

VT-SBC-RK66 Single Board Computer



User Manual

Version: 1.4

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Revision History

No.	Version	Description	Date
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2	V1.1	Replaced the connector pictures	Aug. 9, 2022
3	V1.2	Added the software debugging instructions	Dec. 16, 2022
4	V1.3	Updated Android system manual	Mar. 17, 2023
5	V1.4	Added Debian system manual	Jul. 21, 2023

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Foreword

Thank you for purchasing VT-SBC-RK66 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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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.

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Email: 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

VT-SBC-RK66 multi-functional single board computer is running the latest Android 11 operating system. The high-performance board is GMS certified to enable customers to have unimpeded access to Google mobile services.

The board is powered by RK3566, a cost-effective multi-core processor developed by Rockchip. With 4GB memory and 32GB eMMC storage, it features quick access to data and ultra large capacity. As such, it is capable of dealing with huge volume of data in a timely manner.

With plenty of peripheral interfaces, a wide choice of peripherals can be connected for extended applications, including barcode scanners, cameras, barcode printers and keyboard plates. The SBC also supports ultra-high-definition video outputs as it offers a high-performance video engine coupled with HEVC hardware decoding and 1080p/2K video resolution. Moreover, display interfaces of different specifications allow flexible application of the device in intelligent retailing, new retailing, financial self-service terminals, and other scenarios.

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 control

1.3 Specifications

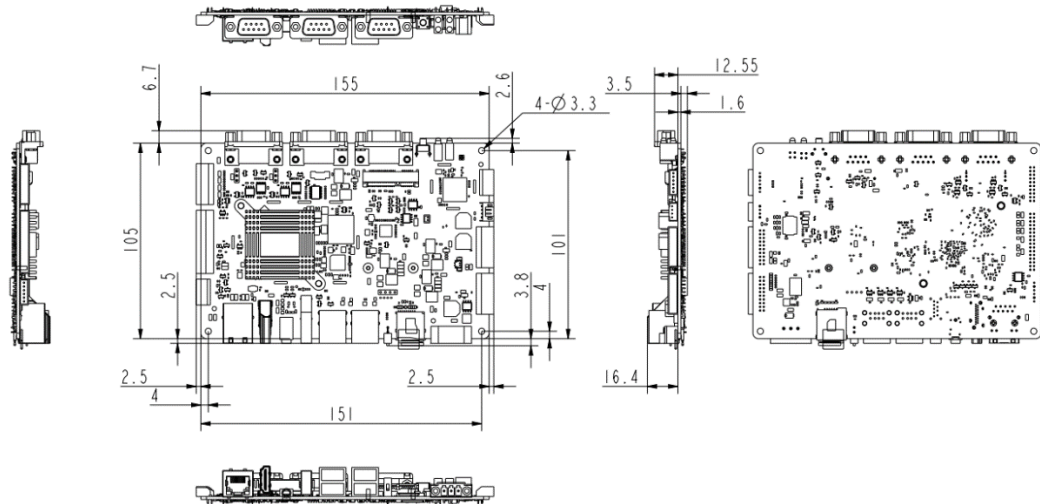
VT-SBC-RK66		
System	CPU	Rockchip RK3566, Quad-core ARM Cortex-A55, 1.8GHz (Max.)
	Memory	4GB
	Storage	32GB (up to 128GB) 1 x Micro-SD (up to 128GB)
Communication	Ethernet	1 x RJ45, 10M/100M/1000Mbps
	Wi-Fi & Bluetooth	Wi-Fi 802.11 a/b/g/n/ac + BT 5.0
	4G/LTE	Supported (expansion by mini PCIe)
Media	Display	1 x HDMI, Type-A, up to 4K × 2K @60Hz 1 x 4-lane eDP, 2K @60Hz 1 x 8-lane MIPI DSI connector (including 4 lanes multiplexed to LVDS): single-channel MIPI DSI: 1080P@60Hz, LVDS: 720P @60Hz; dual-channel MIPI DSI: 2K @60Hz
	Audio	1 x 3.5mm combo audio jack
	Speaker	1 x Speaker connector
	Camera	1 x MIPI CSI, 2 x 10 x 2.0mm
I/Os	Serial port	1 x RS232, DB9 1 x RS232, pin header 2 x RS232/RS485, DB9
	USB	4 x USB 2.0 Type-A (USB OTG supported) 1 x USB 3.0
	SIM slot	1 x SIM card slot
	GPIO	8 x GPIO, 3.3V
	RTC	Supported
	Watchdog	Supported
Expansion	Mini-PCIe	1 x Mini-PCIe for 4G/LTE module
System Control	Button	1 x Reset button
	LED	1 x 4G LED 1 x Power LED 1 x User defined 1 x System LED
Software	OS	Android 11, GMS certified (Optional: Linux OS)
	Device management platform	Vantron BlueSphere MDM
Power	Input	12V/24V 3A DC (±5%), 1 x 3 x 3.81mm
Mechanical	Dimensions	155 x 105 x 16.4mm
Environment Condition	Temperature	Operating: 0°C~+60°C Storage: -40°C~+85°C
	Humidity	Operating: RH 5%~95% Storage: RH 5%~95%
	Certification	FCC ESD: ±4KV (Contact) and ±8KV (Air)

1.4 Operating System

VT-SBC-RK66 supports Android 11 operating systems, users also have the option of Linux operating systems.

1.5 Mechanical Dimensions

- 155 x 105 x 16.4mm



1.6 Power Supply and Consumption

VT-SBC-RK66 works with 12V/24V DC power input, supplied by a DC terminal block.

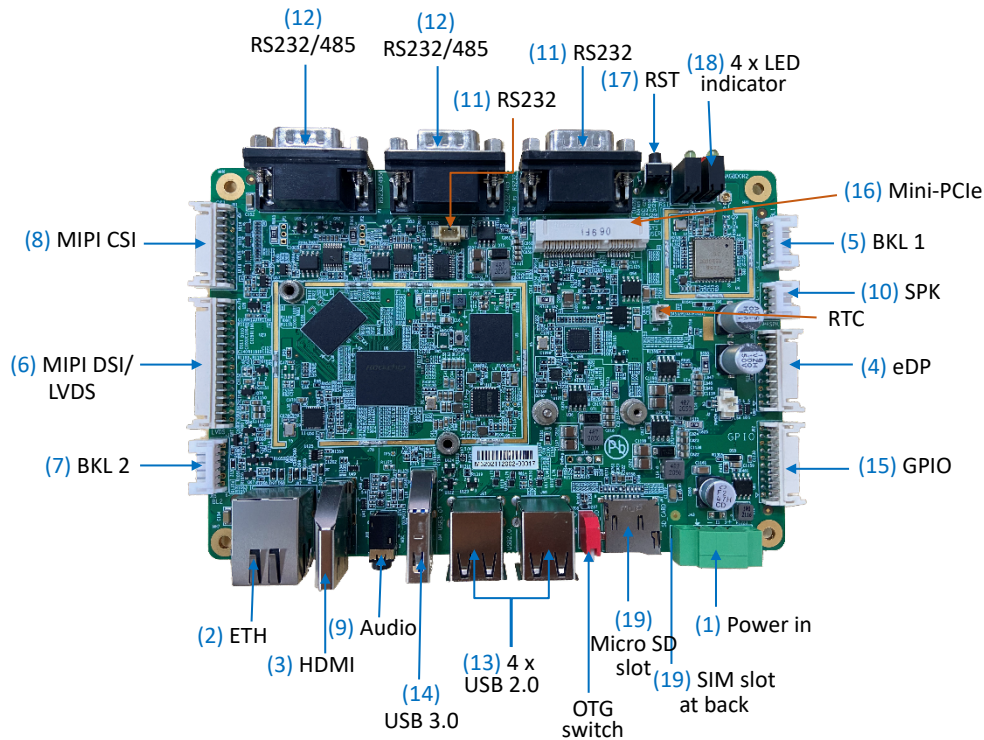
Theoretically, the Board typically consumes about 15W of power. It should be pointed out that power consumption is largely determined by the RAM, storage capacity, and other configurations of the Board.


1.7 Environmental Specifications

VT-SBC-RK66 works at a temperature ranging from 0°C to +60°C and at relative humidity of 5%-95% for non-condensing purpose.

CHAPTER 2 HARDWARE AND PIN ASSIGNMENT

2.1 Product Layout



 The board I/Os will be described in detail in 2.4 Connectors and Jumpers following the sequencing numbers provided here.

2.2 Memory

VT-SBC-RK66 is equipped with a 4GB RAM.

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 Connectors and Jumpers

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

2.4.1 Power terminal (1)

VT-SBC-RK66 implements a terminal block (1 × 3, 3.81mm, 10A) which is designed to connect to a 12V/24V DC (12V 3A recommended) power supply with over-voltage protection and over-current protection. Since the terminal block also provides backlight power supply, please take the input voltage of the backlight into consideration when selecting the power supply.



Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	-VDC	P	12V DC Power_In -
3	+VDC	P	12V DC Power_In +

2.4.2 Ethernet jack (2)

VT-SBC-3588 implements an RJ45 Ethernet jack with two LED indicators, green for activity indication and yellow for link indication. The port supports 10/100/1000 Mbps transmission rate.

2.4.3 HDMI (3)

There is an HDMI port (Type-A) on the Board, supporting HDMI 2.0a protocol with a resolution up to 4K × 2K @60Hz.

2.4.4 eDP (4)

VT-SBC-RK66 implements a 4-lane eDP connector ($2 \times 10 \times 2.0\text{mm}$) to connect an external screen via an extension cable.

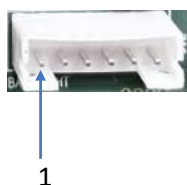


eDP pinout description:

Pin	Name	Description
1	EDP_TX_D0N	eDP differential lane 0 negative
2	EDP_TX_D1N	eDP differential lane 1 negative
3	EDP_TX_D0P	eDP differential lane 0 positive
4	EDP_TX_D1P	eDP differential lane 1 positive
5	GND	Digital ground
6	GND	Digital ground
7	EDP_TX_D2N	eDP differential lane 2 negative
8	EDP_TX_D3N	eDP differential lane 3 negative
9	EDP_TX_D2P	eDP differential lane 2 positive
10	EDP_TX_D3P	eDP differential lane 3 positive
11	GND	Digital ground
12	GND	Digital ground
13	EDP_TX_AUXN	eDP differential AUX channel negative
14	eDP_HPD	Hot Plug Detect
15	EDP_TX_AUXP	eDP differential AUX channel positive
16	GND	Digital ground
17	GND	Digital ground
18	GND	Digital ground
19	EDP_VDD	Power Supply
20	EDP_VDD	Power Supply

2.4.5 Backlight connector 1 (5)

There is an LCD backlight power connector BKL1 (1 x 6 x 2.0mm) that is designed to connect a backlight to increase readability of the LCD connected to the eDP connector in low light conditions.



BKL1 pinout description:

Pin	Name	Description
1	EDP_BLK	LCD power supply for LED driver
2	EDP_BLK	LCD power supply for LED driver
3	EDP_BKLT_EN	LED driver enabling
4	EDP_BKLT_PWM	PWM signal for LED driver
5	GND	Ground
6	GND	Ground

2.4.6 MIPI DSI/LVDS (6)

VT-SBC-RK66 implements a dual-channel 8-lane MIPI DSI connector (2 × 16 × 2.0mm) to connect an external screen via an extension cable. The connector has 4 lanes multiplexed to LVDS.



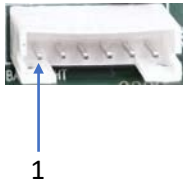
MIPI DSI/LVDS pinout description:

Pin	Name	Description
1	MIPI1_DSI_DN3	MIPI1_DSI Differential Lane 3 -
2	MIPI1_DSI_DP3	MIPI1_DSI Differential Lane 3 +
3	MIPI1_DSI_CLKN	MIPI1_DSI Differential Clock Lane -
4	MIPI1_DSI_CLKP	MIPI1_DSI Differential Clock Lane +
5	GND	Digital Ground
6	GND	Digital Ground
7	MIPI1_DSI_DN2	MIPI1_DSI Differential Lane 2 -
8	MIPI1_DSI_DP2	MIPI1_DSI Differential Lane 2 +

9	MIPI1_DSI_DN1	MIPI1_DSI Differential Lane 1 -
10	MIPI1_DSI_DP1	MIPI1_DSI Differential Lane 1 +
11	MIPI1_DSI_DN0	MIPI1_DSI Differential Lane 0 -
12	MIPI1_DSI_DP0	MIPI1_DSI Differential Lane0 +
13	LVDS_MIP10_DN3	LVDS/MIPI_DSI Differential Lane 3 -
14	LVDS_MIP10_DP3	LVDS/MIPI_DSI Differential Lane 3 +
15	LVDS_MIP10_CLKN	LVDS/MIPI_DSI Differential Clock Lane -
16	LVDS_MIP10_CLKP	LVDS/MIPI_DSI Differential Clock Lane +
17	GND	Digital Ground
18	GND	Digital Ground
19	LVDS_MIP10_DN2	LVDS/MIPI_DSI Differential Lane 2 -
20	LVDS_MIP10_DP2	LVDS/MIPI_DSI Differential Lane 2 +
21	LVDS_MIP10_DN1	LVDS/MIPI_DSI Differential Lane 1 -
22	LVDS_MIP10_DP1	LVDS/MIPI_DSI Differential Lane 1 +
23	LVDS_MIP10_DN0	LVDS/MIPI_DSI Differential Lane 0 -
24	LVDS_MIP10_DP0	LVDS/MIPI_DSI Differential Lane 0 +
25	GND	Digital Ground
26	GND	Digital Ground
27	LVDS_PWR	Power Supply
28	GND	Digital Ground
29	LVDS_PWR	Power Supply
30	LVDS_PWR	Power Supply
31	GND	Digital Ground
32	GND	Digital Ground

2.4.7 Backlight connector 2 (7)

There is another LCD backlight power connector BKL2 (1 x 6 x 2.0mm) on the Board designed to connect a backlight to increase readability of the LCD connected to the MIPI DSI/LVDS connector in low light conditions.



BKL2 pinout description:

Pin	Name	Description
1	LCD_BLK	LCD Power Supply for LED Driver
2	LCD_BLK	LCD Power Supply for LED Driver
3	LCD_BKLT_EN	LED Driver Enabling
4	LCD_BKLT_PWM	PWM Signal for LED Driver
5	GND	Ground
6	GND	Ground

2.4.8 MIPI CSI (8)

VT-SBC-RK66 implements a MIPI CSI connector (2 × 10 × 2.0mm) for connecting HD cameras via an extension cable.



Please refer to the next page for the pinout description of the connector.

Pinout description:

Pin	Name	Description
1	MIPI_CSI_RX_D2N	MIPI-CSI differential lane 2 negative
2	MIPI_CSI_RX_D3N	MIPI-CSI differential lane 3 negative
3	MIPI_CSI_RX_D2P	MIPI-CSI differential lane 2 positive
4	MIPI_CSI_RX_D3P	MIPI-CSI differential lane 3 positive
5	GND	Digital ground
6	GND	Digital ground
7	MIPI_CSI_RX_D0N	MIPI-CSI differential lane 0 negative
8	MIPI_CSI_RX_D1N	MIPI-CSI differential lane 1 negative
9	MIPI_CSI_RX_D0P	MIPI-CSI differential lane 0 positive
10	MIPI_CSI_RX_D1P	MIPI-CSI differential lane 1 positive
11	MIPI_CSI_RX_CLK0N	MIPI-CSI differential clock lane negative
12	I2C2_SCL	I2C serial port 2 clock signal
13	MIPI_CSI_RX_CLK0P	MIPI-CSI differential clock lane positive
14	I2C2_SDA4	I2C serial port 2 data signal
15	MCLK	Main Clock
16	CAM_RST	Reset control signal
17	VCC1V8_DVP	1.8V IO power
18	CAM_PWN	Power down control signal
19	VCC1V5_DVP	1.5V Core power
20	VCC2V8_DVP	2.8V Analog power

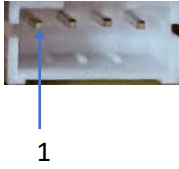
2.4.9 Audio jack (9)

VT-SBC-RK66 provides a 3.5mm 4-pole combo audio jack supporting headphone and microphone.



2.4.10 Speaker connector (10)

VT-SBC-RK66 provides an L/R speaker (1 × 4 × 2.0mm) that allows connection of a 5W/8Ω speaker.

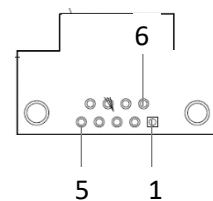
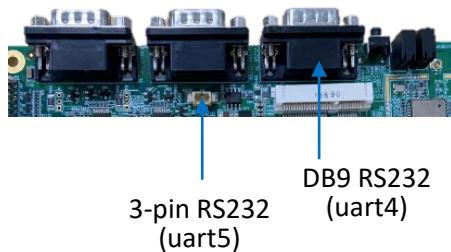


Pinout description:

Pin	Name	Description
1	OUTR-	Class-D H-bridge negative output for right channel
2	OUTR+	Class-D H-bridge positive output for right channel
3	OUTL-	Class-D H-bridge negative output for left channel
4	OUTL+	Class-D H-bridge positive output for left channel

2.4.11 RS232 (11)

VT-SBC-RK66 provides two RS232 connectors, one is a DB9 male connector (uart4), another is a 3-pin connector (uart5).



RS232 (DB9) pinout description:

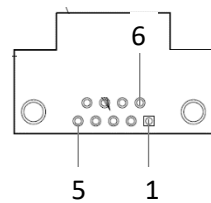
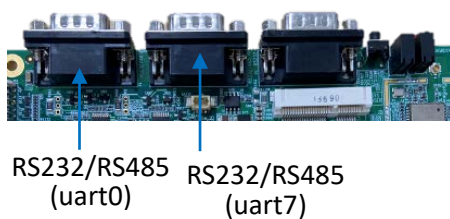
Pin	Name	Description
1	NC	
2	RXDA	RS232_RXD
3	TXDA	RS232_TXD
4	NC	
5	GND	Ground
6	NC	
7	NC	
8	NC	
9	NC	

3-pin RS232 pinout description:

Pin	Name	Description
1	RXDB	RS232_RXD
2	TXDB	RS232_TXD
3	GND	Ground

2.4.12 RS232/RS485 (12)

VT-SBC-RK66 also provides two DB9 RS232/RS485 multiplex connectors (uart0 and uart7), and users can configure the connectors based on needs.

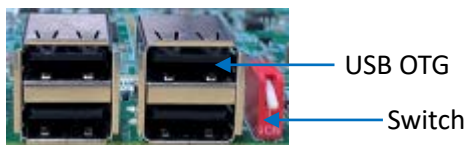


RS232/RS485 pinout description:

Pin	Name	Description
1	RS485_2_A	RS485_P
2	RS485_2_B/RXDF	RS485_N/RS232_RXD
3	TXDF	RS232_TXD
4	NC	
5	GND	Ground
6	NC	
7	NC	
8	NC	
9	NC	

2.4.13 USB 2.0 (13)

VT-SBC-RK66 implements four USB 2.0 interfaces (Type-A), including one USB OTG on the top right that can switch between host (down) and device (up) modes with the red switch next to the USB interfaces. Before switching the OTG modes, please position the switch in place before plugging into the USB cable.



The pinout of these USB 2.0 interfaces is in line with the pin assignment of standard USB 2.0 (Type-A) interface.

2.4.14 USB 3.0 connector (14)

VT-SBC-RK66 provides one USB 3.0 interface (Type-A).



The pinout of the USB 3.0 interface is in line with the pin assignment of standard USB 3.0 (Type-A) interface.

2.4.15 GPIO (15)

VT-SBC-RK66 provides 8 GPIOs ($2 \times 10 \times 2.0\text{mm}$) to allow connection of peripherals or control certain electronic components.



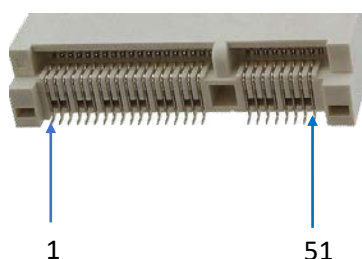
Please refer to the next page for the pinout description of the connector.

Pinout description:

Pin	Name	Description
1	GND	Ground
2	GND	Ground
3	CPU_GPIO0	CPU general purpose input output
4	CPU_GPIO4	CPU general purpose input output
5	GND	Ground
6	GND	Ground
7	CPU_GPIO1	CPU general purpose input output
8	CPU_GPIO5	CPU general purpose input output
9	VCC_EXT_3V3	DC 3.3V external power output
10	VCC_EXT_3V3	DC 3.3V external power output
11	GND	Ground
12	GND	Ground
13	CPU_GPIO2	CPU general purpose input output
14	CPU_GPIO6	CPU general purpose input output
15	GND	Ground
16	GND	Ground
17	CPU_GPIO3	CPU general purpose input output
18	CPU_GPIO7	CPU general purpose input output
19	VCC_EXT_3V3	DC 3.3V general purpose input output
20	VCC_EXT_3V3	DC 3.3V general purpose input output

2.4.16 Mini PCIe (16)

VT-SBC-RK66 provides a mini PCIe socket for user expansion to connect a 4G/LTE module.



Please refer to the next page for the pinout description of the socket.

The pinout description:

Pin	Name	Description
1	NC	
2	PCIE_3V3	3.3V power supply for 4G module
3	NC	
4	NC	
5	NC	
6	NC	
7	NC	
8	PCle_UIM_PWR	SIM card power supply
9	GND	Ground
10	PCle_UIM_DATA	SIM card data interface
11	NC	
12	PCle_UIM_CLK	SIM card clock
13	NC	
14	PCle_UIM_RST	SIM card reset
15	GND	Ground
16	PCle_UIM_VPP	SIM card power supply programming
17	NC	
18	GND	Ground
19	NC	
20	NC	
21	GND	Ground
22	NC	
23	NC	
24	PCIE_3V3	3.3V power supply for 4G module
25	NC	
26	GND	Ground
27	GND	Ground
28	NC	
29	GND	Ground
30	NC	
31	NC	
32	NC	
33	NC	

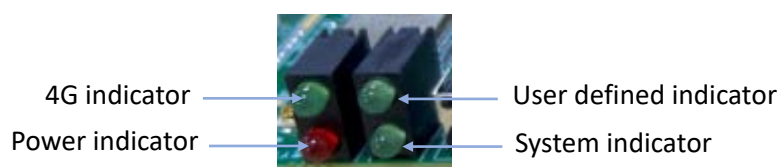
34	GND	Ground
35	GND	Ground
36	HOST2_DM	USB 2.0 signal negative
37	GND	Ground
38	HOST2_DP	USB 2.0 signal positive
39	PCIE_3V3	3.3V power supply for 4G module
40	GND	Ground
41	PCIE_3V3	3.3V power supply for 4G module
42	4G_LED_EN	4G LED ground
43	GND	Ground
44	NC	
45	GND	Ground
46	NC	
47	GND	Ground
48	NC	
49	GND	Ground
50	NC	
51	GND	Ground
52	PCIE_3V3	3.3V power supply for 4G module

2.4.17 Reset button (17)

There is a pinhole reset button on VT-SBC-RK66 for restarting the board upon a short press.

2.4.18 LED indicators (18)


VT-SBC-RK66 provides four LED indicators with functions listed below:



Please refer to the following page for the definition of the indicators.

Definition of the indicators:

Indicator name	Definition
4G indicator	Blinking: 4G communication working properly Off: Problem with 4G communication
USER indicator	Refer to 3.7 for the command to enable the LED in Android system
POWER indicator	Solid red: System power OK Off: Problem with system power
SYS indicator	Solid green: System running properly Off: System abnormality

 *If the power indicator is on while the other three indicators are off, the Board is shut down with power connected.*

2.4.19 Micro SD & Micro SIM slots (19)

VT-SBC-RK66 provides a Micro SD card slot that supports a storage device of up to 128GB.

The SIM card slot supports SIM card hot plugging. The 4G LTE module of the Board is AT&T and Verizon pre-certified, and you may consult your sales executive for the module name before applying a SIM card from the carrier.


CHAPTER 3 ANDROID SYSTEM MANUAL

This chapter briefs on the settings and common use of the interfaces in the Android system. Please connect a mouse, a keyboard and a monitor to VT-SBC-RK66 for smooth operation.

3.1 Time and Date Setup

Please confirm if the system time is correct after first bootup. Change of the system settings will synchronize the date and time to the RTC which ensures correct display of the system time and date after recovery from abrupt power failure or system fault.

1. Swipe up to unlock the screen;
2. Navigate to **Settings > System > Time and Date** in sequence to enter the settings page;
3. By default, the system applies the date and time zone provided by the network, you can keep the settings or change the them manually;
4. If the system applies the time zone provided by network, please confirm if the time zone coincides with your local time zone. If not, please disable the option first;
5. Then click the **Time Zone** to access the settings page;
6. Select a region where the device is located (for instance, United States);
7. Select a proper time zone for it;
8. Enable the **Time zone provided by network** option, which will not change the settings you have made;
9. You can then choose to set the date and time manually or synchronize to the network time. If you use the time provided by network, the system time will automatically align to the current time zone;
10. When the time and date are all set, they will be synchronized to the RTC.

 *To ensure smooth setup, please make sure the Board is connected to Internet if you choose the network time.*

3.2 Enable Developer Options

To enable Developer options of VT-SBC-RK66, follow the steps below:

1. Connect VT-SBC-RK66 to a mouse, a keyboard, and a monitor for easier operations;
2. Click **Settings > About <Tablet>** in sequence;
3. Navigate to the bottom and locate **Build number**, and click it consecutively for at least 7 times until you see a prompt indicating you are now a developer;
4. Go back to **Settings > System > Advanced > Developer options** and toggle on **USB debugging** (under the DEBUGGING sub-menu), then you can customize the device settings.

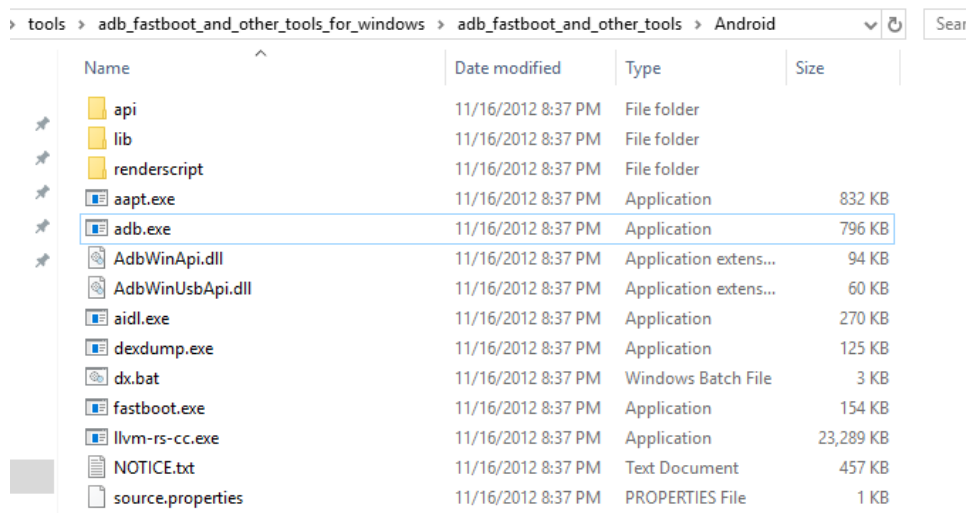
 Depending on the Android version, the entry might vary slightly.

3.3 ADB Setup on the Windows host

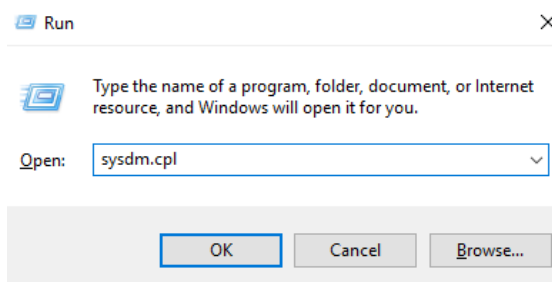
Android Debug Bridge (ADB) is a tool that is designed to connect your development workstation directly to your Android device for debugging, device upgrading, app installation, etc.

Make sure you have enabled **Developer Options** and toggled on **USB debugging** before you proceed with the ADB setup as follows.

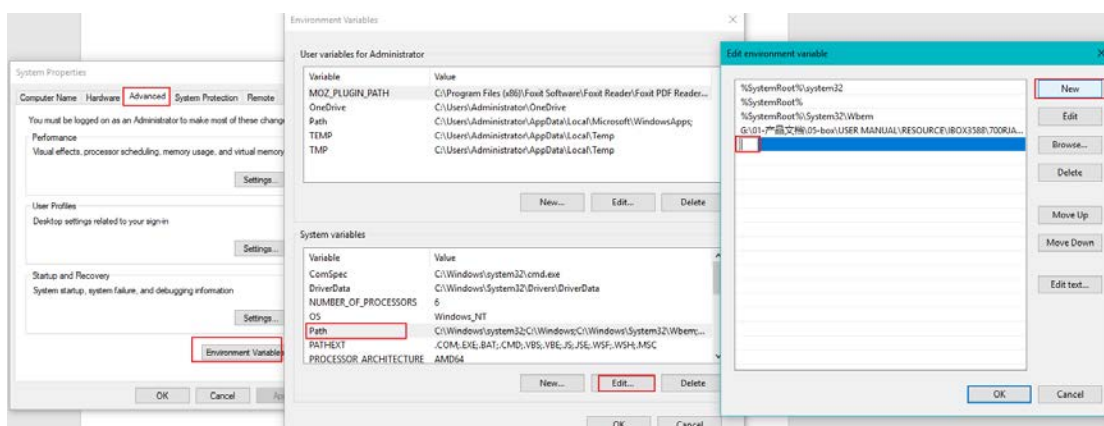
1. Unzip the software release package and navigate to the following directory: \SW\tools;
2. Extract the **adb_fastboot_and_other_tools_for_windows** zip file;
3. Navigate to the **Android** folder that contains the ADB tool kit, and copy the folder path;



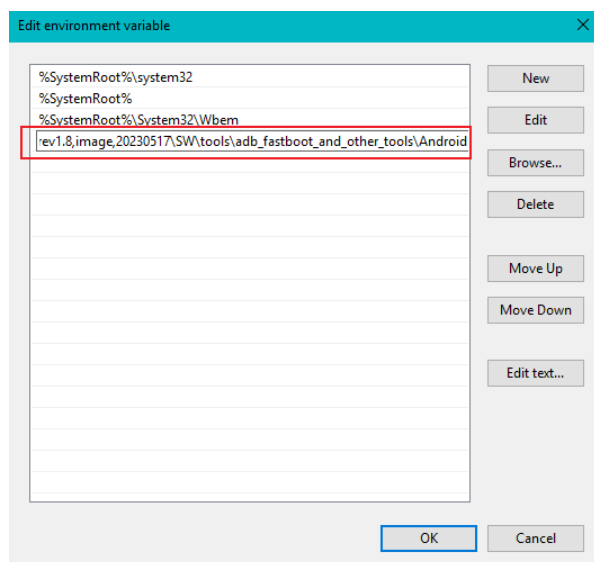
- Press “Win + R” and input “sysdm.cpl” in the dialogue box to open the settings interface;



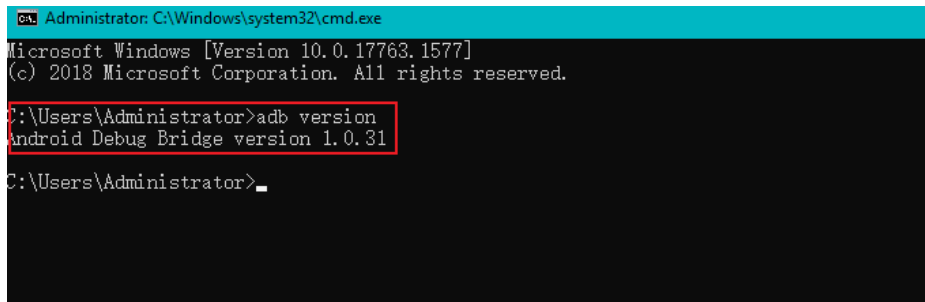
- Click in sequence **Advanced > Environment Variables > System Variables > Path > Edit**, and click **New** in the pop-up;



- Paste the path of the **Android** folder, and click **OK** one by one to confirm and exit;



7. Press “Win + R” and input `cmd` in the dialogue box to open the command prompt;
8. Input `adb version` in the command prompt to check if the ADB tool is installed.



```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.17763.1577]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>adb version
Android Debug Bridge version 1.0.31

C:\Users\Administrator>
```

3.4 App Installation via ADB Commands

In addition to the standard pre-installed Android applications, users can install their own applications on the Board provided that it runs an Android system.

All tools to be used for the installation are available in the software release package provided by Vantron. You can install the apps as long as the Android SDK Platform Tools are installed and accessible on the host computer. The Windows environment is used for illustration in the following section.

3.4.1 Prerequisites

- VT-SBC-RK66 running Android operating system
- A host computer running Windows 7 or later (with ADB setup finished)
- A USB cable (Type-A to Type-A)
- The board is in client mode (OTG switch dialed up)

3.4.2 App installation

1. Connect the Board and the Windows host computer via the USB cable;
2. Press “Win + R” and input `cmd` in the dialogue box to open the command prompt;
3. Input `adb devices -l` in the command prompt to check if the Board is connected to the host computer;

```
C:\Users\Administrator>adb devices -l
List of devices attached
64MU4JUVY0          device product:IBOX66 model:IBOX66 device:IBOX66 transport_id:1
```

4. When the device information is displayed under the command, the Board is an ADB device and you can copy the serial number (squared as shown above) for the next step;
5. Input the following command line to install the app;


```
adb -s <serial number> install "<APP path>"
```


 *Make sure there is no special character in the app path.*

6. The installation will be executed after the command line is input and the result of installation will be displayed below the command;

```
C:\Users\Administrator>adb -s 64MU4JUVY0 install "C:\Users\Administrator\Desktop\Libraries for developers_v3.83_apkpure.com.apk"
Performing Streamed Install
Success
```

7. The newly installed app will be displayed on the App drawer in the Alphabetic order.

 *The screenshots are for illustration only and are not intended to represent the actual device number and other information of the device currently in your possession.*

 *In step 4 shown above, you can drag the .apk file from the local directory to the command line to replace the <App path> you typed in manually.*

3.5 Image Flashing on a Windows Host

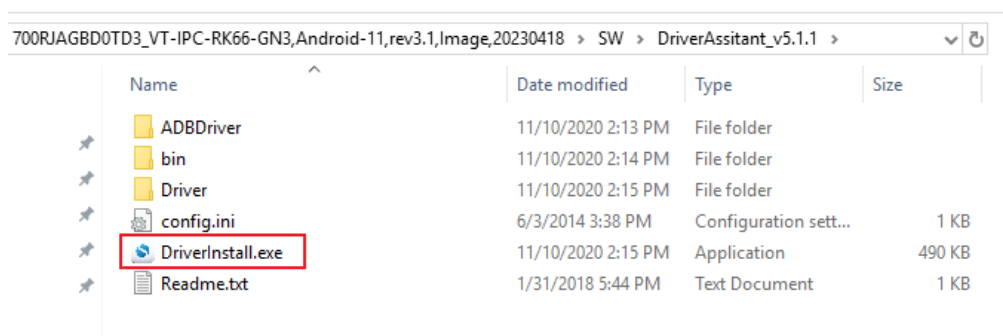
Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image as needed. This section briefs on the image flashing on a Windows host.

3.5.1 Prerequisites

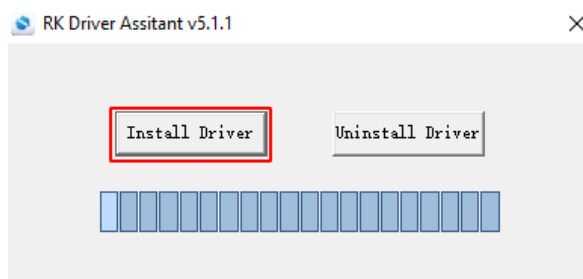
- VT-SBC-RK66
- A host computer running Windows 7 or later (with ADB setup finished)
- A USB cable (Type-A to Type-A)
- The board is in client mode (OTG switch dialed up)

3.5.2 Driver installation

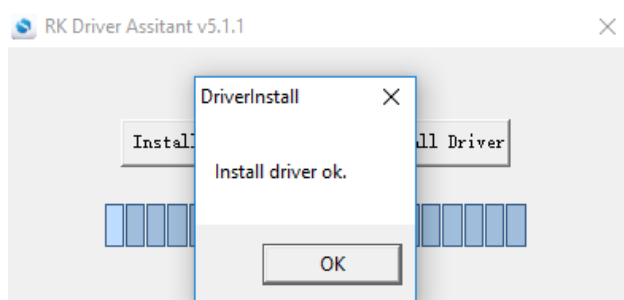
1. Unzip the release package, and open the directory of the upgrade driver (\\SW\\DriverAssitant_vxxx) to locate the **DriverInstall.exe**;



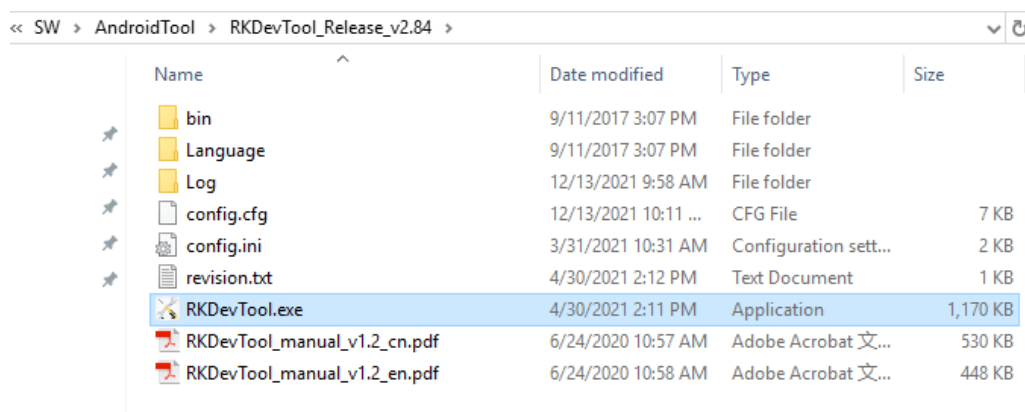
2. Right click the mouse and run the program as administrator;
3. Click **Uninstall Driver** first to remove the previously installed driver, if any, then click **Install Driver** and wait;



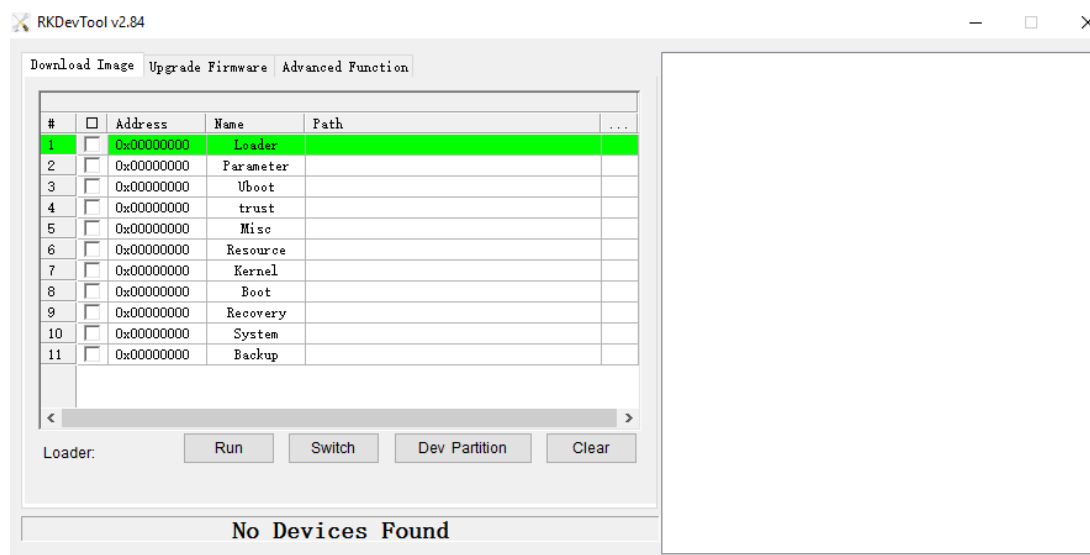
4. A pop-up will appear in a second suggesting the driver is installed;



5. Open the directory of the upgrade tool (path: \SW\AndroidTool\RKDevTool_Release_vxxx\RKDevTool);



6. Double click **RKDevTool.exe** to open the upgrade window;



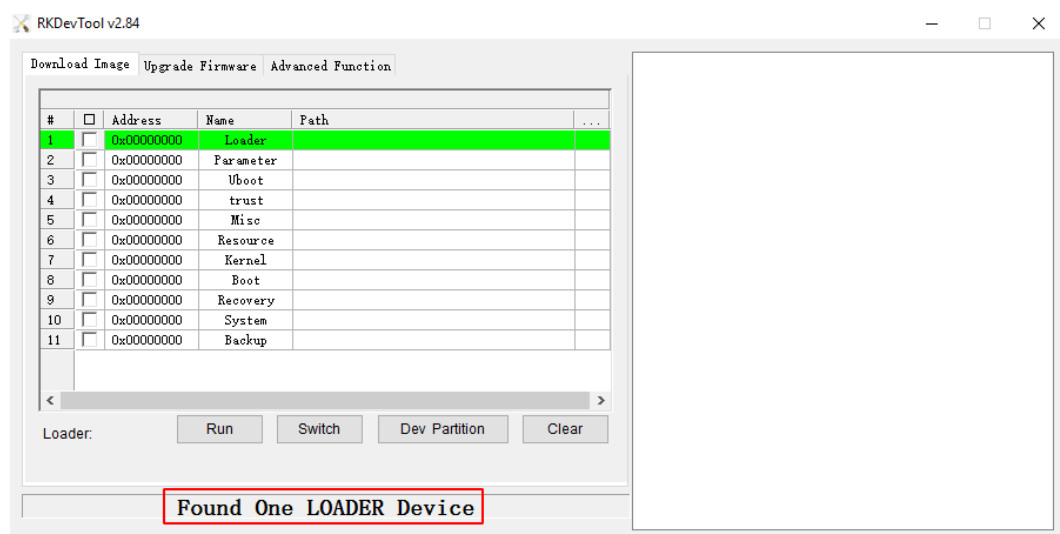
7. Connect VT-SBC-RK66 to the Windows host with the USB Type-A to Type-A cable;
8. Press "Win + R" and input `cmd` in the dialog box to open the command prompt;
9. Input `adb devices` in the command prompt to check if the Board is connected to the Windows host;
10. Once the Board is identified by the Windows host, input `adb shell` in the command prompt for executing shell commands to the Board;

```
C:\Users\Administrator>adb shell
root@linaro-alip:/#
root@linaro-alip:/# ls
bin    home    oem      run      srv      userdata
boot  lib      opt      sbin     sys      usr
data  lost+found  proc    sdcard   system  var
dev   media   rockchip-test sha256sum README tmp   vendor
etc   mnt     root     sha256sum.txt  udisk
```

11. Input `reboot loader` to reboot the Board and it will enter the Loader mode;

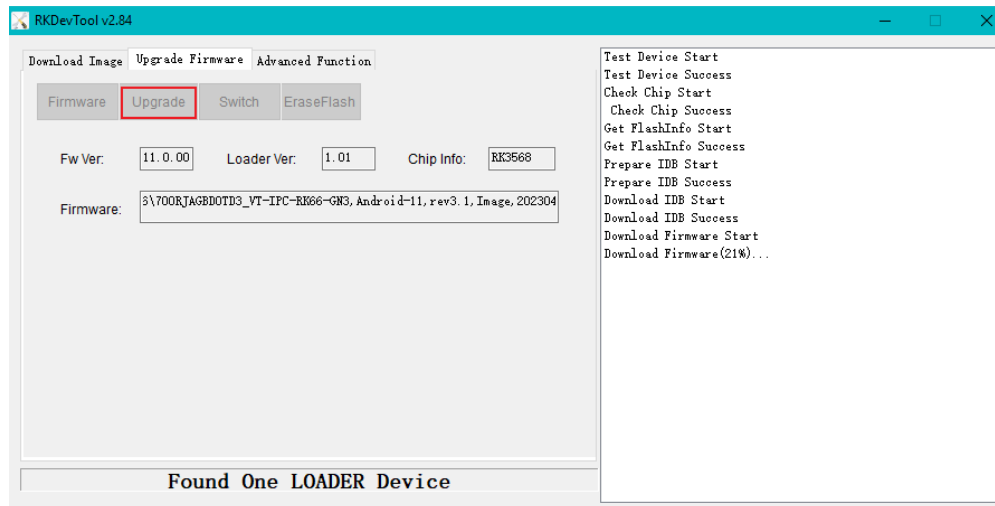
```
root@linaro-alip:/# reboot loader
root@linaro-alip:/#
C:\Users\Administrator>
```

12. Then the upgrade window will prompt for the existence of a Loader device, indicating that the upgrade process is ready.



3.5.3 Image Flashing

1. Click the **Upgrade Firmware** tab in the RK Device Tool window (the second tab on the top of the window) and then click the **Firmware** button;
2. Open the image file **update.img** from the local directory (\SW\Image), and the firmware details will be automatically populated;
3. Click the **Upgrade** button (next to the **Firmware** button), and the Board will start to download the image and upgrade;



4. When the upgrade finishes, the Board will reboot automatically.

3.6 Serial Ports

VT-SBC-RK66 offers two RS232 connectors (uart4 and uart5) and two RS232/RS485 connectors (uart0 and uart7) for serial communication.

To test if the serial ports function properly:

1. Connect the Board to a Linux host (Ubuntu 22.04 for instance) with the USB cable (Type-A to Type-A);

2. Use a proper serial adapter to connect the target serial port to a serial device;

▶ Refer to 2.4.11 and 2.4.12 for the pinout description of the ports.

3. Open a terminal and install a serial communication program ('microcom' for instance);

```
$ sudo apt install microcom
```

4. Input the following command line to install ADB tool;

```
$ sudo apt install adb
```

5. Check if the Board is connected to the Linux host via ADB;

```
$ adb devices -l
```

```
ubuntu:~$ adb devices -l
List of devices attached
64MU4JUVY0      device usb:1-1 product:IBOX66 model:IBOX66 device:IBOX66
transport_id:3
```

6. Input `adb shell` in the terminal to execute shell commands on the Board;

```
ubuntu:~$ adb shell
IBOX66:/ $
IBOX66:/ $ ls
acct      d          etc         mnt        sdcard
apex      data      init        odm        storage
bin       data_mirror  init.environ.rc  oem        sys
bugreports  debug_ramdisk  linkerconfig  proc       system
cache      default.prop  lost+found   product    system_ext
config     dev         metadata     res        vendor
IBOX66:/ $ cd sys
IBOX66:/sys $ ls
bcm-dhd  bus      dev      firmware  kernel  power  system_monitor
block    class   devices  fs         module  rk8xx  van-misc
IBOX66:/sys $
```

7. Input `su` in the terminal to switch to the root user;

```
2|IBOX66:/ $ su
IBOX66:/ #
IBOX66:/ #
```

8. Enter `cd sys/van-misc` to access the directory of the serial ports as follows:

```
IBOX66:/ # cd sys/van-misc
IBOX66:/sys/van-misc # ls
eeprom_wp  uart0_mode  uart0_rts  uart7_mode  uart7_rts  user_led
IBOX66:/sys/van-misc #
```

9. Set the baud rate (9600 for instance) of the serial ports (uart4 for instance);

```
# microcom -s 9600 /dev/ttyS4

<Text the data to send to the connected device>
```

10. For the RS232/RS485 ports, input the following commands to switch the mode of the port:

```
# echo 1 > sys/van-misc/uart0_mode // uart0 RS232 mode
# echo 0 > sys/van-misc/uart0_mode // uart0 RS485 mode
# echo 1 > sys/van-misc/uart7_mode // uart7 RS232 mode
# echo 0 > sys/van-misc/uart7_mode // uart7 RS485 mode
```

3.7 GPIO

VT-SBC-RK66 provides 8 GPIOs, starting from GPIO0 to GPIO7. GPIO0 to GPIO7 correspond to GPIO104, GPIO107, GPIO108, GPIO109, GPIO110, GPIO111, GPIO112, and GPIO113 in the software system, respectively.

Please refer to 2.4.15 for the pinout description of the GPIOs.

Before you start to use the GPIOs, please install the ADB tool on the Linux host, if necessary, as set out in step 4 in 3.5.

1. Execute `adb shell` command in the terminal;
2. Input the following commands to enter the directory of the GPIO and check GPIO nodes:

```
~# cd sys/class/gpio/

/sys/class/gpio # ls
```


```
IBOX66:/ # cd sys/class/gpio/
IBOX66:/sys/class/gpio # ls
export  gpio108  gpio111  gpio22      gpiochip255  gpiochip96
gpio104  gpio109  gpio112  gpiochip0    gpiochip32   unexport
gpio107  gpio110  gpio113  gpiochip128  gpiochip64
IBOX66:/sys/class/gpio #
```

3. Set a GPIO (GPIO104 for instance) to the high level;

```
# echo 1 > /sys/class/gpio/gpio104/value  
# cat /sys/class/gpio/gpio104/value
```

4. Set a GPIO (GPIO104 for instance) to the low level;

```
# echo 0 > /sys/class/gpio/gpio104/value  
# cat /sys/class/gpio/gpio104/value
```

 Follow the same way to set the levels of the remaining GPIOs.

3.8 User Indicator Control

There is a user-defined LED indicator on VT-SBC-RK66 (refer to 2.4.18 for details), users can use the following command line to enable and disable the indicator.

1. Install ADB tool in the Linux system, if needed, as set out in step 4 in 3.5;
2. Execute `adb shell` command in the terminal;
3. Input the following commands to enable and disable the indicator.

```
# echo 1 > /sys/van-misc/user_led      [enable]  
# echo 0 > /sys/van-misc/user_led      [disable]
```


CHAPTER 4 DEBIAN SYSTEM MANUAL

This chapter briefs on the settings and common use of the Interfaces in the Debian system.
Please connect a mouse, a keyboard and a monitor to VT-SBC-RK66 for smooth operation.

4.1 About the System

Debian is a Linux distribution and the Device was built by Debian GNU/Linux 10 operating system.

4.1.1 User and password

The system will automatically log in without the need to input the password. However, if you have switched the account/locked the screen/logged out, you will be prompted to input the password to log in the system.

- Default user: vantron
- Password: vantron

4.1.2 System information


1. Connect a mouse, a keyboard and a monitor to VT-SBC-RK66;
2. Power on the Device to login;
3. Click the Debian icon, then click **System Tools > LXTerminal** in sequence to open the system terminal;
4. Input `cat /etc/os-release` in the terminal to check the system information;



```
vantron@vantron: ~  
File Edit Tabs Help  
bash: export: '--ignore-gpu-blacklist': not a valid identifier  
vantron@vantron:~$ cat /etc/os-release  
PRETTY_NAME="Debian GNU/Linux 10 (buster)"  
NAME="Debian GNU/Linux"  
VERSION_ID="10"  
VERSION="10 (buster)"  
VERSION_CODENAME=buster  
ID=debian  
HOME_URL="https://www.debian.org/"  
SUPPORT_URL="https://www.debian.org/support"  
BUG_REPORT_URL="https://bugs.debian.org/"  
vantron@vantron:~$
```














5. Input `sudo su` to switch to the root user (no password).

4.2 System Settings

By clicking on the power icon  on the bottom right corner of the screen, you can

- Shut down/Restart/Suspend the Device
- Lock the screen
- Switch the user
- Log out the current user

The menu bar on the bottom of the screen:

-  Main menu: You can open accessories, applications, the console terminal, or customize the system settings
-  File manager: Provides access to device files, applications
-  Web browser: Provides access to webs on Internet
-  Window tool: To minimize or fold the windows
-  Desktop switch: To switch between working areas
-  CPU usage: Displays the CPU usage in real time
-  Volume menu: Adjusts the system volume
-  Virtual keyboard: To open/close the virtual keyboard, set the input method upon a right click of the mouse
-  Network settings: You can connect to Ethernet/Wi-Fi/VPN, or create/edit the connection
-  Bluetooth settings: To pair and set up the Bluetooth devices
-  System time
-  Screen lock
-  Power icon

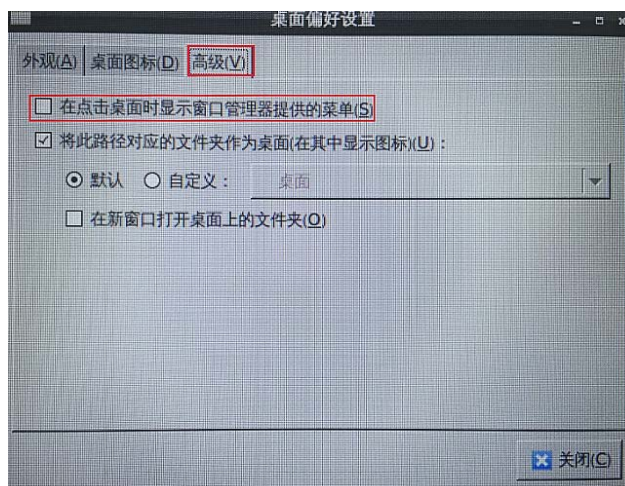
4.2.1 Language setup

Assume the system language is Simplified Chinese. The following example demonstrates how to change the system language to English (US).

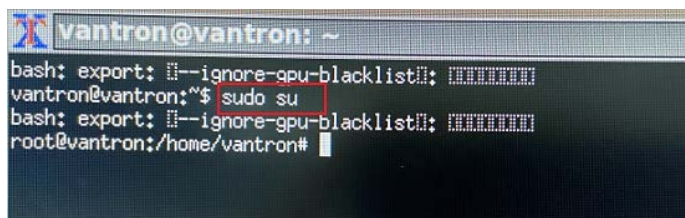
1. Right click the mouse on the desktop background;
2. Select the desktop preference option at the bottom of the menu;



3. Check the 'show menus provided by window managers when desktop is clicked' option (first line) in the advanced menu (third tab) to change the right-click menu;



4. Return to the desktop background and open the terminal emulator;
5. Input `sudo su` in the terminal to switch to the root mode;



6. Run the following command to check the language currently used by the system;

```
# env | grep LANG
LANG= zh_CN.UTF-8      // the system language is simplified Chinese
```

7. Run the following command to call the locale configuration page (en_US.UTF-8 refers to the locale for the target language that you wish to switch to);

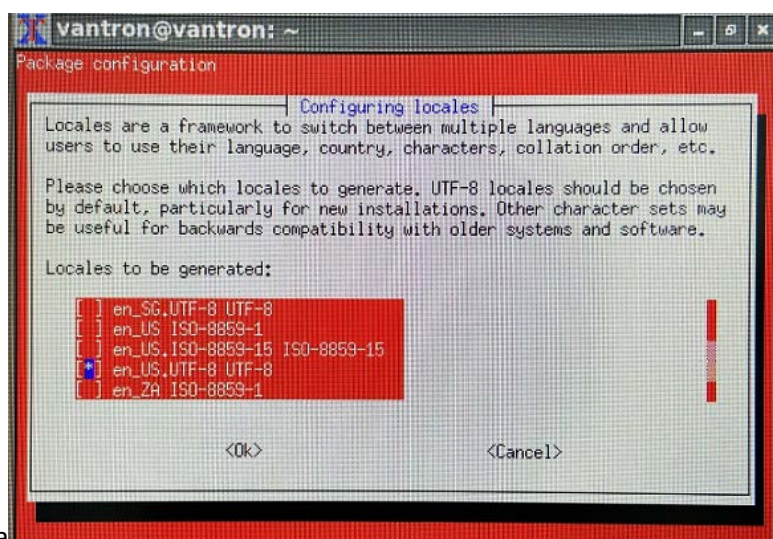
```
# export LANG=en_US.UTF-8
```

8. Use the following command to re-configure the locales;

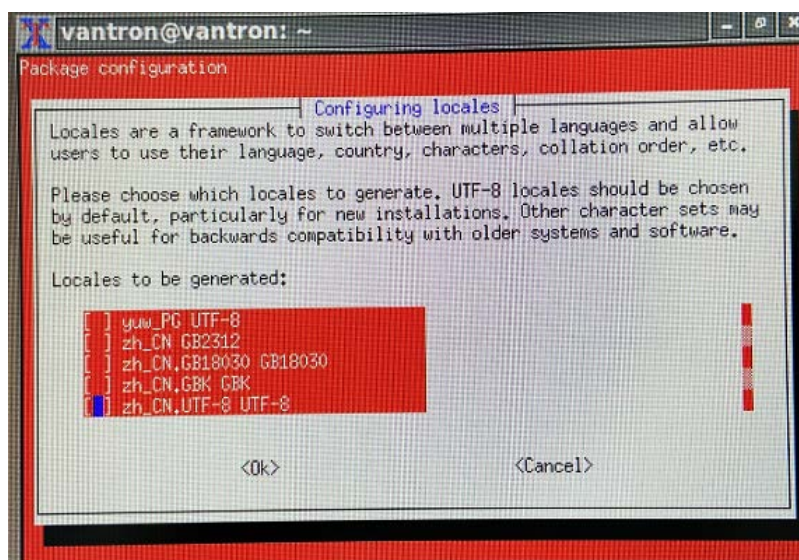
```
# dpkg-reconfigure locales
```

9. Use the up and down arrows on the keyboard to move to the target locale (en_US.UTF-8);

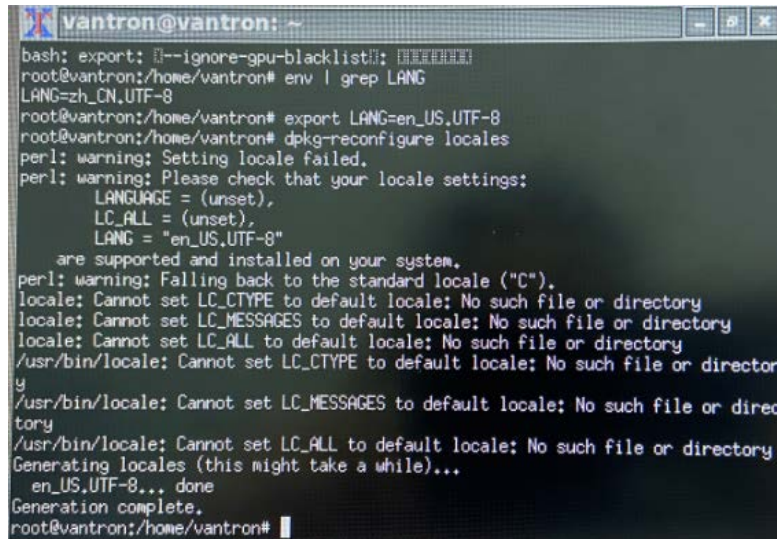
10. Press "Space" in front of the target locale to select the language;



11. Move down to the current locale (zh_CN.UTF-8) and press "Space" to uncheck the current language;



12. Press “Tab” to move the cursor to the <OK> option and press “Enter” to confirm your choice;
13. In the following pop-up, use the up and down arrows to move to the target locale (en_US.UTF-8) in the list, then press “Tab” to move the cursor to the <OK> option and press “Enter” to confirm your choice;
14. Wait a few seconds for the locale to take effect;



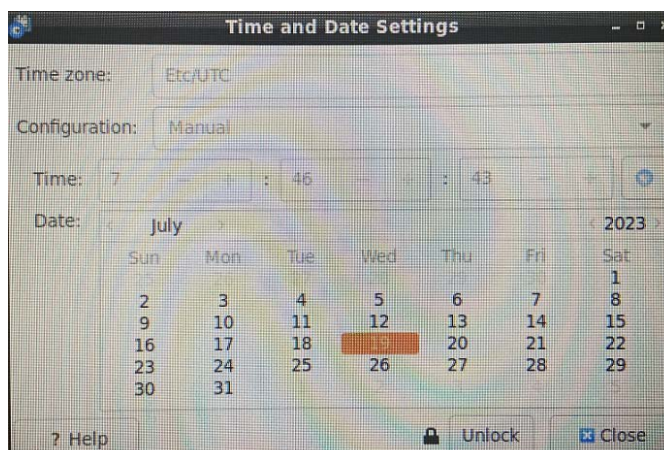
```
vantron@vantron: ~  
bash: export: _=ignore-gpu-blacklist: [REDACTED]  
root@vantron:/home/vantron# env | grep LANG  
LANG=zh_CN.UTF-8  
root@vantron:/home/vantron# export LANG=en_US.UTF-8  
root@vantron:/home/vantron# dpkg-reconfigure locales  
perl: warning: Setting locale failed.  
perl: warning: Please check that your locale settings:  
    LANGUAGE = (unset),  
    LC_ALL = (unset),  
    LANG = "en_US.UTF-8"  
are supported and installed on your system.  
perl: warning: Falling back to the standard locale ("C").  
locale: Cannot set LC_CTYPE to default locale: No such file or directory  
locale: Cannot set LC_MESSAGES to default locale: No such file or directory  
locale: Cannot set LC_ALL to default locale: No such file or directory  
/usr/bin/locale: Cannot set LC_CTYPE to default locale: No such file or directory  
/usr/bin/locale: Cannot set LC_MESSAGES to default locale: No such file or directory  
/usr/bin/locale: Cannot set LC_ALL to default locale: No such file or directory  
Generating locales (this might take a while)...  
  en_US.UTF-8... done  
Generation complete.  
root@vantron:/home/vantron#
```

15. Then input `reboot` to restart the system;
16. Select “Update Names” after device reboot to update the files to the current language;
17. Run `locale -a` command to check if the locale is set as the default system language.

4.2.2 Time and date setup

Please confirm if the system time is correct after first bootup. To change the system time:

1. Click the **Debian icon** > **Preference** > **Time and Date** to open the Time and Date settings;



2. Click **Unlock** and enter the password (vantron) before editing;
3. Click Time zone and select the correct one for the Device from the list;
4. Choose to synchronize the time with the Internet server (device shall have Internet access) or fill in the time manually;
5. Click **Lock** and close the window;
6. Reboot the device to let the settings take effect.

The real-time clock (RTC) component provides accurate time and date information for the system after its recovery from abrupt power failure or system fault. When necessary, follow the steps below to synchronize the RTC and system time.

1. Click the **Debian icon > System Tools > LXTerminal** to open a terminal;
2. Input `sudo su` to switch to the root user;
3. Set the date and time for the system;

```
# date -s "2023-03-24 14:38:10"
```

4. Synchronize the date and time to the RTC;

```
# hwclock -w
```

5. Reboot the Device;

```
# reboot
```


6. Check the RTC information.

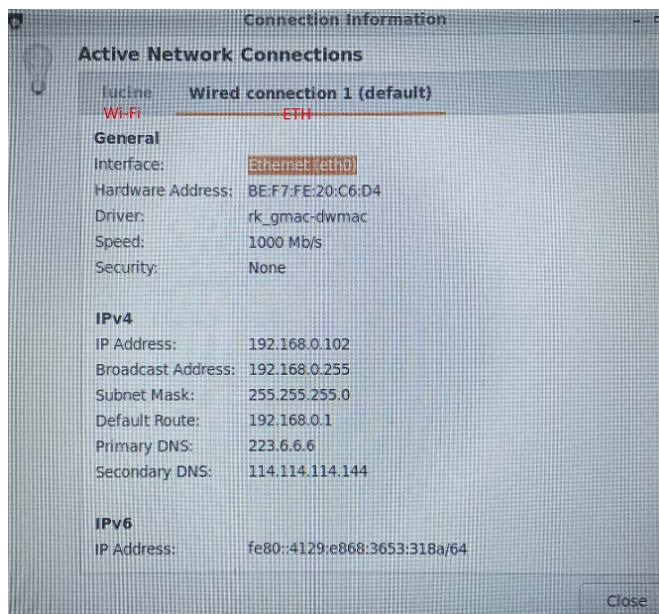
```
# hwclock -r
```

4.2.3 Network configuration

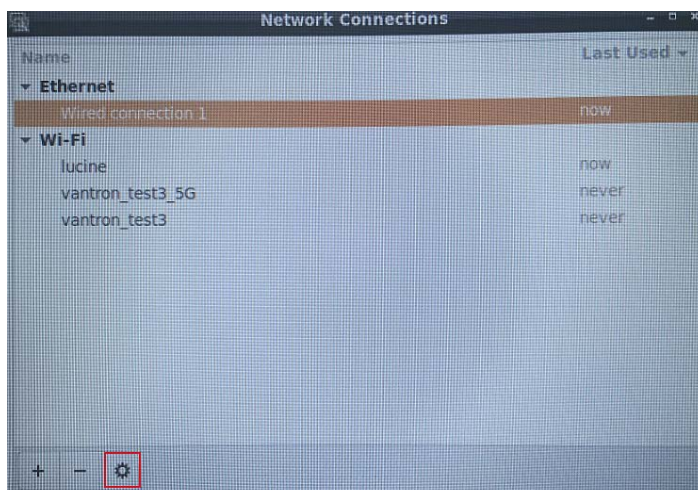
The Device is configured to have Internet access once it connects to a live Ethernet or joins to a Wi-Fi network.

Make sure you have installed the Wi-Fi antennas before connecting to an existing wireless network.

1. To join to a Wi-Fi network, click the network icon  the menu bar and search for the target network in the list;
2. Input the password of the target Wi-Fi network and wait for the connection;
3. To check the current network connection, you can move the cursor to the network icon, and right click the mouse to select **Connection Information**:



4. To edit the network configurations, you can right click the network icon and select **Edit Connections**, then select a connection and click the cog icon to edit the settings.



4.3 Image Flashing on a Windows Host

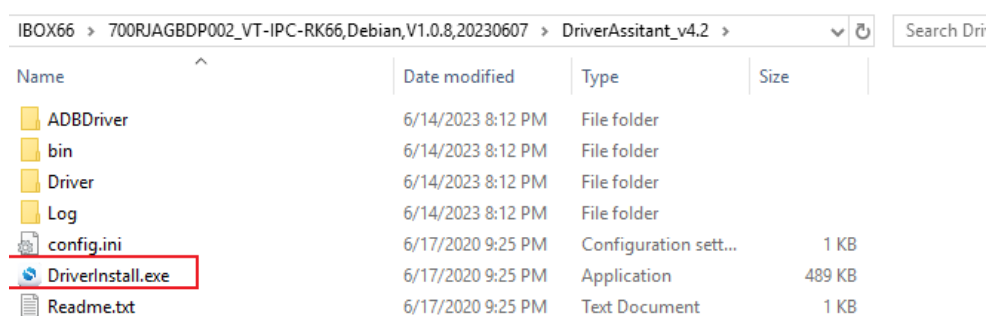
Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image as needed. This section briefs on the image flashing on a Windows host.

4.3.1 Prerequisites

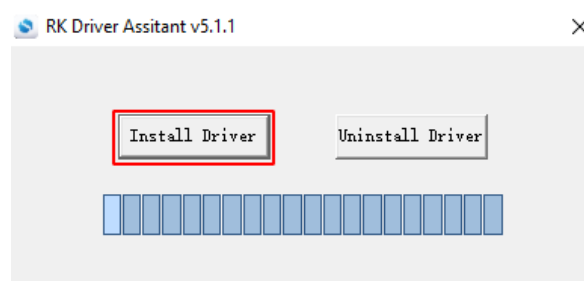
- VT-SBC-RK66
- A host computer running Windows 7 or later (with ADB setup finished)
- A USB cable (Type-A to Type-A)
- The device is in client mode (OTG switch dialed up)

4.3.2 Driver Installation

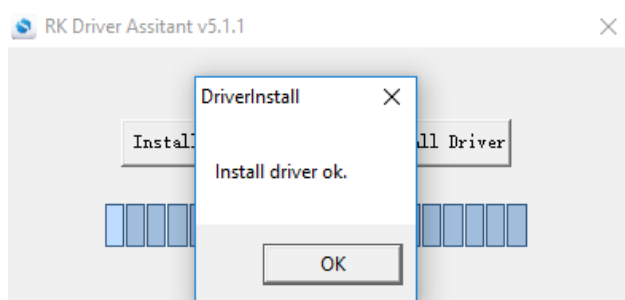
1. Unzip the software release package and open the directory of the upgrade driver (\DriverAssitant_vxxx) to locate the **DriverInstall.exe**;



2. Right click the mouse and run the program as administrator;
3. Click **Uninstall Driver** first to remove the previously installed driver, if any, then click **Install Driver** and wait;



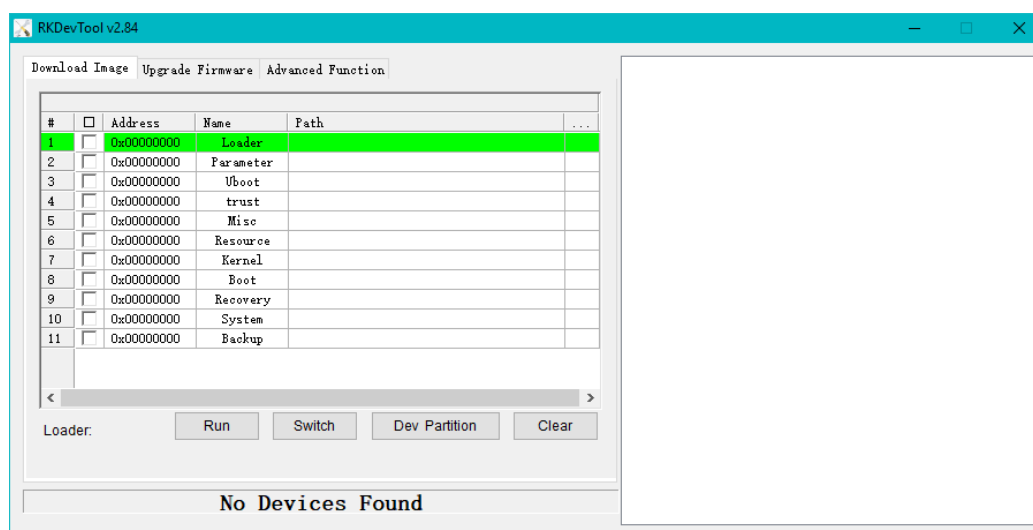
4. A pop-up will appear in a second suggesting the driver is installed;



5. Return to the release package and open the directory of the upgrade tool (path: \RKDevTool_Release\RKDevTool.exe);

IBOX66 > 700RJAGBDP002_VT-IPC-RK66,Debian,V1.0.8,20230607 > RKDevTool_Release			
Name	Date modified	Type	Size
bin	6/14/2023 8:12 PM	File folder	
Language	7/17/2023 3:26 PM	File folder	
Log	7/17/2023 3:26 PM	File folder	
config.cfg	7/17/2023 3:26 PM	CFG File	7 KB
config.ini	5/19/2022 1:44 PM	Configuration sett...	2 KB
px3se-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
px30-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
readme.txt	5/19/2022 1:44 PM	Text Document	1 KB
revision.txt	5/19/2022 1:44 PM	Text Document	1 KB
rk312x-config.cfg	5/19/2022 1:44 PM	CFG File	6 KB
rk356x-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk1808-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3036-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3128-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3128h-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3229-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3288-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3308-config.cfg	5/19/2022 1:44 PM	CFG File	6 KB
rk3326-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3328-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
rk3399-config.cfg	5/19/2022 1:44 PM	CFG File	7 KB
RKDevTool.exe	5/19/2022 1:44 PM	Application	1,170 KB
RKDevTool_manual_v1.2_cn.pdf	5/19/2022 1:44 PM	Adobe Acrobat 文...	530 KB
RKDevTool_manual_v1.2_en.pdf	5/19/2022 1:44 PM	Adobe Acrobat 文...	448 KB
rv1126_rv1109_tb-config.cfg	5/19/2022 1:44 PM	CFG File	3 KB
rv1126_rv1109_tb-config.cfg	5/19/2022 1:44 PM	CFG File	6 KB

- Double click **RKDevTool.exe** to open the upgrade window;



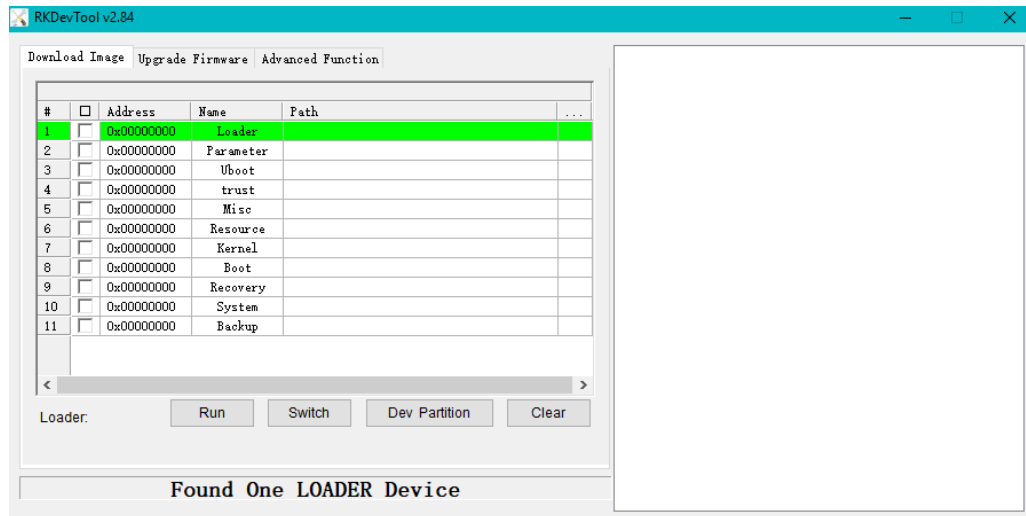
- Connect VT-SBC-RK66 to the Windows host with the USB Type-A to Type-A cable;
- Press "Win + R" and input `cmd` in the dialog box to open the command prompt;
- Input `adb devices` in the command prompt to check if the Device is connected to the Windows host;
- Once the Device is identified by the Windows host, input `adb shell` in the command prompt for executing shell commands to the Device;

```
C:\Users\Administrator>adb shell
root@linaro-alip:/#
root@linaro-alip:/# ls
bin    home    oem      run      srv      userdata
boot   lib     opt      sbin     sys      usr
data   lost+found  proc    sdcard   system  var
dev    media   rockchip-test sha256sum README tmp      vendor
etc    mnt     root     sha256sum.txt  udisk
root@linaro-alip:/#
```

- Input `reboot loader` to reboot the Device and it will enter the Loader mode;

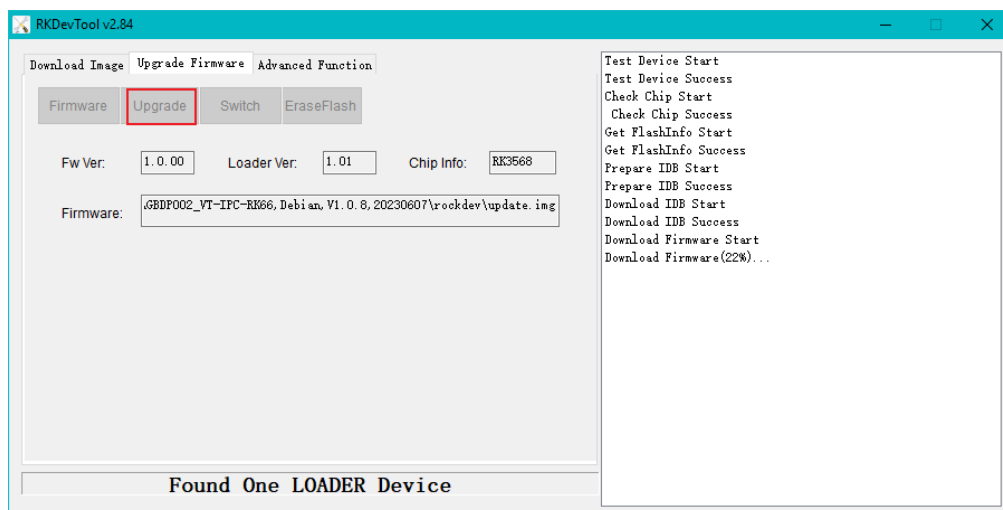
```
root@linaro-alip:/# reboot loader
root@linaro-alip:/#
C:\Users\Administrator>
```

- Then the upgrade window will prompt for the existence of a Loader device, indicating that the upgrade process is ready.



4.3.3 Image flashing

- Click the **Upgrade Firmware** tab in the RK Device Tool window (the second tab on the top of the window) and then click the **Firmware** button;
- Open the image file **update.img** from the local directory (\rockdev), and the firmware details will be automatically populated;
- Click the **Upgrade** button (next to the **Firmware** button), and the Device will start to download the image and upgrade;



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

4.4 Serial Ports

VT-SBC-RK66 offers two RS232 connectors (uart4 and uart5) and two RS232/RS485 connectors (uart0 and uart7) for serial communication. The ports are mapped as /dev/ttyS0, /dev/ttyS4, /dev/ttyS5, and /dev/ttyS7 respectively in the system.

The RS232/RS485 multiplexers will **switch the mode automatically** based on the wiring by the user. Please refer to 2.4.11 and 2.4.12 for the pinout description of the connectors.

To test if the serial ports function properly:

1. Connect the Device to a Linux host (Ubuntu 22.04 for instance) with the USB cable (Type-A to Type-A);
2. Use a proper serial adapter to connect the target serial port to the host computer;
3. Set the baud rate (115200 for instance) of a serial port (uart0 for instance);

```
$ adb shell // open the device shell (not necessary if you use the console)
# su // enable the root privilege (not necessary if you use the console)
# stty -F /dev/ttyS0 speed 115200 // set the baud rate of uart0 to 115200
```

4. Test for serial communication.

```
# cat /dev/ttyS0 & // receive data
# echo TEST > /dev/ttyS0 // send data
```

4.5 4G module

VT-SBC-RK66 integrates an automatic dial-up script. The dial-up fails when there is no SIM card in the slot, yet the normal operation of the Device will not be impacted.

Before using the cellular communication, please remember to insert the activated SIM card into the SIM slot and install the 4G antennas before power up.

1. The dial-up script runs automatically upon power up;
2. Use the `ifconfig` command to check the information of the network card (PPP0 in this case) after successful dial-up;

```
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500
    inet 10.58.143.26 netmask 255.255.255.255 destination 10.64.64.64
    ppp txqueuelen 3 (Point-to-Point Protocol)
    RX packets 76 bytes 5970 (5.8 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 85 bytes 5964 (5.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

3. Test the network connection using the `ping` command.

```
root@vantron:~# route add default gw 10.58.143.26
root@vantron:~#
root@vantron:~# ping www.baidu.com
PING www.a.shifen.com (14.215.177.39): 56 data bytes
64 bytes from 14.215.177.39: icmp_seq=0 ttl=54 time=161.061 ms
64 bytes from 14.215.177.39: icmp_seq=1 ttl=54 time=123.829 ms
^C--- www.a.shifen.com ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max/stddev = 123.829/142.445/161.061/18.616 ms
```

4.6 Ethernet

VT-SBC-RK66 is configured to connect to Internet once it connects to a live Ethernet.

1. Connect the RJ45 Ethernet jack of the Device to network;
2. Use the `ifconfig` command to check the information of the network card (eth0 in this case);

```
root@vantron:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.9.167 netmask 255.255.255.0 broadcast 192.168.9.255
    inet6 fe80::bcf3:fe35:e071:f00b prefixlen 64 scopeid 0x20<link>
    ether 46:e6:8f:6f:80:cf txqueuelen 1000 (Ethernet)
    RX packets 89 bytes 20331 (19.8 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 43 bytes 4170 (4.0 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 38
```

3. Test the network connection using the `ping` command.

```
root@vantron:~# ping 192.168.9.166
PING 192.168.9.166 (192.168.9.166): 56 data bytes
64 bytes from 192.168.9.166: icmp_seq=0 ttl=128 time=0.525 ms
64 bytes from 192.168.9.166: icmp_seq=1 ttl=128 time=1.020 ms
64 bytes from 192.168.9.166: icmp_seq=2 ttl=128 time=1.040 ms
64 bytes from 192.168.9.166: icmp_seq=3 ttl=128 time=1.048 ms
64 bytes from 192.168.9.166: icmp_seq=4 ttl=128 time=1.017 ms
^C--- 192.168.9.166 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.525/0.930/1.048/0.203 ms
```

4.7 USB

When any of the USB interfaces connects to a storage device, input the following commands to check/configure the USB interface.

1. Check the USB interface information:

```
$ lsusb
```

2. Mount the USB device to a specified directory (e.g., /mnt):

```
$ mount /dev/xxx /mnt
```

3. Check the mounted content in /mnt:

```
$ ls /mnt
```

4. Unmount the USB device from /mnt:

```
$ umount /dev/mnt
```

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** depending on the Product 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.