

VT-SBC-3568 Single Board Computer



User Manual

Version: 1.1

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Revision History

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Foreword

Thank you for purchasing VT-SBC-3568 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:

- Network architects/programmers
- 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 name and PO number;
- Complete description of the problem;
- Error message you received, if any.

US Office: Vantron Technology, Inc.

Address: 48434 Milmont Drive, Fremont, CA 94538

Tel: (650) 422-3128

Email: sales@vantrontech.com

China Office: Chengdu Vantron Technology Co., Ltd.

Address: 6th Floor, 1st Building, No.9, 3rd WuKe East Street, WuHou District, Chengdu, P.R. China 610045

Tel: 86-28-8512-3930/3931, 86-28-8515-7572/6320

Email: sales@vantrontech.com.cn

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

VT-SBC-3568 single board computer is based on Rockchip RK3568 processor that integrates quad-core ARM Cortex-A55 CPU and Mali G52 GPU to provide optimized performance at lower power consumption, and offer high-quality video encoding and decoding for better display performance.

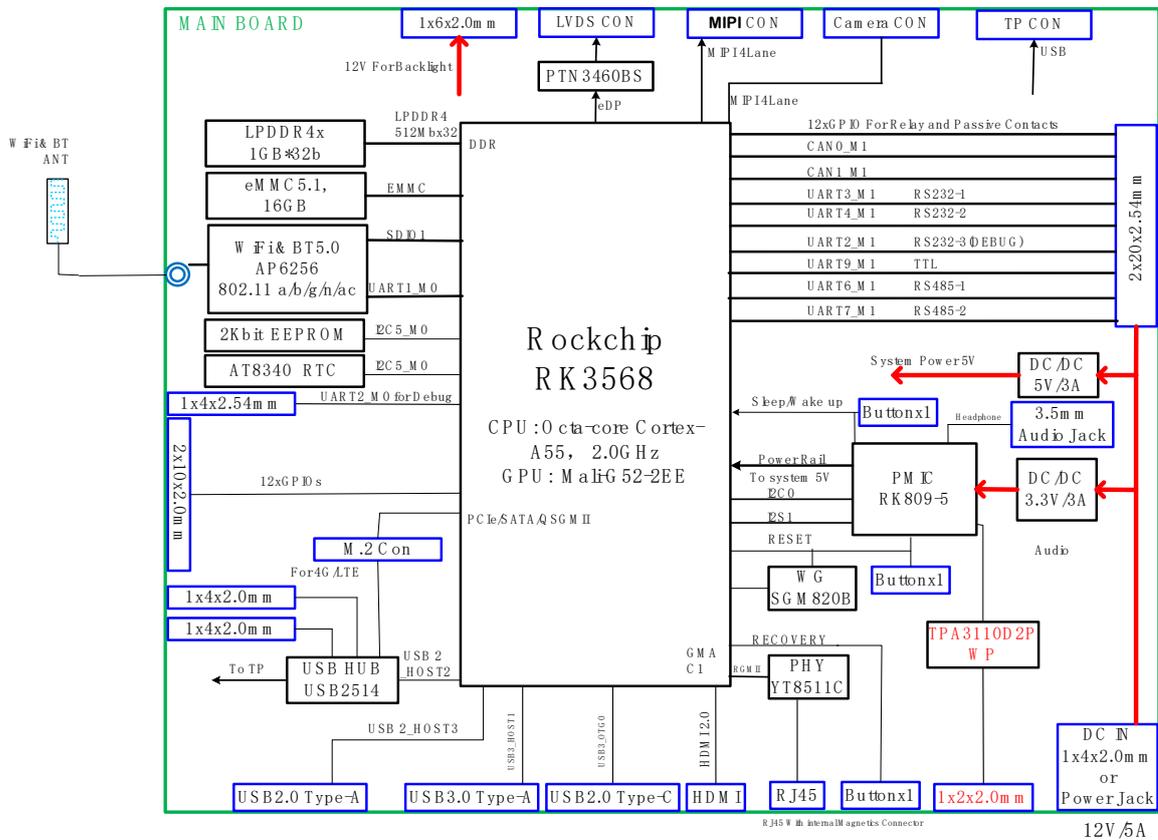
While both wired and wireless network accesses are available, user data is kept safe and secure in transmission. Meanwhile, VT-SBC-3568 provides a range of customer expansion options to meet the requirements of different application purposes, especially in industrial IoT scenarios.

Featuring high flexibility and high performance, VT-SBC-3568 could work under extreme environments at industrial-grade temperatures ranging from 0°C to +60°C, making it a reliable industrial IoT solution.

1.2 Terminology

Terminology	Description
NC	No connection
VCC	Voltage common collector
GND	Ground
/	Active low signal
+	Positive of difference signal
-	Negative of difference signal
I	Input
O	Output
I/O	Input/output
P	Power or ground
A	Analog
OD	Open drain
CMOS	3.3 V CMOS
LVC MOS	Low Voltage CMOS
LVTTL	Low Voltage TTL
3.3V	3.3 V signal level
5V	5V signal level
USB	5V tolerant signal
PCIe	PCI Express signal, not 3.3 V tolerant
MMC	Multimedia Card

1.3 Block Diagram



1.4 Specifications

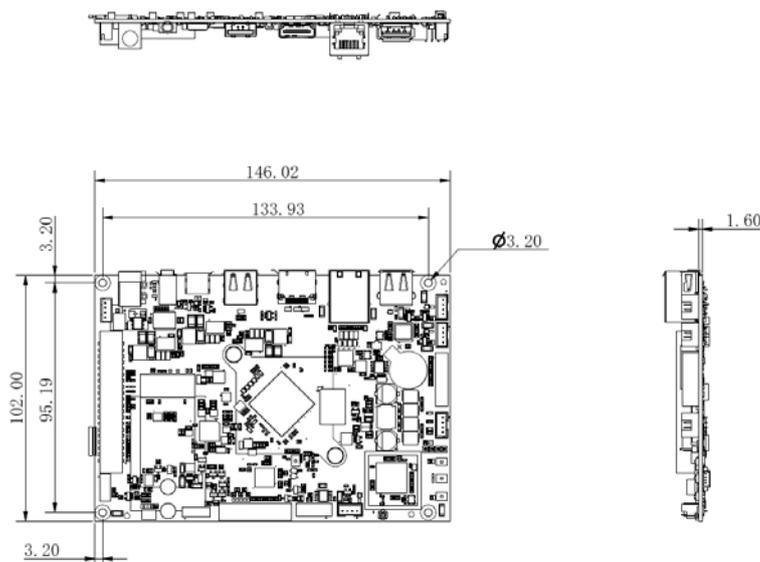
VT-SBC-3568		
System	CPU	RK3568, Quad-core ARM Cortex-A55 MPCore, up to 2.0 GHz
	GPU	ARM Mali-G52
	Memory	4GB LPDDR4 (Optional: 2GB)
	Storage	16GB eMMC V5.1, up to 128GB 2Kb EEPROM
Communication	Ethernet	1 x RJ45, 10/100/1000Mbps 100Base-T4 (surge suppression)
	Cellular	4G/5G (Optional)
	Wi-Fi & BT	802.11 a/b/g/n/ac & BT 5.0
Media	Display	Dual LVDS, Resolution up to 1920 x 1080, with backlight connector (Optional: eDP, Resolution up to 2K) 1 x MIPI DSI
	TP	Infrared touch panel (Optional)
	HDMI	1 x HDMI 2.0
	Camera	1 x 4-lane MIPI CSI
	Audio	1 x 3.5mm Audio jack 1 x Speaker, up to 15W
I/Os	Serial	5 x UART (RS232 & RS485) 1 x UART for debug
	USB	1 x USB 3.0 3 x USB 2.0 1 x USB 2.0 Type-C
	GPIO	24 x GPIO
	SIM slot	1 x Micro SIM slot
	RTC	Supported
	WDT	Supported
Expansion	Bus	2 x CAN, without transmitter 1 x I ² C for TP 1 x USB 2.0 host for TP 1 x M.2 key B for 4G/5G module and SSD
	System Control	1 x Reset 1 x Power button 1 x Volume button
Power	Input	12V/3A DC
Software	Operating system	Debian 10, Android 11+
Mechanical	Dimensions	146.02 x 102mm
	Cooling mode	Fanless
Environment Condition	Temperature	Operating: 0°C~+60°C (RK3568), -20°C~+70°C (RK3568J) Storage: -20°C~+70°C (RK3568), -40°C~+85°C (RK3568J)
	Humidity	≤96%RH (Non-condensing)

1.5 Operating system

VT-SBC-3568 supports Debian 10 and Android 11+ operating systems.

1.6 Mechanical Dimensions

- 146.02mm x 102mm



1.7 Power Supply and Consumption

VT-SBC-3568 works with 12V/3A DC power supply.

The power consumption of the Board is 30W at the maximum. It should be pointed out that power consumption is largely determined by the RAM, storage capacity, and other configurations of the board.

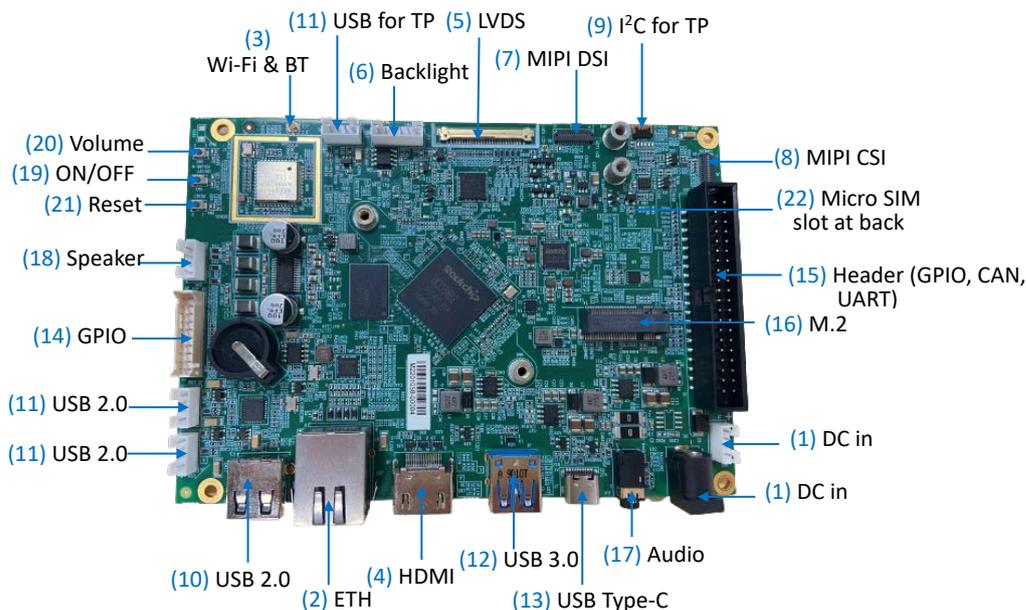
1.8 Environmental Specifications

VT-SBC-3568 works at a temperature ranging from 0°C to +60°C (for 3568J: -20°C to +70°C) and is designed to be stored at a temperature ranging from -20°C to +70°C (for 3568J: -40°C~+85°C) and a humidity of no more than 96% RH for non-condensing purpose.

CHAPTER 2

CONNECTOR DESCRIPTION

2.1 SBC Layout



2.2 Memory and Storage

2.2.1 LPDDR4 RAM

VT-SBC-3568 is equipped with a 4GB LPDDR4 RAM by default, and users also have the option of 2GB RAM.

2.2.2 eMMC Flash

VT-SBC-3568 provides an eMMC 5.1 flash up to 128 GB, and the default capacity is 16GB. It is used as the default boot and storage device.

2.2.3 EEPROM

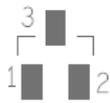
VT-SBC-3568 provides a 2Kb EEPROM to store hardware configuration information.

2.3 Identification of Pin 1

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.

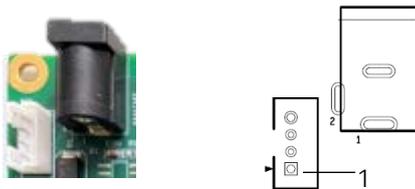


2.4 Connector

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

2.4.1 Power input (1)

VT-SBC-3568 provides a 4-pin power connector and a female power jack to supply power for the Board.



Pinout description of the 4-pin power connector:

Pin	Name	Type	Description
1	+VDC	P	DC-IN POWER +
2	+VDC	P	DC-IN POWER +
3	-VDC	P	DC-IN POWER -
4	-VDC	P	DC-IN POWER -

2.4.2 J23 Ethernet port (2)

VT-SBC-3568 offers an RJ45 ethernet jack with two LEDs, green for activity indication and yellow for link indication. The interface supports 10/100/1000 Mbps transmission rate.

2.4.3 J13 Wi-Fi and Bluetooth (3)

VT-SBC-3568 offers an AP6256 1T1R combo SiP module, combining 802.11 a/b/g/n/ac Wi-Fi and Bluetooth 5.0.

2.4.4 J9 HDMI (4)

VT-SBC-3568 offers a standard HDMI Type-A interface for image output. The pinout description of the interface is in line with the pin assignment of standard HDMI Type-A interface.

2.4.5 J11 LVDS (5)

VT-SBC-3568 offers a dual LVDS interface to connect high-definition displays (resolution up to 1920 x 1080).

Specifications: 1 x 40, 0.5mm, 0.5A, 1.00mm (H), male, RA, SMT, RoHS (IPEX: 20455-040E66).



Pinout description:

Pin	Name	Type	Description
1	PANEL_BL_PWM	O	LCD backlight PWM control output
2	PANEL_BKLTEN	O	LCD backlight power control output
3	LVDS_B_D3+	O	LVDS B Lane3 +
4	LVDS_B_D3-	O	LVDS B Lane3 -
5	LVDS_B_CLK+	O	LVDS B CLK+
6	LVDS_B_CLK-	O	LVDS B CLK-
7	NC		
8	LVDS_B_D2+	O	LVDS B Lane2 +
9	LVDS_B_D2-	O	LVDS B Lane2 -
10	LVDS_B_D1+	O	LVDS B Lane1 +
11	LVDS_B_D1-	O	LVDS B Lane1 -
12	SEL68	O	
13	NC		

14	eDP_HPD	I	热插拔检测信号
15	LVDS_B_D0+	O	LVDS B Lane0 +
16	LVDS_B_D0-	O	LVDS B Lane0 -
17	LVDS_DDC_DATA	I/O	I2C_SDA
18	LVDS_DDC_CLK	O	I2C_SCL
19	GND	P	接地
20	LVDS_A_D3+	O	LVDS A Lane3 +
21	LVDS_A_D3-	O	LVDS A Lane3 -
22	GND	P	接地
23	LVDS_A_CLK+	O	LVDS A CLK +
24	LVDS_A_CLK-	O	LVDS A CLK -
25	GND	P	接地
26	LVDS_A_D2+	O	LVDS A Lane2 +
27	LVDS_A_D2-	O	LVDS A Lane2 -
28	GND	P	接地
29	LVDS_A_D1+	O	LVDS A Lane1 +
30	LVDS_A_D1-	O	LVDS A Lane1 -
31	GND	P	接地
32	LVDS_A_D0+	O	LVDS A Lane0 +
33	LVDS_A_D0-	O	LVDS A Lane0 -
34	GND	P	接地
35	NC		
36	NC		
37	LCD_VDD	P	LCD 电源
38	LCD_VDD	P	LCD 电源
39	LCD_VDD	P	LCD 电源
40	LCD_VDD	P	LCD 电源

2.4.6 J12 Backlight connector (6)

VT-SBC-3568 offers a backlight connector that supplies power for the LCD panel.

Specifications: 1 x 6, 2.0mm, 2A, 6mm (H), male, RA, -25°C~85°C, THR, RoHS (JST: B6B-PH-K-S (LF) (SN))



Pinout description:

Pin	Name	Type	Description
1	LCD_BLK	P	Power supply 12V for backlight
2	LCD_BLK	P	Power supply 12V for backlight
3	PANEL_BKLTEN	O	LCD backlight power control output
4	PANEL_BL_PWM	O	LCD backlight PWM control output
5	GND	P	Ground
6	GND	P	Ground

2.4.7 J10 MIPI DSI (7)

VT-SBC-3568 offers a 4-lane MIPI DSI connector for connecting displays.

Specifications: 1 x 31, 0.3mm, 1.0mm(H), RA, Bot, WDT, SMT, RoHS (LZR: FPC031003-31LG)



1

Pinout description:

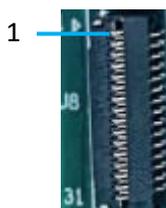
Pin	Name	Type	Description
1	LED+	P	Power supply for backlight
2	LED+	P	Power supply for backlight
3	LED+	P	Power supply for backlight
4	NC		
5	LED-	P	Feedback for current of backlight
6	LED-	P	Feedback for current of backlight
7	LED-	P	Feedback for current of backlight
8	LED-	P	Feedback for current of backlight
9	GND	P	Ground
10	GND	P	Ground
11	MIPI_D2P	O	MIPI DSI Lane2 +
12	MIPI_D2N	O	MIPI DSI Lane2 -
13	GND	P	Ground
14	MIPI_D1P	O	MIPI DSI Lane1 +
15	MIPI_D1N	O	MIPI DSI Lane1 -
16	GND	P	Ground
17	MIPI_CLK+	O	MIPI DSI CLK+
18	MIPI_CLK-	O	MIPI DSI CLK-
19	GND	P	Ground
20	MIPI_D0P	O	MIPI DSI Lane0 +

21	MIPI_D0N	O	MIPI DSI Lane0 -
22	GND	P	Ground
23	MIPI_D3P	O	MIPI DSI Lane3 +
24	MIPI_D3N	O	MIPI DSI Lane3 -
25	GND	P	Ground
26	ID	I	LCD ID
27	RST_LCD	O	LCD RESET
28	NC		
29	VCCIO_1V8	P	power supply 1.8V
30	VCC3V3_LCD	P	power supply 3.3V
31	VCC3V3_LCD	P	power supply 3.3V

2.4.8 J8 MIPI CSI (8)

VT-SBC-3568 offers a 4-lane MIPI CSI connector for connecting cameras.

Specifications: 1 x 31, 0.3mm, 1.0mm(H), RA, Bot, WDT, SMT, RoHS (LZR: FPC031003-31LG)



Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	MIPI_CSI_D3N	A	MIPI CSI Lane3 -
3	MIPI_CSI_D3P	A	MIPI CSI Lane3 +
4	GND	P	Ground
5	MIPI_CSI_D2N	A	MIPI CSI Lane2 -
6	MIPI_CSI_D2P	A	MIPI CSI Lane2 +
7	GND	P	Ground
8	MIPI_CSI_D1N	A	MIPI CSI Lane1 -
9	MIPI_CSI_D1P	A	MIPI CSI Lane1 +
10	GND	P	Ground
11	MIPI_CSI_D0N	A	MIPI CSI Lane0 -
12	MIPI_CSI_D0P	A	MIPI CSI Lane0 +
13	GND	P	Ground
14	MIPI_CSI_CLK0N	A	MIPI CSI CLK-
15	MIPI_CSI_CLK0P	A	MIPI CSI CLK+
16	GND	P	Ground

17	I2C2_SCL_M1_1V8	O	I2C_SCL
18	I2C2_SDA_M1_1V8	I/O	I2C_SDA
19	MIPI_CAM_RST	O	Camera RESET
20	MIPI_CAM_PWN	O	Camera Power Down
21	GND	P	Ground
22	MIPI_CAM_MCLK	O	Camera Main CLK
23	GND	P	Ground
24	NC		
25	VCC1V8_DVP	P	Power supply 1.8V
26	VCC1V8_DVP	P	Power supply 1.8V
27	VCC1V5_DVP	P	Power supply 1.5V
28	VCC2V8_DVP	P	Power supply 2.8V
29	VCC2V8_DVP	P	Power supply 2.8V
30	NC		
31	GND	P	Ground

2.4.9 J22 I²C (9)

VT-SBC-3568 offers an I²C interface for connecting a touch panel.

Specifications: 1 x 6, 0.5mm, 0.4A, 0.9mm(H), female, RA, WDT, SMT, RoHS (UJU: PF050-B06B-C09-A)



Pinout description:

Pin	Name	Type	Description
1	VCC3V3_PMU	P	Power supply 3.3V
2	GND	P	Ground
3	I2C1_SCL_TP	O	I2C_SCL for TP
4	I2C1_SDA_TP	I/O	I2C_SDA for TP
5	TP_INT	I	TP interrupt
6	TP_RST	O	TP RESET

2.4.10 U40 USB 2.0 Type-A (10)

VT-SBC-3568 is designed to connect peripherals via the USB 2.0 Type-A interface to expand the functions.

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



USB 2.0 Type-A

2.4.11 J3/J4/J5 USB 2.0 (11)

There are three USB 2.0 connectors, one could be used for connection of a touch panel, and the other two are in host mode by default (chipset USB2514).

Specifications: 1 x 4, 2.0mm, 2A, 6mm(H), male, RA, WDT, THR, RoHS (JST: B4B-PH-K-S (LF) (SN))



Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	HUB_HOST_DP	I/O	USB DATA+
3	HUB_HOST_DM	I/O	USB DATA-
4	HUB_HOST_5V	P	Power supply 5V for USB

2.4.12 J6 USB 3.0 (12)

VT-SBC-3568 offers a USB 3.0 (Type-A) interface with pinout in line with the pin assignment of standard USB 3.0 Type-A.



USB 3.0

2.4.13 J7 USB 2.0 Type-C (13)

VT-SBC-3568 offers a USB 2.0 Type-C interface.

Specifications: Max. current output: 0.5A, OTG supported.

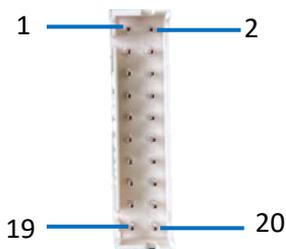


USB 2.0 Type-C

2.4.14 J21 GPIO (14)

There is a GPIO header supporting 12 GPIOs and user can customize the use of the pins.

Specification: 2 x 10, 2.0 mm, 6.5 mm (H), Vert, -25~85°C, THR, RoHS (JST: B20B-PHDSS (LF) (SN))



Pinout description (a user case is that the pins are used for LED and buttons):

Pin	Name	Type	Description
1	LED_1	O	LED output signal
2	BUTTON_1	I	Button input data
3	LED_2	O	LED output signal
4	BUTTON_2	I	Button input data
5	LED_3	O	LED output signal
6	BUTTON_3	I	Button input data
7	LED_4	O	LED output signal
8	BUTTON_4	I	Button input data
9	LED_5	O	LED output signal
10	BUTTON_5	I	Button input data
11	LED_6	O	LED output signal
12	BUTTON_6	I	Button input data
13	VCC3V3_EXT	P	Power supply 3.3V
14	VCC3V3_EXT	P	Power supply 3.3V
15	GND	P	Ground

16	GND	P	Ground
17	VCC_1V8	P	Power supply 1.8V
18	VCC_1V8	P	Power supply 1.8V
19	GND	P	Ground
20	GND	P	Ground

2.4.15 J20 40-pin header (15)

The 40-pin header on VT-SBC-3568 supports 2 CAN buses, 6 UART ports, and 12 GPIOs (customized for alarm in and out in the following description). Among the 6 UART ports, there are 2 RS485 ports (UART 6 & UART 7, corresponding to nodes ttyS6 & ttyS7), 1 TTL (UART 9, corresponding to ttyS9), 2 RS232 (UART 3 & UART 4, corresponding to ttyS3 and ttyS4), and 1 RS232 (UART 2) used for debugging.

Specifications: 2 x 20, 2.54mm, 8.8 mm(H), Vert, -45~105°C, SMT, RoHS



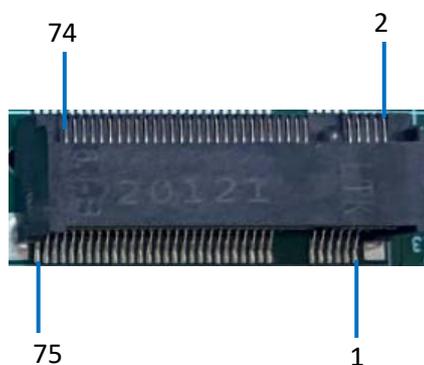
Pinout description:

Pin	Name	Type	Description
1	CAN0_RX_M1	I	CAN0 serial port data input
3	CAN0_TX_M1	O	CAN0 serial port data output
5	CAN1_RX_M1	I	CAN1 serial port data input
7	CAN1_TX_M1	O	CAN1 serial port data output
9	ALARM_OUT1	O	Alarm output
11	ALARM_OUT2	O	Alarm output
13	ALARM_OUT3	O	Alarm output
15	ALARM_OUT4	O	Alarm output
17	ALARM_IN1	I	Alarm input
19	ALARM_IN2	I	Alarm input
21	ALARM_IN3	I	Alarm input
23	ALARM_IN4	I	Alarm input
25	ALARM_IN5	I	Alarm input
27	ALARM_IN6	I	Alarm input
29	ALARM_IN7	I	Alarm input

31	EXGND	P	Ground
33	EXGND	P	Ground
35	EXGND	P	Ground
37	EXGND	P	Ground
39	EXGND	P	Ground
2	UART9_RX_M1	I	UART9 receive data
4	UART9_TX_M1	O	UART9 transmit data
6	UART2_RX_M0_DEBUG	I	UART2 receive data
8	UART2_TX_M0_DEBUG	O	UART2 transmit data
10	UART4_RX_M1	I	UART4 receive data
12	UART4_TX_M1	O	UART4 transmit data
14	UART3_RX_M1	I	UART3 receive data
16	UART3_TX_M1	O	UART3 transmit data
18	UART7_RX_M1	I	UART7 receive data
20	UART7_TX_M1	O	UART7 transmit data
22	RS485_DIR1_GPIO3_B5	I/O	RS485_1 control output signal
24	UART6_RX_M1	I	UART6 receive data
26	UART6_TX_M1	O	UART6 transmit data
28	RS485_DIR2_GPIO3_B6	I/O	RS485_2 control output signal
30	ALARM_IN8	I	Alarm input
32	DC_IN	P	Power input
34	DC_IN	P	Power input
36	DC_IN	P	Power input
38	DC_IN	P	Power input
40	DC_IN	P	Power input

2.4.16 J17 M.2 Key B slot (16)

VT-SBC-RK3568 offers an M.2 Key B slot, supporting PCIe to connect a 3G/4G/5G module and supporting SATA.



Pinout description:

Pin	Name	Type	Description	Comment
1, 20, 22, 23, 24, 28, 29, 31, 35, 37, 38, 40, 42, 44, 46, 48, 56, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68	NC	NC		
2, 4, 70, 72, 74	PCIE_3V3	P		
3, 5, 11, 27, 33, 39, 45, 51, 57, 71, 73, 76, 77	GND	P	Ground	
36	5G_USIM_PWR	P	USIM power output	Either 1.8 V or 3.0 V is supported by the module automatically.
34	5G_USIM_DATA	I/O	USIM data signal	
32	5G_USIM_CLK	I	USIM clock signal	
30	5G_USIM_RESET	I	USIM reset signal	
66	SIM_DETECT1	O	USIM Plug Detect signal	
7	USBDP_DN4	IO	USB data+	
9	USBDM_DN4	IO	USB data-	
41	PCIE_RXN_A	O	PCIE 2.0 transmit data-	
43	PCIE_RXP_A	O	PCIE 2.0 transmit data+	
47	PCIE_TXN_A	I	PCIE 2.0 receive data-	
49	PCIE_TXP_A	I	PCIE 2.0 receive data+	
53	PCIE_CLKN_A	I	PCIE 2.0 CLK-	
55	PCIE_CLKP_A	I	PCIE 2.0 CLK+	
6	5G_PWR_OFF#1_1V8	I	5G power on and off control	1.8 V power domain
8	5G_DISABLE#1_1V8	O	5G Flight mode control data	
67	WWAN_RESET#1	I	5G RESET	

2.4.17 J16 Audio jack (17)

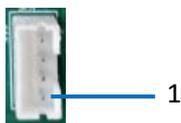
VT-SBC-RK3568 offers a 3.5mm audio jack.



2.4.18 J15 Speaker connector (18)

VT-SBC-RK3568 offers a left/right speaker connector that is designed to connect a 5W/8Ω speaker.

specifications: 1 x 4, 2.0mm, 2A, 6mm (H), male, Vert, WDT, THR, RoHS (JST: B4B-PH-K-S (LF) (SN))



Pinout description:

Pin	Name	Type	Description
1	OUTL+A	A	5W speaker +
2	OUTL-A	A	5W speaker -
3	OUTR-A	A	5W speaker -
4	OUTR+A	A	5W speaker +

2.4.19 Buttons (19-21)

VT-SBC-3568 offers three buttons, including a volume button, an on/off button, and a reset button.



2.4.20 J18 Micro SIM (22)

VT-SBC-3568 offers a Micro SIM card slot.

Specifications: Micro SIM, push-push, -25°C~90°C, No WP, SMT, RoHS

CHAPTER 3

SOFTWARE

3.1 Prerequisites

Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image in the Windows and Ubuntu environments.

Please prepare the following:

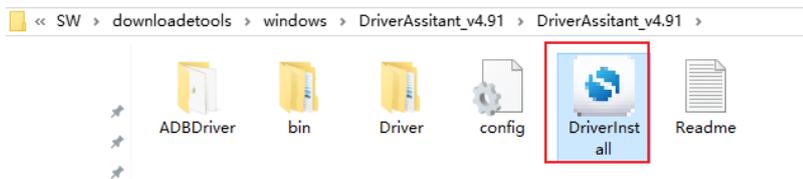
- A host with terminal tools installed (running Windows 7 or later or Ubuntu 16.4 or later)
- USB cable
- Connect the host and VT-SBC-3568 with the USB cable

3.2 Firmware Upgrade in Loader Mode (Windows system)

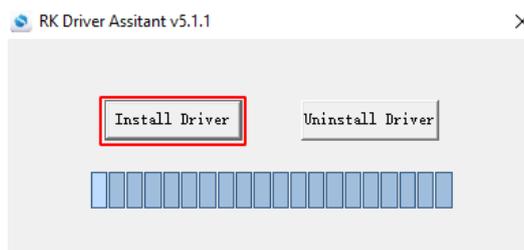
3.2.1 Driver installation

In windows environment, follow the steps below to finish driver installation.

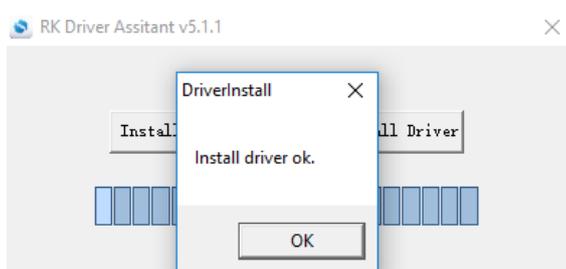
1. Unzip the release package sent from Vantron, and open the folder;
2. Navigate to the following directory: SW/ downloadetools/ windows/ DriverAssitant_v4.91/ DriverInstall;



3. Right click the mouse and run the program as administrator;
4. Click **Install the Driver** and wait;

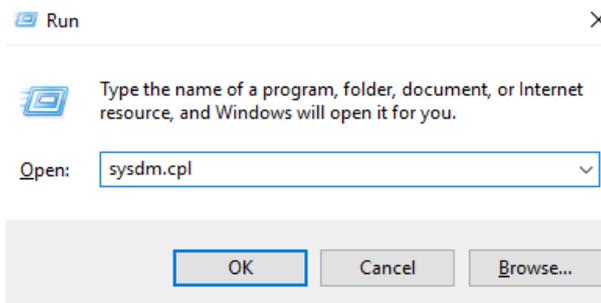


5. A pop-up will appear in a second suggesting the driver is installed;

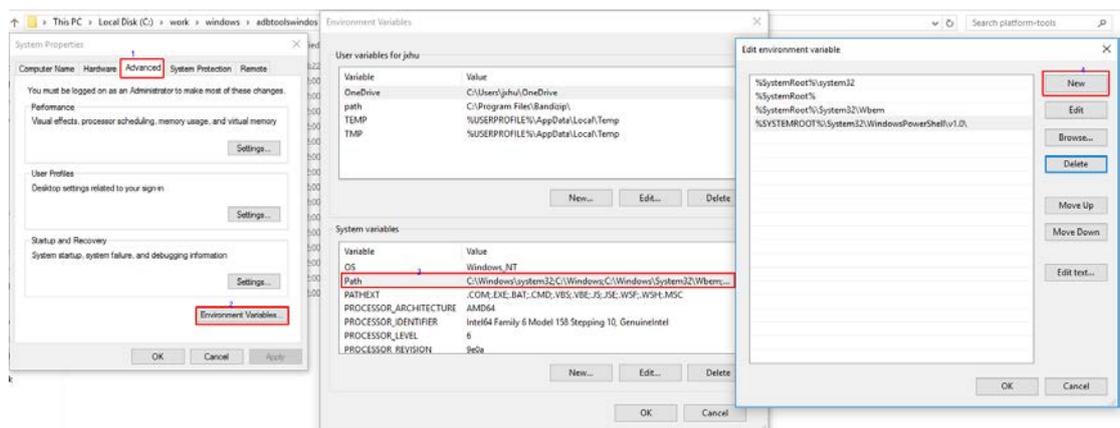


3.2.2 ADB setup

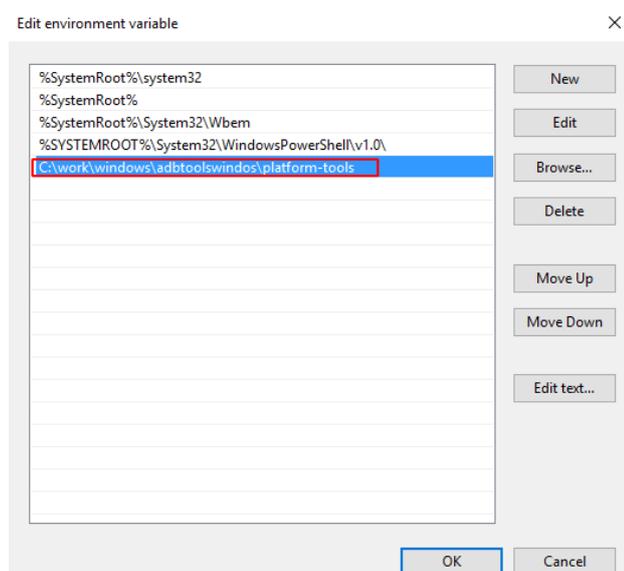
1. Open the release package and navigate to the following directory: SW/downloadtools/ windows/ adbtoolswindos/ platform-tools to locate **adb .exe**;
2. Press “Win + R” and input “sysdm.cpl” in the dialogue box to open the settings interface;



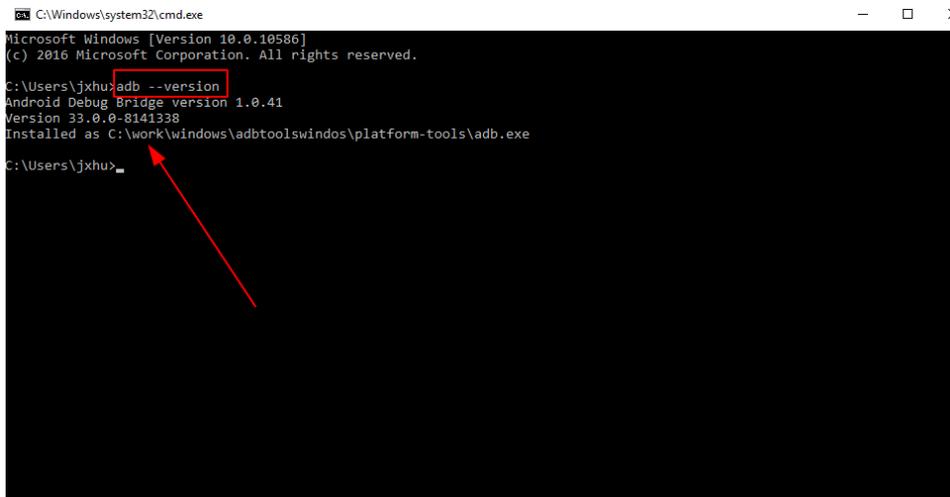
3. Click in sequence **Advanced > Environment Variables > Path > Edit**, and click **New** in the pop-up;



4. Copy the path of **adb .exe** as mentioned in step 1, and click **OK** to confirm;



5. Press “Win + R” and input “cmd” in the dialogue box;
6. Input “adb --version” in the command prompt window to check if the ADB tool is installed.



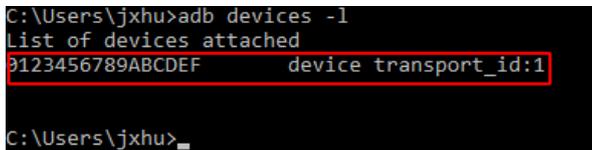
```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.18586]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\jxhu>adb --version
Android Debug Bridge version 1.0.41
Version 33.0.0-8141338
Installed as C:\work\windows\adbtools\windows\platform-tools\adb.exe

C:\Users\jxhu>
```

3.2.3 Image download

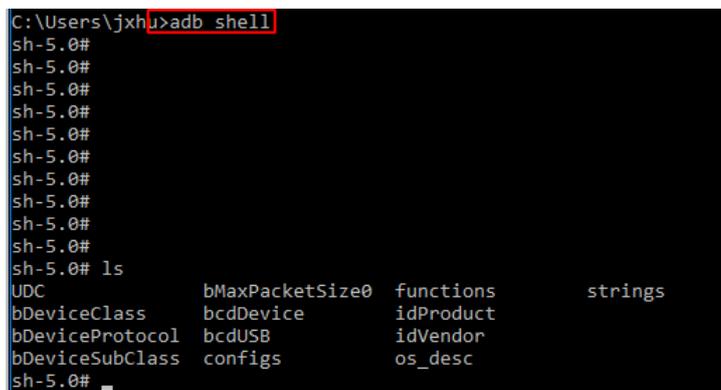
1. Connect VT-SBC-3568 and the host with the USB cable;
2. Input “adb devices -l” in the command prompt window to check if VT-SBC-3568 is connected to the host;



```
C:\Users\jxhu>adb devices -l
List of devices attached
9123456789ABCDEF    device transport_id:1

C:\Users\jxhu>
```

3. Navigate to the local directory as follows: SW/ downloadetools/ windows/ RKDevTool_Release_v2.84, and double click RKDevTool.exe  RKDevTool ;
4. Normally, a message suggesting the existence of an ADB device will show up at the bottom of the tool window in about 10 seconds;
5. Input “adb shell” in the prompt window to enter ADB shell so that you can execute shell commands on the device;

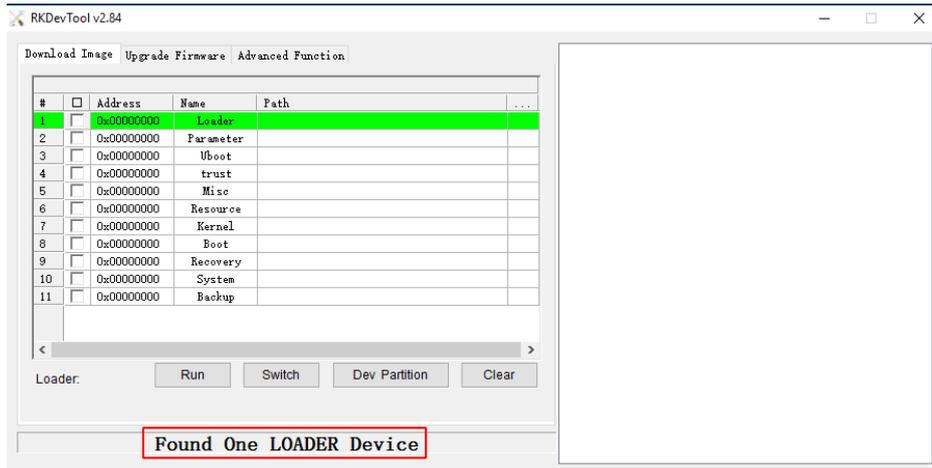


```
C:\Users\jxhu>adb shell
sh-5.0#
sh-5.0# ls
UDC                bMaxPacketSize0  functions         strings
bDeviceClass       bcdDevice         idProduct
bDeviceProtocol    bcdUSB            idVendor
bDeviceSubClass    configs           os_desc
sh-5.0#
```

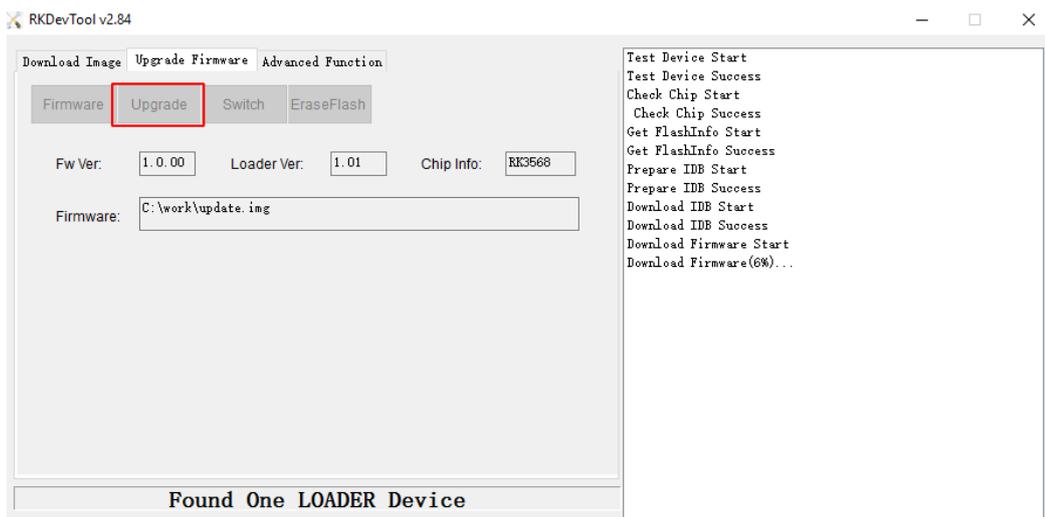
- Input "reboot loader" in ADB shell to enter Loader mode;

```
sh-5.0# reboot loader  
C:\Users\jxhu>
```

- Go back to RK Device Tool window, you'll see a message suggesting the existence of a loader device at the bottom;



- Click **Upgrade Firmware** tab (the second tab at the top of the window) and then **Firmware** button;
- Select **update.img** from the directory: **SW\ Image** and click **Open**, and the firmware details will be automatically populated in the firmware information box;
- Click **Upgrade** button (next to **Firmware** button), and the device will start to download the image and upgrade;



- When the upgrade finishes, the device will reboot automatically.

3.3 Firmware Upgrade in Loader Mode (Ubuntu system)

3.3.1 ADB setup

1. Input the following command line in Ubuntu terminal to install ADB tool;

```
$ sudo apt-get install adb -y
```

```
jxhu@vantron:~$ sudo apt-get install adb
[sudo] password for jxhu:
Reading package lists... Done
Building dependency tree
Reading state information... Done
adb is already the newest version (1:8.1.0+r23-5ubuntu2).
The following packages were automatically installed and are no longer required:
  binutils-aarch64-linux-gnu binutils-arm-linux-gnueabihf cpp-9-aarch64-linux-gnu
  gcc-9-arm-linux-gnueabihf-base gcc-9-cross-base libasan5-arm64-cross
  libgcc-9-dev-arm64-cross libgcc-9-dev-armhf-cross libgcc-s1-arm64-cross
  libstdc++6-armhf-cross libtsan0-arm64-cross libubsan1-arm64-cross
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 49 not upgraded.
jxhu@vantron:~$
```

2. Connect VT-SBC-3568 and the host with the USB cable;
3. Check if VT-SBC-3568 is connected to the host;

```
$ adb devices -l
```

```
jxhu@vantron:~$ adb devices -l
List of devices attached
0123456789ABCDEF      device usb:1-3 transport_id:1
jxhu@vantron:~$
```

4. Input “adb shell” to enter ADB shell so that you can execute shell commands on the device;

```
jxhu@vantron:~$ adb shell
sh-5.0# ls
UDC                bMaxPacketSize0  functions         strings
bDeviceClass       bcdDevice        idProduct
bDeviceProtocol    bcdUSB           idVendor
bDeviceSubClass    configs          os_desc
sh-5.0#
```

5. Input “reboot loader” in ADB shell, and the device will reboot automatically and enter the loader mode.

```
sh-5.0# reboot loader
jxhu@vantron:~$
```

3.3.2 Image Download

1. Locate the local directory of the upgrade tool in the release package, i.e., SW\downloadetools\linux\Linux_Upgrade_Tool;
2. Use the upgrade tool: copy the release package to Ubuntu system from the local directory, or save the release package in a USB drive and open it with command lines in Ubuntu, or open the terminal from the directory of the upgrade tool in Ubuntu, choose whichever convenient for you;



3. Input the following command line in the terminal to download the upgrade image;

```
$ ./upgrade_tool uf xxx/SW/update.img
```

▶ “xxx” is the full name of the release package.

4. The system will start upgrading right the download finishes, and the system will reboot automatically when the upgrade finishes.

3.4 Development Guide

3.4.1 Static IP setup

1. Input the following command in the terminal for network setup

```
$ vi /etc/network/interfaces
```

2. Example:

```
$ auto eth0
$ iface eth0 inet static
$ address 192.168.1.111
$ netmask 255.255.255.0
$ gateway 192.168.1.1

$ reboot
```

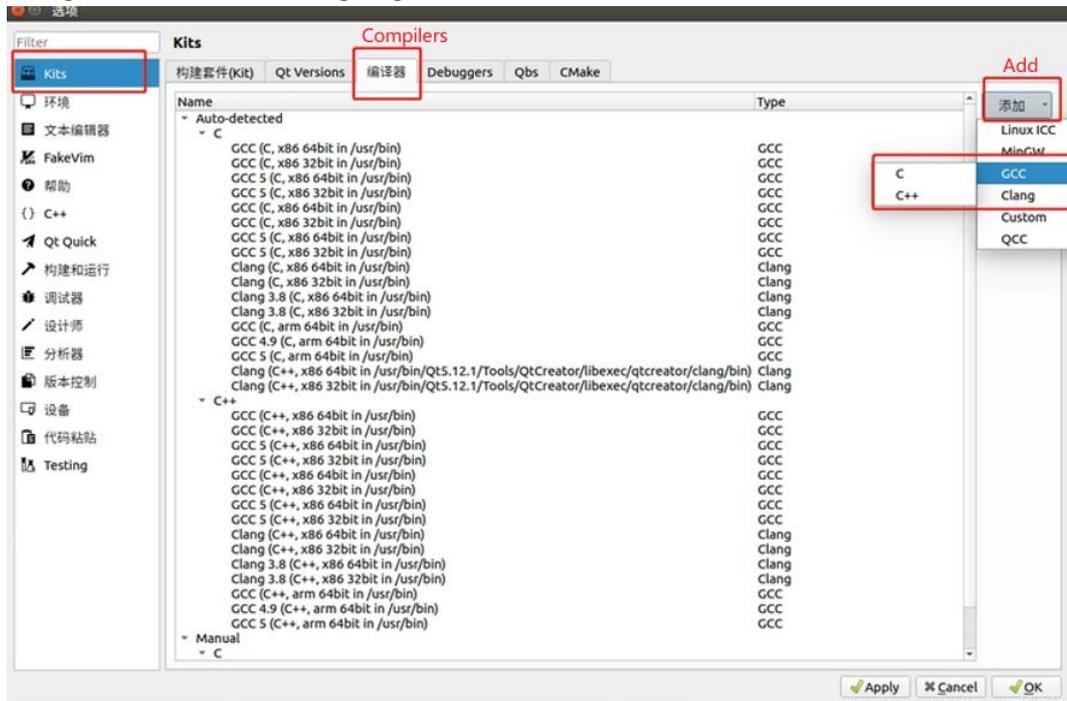
3.4.2 Qt setup for cross compilation

1. Install Qt installer (Ubuntu 20.04 is recommended);

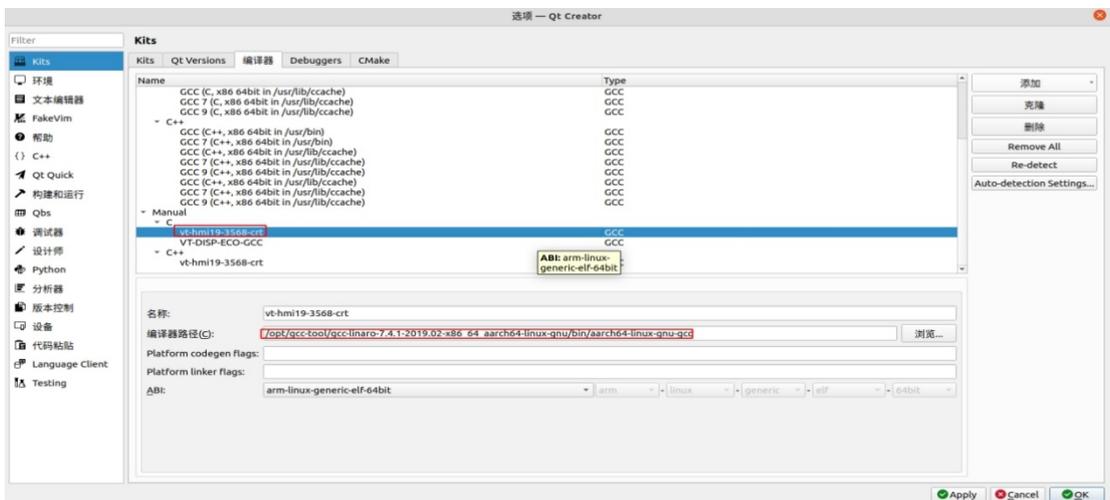
```
$ dpkg -i ubuntu-host-qt-5.12.11.deb
```



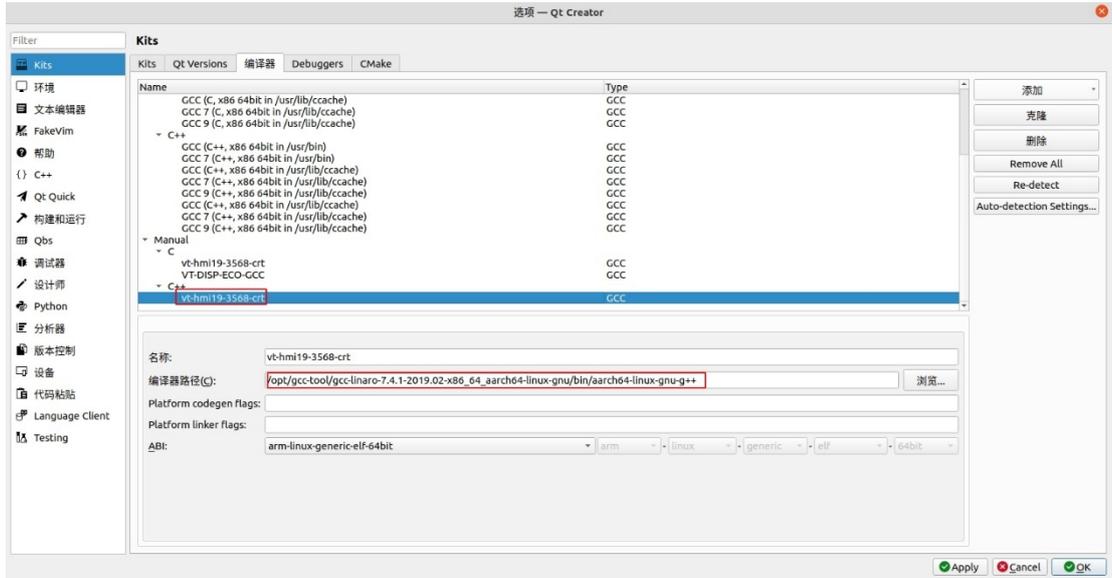
2. Run the installer and click **Tool -> Options -> Kits** in sequence, then add the compilers that have been installed: aarch64-linux-gnu-gcc, aarch64-linux-gnu-g++, aarch64-linux-gnu/bin/aarch64-linux-gnu-gdb.



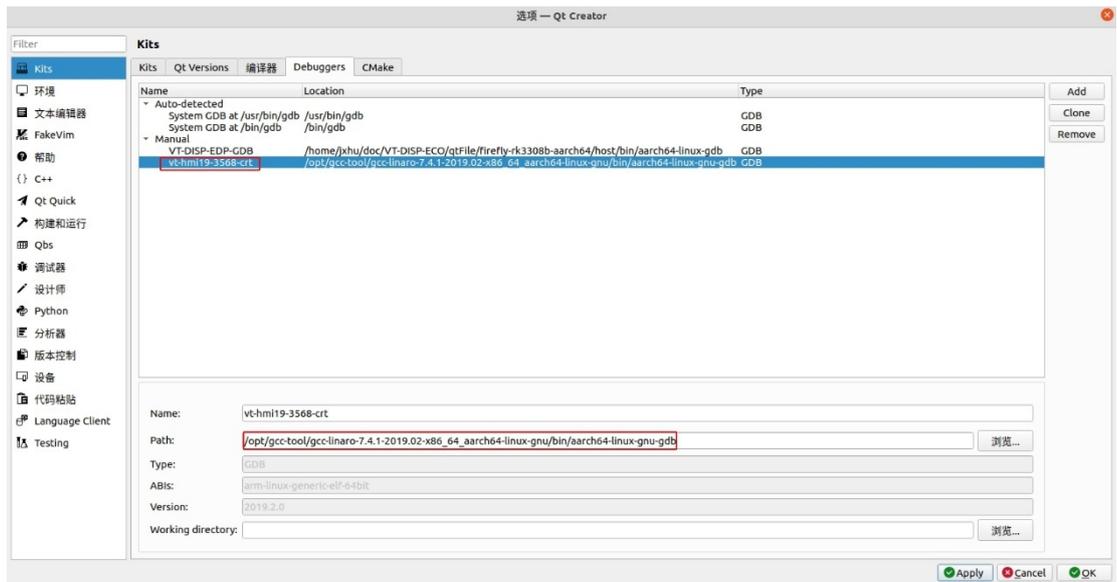
3. Configure GCC (path: opt/gcc-tool/gcc-linaro-7.4.1-2019.02-x86_64_aarch64-linux-gnu/bin/aarch64-linux-gnu-gcc);



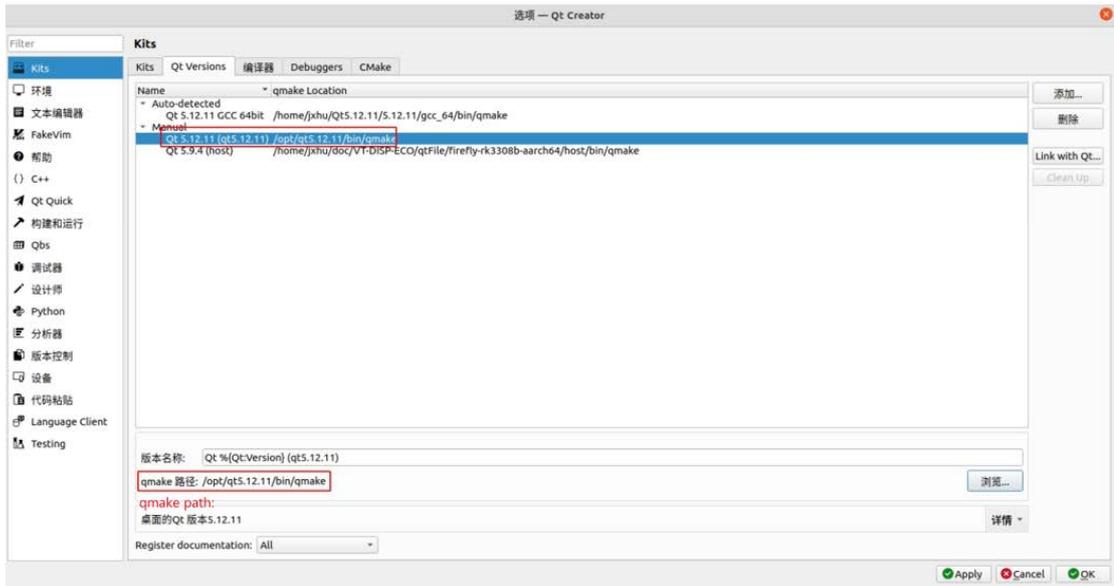
4. Configure G++ (path: /opt/gcc-tool/gcc-linaro-7.4.1-2019.02-x86_64_aarch64-linuxgnu/bin/aarch64-linux-gnu-g++);



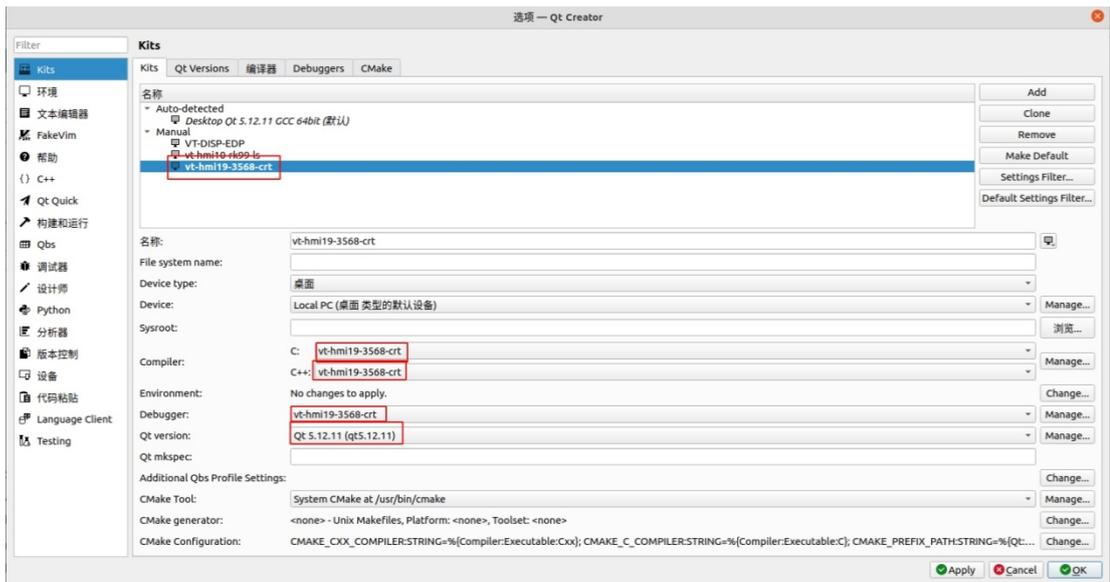
5. Configure GDB (path: /opt/gcc-tool/gcc-linaro-7.4.1-2019.02-x86_64_aarch64-linuxgnu/bin/aarch64-linux-gnu-gdb);



6. Click **Qt Versions** next to **Compiler** to configure qmake;



7. Add the build kit, including name, device type, compiler, and Qt version.



3.5 Use MySQL

1. Log in MySQL;

```
mysql -uroot
```

2. Use MySQL database;

```
use mysql;
```

3. Set passwords for rootuser;

```
SET PASSWORD FOR 'root'@'localhost' = PASSWORD('123456');
```

4. Allow remote connection;

```
update user set host='%' where user='root' and host='localhost';  
FLUSH PRIVILEGES;
```

3.6 Interface Configuration

3.6.1 Serial port

VT-SBC-3568 offers 6 UART ports, including 2 RS485 ports (UART 6 & UART 7, corresponding to nodes ttyS6 & ttyS7), 1 TTL (UART 9, corresponding to ttyS9), 2 RS232 (UART 3 & UART 4, corresponding to ttyS3 and ttyS4), and 1 RS232 (UART 2) used for debugging.

1. Input the node of the serial port to enable serial communication (e.g., RS485_1);

```
# rs485_active /dev/ttyS6
```

2. Send data ("TEST") to the serial port and receive the data.

```
# echo TEST > /dev/ttyS6
```

```
# cat /dev/ttyS6 &
```

 the serial port cannot receive and transmit data at the same time.

3.6.2 CAN

VT-SBC-3568 offers two CAN buses (CAN0 & CAN1).

Configure the CAN buses and run the commands:

```
# ip link set can0 up type can bitrate 125000  
IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready  
# ip link set can1 up type can bitrate 125000  
IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready  
#ifconfig  
can0   Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  
00
```

```
UP RUNNING NOARP MTU:16 Metric:1
RX packets:12 errors:0 dropped:0 overruns:0 frame:0
TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:10
RX bytes:44 (44.0 B) TX bytes:20 (20.0 B)
Interrupt:32

can1    Link encap:UNSPEC HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
UP RUNNING NOARP MTU:16 Metric:1
RX packets:12 errors:0 dropped:0 overruns:0 frame:0
TX packets:7 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:10
RX bytes:44 (44.0 B) TX bytes:24 (24.0 B)
Interrupt:33
```

3.6.3 GPIO

1. Write a GPIO pin number to “/sys/class/gpio/export” to export the pin, for instance pin value = 20:

```
~# echo 20 > /sys/class/gpio/export
```

2. Set the pin direction as input or output (in for input and out for output);

```
~# echo out > /sys/class/gpio/gpio20/direction
```

3. If you configured an output pin in the prior step, now you can set its value to 0 or 1 (corresponding to low or high) as follows:

```
~# echo 0 > /sys/class/gpio/gpio20/value [set it low], or
```

```
~# echo 1 > /sys/class/gpio/gpio20/value [set it high]
```

4. Read the GPIO value;

```
~# cat /sys/class/gpio/gpio20/value
```

5. When you finish using the pin, just unexport it. To do this, write the pin number to the unexport file:

```
~# echo 20 > /sys/class/gpio/unexport
```

3.6.4 Ethernet

Set up and verify the IP address of the ethernet port:

```
# ifconfig eth0 192.168.9.10
# ping 192.168.9.10
PING 192.168.9.10 (192.168.9.10): 56 data bytes
64 bytes from 192.168.9.10: seq=0 ttl=64 time=1.296 ms
64 bytes from 192.168.9.10: seq=1 ttl=64 time=1.358 ms
```

CHAPTER 4

DISPOSAL AND PRODUCT WARRANTY

4.1 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.

4.2 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 a 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.