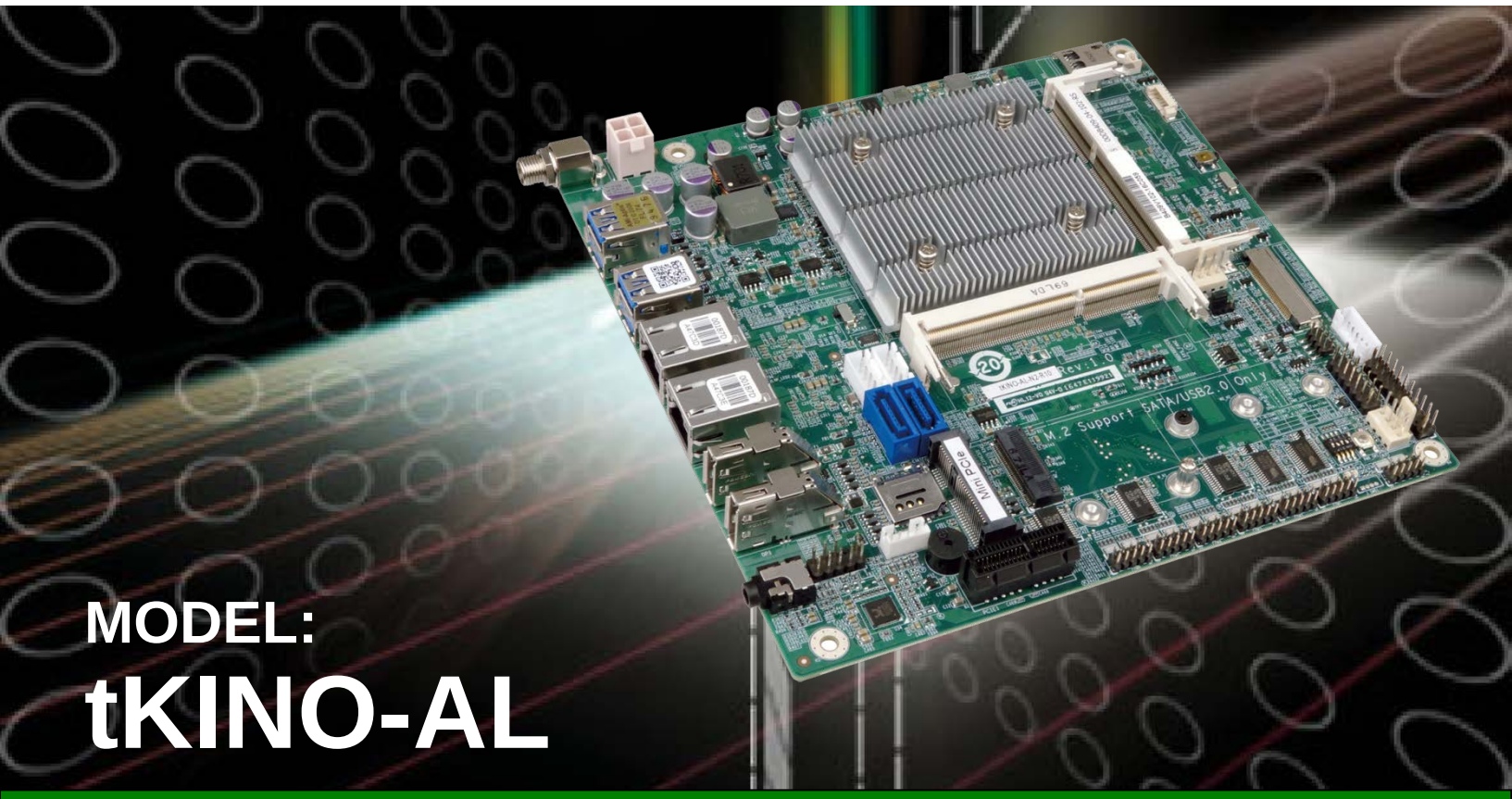
IEI Integration Corp.



MODEL:

tKINO-AL

Thin Mini-ITX SBC with 14nm Intel® Pentium® or Celeron® On-board SoC, DisplayPort++, Dual PCIe GbE, USB 3.0, PCIe Mini, M.2, PCIe x1, SATA 6Gb/s, RS-232/422/485, Audio, TPM and RoHS

User Manual

Rev. 1.01 - May 3, 2018

RoHS Lead Free

Revision

Date	Version	Changes
May 3, 2018	1.01	Deleted E series SKUs
January 11, 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.

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Chapter

1

Introduction

1.1 Introduction

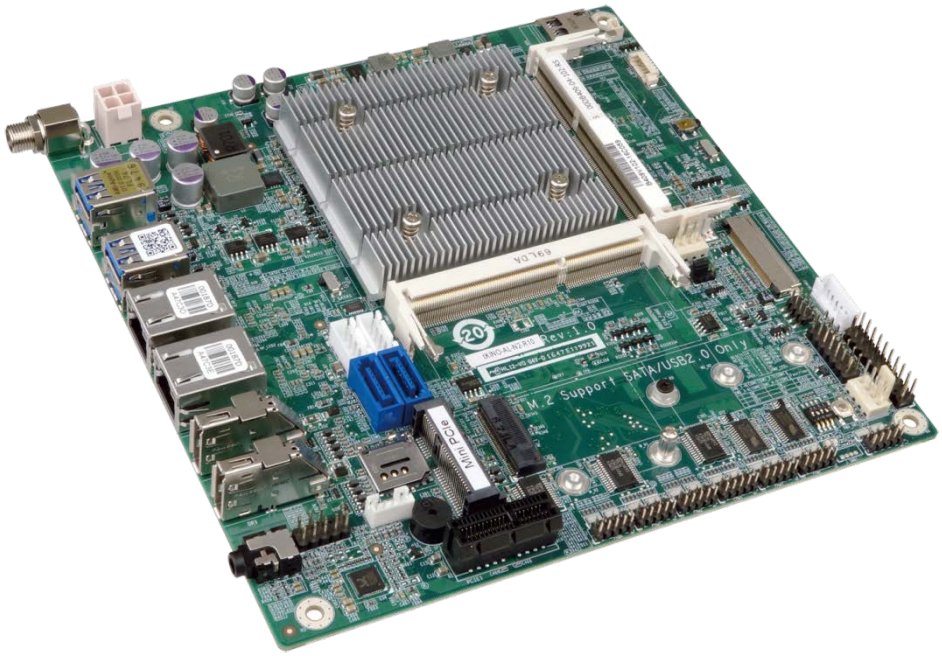


Figure 1-1: tKINO-AL

The tKINO-AL series is a thin Mini-ITX form factor single bard computer. It has an on-board 14nm Intel® Pentium® or Celeron® processor, and supports two 204-pin 1867/1600 MHz dual-channel DDR3 Low Voltage (DDR3L) SDRAM SO-DIMM slots with up to 8.0 GB of memory.

The tKINO-AL series includes one internal eDP connector and two external Dual-mode DisplayPort (DisplayPort++) connectors for triple independent display which support up to 4K resolution at 60 Hz.

Expansion and I/O include one PCIe x1 slot, one PCIe Mini slot supporting WWAN modules, one M.2 B-key slot for expansion, four USB 3.0 connectors on the rear panel, two USB 2.0 connectors by pin header and two SATA 6Gb/s connectors. Serial device connectivity is provided by four internal RS-232 connectors and two internal RS-232/422/485 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 tKINO-AL series are listed below.

Model No.	SoC
tKINO-AL-N2-R10	Intel® Pentium® N4200 on-board SoC (up to 2.5 GHz, quad-core, 2 MB cache, TDP=6 W)
tKINO-AL-N1-R10	Intel® Celeron® N3350 on-board SoC (up to 2.4 GHz, dual-core, 2 MB cache, TDP=6 W)

Table 1-1: tKINO-AL Model Variations

1.3 Features

Some of the tKINO-AL motherboard features are listed below:

- Thin Mini-ITX motherboard supports 14nm Intel® Pentium®/Celeron® on-board SoC
- Triple independent display supporting up to 4K resolution at 60 Hz
- Two 1867/1600 MHz DDR3L SO-DIMM slots support up to 8 GB of memory
- Two SATA 6Gb/s connectors with 5 V / 12 V power output
- Full-size/half-size PCIe Mini card slot with SIM card holder for WWAN expansion
- M.2 2242/2260/2280 B-key modules supported
- Four USB 3.0 external connectors
- Four 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 tKINO-AL are shown in the figure below.

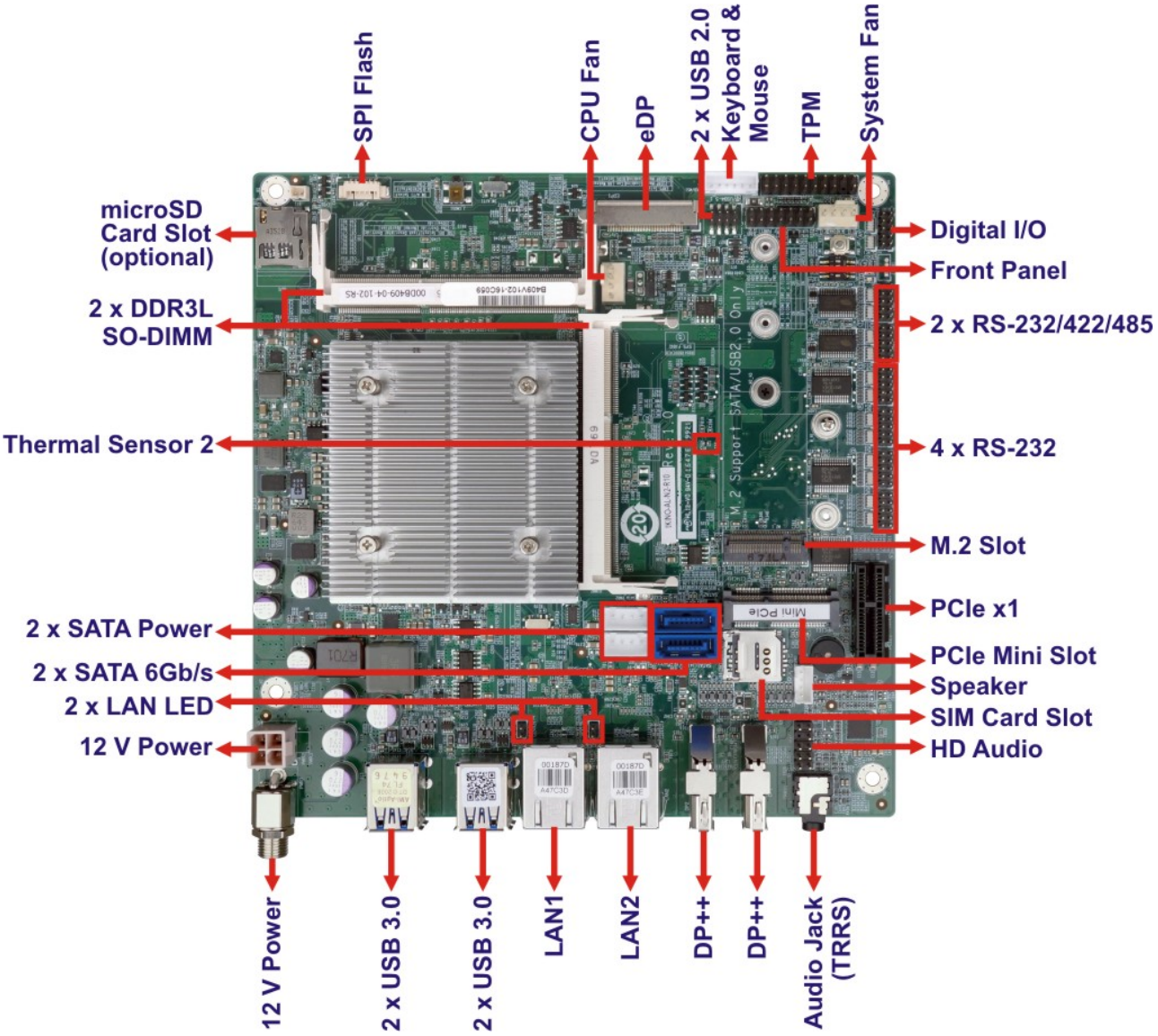


Figure 1-2: Connectors (Front Side)

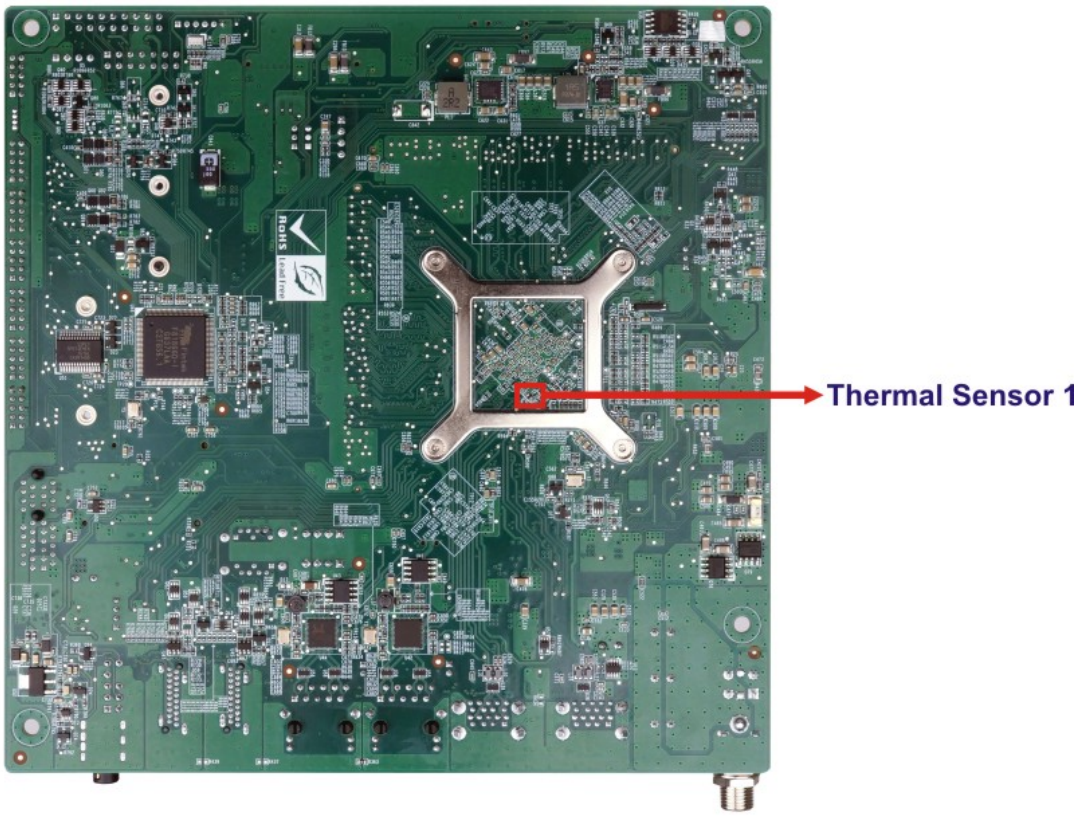


Figure 1-3: Connectors (Solder Side)

1.5 Dimensions

The dimensions of the board are listed below:

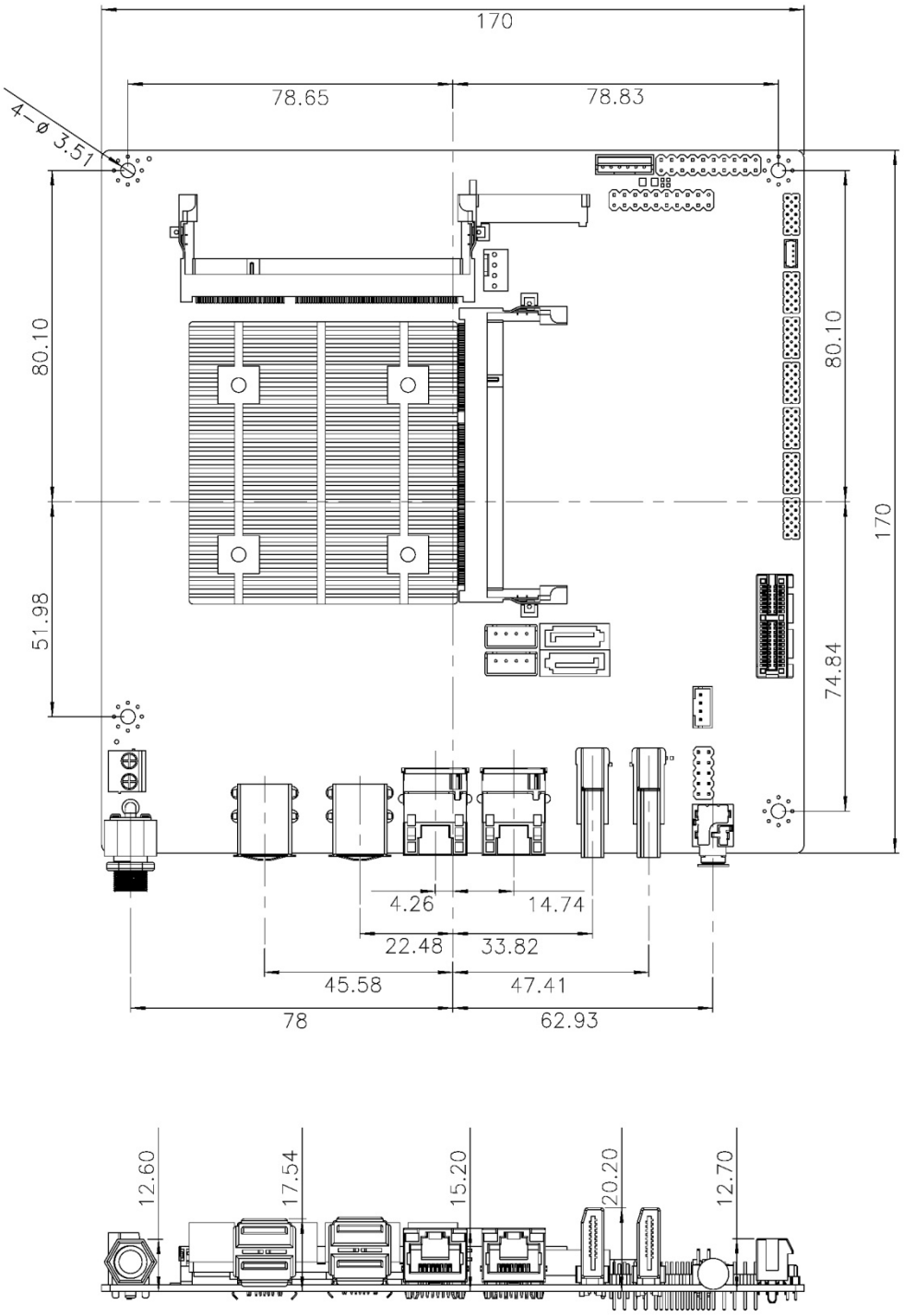


Figure 1-4: Dimensions (mm)

1.6 Data Flow

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

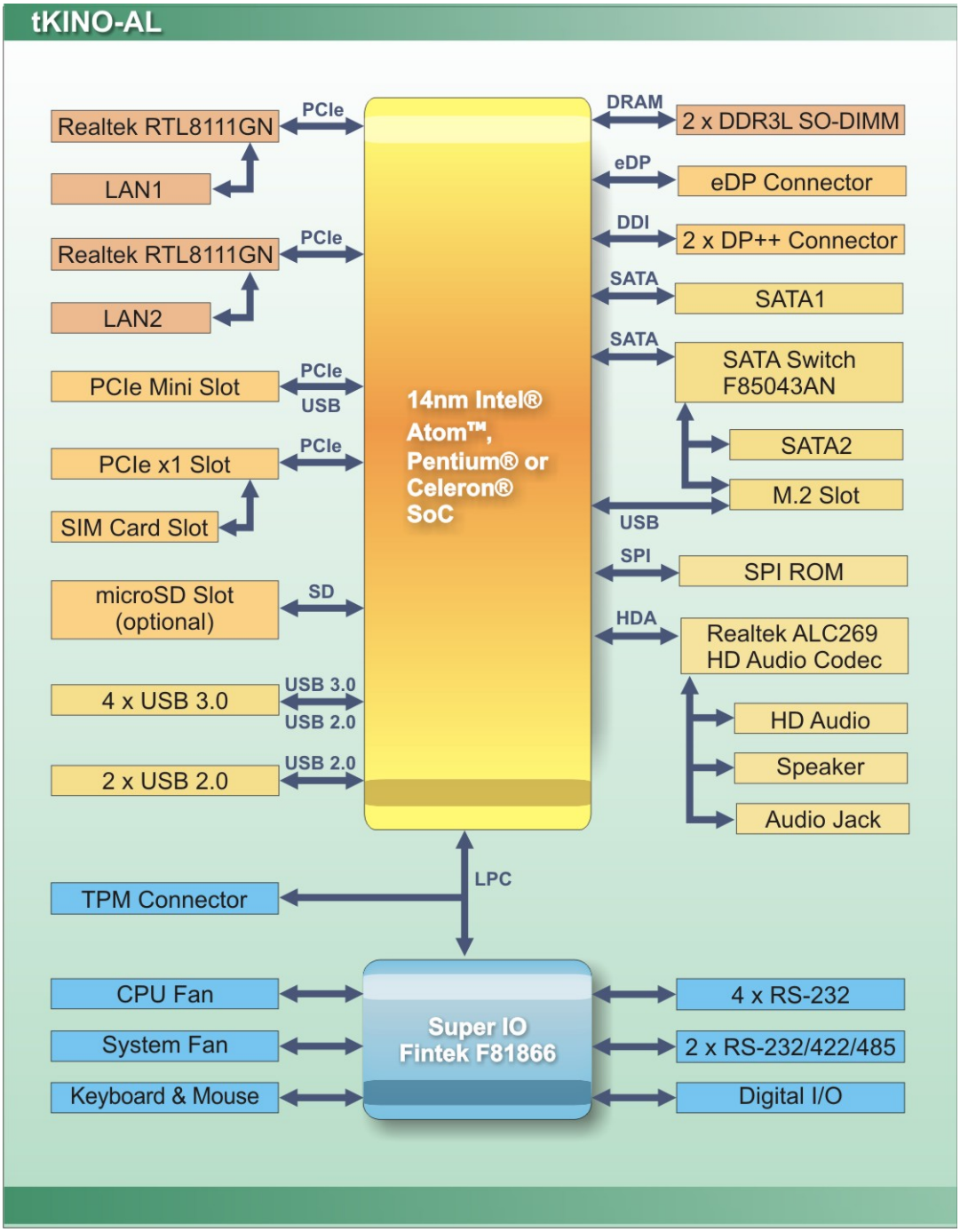


Figure 1-5: Data Flow Diagram

1.7 Technical Specifications

tKINO-AL technical specifications are listed below.

Specification	tKINO-AL
Form Factor	Mini-ITX
SoC	Intel® Pentium® N4200 on-board SoC (up to 2.5 GHz, quad-core, 2 MB cache, TDP=6 W) Intel® Celeron® N3350 on-board SoC (up to 2.4 GHz, dual-core, 2 MB cache, TDP=6 W)
BIOS	AMI UEFI BIOS
Memory	Two 204-pin 1867/1600 MHz dual-channel DDR3L SDRAM SO-DIMM slots (system max. 8 GB)
Graphics	9th generation Intel® HD Graphics with 18 execution units, supporting 4K codec decode & encode for HEVC, H.264, VP8, SVC and MVC
Display Output	Triple independent display 1 x eDP (up to 3840x2160 @ 60Hz) 2 x DisplayPort++ (DP: up to 4096x2160 @ 60Hz HDMI: up to 3840x2160 @ 30Hz)
Ethernet	Dual Realtek RTL8111GN PCIe GbE controller
Digital I/O	8-bit digital I/O by 10-pin (2x5) header
Super IO	Fintek F81866
Audio	Realtek ALC269 HD codec
Watchdog Timer	Software programmable support 1~255 sec. system reset
I/O Interface	
Audio Connector	1 x Audio TRRS jack (supporting headphone and mic) 1 x Analog audio by 10-pin (2x5) header 1 x Speaker by 4-pin (1x4) wafer

Specification	tKINO-AL
Ethernet	2 x RJ-45 GbE port
Keyboard/Mouse	1 x KB/MS by 6-pin (1x6) wafer
Serial Ports	2 x RS-232/422/485 by 10-pin (2x5) header 4 x RS-232 by 10-pin (2x5) header
USB Ports	4 x USB 3.0 on rear I/O 2 x USB 2.0 by 8-pin (2x4) header
Front Panel	1 x Front panel connector by 14-pin (2x7) header for power LED, HDD LED, speaker, 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
TPM	1 x TPM connector by 20-pin (2x10) header
Storage	2 x SATA 6Gb/s with 5 V / 12 V SATA power connectors 1 x microSD socket (optional)
Expansion	1 x Full-size/Half-size PCIe Mini card slot (with SIM holder) 1 x M.2 2242/2260/2280 slot (B key, SATA 1 port + USB 2.0 signal) 1 x PCIe x1 slot
Environmental and Power Specifications	
Power Supply	12 V DC input (AT/ATX support)
Power Connector	1 x External DC power jack (ø5.5 mm) 1 x Internal power connector by 4-pin (2x2) connector
Power Consumption	+12 V @ 2.58 A (Intel® Pentium® N4200 processor with two 8 GB 1600 MHz DDR3L memory)
Operating Temperature	-20°C ~ 70°C
Storage Temperature	-40°C ~ 85°C
Humidity	5% ~ 95%, non-condensing
Physical Specifications	

Specification	tKINO-AL
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 tKINO-AL 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 tKINO-AL was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The tKINO-AL is shipped with the following components:

Quantity	Item and Part Number	Image
1	tKINO-AL single board computer	
1	SATA with 5V/12V output cable kit (**P/N**: 32801-000100-300-RS)	
1	I/O shielding	
1	Quick Installation Guide	

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
KB/MS PS/2 Y-cable, 135 mm, P=2.0 (**P/N**: 32000-023800-RS)	
Dual USB cable (wo bracket), 210mm, P=2.0 (**P/N**: 32000-070301-RS)	
RS-232 cable, 200mm, P=2.0 (**P/N:** 32205-002700-100-RS)	
Infineon TPM module, 20-pin, firmware v3.17 (**P/N**: TPM-IN01-R20)	
Infineon TPM 2.0 module, 20-pin, firmware v5.5 (**P/N**: TPM-IN02-R20)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 tKINO-AL Layout

The figures below show all the connectors and jumpers.

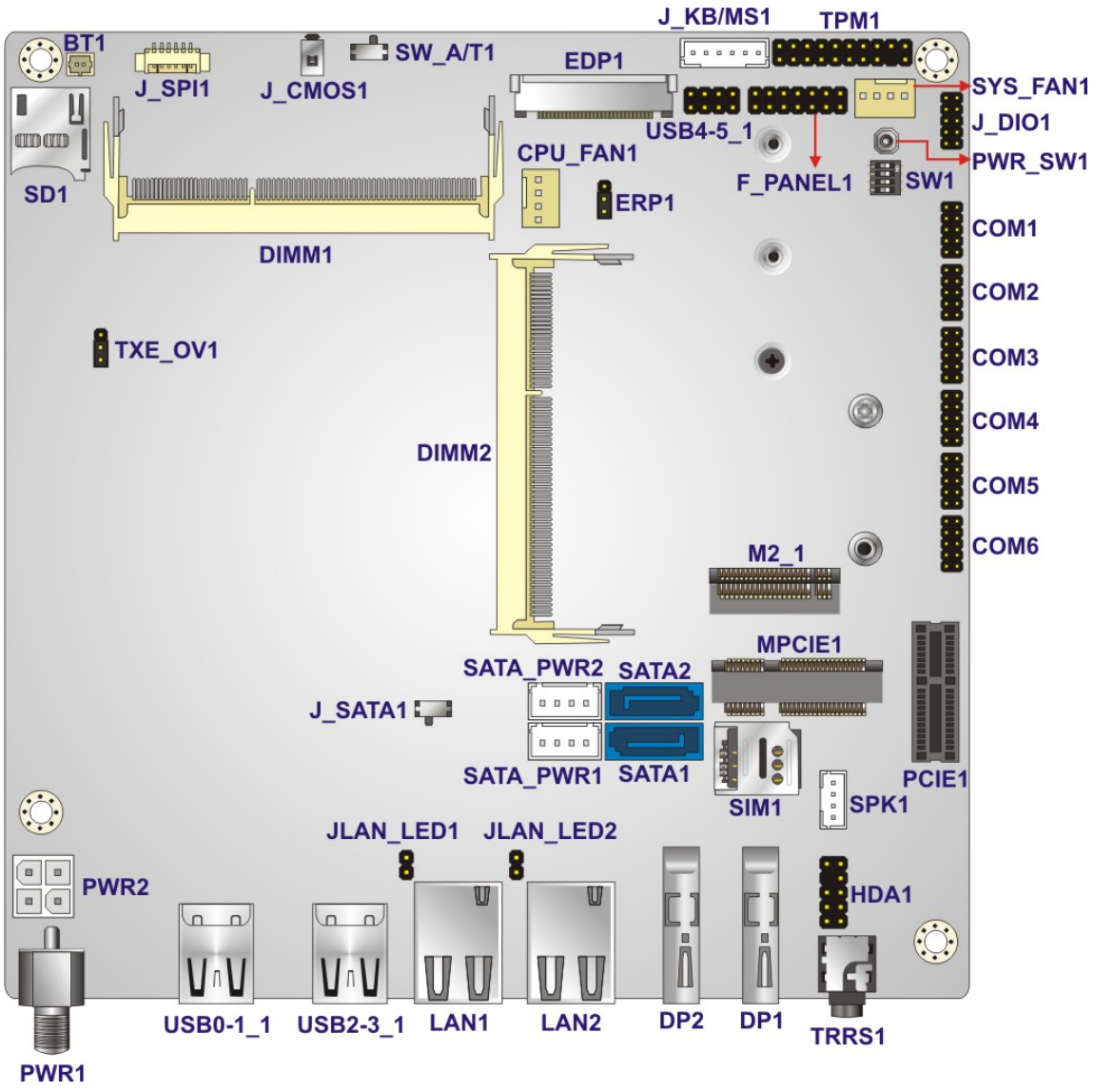


Figure 3-1: Connector and Jumper Locations (Front)

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	PWR2
Audio connector	10-pin header	HDA1
Battery connector	2-pin wafer	BT1
Digital I/O connector	10-pin header	J_DIO1
eDP connector	40-pin connector	EDP1
Fan connector, CPU	4-pin wafer	CPU_FAN1
Fan connector, system	4-pin wafer	SYS_FAN1
Front panel connector	14-pin header	F_PANEL1
Keyboard & mouse connector	6-pin wafer	J_KB/MS1
LAN LED connectors	2-pin header	JLAN_LED1, JLAN_LED2
M.2 slot	M.2 B-key slot	M2_1
Memory slot	204-pin DDR3L SO-DIMM	DIMM1, DIMM2
microSD slot (optional)	microSD slot	SD1
PCIe Mini card slot	PCIe Mini slot	MPCIE1
PCIe x1 slot	PCIe x1 slot	PCIE1
Power button	On-board power button	PWR_SW1
RS-232 serial port connectors	10-pin header	COM3, COM4, COM5, COM6
RS-232/422/485 serial port connectors	10-pin header	COM1, COM2

SATA 6Gb/s drive connectors	7-pin SATA connector	SATA1, SATA2
SATA power connectors	4-pin wafer	SATA_PWR1, SATA_PWR2
SIM card slot	micro-SIM card slot	SIM1
Speaker connector	4-pin wafer	SPK1
SPI flash connector, BIOS	6-pin wafer	J_SPI1
TPM connector	20-pin header	TPM1
USB 2.0 connector	8-pin header	USB4-5_1

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	PWR1
Audio jack (TRRS)	Audio jack	TRRS1
LAN connectors	RJ-45	LAN1, LAN2
DisplayPort++ connectors	DisplayPort	DP1, DP2
USB 3.0 connectors	USB 3.0	USB0-1_1, USB2-3_1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the tKINO-AL.

3.2.1 12 V DC-IN Power Connector

CN Label: **PWR2**

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

CN Location: See **Figure 3-2**

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

The connector supports the 12 V power supply.

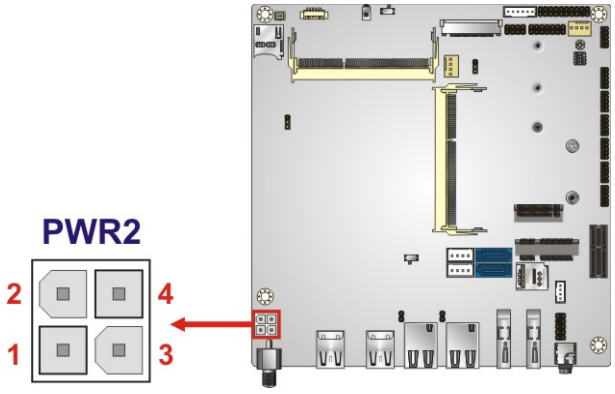


Figure 3-2: DC-IN Power Connector Location

Pin	Description	Pin	Description
1	GND	2	GND
3	VCC	4	VCC

Table 3-3: DC-IN Power Connector Pinouts

3.2.2 Audio Connector

CN Label: **HDA1**

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

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

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.

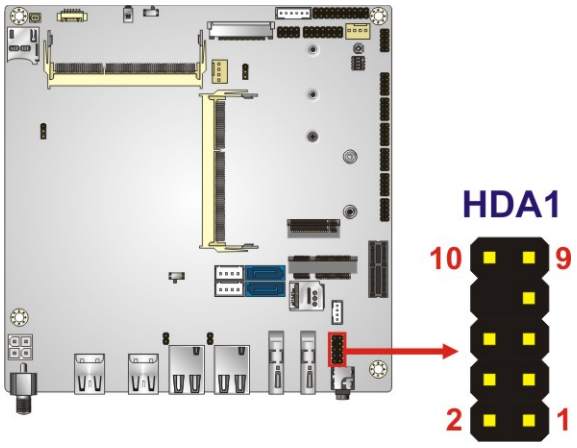


Figure 3-3: Audio Connector Location

Pin	Description	Pin	Description
1	MIC2-L	2	GND
3	MIC2-R	4	Pre-Sense#
5	HPOUT-R	6	MIC2-JD
7	GND	8	Key
9	HPOUT-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:	**BT1**
CN Type:	2-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-4**
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.

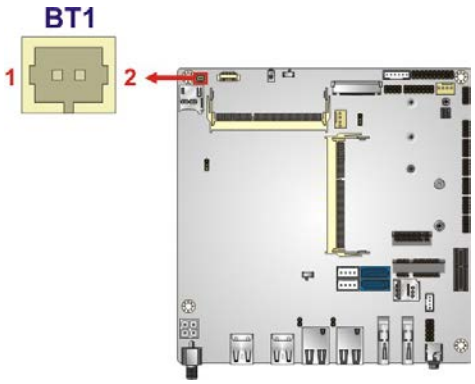


Figure 3-4: Battery Connector Location

Pin	Description
1	RTC Battery+
2	RTC Battery-

Table 3-5: Battery Connector Pinouts

3.2.4 Digital I/O Connector

CN Label: **J_DIO1**

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

CN Location: See **Figure 3-5**

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

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

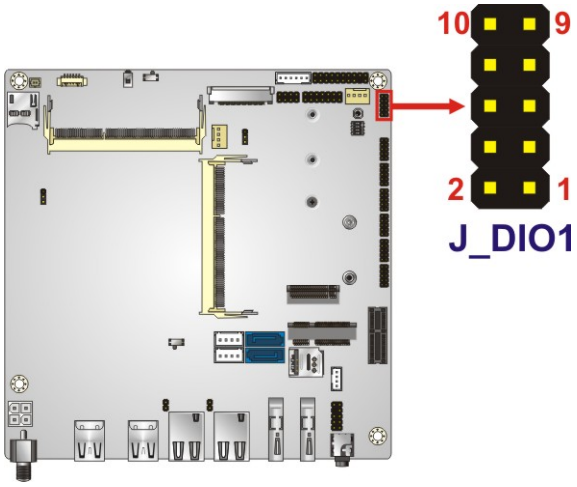


Figure 3-5: Digital I/O Connector Location

Pin	Description	Pin	Description
1	GND	2	+5V
3	D_OUT3	4	D_OUT2
5	D_OUT1	6	D_OUT0
7	D_IN3	8	D_IN2
9	D_IN1	10	D_IN0

Table 3-6: Digital I/O Connector Pinouts

3.2.5 eDP Connector

CN Label: **EDP1**

CN Type: 40-pin connector

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

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

The eDP connector is for connecting eDP devices.

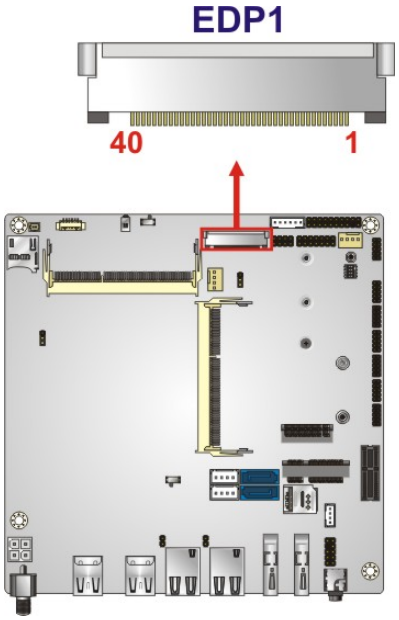


Figure 3-6: eDP Connector Location

Pin	Description	Pin	Description
1	NC	21	LCD_VCC
2	H-GND	22	NC
3	LANE3_N	23	LCD_GND
4	LANE3_P	24	LCD_GND
5	H-GND	25	LCD_GND
6	LANE2_N	26	LCD_GND
7	LANE2_P	27	HPD
8	H-GND	28	BKLT_GND
9	LANE1_N	29	BKLT_GND

Pin	Description	Pin	Description
10	LANE1_P	30	BKLT_GND
11	H-GND	31	BKLT_GND
12	LANE0_N	32	BKLT_ENABLE
13	LANE0_P	33	BKLT_PWM_DIM
14	H-GND	34	NC
15	AUX_CH_P	35	NC
16	AUX_CH_N	36	BKLT_PWR
17	H-GND	37	BKLT_PWR
18	LCD_VCC	38	BKLT_PWR
19	LCD_VCC	39	BKLT_PWR
20	LCD_VCC	40	NC

Table 3-7: eDP Connector Pinouts

3.2.6 Fan Connectors

CN Label: **CPU_FAN1, SYS_FAN1**

CN Type: 4-pin wafer, p=2.54 mm

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

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

The fan connector attaches to a cooling fan.

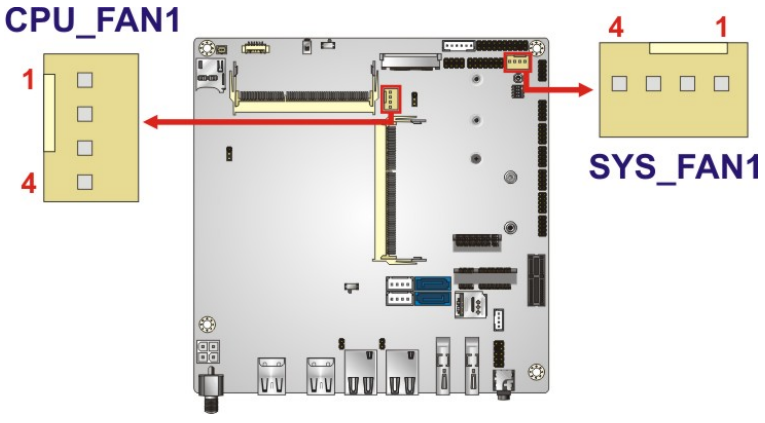


Figure 3-7: Fan Connector Locations

Pin	Description
1	GND
2	12V
3	FAN_IO
4	FANCTL

Table 3-8: Fan Connector Pinouts

3.2.7 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 14-pin header, p=2.54 mm

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

CN Pinouts: See **Table 3-9**

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

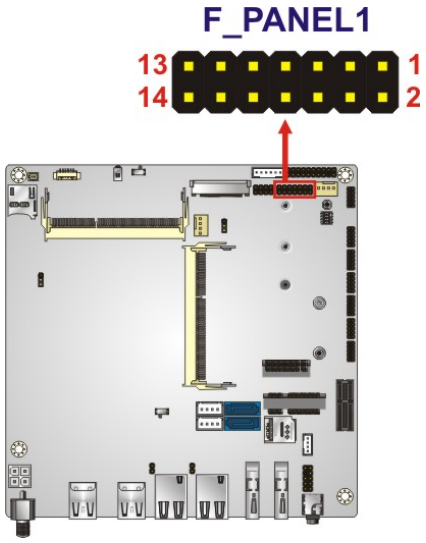


Figure 3-8: Front Panel Connector Location

Pin	Description	Pin	Description
1	PWR_LED+	2	SPKR+
3	NC	4	NC
5	PWR_LED-	6	NC
7	PWR_SW+	8	SPKR-
9	PWR_SW-	10	NC
11	HDD_LED+	12	RESET_SW+
13	HDD_LED-	14	RESET_SW-

Table 3-9: Front Panel Connector Pinouts

3.2.8 Keyboard and Mouse Connector

CN Label: **J_KB/MS1**

CN Type: 6-pin wafer, p=2.00 mm

CN Location: See **Figure 3-9**

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

The keyboard/mouse connector connects to a PS/2 Y-cable that can be connected to a PS/2 keyboard and mouse.

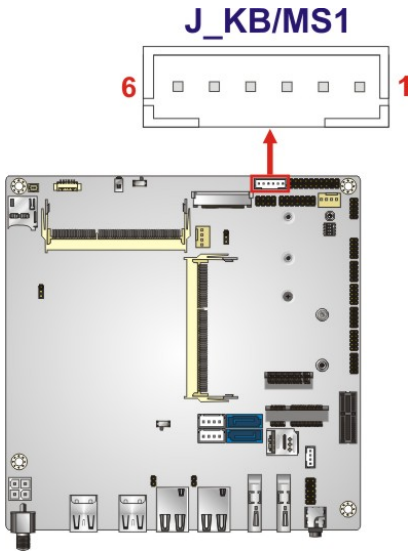


Figure 3-9: Keyboard and Mouse Connector Location

Pin	Description
1	+5V
2	Mouse Data
3	Mouse Clock
4	Keyboard Data
5	Keyboard Clock
6	GND

Table 3-10: Keyboard and Mouse Connector Pinouts

3.2.9 LAN LED Connectors

CN Label: **JLAN_LED1, JLAN_LED2**

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

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

CN Pinouts: See **Table 3-11**

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

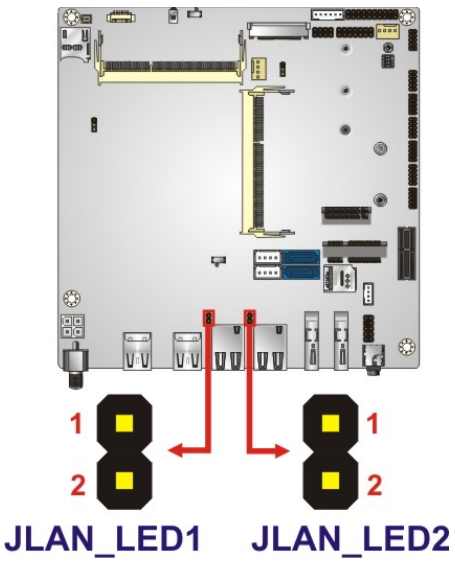


Figure 3-10: LAN LED Connector Locations

Pin	Description
1	LED+
2	LED-

Table 3-11: LAN LED Connector Pinouts

3.2.10 M.2 Slot

CN Label: **M2_1**

CN Type: M.2 B-key slot

CN Location: See **Figure 3-12**

The M.2 slot is keyed in the B position and provides three positions for the mounting screw, accepting 2242, 2260 and 2280 sizes of M.2 modules. The M.2 slot supports SATA and USB 2.0 interfaces only.

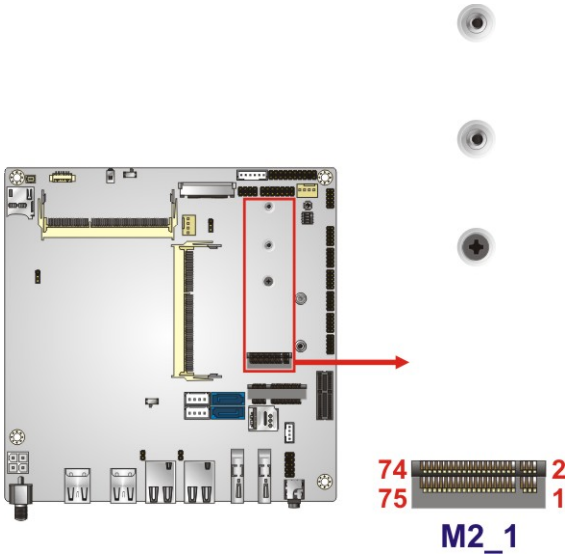


Figure 3-11: M.2 Slot Location

3.2.11 microSD Slot (Optional)

CN Label: **SD1**

CN Type: microSD card slot

CN Location: See **Figure 3-12**

The microSD card slot accepts a microSD card for storage.

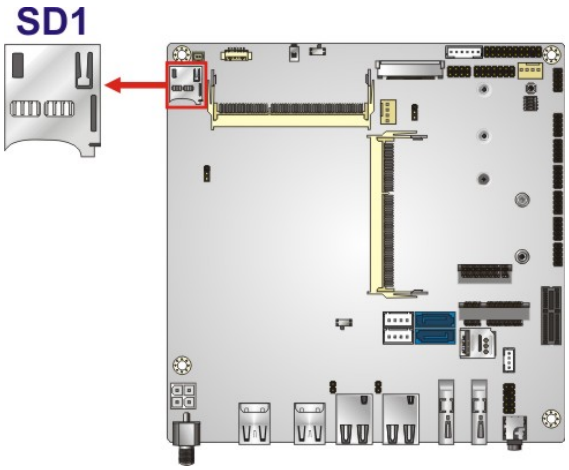


Figure 3-12: microSD Card Slot Location

3.2.12 PCIe Mini Card Slot

CN Label: **MPCIE1**

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

CN Location: See **Figure 3-13**

CN Pinouts: See **Table 3-12**

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

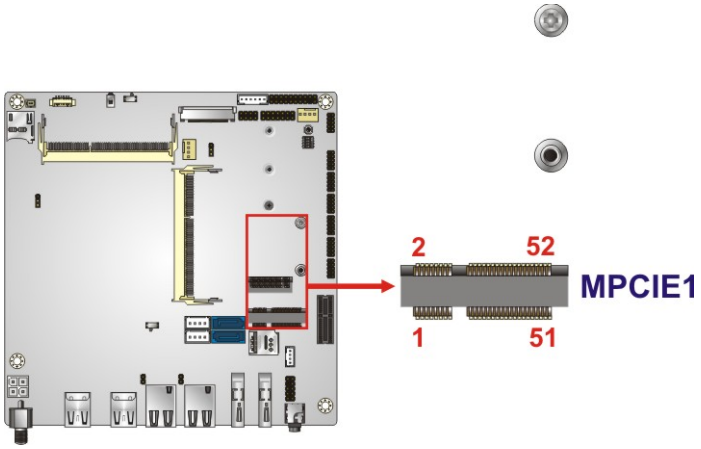


Figure 3-13: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5 V
7	N/C	8	N/C
9	GND	10	N/C
11	CLK-	12	N/C
13	CLK+	14	N/C
15	GND	16	N/C
17	N/C	18	GND
19	N/C	20	WLAN_EN
21	GND	22	BUF_PLT_RST#
23	PCIE_RXN0	24	VCC3A
25	PCIE_RXP0	26	GND
27	GND	28	1.5 V
29	GND	30	SMBCLK
31	PCIE_TXN0	32	SMBDATA
33	PCIE_TXP0	34	GND
35	GND	36	USB3-_GL850
37	N/C	38	USB3+_GL850
39	N/C	40	GND

Pin	Description	Pin	Description
41	N/C	42	N/C
43	N/C	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5 V
49	N/C	50	GND
51	N/C	52	VCC3

Table 3-12: PCIe Mini Card Slot Pinouts

3.2.13 PCIe x1 Card Slot

CN Label: **PCIE1**

CN Type: PCIe x1 slot

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

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

The PCIe x1 slot is for PCIe x1 expansion cards.

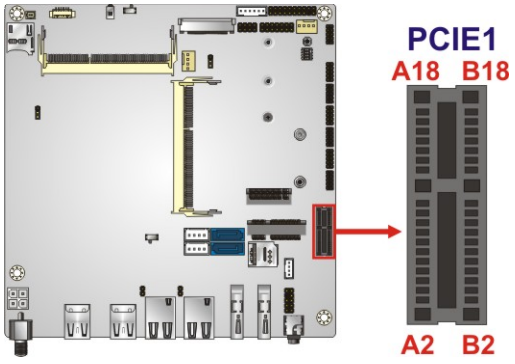


Figure 3-14: PCIe x1 Slot Location

Pin	Description	Pin	Description
A1	+12V	B1	PRSNT#1
A2	+12V	B2	+12V
A3	RSVD	B3	+12V
A4	GND	B4	GND
A5	SMCLK	B5	JTAG2

Pin	Description	Pin	Description
A6	SMDAT	B6	JTAG3
A7	GND	B7	JTAG4
A8	+3.3V	B8	JTAG5
A9	JTAG1	B9	+3.3V
A10	3.3 Vaux	B10	+3.3V
A11	WAKE#	B11	PWRGD
A12	RSVD	B12	GND
A13	GND	B13	REFCLK+
A14	HSOp(0)	B14	REFCLK-
A15	HSOn(0)	B15	GND
A16	GND	B16	HSIp(0)
A17	PRSNT#2	B17	HSIn(0)
A18	GND	B18	GND

Table 3-13: PCIe x1 Slot Pinouts

3.2.14 RS-232 Serial Port Connector

CN Label: **COM3, COM4, COM5, COM6**

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

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

CN Pinouts: See **Table 3-14**

The serial connectors provide RS-232 connections.

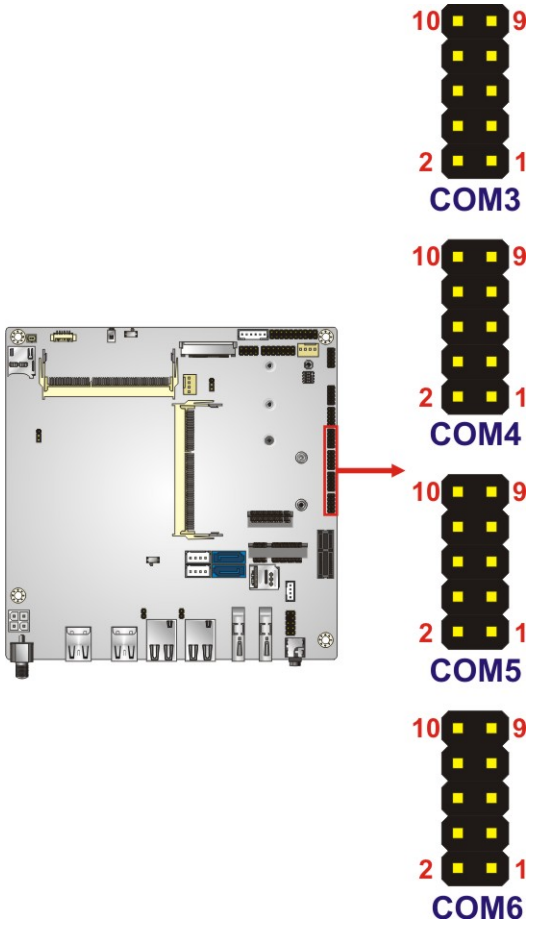


Figure 3-15: RS-232 Serial Port Connector Locations

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

3.2.15 RS-232/422/485 Serial Port Connector

CN Label:	**COM1, COM2**
CN Type:	10-pin header, p=2.00 mm
CN Location:	See **Figure 3-16**
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 4.7.3**.

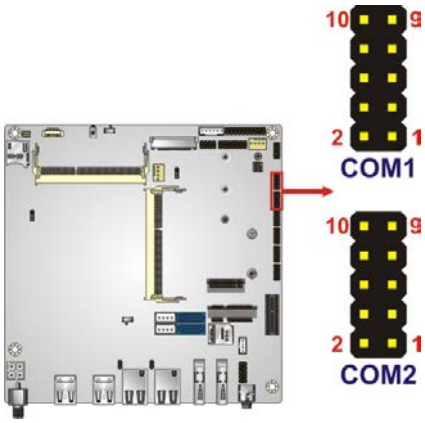


Figure 3-16: RS-232/422/485 Connector Locations

Pin	RS-232	RS-422	RS-485
1	DCD	TXD422-	TXD485-
2	DSR		
3	RX	TXD422+	TXD485+
4	RTS		
5	TX	RXD422+	
6	CTS		
7	DTR	RXD422-	
8	RI		
9	GND	GND	GND
10	GND	GND	GND

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

3.2.16 SATA 6Gb/s Drive Connectors

CAUTION:

If an M.2 module is installed in the M.2 slot (M2_1), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the M.2 module for storage.

CN Label:	**SATA1, SATA2**
CN Type:	7-pin SATA connector
CN Location:	See **Figure 3-17**

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.

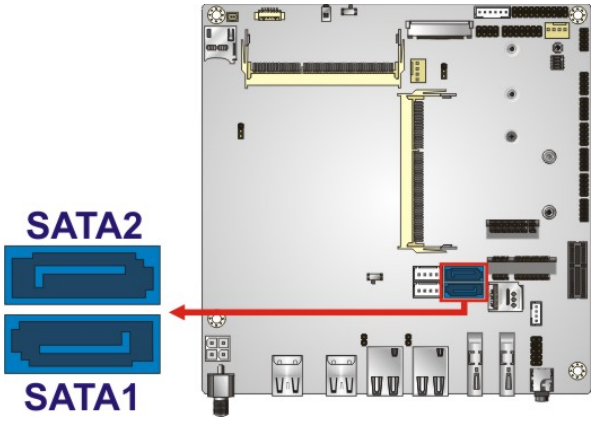


Figure 3-17: SATA 6Gb/s Drive Connectors Locations

3.2.17 SATA Power Connectors

CN Label:	**SATA_PWR1, SATA_PWR2**
CN Type:	4-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-18**
CN Pinouts:	See **Table 3-16**

The SATA power connector provides +5 V and +12 V power output to the SATA connector.

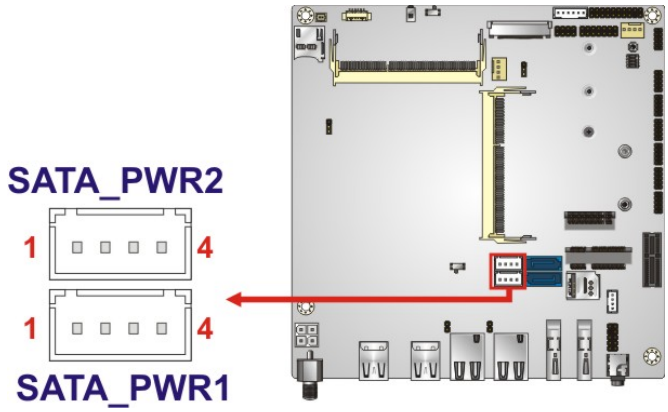


Figure 3-18: SATA Power Connector Locations

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

Table 3-16: SATA Power Connector Pinouts

3.2.18 SIM Card Slot

CN Label: **SIM1**

CN Type: micro-SIM card slot

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

The SIM card slot accepts a SIM card for 3G network communication.

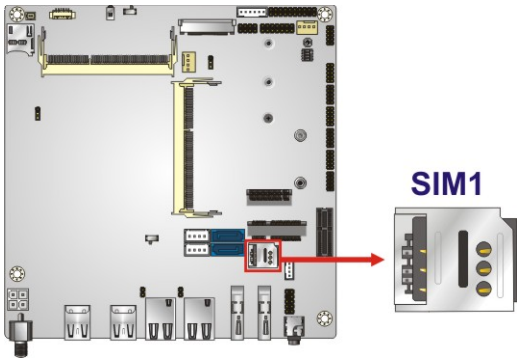


Figure 3-19: SIM Card Slot Location

3.2.19 Speaker Connector

CN Label:	**SPK1**
CN Type:	4-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-20**
CN Pinouts:	See **Table 3-17**

Use the speaker connector to connect a speaker.

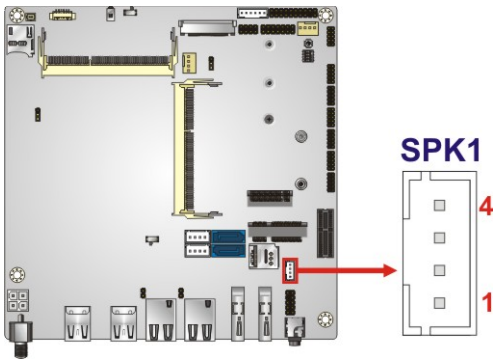


Figure 3-20: Speaker Connector Location

Pin	Description
1	L+
2	L-
3	R-
4	R+

Table 3-17: Speaker Connector Pinouts

3.2.20 SPI Flash Connector, BIOS

CN Label:	**J_SPI1**
CN Type:	6-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-21**
CN Pinouts:	See **Table 3-18**

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

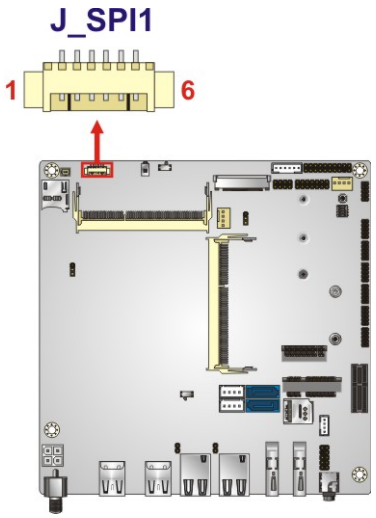


Figure 3-21: SPI Flash Connector Location

Pin	Description
1	+3.3V
2	CS#
3	MISO
4	Clock
5	MOSI
6	GND

Table 3-18: SPI Flash Connector Pinouts

3.2.21 TPM Connector

CN Label:	**TPM1**
CN Type:	20-pin header, p=2.54 mm
CN Location:	See **Figure 3-22**
CN Pinouts:	See **Table 3-19**

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

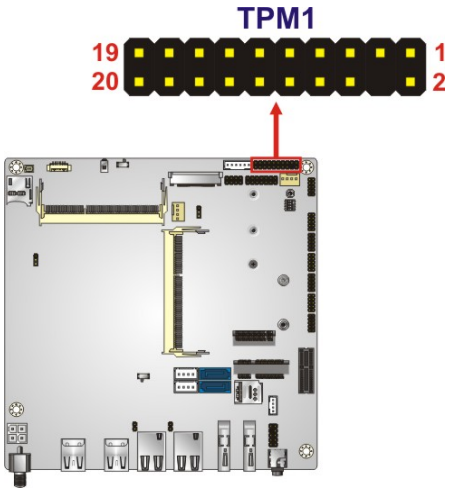


Figure 3-22: TPM Connector Location

Pin	Description	Pin	Description
1	Clock	2	GND
3	LFRAME#	4	Serial IRQ
5	LPC Reset	6	LAD2-
7	LAD3	8	LAD0
9	+3.3V	10	LPC Reset
11	LAD0	12	GND
13	SCL	14	SDA
15	SB3V	16	SERIRQ
17	GND	18	CLKRUN#
19	LPCPD#	20	LDRQ#

Table 3-19: TPM Connector Pinouts

3.2.22 USB Connector

CN Label: **USB4-5_1**

CN Type: 8-pin header, p=2.0 mm

CN Location: See **Figure 3-23**

CN Pinouts: See **Table 3-20**

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

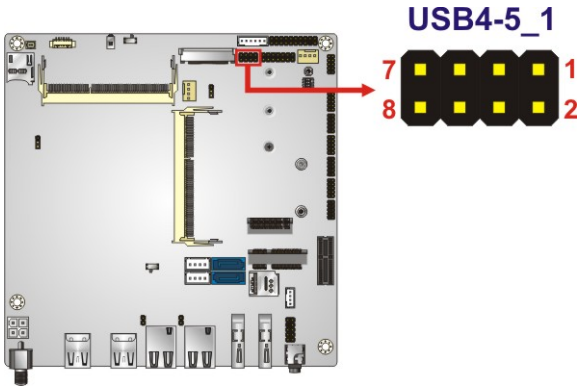


Figure 3-23: USB Connector Location

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

Table 3-20: USB Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-24 shows the tKINO-AL external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

- 1 x Audio jack (TRRS1)
- 1 x DC-in power jack (PWR1)
- 2 x GbE connector (LAN1, LAN2)
- 2 x DisplayPort++ connector (DP1, DP2)
- 4 x USB 3.0 connector (USB0-1_1, USB2-3_1)

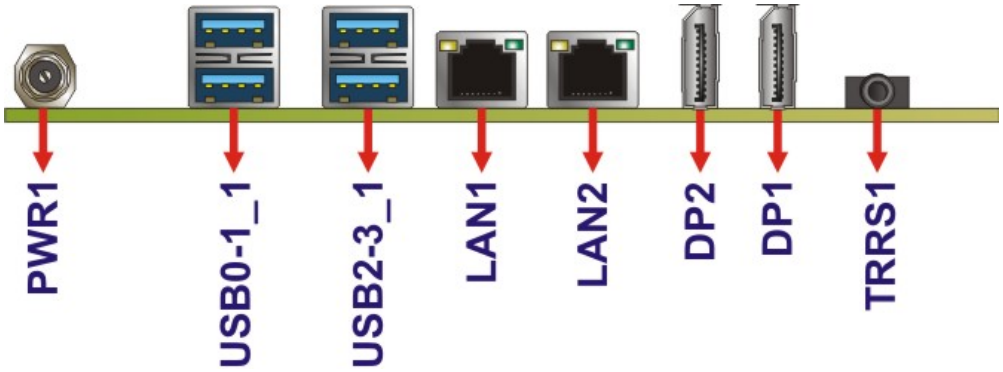


Figure 3-24: External Peripheral Interface Connector

3.3.1 Audio Jack

CN Label: **TRRS1**

CN Type: Audio TRRS jack

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

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

The audio TRRS jack supports headphone and microphone cable.

Pin	Description
1	MIC
2	Right
3	Detect+
4	Detect-

Pin	Description
5	Left-
6	GND

Table 3-21: Audio Jack Pinouts

3.3.2 DisplayPort++ Connectors

CN Label: **DP1, DP2**

CN Type: DisplayPort connector

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

CN Pinouts: See **Table 3-22**

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	HD_DP_DATA0	2	GND
3	HD_DP_DATA0#	4	HD_ DP_DATA1
5	GND	6	HD_ DP_DATA1#
7	HD_ DP_DATA2	8	GND
9	HD_ DP_DATA2#	10	HD_ DP_DATA3
11	GND	12	HD_ DP_DATA3#
13	DP0_EN	14	NC
15	HD0_DP0_AUP	16	GND
17	HD0_DP0_AUN	18	DP0_HDP
19	GND	20	DP0_VCC

Table 3-22: DisplayPort++ Connector Pinouts

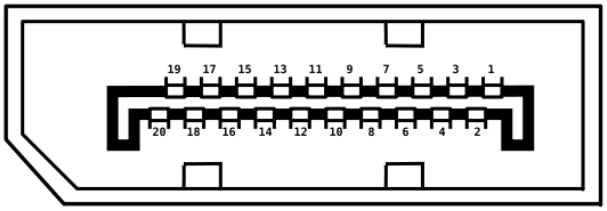


Figure 3-25: DisplayPort++ Connector Pinout Locations

3.3.3 LAN Connectors

CN Label: **LAN1, LAN2**

CN Type: RJ-45

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

CN Pinouts: See **Figure 3-26** and **Table 3-23**

The LAN connector connects to a local network.

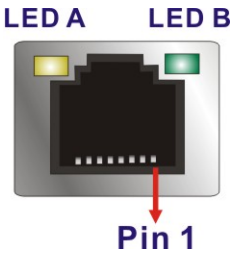


Figure 3-26: LAN Connector

Pin	Description	Pin	Description
1	MDI0+	6	GND
2	MDI0-	7	MDI2+
3	MDI1+	8	MDI2-
4	MDI1-	9	MDI3+
5	VDD	10	MDI3-

Table 3-23: LAN Pinouts

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 3-24: Connector LEDs

3.3.4 Power Connector

CN Label: **PWR1**

CN Type: Power jack

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

The power connector supports the 12V power adapter.

Figure 3-27: Power Jack

3.3.5 USB Connectors

CN Label: **USB0-1_1, USB2-3_1**

CN Type: USB 3.0 ports

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

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

The tKINO-AL has four external USB 3.0 ports. The USB 3.0 connector can be connected to a USB 2.0 or USB 3.0 device. The pinouts of USB 3.0 connectors are shown below.

Pin	Description	Pin	Description
1	+5V	2	USB2P0-
3	USB2P0+	4	GND
5	USB3P0_RXDN1	6	USB3P0_RXDP1
7	GND	8	USB3P0_TXDN1
9	USB3P0_TXDP1		

Table 3-25: USB 3.0 Port Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the tKINO-AL. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the tKINO-AL 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 tKINO-AL, place it on an anti-static pad. This reduces the possibility of ESD damaging the tKINO-AL.
- ***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 tKINO-AL, tKINO-AL 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 tKINO-AL 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 tKINO-AL 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 tKINO-AL off:
  - When working with the tKINO-AL, 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 tKINO-AL **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 an SO-DIMM, please follow the steps below and refer to **Figure 4-1**.

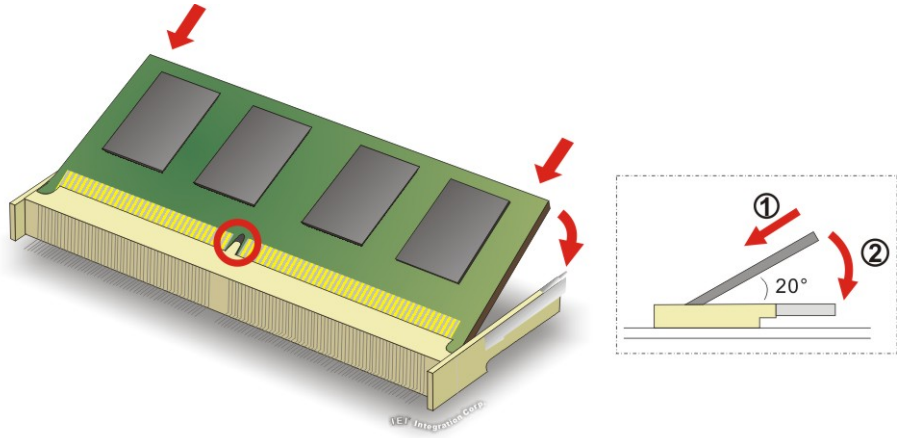


Figure 4-1: SO-DIMM Installation

Step 1: Locate the SO-DIMM socket. Place the board on an anti-static mat.

Step 2: Align the SO-DIMM with the socket. Align the notch on the memory with the notch on the memory socket.

Step 3: Insert the SO-DIMM. Push the memory in at a 20º angle. (See **Figure 4-1**)

Step 4: Seat the SO-DIMM. Gently push downwards and the arms clip into place. (See **Figure 4-1**)

4.4 M.2 Module Installation

CAUTION:

If an M.2 module is installed in the M.2 slot (M2_1), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the M.2 module for storage.

To install an M.2 module, please follow the steps below.

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

Step 2: Remove the on-board retention screw and the plastic ring as shown in **Figure 4-2**.

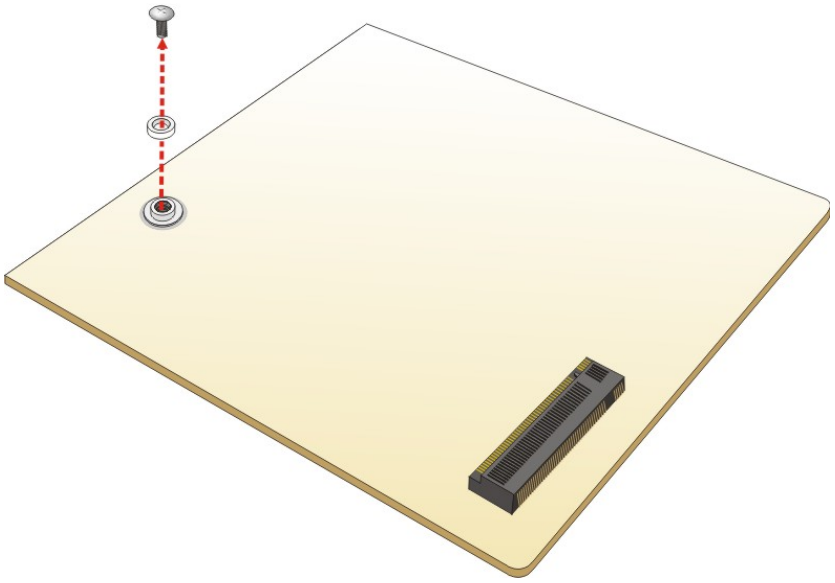


Figure 4-2: Removing the M.2 Module Retention Screw and Plastic Ring

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**).

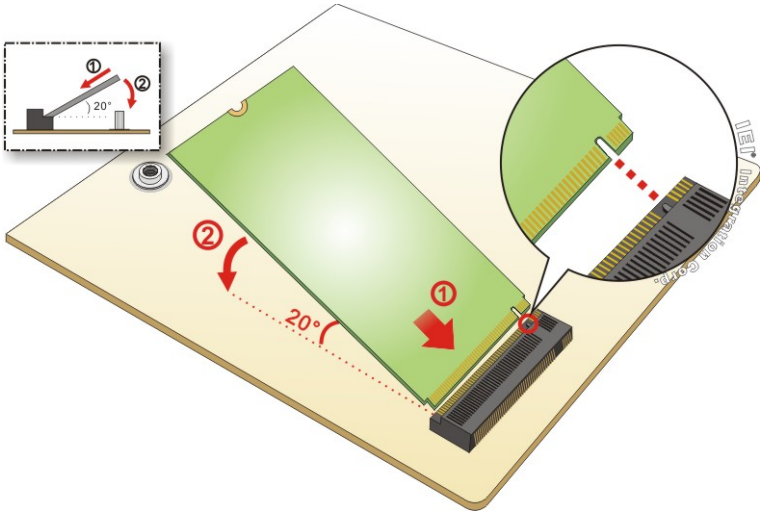


Figure 4-3: Inserting the M.2 Module into the Slot at an Angle

Step 4: Put the plastic ring onto the screw holes. Push the M.2 module down and secure it with the previously removed retention screw (**Figure 4-4**).

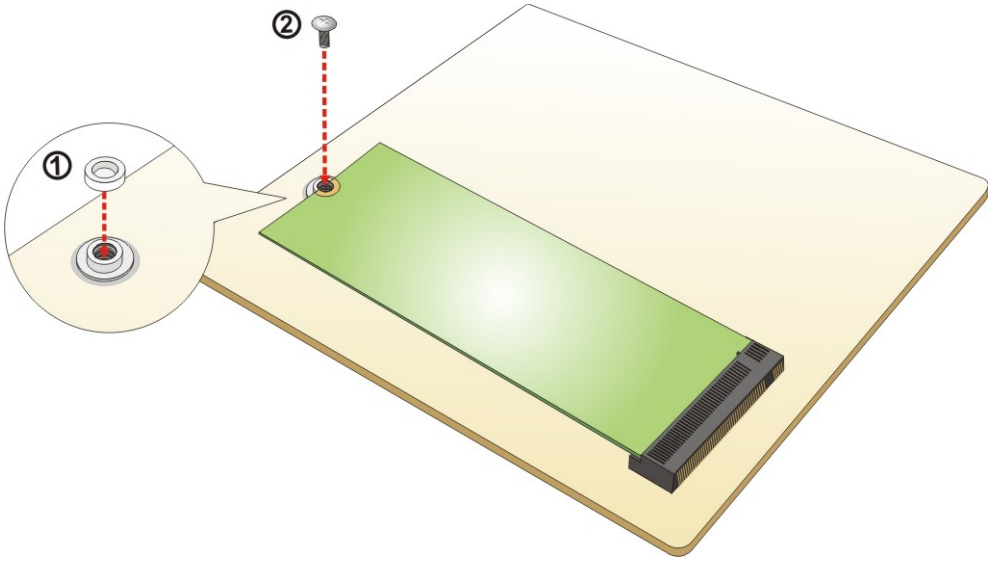


Figure 4-4: Securing the M.2 Module

4.5 PCIe Mini Card Installation

The PCIe Mini card slot on the tKINO-AL 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 4-5**.

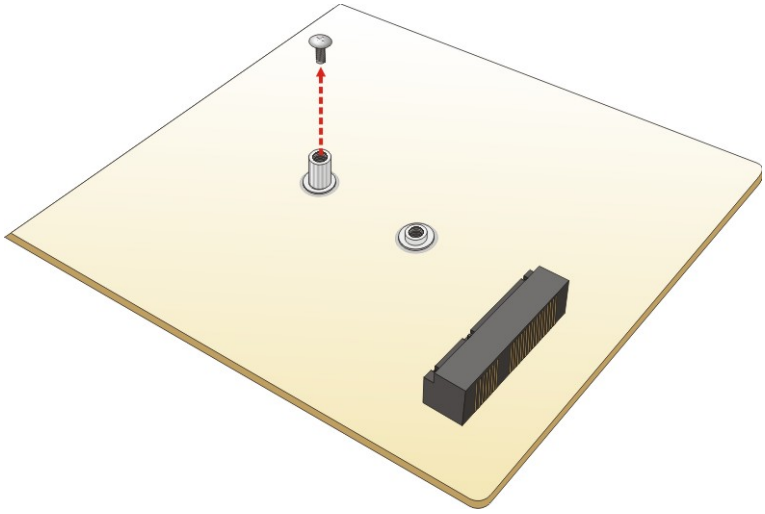


Figure 4-5: Removing the Retention Screw

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 4-6**).

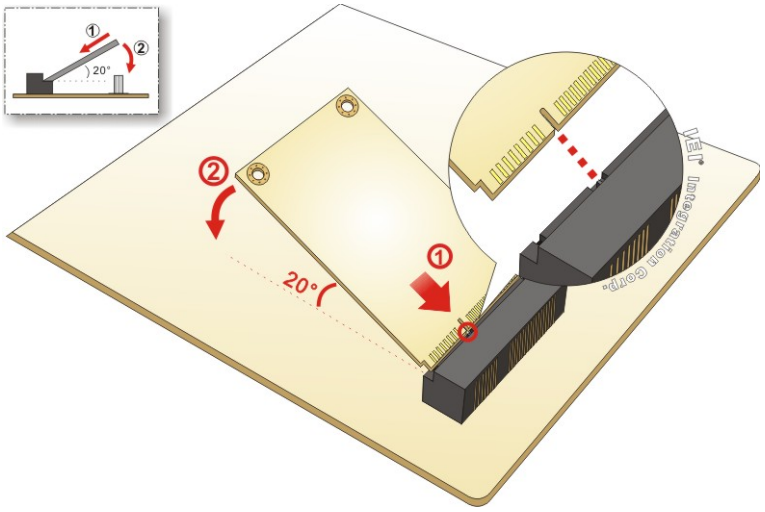


Figure 4-6: Inserting the Full-size PCIe Mini Card into the Slot at an Angle

Step 4: Secure the full-size PCIe Mini card with the retention screw previously removed (**Figure 4-7**).

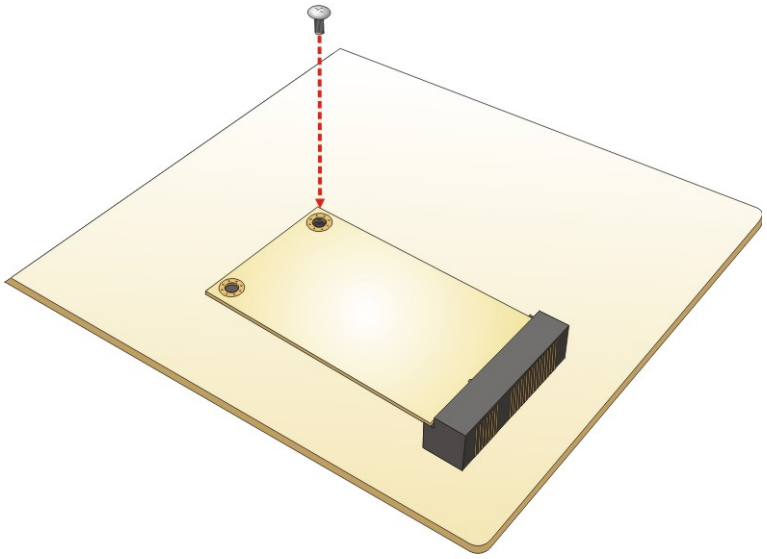


Figure 4-7: Securing the Full-size PCIe Mini Card

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 4-8**.

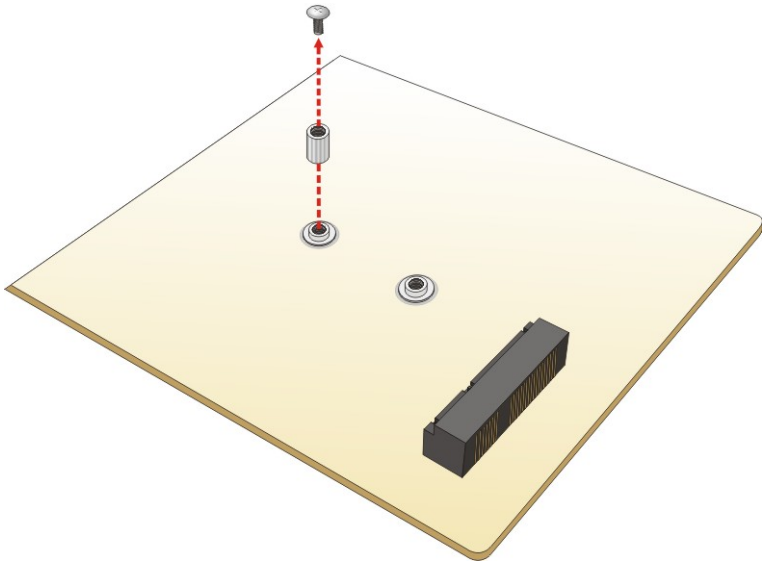


Figure 4-8: Removing Retention Screw and Standoff

Step 3: Install the previously removed standoff to the screw hole for the half-size PCIe Mini card (**Figure 4-9**).

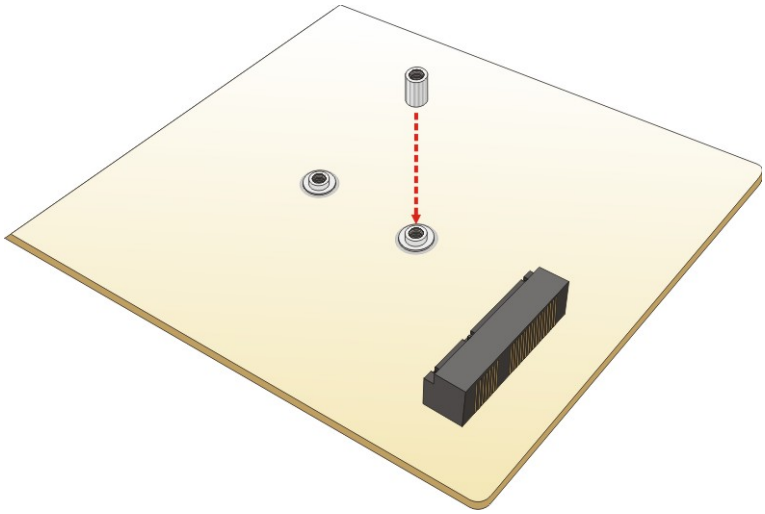


Figure 4-9: Installing the Standoff

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 4-10**).

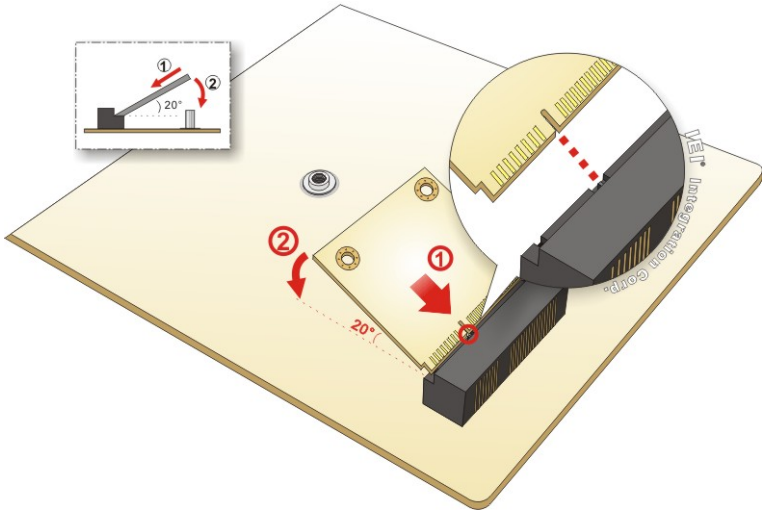


Figure 4-10: Inserting the Half-size PCIe Mini Card into the Slot at an Angle

Step 5: Secure the half-size PCIe Mini card with the retention screw previously removed (**Figure 4-11**).

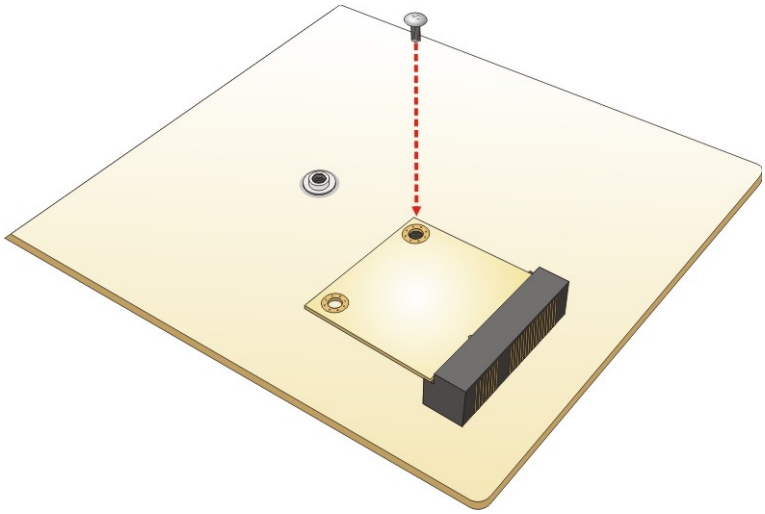


Figure 4-11: Securing the Half-size PCIe Mini Card

4.6 SIM Card Installation

To install a SIM card, please follow the steps below.

Step 1: Locate the SIM card slot. See **Section 3.2.18**.

Step 2: Unlock the SIM card slot cover by sliding the cover in the direction as shown by the arrow in **Figure 4-12**.

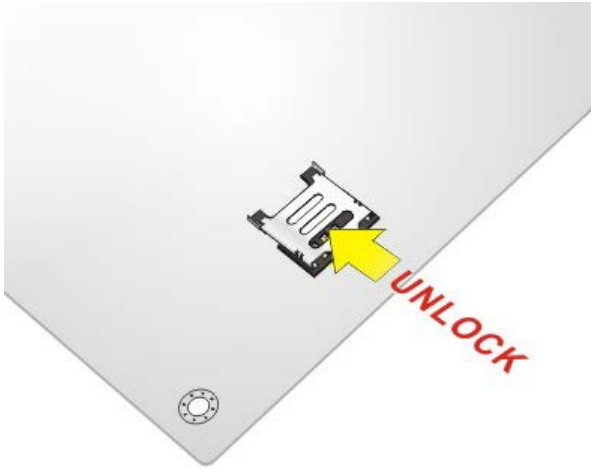


Figure 4-12: Unlock SIM Card Slot Cover

Step 3: Open the slot cover and place a SIM card onto the slot. The cut mark on the corner should be facing away from the slot as shown in **Figure 4-13**.

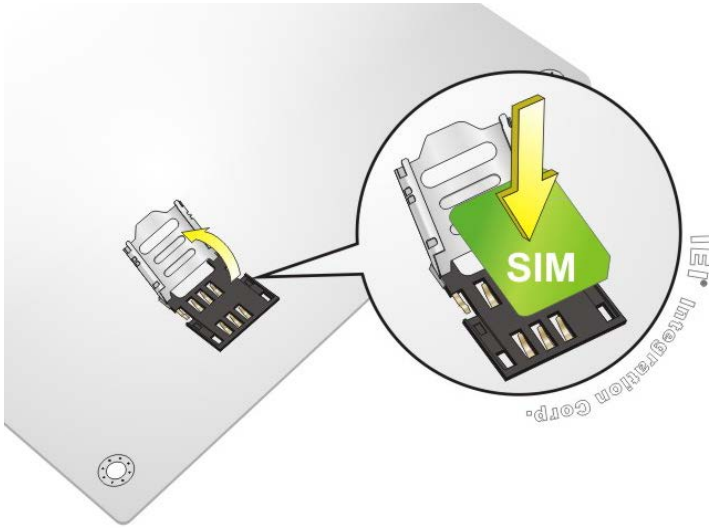


Figure 4-13: SIM Card Installation

Step 4: Close the slot cover and lock it by sliding it in the direction as shown by the arrow in **Figure 4-14**.

Figure 4-14: Lock SIM Card Slot Cover

4.7 System Configuration

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

4.7.1 AT/ATX Mode Select Switch

The AT/ATX mode select switch (SW_A/T1) 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 4-15** below.

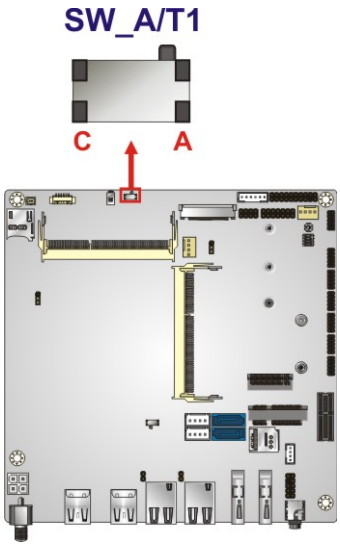


Figure 4-15: AT/ATX Mode Select Switch Location

4.7.2 Clear CMOS Button

If the tKINO-AL 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 4-16**

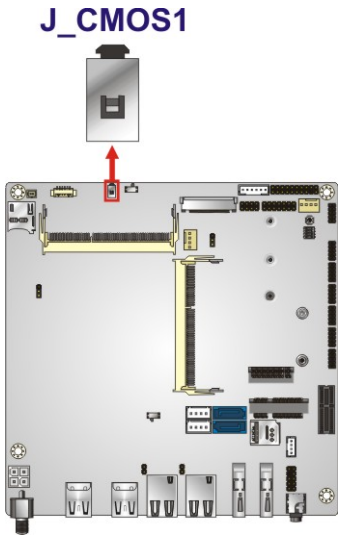


Figure 4-16: Clear CMOS Button Location

4.7.3 COM1 and COM2 Port Function Select Switch

The COM1 and COM2 function select switch (SW1) sets the communication protocol used by the COM1 and COM2 serial communication ports as RS-232, RS-422 or RS-485. The COM1 and COM2 function select switch settings are shown in **Table 4-2**.

* ON=0, OFF=1

SW1 (1-2-3-4)	Description
0101	RS-232 (default)
0000	RS-422
1010	RS-485

Table 4-2: COM1 and COM2 Function Select Switch Settings

The location of the COM1 and COM2 function select switch is shown below.

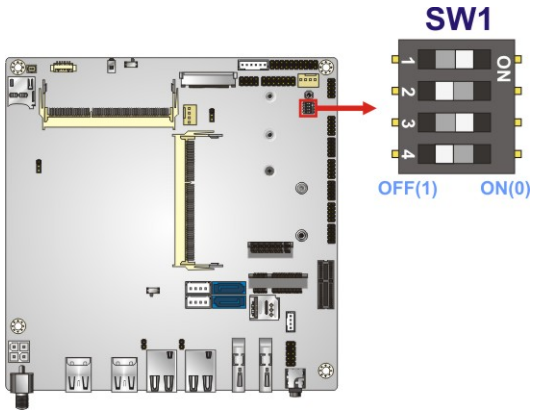


Figure 4-17: COM1 and COM2 Function Select Switch Location

4.7.4 ErP Mode Setup Jumper

The ErP mode setup jumper (ERP1, p=2.00 mm) allows users to enable or disable the ErP mode. Refer to **Figure 4-18** and **Table 4-3** for the jumper location and settings.

Setting	Description
Short 1-2	Disable ErP mode (standby mode supported) (default)
Short 2-3	Enable ErP mode (the user can use BIOS to disable ErP)

Table 4-3: ErP Mode Setup Jumper Settings

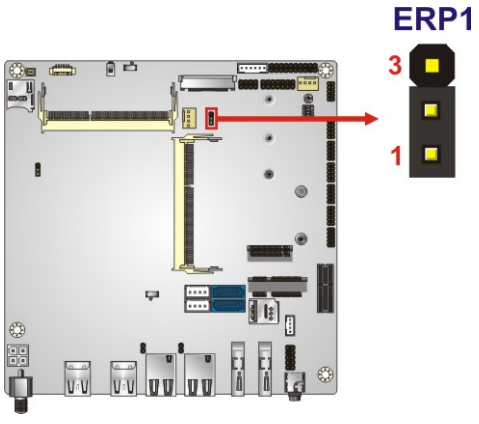


Figure 4-18: ErP Mode Setup Jumper Location

4.7.5 Flash Descriptor Security Override Jumper

The Flash Descriptor Security Override jumper (TXE_OV1, p=2.00 mm) allows users to enable or disable the ME firmware update. Refer to **Figure 4-19** and **Table 4-4** for the jumper location and settings.

Setting	Description
Short 1-2	Disabled (default)
Short 2-3	Enabled

Table 4-4: Flash Descriptor Security Override Jumper Settings

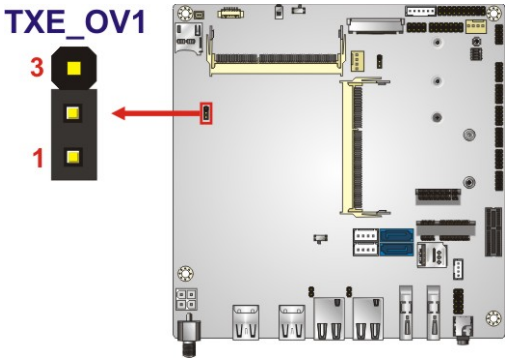


Figure 4-19: Flash Descriptor Security Override Jumper Location

To update the ME firmware, please follow the steps below.

Step 1: Before turning on the system power, short pin 2~3 of the Flash Descriptor Security Override jumper.

Step 2: Update the BIOS and ME firmware, and then turn off the system power.

Step 3: Remove the metal clip on the Flash Descriptor Security Override jumper to its default setting (short 1~2).

Step 4: Restart the system. The system will reboot 2 ~ 3 times to complete the ME firmware update.

4.7.6 M.2 and SATA2 Select Switch

Use the M.2 and SATA2 select switch (J_SATA1) to set the priority of M2_1 and SATA2 connectors since the M.2 (M2_1) slot is co-lay with the SATA2 connector. The M.2 and SATA2 select switch settings are shown in **Table 4-5**.

Setting	Description
Short A-B	M.2 as the priority (Default) (SATA2 will be disabled if an M.2 module is installed in the M2_1 slot.)
Short B-C	M2_1 is enabled and SATA2 is disabled.

Table 4-5: M.2 and SATA2 Select Switch Settings

The location of the M.2 and SATA2 select switch is shown in **Figure 4-20** below.

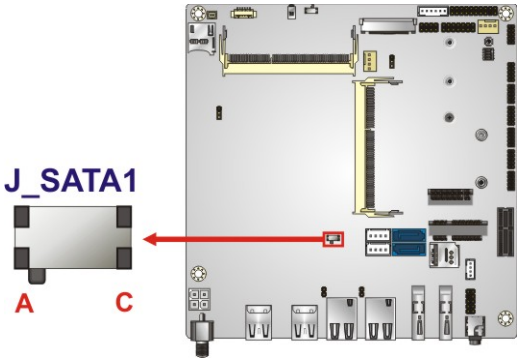


Figure 4-20: M.2 and SATA2 Select Switch Location

4.8 Chassis Installation

4.8.1 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 tKINO-AL 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.

4.8.2 Motherboard Installation

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

4.9 SATA Drive Connection

The tKINO-AL is shipped with a SATA drive cable. To connect the SATA drive to the connector, please follow the steps below.

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

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-21**.

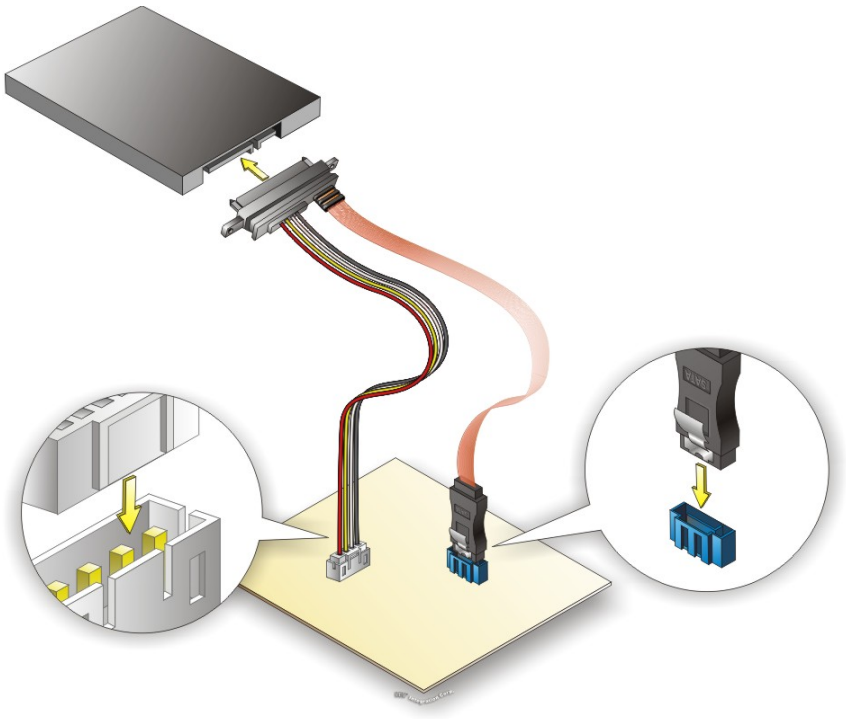


Figure 4-21: SATA Drive Cable Connection

NOTE:

The connector locations in the diagram above are just for reference. For the exact locations, please see **Section 3.2.16** and **3.2.17**.

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 4-21**.

Step 4: To remove the SATA cable from the SATA connector, press the clip on the connector at the end of the cable.

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 4.7.2**.

5.1.5 BIOS Menu Bar

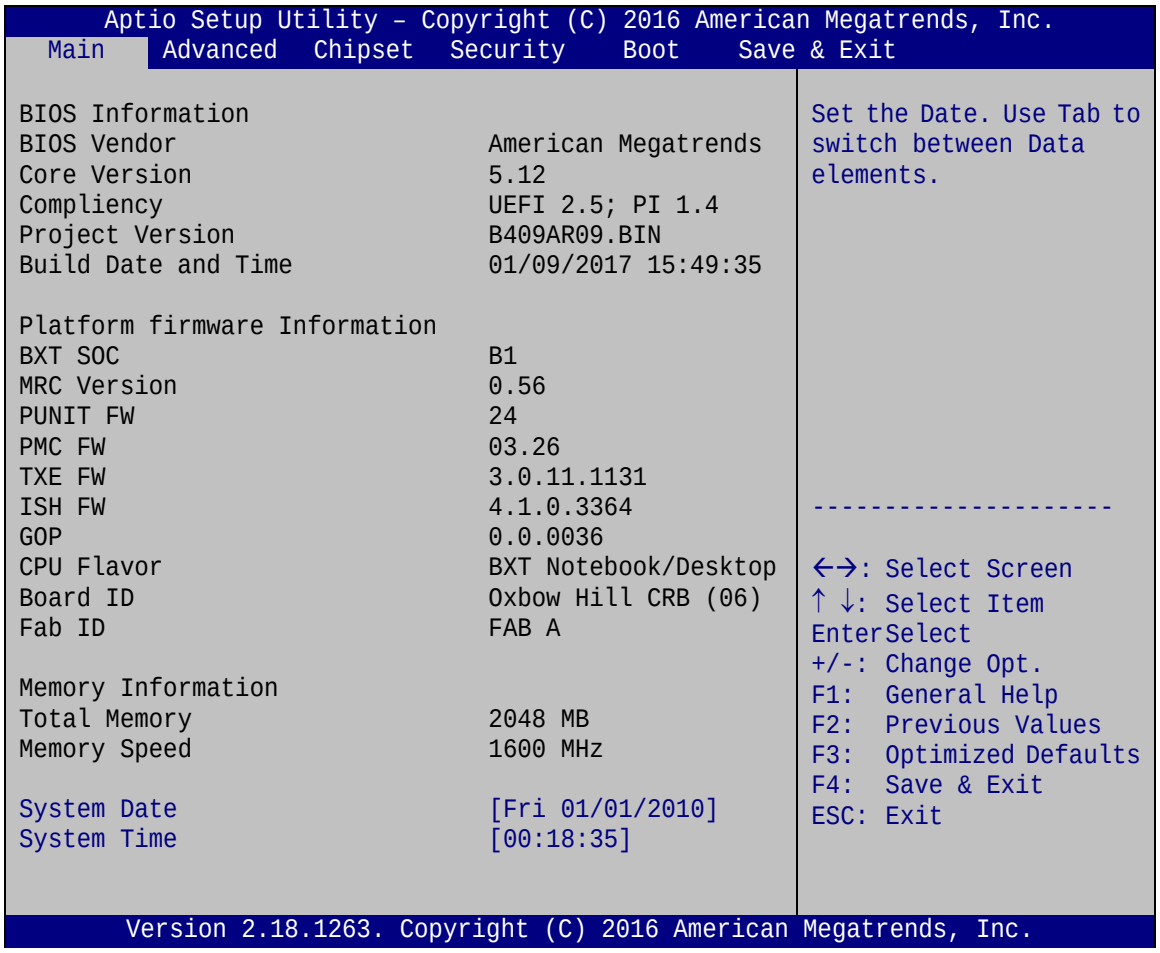
The **menu bar** on top of the BIOS screen has the following main items:

- 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]**

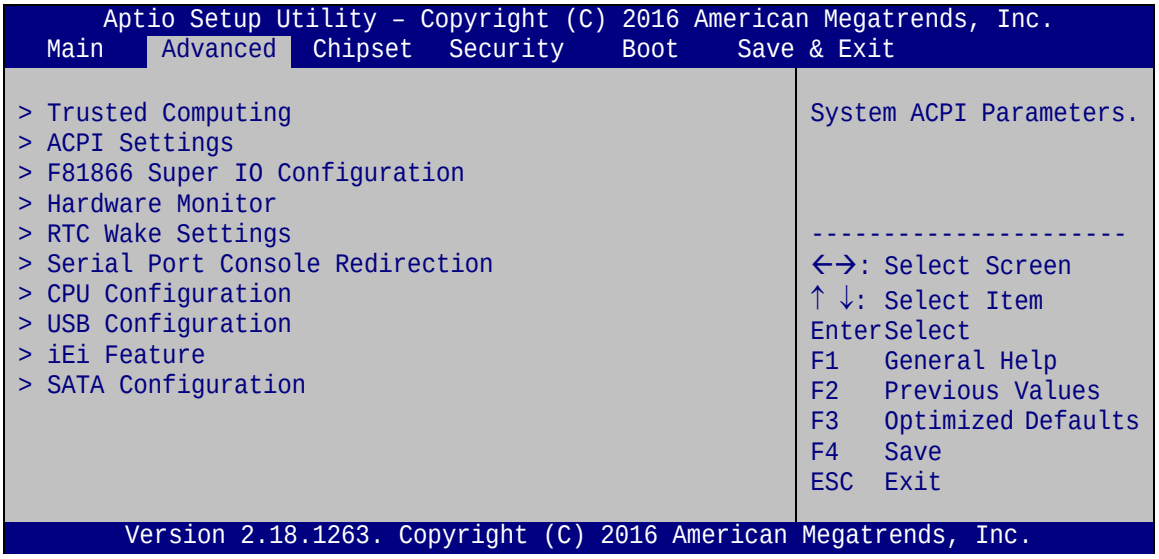
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

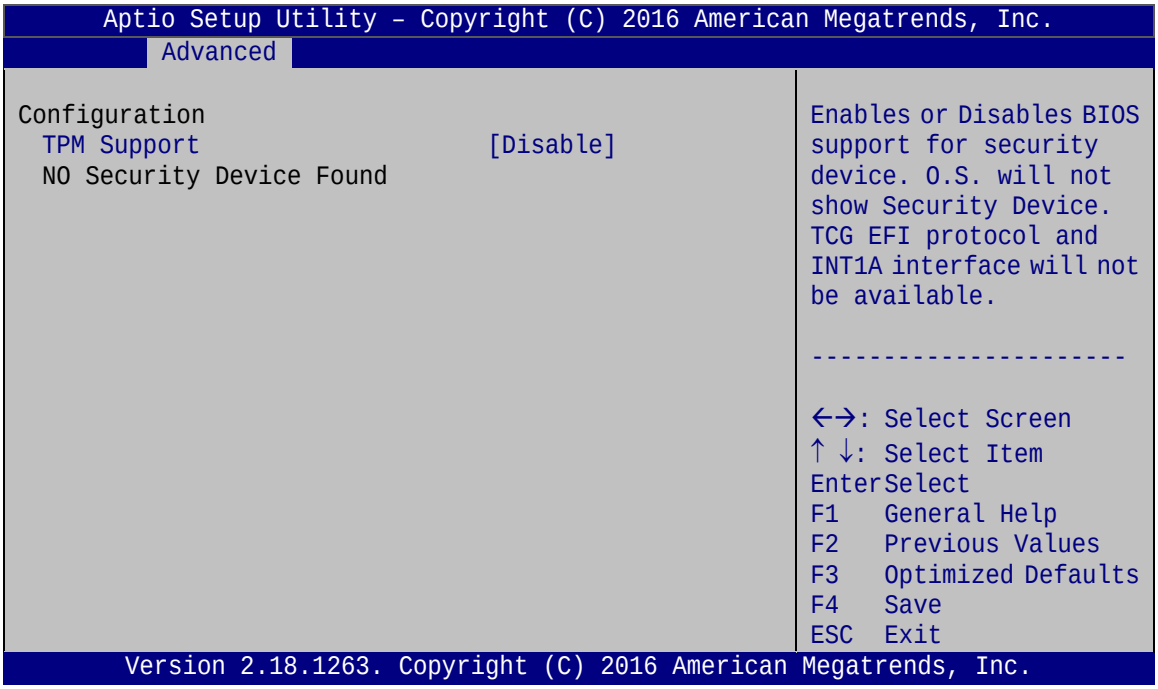
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



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

➔ **TPM Support [Disable]**

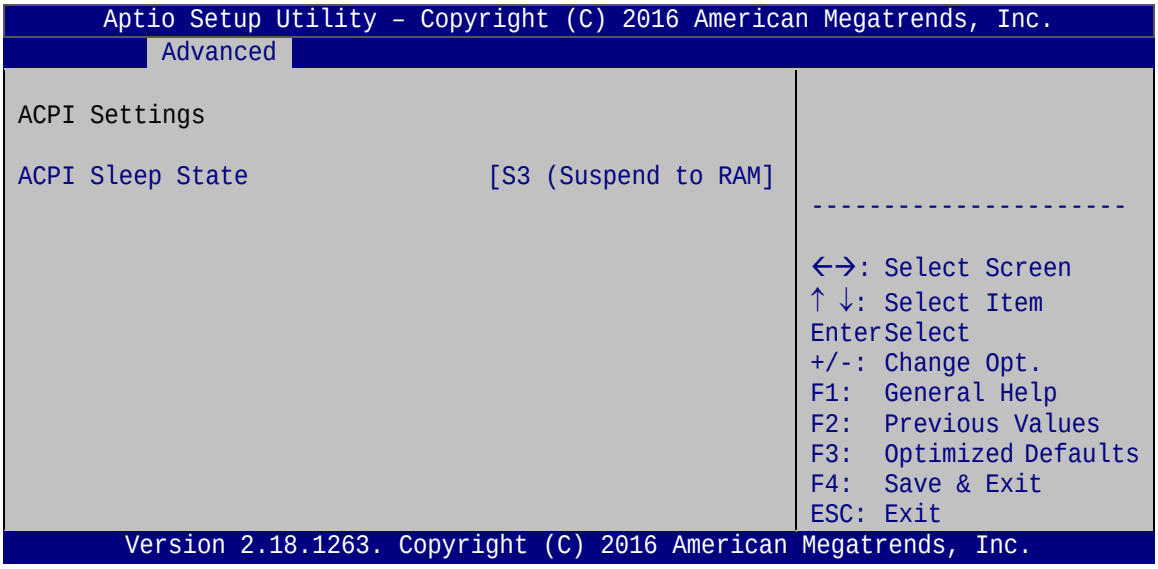
Use the **TPM Support** option to configure support for the security device.

➔ **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

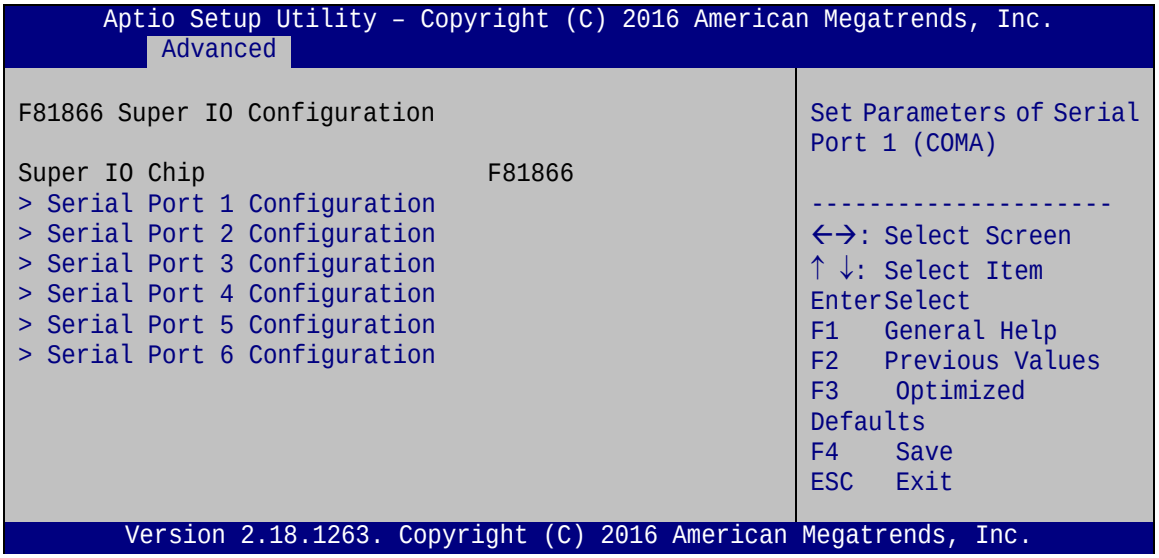
➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

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 F81866 Super IO Configuration

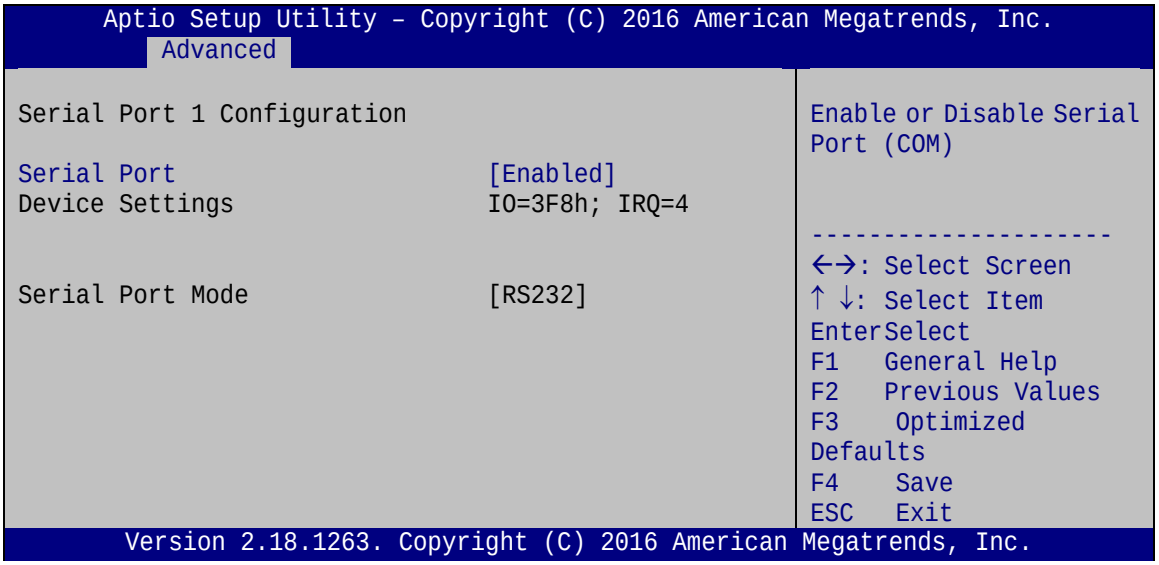
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 5**) to set or change the configurations for the serial ports.



BIOS Menu 5: F81866 Super IO Configuration

5.3.3.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 6**) to configure the serial port n.



BIOS Menu 6: Serial Port n Configuration

5.3.3.1.1 Serial Port N Configuration

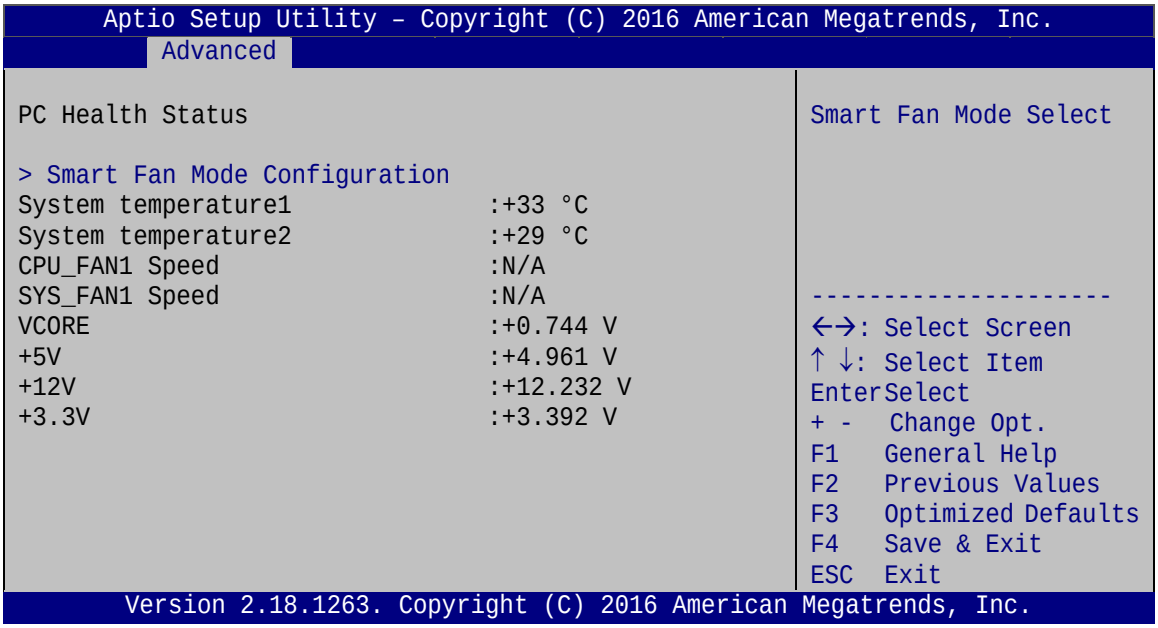
➔ **Serial Port [Enabled]**

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

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

5.3.4 Hardware Monitor

The **Hardware Monitor** menu (**BIOS Menu 7**) contains the fan configuration submenus and displays operating temperature, fan speeds and system voltages.



BIOS Menu 7: Hardware Monitor

➔ **PC Health Status**

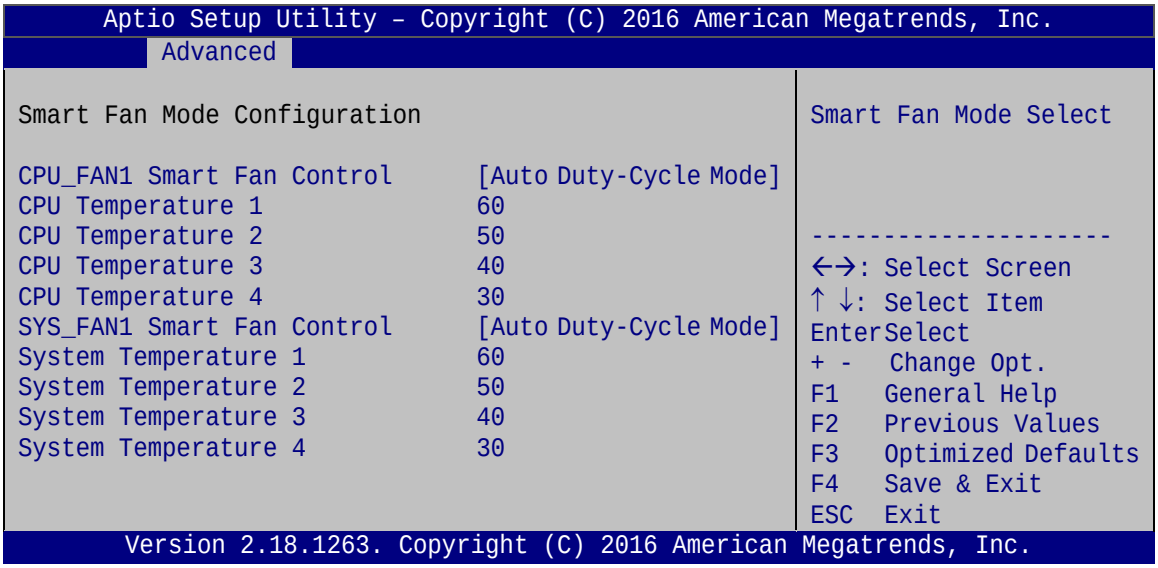
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - System temperature 1
  - System temperature 2

- Fan Speed:
  - CPU Fan Speed
  - System Fan Speed
- Voltages
  - VCORE
  - +5V
  - +12V
  - +3.3V

5.3.4.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 8**) to configure fan temperature and speed settings.



BIOS Menu 8: Smart Fan Mode Configuration

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

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

➔ **Manual Duty Mode**	The fan spins at the speed set in the Manual Mode option
➔ **Auto Duty-Cycle Mode** **DEFAULT**	The fan adjusts its speed using Auto Duty-Cycle Mode settings

➔ **CPU Temperature 1**

If CPU temperature is higher than the value set in this BIOS option, the fan duty cycle is 100. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **CPU Temperature 2**

If CPU temperature is higher than the value set in this BIOS option, the fan duty cycle is 85. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **CPU Temperature 3**

If CPU temperature is higher than the value set in this BIOS option, the fan duty cycle is 70. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **CPU Temperature 4**

If CPU temperature is higher than the value set in this BIOS option, the fan duty cycle is 60; if it is lower than the value, the fan duty cycle is 50. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **System Temperature 1**

If system temperature is higher than the value set in this BIOS option, the fan duty cycle is 100. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **System Temperature 2**

If system temperature is higher than the value set in this BIOS option, the fan duty cycle is 85. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **System Temperature 3**

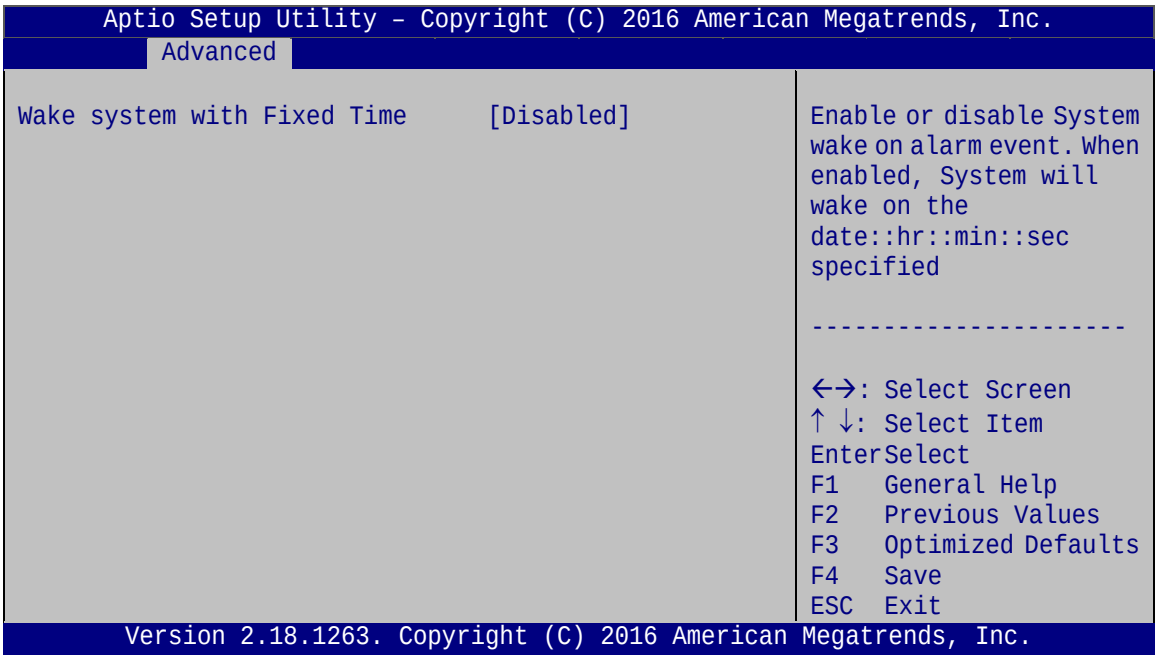
If system temperature is higher than the value set in this BIOS option, the fan duty cycle is 70. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **System Temperature 4**

If system temperature is higher than the value set in this BIOS option, the fan duty cycle is 60; if it is lower than the value, the fan duty cycle is 50. Use the + or – key to change the value or enter a decimal number between 1 and 100.

5.3.5 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 9**) configures RTC wake event.



BIOS Menu 9: 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.

5.3.6 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 10**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
Advanced

  COM1                                       Console Redirection
  Console Redirection        [Disabled]      Enable or Disable
> Console Redirection Settings

  COM2
  Console Redirection        [Disabled]
> Console Redirection Settings

  COM3
  Console Redirection        [Disabled]
> Console Redirection Settings

  COM4
  Console Redirection        [Disabled]      ---------------------
> Console Redirection Settings               ←→: Select Screen
                                             ↑ ↓: Select Item
  COM5                                       EnterSelect
  Console Redirection        [Disabled]      F1   General Help
> Console Redirection Settings               F2   Previous Values
                                             F3   Optimized
  COM6                                       Defaults
  Console Redirection        [Disabled]      F4   Save
> Console Redirection Settings               ESC  Exit

Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 10: Serial Port Console Redirection

➔ **Console Redirection [Disabled]**

Use **Console Redirection** option to enable or disable the console redirection function.

➔	**Disabled**	**DEFAULT**	Disabled the console redirection function
➔	**Enabled**		Enabled the console redirection function

5.3.7 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 11**) to view detailed CPU specifications and configure the CPU.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
  Advanced

CPU Configuration                                  Number of cores to enable
                                                   in each processor
Intel(R) Pentium(R) CPU N4200 @ 1.10GHz            package.
CPU Signature                  506C9
Microcode Patch                24
Max CPU Speed                  1100 MHz
Min CPU Speed                  800 MHz
Processor Cores                4
Intel HT Technology            Not Supported
Intel VT-x Technology          Supported
Intel SMX Technology           Not Supported       ----------------------

L1 Data Cache                  24 KB x 4           ←→: Select Screen
L1 Code Cache                  32 KB x 4           ↑ ↓: Select Item
L2 Cache                       1024 KB x 2         EnterSelect
L3 Cache                       Not Present         F1   General Help
Speed                          1100 MHz            F2   Previous Values
64-bit                         Supported           F3    Optimized
                                                   Defaults
Active Processor Cores         [Disabled]          F4    Save
Intel Virtualization Technology [Enabled]          ESC   Exit
EIST                           [Enabled]
C-States                       [Disabled]

Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 11: CPU Configuration

➔ **Active Processor Cores [Disabled]**

Use the **Active Processor Cores** BIOS option to enable or disabled the active processor core function.

- ➔ **Disabled** **DEFAULT** Disable the active processor core function.
- ➔ **Enabled** Enable the active processor core function.

➔ **Intel Virtualization Technology [Enabled]**

Use the **Intel Virtualization Technology** option to enable or disable virtualization on the system. When combined with third party software, Intel® Virtualization technology allows several OSs to run on the same system at the same time.

- ➔ **Disabled** Disables Intel® Virtualization Technology.
- ➔ **Enabled** **DEFAULT** Enables Intel® Virtualization Technology.

➔ **EIST [Enabled]**

Use the **EIST** option to enable or disable the Intel® Speed Step Technology.

- ➔ **Disabled** Disables the Intel® Speed Step Technology.
- ➔ **Enabled** **DEFAULT** Enables the Intel® Speed Step Technology.

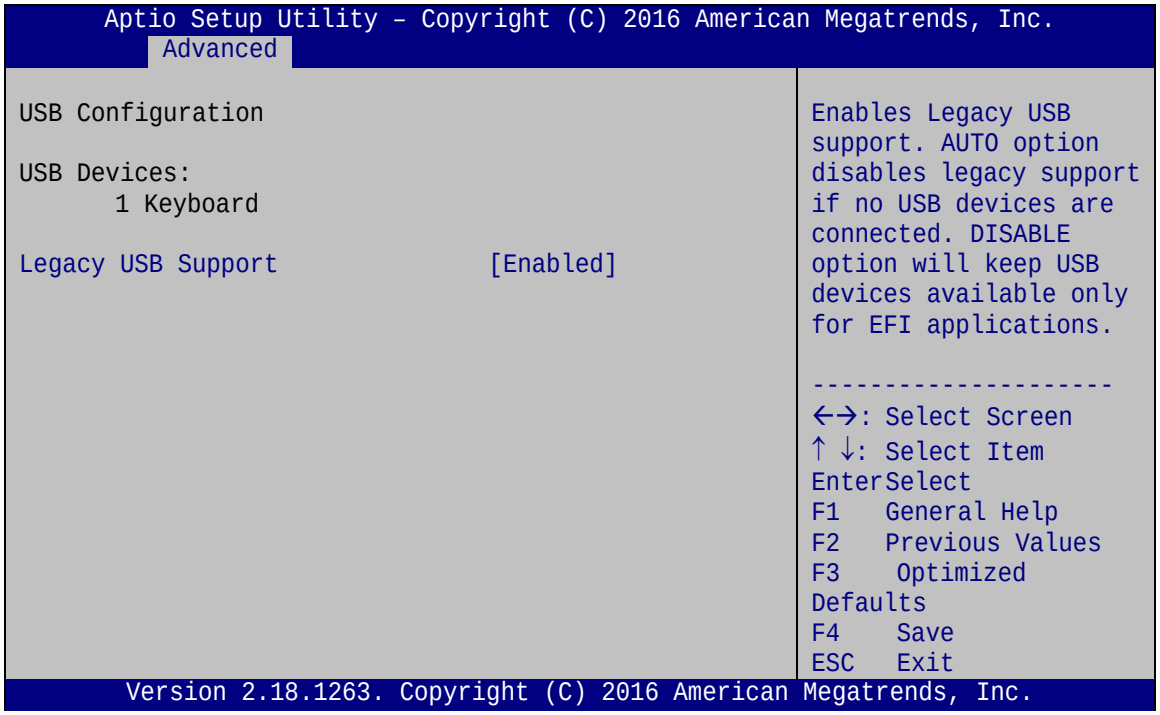
➔ **C-States [Disabled]**

Use the **C-States** option to enable or disable the C-states.

- ➔ **Disabled** **DEFAULT** Disables the C-state
- ➔ **Enabled** Enables the C-state

5.3.8 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 12**) to read USB configuration information and configure the USB settings.



BIOS Menu 12: USB Configuration

➔ **USB Devices**

The **USB Devices Enabled** field lists the USB devices that are enabled on the system

➔ **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.

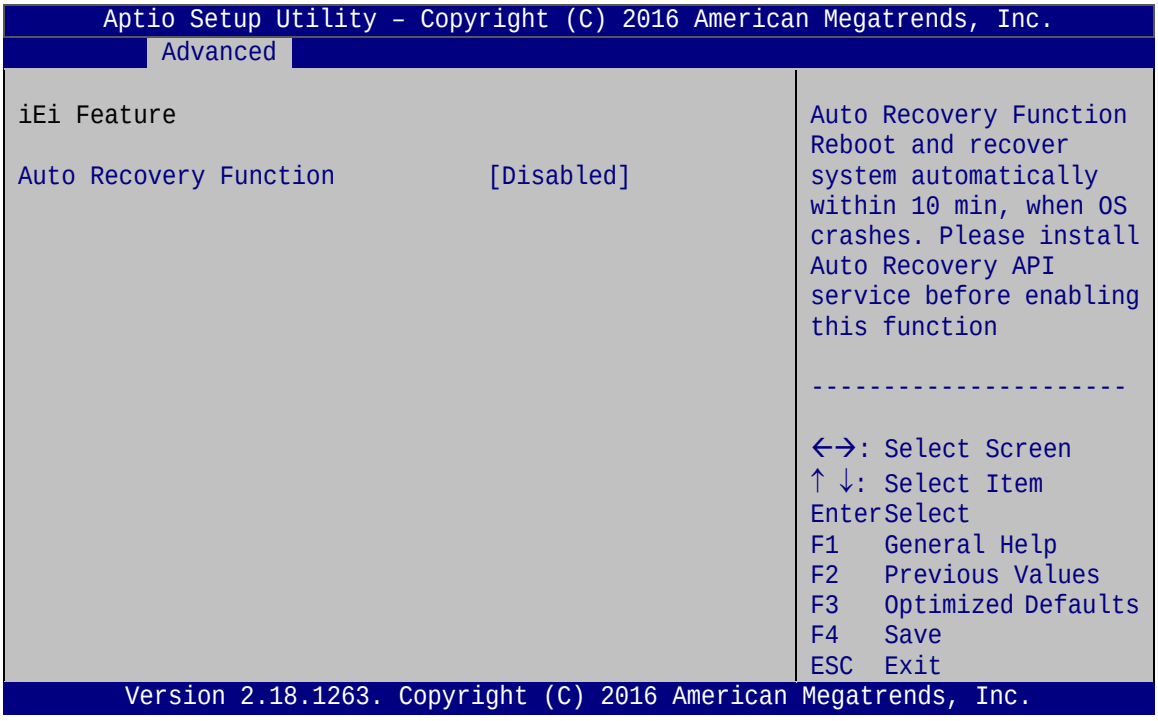
➔ **Enabled** **DEFAULT** Legacy USB support enabled

➔ **Disabled** Legacy USB support disabled

➔ **Auto** Legacy USB support disabled if no USB devices are connected

5.3.9 IEI Feature

Use the **IEI Feature** menu (**BIOS Menu 13**) to configure One Key Recovery function.



BIOS Menu 13: IEI Feature

➔ **Auto Recovery Function [Disabled]**

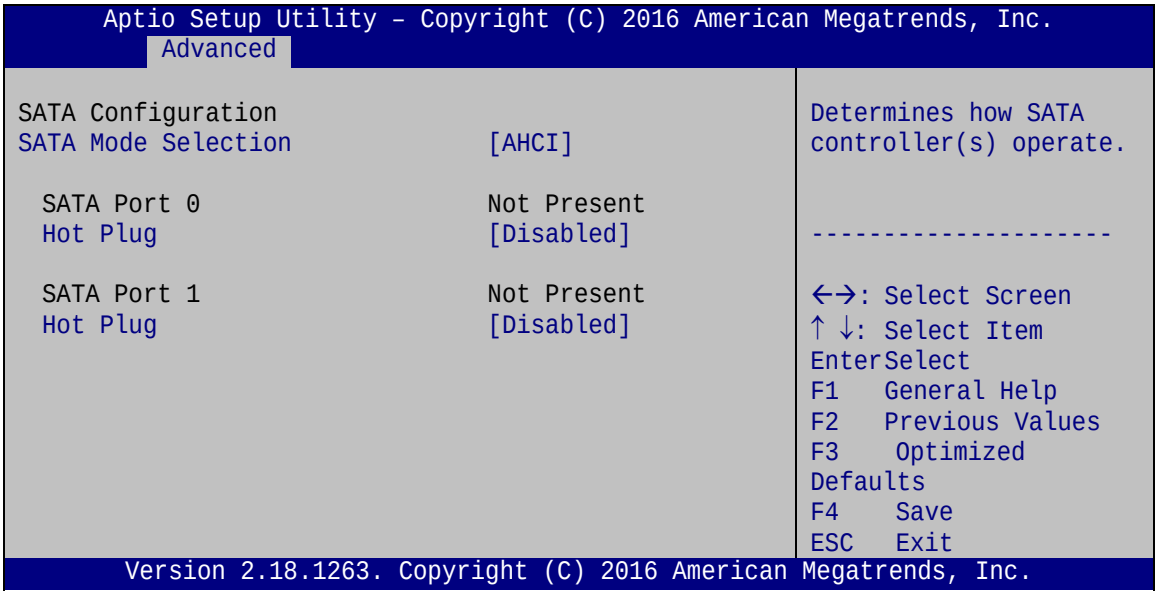
Use the **Auto Recovery Function** BIOS option to enable or disable the auto recovery function of the IEI One Key Recovery.

➔ **Disabled** **DEFAULT** Auto recovery function disabled

➔ **Enabled** Auto recovery function enabled

5.3.10 SATA Configuration

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



BIOS Menu 14: SATA Configuration

➔ **SATA Mode Selection [AHCI]**

Use the **SATA Mode Selection** option to configure SATA devices as AHCI devices.

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

➔ **Hot Plug [Disabled]**

Use the **Hot Plug** option to enable or disable the SATA device hot plug.

➔ **Disabled** **DEFAULT** Disable the SATA device hot plug capability.

➔ **Enabled** Enable the SATA device hot plug capability

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 15**) to access the north bridge and south bridge configuration menus

WARNING!

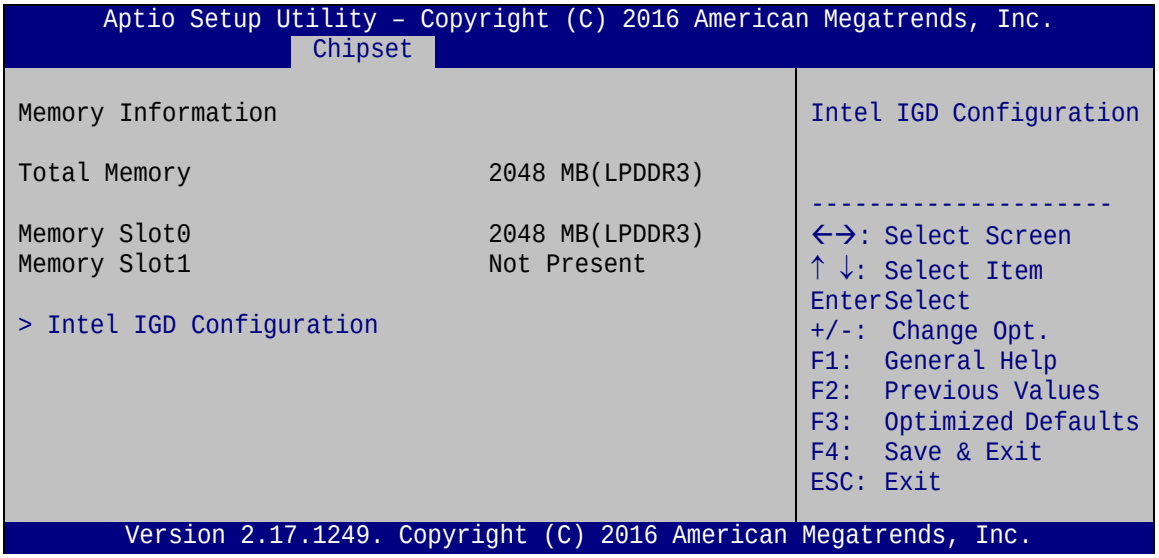
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
  Main    Advanced  Chipset   Security    Boot    Save & Exit

> North Bridge                                  North Bridge Parameters
> South 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) 2016 American Megatrends, Inc.
```

BIOS Menu 15: Chipset

5.4.1 North Bridge Configuration

Use the **North Bridge Configuration** menu (**BIOS Menu 16**) to configure the Intel IGD settings.



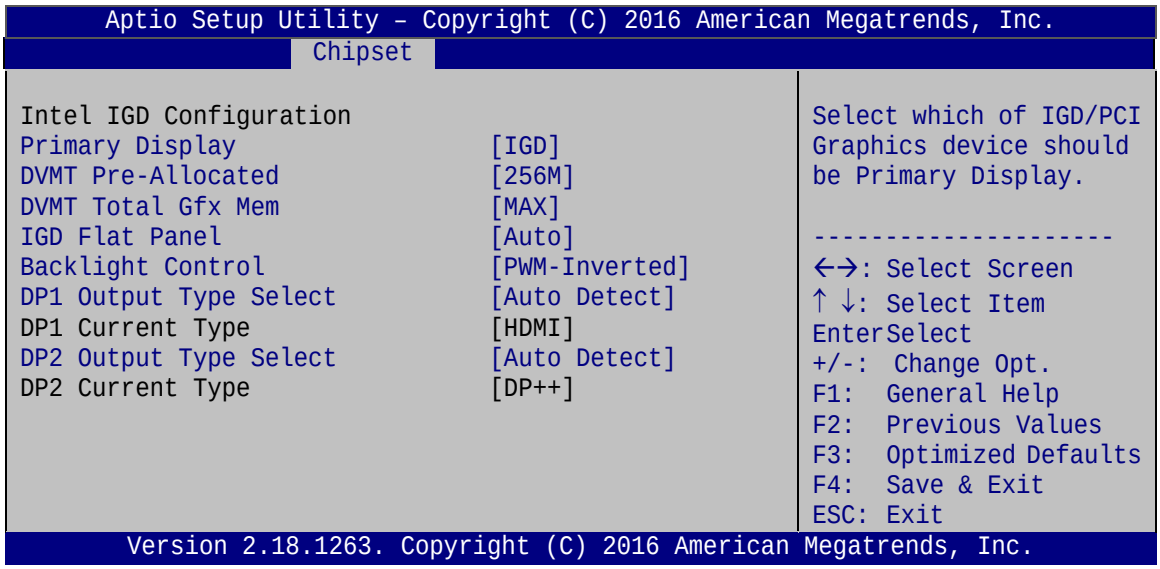
BIOS Menu 16: North Bridge Configuration

➔ **Memory Information**

The **Memory Information** lists a brief summary of the on-board memory. The fields in **Memory Information** cannot be changed.

5.4.1.1 Intel IGD Configuration

Use the **Intel IGD Configuration** menu (**BIOS Menu 17**) to configure the video device connected to the system.



BIOS Menu 17: Intel IGD Configuration

➔ **Primary Display [IGD]**

Use the **Primary Display** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a PCI express (PEG) controller. Configuration options are listed below:

- IGD **DEFAULT**
- PCIe

➔ **DVMT Pre-Allocated [256MB]**

Use the **DVMT Pre-Allocated** option to set the amount of system memory allocated to the integrated graphics processor when the system boots. The system memory allocated can then only be used as graphics memory, and is no longer available to applications or the operating system. Configuration options are listed below:

- 64M
- 128M
- 256M **DEFAULT**
- 512M

➔ **DVMT Total Gfx Mem [MAX]**

Use the **DVMT Total Gfx Mem** option to select DVMT5.0 total graphic memory size used by the internal graphic device. The following options are available:

- 128M
- 256M
- MAX **DEFAULT**

➔ **IGD Flat Panel [Auto]**

Use the **IGD Flat Panel** option to select the type of flat panel connected to the system. Configuration options are listed below.

- Auto **DEFAULT**
- 640 x 480
- 800 x 600
- 1024 x 768
- 1280 x 1024
- 1366 x 768
- 1680 x 1050
- 1920 x 1200
- 1280 x 800

➔ **Backlight Control [PWM-Inverted]**

Use the **Backlight Control** option to specify the backlight control mode. Configuration options are listed below.

- PWM-Inverted **DEFAULT**
- PWM-Normal

➔ **DP1/2 Output Type Select [Auto Detect]**

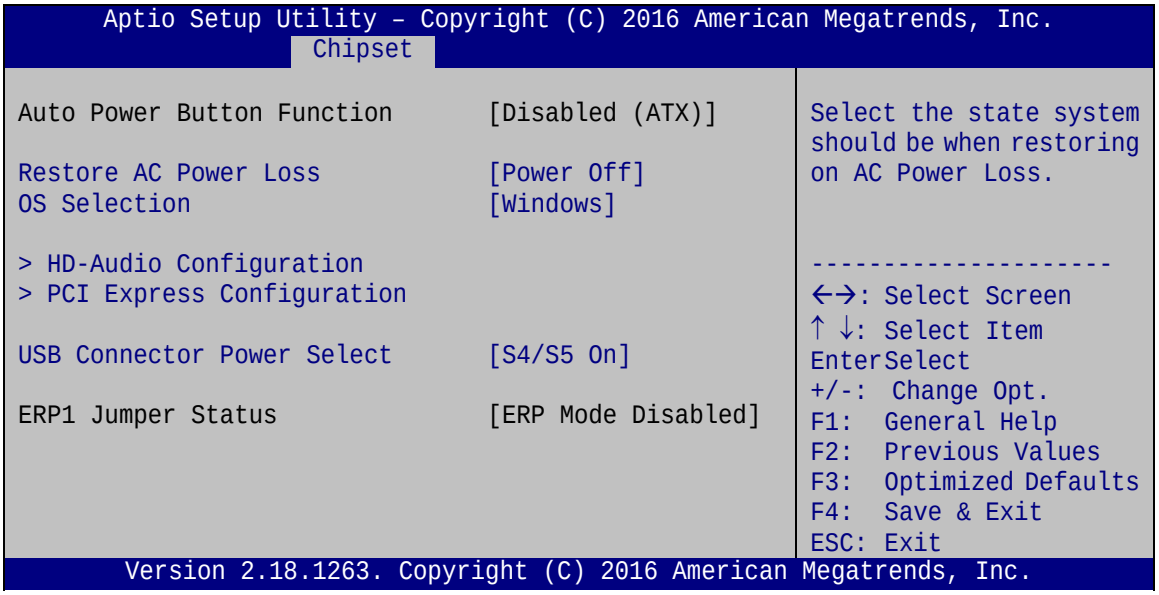
Use the **DP1/2 Output Type Select** option to specify the DisplayPort output type. Configuration options are listed below.

- Auto Detect **DEFAULT**
- DP++

- HDMI

5.4.2 South Bridge Configuration

Use the **South Bridge Configuration** menu (**BIOS Menu 18**) to configure the south bridge chipset.



BIOS Menu 18: South Bridge Configuration

➔ **Restore on AC Power Loss [Power Off]**

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

➔ **OS Selection [Windows]**

Use the **OS Selection** BIOS option to select an operating system (OS) before installing OS.

➔ **Windows**	**DEFAULT**	The system will be installed with Windows operating system.
➔ **Android**		The system will be installed with Android operating system.
➔ **WIN 7**		The system will be installed with Windows 7 operating system.
➔ **Intel Linux**		The system will be installed with Linux operating system.

WARNING:

Before installing the operating system, the user must enter the **Boot** BIOS menu and choose which operating system will be installed. Otherwise, the OS installation may fail.

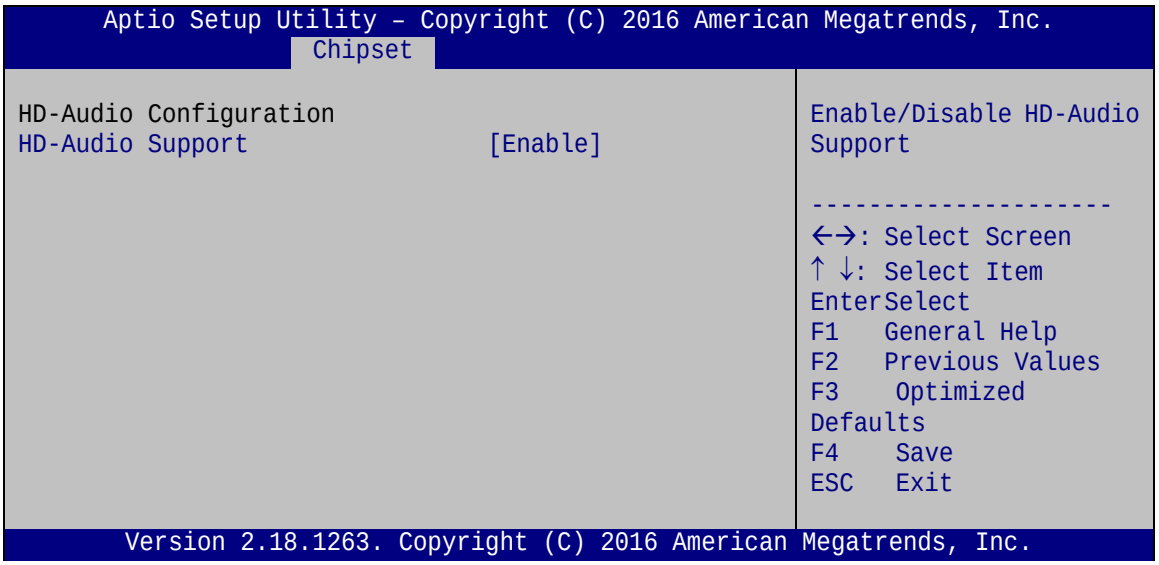
➔ **USB Connector Power Select [S4/S5 On]**

Use the **USB Connector Power Select** BIOS option to turn on or turn off the 5V USB power during S4/S5.

➔ **S4/S5 Off**		Turn off the 5V USB power during S4/S5
➔ **S4/S5 On**	**DEFAULT**	Turn on the 5V USB power during S4/S5

5.4.2.1 HD-Audio Configuration

Use the **HD-Audio Configuration** menu (**BIOS Menu 19**) to configure the HD Audio.



BIOS Menu 19: HD-Audio Configuration

➔ **HD-Audio Support [Enable]**

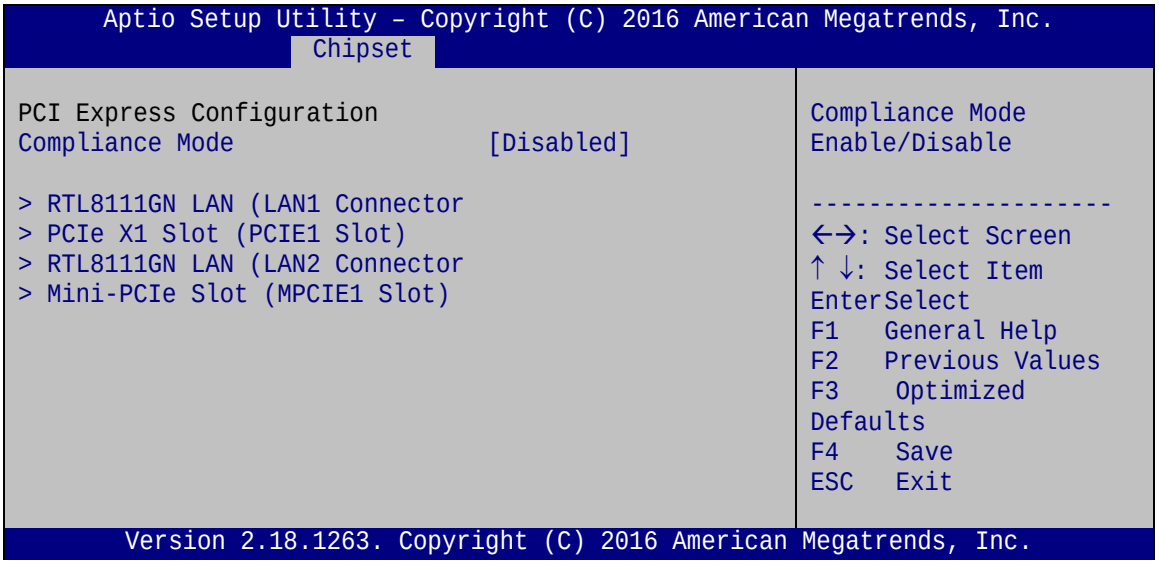
Use the **HD-Audio Support** option to enable or disable the High Definition Audio controller.

➔ **Disable** The onboard High Definition Audio controller is disabled

➔ **Enable** **DEFAULT** The onboard High Definition Audio controller is detected automatically and enabled

5.4.2.2 PCI Express Configuration

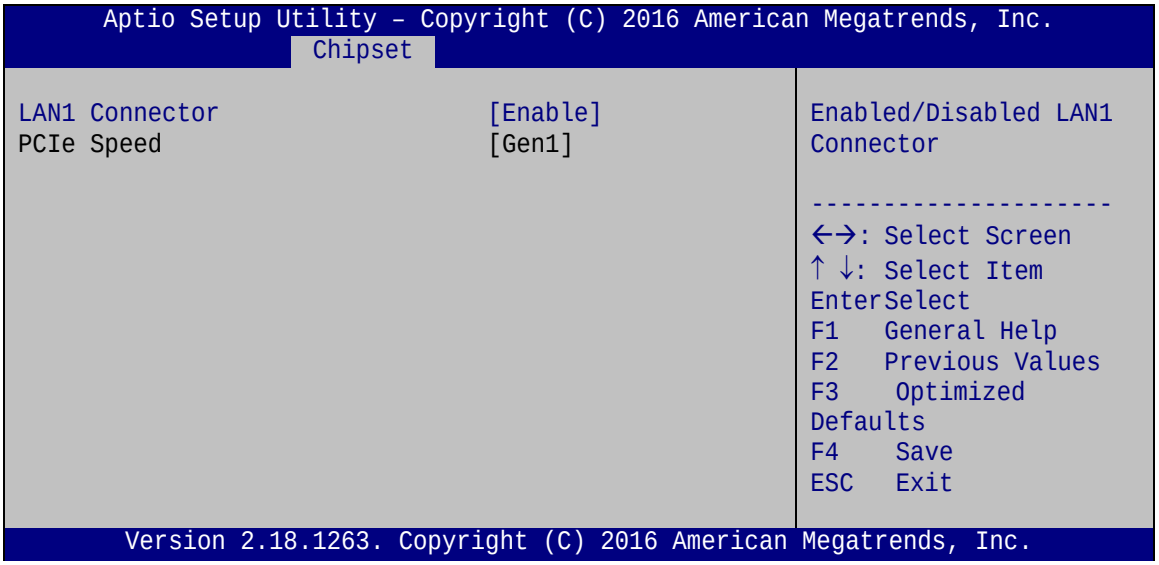
Use the **PCI Express Configuration** menu (**BIOS Menu 20**) to configure the PCI Express.



BIOS Menu 20: PCI Express Configuration

5.4.2.2.1 RTL8111GN LAN

Use the **RTL8111GN LAN** menu (**BIOS Menu 21**) to configure the LAN 1 or LAN 2 port.



BIOS Menu 21: RTL8111GN LAN

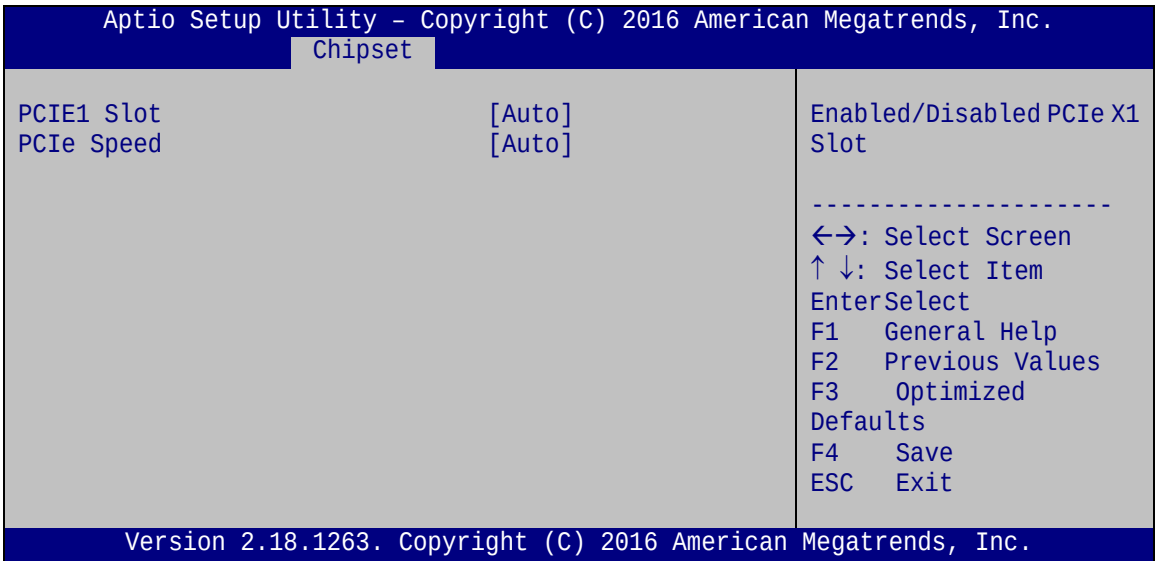
➔ **LAN1/2 Connector [Enable]**

Use the **LAN1/2 Connector** option to enable or disable the LAN port.

➔ **Disable**		Disable the LAN port
➔ **Enable**	**DEFAULT**	Enable the LAN port

5.4.2.2.2 PCIe X1 Slot (PCIE1 Slot)

Use the **PCIe X1 Slot** menu (**BIOS Menu 22**) to configure the PCIe x1 slot (PCIE1).



BIOS Menu 22: PCIe X1 Slot (PCIE1 Slot)

➔ **PCIE1 Slot [Auto]**

Use the **PCIE1 Slot** option to enable or disable the PCIe x1 slot (PCIE1).

➔ **Disable**		Disable PCIe x1 slot.
➔ **Enable**		Enable PCIe x1 slot.
➔ **Auto**	**DEFAULT**	Disable the unused root port automatically for the most optimum power saving.

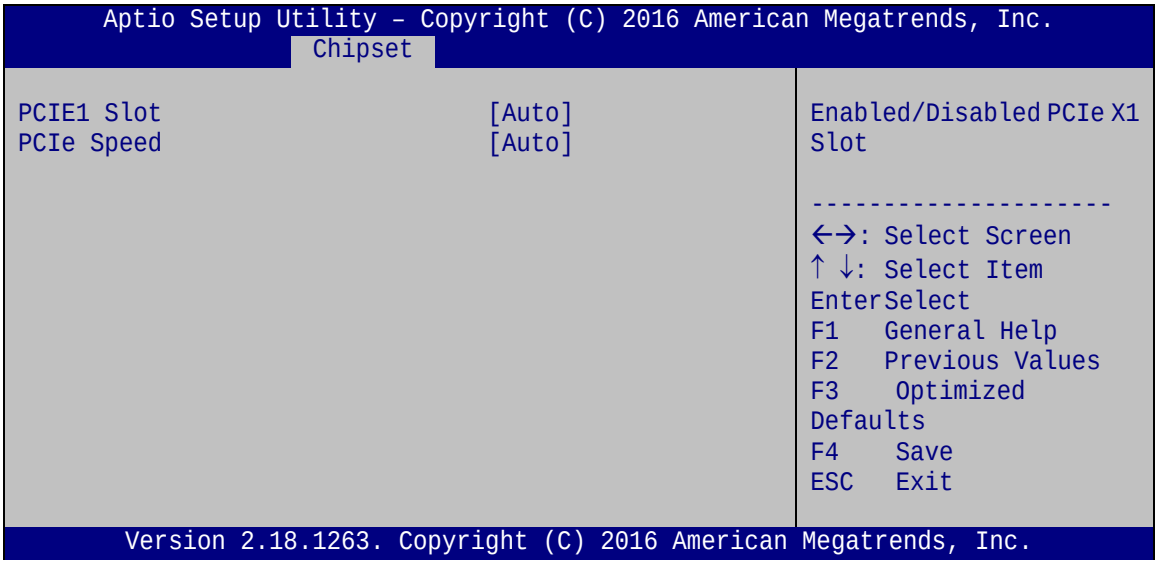
➔ **PCIe Speed [Auto]**

Use the **PCIe Speed** option to configure PCIe x1 slot speed.

➔ **Auto**	**DEFAULT**	Configure PCIe x1 slot speed to auto
➔ **Gen 1**		Configure PCIe x1 slot speed to Gen1
➔ **Gen 2**		Configure PCIe x1 slot speed to Gen2

5.4.2.2.3 Mini-PCIe Slot (MPCIE1 Slot)

Use the **Mini-PCIe Slot** menu (**BIOS Menu 23**) to configure the PCIe Mini slot (MPCIE1).



BIOS Menu 23: Mini-PCIe Slot (MPCIE1 Slot)

➔ **MPCIE1 Slot [Auto]**

Use the **MPCIE1 Slot** option to enable or disable the PCIe Mini slot (MPCIE1).

➔ **Disable**		Disable PCIe Mini slot.
➔ **Enable**		Enable PCIe Mini slot.
➔ **Auto**	**DEFAULT**	Disable the unused root port automatically for the most optimum power saving.

➔ **PCIe Speed [Auto]**

Use the **PCIe Speed** option to configure PCIe Mini slot speed.

➔	**Auto**	**DEFAULT**	Configure PCIe Mini slot speed to auto
➔	**Gen 1**		Configure PCIe Mini slot speed to Gen1
➔	**Gen 2**		Configure PCIe Mini slot speed to Gen2

5.5 Security

Use the **Security** menu (**BIOS Menu 24**) to set system and user passwords.

```
      Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
  Main    Advanced   Chipset   Security    Boot    Save & Exit

Password Description                          Set Administrator
                                              Password
If ONLY the Administrator's password is set,
then this only limits access to Setup and is  ---------------------
only asked for when entering Setup            ←→: Select Screen
If ONLY the User's password is set, then this ↑ ↓: Select Item
is a power on password and must be entered to EnterSelect
boot or enter Setup. In Setup the User will   F1   General Help
have Administrator rights.                    F2   Previous Values
The password length must be:                  F3    Optimized
Minimum length                  3             Defaults
Maximum length                  20            F4    Save
                                              ESC   Exit
Administrator Password
User Password

        Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 24: Security

➔ **Administrator Password**

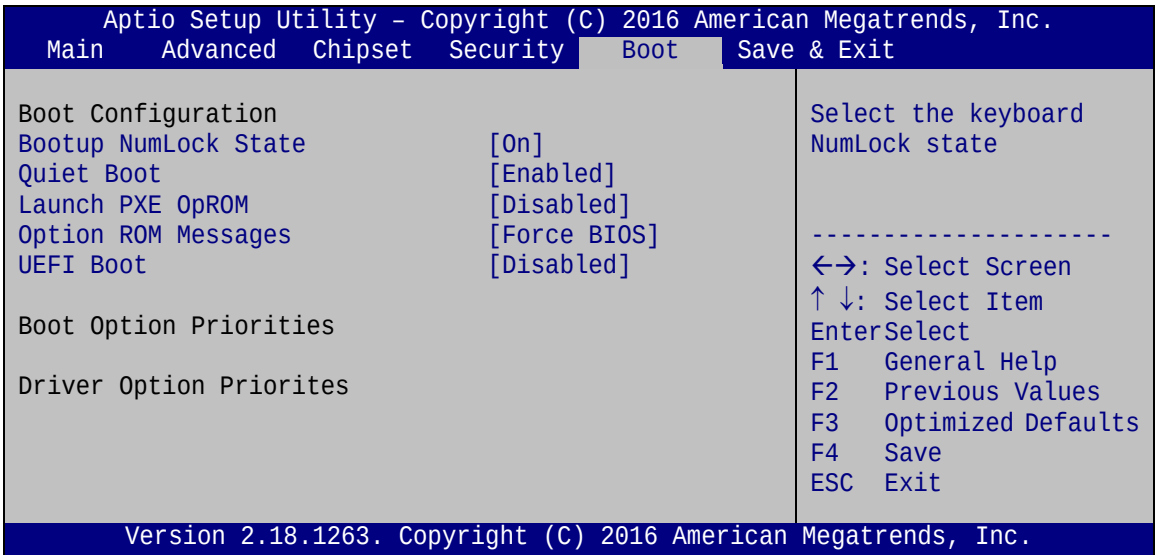
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 25**) to configure system boot options.



BIOS Menu 25: 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.

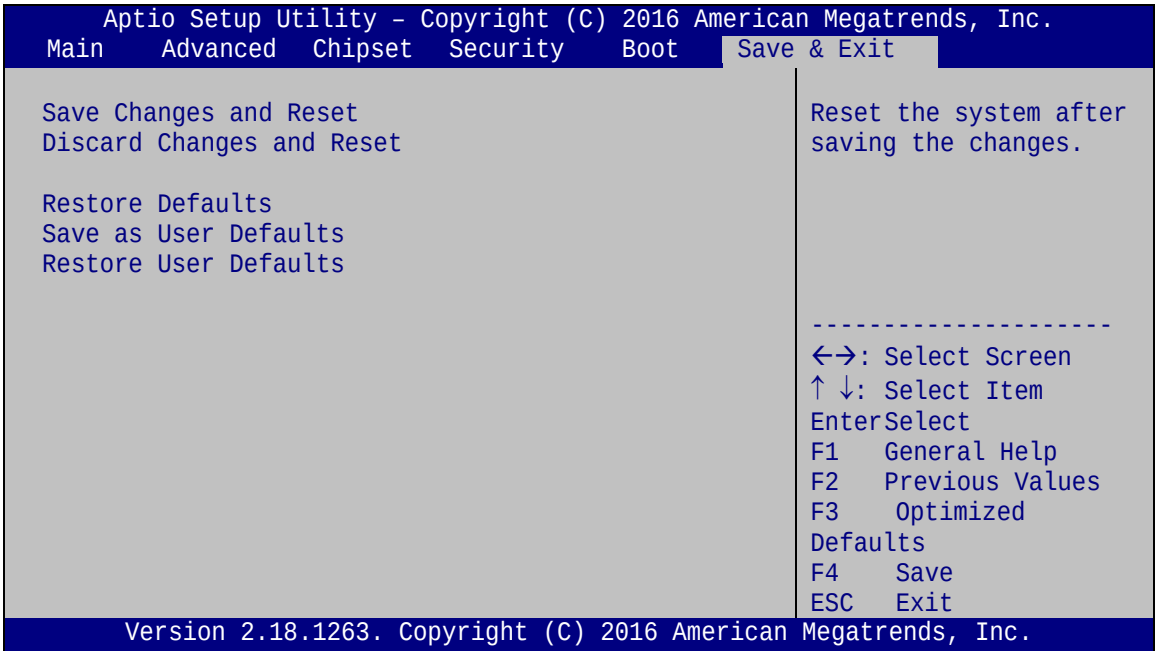
➔	**Enabled**		Boot from UEFI devices is enabled.
➔	**Disabled**	**DEFAULT**	Boot from UEFI devices is disabled.

➔ **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 26**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 26: 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

6.1 Available Drivers

All the drivers for the tKINO-AL are available on IEI Resource Download Center (https://download.ieiworld.com). Type tKINO-AL and press Enter to find all the relevant software, utilities, and documentation.

Figure 6-1: IEI Resource Download Center

IEI provides the following drivers for Windows 7, Windows 8 and Windows 10 operating systems.

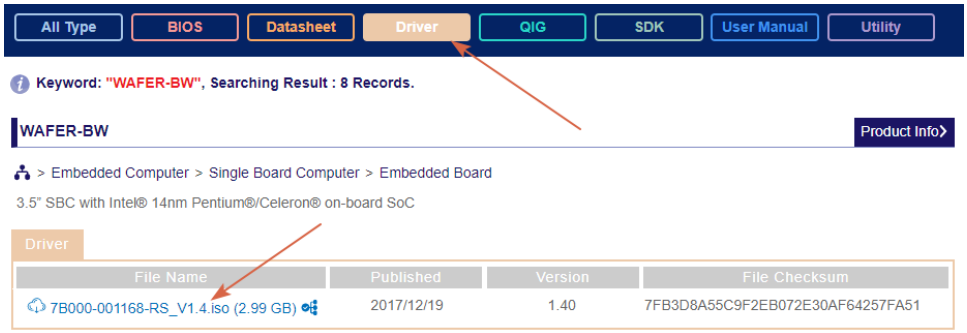
- Chipset
- Graphics
- Audio
- LAN
- Serial I/O
- TXE

6.2 Driver Download

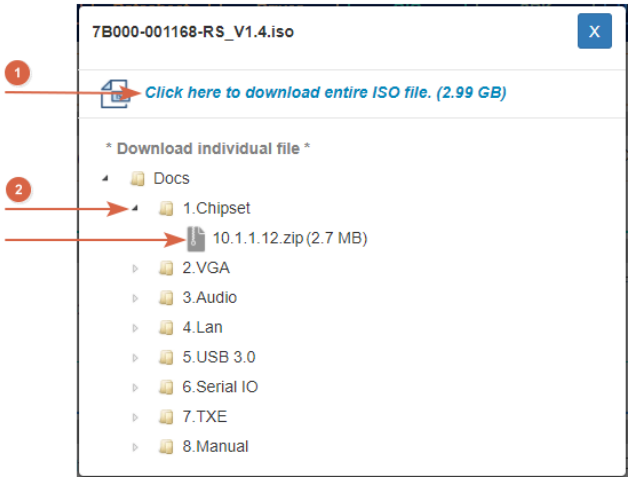
To download drivers from IEI Resource Download Center, follow the steps below.

Step 1: Go to https://download.ieiworld.com. Type tKINO-ALtKINO-ALtKINO-AL and press Enter.

Step 2: All product-related software, utilities, and documentation will be listed. You can choose **Driver** to filter the result.



Step 3: Click the driver file name on the page and you will be prompted with the following window. You can download the entire ISO file (❶), or click the small arrow to find an individual driver and click the file name to download (❷).



NOTE:

To install software from the downloaded ISO image file in Windows 8, 8.1 or 10, double-click the ISO file to mount it as a virtual drive to view its content. On Windows 7 system, an additional tool (such as Virtual CD-ROM Control Panel from Microsoft) is needed to mount the file.

NOTE:

The Intel TXE requires that Microsoft's "Kernel-Mode Driver Framework (KMDF) version 1.11 update for Windows 7" must be installed first on Windows 7 OS. If the KMDF is not installed, either error 37 or error 28 may appear on the Intel TXE device in Device Manager.

Please find the KMDF version 1.11 update for Windows 7 in the TXE driver folder or click the following link to download it.

http://www.microsoft.com/en-us/download/details.aspx?id=38423

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

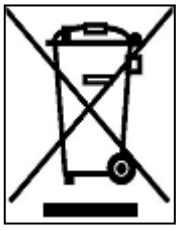
Product Disposal

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

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 tKINO-AL 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。