IEI Integration Corp.

MODEL:

KINO-TGL-U

**Mini-ITX SBC with 11th Gen Intel® Core™ i7/i5/i3 or Celeron®
On-board CPU, HDMI, DP, iDPM, Dual 2.5GbE, USB 3.2 Gen 2,
SATA 6Gb/s, M.2, RS-232/422/485, HD Audio, and RoHS**

User Manual

Rev. 1.00 - July 8, 2022

RoHS Lead Free

Revision

Date	Version	Changes
July 8, 2022	1.00	Initial release

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Manual Conventions

WARNING

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

CAUTION

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

NOTE

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

HOT SURFACE

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

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Introduction

1.1 Introduction

Figure 1-1: KINO-TGL-U

The KINO-TGL-U series is a Mini-ITX form factor single bard computer. It has an on-board 11th generation Intel® Core™ i7/i5/i3 or Celeron® processor, and supports two 260-pin 3200 MHz DDR4 SDRAM SO-DIMM slots with up to 64.0 GB of memory.

The KINO-TGL-U series includes one DP connector, one HDMI connector and one internal iDPM connector for triple independent display.

Expansion and I/O include one PCIe Gen4 x8 expansion slot, one M.2 M-key slot supporting storage, one M.2 A-key slot for wireless LAN and Bluetooth, four USB 3.2 Gen2 connectors on the rear panel, and two SATA 6Gb/s connectors. Serial device connectivity is provided by five RS-232 connectors, and one RS-422/485 connector. Two RJ-45 2.5GbE connectors provide the system with smooth, high-speed connections to an external LAN.

1.2 Model Variations

The model variations of the KINO-TGL-U series are listed below.

Model No.	Processor
KINO-TGL-U-i7-R10	Intel® Core™ i7-1185G7E (up to 4.8 GHz, quad-core, 12 MB cache, TDP=28/15/12 W)
KINO-TGL-U-i5-R10	Intel® Core™ i5-1145G7E (up to 4.4 GHz, quad-core, 8 MB cache, TDP=28/15/12 W)
KINO-TGL-U-i3-R10	Intel® Core™ i3-1115G4E (up to 4.1 GHz, quad-core, 6 MB cache, TDP=28/15/12 W)
KINO-TGL-U-C-R10	Intel® Celeron® 6305E (up to 1.8 GHz, dual-core, 4 MB cache, TDP=15 W)

Table 1-1: KINO-TGL-U Model Variations

1.3 Features

Some of the KINO-TGL-U motherboard features are listed below:

- Mini-ITX motherboard with 11th generation Intel® Core™ i7/i5/i3 or Celeron® processor
- Triple independent display
- Two 3200 MHz DDR4 SO-DIMM slots support up to 64 GB of memory
- Support triple independent displays (HDMI, DP, iDPM)
- Dual Intel® 2.5GbE LAN
- One M.2 M-key slot supporting storage
- One M.2 A-key slot supporting wireless LAN and Bluetooth
- PCIe 4.0 x8 slot (x4 signal)
- Two SATA 6Gb/s connectors with power output
- Four USB 3.2 Gen 2 external connectors
- Five RS-232 connectors and one RS-422/285 connector
- Wide range 9V~36V DC input

1.4 Connectors

The connectors on the KINO-TGL-U are shown in the figure below.

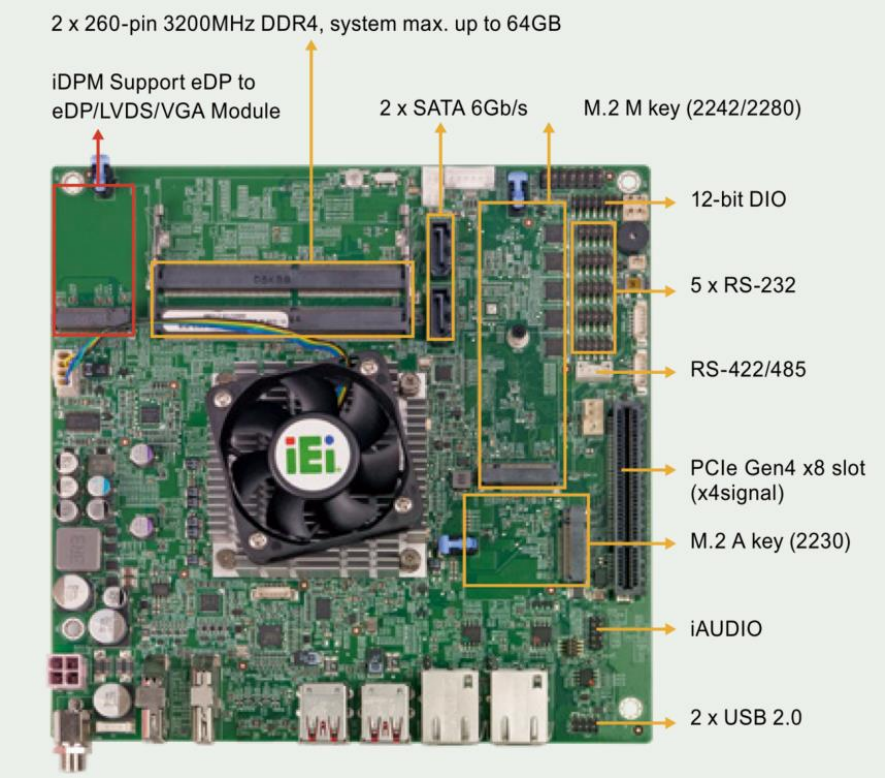


Figure 1-2: Connectors (Front Side)

1.5 Dimensions

Figure 1-3 shows the dimensions of the KINO-TGL-U.

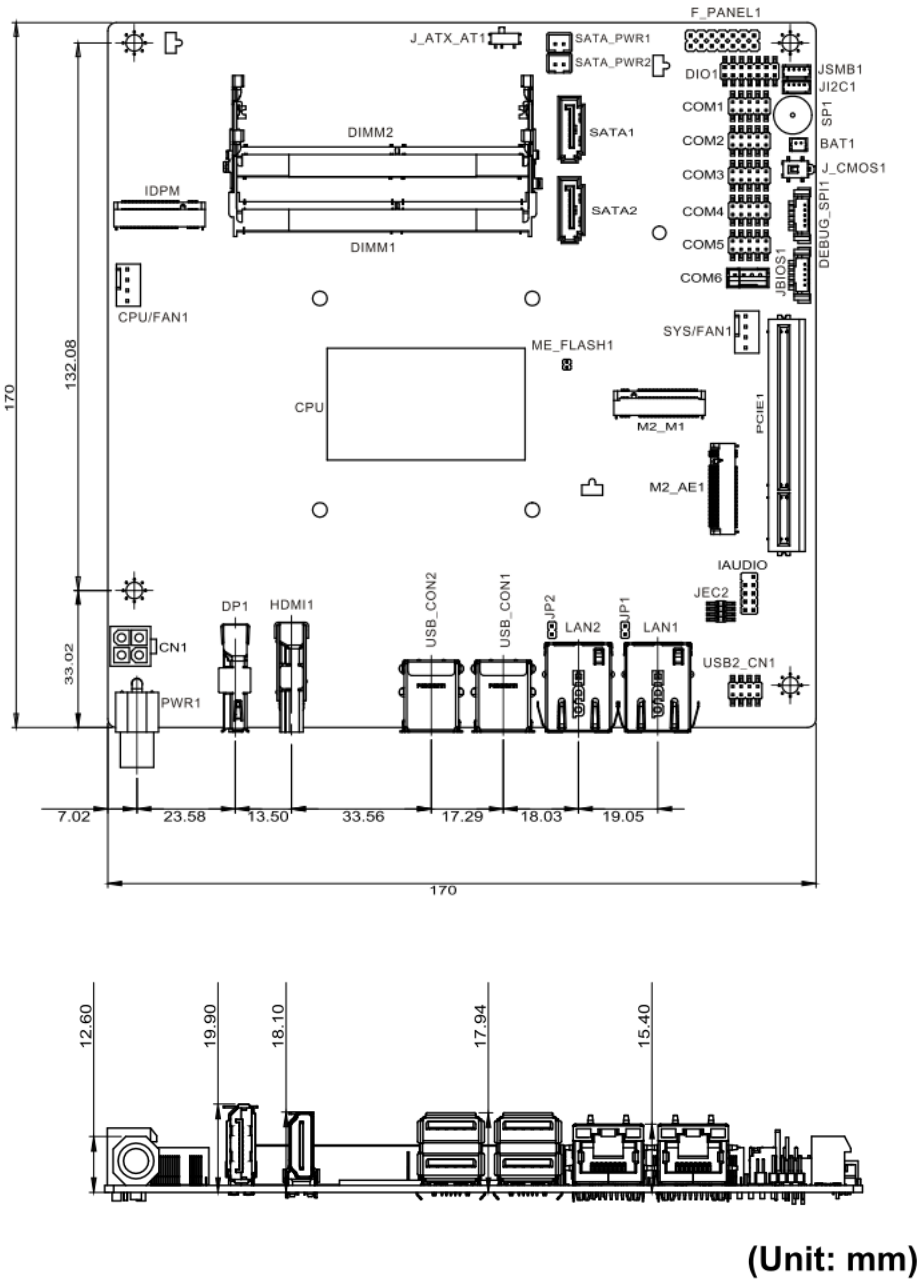


Figure 1-3: Dimensions (mm)

1.6 Data Flow

Figure 1-4 shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

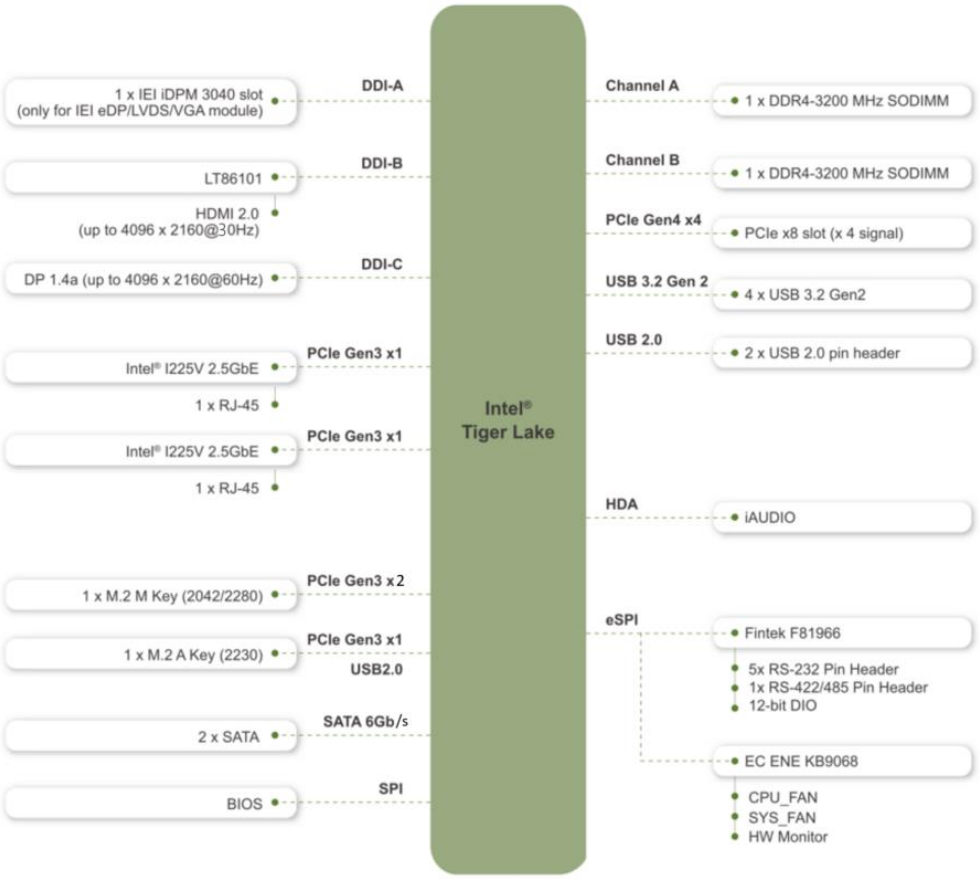


Figure 1-4: Data Flow Diagram

1.7 Technical Specifications

KINO-TGL-U technical specifications are listed below.

Specification	KINO-TGL-U
CPU	11th generation Intel® mobile Tiger Lake-UP3 on-board processor: ▪ Intel® Core™ i7-1185G7E (up to 4.8 GHz, quad-core, 12 MB cache, TDP=28/15/12 W) ▪ Intel® Core™ i5-1145G7E (up to 4.4 GHz, quad-core, 8 MB cache, TDP=28/15/12 W) ▪ Intel® Core™ i3-1115G4E (up to 4.1 GHz, quad-core, 6 MB cache, TDP=28/15/12 W) ▪ Intel® Celeron® 6305E (up to 1.8 GHz, dual-core, 4 MB cache, TDP=15 W)
BIOS	AMI UEFI BIOS
Memory	Two 260-pin 3200 MHz DDR4 SO-DIMM slots (system max. 64 GB)
Graphics	Intel® Gen11 UHD Graphics for Core™ i3-1115G4E and Celeron® 6305E, Intel® Iris® Xe Graphics for i5-1145G7E and i7-1185G7E
Display Output	Triple 4K independent display 1 x DP 1.4a (up to 4096x2160 @ 60 Hz) 1 x IEI iDPM 3040 slot (only for IEI eDP/LVDS/VGA module) 1 x HDMI 2.0b (up to 4096x2160 @ 30 Hz)
Ethernet	LAN1: Intel® I225V 2.5GbE controller LAN2: Intel® I225V 2.5GbE controller
Digital I/O	12-bit digital I/O by 14-pin (2x7) header
Super IO	Fintek F81866D
Embedded Controller	ENE KB9068
Audio	Realtek ALC888S HD codec
Watchdog Timer	Software programmable support 1~255 sec. system reset
I/O Interface	

Specification	KINO-TGL-U
Audio Connector	1 x iAUDIO, support IEI AC-KIT-888S Audio Module (2 x 5 pin)
Ethernet	2 x RJ-45 2.5GbE port
Serial Ports	1 x RS-422/485 by 4-pin (1x4) wafer (RS-485 supports AFC) 5 x RS-232 by 10-pin (2x5) header
USB Ports	4 x USB 3.2 Gen 2 (10Gb/s) Type-A on rear I/O 2 x USB2.0 by 8-pin (2x4) header
Front Panel	1 x Front panel connector by 14-pin (2x7) header (for connecting power LED, HDD LED, power button and reset button)
LAN LED	2 x LAN link LED connector by 2-pin header
Fan	1 x CPU fan connector by 4-pin (1x4) wafer 1 x System fan connector by 4-pin (1x4) wafer
SMBus	1 x SMBus connector by 4-pin (1x4) wafer
I^2C	1 x I^2C connector by 4-pin (1x4) wafer
Storage	2 x SATA 6Gb/s with 5 V SATA power connectors
Expansion	1 x PCIe x8 slot (PCIe 4.0 with x4 signal, open-ended) 1 x M.2 2230 A-key slot (PCIe x1 & USB 2.0) 1 x M.2 2242/2280 M-key slot (PCIe x2)
TPM	Support Intel® PTT(TPM 2.0)
Environmental and Power Specifications	
Power Supply	9 V ~ 36 V DC input (AT/ATX power mode) ErP/EuP compliant
Power Connector	1 x Internal power connector by 4-pin (2x2) connector 1 x External DC power jack (Ø5.5mm)
Power Consumption	9V@9.19A, 12V@7.768A, 28V@3.119A, 36V@2.459A (Intel® Core™ i7-1185G7E CPU with one 8 GB 2933 MHz DDR4 SO-DIMM)
Operating Temperature	0°C ~ 60°C
Storage Temperature	-30°C ~ 70°C
Humidity	5% ~ 95%, non-condensing

Specification	KINO-TGL-U
Safety	CE, FCC
Physical Specifications	
Dimensions	170 mm x 170 mm
Weight GW/NW	900 g / 400 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 KINO-TGL-U 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:

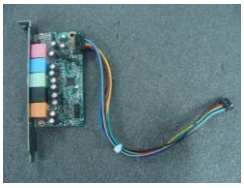
If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the KINO-TGL-U was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The KINO-TGL-U is shipped with the following components:

Quantity	Item and Part Number	Image
1	KINO-TGL-U single board computer	
1	SATA with power cable kit	
1	Quick Installation Guide	
1	I/O shielding	

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
RS-232 cable, 200 mm, p=2.0 mm (**P/N**: 32205-002700-200-RS)	
SATA power cable, MOLEX 8981-4M to SATA15P, 150mm (**P/N**: 32102-000100-200-RS)	
Dual-port USB cable, 210mm, p=2.0 (**P/N**: 32001-008600-200-RS)	
Realtek ALC888S 7.1 Channel HD Audio peripheral board, RoHS (**P/N**:AC-KIT-888S-R10)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 KINO-TGL-U Layout

The figures below show all the connectors and jumpers.

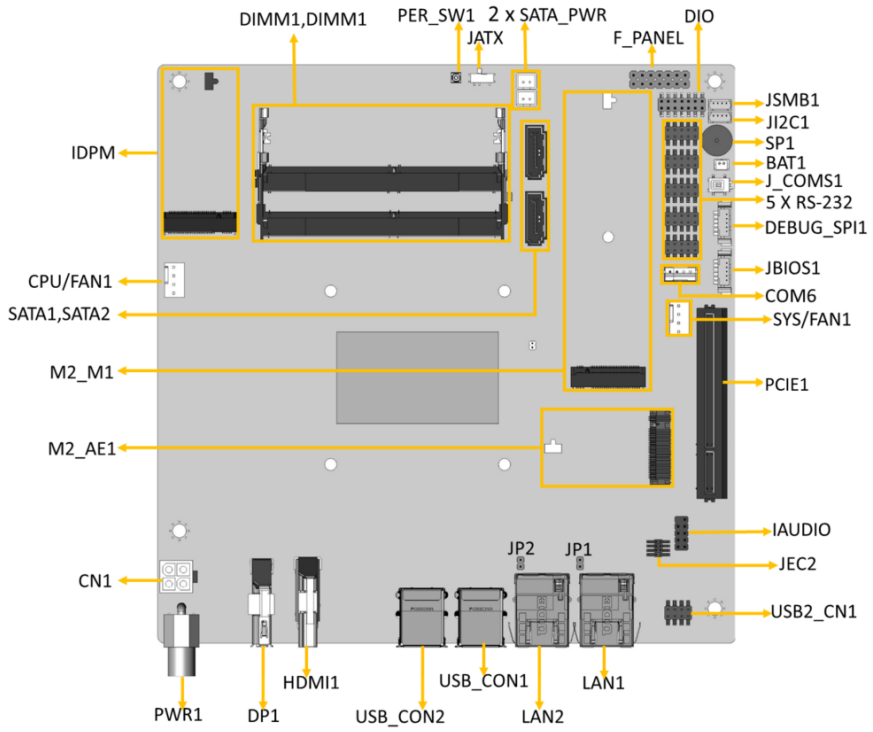


Figure 3-1: Connector and Jumper Locations

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Audio connector	10-pin header	IAUDIO
Battery connector	2-pin wafer	BAT1
DC-IN power connector	4-pin Molex	CN1
Digital I/O connector	14-pin header	DIO1
iDPM slot	IDPM 3040	IDPM
Fan connector, CPU	4-pin wafer	CPU/FAN1
Fan connector, system	4-pin wafer	SYS/FAN1
Front panel connector	14-pin header	F_PANEL1
I^2C connector	4-pin wafer	JI2C1
LAN LED connectors	2-pin header	JP1, JP2
Memory slots	260-pin DDR4 SO-DIMM	DIMM1, DIMM2
PCIe x8 slot (x4 signal)	PCIe x8 slot	PCIE1
M.2 A-key slot	M.2 A-key 2230	M2_AE1
M.2 M-key slot	M.2 M-key 2242/2280	M2_M1
Power button (on board)	Push button	PWR_SW1
RS-232 serial port connectors	10-pin header	COM1, COM2, COM3, COM4, COM5
RS-422/485 serial port connector	4-pin wafer	COM6
SATA 6Gb/s drive connectors	7-pin SATA connector	SATA1, SATA2

SATA power connectors	2-pin wafer	SATA_PWR1, SATA_PWR2
SMBus connector	4-pin wafer	JSMB1
SPI flash connector, BIOS	6-pin wafer	JBIOS1
Flash EC ROM connector	8-pin wafer	JEC2
EC debug connector	6-pin FPC	DEBUG_SPI1
USB2.0 connectors	8-pin header	USB2_CN1

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
DP connector	DP	DP1
HDMI connector	HDMI	HDMI1
LAN connectors	RJ-45	LAN1, LAN2
Power input connector	Power jack	PWR1
USB 3.2 Gen 2 connectors	USB 3.2 Gen 2 Type-A	USB_CON1,USB_CON2

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the KINO-TGL-U.

3.2.1 Audio Connector

CN Label: **IAUDIO**

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

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

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

The audio connector is connected to IEI AC-KIT-888S Audio Module including speakers and microphones for the input and output of audio signals to and from the system.

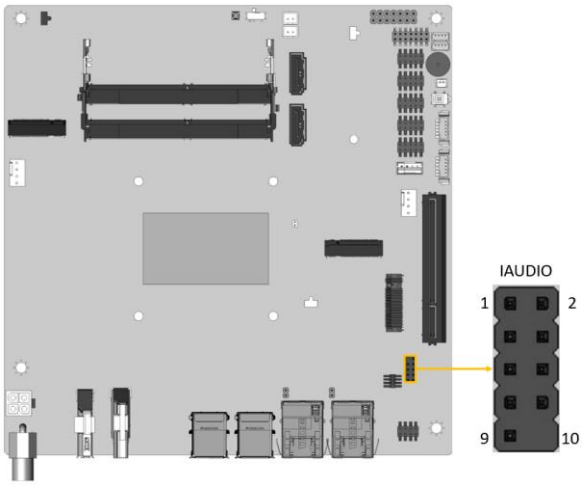


Figure 3-2: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HDA_SYNC	2	HDA_BIT_CLK
3	HDA_SDOUT	4	HDA_SPKR
5	HDA_SDIN	6	HDA_RST#
7	HDA_VCC	8	HDA_GND
9	HDA_+12V	10	HDA_GND

Table 3-3: Audio Connector Pinouts

3.2.2 Battery Connector

CAUTION:

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

Dispose of used batteries according to instructions and local regulations.

CN Label:	**BAT1**
CN Type:	2-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-3**
CN Pinouts:	See **Table 3-4**

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. **NOTE:** It is recommended to attach the RTC battery onto the system chassis in which the KINO-TGL-U is installed.

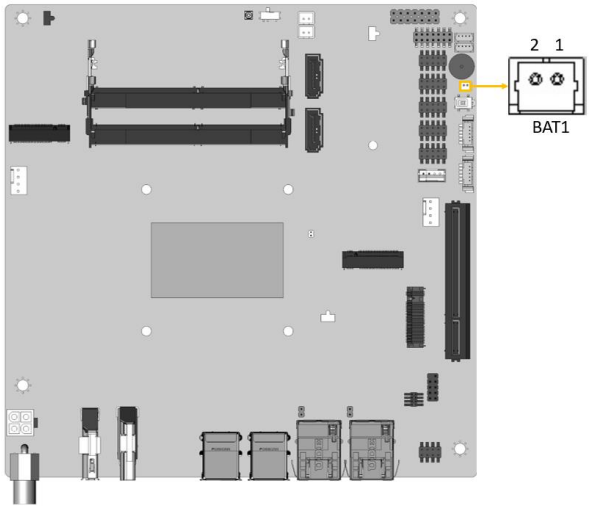


Figure 3-3: Battery Connector Location

Pin	Description
1	VBAT+
2	GND

Table 3-4: Battery Connector Pinouts

3.2.3 DC-IN Power Connector

CN Label: **CN1**

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

CN Location: See **Figure 3-4**

CN Pinouts: See **Table 3-5**

The connector supports 9 V ~ 36 V power supply.

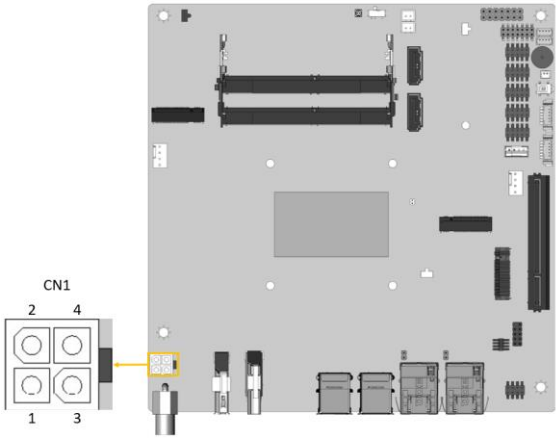


Figure 3-4: DC-IN Power Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	VIN	4	VIN

Table 3-5: DC-IN Power Connector Pinouts

3.2.4 Digital I/O Connector

CN Label: **DIO1**

CN Type: 14-pin header, p=2.00 mm

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

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

The 12-bit digital I/O connector provides programmable input and output for external devices.

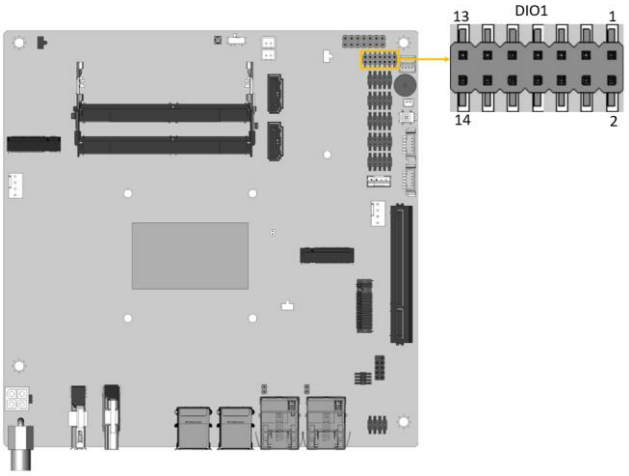


Figure 3-5: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+5V
3	Output 5	4	Output 4
5	Output 3	6	Output 2
7	Output 1	8	Output 0
9	Input 5	10	Input 4
11	Input 3	12	Input 2
13	Input 1	14	Input 0

Table 3-6: Digital I/O Connector Pinouts

3.2.5 iDPM Slot

CN Label:	**IDPM**
CN Type:	IDPM 3040
CN Location:	See **Figure 3-6**
CN Pinouts:	See **Table 3-7**

The IDPM connector supports IEI eDP/LVDS/VGA module.

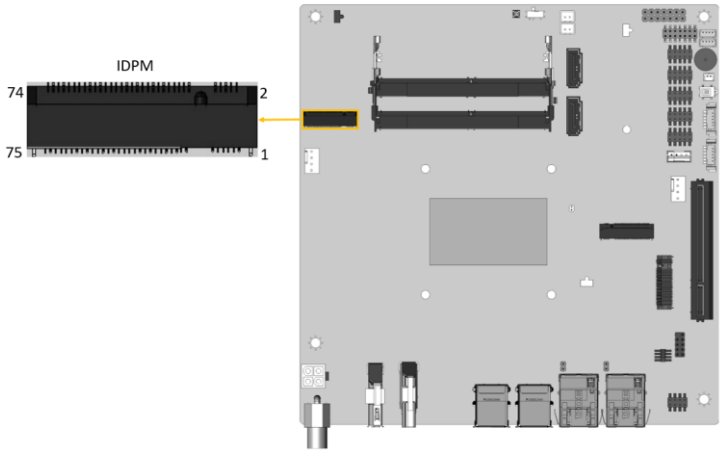


Figure 3-6: iDPM Connector Location

IDPM: IEI IDPM Slot (for IEI eDP/LVDS/VGA Module)			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+3.3V
3	GND	4	+3.3V
5	GND	6	+3.3V
7	GND	8	+3.3V
9	GND	10	+3.3V
11	+5V	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	Module Key
17	Module Key	18	Module Key
19	Module Key	20	+3.3VS
21	DISPLAY_DETECT_PIN 21	22	+3.3VS
23	DISPLAY_DETECT_PIN 23	24	+3.3VS
25	GND	26	+3.3VS
27	GND	28	GND
29	EDP_TX3_DN	30	+12VS
31	EDP_TX3_DP	32	+12VS
33	GND	34	+12VS
35	EDP_TX2_DN	36	+12VS
37	EDP_TX2_DP	38	GND
39	GND	40	SMB_CLK
41	EDP_TX1_DN	42	SMB_DATA
43	EDP_TX1_DP	44	GND
45	GND	46	EC_BKLT_CTRL
47	EDP_TX0_DN	48	EDP1_BKLT_CTRL
49	EDP_TX0_DP	50	EDP1_BKLT_EN
51	GND	52	EDP1_VDD_EN #
53	EDP_AUX_DN	54	EDP_HPD_R
55	EDP_AUX_DP	56	BUF_PLT_RST#
57	GND	58	LVDS_EN
59	GND	60	+V5S

61	GND	62	+V5S
63	GND	64	+V5S
65	GND	66	+V5S
67	GND	68	+12VA
69	GND	70	+12VA
71	GND	72	+12VA
73	GND	74	+12VA
75	GND		

Table 3-7: IDPM Connector Pinouts

3.2.6 Fan Connector, CPU

CN Label: **CPU/FAN1**

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

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

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

The CPU fan connector attaches to a CPU cooling fan.

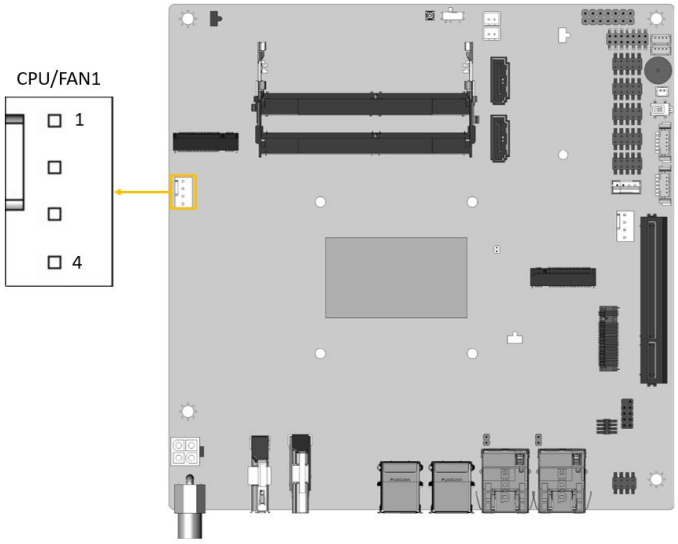


Figure 3-7: CPU Fan Connector Location

Pin	Description
1	GND
2	+12V
3	Rotation Signal
4	PWM

Table 3-8: CPU Fan Connector Pinouts

3.2.7 Fan Connector, System

CN Label: **SYS/FAN1**

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

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

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

The system fan connector attaches to a system cooling fan.

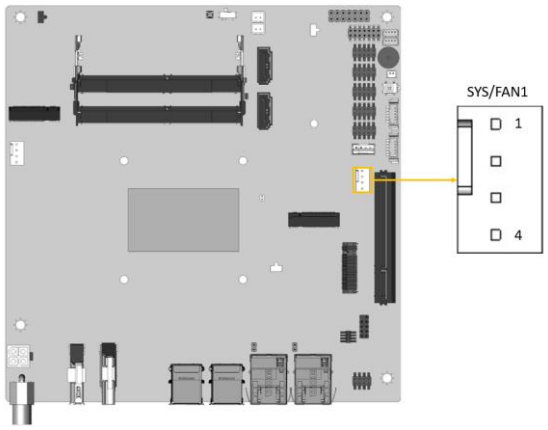


Figure 3-8: System Fan Connector Location

Pin	Description
1	GND
2	+12V
3	Rotation Signal
4	PWM

Table 3-9: System Fan Connector Pinouts

3.2.8 Front Panel Connector

CN Label: **F_PANEL1**

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

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

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

The front panel connector connects to the power button, reset button, speaker, power LED indicator and HDD LED indicator on the system front panel.

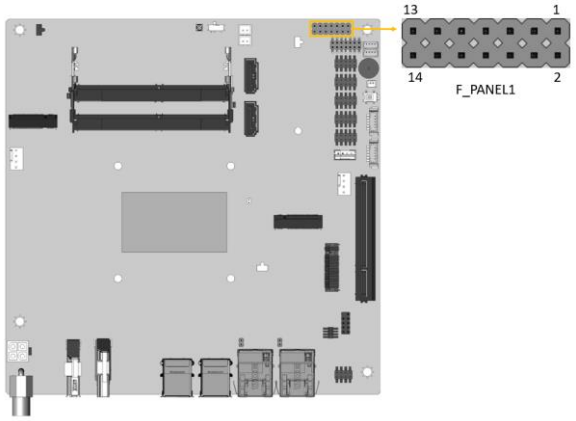


Figure 3-9: Front Panel Connector Location

Function	Pin	Description	Function	Pin	Description
Power LED	1	PWR_LED+	**Speaker**	2	BEEP_PWR
	3	NC		4	NC
	5	PWR_LED-		6	NC
Power Button	7	PWR_BTN+		8	PC_BEEP
	9	PWR_BTN-		10	NC
HDD LED	11	HDD_LED+	**Reset Button**	12	Reset+
	13	HDD_LED-		14	Reset-

Table 3-10: Front Panel Connector Pinouts

3.2.9 I²C Connector

CN Label: **JI2C1**

CN Type: 4-pin wafer, p=1.25 mm

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

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

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

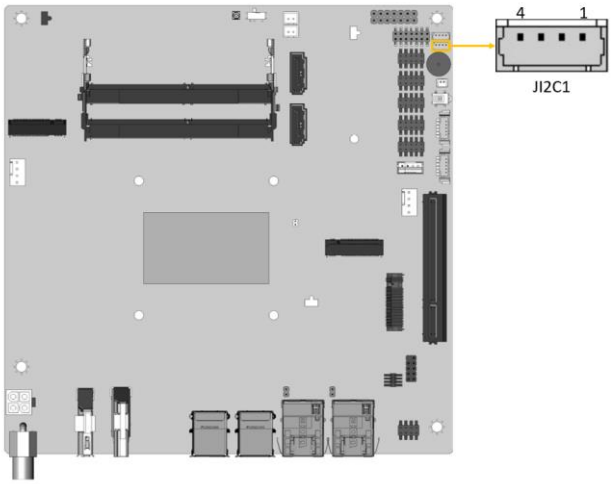


Figure 3-10: I²C Connector Location

Pin	Description
1	GND
2	I2C_DATA
3	I2C_CLK
4	+5V

Table 3-11: I²C Connector Pinouts

3.2.10 LAN LED Connectors

CN Label: **JP1, JP2**

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

CN Location: See **Figure 3-11**

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

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

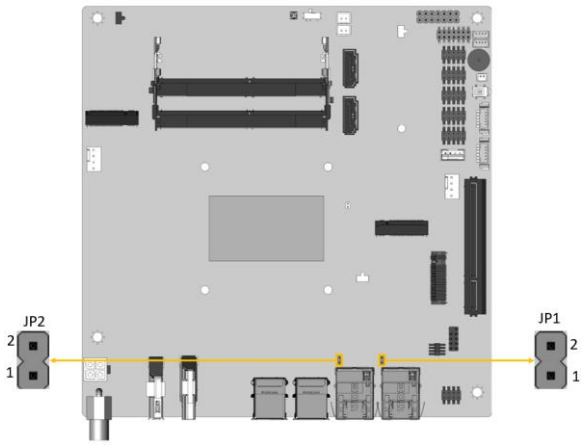


Figure 3-11: LAN LED Connector Locations

Pin	Description
1	+3.3VLAN
2	LAN_LED_LINK#_ACT

Table 3-12: LAN LED Connector Pinouts

3.2.11 Memory Slots

CN Label: **DIMM1, DIMM2**

CN Type: 260-pin DDR4 SO-DIMM slot

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

The memory slots accept DDR4 SO-DIMM.

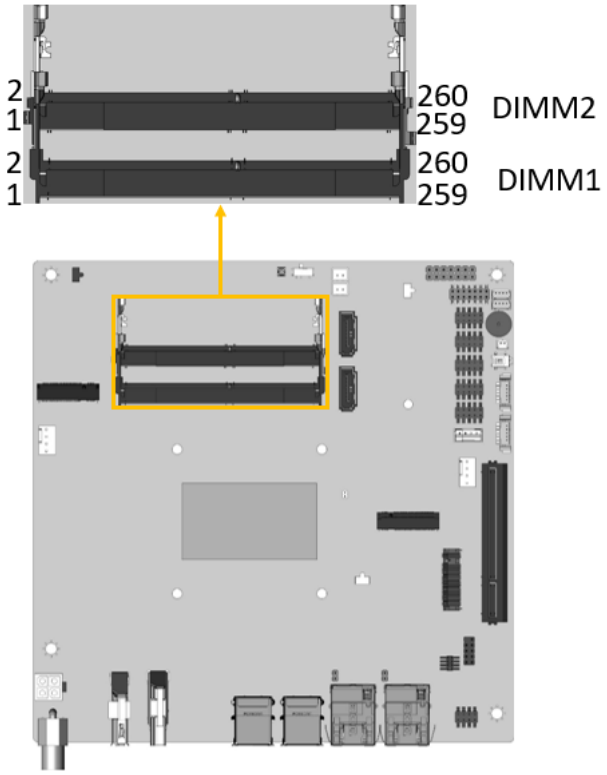


Figure 3-12: Memory Slot Locations

CAUTION:

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

3.2.12 PCI Express x8 Slot

CN Label: **PCIE1**

CN Type: PCIe x8 slot

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

The PCIe x8 expansion card slot supports PCIe x4 expansion cards.

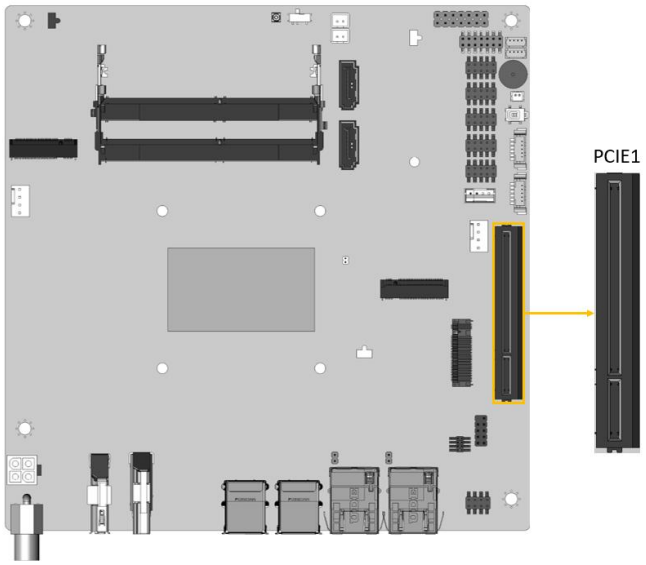


Figure 3-13: PCIe x8 Slot Location

3.2.13 M.2 A-key Slot

CN Label: **M2_AE1**

CN Type: M.2 A-key 2230

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

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

The M.2 slot is keyed in the AE position and accepts 2230 size of M.2 modules. The M.2 slot supports USB 2.0 and PCIe x1 interfaces only.

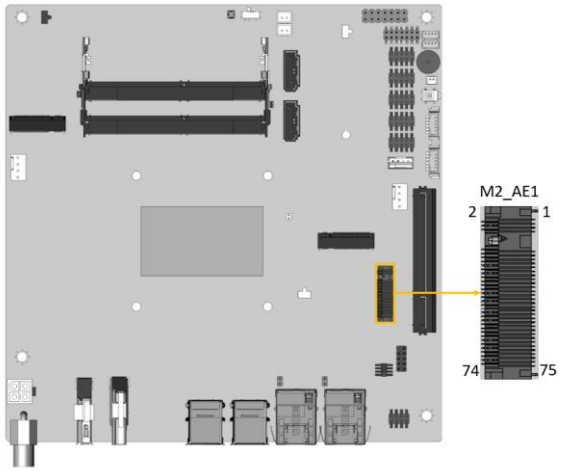


Figure 3-14: M.2 A-key Slot Location

Pin	Description	Pin	Description
1	GND	2	+3.3V
3	USB+	4	+3.3V
5	USB-	6	NC
7	GND	8	Module Key
9	Module Key	10	Module Key
11	Module Key	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	NC
17	NC	18	GND

Pin	Description	Pin	Description
19	NC	20	NC
21	NC	22	NC
23	GND	24	GND
25	NC	26	NC
27	NC	28	NC
29	GND	30	GND
31	NC	32	NC
33	GND	34	NC
35	PCIE_TX+	36	GND
37	PCIE_TX-	38	CL_RST#
39	GND	40	CL_DATA
41	PCIE_RX+	42	CL_CLK
43	PCIE_RX-	44	NC
45	GND	46	NC
47	PCIE_CLK+	48	NC
49	PCIE_CLK-	50	NC
51	GND	52	BUF_PLT_RST#
53	NC	54	Pull up +3.3V
55	NC	56	Pull up +3.3V
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	+3.3V
73	NC	74	+3.3V
75	GND		

Table 3-13: M.2 A-key Slot Pinouts

3.2.14 M.2 M-key Slot

CN Label: **M2_M1**

CN Type: M.2 M-key 2242/2280

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

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

The M.2 slot is keyed in the M position and provides two positions for the mounting screw, accepting 2242 and 2280 sizes of M.2 modules. The M.2 slot supports PCIe x2 interfaces only.

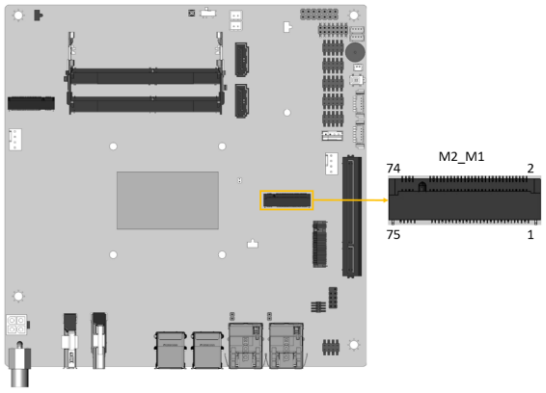


Figure 3-15: M.2 M-key Slot Location

Pin	Description	Pin	Description
1	GND	2	+3.3V
3	GND	4	+3.3V
5	NC	6	NC
7	NC	8	NC
9	GND	10	+3.3V
11	NC	12	+3.3V
13	NC	14	+3.3V
15	GND	16	+3.3V
17	NC	18	+3.3V
19	NC	20	NC

Pin	Description	Pin	Description
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	PCIE_RXN1	30	NC
31	PCIE_RXP1	32	NC
33	GND	34	NC
35	PCIE_TXN1	36	NC
37	PCIE_TXP1	38	DEVSLP
39	GND	40	NC
41	PCIE_RXN0	42	NC
43	PCIE_RXP0	44	NC
45	GND	46	NC
47	PCIE_TXN0	48	NC
49	PCIE_TXP0	50	PERST#
51	GND	52	CLKREQ
53	REFCLKN	54	PEWAKE
55	REFCLKP	56	NC
57	GND	58	NC
59	Module Key	60	Module Key
61	Module Key	62	Module Key
63	Module Key	64	Module Key
65	Module Key	66	Module Key
67	NC	68	NC
69	PEDET	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

Table 3-14: M.2 M-key Slot Pinouts

3.2.15 Power Button

CN Label: **PWR_SW1**

CN Type: Push button

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

The on-board power button controls system power.

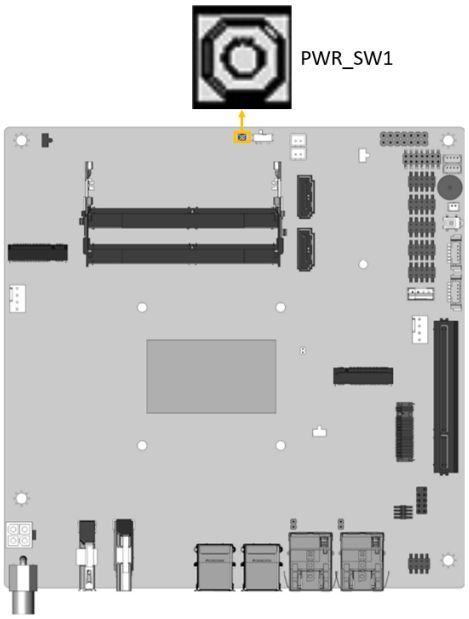


Figure 3-16: Power Button Location

3.2.16 RS-232 Serial Port Connectors

CN Label:	**COM1, COM2, COM3, COM4,COM5**
CN Type:	10-pin header, p=2.00 mm
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-15**

The serial connector provides RS-232 connection.

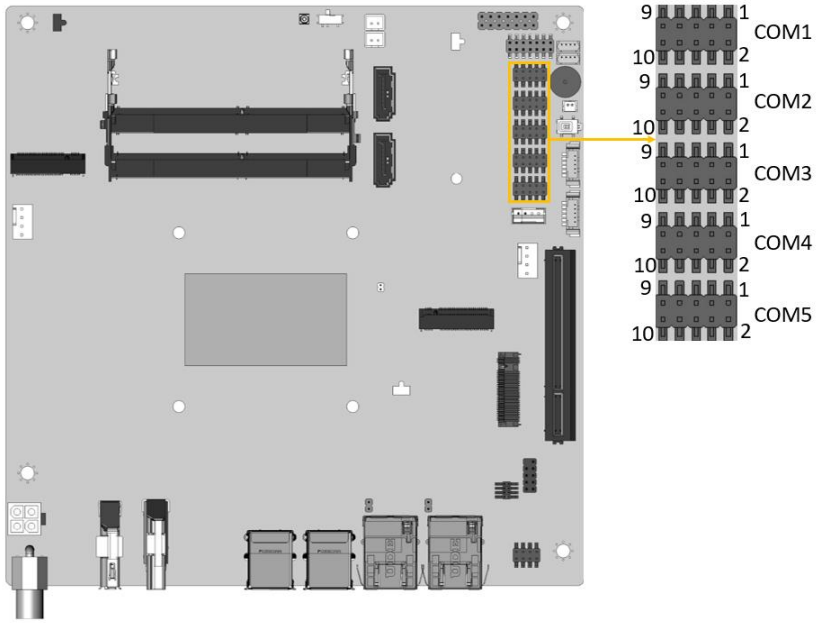


Figure 3-17: RS-232 Serial Port Connector Locations

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

Table 3-15: RS-232 Serial Port Connector Pinouts

3.2.17 RS-422/485 Serial Port Connector

CN Label:	**COM6**
CN Type:	4-pin header, p=2.00 mm
CN Location:	See **Figure 3-18**
CN Pinouts:	See **Table 3-16**

NOTE:

These pins are shared with those on the main serial port. Use either the pins on the main connector, or on this connector, but not both.

This connector provides RS-422 or RS-485 communications.

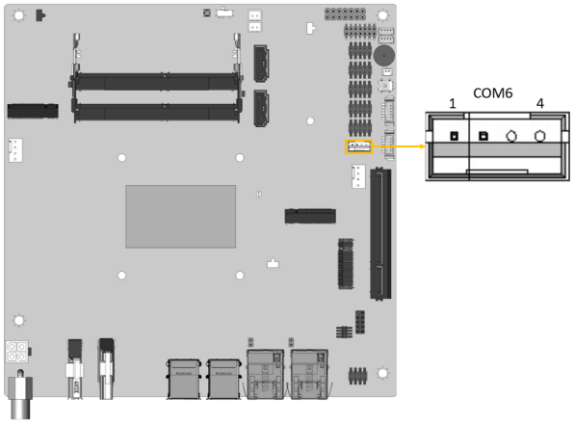


Figure 3-18: Serial Port Connector Location

Pin	Description
1	RXD-
2	RXD+
3	TXD+/DATA+
4	TXD-/DATA-

Table 3-16: Serial Port Connector Pinouts

3.2.18 SATA 6Gb/s Drive Connectors

CN Label:	**SATA1, SATA2**
CN Type:	7-pin SATA connector
CN Location:	See **Figure 3-19**

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

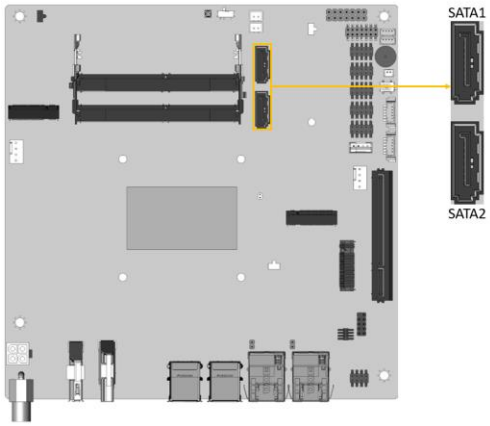


Figure 3-19: SATA 6Gb/s Drive Connectors Locations

3.2.19 SATA Power Connectors

CN Label:	**SATA_PWR1, SATA_PWR2**
CN Type:	2-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-20**
CN Pinouts:	See **Table 3-17**

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

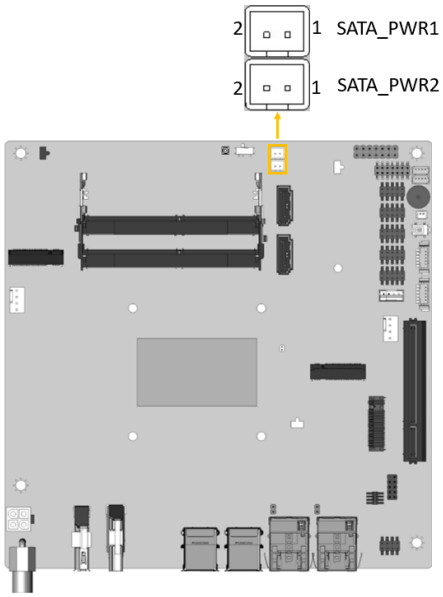


Figure 3-20: SATA Power Connector Locations

Pin	Description
1	+5V
2	GND

Table 3-17: SATA Power Connector Pinouts

3.2.20 JSMBus Connector

CN Label: **JSMB1**

CN Type: 4-pin wafer, p=1.25 mm

CN Location: See **Figure 3-21**

CN Pinouts: See **Table 3-18**

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

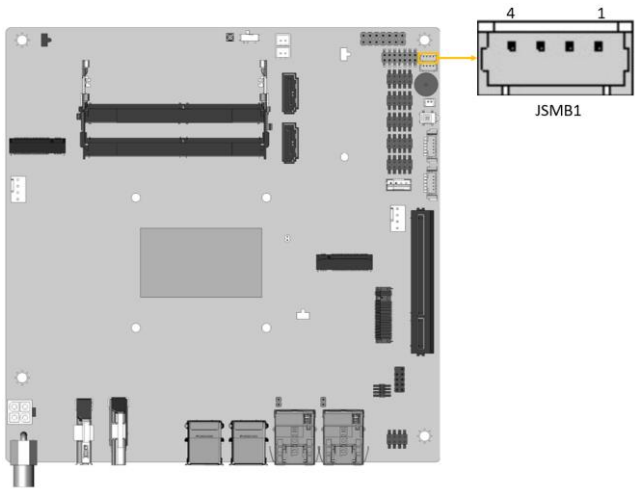


Figure 3-21: SMBus Connector Location

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

Table 3-18: SMBus Connector Pinouts

3.2.21 SPI Flash Connector, BIOS

CN Label: **JBIOS1**

CN Type: 6-pin wafer, p=1.25 mm

CN Location: See **Figure 3-22**

CN Pinouts: See **Table 3-19**

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

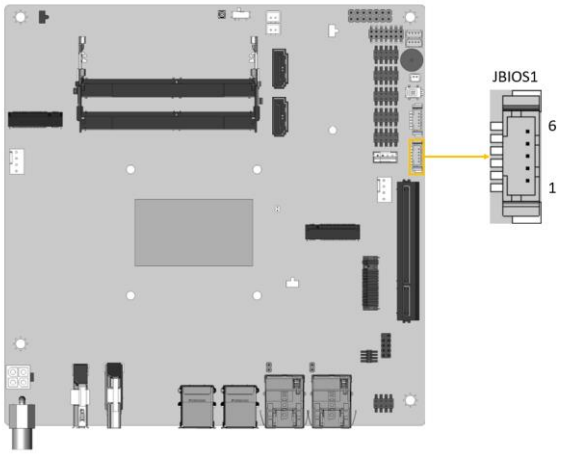


Figure 3-22: SPI Flash Connector Location

Pin	Description
1	+3.3VA
2	SPI_CS#
3	SPI_SO
4	SPI_CLK
5	SPI_SI
6	GND

Table 3-19: SPI Flash Connector Pinouts

3.2.22 Flash EC ROM Connector

CN Label: **JEC2**

CN Type: 8-pin wafer, p=1.27 mm

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

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

The Flash EC ROM connector is used to flash the EC ROM.

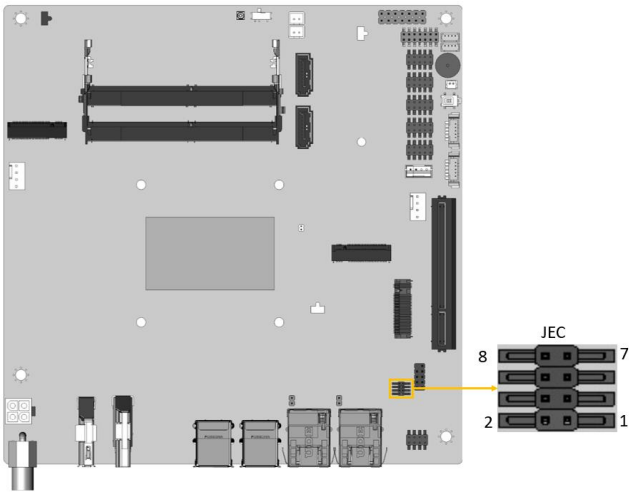


Figure 3-23: SPI Flash Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	SPI_CS#	2	+3.3V
3	SPI_SO	4	NC
5	EC_DET_FLASH	6	SPI_CLK
7	GND	8	SPI_SI

Table 3-20: SPI Flash Connector Pinouts

3.2.23 EC Debug Connector

CN Label: **DEBUG_SPI1**

CN Type: 6-pin wafer, p=1.25 mm

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

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

The DEBUG_SPI1 connector is used for EC debug (with SPI protocol).

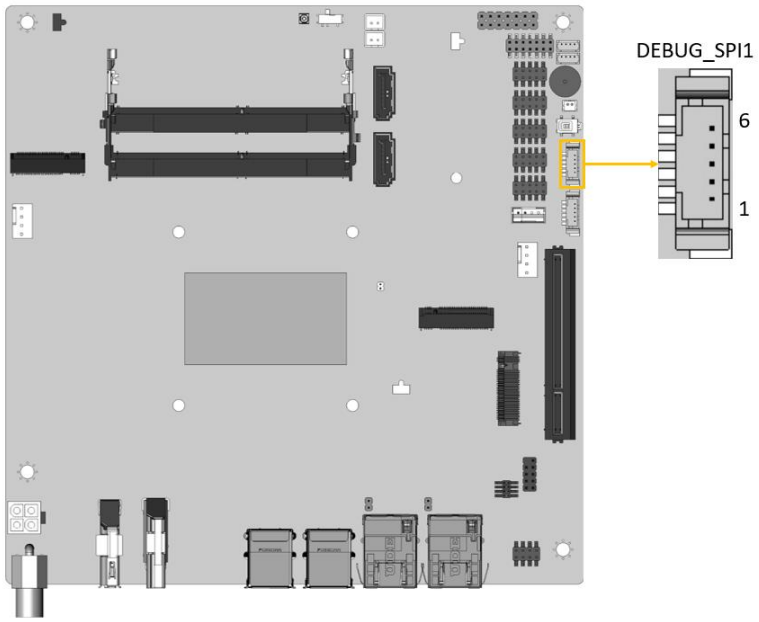


Figure 3-24: EC debug Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	2	EDICS
3	EDIDO	4	EDICLK
5	EDIDI	6	GND

Table 3-21: Debug Connector Pinouts

3.2.24 Internal USB 2.0 Connector

CN Label: **USB2_CN1**

CN Type: 8-pin header, p=2.54 mm

CN Location: See **Figure 3-25**

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

The Internal USB 2.0 connectors connect to USB 2.0 devices. Each pin header provides two USB 2.0 ports.

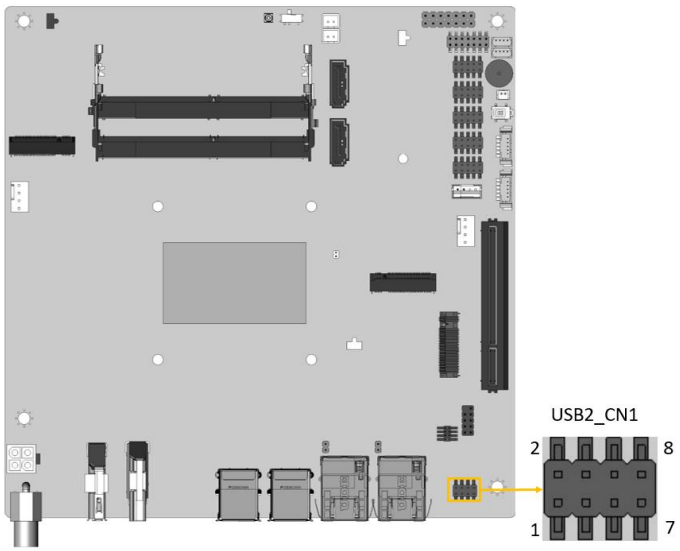


Figure 3-25: Internal USB 2.0 Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	USB_DATA-	4	USB_DATA+
5	USB_DATA+	6	USB_DATA-
7	GND	8	VCC

Table 3-22: Internal USB 2.0 Connector

3.3 External Peripheral Interface Connector Panel

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

- 2 x 2.5GbE connector
- 1 x HDMI connector
- 1 x DP connector
- 1 x Power input jack
- 4 x USB 3.2 Gen 2 connector

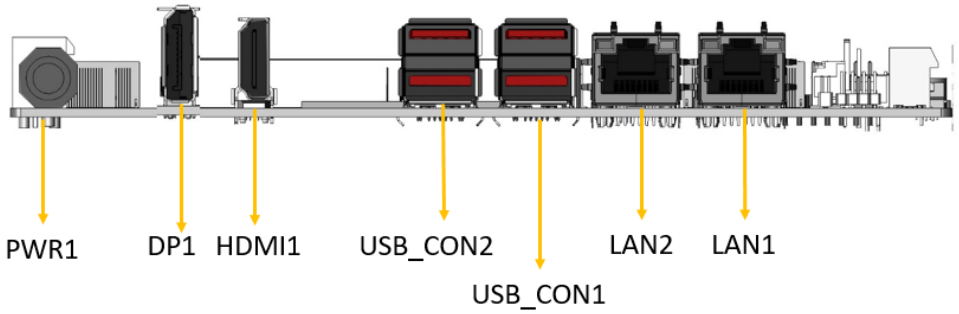


Figure 3-26: External Peripheral Interface Connector

3.3.1 DP Connector

CN Label: **DP1**

CN Type: DP connector

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

CN Pinouts: See **Table 3-23** and **Figure 3-27**

The DP connector can connect to display devices with DisplayPort interface.

Pin	Description	Pin	Description
1	LANE0P	11	GND
2	GND	12	LANE3N
3	LANE0N	13	AUX_CTRL_DET_C
4	LANE1P	14	GND

Pin	Description	Pin	Description
5	LANE1N	15	AUXP
6	GND	16	GND
7	LANE2P	17	AUXN
8	GND	18	HPD
9	LANE2N	19	GND
10	LANE3P	20	+5V

Table 3-23: DP Connector Pinouts

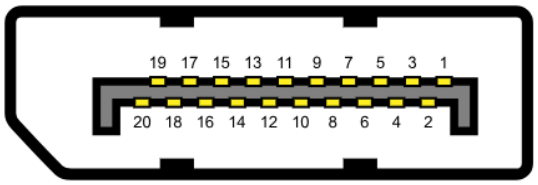


Figure 3-27: DP Connector Pinout Locations

3.3.2 HDMI Connector

CN Label: **HDMI1**

CN Type: HDMI connector

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

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

The HDMI connector can connect to HDMI devices.

Pin	Description	Pin	Description
1	HDMI_DATA2	2	GND
3	HDMI_DATA2#	4	HDMI_DATA1
5	GND	6	HDMI_DATA1#
7	HDMI_DATA0	8	GND
9	HDMI_DATA0#	10	HDMI_CLK
11	GND	12	HDMI_ CLK#

Pin	Description	Pin	Description
13	N/C	14	N/C
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	+5V
19	HDMI_HPD	20	HDMI_GND
21	HDMI_GND	22	HDMI_GND
23	HDMI_GND		

Table 3-24: HDMI Connector Pinouts

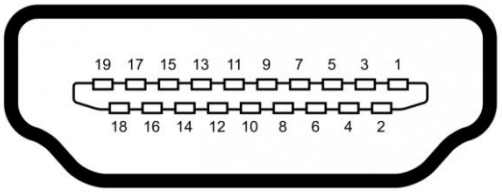


Figure 3-28: HDMI Connector Pinout Locations

3.3.3 LAN Connectors

CN Label: **LAN1, LAN2**

CN Type: RJ-45

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

CN Pinouts: See **Table 3-25** and **Figure 3-29**

The 2.5GbE LAN connector connects to a local network.

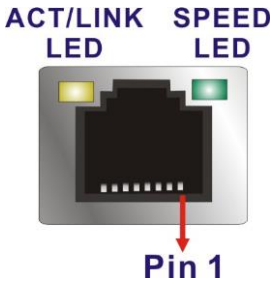


Figure 3-29: 2.5GbE LAN Connector

Pin	Description	Pin	Description
1	MDIA3-	5	MDIA2+
2	MDIA3+	6	MDIA2-
3	MDIA2-	7	MDIA0-
4	MDIA1-	8	MDIA0+

Table 3-25: 2.5GbE LAN Pinouts

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 100 Mb/s green: 2.5 Gb/s orange: 1 Gb/s

Table 3-26: Connector LEDs

3.3.4 Power Connector (Power Adapter)

CN Label: **PWR1**

CN Type: DC jack

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

The connector supports 9 V ~ 36 V power adapter.

Figure 3-30: Power Jack

3.3.5 USB 3.2 Gen 2 Connectors

CN Label: **USB_CON1, USB_CON2**

CN Type: USB 3.2 Gen 2 Type-A

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

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

The KINO-TGL-U has four external USB 3.2 Gen 2 ports. The USB connector can be connected to a USB 2.0 or USB 3.2 device. The pinouts of USB 3.2 Gen 2 connectors are shown below.

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

Table 3-27: USB 3.2 Gen 2 Port Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the KINO-TGL-U. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the KINO-TGL-U 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 KINO-TGL-U, place it on an anti-static pad. This reduces the possibility of ESD damaging the KINO-TGL-U.
- ***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 KINO-TGL-U, KINO-TGL-U 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 KINO-TGL-U 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 KINO-TGL-U 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 KINO-TGL-U off:
  - When working with the KINO-TGL-U, 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 KINO-TGL-U **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**.

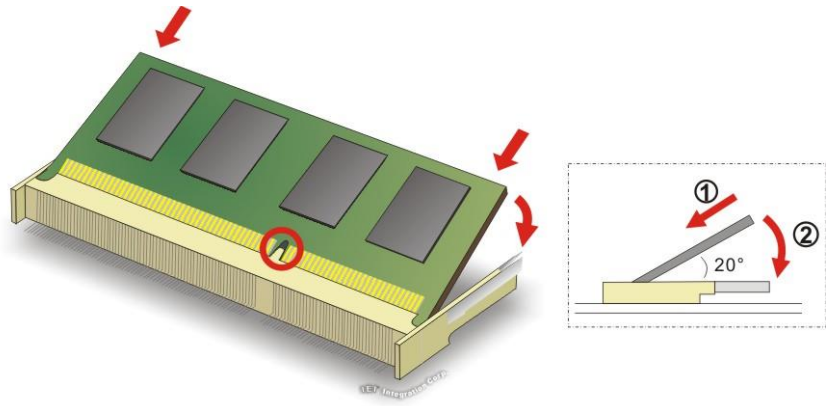


Figure 4-1: SO-DIMM Installation

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

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

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

Step 2: Line up the notch on the module with the notch on the slot. Slide the M.2 module into the socket at an angle of about 20º (**Figure 4-2**).

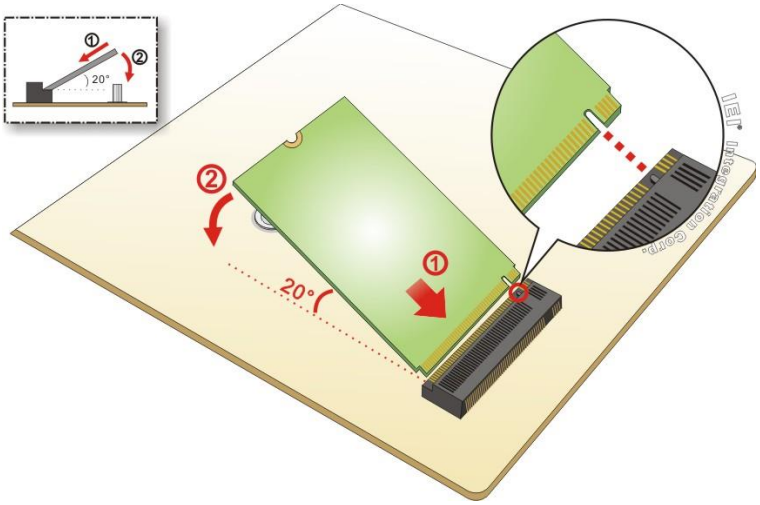


Figure 4-2: Inserting the M.2 Module into the Slot at an Angle

Step 3: Secure the M.2 module with an M2*3 retention screw (**Figure 4-3**).

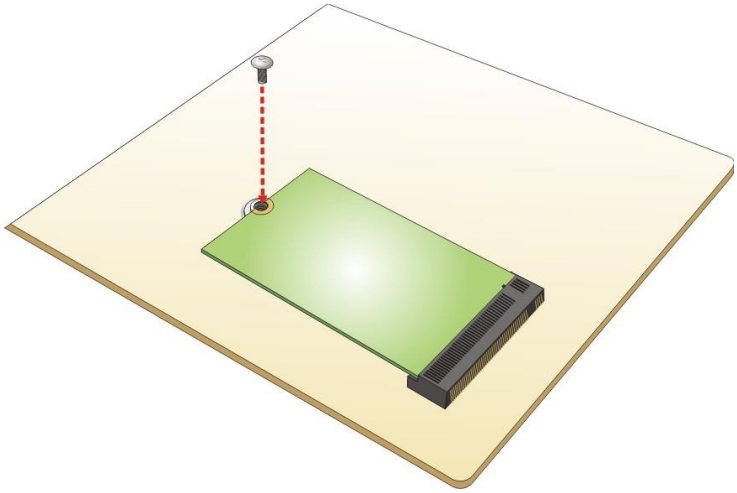


Figure 4-3: Securing the M.2 Module

4.5 System Configuration

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

4.5.1 AT/ATX Mode Select Switch

CN Label: **J_ATX_AT1**

CN Type: Switch

CN Location: See **Figure 4-4**

CN Settings: See **Table 4-1**

The AT/ATX mode select switch 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 4-4** below.

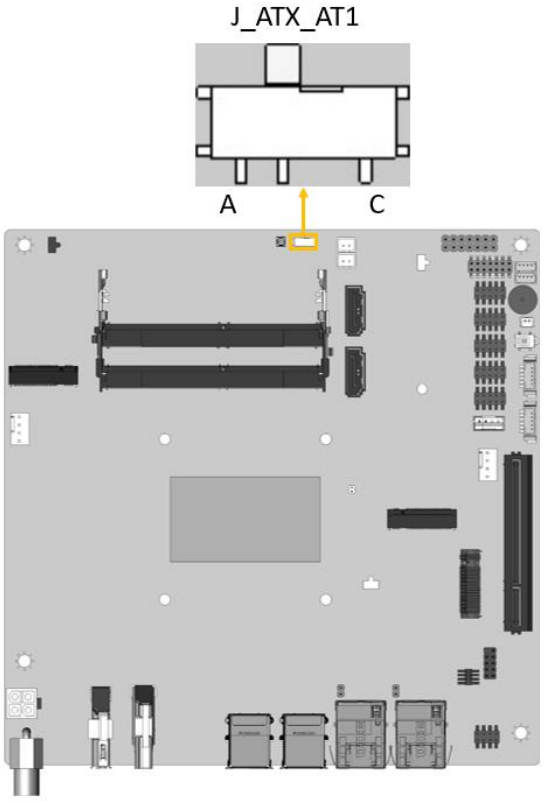


Figure 4-4: AT/ATX Mode Select Switch Location

4.5.2 Clear CMOS Button

CN Label:	**J_CMOS1**
CN Type:	Button
CN Location:	See **Figure 4-5**

If the KINO-TGL-U 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 is shown in **Figure 4-5**

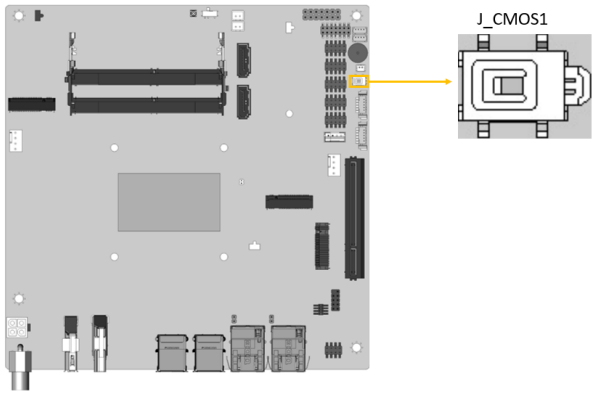


Figure 4-5: Clear CMOS Button Location

4.5.3 Flash Descriptor Security Override Jumper

CN Label:	**ME_FLASH1**
CN Type:	2-pin header, p=1.27 mm
CN Location:	See **Figure 4-6**
CN Settings:	See **Table 4-2**

The Flash Descriptor Security Override jumper (ME_FLASH1) allows to enable or disable the ME firmware update. Refer to **Figure 4-6** and **Table 4-2** for the jumper location and settings.

Setting	Description
Open	Disabled (default)
Short	Enabled

Table 4-2: Flash Descriptor Security Override Jumper Settings

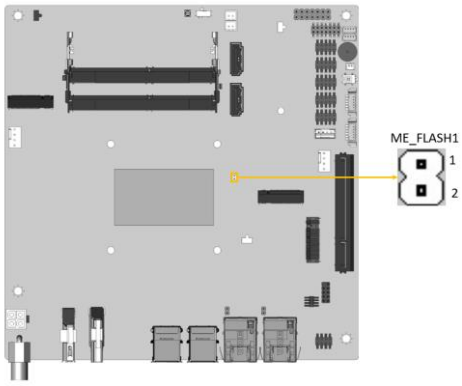


Figure 4-6: Flash Descriptor Security Override Jumper Location

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

Step 1: Before turning on the system power, short 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.

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

4.5.4 USB Power Select

The USB power selection is made through the BIOS options in "Chipset → PCH-IO Configuration" BIOS menu. Use the **USB Power SW** BIOS option to configure the power source to all the external and internal USB ports of the KINO-TGL-U.

→	**+5V DUAL**	**DEFAULT**	Set the USB power source to +5V dual
→	**+5V**		Set the USB power source to +5V

Table 4-3: USB Power Selection BIOS Options

4.6 Chassis Installation

4.6.1 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 KINO-TGL-U 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.

4.6.2 Motherboard Installation

To install the KINO-TGL-U motherboard into the chassis please refer to the reference material that came with the chassis.

4.7 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the on-board connectors

4.7.1 RS-232 Cable Connection

The single RS-232 cable consists of one serial port connector attached to a serial communications cable that is then attached to a D-sub 9 male connector. To install the single RS-232 cable, please follow the steps below.

Step 1: **Locate the connector**. The location of the RS-232 connector is shown in **Chapter 3**.

Step 2: **Insert the cable connector.** Align the cable connector with the onboard connector. Make sure pin 1 on the board and connector line up. Pin 1 on the cable connector is indicated with a white dot. See **Figure 4-7**.

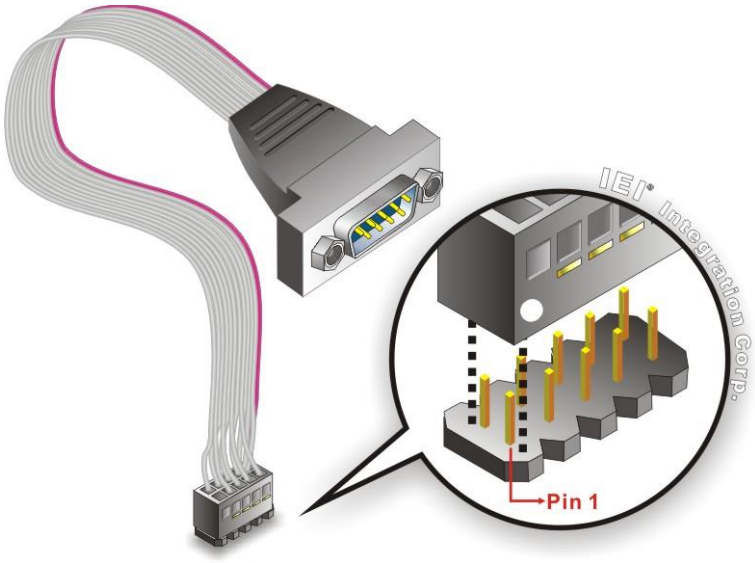


Figure 4-7: Single RS-232 Cable Installation

Step 3: **Secure the bracket**. The single RS-232 connector has two retention screws that must be secured to a chassis or bracket.

Step 4: **Connect the serial device**. Once the single RS-232 connector is connected to a chassis or bracket, a serial communications device can be connected to the system.

4.7.2 SATA Drive Connection

The KINO-TGL-U 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 4-8**.

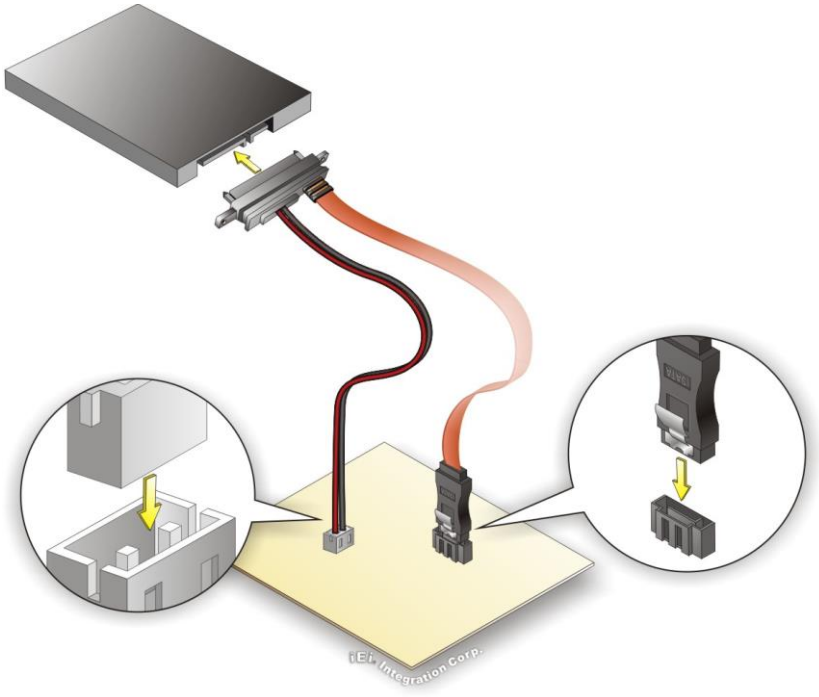


Figure 4-8: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 4-8**.

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

Software Drivers

5.1 Available Drivers

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

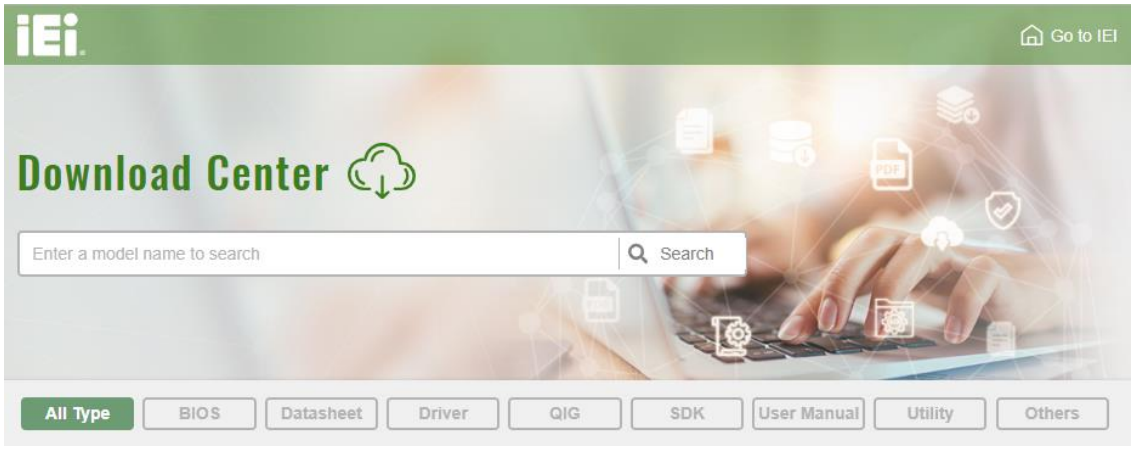
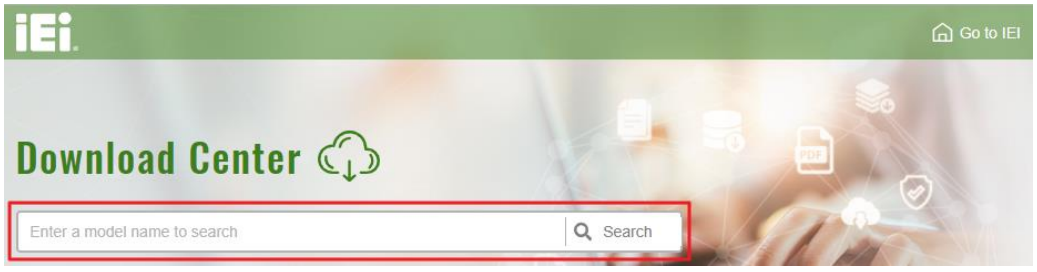


Figure 5-1: IEI Resource Download Center

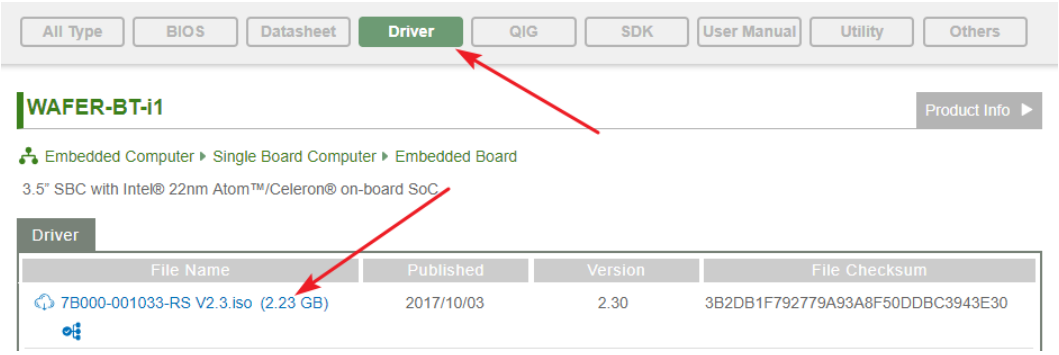
5.2 Driver Download

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

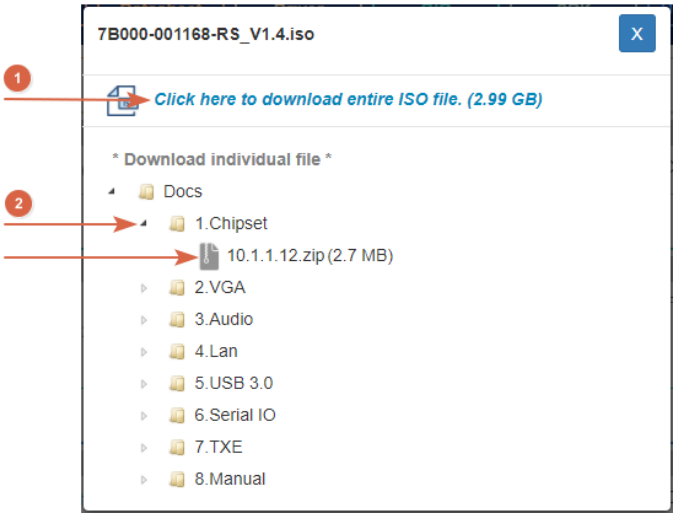
Step 1: Go to https://download.ieiworld.com. Type KINO-TGL-U and press Enter.



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 double click an individual item to find its driver file 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.

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

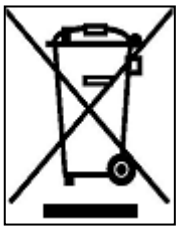
Product Disposal

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

Digital I/O Interface

C.1 Introduction

The DIO connector on the KINO-TGL-U is interfaced to GPIO ports on the Super I/O chipset. 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

C.2 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 input value

C.3 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

D

Error Beep Code

D.1 PEI Beep Codes

Number of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXEIPL was not found
3	DXE Core Firmware Volume was not found
4	Recovery failed
4	S3 Resume failed
7	Reset PPI is not available

D.2 DXE Beep Codes

Number of Beeps	Description
1	Invalid password
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met

NOTE:

If you have any question, please contact IEI for further assistance.

Appendix

E

Hazardous Materials Disclosure

E.1 RoHS II Directive (2015/863/EU)

The details provided in this appendix are to ensure that the product is compliant with the RoHS II Directive (2015/863/EU). The table below acknowledges the presences of small quantities of certain substances in the product, and is applicable to RoHS II Directive (2015/863/EU).

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)	Bis(2-ethylhexyl) phthalate (DEHP)	Butyl benzyl phthalate (BBP)	Dibutyl phthalate (DBP)	Diisobutyl phthalate (DIBP)
Housing	O	O	O	O	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O	O	O	O	O
Battery	O	O	O	O	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 Directive (EU) 2015/863.

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 Directive (EU) 2015/863.

E.2 China RoHS

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
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/T11364-2014 與 GB/T26572-2011 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/T11364-2014 與 GB/T26572-2011 标准规定的限量要求。