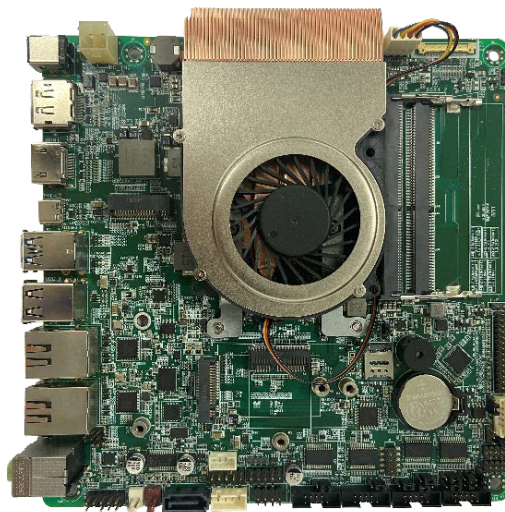


# VT-MITX-TGL Single Board Computer



## User Manual

Version: 1.3

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## Revision History

No.	Version	Description	Date
1	V1.0	First release	Jul. 21, 2022
2	V1.1	Updated interface figures	Nov. 19, 2022
3	V1.2	Updated I2C description as per the upgraded device	May 22, 2023
4	V1.3	Added the debugging of the UART and GPIO	Aug. 30, 2023

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## Foreword

Thank you for purchasing VT-MITX-TGL single board computer (“the Board” or “the Product”). This manual intends to provide guidance and assistance necessary on setting up, operating or maintaining the Product. Please read this manual and make sure you understand the functionality of the Product before putting it into use.

## Intended Users

This manual is intended for:

- Embedded software developer
- Custom development software engineer
- Other technically qualified personnel

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## Disclaimer

While all information contained herein has been carefully checked to assure its accuracy in technical details and typography, Vantron does not assume any responsibility resulting from any error or features of this manual, nor from improper uses of this manual or the software.

It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without notice.

## Technical Support and Assistance

Should you have any question about the Product that is not covered in this manual, contact your sales representative for solution. Please include the following information in your question:



- Product Signal and PO number;
- Complete description of the problem;
- Error message you received, if any.

## Vantron Technology, Inc.

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Email: [sales@vantrontech.com](mailto:sales@vantrontech.com)

## Symbology

This manual uses the following signs to prompt users to pay special attention to relevant information.







	Caution for latent damage to system or harm to personnel
	Attention to important information or regulations

## General Safety Instructions

The Product is supposed be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations. For your safety and prevention of damage to the Product, please read and observe carefully the following safety instructions prior to installation and operation. Keep this manual well for future reference.

- Do not disassemble or otherwise modify the Product. Such action may cause heat generation, ignition, electronic shock, or other damages including human injury, and may void your warranty.
- Keep the Product away from heat source, such as heater, heat dissipater, or engine casing.
- Do not insert foreign materials into any opening of the Product as it may cause the Product to malfunction or burn out.
- To ensure proper functioning and prevent overheating of the Product, do not cover or block the ventilation holes of the Product.
- Follow the installation instructions with the installation tools provided or recommended.
- The use or placement of the operation tools shall comply with the code of practice of such tools to avoid short circuit of the Product.
- Cut off the power before inspection of the Product to avoid human injury or product damage.

## Precautions for Power Cables and Accessories

-  Use proper power source only. Make sure the supply voltage falls within the specified range.
-  Place the cables properly at places without extrusion hazards.
-  There is a coin cell battery for powering the RTC. Therefore, please avoid short circuit of the battery during transportation or operation at high temperatures.
-  Cleaning instructions:
  - Power off before cleaning the Product
  - Do not use spray detergent
  - Clean with a damp cloth
  - Do not try to clean exposed electronic components unless with a dust collector
-  Power off and contact Vantron technical support engineer in case of the following faults:
  - The Product is damaged
  - The temperature is excessively high
  - Fault is still not solved after troubleshooting according to this manual
-  Do not use in combustible and explosive environment:
  - Keep away from combustible and explosive environment
  - Keep away from all energized circuits
  - Unauthorized removal of the enclosure from the device is not allowed
  - Do not change components unless the power cable is unplugged.
  - In some cases, the device may still have residual voltage even if the power cable is unplugged. Therefore, it is a must to remove and fully discharge the device before replacement of the components.



## **CHAPTER 1 INTRODUCTION**

## 1.1 Product Overview

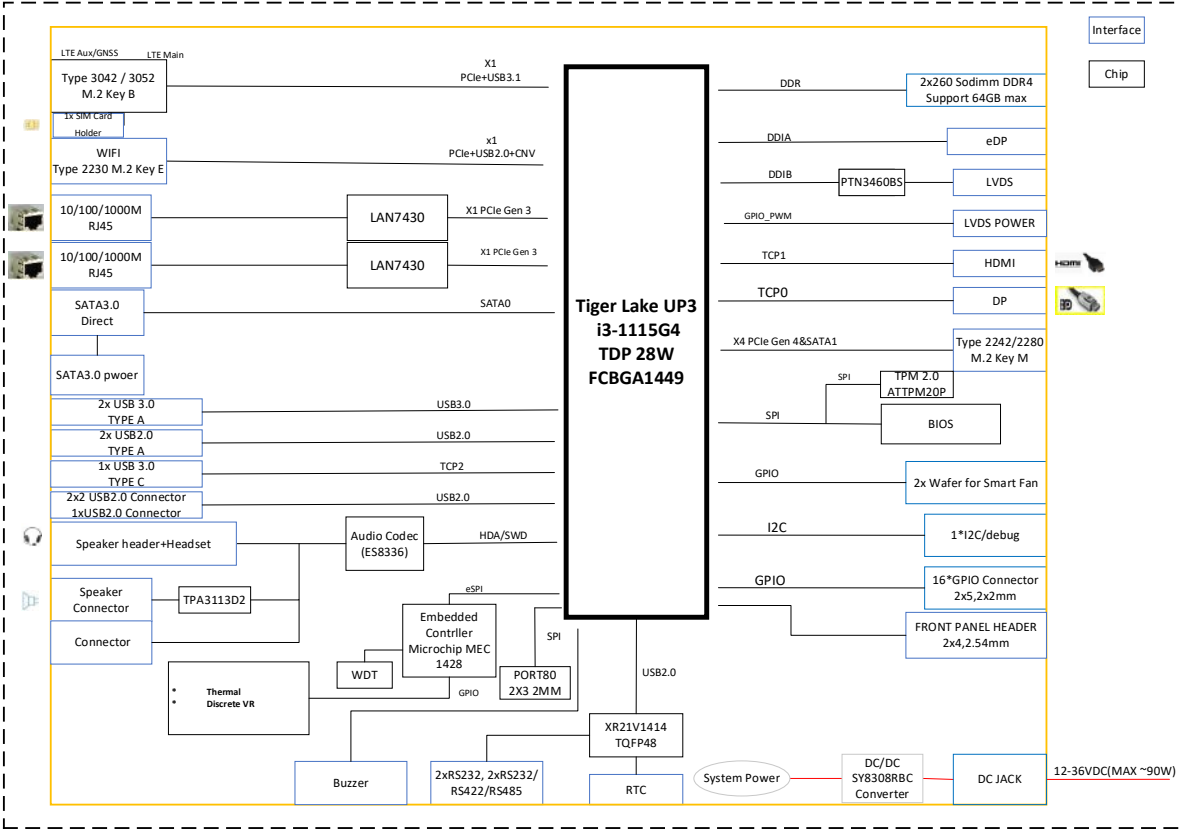
The VT-MITX-TGL single board computer adheres to the international industry size standards with a 170mm x 170mm form factor. It is powered by the latest 11th Gen Intel® Core™ U series processor that combines best-in-class technologies to offer the best user experience. It supports high-definition audio encoding and decoding to provide outstanding clarity and fidelity. Better yet, it provides rich interfaces and customer expansion options to meet varying application scenarios including smart retail, self-service terminals, industrial automation, intelligent medical health, and digital media.

Featuring high flexibility and high performance, the motherboard could work under extreme environments with extended temperatures ranging from -40°C to +85°C, making it a reliable solution for industrial applications.

## 1.2 Terminology/Acronym

Terminology/Acronym	Description
NC	No connection
VCC	Voltage common collector
GND	Ground
P (+)	Positive of difference signal
N (-)	Negative of difference signal
#	Active low signal
I	Input
O	Output
I/O	Input/output
P	Power or ground
A	Analog
OD	Open drain
PCIe	PCI express signal
MDI	Media dependent interface
BKL	Backlight

### 1.3 Block Diagram



## 1.4 Specifications

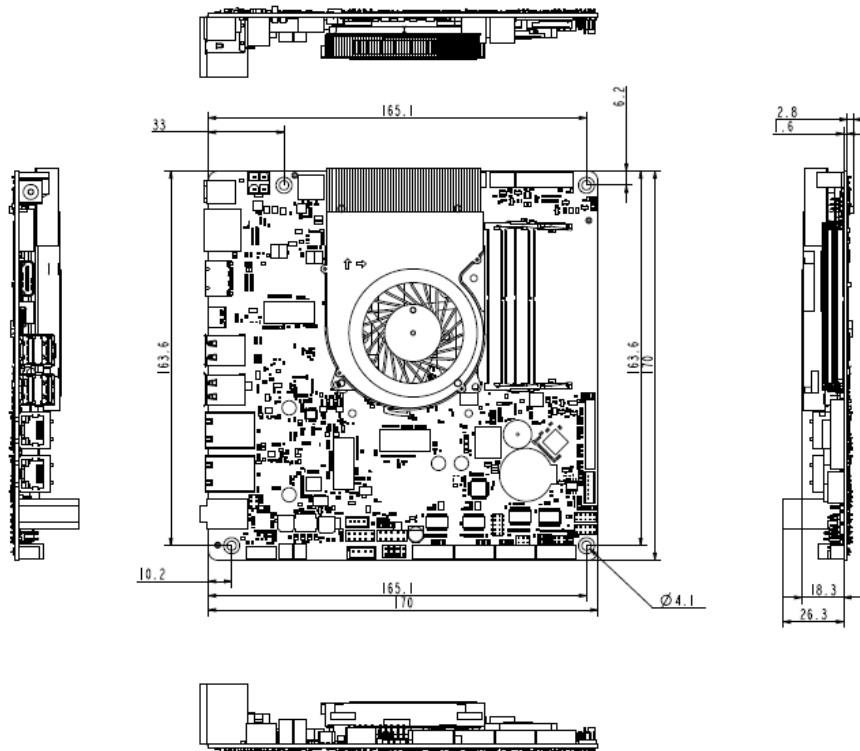
VT-MITX-TGL			
<b>System</b>	CPU	11 <sup>th</sup> Gen Intel® Core™ U-Series i3-1115G4/ i5-1155G7/ i7-1195G7 processor	
	Memory	2 x DDR4 SO-DIMM socket, 3200MHz, up to 64GB	
	Storage	1 x SATA 3.0 (Expandable via M.2 M-Key)	
<b>Communication</b>	Ethernet	2 x RJ45, Realtek® 1Gbps PCIe Ethernet controller	
<b>Media</b>	Graphics	Intel® Iris® Xe Graphics	
	Display	1 x HDMI: Resolution up to 4096 x 2160 @24Hz	
		1 x DP: Resolution up to 4096 x 2160 @24Hz	
		1 x eDP: Resolution up to 4096 x 2160 @60Hz	
		1 x LVDS/eDP: LVDS, resolution up to 1920 x 1200 @60Hz; eDP, resolution up to 4096 x 2160 @60Hz	
Audio CODEC	Realtek® 5.1 channel HDA Codec		
Audio interface	1 x Mic/Line-out	1 x Headphone jack	
	2 x Speaker connector	1 x Microphone jack	
<b>I/Os</b>	Serial	2 x RS232	2 x RS232/RS422/RS485
	USB	2 x USB 2.0 Type-A	1 x USB 3.1 Type-C
		2 x USB 3.0 Type-A	3 x Built-in USB 2.0
	GPIO	16 x GPIO	
	I <sup>2</sup> C	1 x I <sup>2</sup> C	
	SIM card holder	1 x Nano SIM card holder (connected to M.2 B-Key)	
<b>Expansion</b>	M.2	1 x M.2 B-Key (3042/3052, PCIe x 1 / USB 3.1 for 4G/5G expansion)	
		1 x M.2 M-Key (2242/2280, PCIe x 4 / SATA for SSD expansion)	
		1 x M.2 E-Key (2230, PCIe x 1 / USB 2.0/CNVi for Wi-Fi expansion)	
<b>Firmware</b>	BIOS	BYOSOFT (Optional: AMI, Insyde, Phoenix)	
	H/W monitor	Voltages & temperatures	
	RTC	Processor integrated RTC	
	Watchdog	Programmable WDT to generate system reset events	
	Security (optional)	TPM 2.0 supported (Infineon SLB 9670)	
<b>System Control</b>	FP header	1 x Front panel header (power button, reset button, LED power)	
<b>Mechanical</b>	Dimensions	170mm x 170mm	
	Heat dissipation	1 x System fan	1 x CPU fan connector
<b>Power</b>	Input	12V DC (1 x 4-pin power header, 1 x Power jack)	
<b>Software</b>	Operating system	Windows 10, Linux	
	OTA tool	BlueSphere OTA	
<b>Environment Condition</b>	Temperature	Operating: 0°C~+60°C (Optional: -40°C~+85°C)	Storage: -20°C~+75°C (Optional: -55°C~+85°C)
	Certification	CCC, UL, FCC (Part 15 class B), ESD (contact: ±8KV and air: ±12KV)	

## 1.5 Operating System

VT-MITX-TGL supports Windows 10 and Linux operating systems.

## 1.6 Mechanical Dimensions

- 170mm x 170mm



## 1.7 Power Supply and Consumption

VT-MITX-TGL works with +12V DC power input supplied alternatively by a DC connector or a power jack.

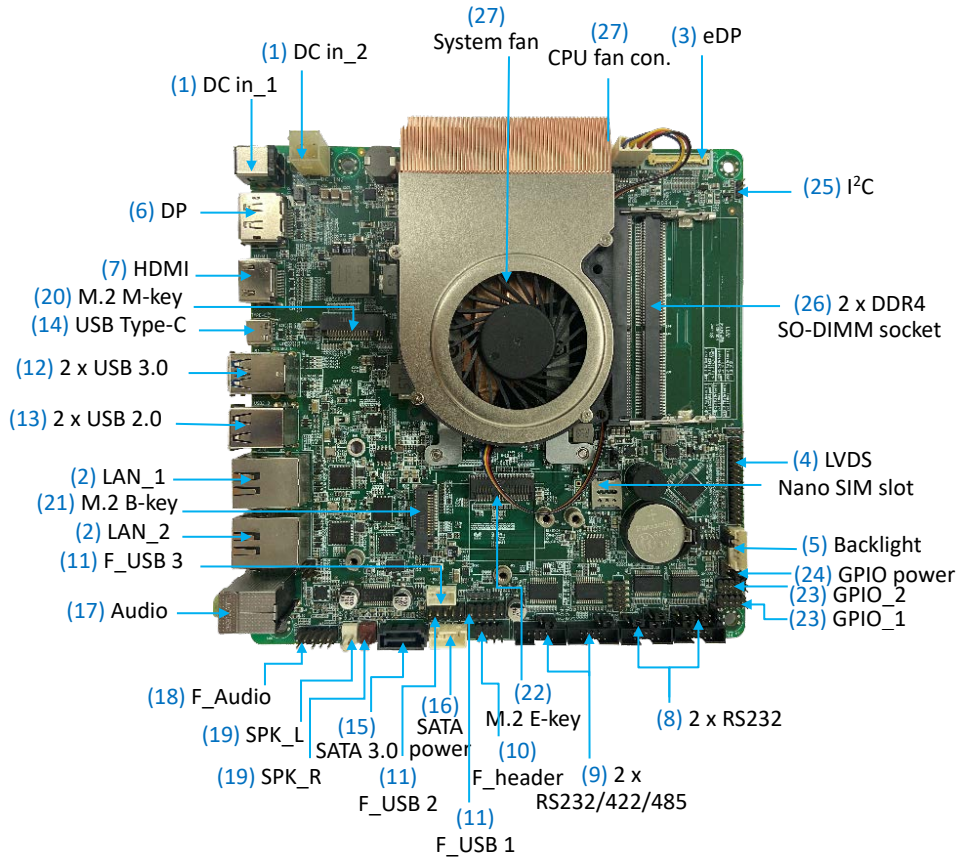
The power consumption of the Board is about 70W with speakers functioning and 60W with speakers not working. It should be pointed out that the power consumption is largely dependent on the RAM, storage capacity, and other configurations of the Board.


## 1.8 Environmental Specifications

VT-MITX-TGL works at a temperature ranging from 0°C to +60°C (optional: -40°C~+85°C), at relative humidity of 10%~85% for non-condensing purpose, and is designed to be stored at a temperature ranging from -40°C to +85°C (optional: -55°C~+85°C).

## **CHAPTER 2 CONNECTORS AND PIN ASSIGNMENT**

## 2.1 Product Layout



 The board I/Os will be described in detail in 2.3 Connectors and Jumpers following the sequencing numbers provided here.

## 2.2 System Configurations

### 2.2.1 CPU

VT-MITX-TGL is powered by the latest 11th Gen Intel® Core™ U series processor that boasts many best-in-class features.

### 2.2.2 Memory

VT-MITX-TGL is equipped with two DDR4 SO-DIMM sockets that support up to 64GB RAM in total with transfer rate at 3200MHz.

### 2.2.3 Storage

VT-MITX-TGL offers a SATA 3.0 connector for connection of a storage device. The storage capacity is also expandable via an M.2 B-Key slot that supports 64GB by default.

## 2.3 Connectors and jumpers

This section is going to brief on the connectors/jumpers with corresponsive pinout description.

Unless otherwise stated, pin 1 of a connector is seated on a square pad that is different from the round pads used for other pins. Sometimes, pin 1 is next to a trigonal mark on the board. When there are two rows of pins on a connector, the row with pin 1 is composed of odd numbers and the other is composed of even numbers.



Usually, there will be numbers or marks next to the pins of a connector on the board to indicate the pinouts.

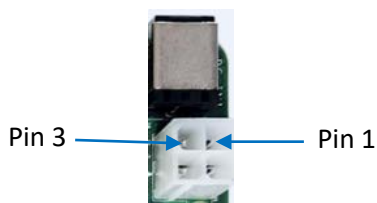


### 2.3.1 J8/J4 Power input (1)

VT-MITX-TGL provides a 4-pin power connector (J4) and a power jack (J8) to supply power for the Board.

Specification of the power connector: 2 x 2 x 4.2mm, 12.8mm (H), Male, Vertical, White, WDT, THR, RoHS

Specification of the power jack: 2.5mm (D), 5.5mm (D), 10A, Male, RA, WDT, THR, RoHS



Pinout description of the 4-pin power connector:

Pin	Signal	Description
1	GND	Ground
2	GND	Ground
3	+VDC	DC-IN POWER +
4	+VDC	DC-IN POWER +



Pinout description of the power jack:

Pin	Signal	Description
1	+VDC	DC-IN POWER +
2	GND	Ground

### 2.3.2 J20/J23 Ethernet ports (2)

VT-MITX-TGL offers two RJ45 Ethernet jacks each with two LEDs (L-Y, R-G), green for activity indication and yellow for link indication.

Specification: Standard RJ45 10M/100M/1000M Base-T Ethernet jack.



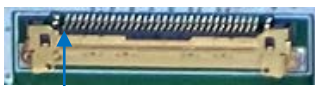
Pinout description:

Pin	Signal	Description
1	L_MDI_0P	Ethernet MDI0+ Signal
2	L_MDI_0N	Ethernet MDI0- Signal
3	L_MDI_1P	Ethernet MDI1+ Signal
4	L_MDI_1N	Ethernet MDI1- Signal
5	L_MDI_2P	Ethernet MDI2+ Signal
6	L_MDI_2N	Ethernet MDI2- Signal
7	L_MDI_3P	Ethernet MDI3+ Signal
8	L_MDI_3N	Ethernet MDI3- Signal

### 2.3.3 J7 eDP connector (3)

VT-MITX-TGL offers an eDP connector for connection of a display.

Specification: 1 x 30 x 0.5mm, 0.5A, 1.05mm (H), Right Angle, WDT, SMT, RoHS



Pin 1

Pinout description:

Pin	Signal	Description
1	+V3.3DX_EDP1	LCD POWER +3.3V
2	+V3.3DX_EDP1	LCD POWER +3.3V
3	+V3.3DX_EDP1	LCD POWER +3.3V
4	eDP_HPDCONN	LVSAAE_DATA

5	GND	Ground
6	DDIA_EDP1_LANE0_L_DN	LVSAE_DATA
7	DDIA_EDP1_LANE0_L_DP	LVSAE_DATA
8	GND	Ground
9	DDIA_EDP1_LANE1_L_DN	LVSAE_DATA
10	DDIA_EDP1_LANE1_L_DP	LVSAE_DATA
11	GND	Ground
12	DDIA_EDP1_LANE2_L_DN	LVSDO_DATA
13	DDIA_EDP1_LANE2_L_DP	LVSDO_DATA
14	GND	Ground
15	DDIA_EDP1_LANE3_L_DN	LVSDO_DATA
16	DDIA_EDP1_LANE3_L_DP	LVSDO_DATA
17	GND	Ground
18	DDIA_EDP1_AUX_DN	LVSAE_CLOCK
19	DDIA_EDP1_AUX_DP	LVSAE_CLOCK
20	GND	Ground
21	GND	Ground
22	EDP1_BKLT_EN_R	BKLT_EN
23	EDP1_BRIGHTNESS_R	BRIGHTNESS
24	GND	Ground
25	GND	Ground
26	GND	Ground
27	+VCC_EDP1_BKLT_R	LCD POWER +12V
28	+VCC_EDP1_BKLT_R	LCD POWER +12V
29	+VCC_EDP1_BKLT_R	LCD POWER +12V
30	+VCC_EDP1_BKLT_R	LCD POWER +12V

### 2.3.4 J19 LVDS/eDP connector (4)

VT-MITX-TGL also offers an LVDS/eDP connector for connection of a display.

Specification: 2 x 15, 2.0mm, 1.5A, 6mm (H), Male, Vertical, WDT, SMT, RoHS



Pinout description:

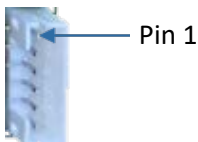
Pin	Signal	Description
1	VDD_LCD	LCD POWER +5V
2	VDD_LCD	LCD POWER +5V
3	VDD_LCD	LCD POWER +5V
4	NC	
5	LCD_DETECT_R	LVDS DETECT
6	SEL 6/8	SELECT 6 OR 8 DEPTH
7	LVDS_A_D0-_R	LVSDO_DATA
8	LVDS_A_D0+_R	LVSDO_DATA
9	LVDS_A_D1-_R	LVSDO_DATA
10	LVDS_A_D1+_R	LVSDO_DATA
11	LVDS_A_D2-_R	LVSDO_DATA
12	LVDS_A_D2+_R	LVSDO_DATA
13	GND	Ground
14	GND	Ground
15	LVDS_A_CLK-_R	LVSDO_CLOCK
16	LVDS_A_CLK+_R	LVSDO_CLOCK
17	LVDS_A_D3-_R	LVSDO_DATA
18	LVDS_A_D3+_R	LVSDO_DATA
19	LVDS_B_D0-/TX0-	LVSAE_DATA
20	LVDS_B_D0+/TX0+	LVSAE_DATA
21	LVDS_B_D1-/TX1-	LVSAE_DATA
22	LVDS_B_D1+/TX1+	LVSAE_DATA
23	LVDS_B_D2-/TX2-	LVSAE_DATA

24	LVDS_B_D2+/TX2+	LVSAE_DATA
25	GND	Ground
26	GND	Ground
27	LVDS_B_CLK-/AUX-	LVSAE_CLOCK
28	LVDS_B_CLK+/AUX+	LVSAE_CLOCK
29	LVDS_B_D3-/TX3-	LVSAE_DATA
30	LVDS_B_D3+/TX3+	LVSAE_DATA

### 2.3.5 J27 Backlight connector (5)

VT-MITX-TGL offers a backlight connector that supplies power for the backlight of the display connected to the LVDS/eDP connector.

Specification: 1 x 6 x 2.0mm, 2A, 6mm (H), Male, Vertical, WDT, THR, RoHS



Pinout description:

Pin	Signal	Description
1	VCC_BLK	LCD BACKLIGHT POWER +12V
2	VCC_BLK	LCD BACKLIGHT POWER +12V
3	LCD_BKLTEN	LCD BACKLIGHT ENABLE
4	LCD_BKLT_PWM	LCD BACKLIGHT PWM
5	GND	Ground
6	GND	Ground

## 2.3.6 J10 DP (6)

VT-MITX-TGL implements a DP 1.4 interface that supports resolution of 4096 x 2160 @24Hz.

Specification: Type-A, No FLN, Female, Right Angle, WDT, SMT, RoHS



Pinout description:

Pin	Signal	Description
1	DDI4_DP_TX0_L_DP	DP DATA
2	GND	Ground
3	DDI4_DP_TX0_L_DN	DP DATA
4	DDI4_DP_TX1_L_DP	DP DATA
5	GND	Ground
6	DDI4_DP_TX1_L_DN	DP DATA
7	DDI4_DP_TX2_L_DP	DP DATA
8	GND	Ground
9	DDI4_DP_TX2_L_DN	DP DATA
10	DDI4_DP_TX3_L_DP	DP DATA
11	GND	Ground
12	DDI4_DP_TX3_L_DN	DP DATA
13	DDI4_OB_AUX_EN	AUX_EN
14	DDI4_DPCON_PIN14_PD	HDMI DATA
15	DDI4_DP_CTRLCLK_AUX_DP	DP DDI CLK
16	DDI4_DP_CTRLDATA_AUX_DN	DP DDI DATA
17	GND	Ground
18	DDI4_OB_DP_HPDP	DP HOT PLUG DETECTION
19	GND	Ground
20	+V3.3S_DDI4_OB_DP_Q	DP POWER +3.3V

## 2.3.7 J11 HDMI (7)

VT-MITX-TGL implements an HDMI 2.0b interface that supports resolution of 4096 x 2160 @60Hz.

Specification: Type-A, FLN, Female, Right Angle, WDT, SMT, RoHS



Pinout description:

Pin	Signal	Description
1	HDMI_DATA2+	HDMI DATA
2	GND	Ground
3	HDMI_DATA2-	HDMI DATA
4	HDMI_DATA1+	HDMI DATA
5	GND	Ground
6	HDMI_DATA1-	HDMI DATA
7	HDMI_DATA0+	HDMI DATA
8	GND	Ground
9	HDMI_DATA0-	HDMI DATA
10	HDMI_CLK+	HDMI CLK
11	GND	Ground
12	HDMI_CLK-	HDMI CLK
13	NC	
14	NC	
15	HDMI_DDC_SCL	HDMI DDC I2C CLK
16	HDMI_DDC_SDA	HDMI DDC I2C DATA
17	GND	Ground
18	VCC_HDMI	HDMI POWER +5V
19	HDMI_HPD	HDMI HOT PLUG DETECTION

### 2.3.8 J52/J53 RS232 (8)

VT-MITX-TGL implements two RS232 connectors (COM3 & COM4).

Specification: 2 x 5 x 1.50mm, 5.75mm (H), Male, Vertical, Black, WDT, THR, RoHS



Pinout description of J52 (COM3):

Pin	Signal	Description
1	DCD3_L	POWER
2	RXD3_L	RS232_RXD
3	TXD3_L	RS232_TXD
4	DTR3	DTR3
5	GND	Ground
6	DSR3	DSR3
7	RTS3	RTS3
8	CTS3	CTS3
9	RI3_L	RI3_L

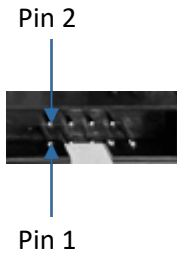
Pinout description of J53 (COM4):

Pin	Signal	Description
1	DCD4_L	POWER
2	RXD4_L	RS232_RXD
3	TXD4_L	RS232_TXD
4	DTR4	DTR4
5	GND	Ground
6	DSR4	DSR4
7	RTS4	RTS4
8	CTS4	CTS4
9	RI4_L	RI4_L

### 2.3.9 J50/J51 RS232/RS422/RS485 (9)

VT-MITX-TGL implements another two RS232/RS422/RS485 connectors (COM1 & COM2) next to the two RS232 connectors.

Specification: 2 x 5 x 1.50mm, 5.75mm (H), Male, Vertical, Black, WDT, THR, RoHS



Pinout description of J50 (COM1):

Pin	Signal			Description
	RS232	RS485	RS422	
1	DCD1	RS485_A	RS422TX+	DATA
2	RXD1	RS485_B	RS422TX-	DATA
3	TXD1	/	RS422RX+	DATA
4	DTR1	/	RS422RX-	DATA
5	GND	/	/	GND
6	DSR1	/	/	DATA
7	RTS1	/	/	DATA
8	CTS1	/	/	DATA
9	RI1_L	/	/	DATA

Pinout description of J51 (COM2):

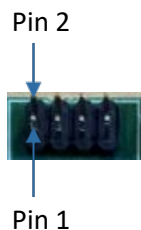
Pin	Signal			Description
	RS232	RS485	RS422	
1	DCD2	RS485_A	RS422TX+	DATA
2	RXD2	RS485_B	RS422TX-	DATA
3	TXD2	/	RS422RX+	DATA
4	DTR2	/	RS422RX-	DATA
5	GND	/	/	GND
6	DSR2	/	/	DATA
7	RTS2	/	/	DATA
8	CTS2	/	/	DATA
9	RI2_L	/	/	DATA



### 2.3.10 J49 Front panel connector (10)

The front panel connector provides signals for system power/reset and LED power.

Specification: 2 x 4, 2.54mm, 2A, 6mm (H), Male, Vertical, WDT, THR, RoHS



Pinout description:

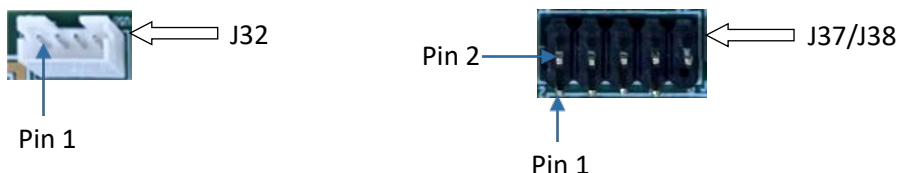
Pin	Signal	Description
1	SATA_ACT+	SATA_ACT+
2	LED_POWER	LED POWER
3	SATA_ACT#	SATA_ACT+
4	GND	GND
5	GND	GND
6	PBTN_IN#	Power Button
7	SYS_REST#	SYS_REST
8	GND	GND

### 2.3.11 J32/J37/J38 USB 2.0 connectors (11)

VT-MITX-TGL offers three USB 2.0 connectors, one is a 4-pin connector (J32), the other two are 10-pin connectors (J37 & J38).

Specification of J32: 1 x 4 x 2.0mm, 2A, 6mm(H), Male, RA, WDT, THR, RoHS

Specification of J37/J38: 2 x 5 x 2.54mm, 2A, 6mm (H), Male, Vertical, WDT, THR, RoHS



Pinout description of J32:

Pin	Signal	Description
1	VCC_USB2.0_1	USB POWER +5V
2	USB2.0_DN	Reserved usb2.0 Negative
3	USB2.0_DP	Reserved usb2.0 Positive
4	GND	Ground

Pinout description of J37/J38:

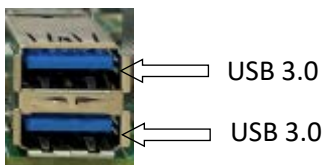
Pin	Signal	Description
1	VCC_USB2.0_2	USB POWER +5V
2	VCC_USB2.0_2	USB POWER +5V
3	USBHUB_3N	Reserved usb2.0 Negative
4	USBHUB_2N	Reserved usb2.0 Positive
5	USBHUB_3P	Reserved usb2.0 Negative
6	USBHUB_2P	Reserved usb2.0 Positive
7	GND	Ground
8	GND	Ground
10	NC	

### 2.3.12 J16 USB 3.0 Type-A (12)

There are two USB 3.0 Type-A interfaces on the Board for expansion of functions.

Specification: 3.0, Type-A, Female, 17.5mm (L), Right Angle, WDT, THR, RoHS

The pinout description of the interfaces is in line with the pin assignment of standard USB 3.0 Type-A.

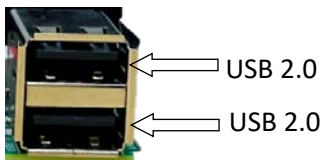


### 2.3.13 J18 USB 2.0 Type-A (13)

There are another two USB 2.0 Type-A interfaces on the Board designed to connect peripherals to expand the functions.

Specification: 2.0, Type-A, Female, Right Angle, Retention, WDT, THR, RoHS

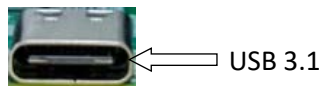
The pinout description of the interfaces is in line with the pin assignment of standard USB 2.0 Type-A.



### 2.3.14 J15 USB 3.1 Type-C (14)

VT-MITX-TGL implements a USB 3.1 Type-C interface that supports OTG functionality to allow greater flexibility for device communication.

Specification: 3.1, Type C, Female, 17.5mm (L), Right Angle, WDT, THR, RoHS



The pinout description of the interface is in line with the pin assignment of standard USB 3.1 Type-C.

### 2.3.15 J54 SATA connector (15)

The SATA connector is designed to connect a storage device for capacity expansion.

Specification: 7-Pin, 1.27mm, 8.4mm (H), WDT, SMT, RoHS

The pinout description of the connector is in line with the pin assignment of standard SATA connector.

### 2.3.16 J48 SATA power connector (16)

VT-MITX-TGL offers a 4-pin power connector to supply power to the storage device.

Specification: 1 x 4 x 2.54mm, 2A, 6mm (H), Male, Vertical, WDT, THR, RoHS



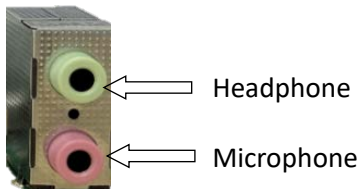
Pinout description:

Pin	Signal	Description
1	+V5_S	POWER +5V
2	GND	Ground
3	GND	Ground
4	+V12_S	POWER +12V

### 2.3.17 J56 Audio jacks (17)

VT-MITX-TGL offers two 3.5mm audio jacks on the Board, one is a headphone jack and the other is a Microphone jack.

Specification: 3.6mm, 4-Pole + 1 Switch, Female, Right Angle, THR, RoHS



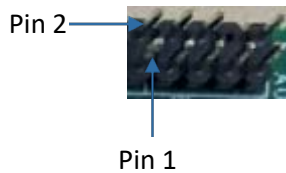
Pinout description:

Pin	Signal	Description
1	GND	Ground
2	HPOUT_L_CRL	AUDIO JACK LEFT VOICE
3	HP_JD	HP Insert
4	GND	Ground
5	HPOUT_R_CRL	AUDIO JACK RIGHT VOICE
21	GND	Ground
22	MIC1_LLL	LEFT INPUT
23	MIC_JD	MIC Insert
24	GND	Ground
25	MIC1_RRR	RIGHT INPUT

### 2.3.18 J25 F\_AUDIO connector (18)

There is a front panel audio connector on the Board which allows you to connect an audio jack to the front panel.

Specification: 2 x 5 x 2.54mm, 3A, 6mm (H), Male, Vertical, THR, RoHS



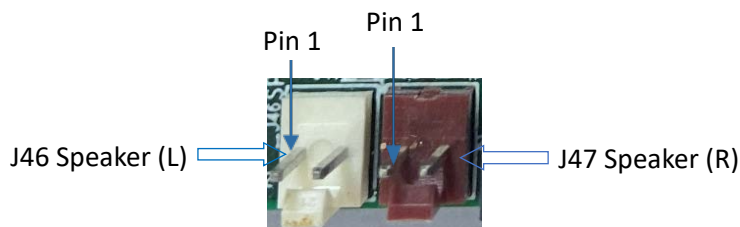
Pinout description:

Pin	Signal	Description
1	MIC2_LLL	MIC LEFT INPUT
2	GND	Ground
3	MIC2_RRR	MIC RIGHT INPUT
4	NC	
5	RINP_AMP2	AMP2 RIGHT INPUT
6	MIC2_JD	MIC2 JD INPUT
7	GND	Ground
9	LINP_AMP2	AMP2 LEFT INPUT
10	HP2_JD	HP2 JD INPUT

### 2.3.19 J46/J47 Speaker connectors (19)

There are two speaker connectors on the Board, providing left and right stereo sound experience to users when connected to the speakers.

Specification of the connectors: 1 x 2 x 2.54 mm, 4A, 10.8mm (H), Male, Vertical, THR, RoHS



Pinout description of the J46 connector:

Pin	Signal	Description
1	OUTPL+	8R/5W SPEAKER ANODE
2	OUTPL-	8R/5W SPEAKER CATHODE

Pinout description of the J47 connector:

Pin	Signal	Description
1	OUTPR+	8R/5W SPEAKER ANODE
2	OUTPR-	8R/5W SPEAKER CATHODE

### 2.3.20 J14 M.2 M-Key (20)

VT-MITX-TGL offers an M.2 M-Key socket (2242/2280) that supports PCIe x 4 / SATA bus interface to connect an SSD for high-speed data transfer and storage.

The pinout of the socket is in line with the pin assignment of standard M.2 for Key M.

### 2.3.21 J24 M.2 B-Key (21)

VT-MITX-TGL offers an M.2 B-Key socket (3042/3052) that supports PCIe x 1 / USB 3.1 bus interface to connect a 4G/5G module for wireless communication.

The pinout of the socket is in line with the pin assignment of standard M.2 for Key B.

### 2.3.22 J21 M.2 E-Key (22)

VT-MITX-TGL offers an M.2 E-Key socket (2230) that supports PCIe x 1 / USB 2.0 / CNVi bus interface to connect a Wi-Fi & Bluetooth module for wireless communication.

The pinout of the socket is in line with the pin assignment of standard M.2 for Key E.

### 2.3.23 J31/J34 GPIO (23)

There are two GPIO connectors on the Board, offering 16 GPIO signals.

Specification: 2 x 5 x 2.0mm, 1.5A, 5.5mm (H), Male, Vertical, WDT, THR, RoHS



Pinout description of J31:

Pin	Signal	Description
1	GPIO_0_3.3V	GPP_U4
2	GPIO_1_3.3V	GPP_U5
3	GPIO_2_3.3V	GPP_U2
4	GPIO_3_3.3V	GPP_H4
5	GPIO_4_3.3V	GPP_D0
6	GPIO_5_3.3V	GPP_D1
7	GPIO_6_3.3V	GPP_D2
8	GPIO_7_3.3V	GPP_D3
9	GND	Ground
10	GPIO POWER	GPIO POWER

Pinout description of J34:

Pin	Signal	Description
1	GPIO_8_3.3V	GPP_S1
2	GPIO_9_3.3V	GPP_S0
3	GPIO_10_3.3V	GPP_S3
4	GPIO_11_3.3V	GPP_S2
5	GPIO_12_3.3V	GPP_R0
6	GPIO_13_3.3V	GPP_R1
7	GPIO_14_3.3V	GPP_R2
8	GPIO_15_3.3V	GPP_R3
9	GND	Ground
10	GPIO POWER	GPIO POWER

### 2.3.24 J29 GPIO power (24)

There is a GPIO power connector on the Board for connecting a power source to supply power to the GPIO.

Specifications: 1 x 3, 2.0mm, 1.5A, 6mm (H), Male, Vertical, WDT, THR, RoHS



Pinout description:

Pin	Signal	Description
1	+V5S	+V5 POWER
2	VCC_GPIO	GPIO
3	+V3.3S	+V3.3 POWER

### 2.3.25 J9 I<sup>2</sup>C (25)

The Board offers a three-pin I<sup>2</sup>C connector.

Specification: 1 x 3 x 1.25mm, 1A, 4.6mm (H), Male, Vertical, THR, RoHS



Pinout description:

Pin	Signal	Description
1	GND	Ground
2	I2C5_SDA_PWRMTR	I2C5 SDA
3	I2C5_SCL_PWRMTR	I2C5 SCL



### 2.3.26 J12/J13 DDR4 SO-DIMM Sockets (26)

The two DDR4 SO-DIMM sockets on the Board support up to 64GB RAM in total with transfer rate at 3200MHz.

### 2.3.27 J5/J6 Fan Connectors (27)

VT-MITX-TGL implements two fan connectors, one (J6) is connected to a fan that offers active heat dissipation for the system, and the other (J5) is a CPU fan connector for user to customize.

Specification: 1 x 4 x 2.54mm, 4A, 11.4mm (H), Male, Vertical, THR, RoHS

Pinout description of J5:

Pin	Signal	Description
1	GND	Ground
2	FAN SUPPLY_+V12	+12V POWER
3	CPU_TACHO_R_FAN	FAN SPEED FEEDBACK
4	FAN_CONN_PWM_IN	FAN SPEED CONTROL

Pinout description of J6:

Pin	Signal	Description
1	GND	Ground
2	FAN SUPPLY_+V12	+12V POWER
3	NA	
4	NA	

## **CHAPTER 3 FIRST-USE DEBUGGING**

### 3.1 Driver Introduction

The table below lists the drivers in the software release package of the Board (path: \700RBX730K302\_VT-mITX-TGL\_Win11\_22H2\_en\_x64\_vxx\_xxx-xxx-xxx\3 Sw-Driver\) that might be used to run VT-MITX-TGL and their respective use.

Driver	Description
Audio	Codec and SST drivers for running the audio devices
Chipset	To tell the user if the chipset INF file needs to be updated
Graphic	Intel graphics driver
LAN	Microchip LAN7400 device driver
Serial IO	Intel serial IO driver
TXE	To manage the Intel CSME firmware
USB2COM	USB to UART driver

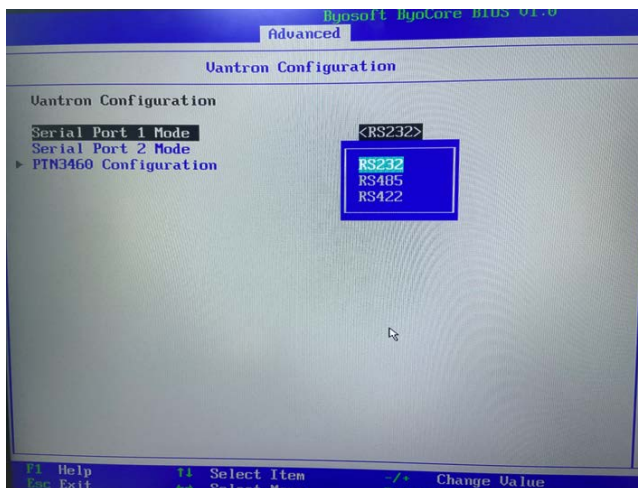
## 3.2 Serial Port Setup

VT-MITX-TGL implements 4 high-speed serial connectors (COM1 ~ COM4). COM1 and COM2 are mapped as serial port 1 and serial port 2 respectively in the BIOS system.

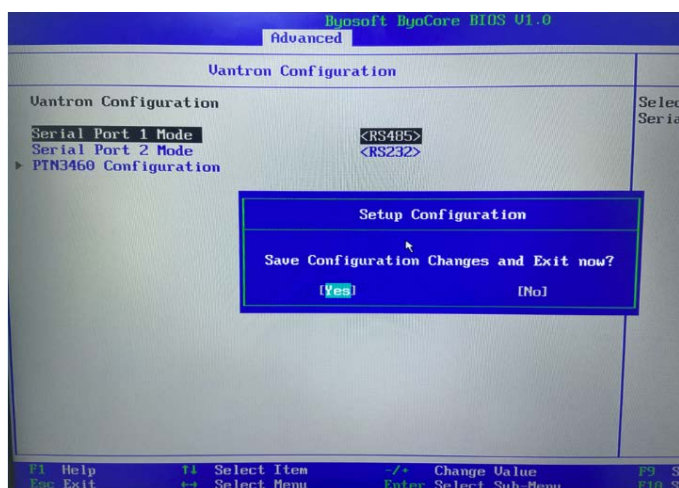
COM1 and COM2 support RS232, RS485, RS422 protocols, while COM3 and COM4 support RS232 protocol.

If you wish to change the mode of COM1 and COM2,

1. Press **F2** during the system boot to enter BIOS;
2. Navigate to **Advanced > Intel Advanced Menu > Vantron Configuration**;
3. Move the cursor to **Serial Port 1 Mode / Serial Port 2 Mode <RS232>**, and press **Enter**;
4. Use the up & down arrows to change the mode;



5. Press **F10** to save and exit.



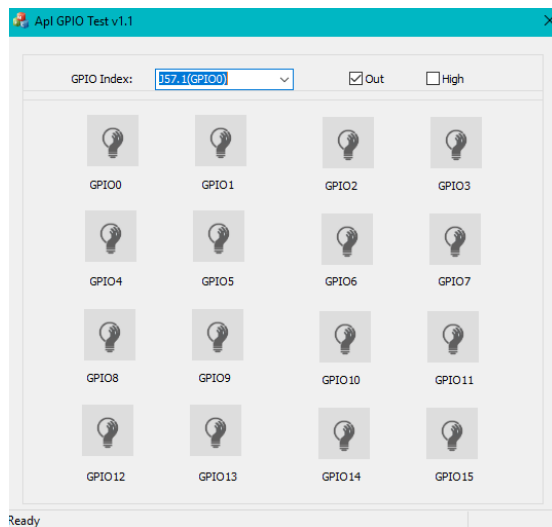
Then You can run the **TestCommPC Vxxx** program in the release package (**\4 SW-Tests\UART**) for serial debugging.

### 3.3 GPIO Setup

VT-MITX-TGL implements 16 GPIOs with details shown below:


Pin	Name	Default mode	Default level
J57.1	GPIO_0	Output	High
J57.2	GPIO_1	Output	High
J57.3	GPIO_2	Output	High
J57.4	GPIO_3	Output	High
J57.5	GPIO_4	Output	High
J57.6	GPIO_5	Output	High
J57.7	GPIO_6	Output	High
J57.8	GPIO_7	Output	High
J59.1	GPIO_8	Output	High
J59.2	GPIO_9	Output	High
J59.3	GPIO_10	Output	High
J59.4	GPIO_11	Output	High
J59.5	GPIO_12	Output	High
J59.6	GPIO_13	Output	High
J59.7	GPIO_14	Output	High
J59.8	GPIO_15	Output	High

You can use the **Test\_Tgl\_OnboardGPIO** program (\4 SW-Tests\GPIO) in the release package for GPIO debugging.



In the above figure:

1. GpioPins: You can select a pin of the GPIO header from the drop-down list for the configuration;
2. Out: Set the mode of the selected GPIO pin as output (checked)/input (unchecked);
3. High: Set the level of the selected GPIO pin as high (checked)/low (unchecked).

 *Please run this program as administrator.*

## **CHAPTER 4 BIOS AND WINDOWS**

## 4.1 BIOS Introduction

BIOS initializes hardware like CPU and memory, and saves hardware settings for installation and loading of the operating system (OS).

Users may need to run BIOS Setup program when:

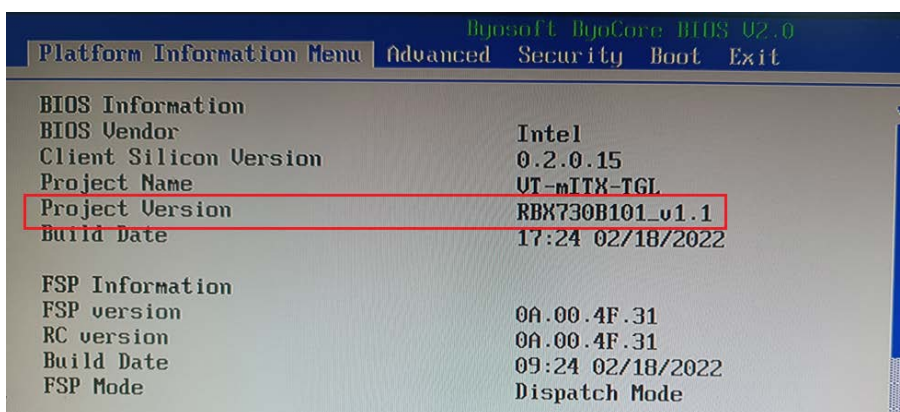
- An error message appears suggesting that the user should run BIOS Setup;
- Default settings need to be customized.

▶ Please be aware that BIOS will be under continuous update for better system performance, therefore the description in this chapter might vary slightly and is for reference only.

## 4.2 BIOS Setup

### 4.2.1 Entering BIOS Setup Utility

When the Board is powered on, the system will start the power-on self-test process. Then you can press **F2** to enter the BIOS configuration page for more settings.



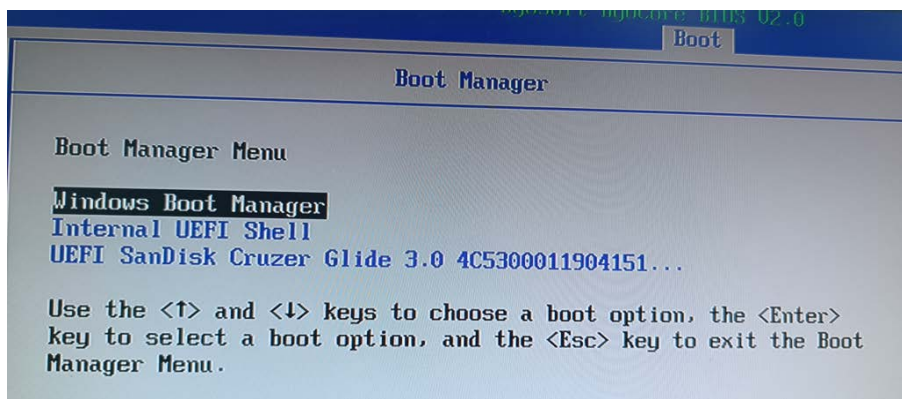
The menu bar comprises:

- **Platform Information Menu:** Basic system configurations, like BIOS information, FSP information, Board information, processor information, firmware information, system time and date, etc.
- **Advanced:** Advanced configurations that allow users to customize the system and board settings
- **Security:** System security settings where users can set the administrator and user passwords, manage the passwords, etc.
- **Boot:** System boot options
- **Exit:** BIOS load or exit options with or without changes saved



## 4.2.2 Selecting a Boot Option

After powering on the Board, you can press **F7** to enter the boot manager menu.



**Windows Boot Manager** is used to access the Windows operating system installed on the Board. When selected, it initiates the boot process for Windows.

**Internal UEFI Shell** is a command line interface that provides access to a range of commands and utilities to be used for network booting, system management or recovery, system diagnostics, troubleshooting, etc.

**UEFI SanDisk xxxx** is a specific boot entry associated with the SanDisk device. This option allows you to boot the Board from this bootable device.

Please refer to 4.3.2 Making a Bootable USB Drive for Window 10 for the details of making a bootable USB device.

## 4.3 Windows 10 System Upgrade

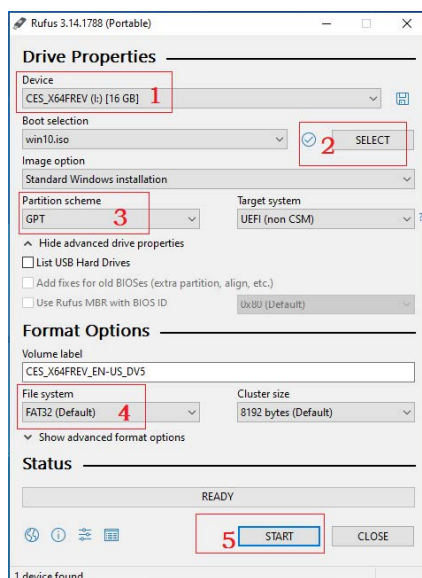
### 4.3.1 Prerequisites

- A USB drive with capacity no less than 8GB, preferably supporting USB 3.0
- Program for making the bootable device: rufus-xxx .exe (available in the release package under \5 image)
- Windows 10 image (available in the release package under \5 image)
- A host computer running Windows system
- An HDMI cable to connect the Board and the host PC
- A USB mouse and keyboard

### 4.3.2 Making a Bootable USB Drive for Windows 10

Plug the USB drive into the host PC. Run rufus-xxx .exe and it will automatically detect the USB drive. Then follow the steps below to make a bootable USB drive.

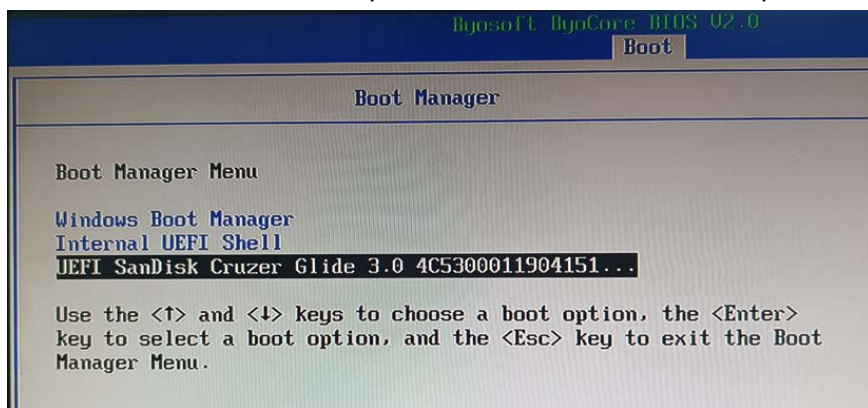
1. Click on **Device** and choose the USB you want to use from the drop-down;
2. Select the ISO image you want to burn onto the USB from the drop-down and click **Select**;
3. Generally, users would like to create a **Standard Windows installation**, and Rufus will automatically detect the correct **Partition Scheme** based on the USB drive. Yet make sure the partition scheme is **GPT**;
4. Set the Target system as **UEFI** and the File system as **FAT32** or **NTFS**;
5. Click **START** to make the bootable USB drive.



6. Unplug the USB drive from the host computer after the bootable device is successfully made.

### 4.3.3 Installing Windows 10

1. Plug the bootable USB drive into the Board;
2. Power the Board on and it will enter the boot process;
3. Press **F7** to enter the **BIOS boot manager** menu;
4. Select the bootable USB drive you created for Windows 10 and press **ENTER**;



5. Wait for the installation of Windows 10 on the Board.

## **CHAPTER 5 DISPOSAL AND WARRANTY**

## 5.1 Disposal

When the device comes to end of life, you are suggested to properly dispose of the device for the sake of the environment and safety.

Before you dispose of the device, please back up your data and erase it from the device.

It is recommended that the device is disassembled prior to disposal in conformity with local regulations. Please ensure that the abandoned batteries are disposed of according to local regulations on waste disposal. Do not throw batteries into fire or put in common waste canister as they are explosive. Products or product packages labeled with the sign of “explosive” should not be disposed of like household waste but delivered to specialized electrical & electronic waste recycling/disposal center.

Proper disposal of this sort of waste helps avoid harm and adverse effect upon surroundings and people’s health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

## 5.2 Warranty

### Product warranty

VANTRON warrants to its CUSTOMER that the Product manufactured by VANTRON, or its subcontractors will conform strictly to the mutually agreed specifications and be free from defects in workmanship and materials (except that which is furnished by the CUSTOMER) upon shipment from VANTRON. VANTRON's obligation under this warranty is limited to replacing or repairing at its option of the Product which shall, within **24 months** after shipment, effective from invoice date, be returned to VANTRON's factory with transportation fee paid by the CUSTOMER and which shall, after examination, be disclosed to VANTRON's reasonable satisfaction to be thus defective. VANTRON shall bear the transportation fee for the shipment of the Product to the CUSTOMER.

### Out-of-Warranty Repair

VANTRON will furnish the repair services for the Product which are out-of-warranty at VANTRON's then-prevailing rates for such services. At customer's request, VANTRON will provide components to the CUSTOMER for non-warranty repair. VANTRON will provide this service as long as the components are available in the market; and the CUSTOMER is requested to place a purchase order up front. Parts repaired will have an extended warranty of 3 months.

### Returned Products

Any Product found to be defective and covered under warranty pursuant to Clause above, shall be returned to VANTRON only upon the CUSTOMER's receipt of and with reference to a VANTRON supplied Returned Materials Authorization (RMA) number. VANTRON shall supply an RMA, when required within three (3) working days of request by the CUSTOMER. VANTRON shall submit a new invoice to the CUSTOMER upon shipping of the returned products to the CUSTOMER. Prior to the return of any products by the CUSTOMER due to rejection or warranty defect, the CUSTOMER shall afford VANTRON the opportunity to inspect such products at the CUSTOMER's location and no Product so inspected shall be returned to VANTRON unless the cause for the rejection or defect is determined to be the responsibility of VANTRON. VANTRON shall in turn provide the CUSTOMER turnaround shipment on defective Product within **fourteen (14) working days** upon its receipt at VANTRON. If such turnaround cannot be provided by VANTRON due to causes beyond the control of VANTRON, VANTRON shall document such instances and notify the CUSTOMER immediately.