MDI1N	8	LAN1_MDI3N

Table 3-25: LAN1 Ethernet Connector Pinouts

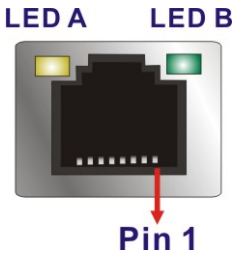


Figure 3-30: Ethernet Connector

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 10 Mb/s green: 100 Mb/s orange: 1000 Mb/s

Table 3-26: Connector LEDs

The USB 3.0 connector can be connected to a USB device.

Pin	Description	Pin	Description
1	VCC	10	VCC
2	USB_DATA-	11	USB_DATA-
3	USB_DATA+	12	USB_ DATA+
4	GND	13	GND
5	USB3_RX-	14	USB3_RX-
6	USB3_RX+	15	USB3_ RX+
7	GND	16	GND
8	USB3_TX-	17	USB3_TX-
9	USB3_TX+	18	USB3_TX+

Table 3-27: USB 3.0 Port Pinouts

3.3.5 Power Connector

CN Label: **PWR_IN1**

CN Type: 4-pin DIN

CN Location: See **Figure 3-26**

The power connector supports the 12V power adapter.

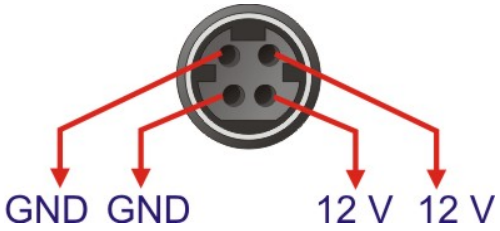


Figure 3-31: Power Connector

3.3.6 USB 2.0 Connector

CN Label: **EXT_USB02**

CN Type: USB 2.0 port

CN Location: See **Figure 3-26**

CN Pinouts: See **Table 3-28**

The gKINO-DMF has one external USB 2.0 port. The USB 2.0 connector can be connected to a USB 2.0 device. The pinouts of USB 2.0 connectors are shown below.

Pin	Description
1	VCC
2	Data-
3	Data+
4	GND

Table 3-28: USB 2.0 Port Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the gKINO-DMF may result in permanent damage to the gKINO-DMF and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the gKINO-DMF. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the gKINO-DMF or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding*** Before handling the board, touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the gKINO-DMF, place it on an anti-static pad. This reduces the possibility of ESD damaging the gKINO-DMF.
- ***Only handle the edges of the PCB***: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before installation. All installation notices must be strictly adhered to. Failing to adhere to these precautions may lead to severe damage and injury to the person performing the installation.

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the gKINO-DMF, gKINO-DMF components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the gKINO-DMF installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the gKINO-DMF on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the gKINO-DMF off:
  - When working with the gKINO-DMF, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the gKINO-DMF **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.3 SO-DIMM Installation

To install a SO-DIMM, please follow the steps below and refer to Figure 4-1.

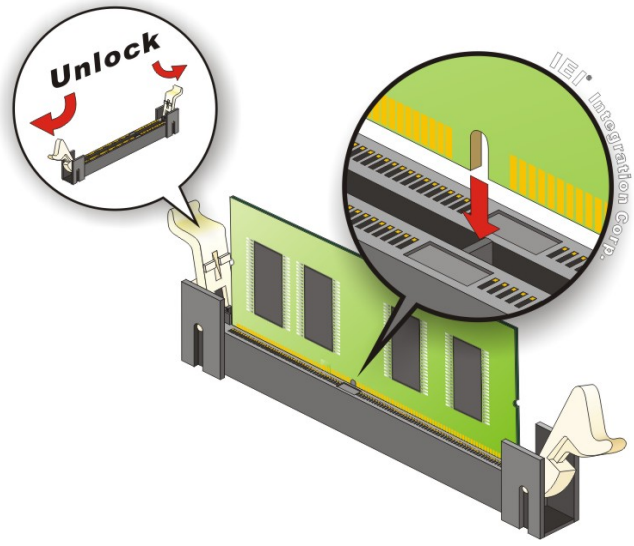


Figure 4-1: SO-DIMM Installation (DDR4)

Step 1: **Open the SO-DIMM socket handles**. Open the two handles outwards as far as they can. See Figure 4-1.

Step 2: **Align the SO-DIMM with the socket**. Align the SO-DIMM so the notch on the memory lines up with the notch on the memory socket. See Figure 4-1.

Step 3: **Insert the SO-DIMM**. Once aligned, press down until the SO-DIMM is properly seated. Clip the two handles into place. See Figure 4-1.

Step 4: **Removing a SO-DIMM**. To remove a SO-DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

CAUTION:

For dual channel configuration, always install two identical memory modules that feature the same capacity, timings, voltage, number of ranks and the same brand.

4.4 M.2 Module Installation

CAUTION:

If an M.2 module is installed in the M.2 slot (M2_KEY_B1), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the M.2 module for storage.

The gKINO-DMF has one M.2 slot for installing the optional M.2 module especially designed for the gKINO-DMF. To install the optional M.2 module, please follow the steps below.

Step 1: Locate the M.2 module slot. See **Chapter 3**.

Step 2: Line up the notch on the M.2 module with the notch on the slot. Slide the M.2 module into the socket vertically.

Step 3: Insert two retention screws into the screw holes on both sides of the slot (one on each side) to secure the M.2 module.

4.5 PCIe Mini Card Installation

The PCIe Mini card slot on the gKINO-DMF allows installation of either a full-size or half-size PCIe Mini card.

4.5.1 Full-size PCIe Mini Card Installation

To install a full-size PCIe Mini card, please follow the steps below.

Step 1: Locate the PCIe Mini card slot. See **Chapter 3**.

Step 2: Remove the retention screw as shown in **Figure 4-2**.

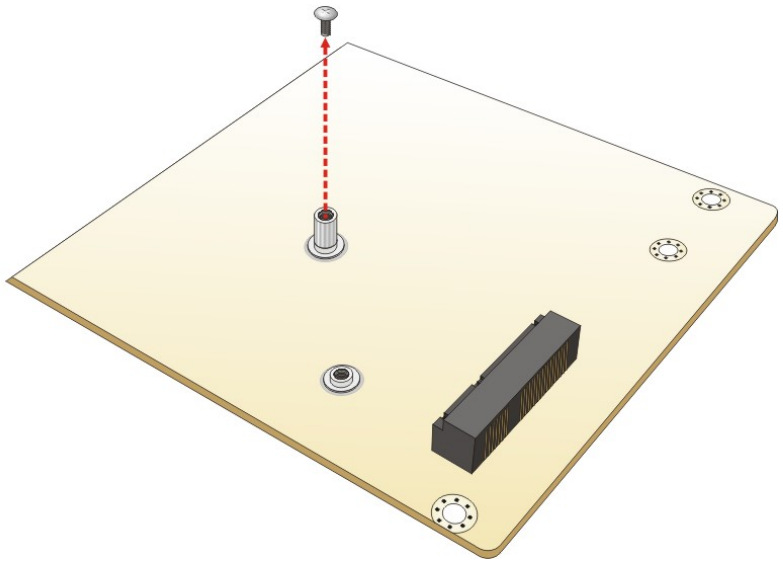


Figure 4-2: Removing the Retention Screw

Step 3: Line up the notch on the card with the notch on the slot. Slide the PCIe Mini card into the socket at an angle of about 20º (**Figure 4-3**).

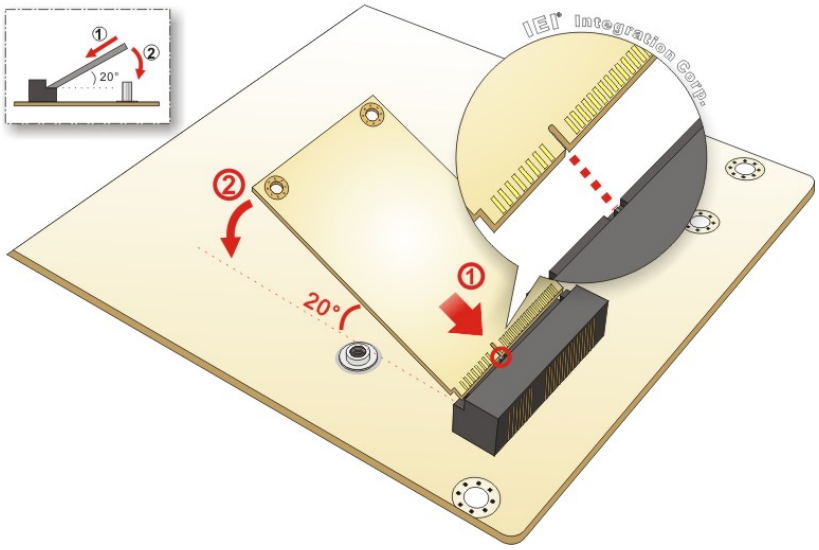


Figure 4-3: Inserting the Full-size PCIe Mini Card into the Slot at an Angle

Step 4: Secure the full-size PCIe Mini card with the retention screw previously removed (**Figure 4-4**).

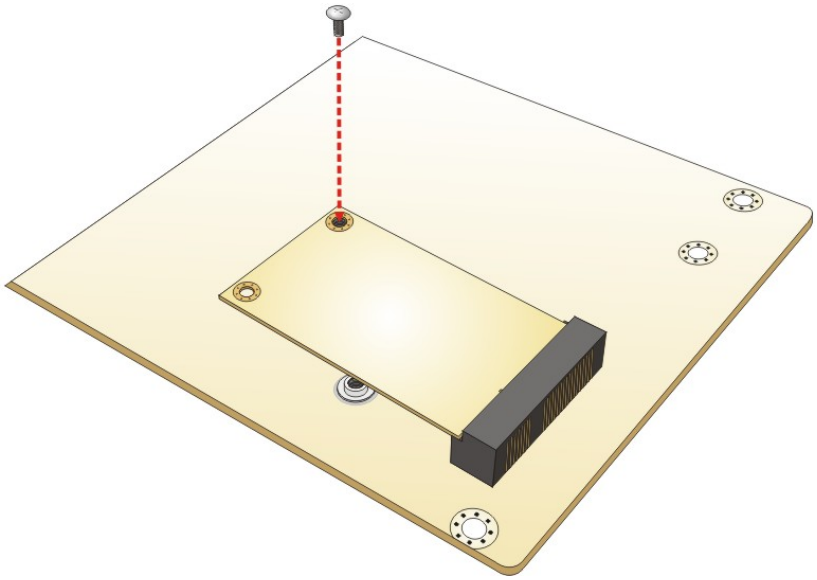


Figure 4-4: Securing the Full-size PCIe Mini Card

4.5.2 Half-size PCIe Mini Card Installation

To install a half-size PCIe Mini card, please follow the steps below.

Step 1: Locate the PCIe Mini card slot. See **Chapter 3**.

Step 2: Remove the retention screw first, then unscrew and remove the standoff secured on the motherboard. See **Figure 4-5**.

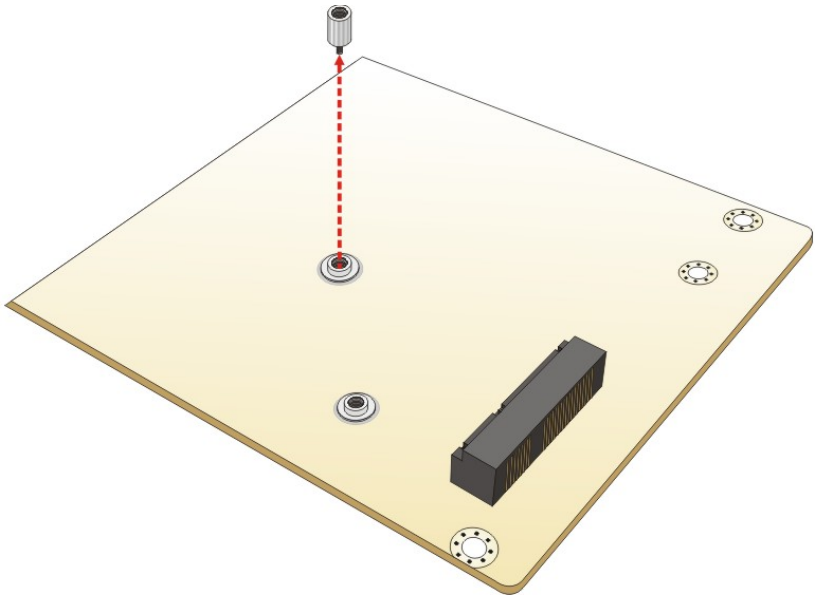


Figure 4-5: Removing Retention Screw and Standoff

Step 3: Install the previously removed standoff to the screw hole for the half-size PCIe Mini card (**Figure 4-6**).

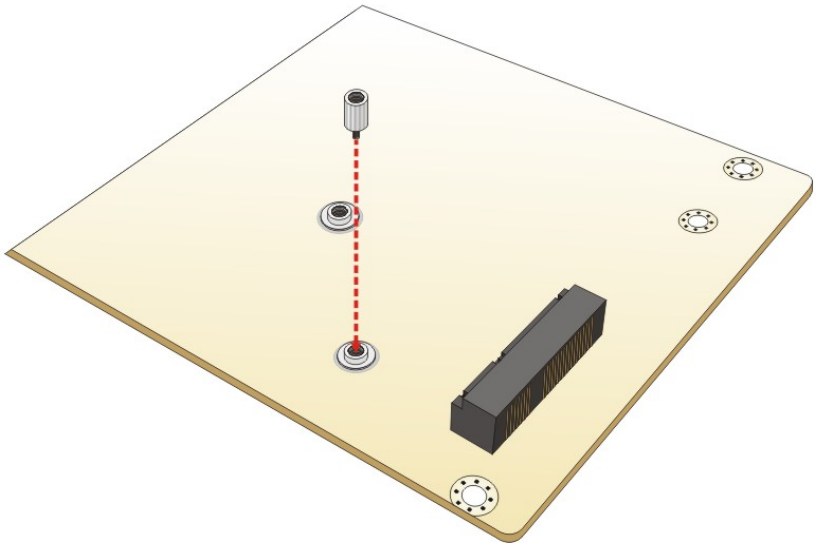


Figure 4-6: Installing the Standoff

Step 4: Line up the notch on the card with the notch on the slot. Slide the PCIe Mini card into the slot at an angle of about 20º (**Figure 4-7**).

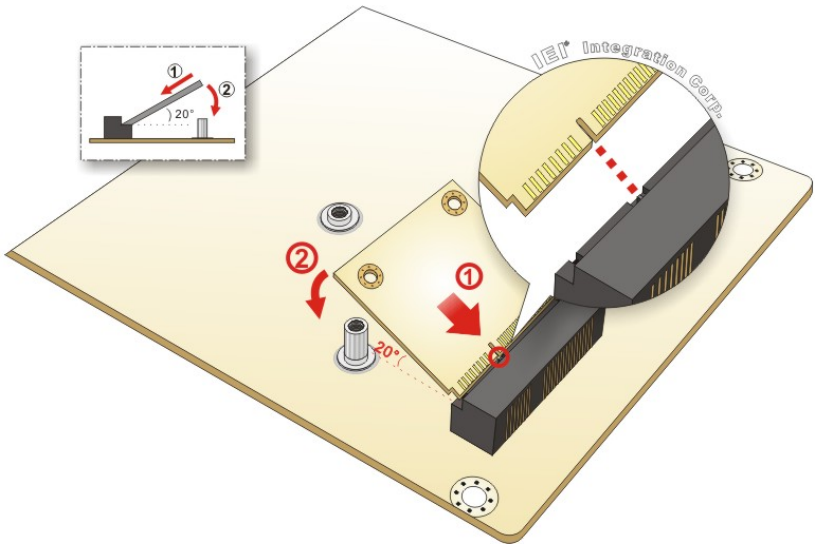


Figure 4-7: Inserting the Half-size PCIe Mini Card into the Slot at an Angle

Step 5: Secure the half-size PCIe Mini card with the retention screw previously removed (**Figure 4-8**).

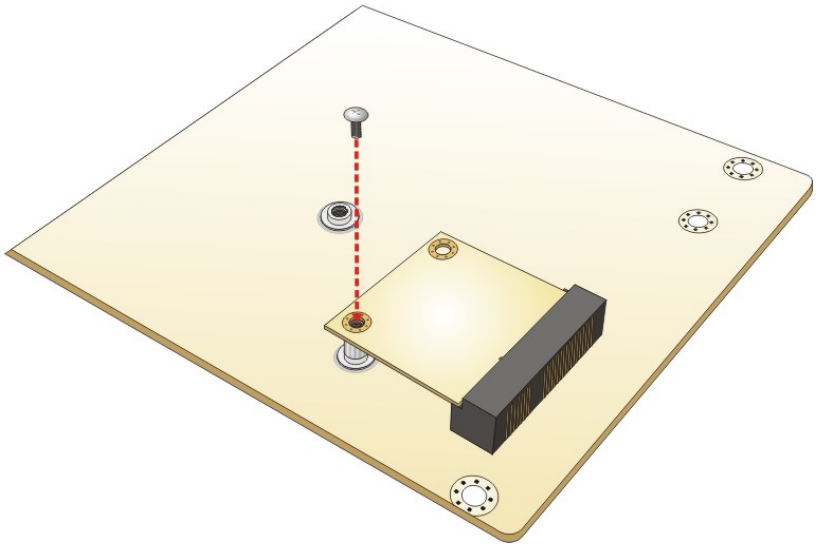


Figure 4-8: Securing the Half-size PCIe Mini Card

4.6 System Configuration

The system configuration is controlled by buttons, jumpers and switches. The system configuration should be performed before installation.

4.6.1 AT/ATX Mode Select Switch

The AT/ATX mode select switch (J_ATX_AT1) specifies the systems power mode as AT or ATX. AT/ATX mode select switch settings are shown in **Table 4-1**.

Setting	Description
Short A-B	ATX Mode (Default)
Short B-C	AT Mode

Table 4-1: AT/ATX Mode Select Switch Settings

The location of the AT/ATX mode select switch is shown in **Figure 4-9** below.

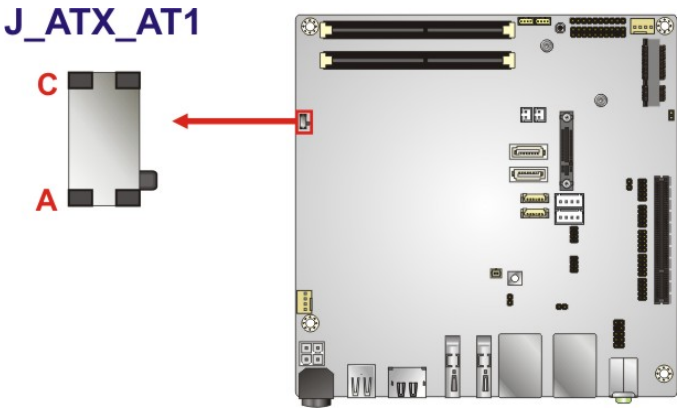


Figure 4-9: AT/ATX Mode Select Switch Location

4.6.2 Clear CMOS Button

If the gKINO-DMF fails to boot due to improper BIOS settings, use the button to clear the CMOS data and reset the system BIOS information.

The location of the clear CMOS button (J_CMOS1) is shown in **Figure 4-10**

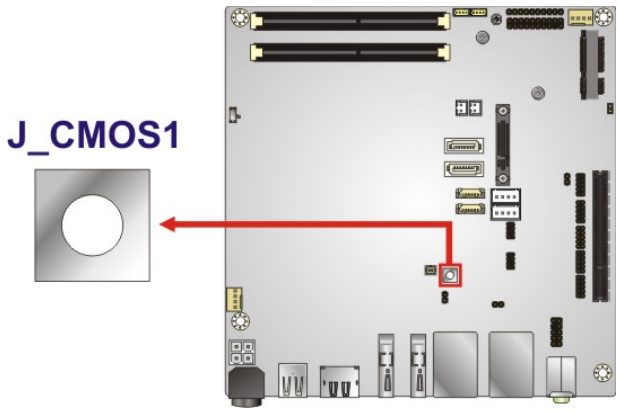


Figure 4-10: Clear CMOS Button Location

4.6.3 M.2 and SATA2 Select Jumper

Use the M.2 and SATA2 select jumper (MSATA_SW1) to set the priority of M2_KEY_B1 and S_ATA2 connectors since the M.2 (M2_KEY_B1) slot is co-lay with the SATA2 connector. The M.2 and SATA2 select switch settings are shown in **Table 4-2**.

Setting	Description
Short	M.2 as the priority (Default) (SATA2 will be disabled if an M.2 module is installed in the M2_KEY_B1 slot.)
Open	SATA2 as the priority

Table 4-2: M.2 and SATA2 Select Switch Settings

The location of the M.2 and SATA2 select switch is shown in **Figure 4-11** below.

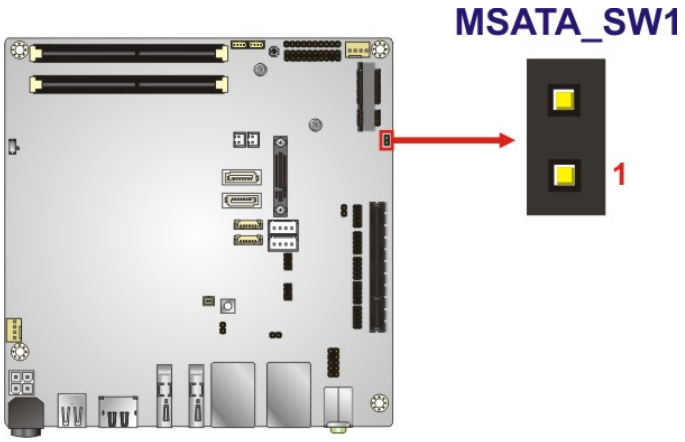


Figure 4-11: M.2 and SATA2 Select Switch Location

4.7 Chassis Installation

4.7.1 Airflow

WARNING:

Airflow is critical for keeping components within recommended operating temperatures. The chassis should have fans and vents as necessary to keep things cool.

The gKINO-DMF must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

4.7.2 Motherboard Installation

To install the gKINO-DMF motherboard into the chassis please refer to the reference material that came with the chassis.

4.8 SATA Drive Connection

The gKINO-DMF is shipped with a SATA drive cable. To connect the SATA drives to the connectors, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector until it clips into place. See Figure 4-12.

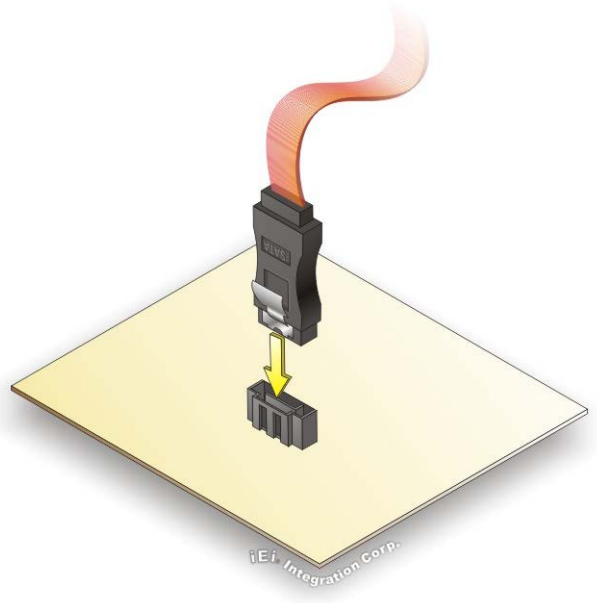


Figure 4-12: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See Figure 4-13.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See Figure 4-13.

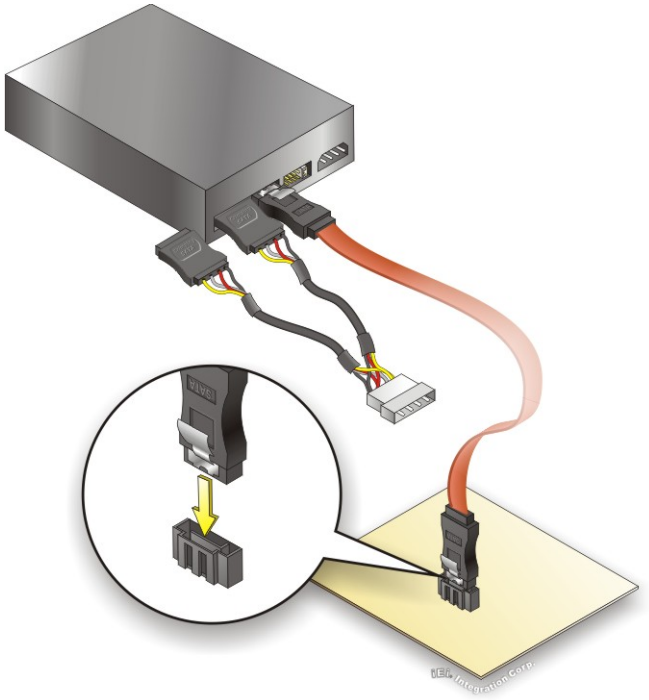


Figure 4-13: SATA Power Drive Connection

NOTE:

The connector locations in the diagram above are just for reference. For the exact locations, please see **Section 3.2.17**.

Chapter

5

BIOS

5.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.

NOTE:

Some of the BIOS options may vary throughout the life cycle of the product and are subject to change without prior notice.

5.1.1 Starting Setup

The UEFI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** or **F2** key as soon as the system is turned on or
2. Press the **DELETE** or **F2** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** or **F2** key is pressed, restart the computer and try again.

5.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in **Table 5-1**.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes

Key	Function
-	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Load previous values.
F3 key	Load optimized defaults
F4 key	Save changes and Exit BIOS
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu

Table 5-1: BIOS Navigation Keys

5.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

5.1.4 Unable to Reboot after Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Section 4.6.2**.

5.1.5 BIOS Menu Bar

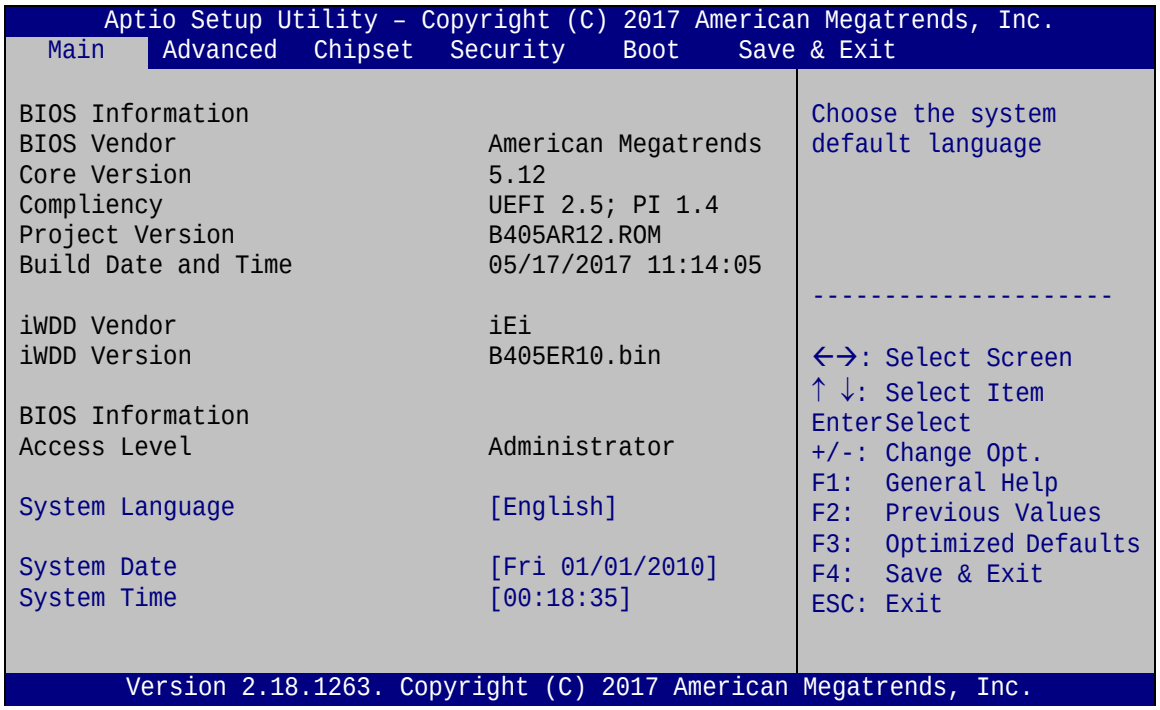
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

5.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING!

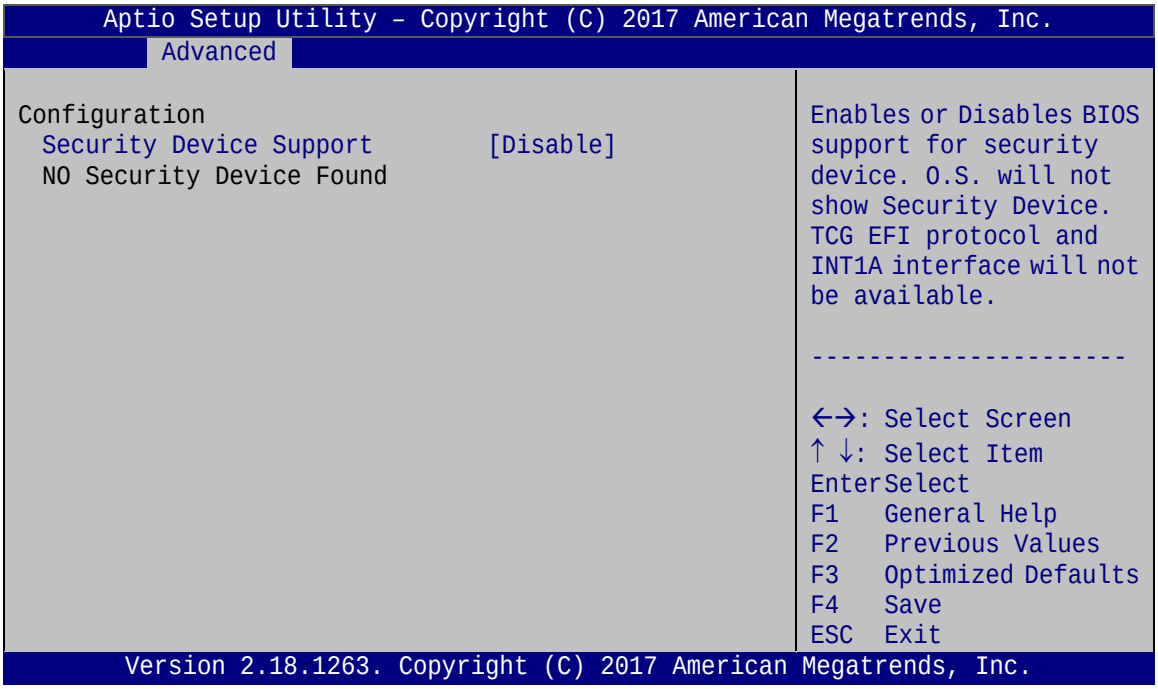
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

```
      Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
  Main    Advanced   Chipset   Security    Boot    Save & Exit

> Trusted Computing                          Trusted Computing
> ACPI Settings                              Settings
> IDE Configuration
> F81866 Super IO Configuration
> iWDD H/W Monitor
> RTC Wake Settings                          ----------------------
> Power Saving Configuration                 ←→: Select Screen
> CPU Configuration                          ↑ ↓: Select Item
> NVMe Configuration                         EnterSelect
> USB Configuration                          F1   General Help
                                             F2   Previous Values
                                             F3   Optimized Defaults
                                             F4   Save
                                             ESC  Exit
      Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 2: Advanced

5.3.1 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 3**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).



BIOS Menu 3: Trusted Computing

➔ **Security Device Support [Disable]**

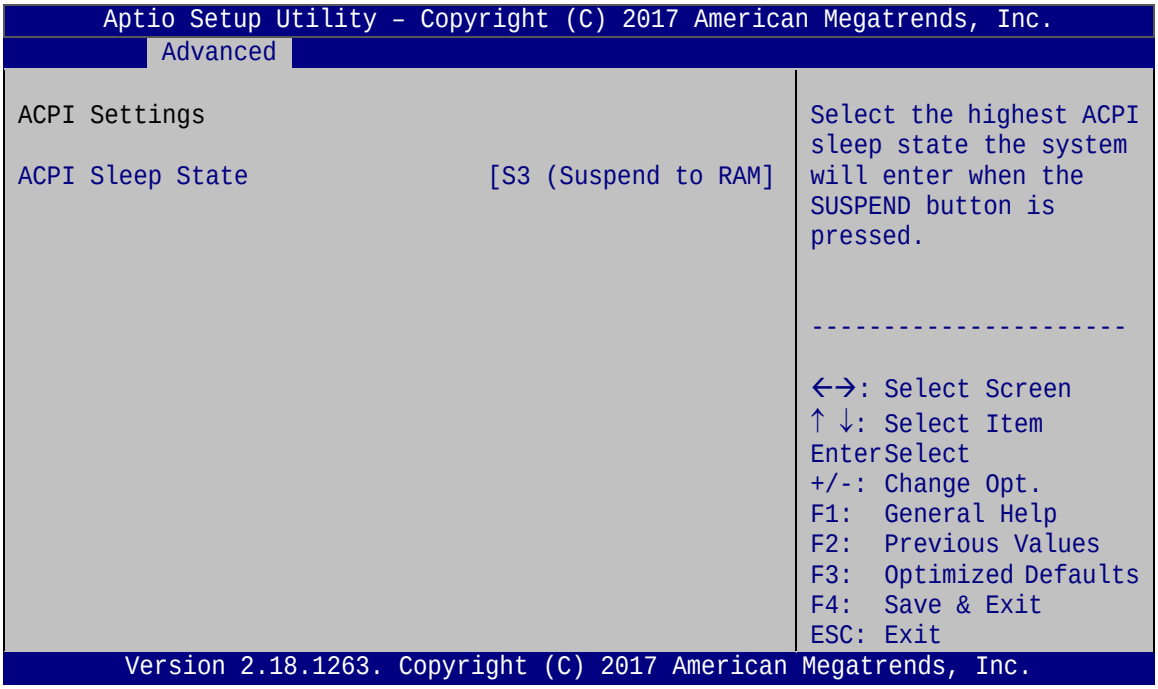
Use the **Security Device Support** option to configure support for the security device.

➔ **Disable** **DEFAULT** Security device support is disabled.

➔ **Enable** Security device support is enabled.

5.3.2 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 4**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 4: ACPI Settings

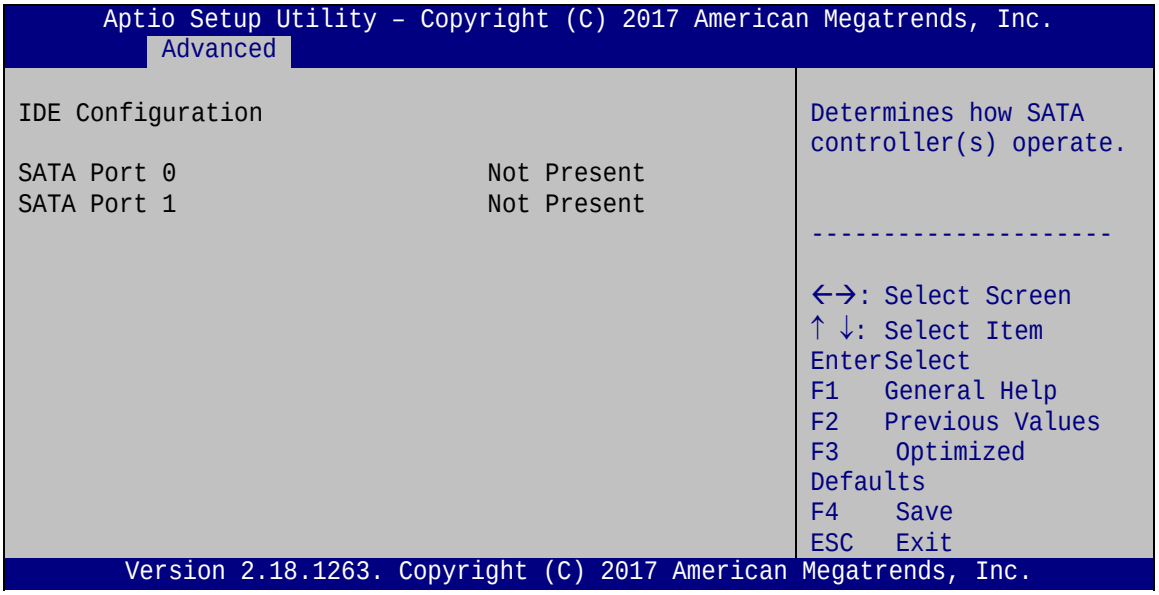
➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

➔ **S3 (Suspend to RAM)** **DEFAULT** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.3 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 5**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 5: IDE Configuration

5.3.4 F81866 Super IO Configuration

Use the **F81866 Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the serial ports.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
Advanced

F81866 Super IO Configuration                    Set Parameters of Serial
                                                 Port 1 (COMA)
Super IO Chip                  F81866
> Serial Port 1 Configuration                    ---------------------
> Serial Port 2 Configuration                    ←→: Select Screen
> Serial Port 3 Configuration                    ↑ ↓: Select Item
> Serial Port 4 Configuration                    EnterSelect
> Serial Port 5 Configuration                    F1   General Help
> Serial Port 6 Configuration                    F2   Previous Values
                                                 F3    Optimized
  Case Open Beep               [Disabled]        Defaults
                                                 F4    Save
                                                 ESC   Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 6: F81866 Super IO Configuration

5.3.4.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 7**) to configure the serial port n.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
Advanced

Serial Port 1 Configuration                      Enable or Disable Serial
                                                 Port (COM)
Serial Port                    [Enabled]
Device Settings                IO=3F8h; IRQ=4
                                                 ---------------------
Change Settings                [IO=3F8h; IRQ=4]  ←→: Select Screen
                                                 ↑ ↓: Select Item
                                                 EnterSelect
                                                 F1   General Help
                                                 F2   Previous Values
                                                 F3    Optimized
                                                 Defaults
                                                 F4    Save
                                                 ESC   Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 7: Serial Port n Configuration

5.3.4.1.1 Serial Port 1 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=3F8h; IRQ=4**	**DEFAULT**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ4
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.4.1.2 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=2F8h; IRQ=4**	**DEFAULT**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ4
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.4.1.3 Serial Port 3 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=3E8h; IRQ=11**	**DEFAULT**	Serial Port I/O port address is 3E8h and the interrupt address is IRQ11
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.4.1.4 Serial Port 4 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=2E8h; IRQ=11**	**DEFAULT**	Serial Port I/O port address is 2E8h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.4.1.5 Serial Port 5 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=2E0h; IRQ=11**	**DEFAULT**	Serial Port I/O port address is 2E0h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

➔ **Transfer Mode [RS232]**

Use the **Transfer Mode** option to select the Serial Port 5 signaling mode.

➔ **RS422**		Serial Port 5 signaling mode is RS-422
➔ **RS485**		Serial Port 5 signaling mode is RS-485
➔ **RS232**	**DEFAULT**	Serial Port 5 signaling mode is RS-232

5.3.4.1.6 Serial Port 6 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **IO=2F0h; IRQ=11**	**DEFAULT**	Serial Port I/O port address is 2F0h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

➔ **Transfer Mode [RS232]**

Use the **Transfer Mode** option to select the Serial Port 6 signaling mode.

➔ **RS422**		Serial Port 6 signaling mode is RS-422
➔ **RS485**		Serial Port 6 signaling mode is RS-485
➔ **RS232**	**DEFAULT**	Serial Port 6 signaling mode is RS-232

➔ **Case Open Beep [Disabled]**

Use the **Case Open Beep** option to enable or disable the chassis intrusion detection function.

➔ **Disabled**	**DEFAULT**	Chassis intrusion detection function is disabled
➔ **Enabled**		Chassis intrusion detection function is enabled

5.3.5 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 8**) contains the fan configuration submenus and displays operating temperature, fan speeds and system voltages.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced
PC Health Status                                Smart Fan Mode Select

CPU temperature                 :+33 °C
System temperature              :+29 °C

CPU_FAN1 Speed                  :6231 RPM
SYS_FAN1 Speed                  :N/A

CPU_CORE                        :+1.211 V       ---------------------
+5V                             :+5.070 V       ←→: Select Screen
+12V                            :+11.516 V      ↑ ↓: Select Item
+DDR                            :+1.202 V       EnterSelect
+5VSB                           :+5.038 V       + -   Change Opt.
+3.3V                           :+3.296 V       F1    General Help
+3.3VSB                           :+3.271 V     F2    Previous Values
                                                F3    Optimized Defaults
> Smart Fan Mode Configuration                  F4    Save & Exit
                                                ESC   Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 8: iWDD H/W Monitor

➔ **PC Health Status**

The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - CPU temperature
  - System temperature
- Fan Speed:
  - CPU Fan Speed
  - System Fan Speed
- Voltages
  - CPU_CORE
  - +5V
  - +12V

- +DDR
- +5VSB
- +3.3V
- +3.3VSB

5.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 9**) to configure fan temperature and speed settings.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced
Smart Fan Mode Configuration                    Smart Fan Mode Select

CPU_FAN1 Smart Fan Control      [Auto Mode]
Auto mode fan start temperature    40
Auto mode fan off temperature      20
Auto mode fan start PWM            30
Auto mode fan slope PWM            2
SYS_FAN1 Smart Fan Control      [Auto Mode]
Auto mode fan start temperature    50
Auto mode fan off temperature      40
Auto mode fan start PWM            30
Auto mode fan slope PWM            1
                                                ---------------------
                                                ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                + -   Change Opt.
                                                F1    General Help
                                                F2    Previous Values
                                                F3    Optimized Defaults
                                                F4    Save & Exit
                                                ESC   Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 9: Smart Fan Mode Configuration

➔ **CPU_FAN1/SYS_FAN1 Smart Fan Control [Auto Mode]**

Use the **CPU_FAN1 Smart Fan Control** BIOS option to configure the CPU Smart Fan.

➔ **Manual Mode** The fan spins at the speed set in the Manual Mode option

➔ **Auto Mode** **DEFAULT** The fan adjusts its speed using these settings:

- Auto mode fan start temperature
- Auto mode fan off temperature
- Auto mode fan start PWM
- Auto mode fan slope PWM

➔ **Auto mode fan start temperature**

WARNING:

Setting this value too high may cause the fan to rotate at full speed only when the CPU is at a very high temperature and therefore cause the system to be damaged.

The **Auto mode fan start temperature** option can only be set if the **CPU_FAN1/SYS_FAN1 Smart Fan Control** option is set to **Auto Mode**. If the system temperature is between **Start Temperature** and **Off Temperature**, the fan speed change to be **Start PWM**. To set a value, select the **Auto mode fan start temperature** option and enter a decimal number between 1 and 100.

➔ **Auto mode fan off temperature**

WARNING:

Setting this value too high may cause the fan to speed up only when the CPU is at a very high temperature and therefore cause the system to be damaged.

The **Auto mode fan off temperature** option can only be set if the **CPU_FAN1/SYS_FAN1 Smart Fan control** option is set to **Auto Mode**. If the system temperature is lower than **Auto mode fan off temperature**, the fan speed change to be lowest. To set a value, select the **Auto mode fan off temperature** option and enter a decimal number between 1 and 100.

➔ **Auto mode fan start PWM**

The **Auto mode fan start PWM** option can only be set if the **CPU_FAN1/SYS_FAN1 Smart Fan control** option is set to **Auto Mode**. Use the **Auto mode fan start PWM** option to set the PWM start value. To set a value, select the **Auto mode fan start PWM** option and enter a decimal number between 1 and 100.

➔ **Auto mode fan slope PWM**

The **Auto mode fan slope PWM** option can only be set if the **CPU_FAN1/SYS_FAN1 Smart Fan control** option is set to **Auto Mode**. Use the **Auto mode fan slope PWM** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. To set a value, select the **Auto mode fan slope PWM** option and enter a decimal number between 1 and 8.

5.3.6 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 10**) configures RTC wake event.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
Advanced

Wake system with Fixed Time      [Disabled]          Enable or disable System
                                                     wake on alarm event. When
                                                     enabled, System will
                                                     wake on the
                                                     date::hr::min::sec
                                                     specified

                                                     ----------------------

                                                     ←→: Select Screen
                                                     ↑↓: Select Item
                                                     Enter Select
                                                     F1   General Help
                                                     F2   Previous Values
                                                     F3   Optimized Defaults
                                                     F4   Save
                                                     ESC  Exit
Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 10: RTC Wake Settings

➔ **Wake system with Fixed Time [Disabled]**

Use the **Wake system with Fixed Time** option to enable or disable the system wake on alarm event.

➔ **Disabled** **DEFAULT** The real time clock (RTC) cannot generate a wake event

➔ **Enabled** If selected, the **Wake up every day** option appears allowing you to enable to disable the system to wake

every day at the specified time. Besides, the following options appear with values that can be selected:

Wake up date

Wake up hour

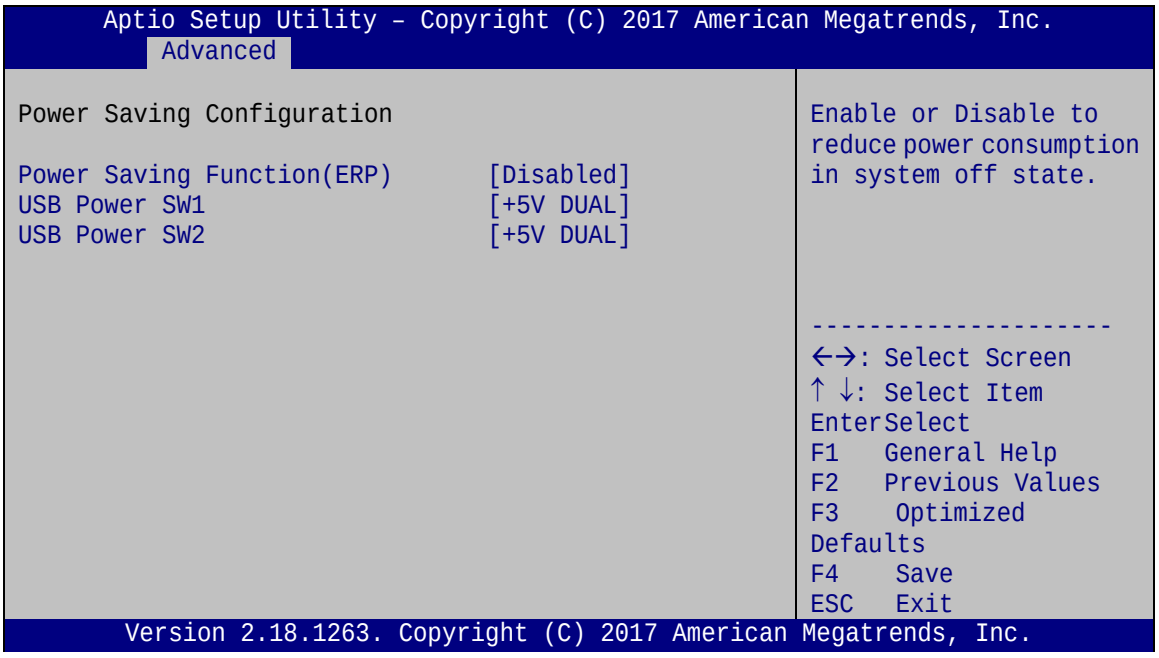
Wake up minute

Wake up second

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

5.3.7 Power Saving Configuration

Use the **Power Saving Configuration** menu (**BIOS Menu 11**) to configure power saving function and USB power.



BIOS Menu 11: Power Saving Configuration

➔ **Power Saving Function [Disabled]**

Use the **Power Saving Function** BIOS option to enable or disable the power saving function.

➔ **Disabled**	**DEFAULT**	Power saving function is disabled.
➔ **Enabled**		Power saving function is enabled. It will reduce power consumption when the system is off.

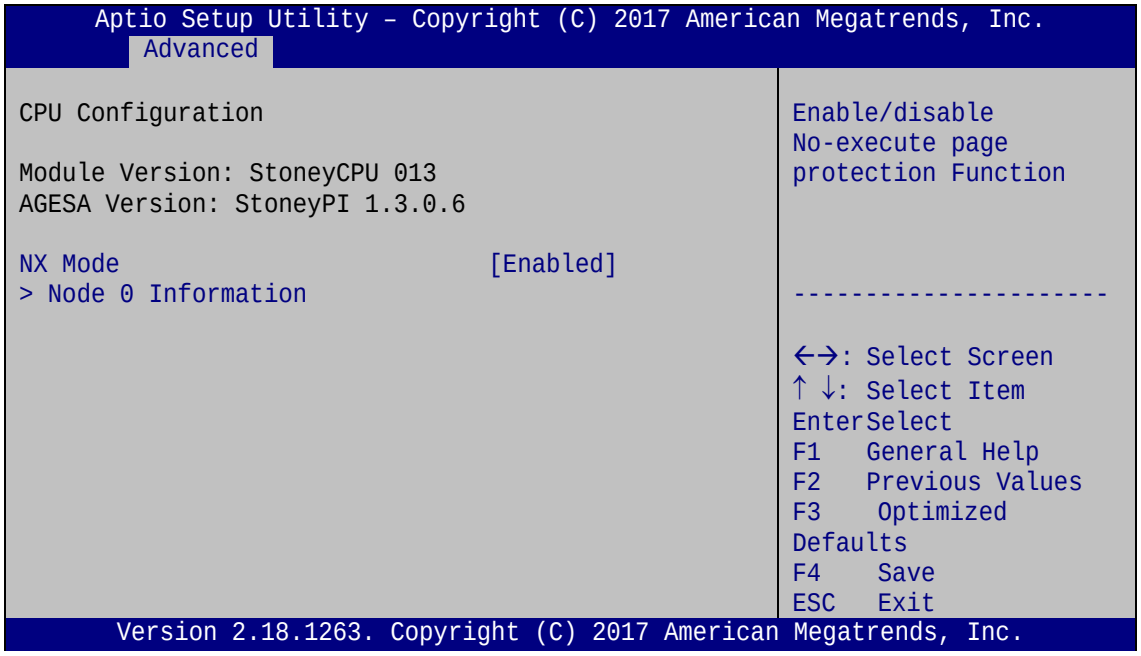
➔ **USB Power SW1/SW2 [+5V DUAL]**

Use the **USB Power SW1/SW2** BIOS option to configure whether to provide power to the USB connector when the system is off. This option is valid only when the above **Power Saving Function** BIOS option is disabled.

➔ **+5V DUAL**	**DEFAULT**	Power is provided to the USB connector when the system is off
➔ **+5V**		Power is not provided to the USB connector when the system is off

5.3.8 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 12**) to view detailed CPU specifications and configure the CPU.



BIOS Menu 12: CPU Configuration

➔ **NX Mode [Enabled]**

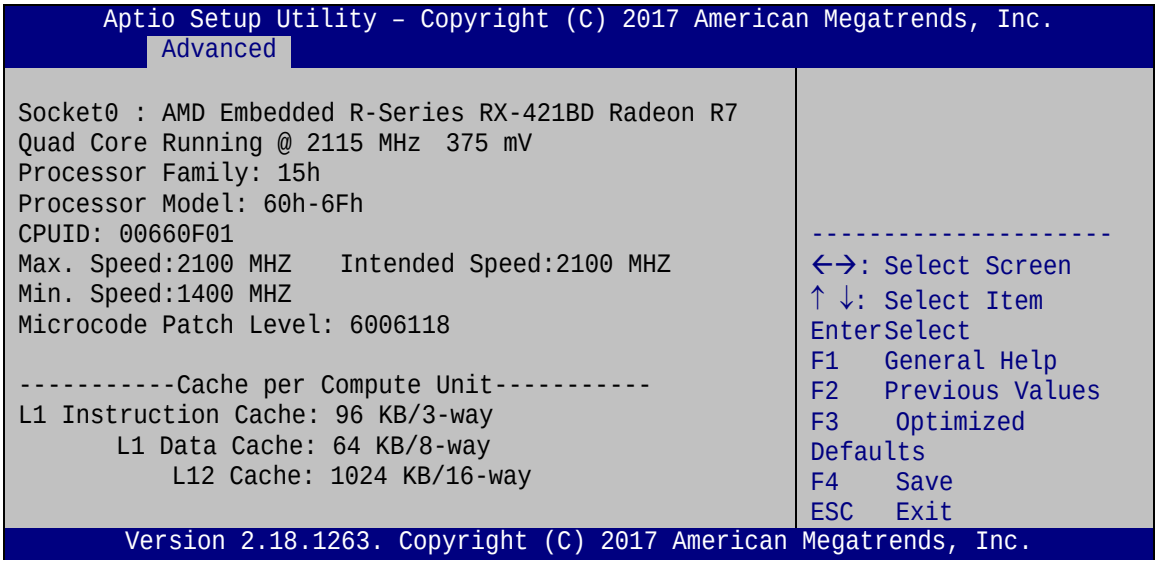
Use the **NX Mode** BIOS option to enable or disabled the No-execute (NX) page-protection function.

➔ **Disabled** Disable the No-execute (NX) page-protection function.

➔ **Enabled** **DEFAULT** Enable the No-execute (NX) page-protection function.

5.3.8.1 Node 0 Information

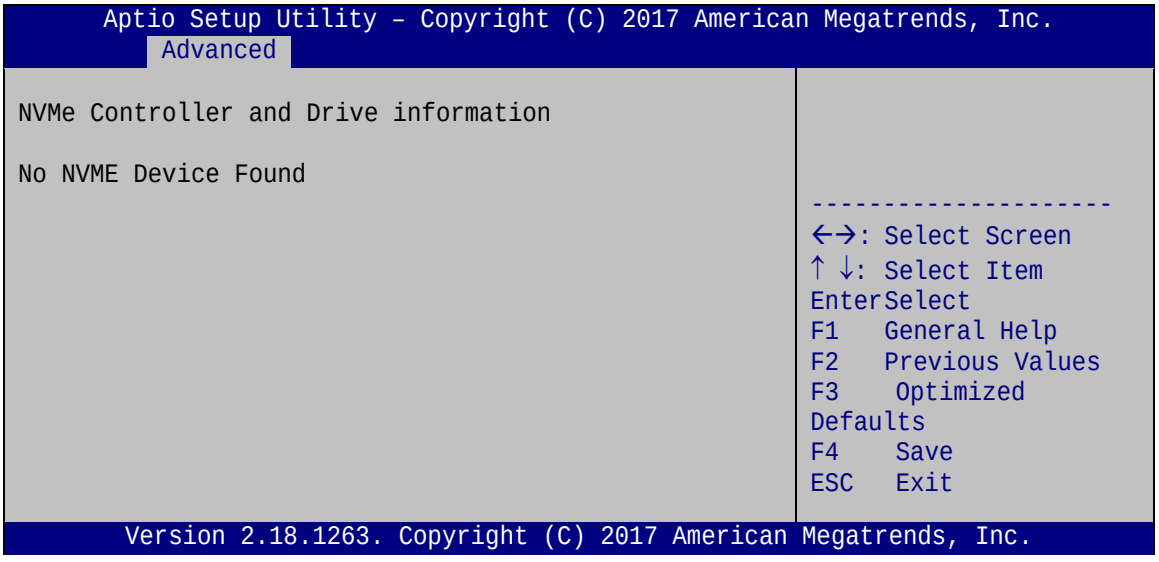
Use the **Node 0 Information** menu (**BIOS Menu 13**) to view memory information related to Node 0.



BIOS Menu 13: Node 0 Information

5.3.9 NVMe Configuration

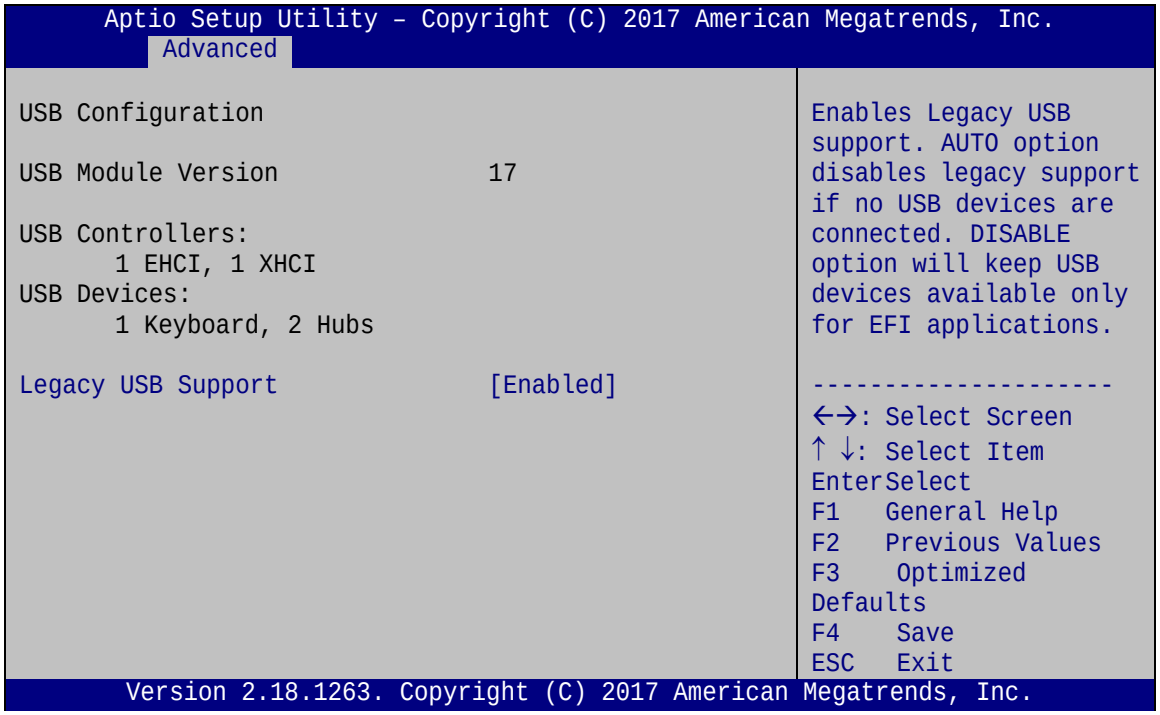
Use the **NVMe Configuration** menu (**BIOS Menu 14**) to change and/or set the configuration of the NVMe devices installed in the system.



BIOS Menu 14: NVMe Configuration

5.3.10 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 15**) to read USB configuration information and configure the USB settings.



BIOS Menu 15: USB Configuration

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔	**Enabled**	**DEFAULT**	Legacy USB support enabled
➔	**Disabled**		Legacy USB support disabled
➔	**Auto**		Legacy USB support disabled if no USB devices are connected

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 16**) to access the north bridge and south bridge configuration menus

WARNING!

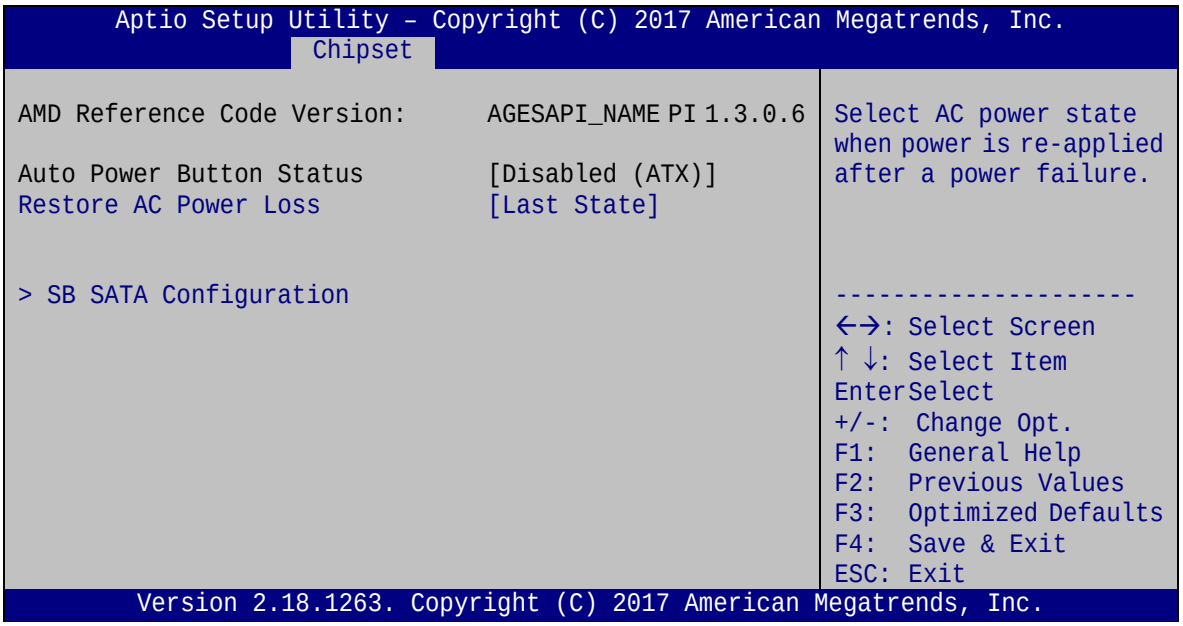
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
  Main    Advanced  Chipset   Security    Boot    Save & Exit

> South Bridge                                  South Bridge Parameters
> GFX Configuration
> North Bridge


                                                ---------------------
                                                ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                +/-:  Change Opt.
                                                F1    General Help
                                                F2    Previous Values
                                                F3    Optimized Defaults
                                                F4    Save & Exit
                                                ESC   Exit
        Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 16: Chipset

5.4.1 South Bridge

Use the **South Bridge** menu (**BIOS Menu 17**) to configure the south bridge chipset.



BIOS Menu 17: South Bridge

➔ **Restore on AC Power Loss [Last State]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

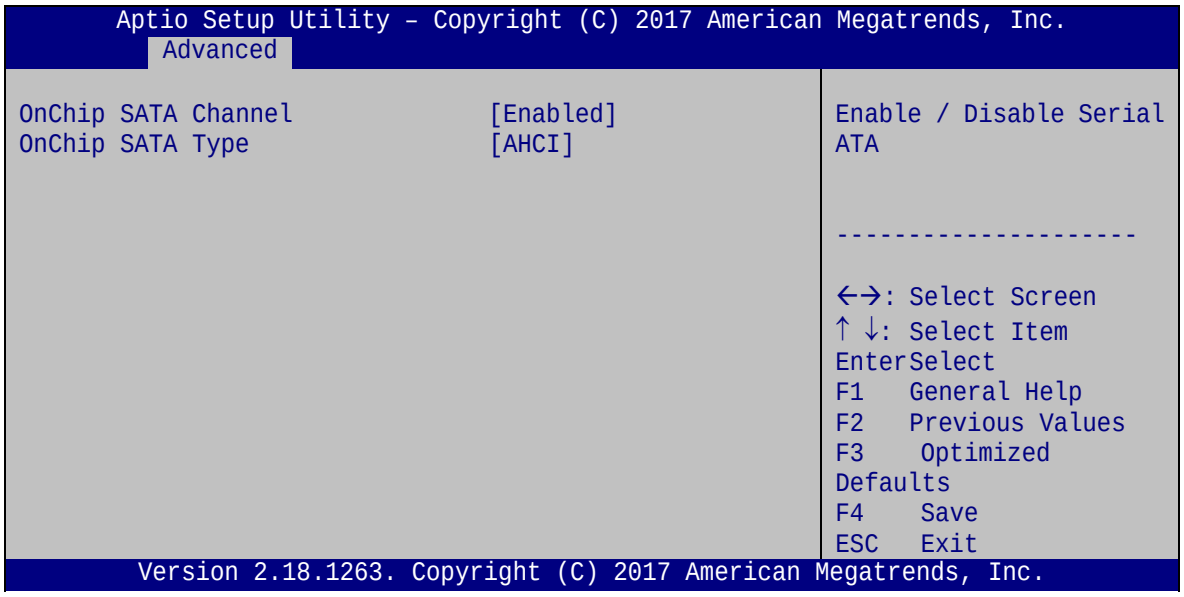
➔ **Power Off** The system remains turned off

➔ **Power On** The system turns on

➔ **Last State** **DEFAULT** The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

5.4.1.1 SB SATA Configuration

Use the **SB SATA Configuration** menu (**BIOS Menu 18**) to configure Serial ATA.



BIOS Menu 18: SB SATA Configuration

➔ **OnChip SATA Channel [Enabled]**

Use the **OnChip SATA Channel** option to enable or disable the SATA controller.

➔ **Disabled** Disables the SATA controller.

➔ **Enabled** **DEFAULT** Enables the SATA controller.

➔ **OnChip SATA Type [AHCI]**

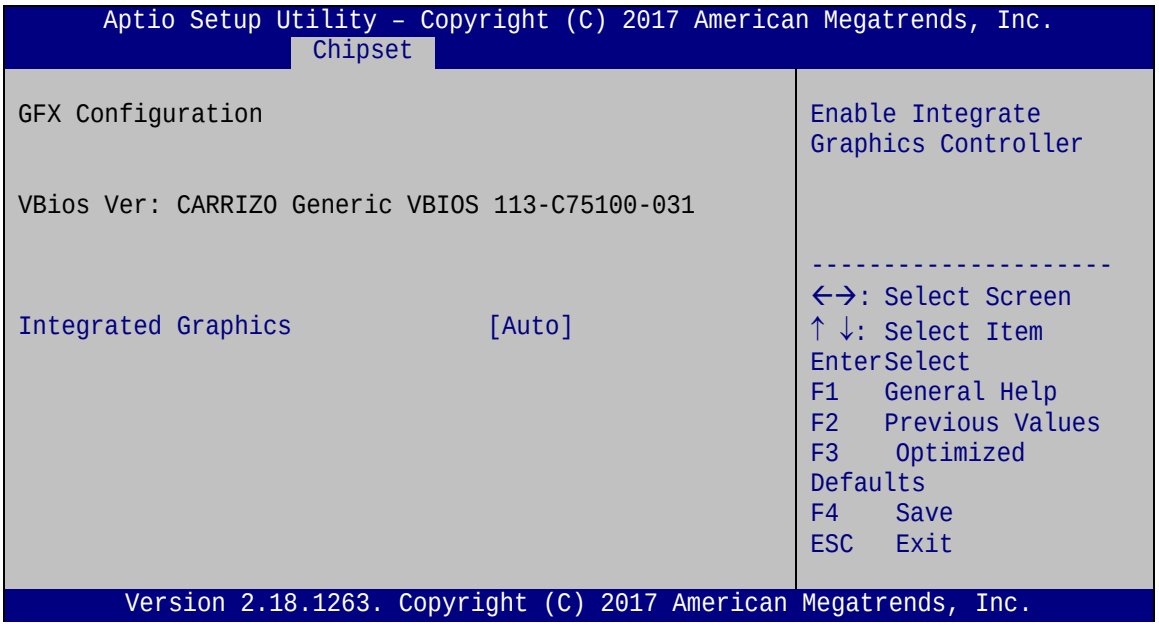
Use the **OnChip SATA Type** option to configure SATA devices as AHCI devices.

➔ **AHCI** **DEFAULT** Configures SATA devices as AHCI device.

➔ **Legacy IDE** Configures SATA devices as legacy IDE device.

5.4.2 GFX Configuration

Use the **GFX Configuration** menu (**BIOS Menu 19**) to configure the graphics controller.



BIOS Menu 19: GFX Configuration

➔ **Integrated Graphics [Auto]**

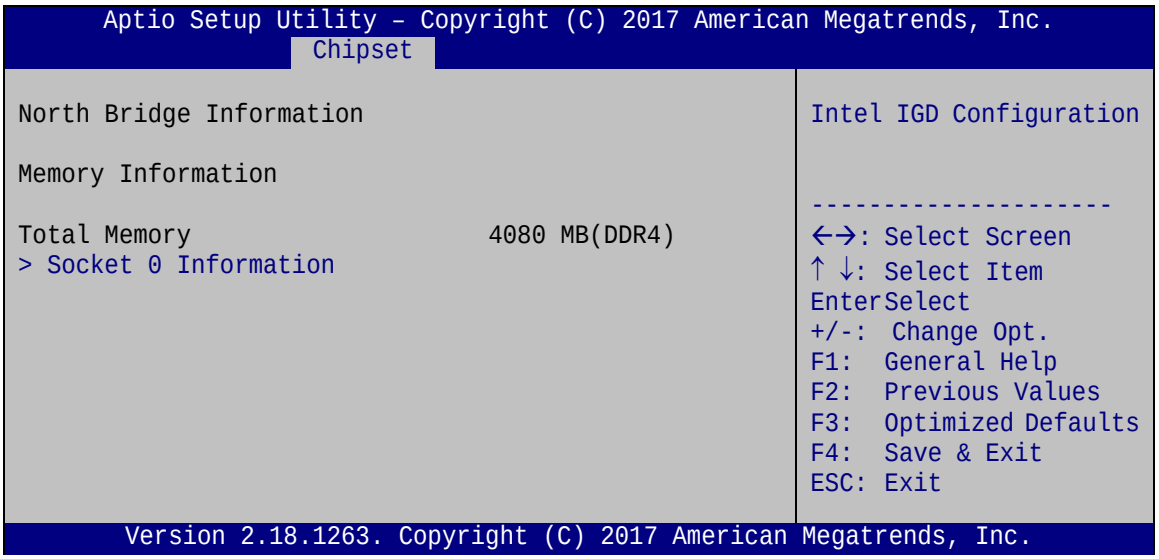
Use the **Integrated Graphics** option to enable or disable the integrated graphics controller.

➔ **Auto** **DEFAULT** The integrated graphics controller is detected automatically and enabled

➔ **Disabled** The integrated graphics controller is disabled

5.4.3 North Bridge

Use the **North Bridge** menu (**BIOS Menu 20**) to configure the memory settings.



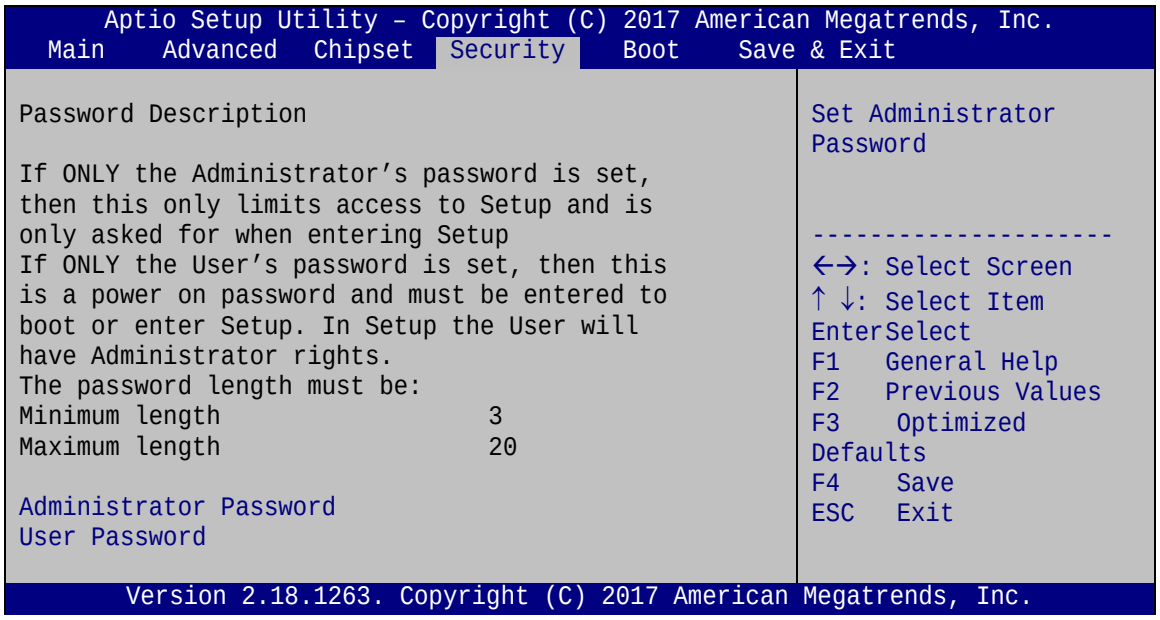
BIOS Menu 20: North Bridge

➔ **Socket 0/1 Information**

The **Socket 0/1 Information** submenu lists a brief summary of the on-board memory.

5.5 Security

Use the **Security** menu (**BIOS Menu 21**) to set system and user passwords.



BIOS Menu 21: Security

➔ **Administrator Password**

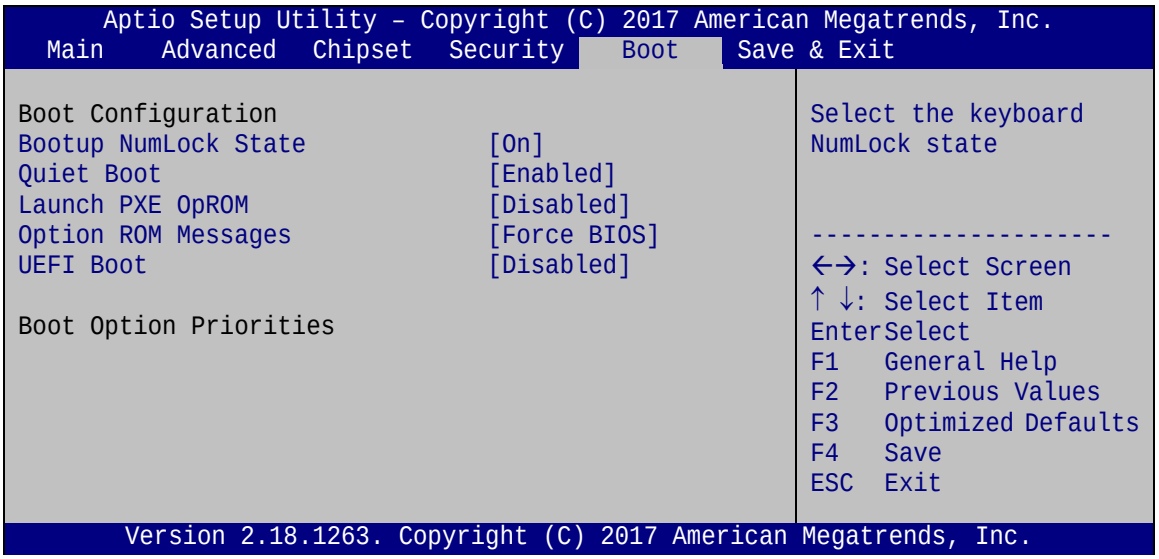
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

Use the **User Password** to set or change a user password.

5.6 Boot

Use the **Boot** menu (**BIOS Menu 22**) to configure system boot options.



BIOS Menu 22: Boot

➔ **Bootup NumLock State [On]**

Use the **Bootup NumLock State** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **Quiet Boot [Enabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔	**Disabled**		Normal POST messages displayed
➔	**Enabled**	**DEFAULT**	OEM Logo displayed instead of POST messages

➔ **Launch PXE OpROM [Disabled]**

Use the **Launch PXE OpROM** option to enable or disable boot option for legacy network devices.

➔	**Disabled**	**DEFAULT**	Ignore all PXE Option ROMs
➔	**Enabled**		Load PXE Option ROMs.

➔ **Option ROM Messages [Force BIOS]**

Use the **Option ROM Messages** option to set the Option ROM display mode.

➔	**Force BIOS**	**DEFAULT**	Sets display mode to force BIOS.
➔	**Keep Current**		Sets display mode to current.

➔ **UEFI Boot [Disabled]**

Use the **UEFI Boot** option to enable or disable to boot from the UEFI devices.

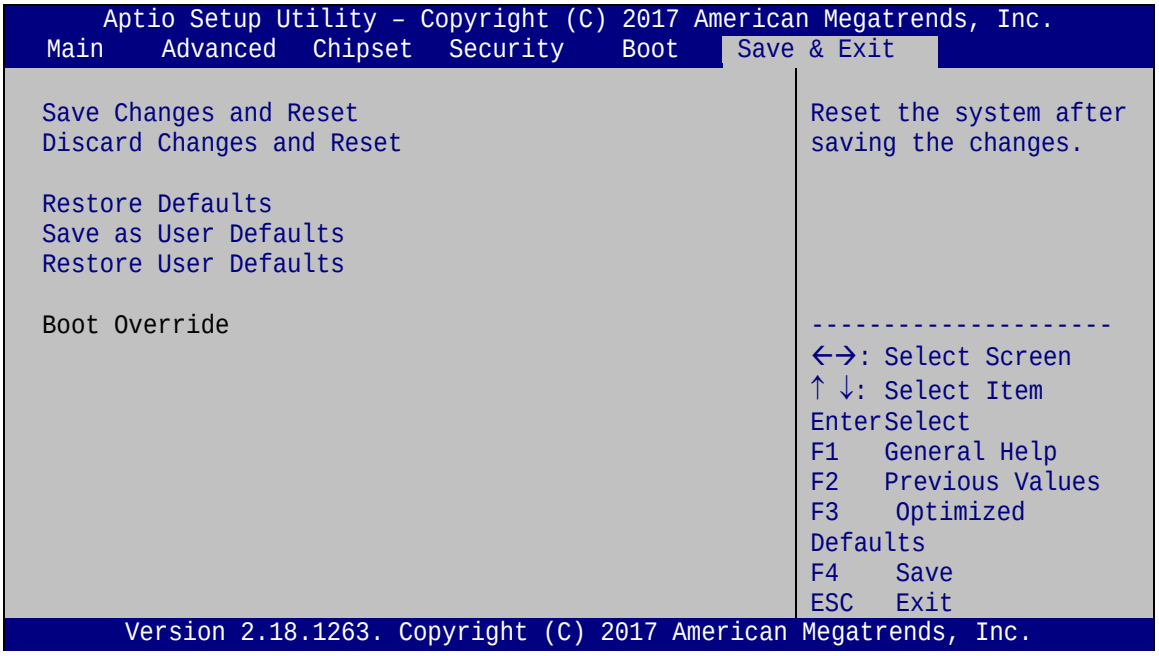
➔	**Enabled**		Boot from UEFI devices is enabled.
➔	**Disabled**	**DEFAULT**	Boot from UEFI devices is disabled.

➔ **Boot Option Priority**

Use the **Boot Option Priority** function to set the system boot sequence from the available devices. The drive sequence also depends on the boot sequence in the individual device section.

5.7 Save & Exit

Use the **Save & Exit** menu (**BIOS Menu 23**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 23: Save & Exit

➔ **Save Changes and Reset**

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Reset**

Use the **Discard Changes and Reset** option to exit the system without saving the changes made to the BIOS configuration setup program.

➔ **Restore Defaults**

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ **Save as User Defaults**

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Chapter

6

Software Drivers

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

6.1 Software Installation

All the drivers for the gKINO-DMF are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

NOTE:

If the installation program doesn't start automatically:
Click "Start->My Computer->CD Drive->autorun.exe"

Step 2: The driver main menu with a list of available drivers appears (**Figure 6-1**).

Figure 6-1: Available Drivers

Step 3: Install all of the necessary drivers in the menu.

6.2 Available Software Drivers

All the drivers for the gKINO-DMF are on the utility CD that came with the system. The utility CD contains drivers for Windows 7, Windows 8 and Windows 10 operating systems. If the drivers are not installed automatically, please install the following drivers manually.

The following drivers can be installed on the **gKINO-DMF**:

- Chipset
- Graphics
- LAN
- Audio

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

This equipment has been tested and found to comply with specifications for CE marking. If the user modifies and/or installs other devices in the equipment, the CE conformity declaration may no longer apply.

FCC WARNING

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

- This device may not cause harmful interference, and
- 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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Appendix

B

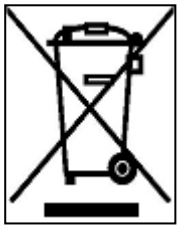
Product Disposal

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union – If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union – The device that produces less waste and is easier to recycle is classified as electronic device in terms of the European Directive 2012/19/EU (WEEE), and must not be disposed of as domestic garbage.



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your device, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

Appendix

C

BIOS Menu Options

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Appendix

D

Terminology

ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CMOS	Complimentary metal-oxide-conductor is a type of integrated circuit used in chips like static RAM and microprocessors.
COM	COM is used to refer to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DE-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to

	analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.
PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.

POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is a form of storage used in computer. RAM is volatile memory, so it loses its data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA 3Gb/s bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while USB 2.0 supports 480Mbps data transfer rates.

Appendix

E

Digital I/O Interface

The DIO connector on the gKINO-DMF is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 8-bit digital inputs and 8-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the Super I/O chipset.

The BIOS interrupt call **INT 15H** controls the digital I/O.

INT 15H:

AH – 6FH	
Sub-function:	
AL – 8	:Set the digital port as INPUT
AL	:Digital I/O input value

Assembly Language Sample 1

```
MOV     AX, 6F08H       ;setting the digital port as input
INT     15H             ;
```

AL low byte = value

AH – 6FH	
Sub-function:	
AL – 9	:Set the digital port as OUTPUT
BL	:Digital I/O output value

Assembly Language Sample 2

```
MOV     AX, 6F09H       ;setting the digital port as output
MOV     BL, 09H                 ;digital value is 09H
INT     15H             ;
```

Digital Output is 1001b

Appendix

F

Watchdog Timer

NOTE:

The following discussion applies to DOS. Contact IEI support or visit the IEI website for drivers for other operating systems.

The Watchdog Timer is a hardware-based timer that attempts to restart the system when it stops working. The system may stop working because of external EMI or software bugs. The Watchdog Timer ensures that standalone systems like ATMs will automatically attempt to restart in the case of system problems.

A BIOS function call (INT 15H) is used to control the Watchdog Timer.

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table F-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. When the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

The Watchdog Timer is activated through software. The software application that activates the Watchdog Timer must also deactivate it when closed. If the Watchdog Timer is not deactivated, the system will automatically restart after the Timer has finished its countdown.

EXAMPLE PROGRAM:

```
; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT     15H

;
; ADD THE APPLICATION PROGRAM HERE
;

        CMP     EXIT_AP, 1      ;is the application over?
        JNE     W_LOOP          ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT     15H

;
; EXIT ;
```

Appendix

G

Hazardous Materials Disclosure

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated "Environmentally Friendly Use Period" (EFUP). This is an estimate of the number of years that these substances would "not leak out or undergo abrupt change." This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the following table.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
Display	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	O	O	O	O	O	O
显示	O	O	O	O	O	O
印刷电路板	O	O	O	O	O	O
金属螺帽	O	O	O	O	O	O
电缆组装	O	O	O	O	O	O
风扇组装	O	O	O	O	O	O
电力供应组装	O	O	O	O	O	O
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求。