Compact3566 Linux6.1 User Manual

V1.0

Boardcon Embedded Designer

Overview

The content of this document is intended solely for the Compact3566 development board, aiming to help users quickly understand, apply, and test the Compact3566 development board.

System Support

Development Board	Debian12	Buildroot
Compact3566_V3	Y	Y

Revision History

Version	Date	Author	Revision History
V1.0	2025-04-22	Liu Yuan	Initial version

Disclaimer

The information in this manual is for reference only. While Boardcon strives to ensure its accuracy, no guarantees are made regarding its completeness or correctness. All content is subject to change without prior notice. Boardcon reserves the right to revise the content of this manual without prior notification.

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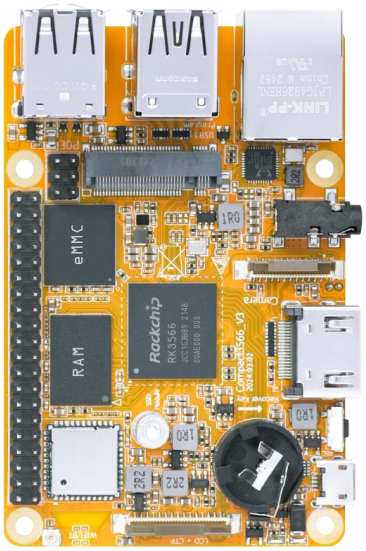
Content

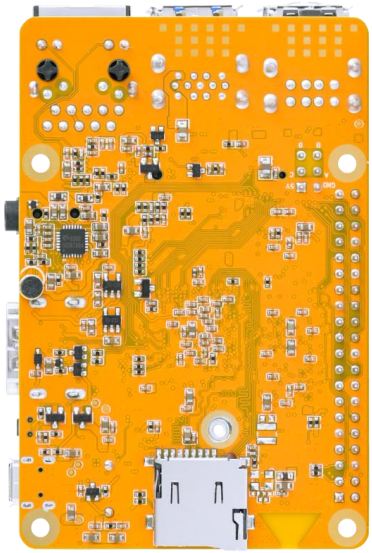
1.Introduction

1.1 Overview

Compact3566 is a Raspberry Pi 3 B+ form factor single board computer (SBC) based on the Rockchip RK3566 Quad-core Cortex-A55 processor designed for IoT devices, such as home security system, Face Recognizing Robot, drones and HMI.

The small computing platform has a high-performance and low power processor with USB ports, Gigabit Ethernet, 2.4G/5G WiFi, M.2, micro-SD card slot, MIPI CSI camera connector, LVDS (or MIPI DSI) and HDMI port that support 4K monitors.





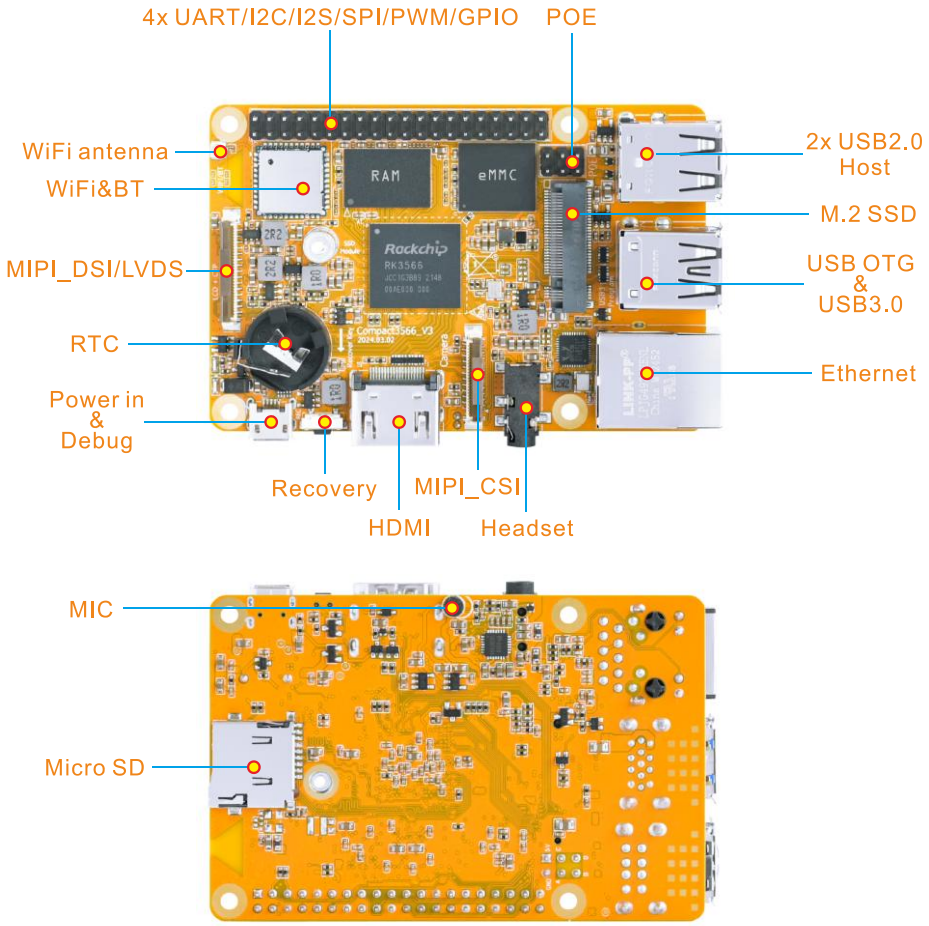
1.2 Product Parameters

Basic Parameters	
SOC	• RK3566
CPU	• Quad-core 64-bit ARM Cortex-A55@ up to 1.8GHz
GPU	• OpenCL 2.0 • OpenGLES 1.1/2.0/3.2 • Vulkan 1.1
NPU	• 1 TOPS AI computing power

		• Supports int8/int16/fp16/bfp16 MAC operations
Video	Decoder	• Support 4096x2306@60fps H.265/H.264/VP9 video decoding • Support 1920x1088@60fps VP8/VC1/MPEG-4,2,1 video decoding • Support 720x576@60fps H.263 video decoding
	Encoder	• Support 1080P@60fps H.265/H.264 video encoding • Support YUV/RGB video source with rotation and mirror
RAM		• 4GB LPDDR4X (up to 8GB)
ROM		• 8GB eMMC (up to 64GB)
Support system		Android, Debian, Buildroot
Hardware Parameters		
Extended Storage		• Support M.2 PCIe NVME SSD • Support MicroSD Card
Display		• Support HDMI TX 4K@60fps display • Support LVDS display
Audio		• Support HDMI TX audio output • Support Headphone output/input • Support MIC input
USB		• Support USB3.0 • Support 3x USB2.0
Network		• Support Gigabit Ethernet • Support WIFI/BT module
Camera		• Support 1x Camera (ov13850)
Peripheral communication		• Support SPI • Support 4xUART
Other parameters		Support Debug, IR, RTC, OTG.
Electrical Parameters		

Power supply input voltage	12V/3A
RTC input voltage	3V/0.6uA
Operating temperature	0 ~ 70°
Storage temperature	-40 ~ 85°
Structural Parameters	
dimensions	85.0mm x 56.0mm

1.3 Hardware Interface Introduction



Interface parameters	
Power in & Debug	Micro USB interface, integration of power supply and serial port debugging
Recover	Recovery key

HDMI	HDMI TX interface
MIPI_CSI	MIPI CSI Camera interface
Headset	Headset output/input
Ethernet	Gigabit Ethernet interface
USB OTG&USB3.0	Dual-layer USB HOST interface
M.2 SSD	M.2 SSD interface
2X USB2.0 Host	Dual-layer USB2.0 HOST interface
POE	Power Over Ethernet interface
4xUART/I2C/I2S/SPI/PWM/GPIO	Expand GPIO interface
WIFI antenna	WIFI antenna interface
WIFI&BT	Realtek RTL8821CS module
RTC	RTC coin cell connector
MIC	Microphone
Micro SD	MicroSD card slot

2.Install Drivers and Tool

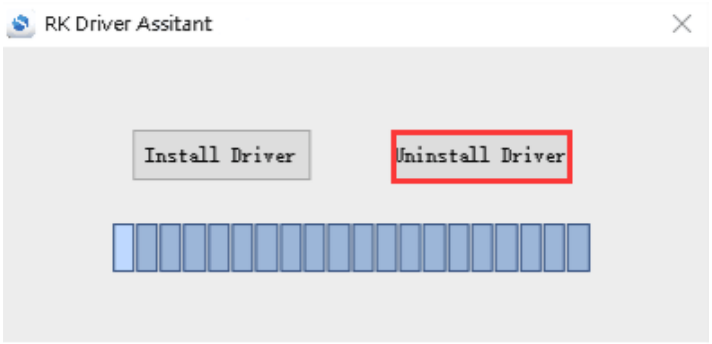
To download firmware and debug in the terminal, the following drivers and software need to be installed (for Windows computers):

Number	Driver name	Driver	Use
1	RK Driver Assitant	DriverInstall.exe	OTG USB driver installation assitant
2	CH9102x	SETUP.EXE	Serial port debugging driver
3	Serial Terminal Tool	SecureCRT.exe	Debugging tool

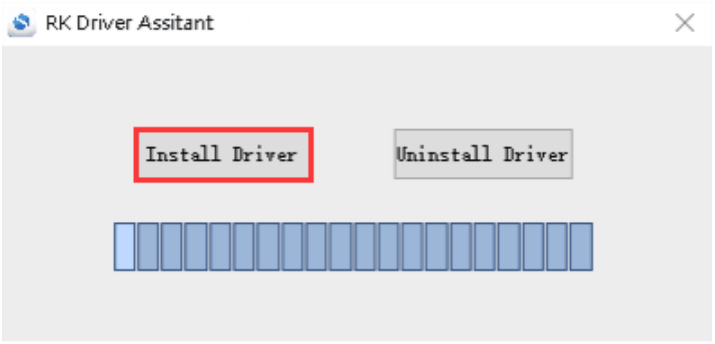
2.1 Install RK Driver Assitant

Step 1: Open *DriverAssitant_v5.1.1/DriverInstall.exe*.

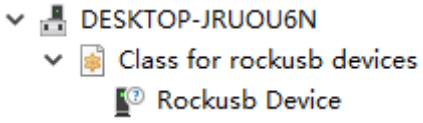
Step 2: To avoid driver conflicts, click **"Uninstall Driver"** to uninstall the driver.



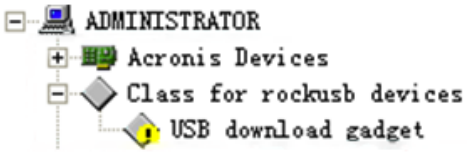
Step 3: Click button **"Install Driver"** to install.



Step 4: After the installation is complete, connect the board and PC with Type-A cable and press the **Recovery** key and hold then power the board, the following information is displayed in the Computer **Device Manager**, indicating that the USB driver was successfully installed.



Step 5: If the following device information appears in the **Device Manager** after the operation in Step 4, user need to proceed to the next step.



Step 6: The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select: *DriverAssitant_v5.1.1/ADBDriver.*

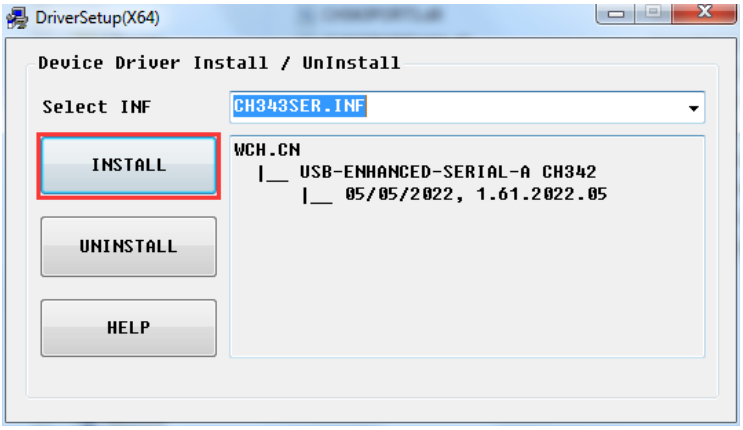
Step 7: After the installation is completed, the following device information can be seen in the Computer **Device Manager**.

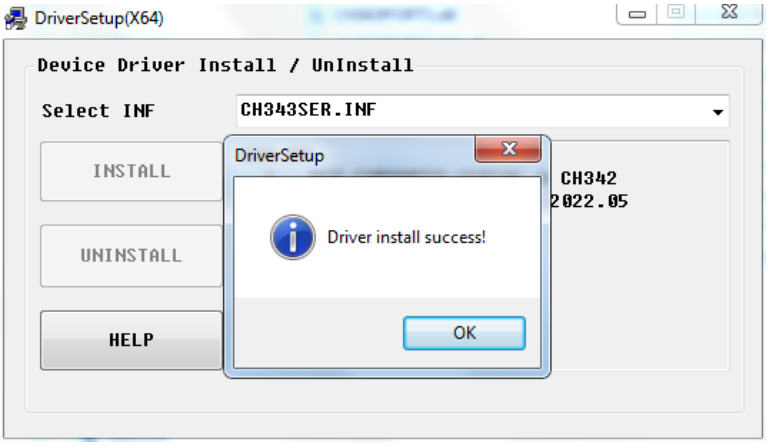
2.2 Install CH9102X Driver

Step 1: Connect the Micro USB cable (for power and debugging).

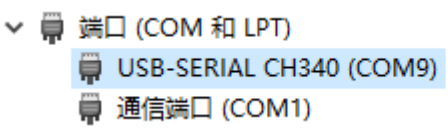
Step 2: Unzip *CH343SER.ZIP* on Windows.

Step 3: Select and install the corresponding *SETUP.EXE* according to the computer properties.





Step 4: After the installation is completed, the device will be listed under **Device Manager** ports with unique serial port assigned.

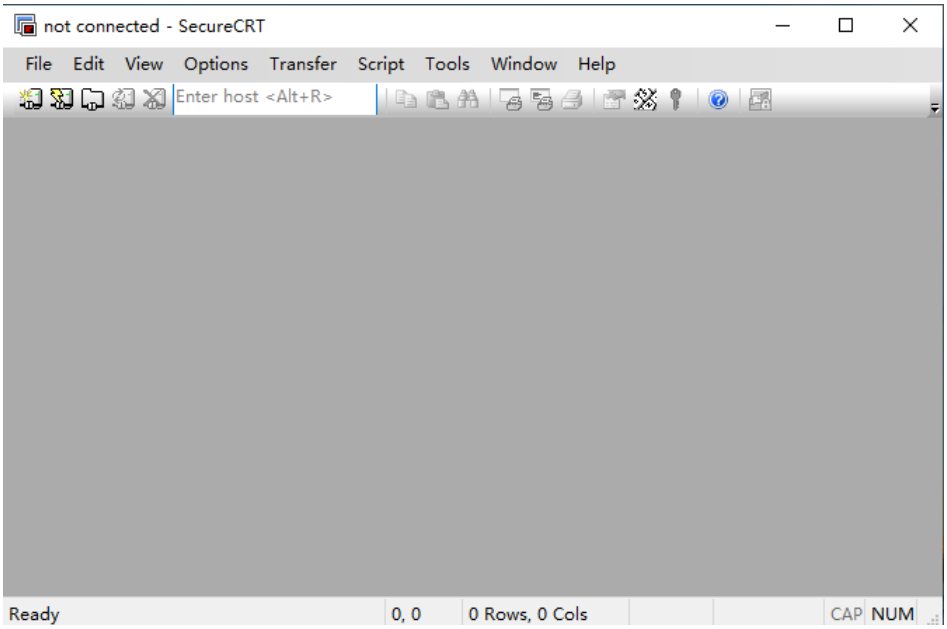


2.3 Install Serial Terminal Tool

The serial terminal SecureCRT is used for debugging in Windows. It can be used directly after decompression.

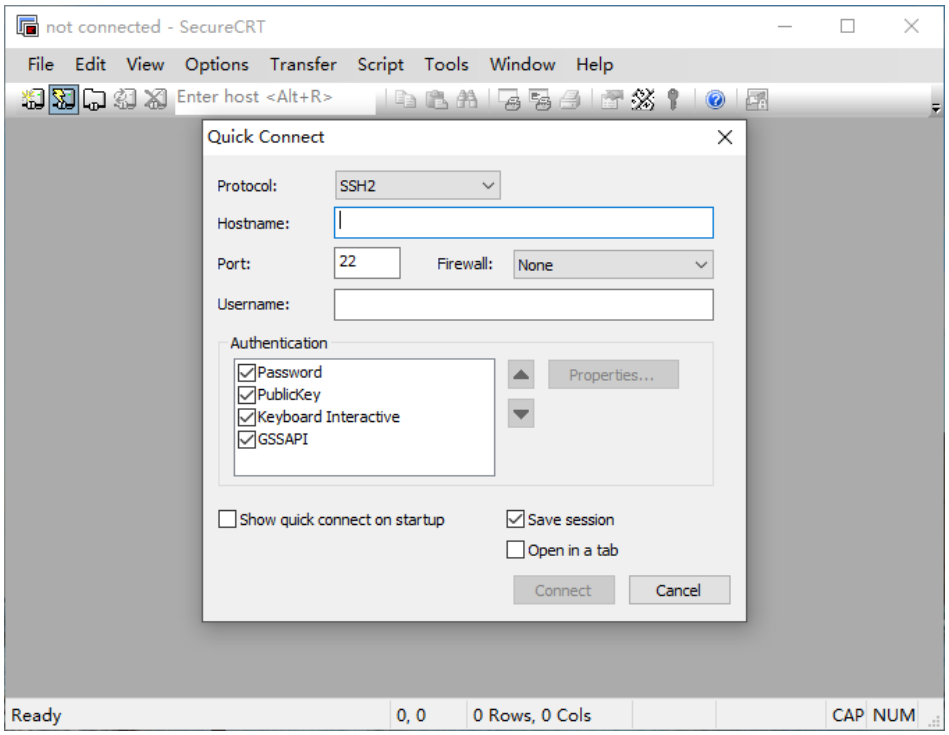
Step 1: Unzip *Platform/SecureCRT.rar* on PC.

Step 2: Click *SecureCRT/SecureCRT.exe* open the SecureCRT.

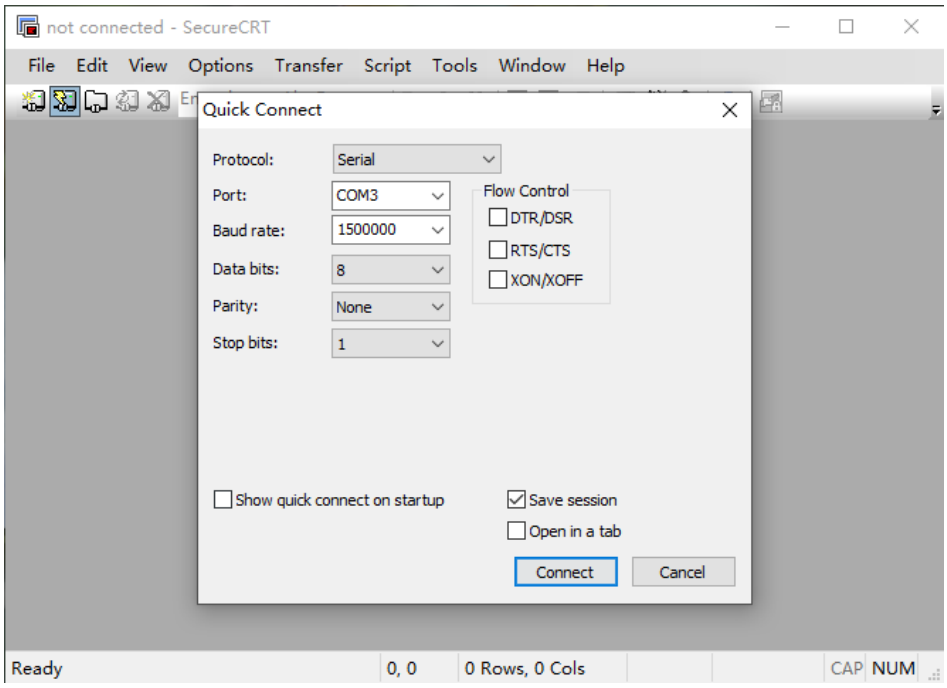


Step 3: Connect the Micro USB cable (for power and debugging).

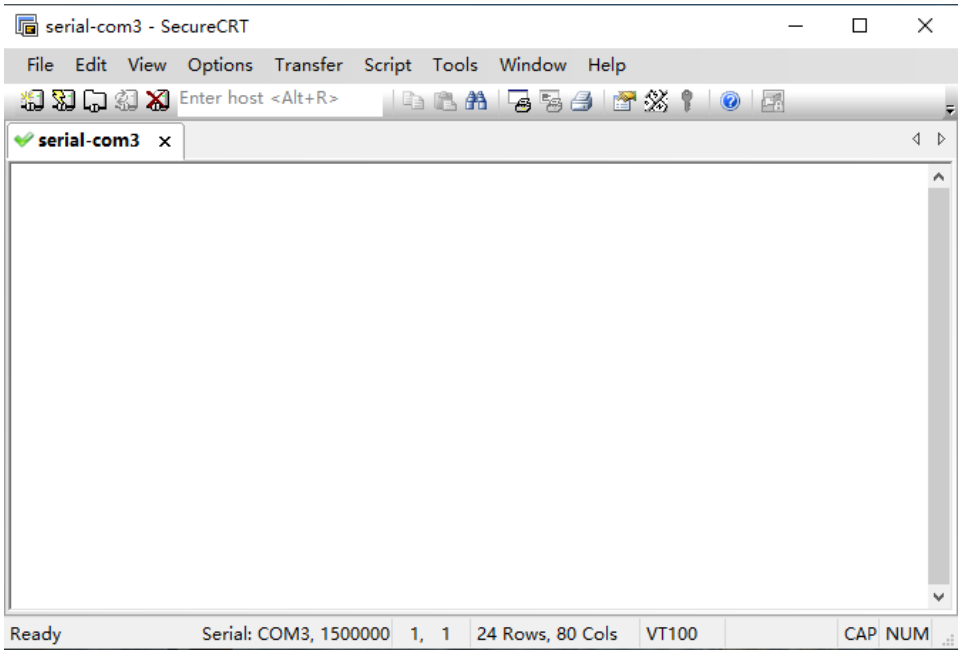
Step 4: Click the **"Quick Connect"** button to go to the Quick Connect configuration screen.



Step 5: Configure as shown in the following figure.



Step 6: After clicking **"Connect"** button, the terminal serial interface will be successfully accessed.



3.Upgrade Introduction

3.1 Upgrade Mode

The firmware can be upgraded via USB cable in two modes:

1. **Loader Mode:**

   The standard mode used for firmware upgrades.

2. **MaskRom Mode:**

   A last-resort mode used when the device is bricked. Entering MaskRom mode requires hardware manipulation, which involves certain risks. It should only be attempted if Loader mode is unavailable.

• Prerequisite

Before upgrading the firmware via USB cable, ensure that the necessary drivers are installed. For installation instructions, refer to the section Install RK Driver Assistant.

3.1.1 How to Enter Loader Mode

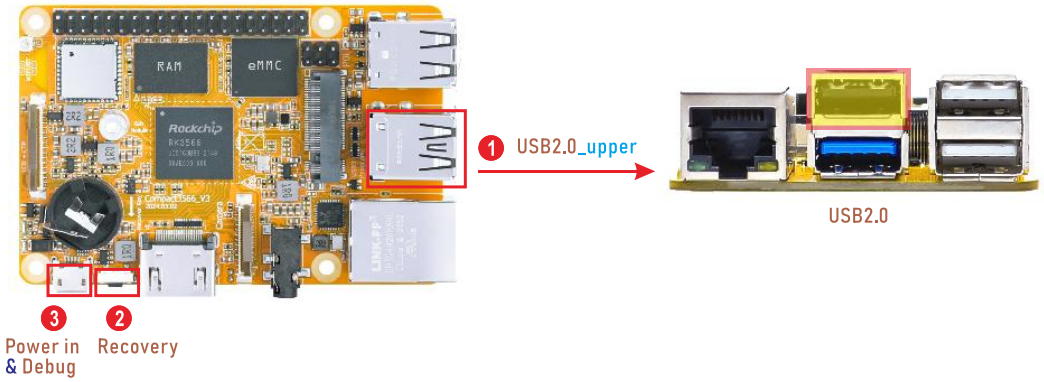
3.1.1.1 Hardware

Step 1: Disconnect the power adapter.

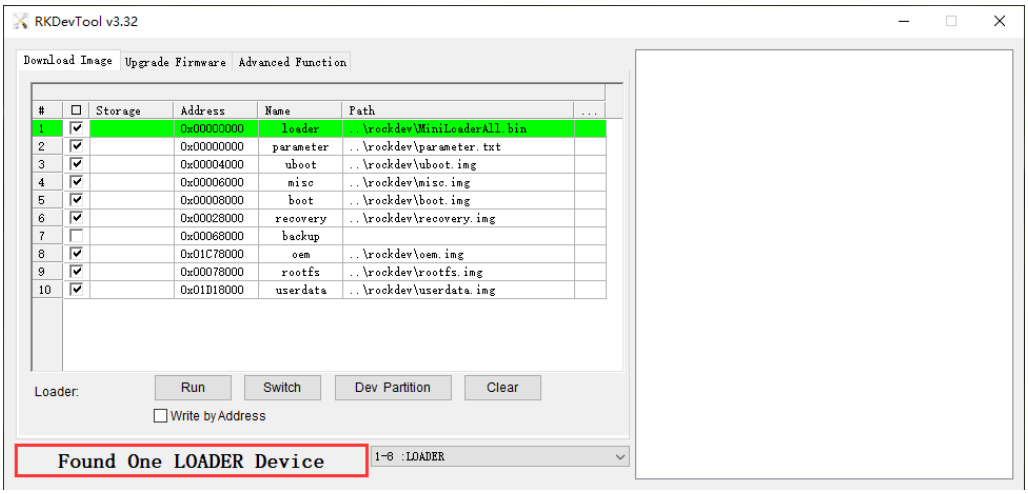
Step 2: Use Type-A data cable to connect personal computer and development board.

Step 3: Press and hold the **Recovery** button on the board

Step 4: Connect the Micro USB cable (for power and debugging).



Step 5: After a few seconds, release the **Recovery** button when the flashing tool shows **"Found one LOADER Devic"**.



3.1.1.2 Software

After connecting the Type-A data cable, execute the following command in the serial debug terminal or adb shell.

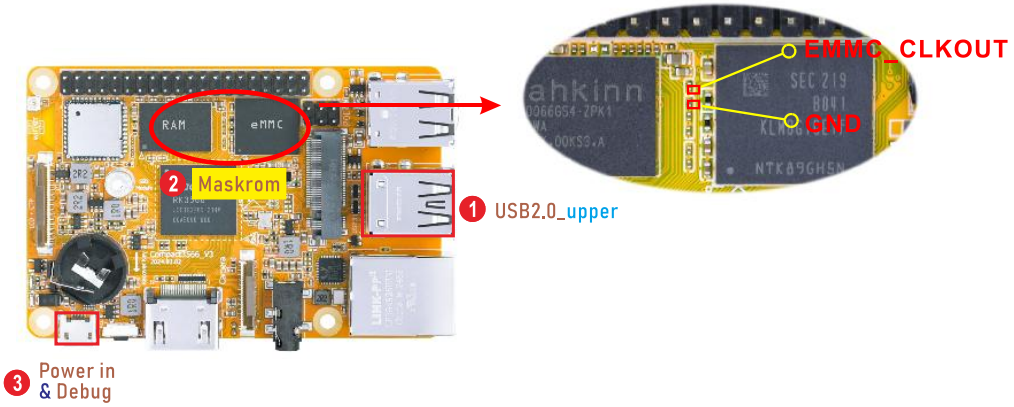
```
# reboot loader
```

3.1.2 How to Enter MaskRom Mode

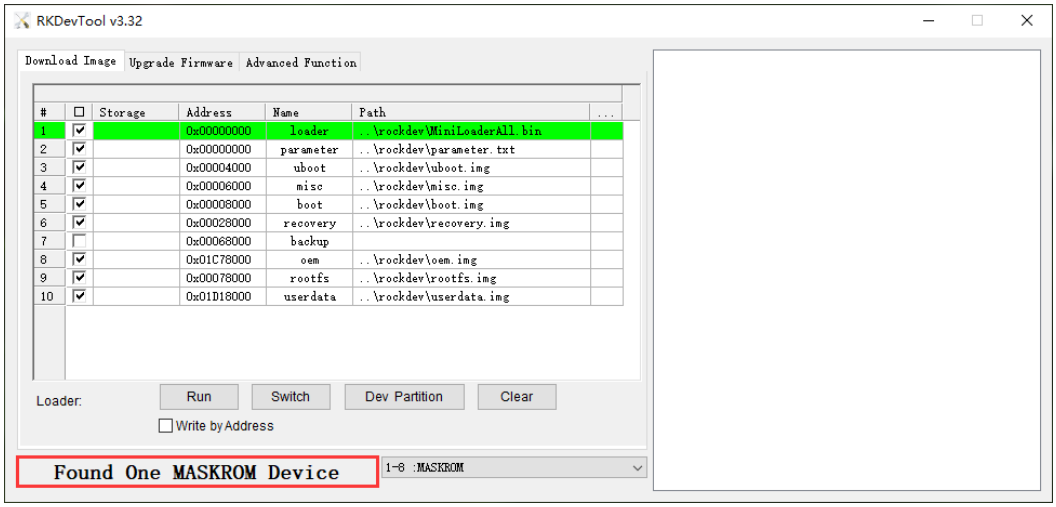
Step 1: Disconnect the power adapter.

Step 2: Use Type-A data cable to connect the personal computer and development board.

Step 3: Short EMMC_CLKOUT to GND.



Step 4: After connecting the power cable, the device will enter MaskRom mode.



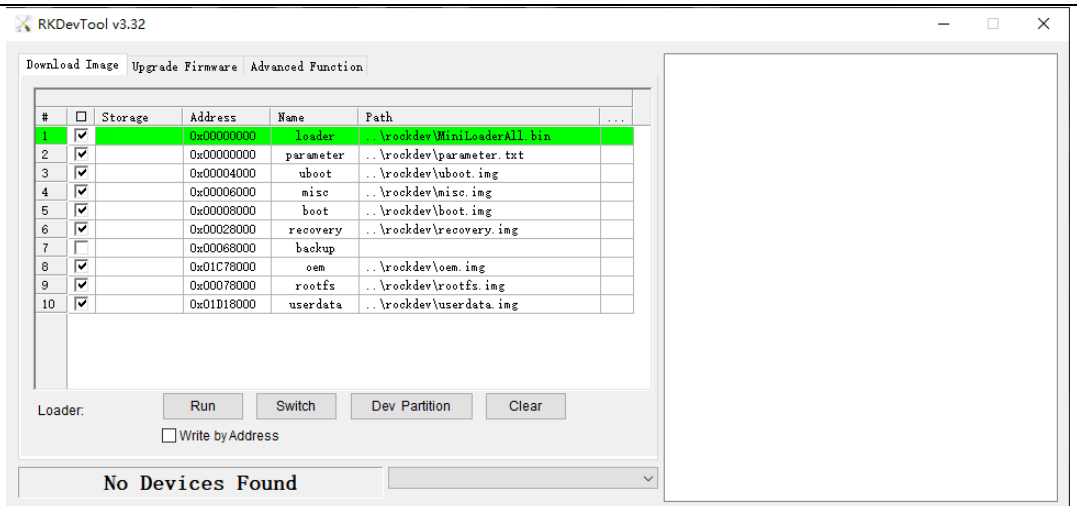
3.2 Burn firmware

Environment: Windows OS (Operating System).

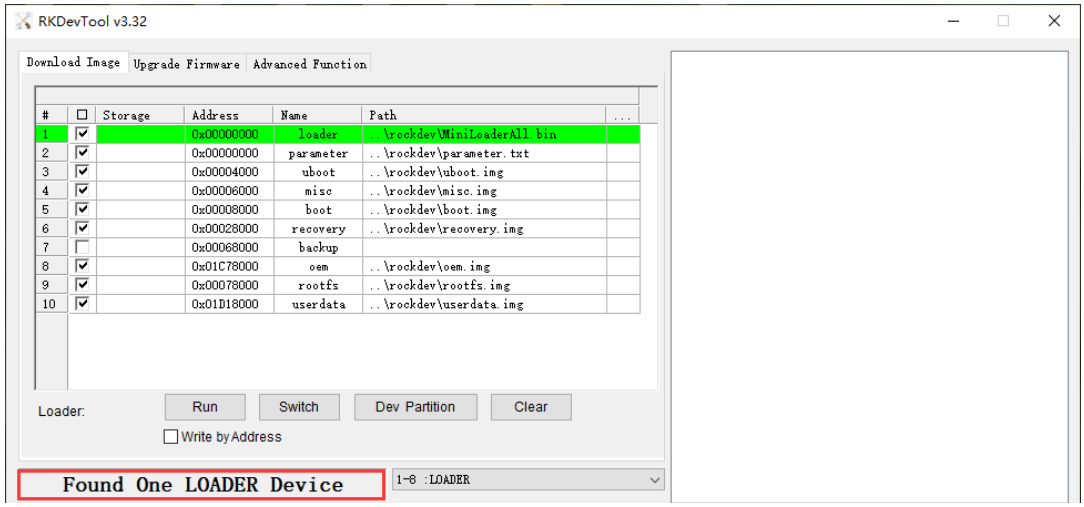
3.2.1 Burn Update.img Firmware

Step 1: Unzip *RKDevTool.rar* on Windows.

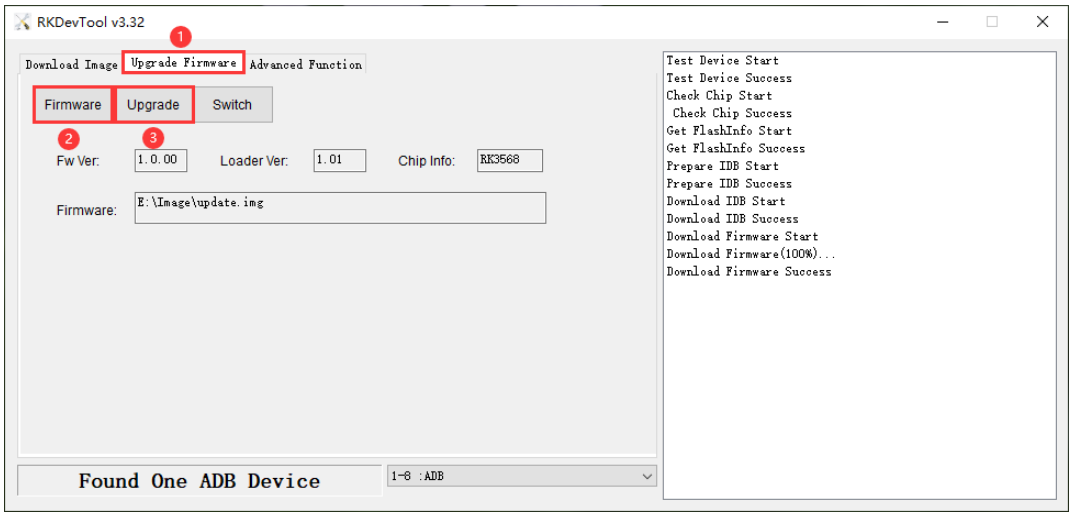
Step 2: Open *RKDevTool\RKDevTool_Release\RKDevTool.exe*.



Step 3: Switch to **loader mode**. (*How to Enter Loader Mode*)



Step 4: Click **Upgrade Firmware** -> **Firmware**, select **update.img**, then click **Upgrade** to flash.



After the flashing is complete, the board will automatically reboot.

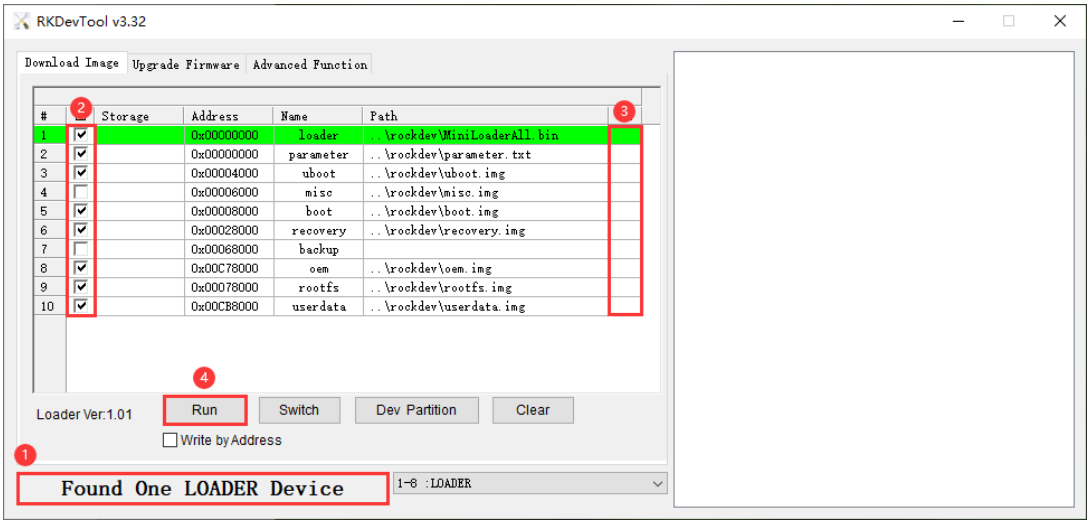
3.2.2 Burn Split Firmware

Step 1: Switch to **Loader mode**. (*How to Enter Loader Mode*)

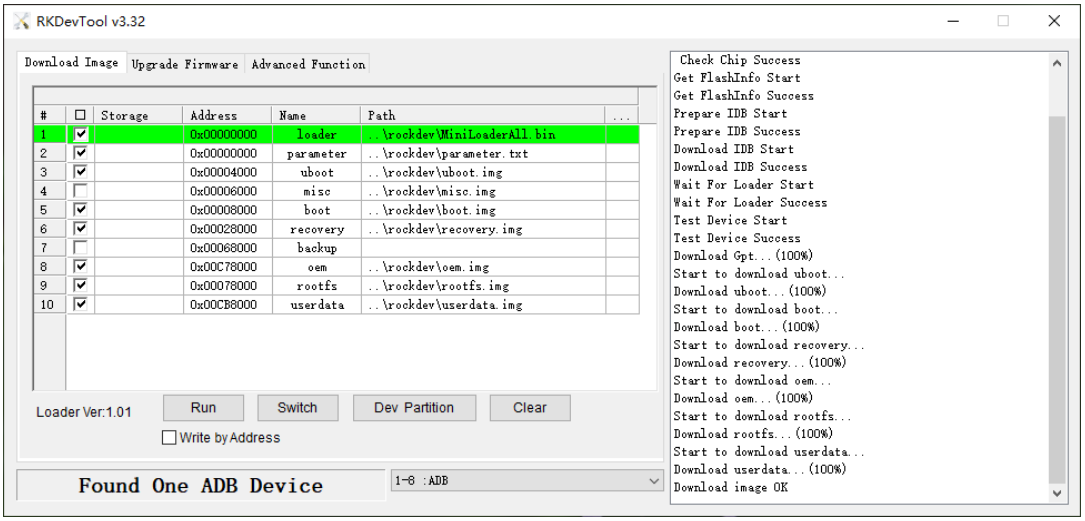
Step 2: Check the partitions to be flashed, multiple partitions can be selected.

Step 3: Ensure the image file path is correct. If necessary, click the blank cell next to the path to reselect it.

Step 4: Click the **Run** button to flash the image.



After the flashing is complete, the board will automatically reboot.



4.Development Environment

4.1 Preparing the Development Environment

It is recommended to use Ubuntu 22.04 or higher version for compilation. If you encounter an error during compilation, user can check the error message and install the corresponding software packages accordingly. Other Linux versions may need to adjust the software package accordingly. In addition to the system requirements, there are other hardware and software requirements.

Hardware requirements	Software requirements
64-bit system, hard disk space should be greater than 100G. If you do multiple builds, you will need more hard drive space.	Ubuntu 22.04

4.2 Installing Libraries and Toolkits

The contents of this directory only provide the software package installation commands that are needed to build the compiled SDK environment. Please install other tools such as samba and ssh yourself.

PC OS	Network	Permission
Ubuntu 22.04	online	root

To install the required tools, execute the following commands:

```
$ sudo apt-get install git ssh make gcc libssl-dev liblz4-tool libmpc-dev
$ sudo apt-get install expect g++ patchelf chrpath gawk texinfo chrpath diffstat
$ sudo apt-get install binfmt-support live-build bison flex fakeroot libgmp-dev
$ sudo apt-get install cmake gcc-multilib g++-multilib unzip device-tree-compiler
$ sudo apt-get install ncurses-dev libgucharmap-2-90-dev bzip2 expat gpgv2
$ sudo apt-get install cpp-aarch64-linux-gnu g++-aarch64-linux-gnu
$ sudo apt install python2 python-is-python3
```

5.Compile Source

Note: The Debian, Buildroot system use the same SDK source package. The difference lies in the rootfs.img used, meaning the steps for building the filesystem are different, while the other steps are the same.

Step 1: Unzip the Source

To extract the source files, execute the following commands:

```
$ tar xvf compact3566_linux6.1-rkr*.tar.bz2
$ cd compact3566_Linux6.1-rkr5/
```

Step 2: Configure the Compiled Board

To configure the board, execute:

```
$ ./build.sh lunch
```

After running **./build.sh lunch**, the system will list available defconfig files.

• To use HDMI as the display, select:

2. boardcon_rk3566_compact3566-v3_hdmi_defconfig

• To use LVDS (1280x800) as the display, select:

3. boardcon_rk3566_compact3566-v3_lvds_defconfig

Example (HDMI display):

```
liuyuan@boardcon:~/opt/Compact3566/compact3566_linux6.1-rkr5$ ./build.sh lunch
############### Rockchip Linux SDK ###############
Manifest: rk3566_rk3568_linux6.1_release_v1.1.0_20241220.xml
Log colors: message notice warning error fatal
Log saved at /home/liuyuan/opt/Compact3566/compact3566_linux6.1-rkr5/output/sessions/2025-03-28_19-49-11
Pick a defconfig:
1. rockchip_defconfig
2. boardcon_rk3566_compact3566-v3_hdmi_defconfig
3. boardcon_rk3566_compact3566-v3_lvds_defconfig
4. rockchip_rk3566_evb2_lp4x_v10_32bit_defconfig
5. rockchip_rk3566_evb2_lp4x_v10_defconfig
6. rockchip_rk3568_evb1_ddr4_v10_32bit_defconfig
7. rockchip_rk3568_evb1_ddr4_v10_defconfig
8. rockchip_rk3568_evb8_lp4_v10_32bit_defconfig
9. rockchip_rk3568_evb8_lp4_v10_defconfig
10. rockchip_rk3568_pcie_ep_lp4x_v10_defconfig
Which would you like? [1]: 2
Switching to defconfig:
/home/liuyuan/opt/Compact3566/compact3566_linux6.1-rkr5/device/rockchip/.chip/boardcon_rk3566_compact3566-
v3_hdmi_defconfig
#
# configuration written to /home/liuyuan/opt/Compact3566/compact3566_linux6.1-rkr5/output/.config
#
```

Step 3: Compile U-Boot

To compile uboot, execute the following command:

```
$ ./build.sh uboot
```

Step 4: Compile the Kernel

To compile the kernel, execute the following command:

```
$ ./build.sh kernel
```

Step 5: Compile Recovery

To compile recovery, execute the following command:

```
$ ./build.sh recovery
```

Step 6: Compile rootfs

(1) Compile Debian12 (Permission: root)

To compile debian12, execute the following command:

```
$ sudo ./build.sh debian
```

After compilation, a linaro-rootfs.img is generated in the debian directory.

Note: Related dependencies must be installed beforehand.

```
$ cd debian
$ sudo apt-get install binfmt-support qemu-user-static live-build
$ sudo dpkg -i ubuntu-build-service/packages/*
$ sudo apt-get install -f
```

(2) Compile Buildroot

To compile buildroot, execute the following command:

```
$ ./build.sh buildroot
```

Step 7: Generate and Check Firmwares

To generate firmware, execute the following command:

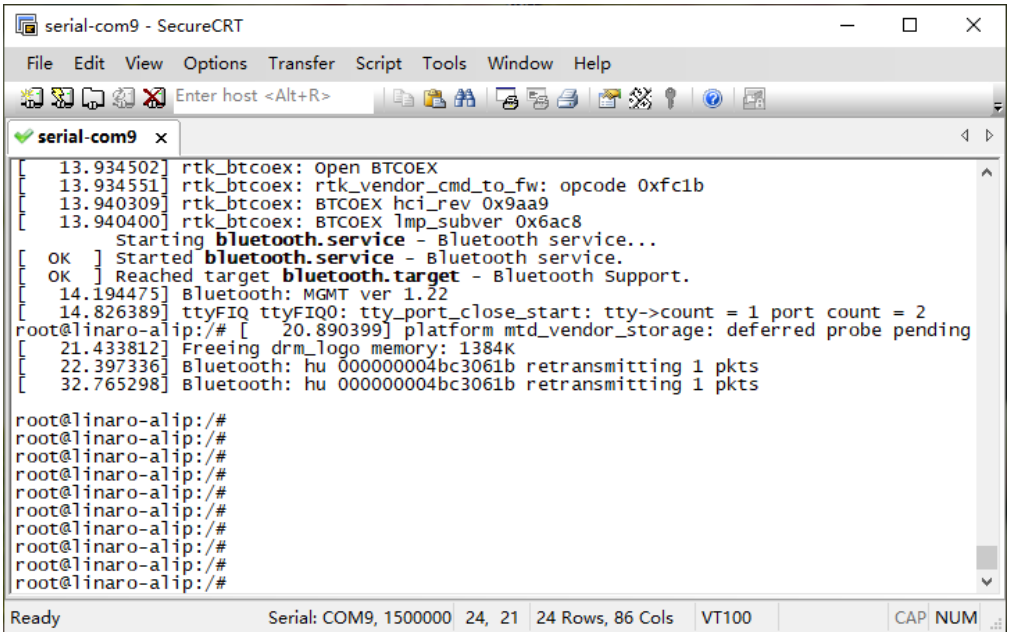
```
$ ./build.sh firmware
```

Images and **update.img** are generated in *rockdev/* directory.

6.Debian12 Test

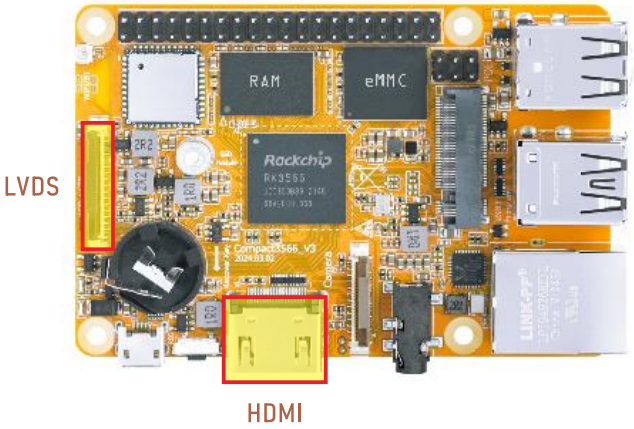
6.1 Serial Terminal

Connect the Micro USB cable (for power and debugging), the terminal will output boot information. The default baudrate is 1500000.

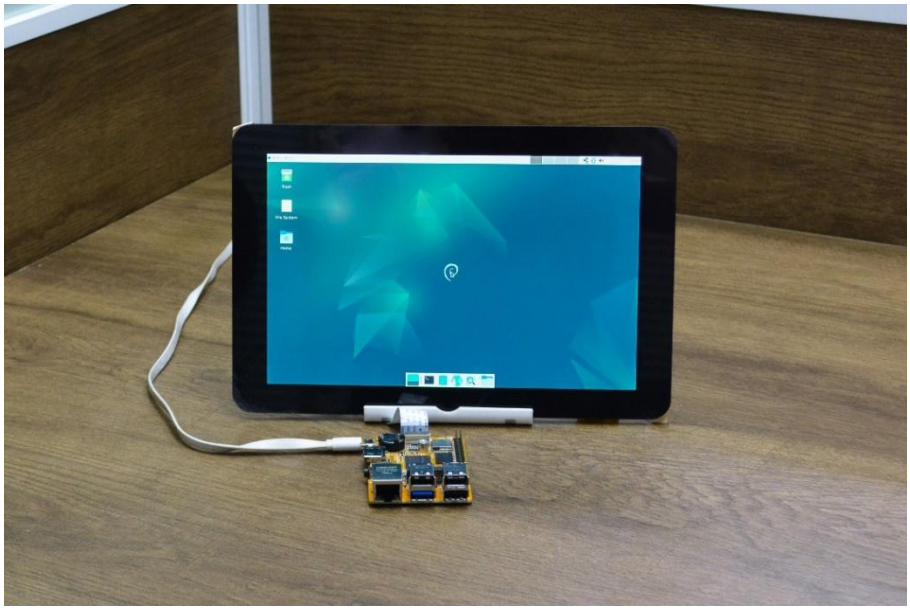


6.2 Display

The Compact566 can only output to a single display (either HDMI or LVDS) at a time.

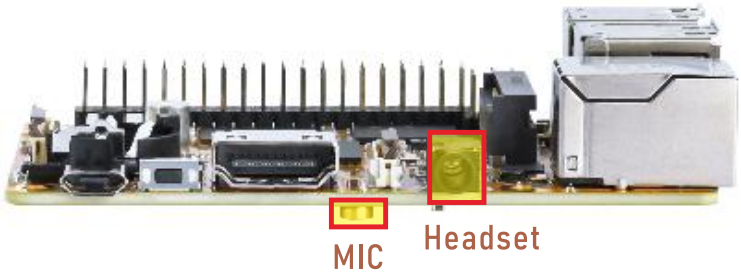


The display effect diagram is as follows:



6.3 Audio I/O

Step 1: Plug the headset into the headset jack.



Step 2: View sound card.

```
# cat /proc/asound/cards
```

```
root@linaro-alip:/# cat /proc/asound/cards
 0 [rockchiphdmi   ]: rockchip_hdmi - rockchip,hdmi
                      rockchip,hdmi
 1 [rockchipes8388c]: rockchip_es8388 - rockchip,es8388-codec
                      rockchip,es8388-codec
```

Step 3: Headset/MIC recording. (Prioritizes headset microphone; defaults to the device's built-in microphone when no headset is connected.)

• To use HDMI as the display:

```
# arecord -Dhw:1,0 -f cd record.wav
```

```
root@linaro-alip:/# arecord -Dhw:1,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
[  514.860659] hw det_value = 1
```

• To use LVDS (1280x800) as the display:

```
# arecord -Dhw:0,0 -f cd record.wav
```

```
root@linaro-alip:/# arecord -Dhw:0,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

Step 4: Play audio through headset.

• When using HDMI as the display:

```
# aplay -Dhw:1,0 record.wav
```

```
root@linaro-alip:/# aplay -Dhw:1,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
[  544.878123] hw det_value = 1
```

Note: Supplementary instructions on audio output.

```
# aplay -Dhw:0,0 record.wav    // HDMI TX audio output
# aplay -Dhw:1,0 record.wav    // Headset audio output
```

• When using LVDS (1280x800) as the display:

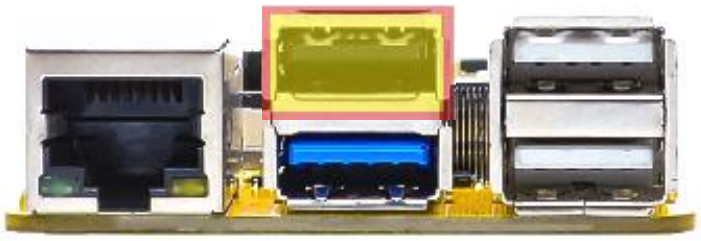
```
# aplay -Dhw:0,0 record.wav
```

```
root@linaro-alip:/# aplay -Dhw:0,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

6.4 USB

6.4.1 USB OTG

Compact3566 OTG defaults to Device mode on startup.



USB OTG

• Use the following command to switch to Host mode:

```
# echo host > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
```

```
root@linaro-alip:/# echo host > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
[  260.143389] dwc3 fcc00000.usb: device disconnectrm/fe8a0000.usb2-phy/otg_mode
root@linaro-alip:/# [  260.145760] android_work: sent uevent USB_STATE=DISCONNECTED
[  260.156340] dwc3 fcc00000.usb: request 00000000eb603692 was not queued to ep0out
[  260.157922] android_work: did not send uevent (0 0 0000000000000000)
[  260.263870] xhci-hcd xhci-hcd.6.auto: xHCI Host Controller
[  260.264355] xhci-hcd xhci-hcd.6.auto: new USB bus registered, assigned bus number 7
[  260.264556] xhci-hcd xhci-hcd.6.auto: USB3 root hub has no ports
[  260.264579] xhci-hcd xhci-hcd.6.auto: hcc params 0x0220fe64 hci version 0x110 quirks
0x0000008022010010
[  260.264642] xhci-hcd xhci-hcd.6.auto: irq 57, io mem 0xfcc00000
[  260.265084] usb usb7: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 6.01
[  260.265125] usb usb7: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[  260.265140] usb usb7: Product: xHCI Host Controller
[  260.265153] usb usb7: Manufacturer: Linux 6.1.99 xhci-hcd
[  260.265166] usb usb7: SerialNumber: xhci-hcd.6.auto
[  260.266336] hub 7-0:1.0: USB hub found
[  260.266439] hub 7-0:1.0: 1 port detected
```

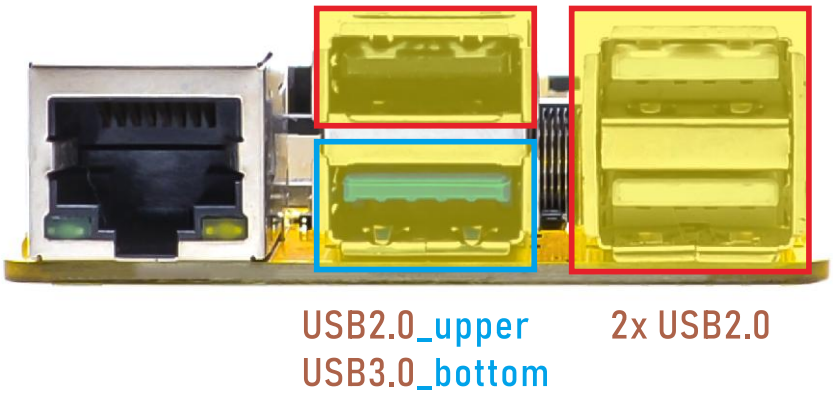
• Use the following command to switch to Device mode:

```
# echo peripheral > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
```

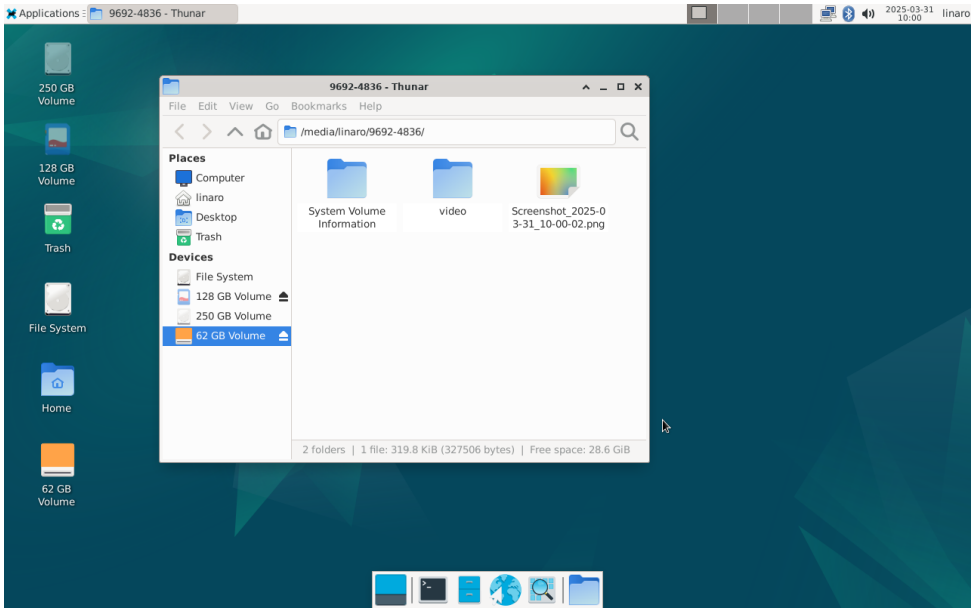
```
root@linaro-alip:/# echo peripheral > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
root@linaro-alip:/# [  289.803846] xhci-hcd xhci-hcd.6.auto: remove, state 4y/otg_mode
[  289.803968] usb usb7: USB disconnect, device number 1
[  289.806390] xhci-hcd xhci-hcd.6.auto: USB bus 7 deregistered
[  290.562318] read descriptors
[  290.562373] read strings
[  290.868086] dwc3 fcc00000.usb: device reset
[  290.956259] android_work: sent uevent USB_STATE=CONNECTED
[  290.990969] android_work: sent uevent USB_STATE=CONFIGURED
[  291.066667] dwc3 fcc00000.usb: device reset
[  291.400149] dwc3 fcc00000.usb: device reset
[  291.521263] android_work: sent uevent USB_STATE=CONFIGURED
```

6.4.2 USB HOST

The USB host can be used to connect devices such as USB mouse, USB keyboards, USB flash drives, and other USB peripherals.



After connecting the USB flash drive, if the device is successfully recognized, an icon will appear on the desktop. Users need to click the icon in order to access the files on the device.



The user can identify whether the mounted flash drive is USB 2.0 or USB 3.0 from the debug log.

• USB2.0 print information in high-speed mode.

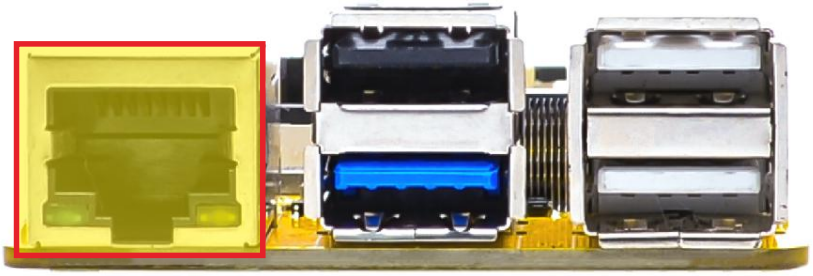
```
root@linaro-alip:/# [  100.401796] usb 5-1.1: new high-speed USB device number 5 using ehci-platform
[  100.540580] usb 5-1.1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[  100.540631] usb 5-1.1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  100.540654] usb 5-1.1: Product: OnlyDisk
[  100.540674] usb 5-1.1: Manufacturer: Netac
[  100.540715] usb 5-1.1: SerialNumber: 0A6544CD10427AB2
[  100.542566] usb-storage 5-1.1:1.0: USB Mass Storage device detected
[  100.543718] scsi host1: usb-storage 5-1.1:1.0
[  101.684785] scsi 1:0:0:0: Direct-Access     Netac    OnlyDisk        8.01 PQ: 0 ANSI: 6
[  101.690705] sd 1:0:0:0: [sdb] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[  101.691923] sd 1:0:0:0: [sdb] Write Protect is off
[  101.692854] sd 1:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[  101.701334]  sdb: sdb1
[  101.701915] sd 1:0:0:0: [sdb] Attached SCSI removable disk
```

• USB3.0 print information in SuperSpeed mode.

```
root@linaro-alip:/# [  532.647833] usb 2-1: new SuperSpeed USB device number 2 using xhci-hcd
[  532.678717] usb 2-1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[  532.678806] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  532.678844] usb 2-1: Product: OnlyDisk
[  532.678875] usb 2-1: Manufacturer: Netac
[  532.678903] usb 2-1: SerialNumber: C0E8BFA3EC38F796
[  532.681471] usb-storage 2-1:1.0: USB Mass Storage device detected
[  532.682322] scsi host0: usb-storage 2-1:1.0
[  534.054924] scsi 0:0:0:0: Direct-Access     Netac    OnlyDisk        8.01 PQ: 0 ANSI: 6
[  534.061337] sd 0:0:0:0: [sda] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[  534.062193] sd 0:0:0:0: [sda] Write Protect is off
[  534.062675] sd 0:0:0:0: [sda] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[  534.071082]  sda: sda1
[  534.071668] sd 0:0:0:0: [sda] Attached SCSI removable disk
```

6.5 Ethernet

Step 1: Connect the network cable to the Ethernet port.



According to the log, it can be seen that the Gigabit Ethernet recognition is successful.

```
root@linaro-alip:/# [  842.043556] rk_gmac-dwmac fe010000.ethernet end1: Link is Up - 1Gbps/Full - flow control
rx/tx
[  842.043727] IPv6: ADDRCONF(NETDEV_CHANGE): end1: link becomes ready
```

Step 2: View network interface information.

```
# ifconfig
```

```
root@linaro-alip:/# ifconfig
end1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.123  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::4518:4199:8681:eecd  prefixlen 64  scopeid 0x20<link>
        ether 46:93:f4:d6:c9:79  txqueuelen 1000  (Ethernet)
        RX packets 173  bytes 23607 (23.0 KiB)
        RX errors 0  dropped 33  overruns 0  frame 0
        TX packets 105  bytes 9546 (9.3 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 55
```

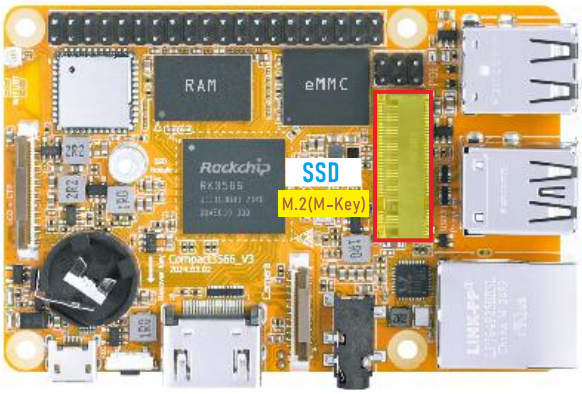
Step 3: Network connection test.

```
# ping -I end1 www.armdesigner.com
```

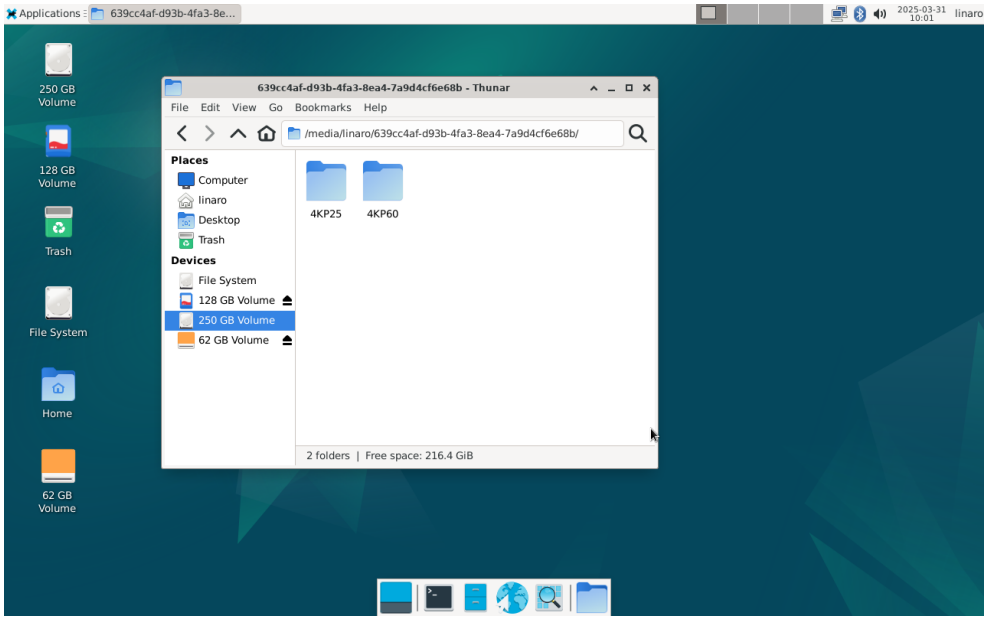
```
root@linaro-alip:/# ping -I end1 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.123 end1: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=171 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 6 received, 14.2857% packet loss, time 16307ms
rtt min/avg/max/mdev = 170.934/171.583/173.918/1.050 ms
```

6.6 M.2 NVME SSD

Step 1: Connect the SSD, then power on.

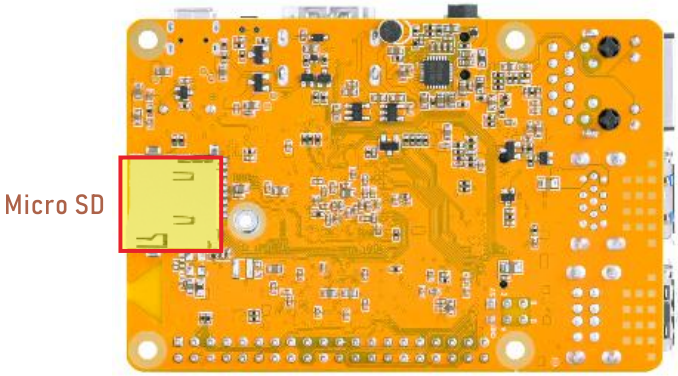


Step 2: If the SSD device is successfully recognized, an icon will appear on the desktop. Users can click the icon to access the SSD device.



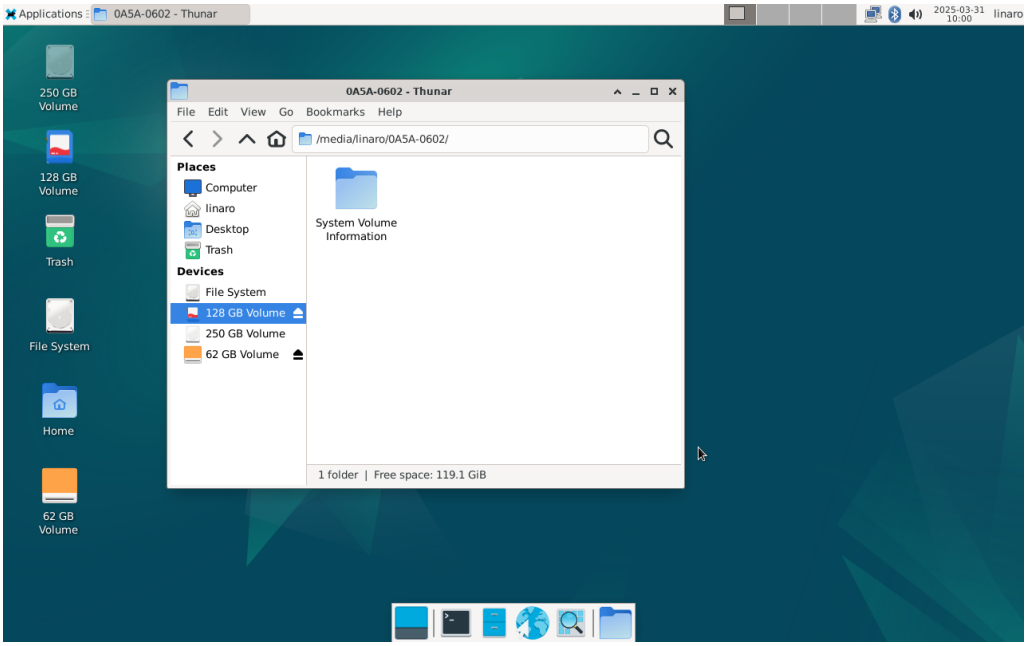
6.7 SD Card

Step 1: Insert the micro SD card into the card slot.

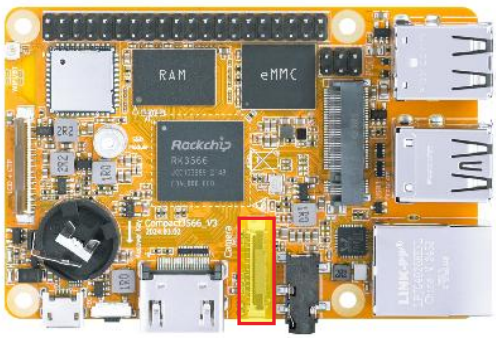


Step 2: After inserting the SD card, if it is recognized successfully, an icon will appear

on the desktop. Users need to click the icon in order to access the SD card.



6.8 Camera



MIPI Camera

OV13850

Step 2: Preview camera.

```
# /rockchip-test/camera/camera_rkisp_test.sh
```

```
root@linaro-alip:/# /rockchip-test/camera/camera_rkisp_test.sh
Start RKISP Camera Preview!
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 1291.008011] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1291.010999] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1291.011149] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
0:00:13.5 / 99:99:99.
```

Step 3: Record the video.

```
# gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \
filesink location=/tmp/h264.mp4
```

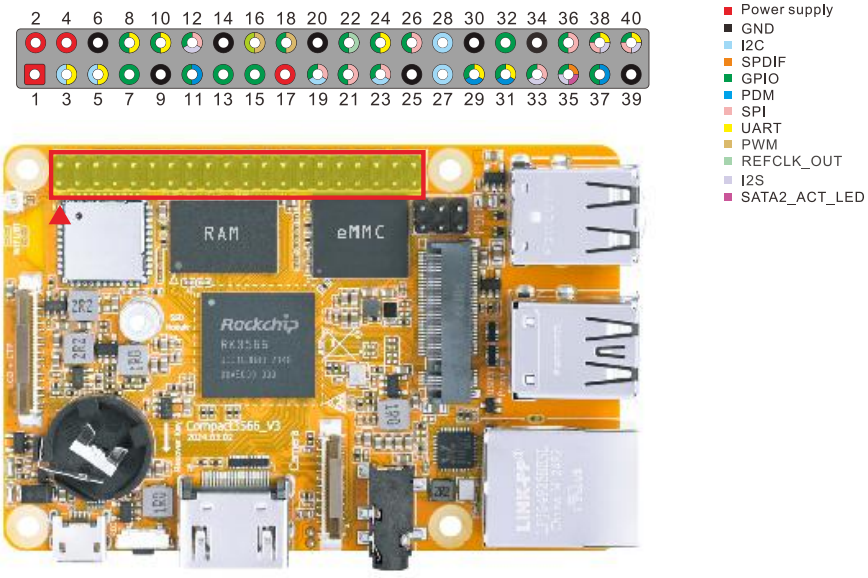
```
root@linaro-alip:/# gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \-buffers=100 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \merate=30/1 ! \
filesink location=/tmp/h264.mp44parse ! mp4mux ! \
Setting pipeline to PAUSED ...4
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 1332.482863] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1332.486664] rkisp rkisp-vir0: first params buf queue
[ 1332.487047] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1332.487117] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
Redistribute latency...
```

Step 4: Take photos.

```
# gst-launch-1.0 -v v4l2src device=/dev/video0 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
multifilesink location=/tmp/test%05d.jpg
```

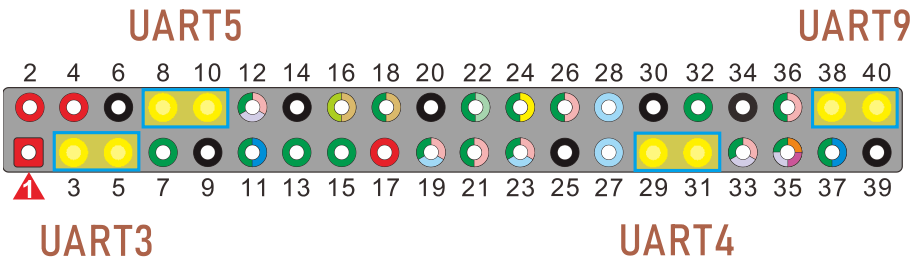
```
root@linaro-alip:/# gst-launch-1.0 -v v4l2src device=/dev/video0 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \o0 num-buffers=10 ! \
multifilesink location=/tmp/test%05d.jpgt=800 ! mppjpegenc ! \
Setting pipeline to PAUSED ...st%05d.jpg
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0: crop-bounds = < (int)0, (int)0, (int)2112, (int)1568 >
New clock: GstSystemClock
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:src: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1,
interlace-mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMultiFileSink:multifilesink0.GstPad:sink: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1,
interlace-mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
[ 1353.072875] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1353.077612] rkisp rkisp-vir0: first params buf queue
[ 1353.077990] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
```

6.9 GPIO



6.9.1 UART

Short circuit RX and TX pins of UART.



• UART3 test:

```
# com /dev/ttyS3 115200 8 0 1
```

```
root@linaro-alip:/# com /dev/ttyS3 115200 8 0 1
port = /dev/ttyS3
baudrate = 115200
cs = 8
parity = 0
stopb = 1
gggjjj
RECV: gggjjj
ooo
RECV: ooo
11
RECV: 11
ggg000
RECV: ggg000
```

• UART4 test:

```
# com /dev/ttyS4 115200 8 0 1
```

```
root@linaro-alip:/# com /dev/ttyS4 115200 8 0 1
port = /dev/ttyS4
baudrate = 115200
cs = 8
parity = 0
stopb = 1
jjjuuuoo
RECV: jjjuuuoo
gggy77
RECV: gggy77
fffffd
RECV: fffffd
```

• UART5 test:

```
# com /dev/ttyS5 115200 8 0 1
```

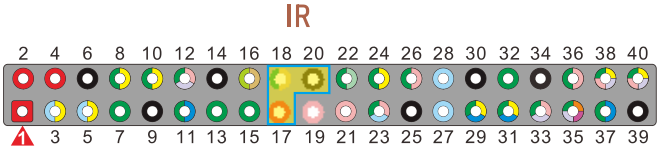
```
root@linaro-alip:/# com /dev/ttyS5 115200 8 0 1
port = /dev/ttyS5
baudrate = 115200
cs = 8
parity = 0
stopb = 1
jjjkk
RECV: jjjkk
uurr
RECV: uurr
w4445
RECV: w4445
```

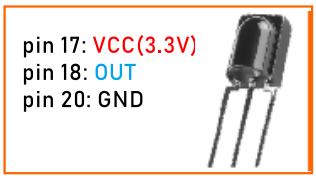
• UART9 test:

```
# com /dev/ttyS9 115200 8 0 1
```

```
root@linaro-alip:/# com /dev/ttyS9 115200 8 0 1
port = /dev/ttyS9
baudrate = 115200
cs = 8
parity = 0
stopb = 1
5555555
RECV: 5555555
iii0077
RECV: iii0077
gggg
RECV: gggg
rrrr00
RECV: rrrr00
```

6.9.2 IR





Step 1: Open IR debugging print.

```
# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/code_print
```

Step 2: When pressing a button on the remote control towards the IR receiver, the key value will be printed to the log.

```
root@linaro-alip:/# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/code_print
root@linaro-alip:/# [ 2395.705625] USERCODE=0x1818
[ 2395.732759] RMC_GETDATA=98
[ 2396.049720] USERCODE=0x1818
[ 2396.076862] RMC_GETDATA=98
[ 2396.401411] USERCODE=0x1818
[ 2396.428547] RMC_GETDATA=98
[ 2396.789799] USERCODE=0x1818
[ 2396.816937] RMC_GETDATA=99
[ 2397.181501] USERCODE=0x1818
[ 2397.208680] RMC_GETDATA=9a
[ 2397.545912] USERCODE=0x1818
[ 2397.573052] RMC_GETDATA=9b
[ 2399.581539] USERCODE=0x1818
[ 2399.608585] RMC_GETDATA=97
```

6.9.3 SPI

Step 1: short circuit MISO_M1 and MOSI_M1 pins of SPI.

Step 2: Execute the test script: **spidev0.0_test**.

```
# spidev0.0_test
```

```
root@linaro-alip:/# spidev0.0_test
spi mode: 0
bits per word: 8
max speed: 500000 Hz (500 KHz)

FF FF FF FF FF FF
40 00 00 00 00 95
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
DE AD BE EF BA AD
F0 0D
```

6.10 RTC

Step 1: Install the coin cell battery.

Step 2: Set the system time.

```
# date -s "2025-03-31 16:46:00"
```

Step 3: Write the system time to the hardware clock.

```
# hwclock -w
```

Step 4: Display the current hardware clock time.

```
# hwclock
```

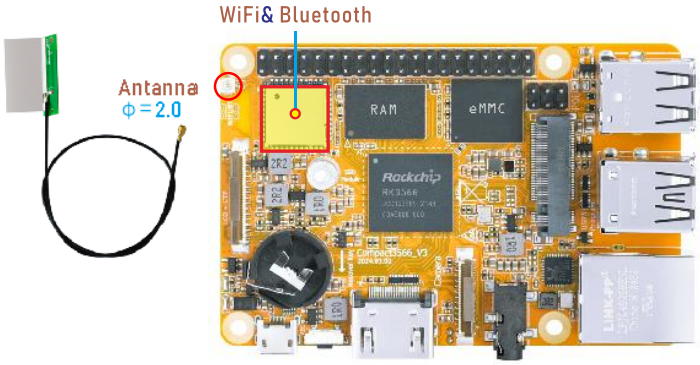
```
root@linaro-alip:/# date -s "2025-03-31 16:46:00"
Mon Mar 31 16:46:00 UTC 2025
root@linaro-alip:/# hwclock -w
root@linaro-alip:/# hwclock
2025-03-31 16:46:08.605266+00:00
root@linaro-alip:/# hwclock
2025-03-31 16:50:37.328349+00:00
root@linaro-alip:/# hwclock
2025-03-31 16:51:59.515741+00:00
```

Step 5: Power off, after a period of time to turn on the power again, check whether the time is saved.

```
root@linaro-alip:/# hwclock
2025-03-31 17:46:25.000495+00:00
root@linaro-alip:/# hwclock
2025-03-31 17:46:51.696701+00:00
root@linaro-alip:/# hwclock
2025-03-31 17:47:11.295753+00:00
root@linaro-alip:/# hwclock
2025-03-31 17:47:38.468340+00:00
```

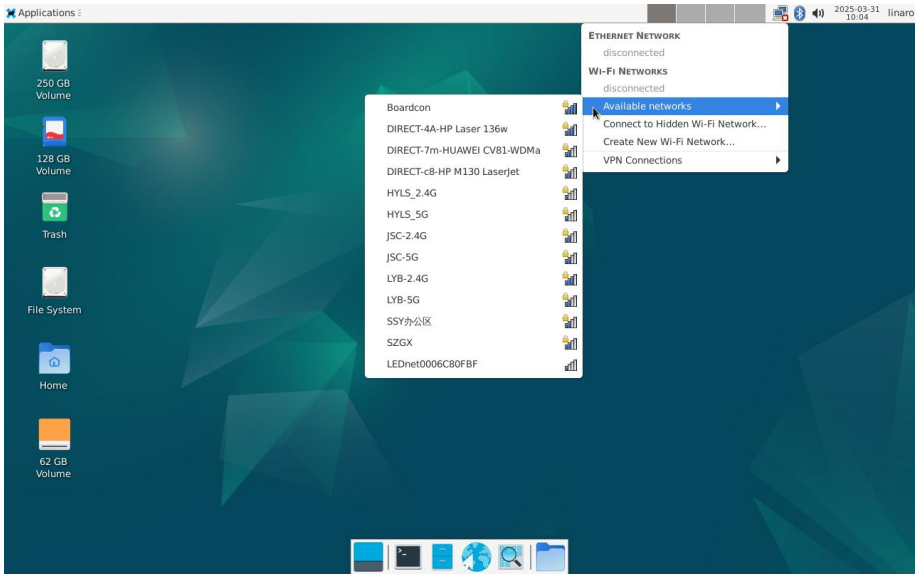
6.11 WiFi & Bluetooth

To use Wi-Fi and Bluetooth functions properly, the antenna needs to be connected.

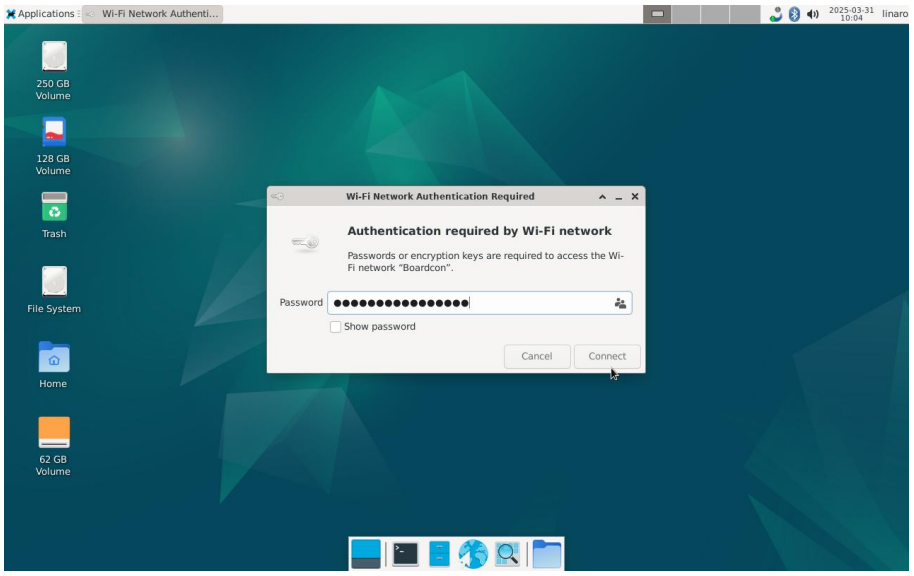


6.11.1 WiFi

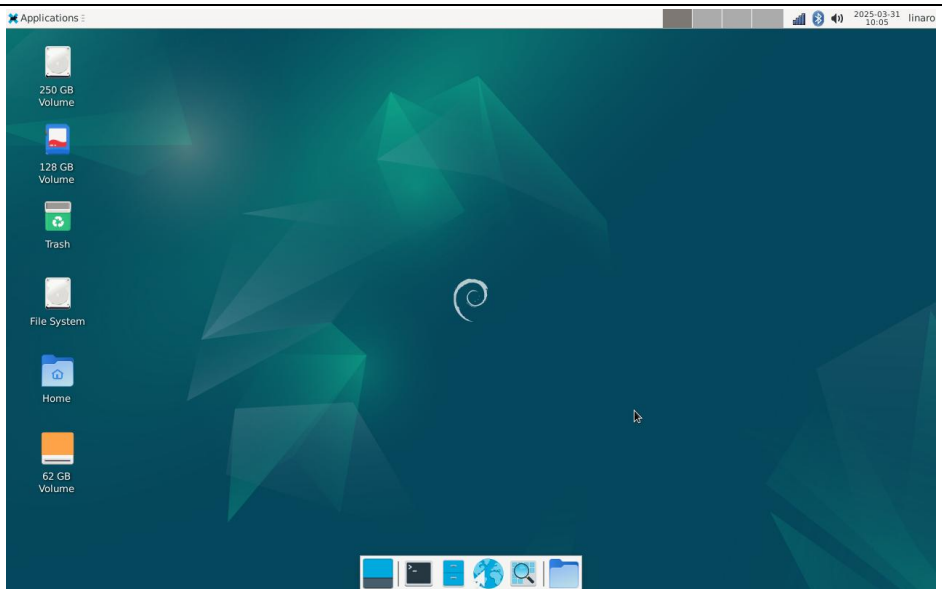
Step 1: Click the network icon in the top right corner of the interface, then select the "**Available Networks**" option to view the list of available hotspots.



Step 2: Select the SSID from the list of available networks and enter the password.



Step 3: After the WiFi successfully connects to the hotspot, the system will display the corresponding connection status icon in the top right corner.



Step 4: Users can test network connectivity using the desktop's built-in browser or verify it through the following command method.

(1) View network interface information.

```
# ifconfig
```

```
root@linaro-alip:/# ifconfig
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
       inet 192.168.0.124  netmask 255.255.255.0  broadcast 192.168.0.255
       inet6 fe80::62b6:26:17a9:362e  prefixlen 64  scopeid 0x20<link>
       ether 78:22:88:d9:62:91  txqueuelen 1000  (Ethernet)
       RX packets 55  bytes 12753 (12.4 KiB)
       RX errors 0  dropped 2  overruns 0  frame 0
       TX packets 30  bytes 3738 (3.6 KiB)
       TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

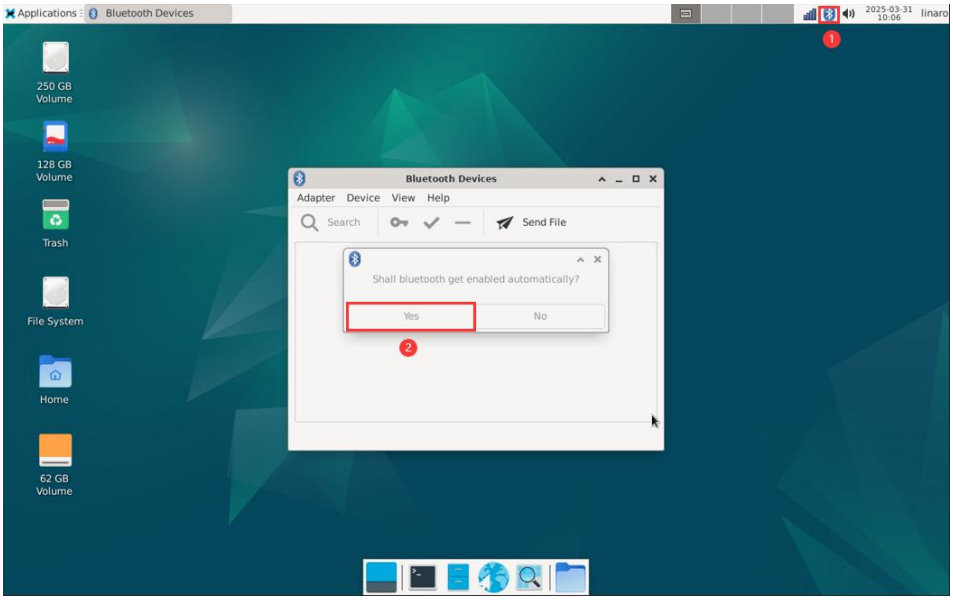
(2) Network connection test.

```
# ping -I wlan0 www.armdesigner.com
```

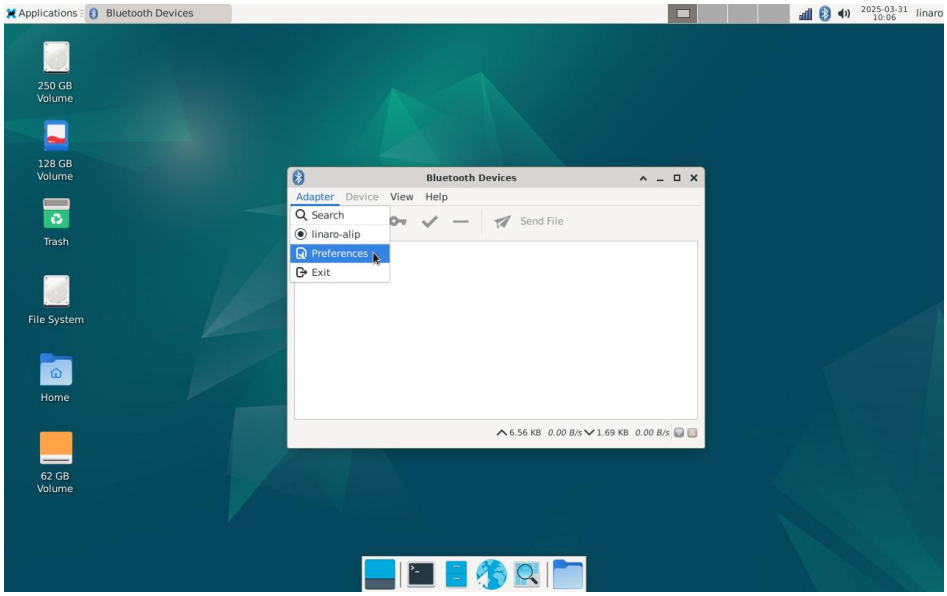
```
root@linaro-alip:/# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.124 wlan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=178 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=178 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=179 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=179 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=177 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6009ms
rtt min/avg/max/mdev = 174.087/177.135/179.413/1.909 ms
```

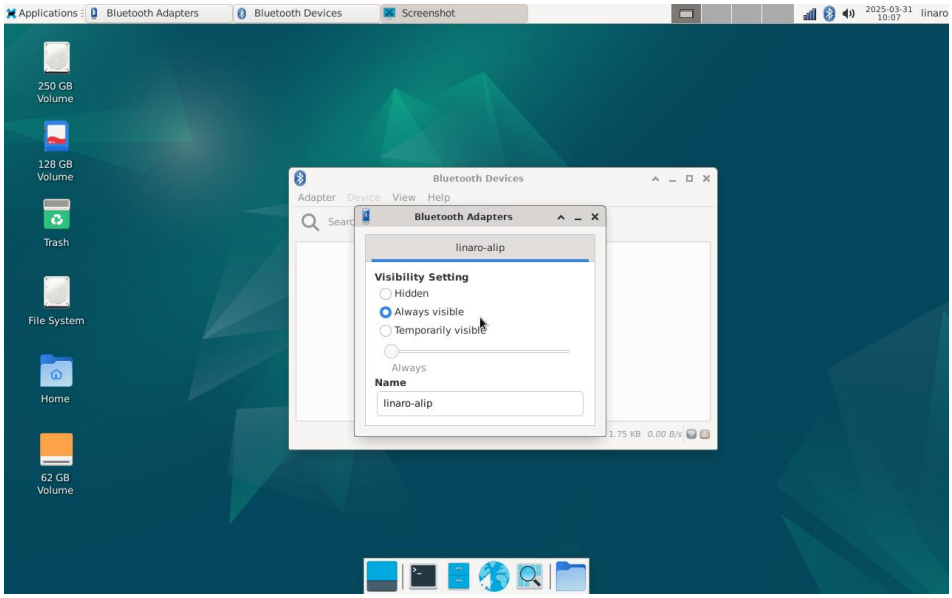
6.11.2 Bluetooth

Step 1: Click the Bluetooth icon in the top right corner of the desktop.

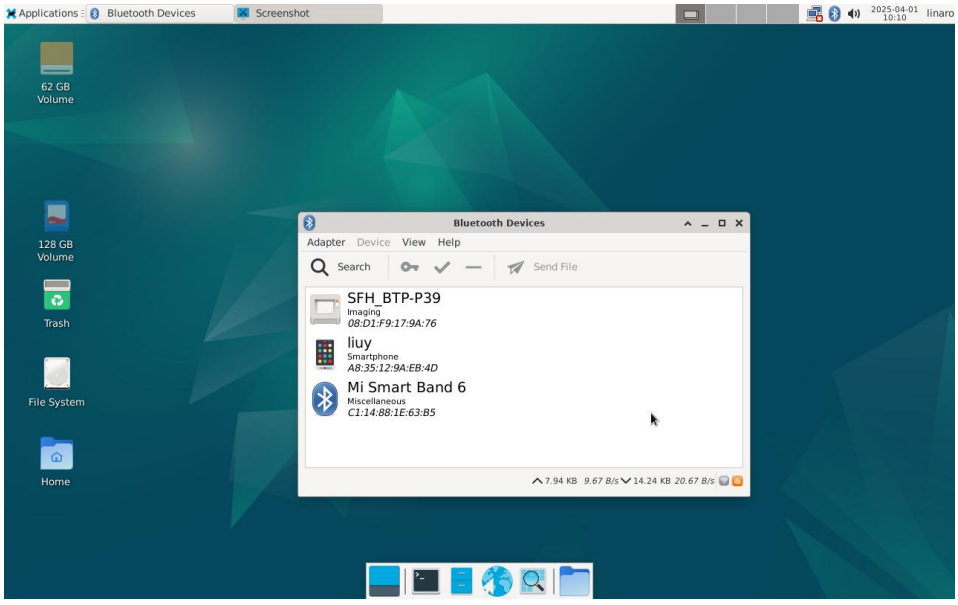


Step 2: The Bluetooth device name is hidden by default. Set it to be visible by clicking **Adapter** -> **Preferences** -> **Always visible**.





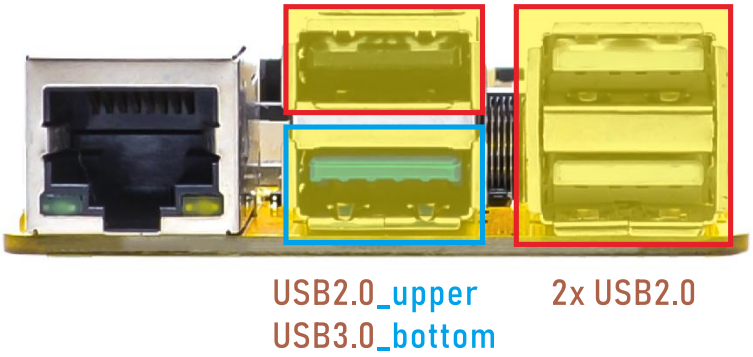
Step 3: Click **Search** to start searching and select the available device in the list to pair.



After successful configuration, Bluetooth devices can pair with each other directly.

6.12 USB 4G

Step 1: Connect the USB 4G module to the USB host interface.



Upon successful recognition of the USB 4G module, the system will create the following device nodes:

```
# ls /dev/ttyUSB*
```

```
root@linaro-alip:/# ls /dev/ttyUSB*
/dev/ttyUSB0  /dev/ttyUSB1  /dev/ttyUSB2
```

Step 2: Initiate the PPP connection.

```
# pppd call quectel-ppp &
```

```
root@linaro-alip:/# pppd call quectel-ppp &
[1] 1938
root@linaro-alip:/# pppd options in effect:
debug          # (from /etc/ppp/peers/quectel-ppp)
nodetach               # (from /etc/ppp/peers/quectel-ppp)
dump           # (from /etc/ppp/peers/quectel-ppp)
noauth         # (from /etc/ppp/peers/quectel-ppp)
user test              # (from /etc/ppp/peers/quectel-ppp)
password ??????        # (from /etc/ppp/peers/quectel-ppp)
remotename 3gppp               # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB2           # (from /etc/ppp/peers/quectel-ppp)
115200         # (from /etc/ppp/peers/quectel-ppp)
lock           # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect              # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect        # (from /etc/ppp/peers/quectel-ppp)
nocrtscts              # (from /etc/ppp/peers/quectel-ppp)
modem          # (from /etc/ppp/peers/quectel-ppp)
asyncmap 0             # (from /etc/ppp/options)
lcp-echo-failure 4             # (from /etc/ppp/options)
lcp-echo-interval 30           # (from /etc/ppp/options)
hide-password          # (from /etc/ppp/peers/quectel-ppp)
novj           # (from /etc/ppp/peers/quectel-ppp)
novjccomp              # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local              # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote             # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gppp          # (from /etc/ppp/peers/quectel-ppp)
noipdefault            # (from /etc/ppp/peers/quectel-ppp)
ipcp-max-failure 30            # (from /etc/ppp/peers/quectel-ppp)
defaultroute           # (from /etc/ppp/peers/quectel-ppp)
usepeerdns             # (from /etc/ppp/peers/quectel-ppp)
noccp          # (from /etc/ppp/peers/quectel-ppp)
noipx          # (from /etc/ppp/options)
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^M^M
OK
 -- got it

send (ATE0^M)
expect (OK)
^M
ATE0^M^M
OK
 -- got it

send (ATI;+CSUB;+CSQ;+CPIN?;+COPS?;+CGREG?;&D2^M)
expect (OK)
^M
^M
Quectel^M
EC200A^M
Revision: EC200AEUHAR01A13M16^M
^M
SubEdition: V02^M
^M
+CSQ: 31,99^M
^M
+CGREG: 0,1^M
^M
+CPIN: READY^M
^M
+COPS: 0,0,"Suning",7^M
^M
OK
 -- got it

send (AT+CGDCONT=1,"IP","3gnet",,0,0^M)
expect (OK)
^M
^M
OK
 -- got it

send (ATD*99#^M)
expect (CONNECT)
^M
^M
```

Step 3: Check the status of the network interfaces.

```
# ifconfig
```

```
root@linaro-alip:/# ifconfig
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST>  mtu 1500
        inet 10.227.116.122  netmask 255.255.255.255  destination 10.64.64.64
        ppp  txqueuelen 3  (Point-to-Point Protocol)
        RX packets 5  bytes 66 (66.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 15  bytes 112 (112.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Step 4: Test the PPP connection.

```
# ping -I ppp0 www.armdesigner.com
```

```
root@linaro-alip:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.227.116.122 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=46 time=366 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=324 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=259 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=546 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=498 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=472 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=46 time=416 ms
^C
--- www.armdesigner.com ping statistics ---
8 packets transmitted, 7 received, 12.5% packet loss, time 7007ms
rtt min/avg/max/mdev = 259.103/411.681/546.039/94.255 ms
```

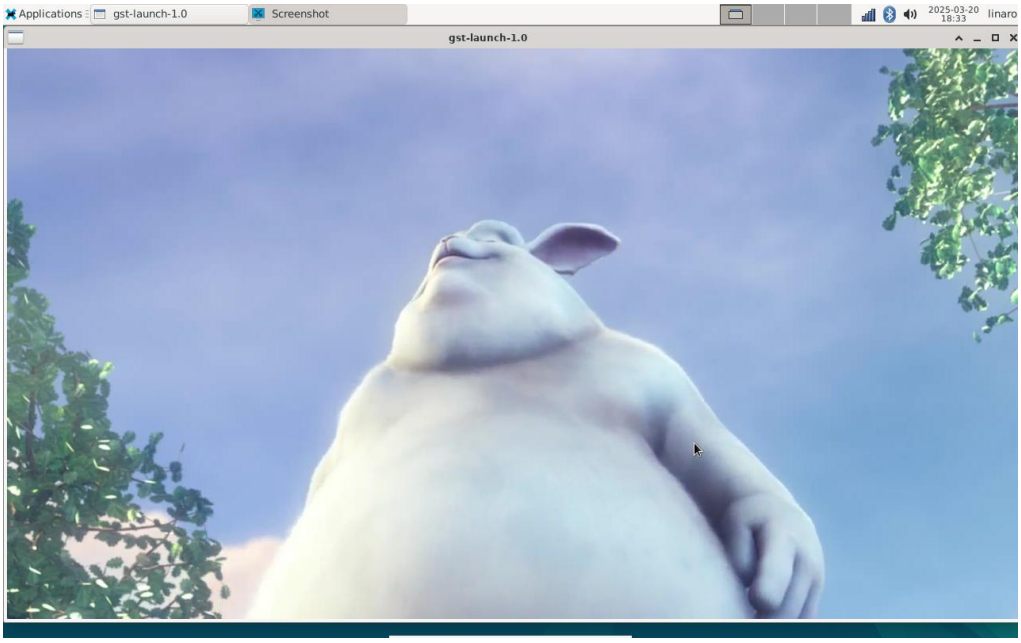
6.13 Video Playback

(1) The directory for the built-in video testing scripts in the system: */rockchip-test/video*

```
root@linaro-alip:/# ls /rockchip-test/video/
test_dec-gst.sh     test_enc-gst.sh         test_gst_video_maxfps.sh
test_dec-mpv.sh     test_gst_multivideo.sh  video_stresstest.sh
test_dec-parole.sh  test_gst_video.sh       video_test.sh
test_dec-qt.sh      test_gst_video_fps.sh
```

Simply execute the script.

```
root@linaro-alip:/# cd /rockchip-test/video/
root@linaro-alip:/rockchip-test/video# ./test_gst_video.sh
Setting pipeline to PAUSED ...
Pipeline is PREROLLING ...
Redistribute latency...
mpp[2097]: mpp_info: mpp version: 331ee68f author: nyanmisaka    2024-12-11 fix[mpp]: Fix input_task_count for
async enc
mpp[2097]: mpp_info: mpp version: 331ee68f author: nyanmisaka    2024-12-11 fix[mpp]: Fix input_task_count for
async enc
mpp[2097]: mpp_info: mpp version: 331ee68f author: nyanmisaka    2024-12-11 fix[mpp]: Fix input_task_count for
async enc
mpp[2097]: mpp: unable to create enc vp8 for soc rk3566 unsupported
mpp[2097]: mpp_info: mpp version: 331ee68f author: nyanmisaka    2024-12-11 fix[mpp]: Fix input_task_count for
async enc
mpp[2097]: mpp_info: mpp version: 331ee68f author: nyanmisaka    2024-12-11 fix[mpp]: Fix input_task_count for
async enc
Redistribute latency...
mpp[2097]: h264d_api: is_avcC=1
Pipeline is PREROLLED ...0 %)
Prerolled, waiting for async message to finish...
Setting pipeline to PLAYING ...
Redistribute latency...
New clock: GstSystemClock
0:00:09.6 / 0:00:29.5 (32.7 %)
```

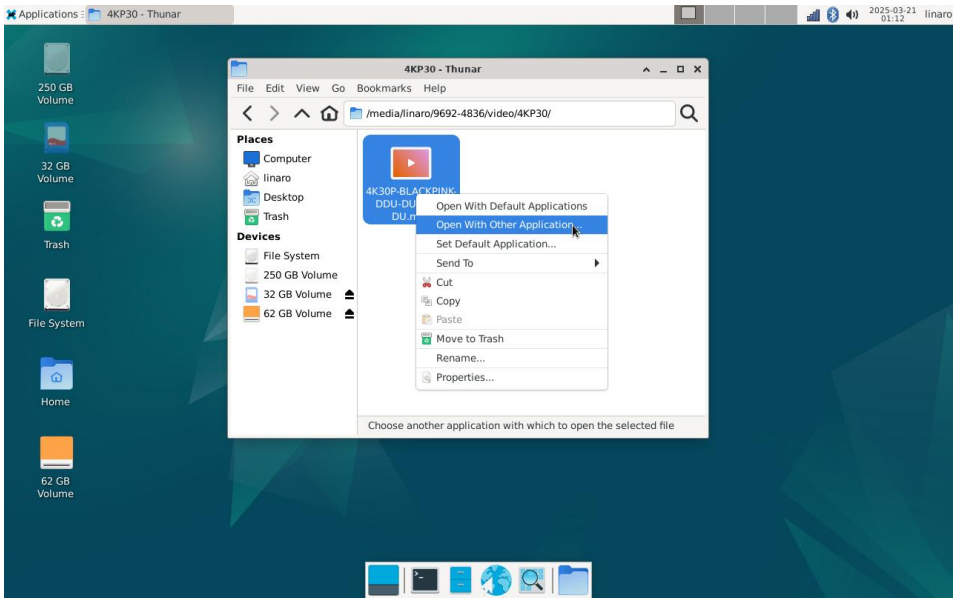


(2) Play the video using Google Chrome.

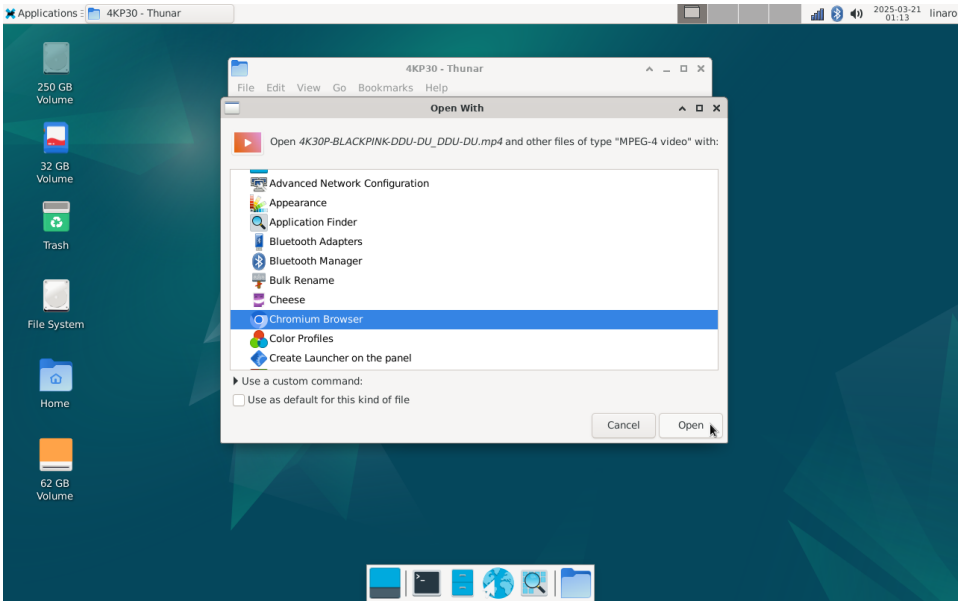
• Google Chrome supports video playback up to 4K, with support for the following decoding formats: VP8, H.264, H.265, VP9, and AV1.

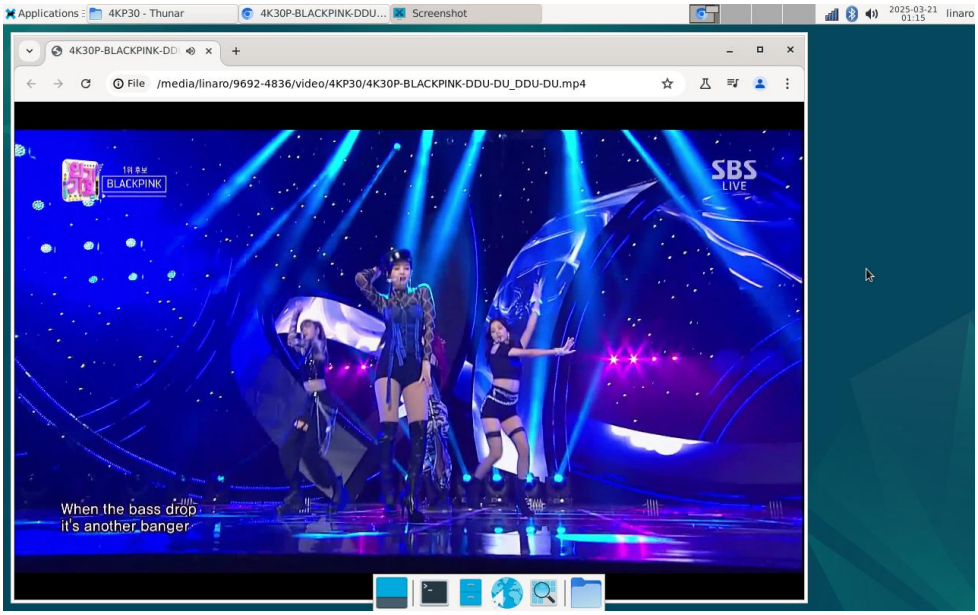
• However, it is only compatible with certain H.265 video files.

Step 1: Select the video file, right-click, and choose **"Open With Other Application…"**.



Step 2: Find **Chromium Browser** in the list, select it, and click **"Open"** to play the video file.





(3) Use the gst-play-1.0 command to play the video.

```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --flags=3 --videosink="kmssink plane-id=96"
/media/linaro/9692-4836/video/4KP60/4KP60-exist.mp4  --audiosink="alsasink
device=hw:0,0"
```

Command explanation:

• export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1: Open AFBC.

• --videosink="kmssink plane-id=96": Specifies the plane. Which can be viewed using the command: cat /sys/kernel/debug/dri/0/state | grep "plane\[".

• /media/linaro/9692-4836/video/4KP60/4KP60-exist.mp4: The media file path to be played.

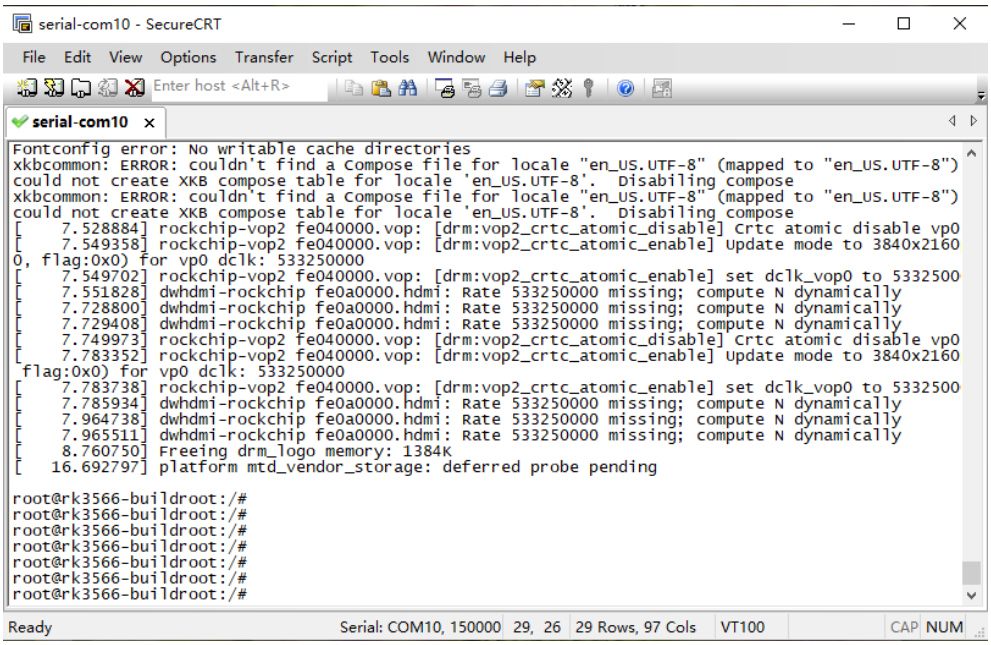
• --audiosink="alsasink device=hw:0,0": Specifies the audio output device as hw:0,0.

```
root@linaro-alip:/# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
gst-play-1.0 --flags=3 --videosink="kmssink plane-id=96" /media/linaro/9692-4836/video/4KP60/4KP60-exist.mp4
--audiosink="alsasink device=hw:0,0"
Press 'k' to see a list of keyboard shortcuts.ideosink="kmssink plane-id=96"
/media/linaro/9692-4836/video/4KP60/4KP60-exist.mp4  --audiosink="alsasink device=hw:0,0"
Now playing /media/linaro/9692-4836/video/4KP60/4KP60-exist.mp4
Redistribute latency...
Redistribute latency...
WARNING No volume control found
WARNING debug information: ../gst/playback/gstplaysink.c(2908): gen_audio_chain ():
/GstPlayBin:playbin/GstPlaySink:playsink:
Volume/mute is not available
[ 3005.813116] dwhdmi-rockchip fe0a0000.hdmi: Rate 533250000 missing; compute N dynamically
[ 3005.813830] dwhdmi-rockchip fe0a0000.hdmi: Rate 533250000 missing; compute N dynamically
Redistribute latency...
Redistribute latency...
Redistribute latency...
0:00:25.6 / 0:04:01.9
```

7.Buildroot Test

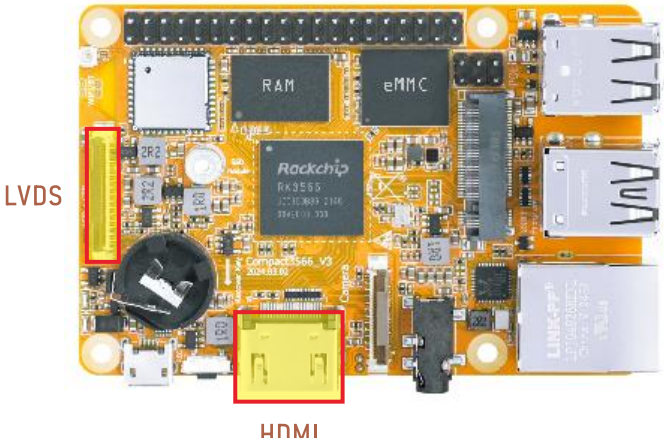
7.1 Serial Terminal

Connect the Micro USB cable (for power and debugging), the terminal will output boot information. The default baudrate is 1500000.



7.2 Display

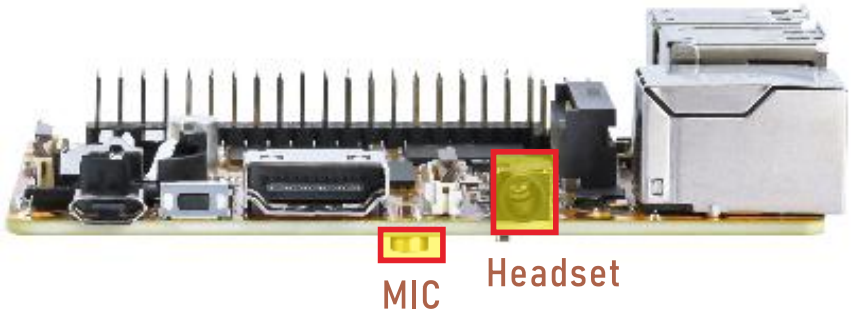
The Compact566 can only output to a single display (either HDMI or LVDS) at a time.



The display effect diagram is as follows:

7.3 Audio I/O

Step 1: Plug the headset into the headset jack.



Step 2: View sound card.

```
# cat /proc/asound/cards
```

```
root@rk3566-buildroot:/# cat /proc/asound/cards
 0 [rockchiphdmi   ]: rockchip-hdmi - rockchip-hdmi
                      rockchip-hdmi
 1 [rockchipes8388c]: simple-card - rockchip,es8388-codec
                      rockchip,es8388-codec
```

Step 3: Headset/MIC recording. (Prioritizes headset microphone; defaults to the device's built-in microphone when no headset is connected.)

• To use HDMI as the display:

```
# arecord -Dhw:1,0 -f cd record.wav
```

```
root@rk3566-buildroot:/# arecord -Dhw:1,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

• To use LVDS (1280x800) as the display:

```
# arecord -Dhw:0,0 -f cd record.wav
```

```
root@rk3566-buildroot:/# arecord -Dhw:0,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

Step 4: Play audio through headset.

• When using HDMI as the display:

```
# aplay -Dhw:1,0 record.wav
```

```
root@rk3566-buildroot:/# aplay -Dhw:1,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

Note: Supplementary instructions on audio output.

```
# aplay -Dhw:0,0 record.wav    // HDMI TX audio output
# aplay -Dhw:1,0 record.wav    // Headset audio output
```

• When using LVDS (1280x800) as the display:

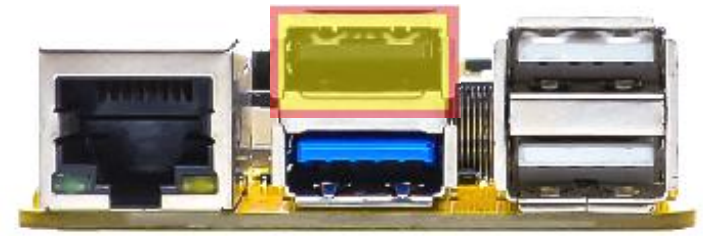
```
# aplay -Dhw:0,0 record.wav
```

```
root@rk3566-buildroot:/# aplay -Dhw:0,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

7.4 USB

7.4.1 USB OTG

Compact3566 OTG defaults to Device mode on startup.



USB OTG

• Use the following command to switch to Host mode:

```
# echo host > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
```

```
_moderk3566-buildroot:/# echo host > /sys/devices/platform/fe8a0000.usb2-phy/otg_
[  240.472321] dwc3 fcc00000.usb: device disconnect
root@rk3566-buildroot:/# [  240.474773] android_work: sent uevent USB_STATE=DISCONNECTED
[  240.484607] dwc3 fcc00000.usb: request 000000000b59f96f was not queued to ep0out
[  240.486542] android_work: did not send uevent (0 0 0000000000000000)
[  240.596147] xhci-hcd xhci-hcd.6.auto: xHCI Host Controller
[  240.596712] xhci-hcd xhci-hcd.6.auto: new USB bus registered, assigned bus number 7
[  240.596874] xhci-hcd xhci-hcd.6.auto: USB3 root hub has no ports
[  240.596892] xhci-hcd xhci-hcd.6.auto: hcc params 0x0220fe64 hci version 0x110 quirks
0x0000008022010010
[  240.596941] xhci-hcd xhci-hcd.6.auto: irq 57, io mem 0xfcc00000
[  240.597239] usb usb7: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 6.01
[  240.597256] usb usb7: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[  240.597266] usb usb7: Product: xHCI Host Controller
[  240.597275] usb usb7: Manufacturer: Linux 6.1.99 xhci-hcd
[  240.597284] usb usb7: SerialNumber: xhci-hcd.6.auto
[  240.597784] hub 7-0:1.0: USB hub found
[  240.597823] hub 7-0:1.0: 1 port detected
```

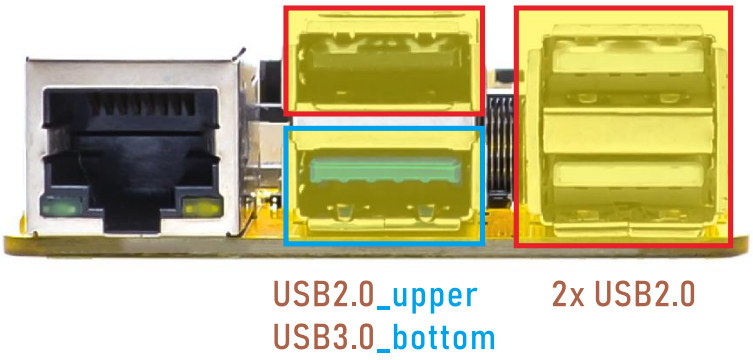
• Use the following command to switch to Device mode:

```
# echo peripheral > /sys/devices/platform/fe8a0000.usb2-phy/otg_mode
```

```
hy/otg_mode-buildroot:/# echo peripheral > /sys/devices/platform/fe8a0000.usb2-ph
root@rk3566-buildroot:/# [  266.962945] xhci-hcd xhci-hcd.6.auto: remove, state 4
[  266.963011] usb usb7: USB disconnect, device number 1
[  266.964468] xhci-hcd xhci-hcd.6.auto: USB bus 7 deregistered
[  267.969397] read descriptors
[  267.969458] read strings
[  268.169402] dwc3 fcc00000.usb: device reset
[  268.228073] dwc3 fcc00000.usb: device reset
[  268.552567] dwc3 fcc00000.usb: device reset
[  268.640460] android_work: sent uevent USB_STATE=CONNECTED
[  268.674489] android_work: sent uevent USB_STATE=CONFIGURED
```

7.4.2 USB HOST

The USB host can be used to connect devices such as USB mouse, USB keyboards, USB flash drives, and other USB peripherals.



The user can identify whether the mounted flash drive is USB 2.0 or USB 3.0 from the debug log.

• USB2.0 print information in high-speed mode.

```
root@rk3566-buildroot:/# [  590.343589] usb 3-1: new high-speed USB device number 3 using ehci-platform
[  590.501304] usb 3-1: New USB device found, idVendor=346d, idProduct=5678, bcdDevice= 3.20
[  590.501364] usb 3-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  590.501391] usb 3-1: Product: HIKSEMI
[  590.501408] usb 3-1: Manufacturer:
[  590.501424] usb 3-1: SerialNumber: FC04626F19B51
[  590.502458] usb-storage 3-1:1.0: USB Mass Storage device detected
[  590.503279] scsi host1: usb-storage 3-1:1.0
[  591.508809] scsi 1:0:0:0: Direct-Access             HIKSEMI         3.20 PQ: 0 ANSI: 4
[  591.511485] sd 1:0:0:0: [sdb] 245760000 512-byte logical blocks: (126 GB/117 GiB)
[  591.512311] sd 1:0:0:0: [sdb] Write Protect is off
[  591.513041] sd 1:0:0:0: [sdb] No Caching mode page found
[  591.513060] sd 1:0:0:0: [sdb] Assuming drive cache: write through
[  591.518179]  sdb: sdb1
[  591.518594] sd 1:0:0:0: [sdb] Attached SCSI removable disk
[  591.789740] FAT-fs (sdb1): utf8 is not a recommended IO charset for FAT filesystems, filesystem will be case
sensitive!
[  591.793498] FAT-fs (sdb1): Volume was not properly unmounted. Some data may be corrupt. Please run fsck.
```

• USB3.0 print information in SuperSpeed mode.

```
root@rk3566-buildroot:/# [  632.652159] usb 2-1: new SuperSpeed USB device number 3 using xhci-hcd
[  632.681442] usb 2-1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[  632.681545] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  632.681584] usb 2-1: Product: OnlyDisk
[  632.681614] usb 2-1: Manufacturer: Netac
[  632.681643] usb 2-1: SerialNumber: C0E8BFA3EC38F796
[  632.684558] usb-storage 2-1:1.0: USB Mass Storage device detected
[  632.686216] scsi host0: usb-storage 2-1:1.0
[  634.092970] scsi 0:0:0:0: Direct-Access     Netac    OnlyDisk        8.01 PQ: 0 ANSI: 6
[  634.097462] sd 0:0:0:0: [sda] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[  634.097960] sd 0:0:0:0: [sda] Write Protect is off
[  634.098180] sd 0:0:0:0: [sda] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[  634.102782]  sda: sda1
[  634.103225] sd 0:0:0:0: [sda] Attached SCSI removable disk
```

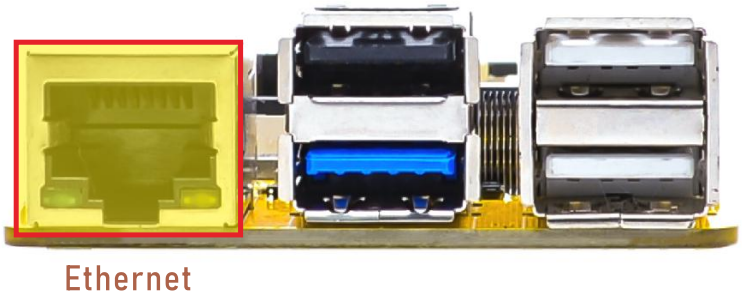
After connecting the USB flash drive, it will be automatically mounted, execute the following command to view the path where the device is mounted:

```
# df -h
```

```
root@rk3566-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  701M  5.0G  13% /
devtmpfs        1.9G  8.0K  1.9G   1% /dev
tmpfs           2.0G  140K  2.0G   1% /tmp
tmpfs           2.0G  388K  2.0G   1% /run
tmpfs           2.0G  148K  2.0G   1% /var/log
tmpfs           2.0G     0  2.0G   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8   23G  348K   23G   1% /userdata
/dev/nvme0n1    229G  138M  217G   1% /mnt/storage
/dev/mmcblk1p1  120G   17M  120G   1% /mnt/sdcard
/dev/sda1        58G   30G   29G  51% /mnt/udisk
/dev/sdb1       118G  154M  118G   1% /media/udisk1
```

7.5 Ethernet

Step 1: Connect the network cable to the Ethernet port.



According to the log, it can be seen that the Gigabit Ethernet recognition is successful.

```
root@rk3566-buildroot:/# [  694.871951] rk_gmac-dwmac fe010000.ethernet eth0: Link is Up - 1Gbps/Full - flow
control rx/tx
[  694.872131] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

Step 2: View network interface information.

```
# ifconfig
```

```
root@rk3566-buildroot:/# ifconfig
eth0      Link encap:Ethernet  HWaddr 46:93:F4:D6:C9:79
          inet addr:192.168.0.123  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::173f:9225:3b27:68a8/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:162 errors:0 dropped:15 overruns:0 frame:0
          TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12857 (12.5 KiB)  TX bytes:1410 (1.3 KiB)
          Interrupt:55
```

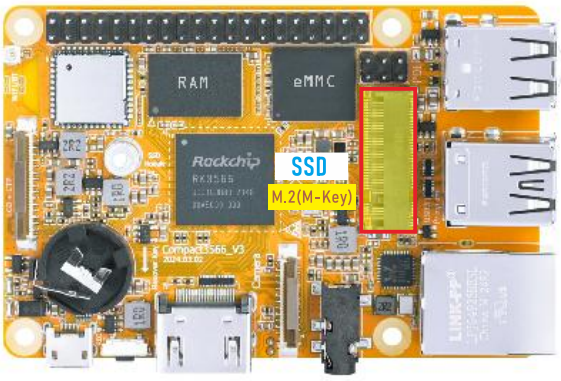
Step 3: Network connection test.

```
# ping -I eth0 www.armdesigner.com
```

```
root@rk3566-buildroot:/# ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.123 eth0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=176 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=171 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6007ms
rtt min/avg/max/mdev = 170.977/172.056/176.074/1.735 ms
```

7.6 M.2 NVME SSD

Step 1: Connect the SSD, then power on.



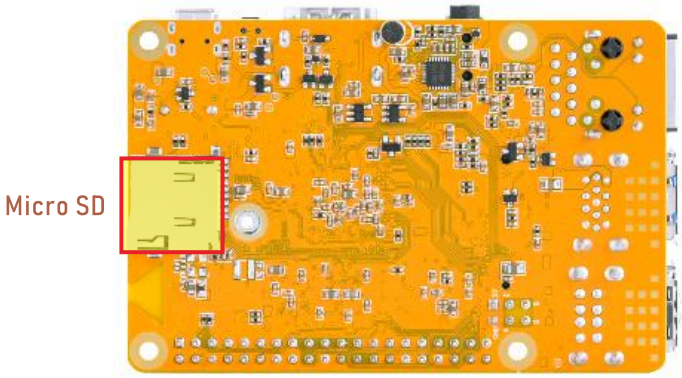
Step 2: The system will automatically mount it, view the device mount path.

```
# df -h
```

```
root@rk3566-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  701M  5.0G  13% /
devtmpfs        1.9G  8.0K  1.9G   1% /dev
tmpfs           2.0G  140K  2.0G   1% /tmp
tmpfs           2.0G  392K  2.0G   1% /run
tmpfs           2.0G  156K  2.0G   1% /var/log
tmpfs           2.0G     0  2.0G   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8   23G  348K   23G   1% /userdata
/dev/nvme0n1    229G  138M  217G   1% /mnt/storage
/dev/mmcblk1p1  120G   17M  120G   1% /mnt/sdcard
/dev/sdb1       118G  154M  118G   1% /media/udisk1
/dev/sda1        58G   30G   29G  51% /mnt/udisk
```

7.7 SD Card

Step 1: Insert the micro SD card into the card slot.



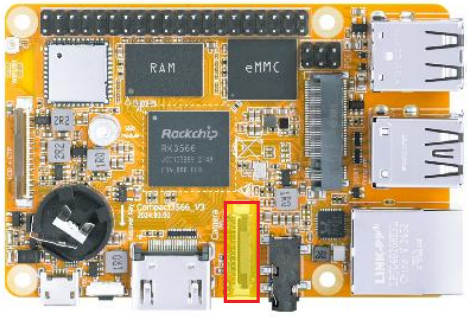
Step 2: The system will automatically mount it, view the device mount path.

```
# df -h
```

```
root@rk3566-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  701M  5.0G  13% /
devtmpfs        1.9G  8.0K  1.9G   1% /dev
tmpfs           2.0G  140K  2.0G   1% /tmp
tmpfs           2.0G  392K  2.0G   1% /run
tmpfs           2.0G  156K  2.0G   1% /var/log
tmpfs           2.0G     0  2.0G   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8   23G  348K   23G   1% /userdata
/dev/nvme0n1    229G  138M  217G   1% /mnt/storage
/dev/mmcblk1p1  120G   17M  120G   1% /mnt/sdcard
/dev/sdb1       118G  154M  118G   1% /media/udisk1
/dev/sda1        58G   30G   29G  51% /mnt/udisk
```

.

7.8 Camera



MIPI Camera

OV13850

Step 2: Preview camera.

```
# /rockchip-test/camera/camera_rkisp_test.sh
```

```
root@rk3566-buildroot:/# /rockchip-test/camera/camera_rkisp_test.sh
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 1253.291385] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1253.291853] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1253.291992] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
[03:14:54.949] seeing the first app
0:00:02.6 / 99:99:99.
```

Step 3: Record the video.

```
# gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \
filesink location=/tmp/h264.mp4
```

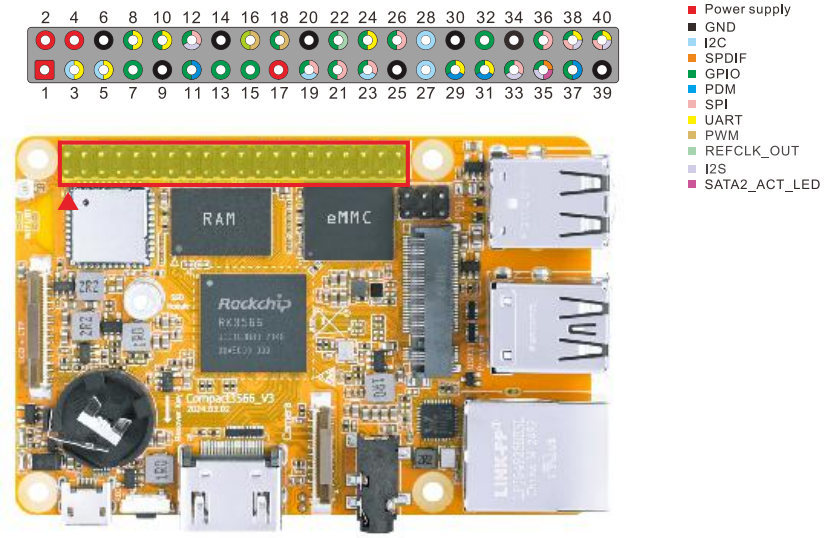
```
00 ! \k3566-buildroot:/# gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=10
> video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \
> videoconvert ! mpph264enc ! h264parse ! mp4mux ! \
> filesink location=/tmp/h264.mp4
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 1286.806461] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1286.810042] rkisp rkisp-vir0: first params buf queue
[ 1286.810375] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1286.810434] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
Redistribute latency...
0:00:04.9 / 99:99:99.
```

Step 4: Take photos.

```
# gst-launch-1.0 -v v4l2src device=/dev/video0 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
multifilesink location=/tmp/test%05d.jpg
```

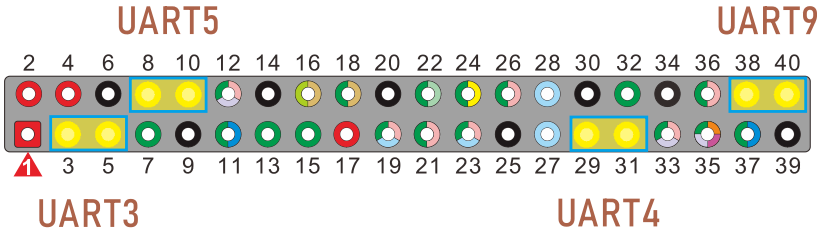
```
s=10 ! \566-buildroot:/# gst-launch-1.0 -v v4l2src device=/dev/video0 num-buffers
> video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
> multifilesink location=/tmp/test%05d.jpg
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0: crop-bounds = < (int)0, (int)0, (int)2112, (int)1568 >
New clock: GstSystemClock
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:src: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1,
interlace-mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMultiFileSink:multifilesink0.GstPad:sink: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1,
interlace-mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
[ 1323.985157] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
[ 1323.988720] rkisp rkisp-vir0: first params buf queue
[ 1323.989066] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1323.989130] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
```

7.9 GPIO



7.9.1 UART

Short circuit RX and TX pins of UART.



• UART3 test:

```
# com /dev/ttyS3 115200 8 0 1
```

```
root@rk3566-buildroot:/# com /dev/ttyS3 115200 8 0 1
port = /dev/ttyS3
baudrate = 115200
cs = 8
parity = 0
stopb = 1
23232kkkkk
RECV: 23232kkkkk
ioioio
RECV: ioioio
llll
RECV: llll
```

• UART4 test:

```
# com /dev/ttyS4 115200 8 0 1
```

```
root@rk3566-buildroot:/# com /dev/ttyS4 115200 8 0 1
port = /dev/ttyS4
baudrate = 115200
cs = 8
parity = 0
stopb = 1
ghghg777
RECV: ghghg777
000uiui
RECV: 000uiui
llllllll
RECV: llllllll
```

• UART5 test:

```
# com /dev/ttyS5 115200 8 0 1
```

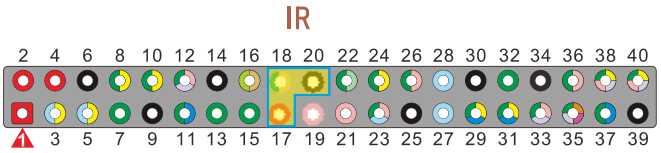
```
root@rk3566-buildroot:/# com /dev/ttyS5 115200 8 0 1
port = /dev/ttyS5
baudrate = 115200
cs = 8
parity = 0
stopb = 1
55656565656
RECV: 55656565656
ooooommm
RECV: ooooommm
7878gggg
RECV: 7878gggg
ooi
RECV: ooi
```

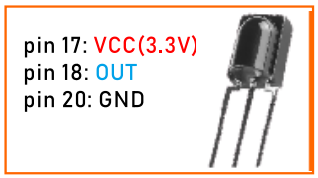
• UART9 test:

```
# com /dev/ttyS9 115200 8 0 1
```

```
root@rk3566-buildroot:/# com /dev/ttyS9 115200 8 0 1
port = /dev/ttyS9
baudrate = 115200
cs = 8
parity = 0
stopb = 1
9898989811
RECV: 9898989811
iiuuu
RECV: iiuuu
888666
RECV: 888666
2333333
RECV: 2333333
```

7.9.2 IR





Step 1: Open IR debugging print.

```
# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/code_print
```

Step 2: When pressing a button on the remote control towards the IR receiver, the key value will be printed to the log.

```
code_print6-buildroot:/# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/c
root@rk3566-buildroot:/# [ 1551.540048] USERCODE=0x1818
[ 1551.567182] RMC_GETDATA=99
[ 1551.919041] USERCODE=0x1818
[ 1551.946222] RMC_GETDATA=99
[ 1552.204616] USERCODE=0xc58
[ 1552.284227] RMC_GETDATA=4c
[ 1552.932608] USERCODE=0x2382
[ 1553.702198] USERCODE=0xd042
[ 1554.150613] USERCODE=0x310
[ 1556.783755] USERCODE=0x1818
[ 1556.810958] RMC_GETDATA=e6
[ 1560.588378] USERCODE=0x1818
[ 1560.615485] RMC_GETDATA=e4
```

7.9.3 SPI

Step 1: short circuit MISO_M1 and MOSI_M1 pins of SPI.

Step 2: Execute the test script: **spidev0.0_test**.

```
# spidev0.0_test
```

```
root@rk3566-buildroot:/# spidev0.0_test
spi mode: 0
bits per word: 8
max speed: 500000 Hz (500 KHz)

FF FF FF FF FF FF
40 00 00 00 00 95
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
DE AD BE EF BA AD
F0 0D
```

7.10 RTC

Step 1: Install the coin cell battery.

Step 2: Set the system time.

```
# date -s "2025-04-03 16:08:00"
```

Step 3: Write the system time to the hardware clock.

```
# hwclock -w
```

Step 4: Display the current hardware clock time.

```
# hwclock
```

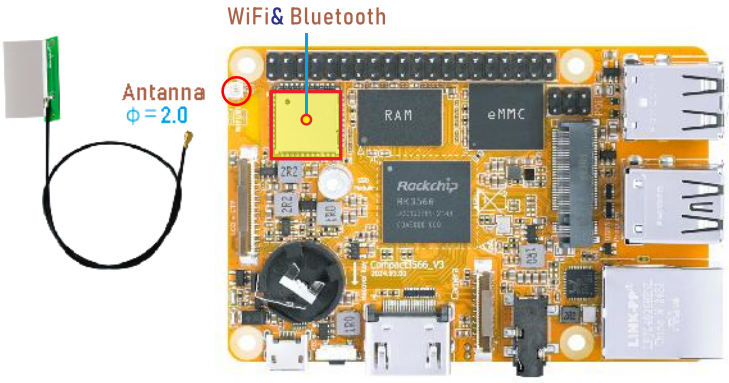
```
root@rk3566-buildroot:/# date -s "2025-04-03 16:08:00"
Thu Apr  3 16:08:00 UTC 2025
root@rk3566-buildroot:/# hwclock -w
root@rk3566-buildroot:/# hwclock
Thu Apr  3 16:08:06 2025  0.000000 seconds
root@rk3566-buildroot:/# hwclock
Thu Apr  3 16:08:33 2025  0.000000 seconds
root@rk3566-buildroot:/# hwclock
Thu Apr  3 16:09:00 2025  0.000000 seconds
```

Step 5: Power off, after a period of time to turn on the power again, check whether the time is saved.

```
root@rk3566-buildroot:/# hwclock
Thu Apr  3 16:23:04 2025  0.000000 seconds
root@rk3566-buildroot:/# hwclock
Thu Apr  3 16:23:31 2025  0.000000 seconds
root@rk3566-buildroot:/# hwclock
Thu Apr  3 08:25:18 2025  0.000000 seconds
root@rk3566-buildroot:/# hwclock
Thu Apr  3 08:25:25 2025  0.000000 seconds
```

7.11 WiFi & Bluetooth

To use Wi-Fi and Bluetooth functions properly, the antenna needs to be connected.



7.17.1 WiFi

Step 1: View the device information.

```
# ifconfig
```

```
root@rk3566-buildroot:/# ifconfig
wlan0     Link encap:Ethernet  HWaddr 78:22:88:D9:62:91
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Step 2: Scan for available WiFi hotspots.

```
# iwlist wlan0 scan
```

```
 root@rk3566-buildroot:/# iwlist wlan0 scan
wlan0     Scan completed :
          Cell 01 - Address: B2:22:7A:5A:B6:4A
                    ESSID:"DIRECT-4A-HP Laser 136w"
                    Protocol:IEEE 802.11gn
                    Mode:Master
                    Frequency:2.462 GHz (Channel 11)
                    Encryption key:on
                    Bit Rates:72 Mb/s
                    Extra:rsn_ie=30140100000fac040100000fac040100000fac020c00
                    IE: IEEE 802.11i/WPA2 Version 1
                        Group Cipher : CCMP
                        Pairwise Ciphers (1) : CCMP
                        Authentication Suites (1) : PSK
                    Quality=92/100  Signal level=43/100
                    Extra:fm=0003
          Cell 02 - Address: B4:F1:8C:6D:D1:24
                    ESSID:"Boardcon"
                    Protocol:IEEE 802.11bgn
                    Mode:Master
                    Frequency:2.462 GHz (Channel 11)
                    Encryption key:on
                    Bit Rates:780 Mb/s
                    Extra:wpa_ie=dd160050f20101000050f20401000050f20401000050f202
```

Step 3: Connect to the hotspot.

```
# wifi-connect.sh SSID PSK
```

```
root@rk3566-buildroot:/# wifi-connect.sh Boardcon Boardcon43435656
connect to WiFi ssid: Boardcon, Passwd: Boardcon43435656
Successfully initialized wpa_supplicant
root@rk3566-buildroot:/# [ 1742.455912] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
```

Step 4: View the network interface status.

```
# ifconfig
```

```
root@rk3566-buildroot:/# ifconfig
wlan0     Link encap:Ethernet  HWaddr 78:22:88:D9:62:91
          inet addr:192.168.0.124  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::9462:a01f:bf7d:9bdd/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:86 errors:0 dropped:24 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:11258 (10.9 KiB)  TX bytes:2584 (2.5 KiB)
```

Step 5: Test the WiFi network.

```
# ping -I wlan0 www.armdesigner.com
```

```
root@rk3566-buildroot:/# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.124 wlan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=200 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=195 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=199 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=195 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=194 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=198 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6008ms
rtt min/avg/max/mdev = 194.044/197.018/200.347/2.184 ms
```

7.17.2 Bluetooth

On Buildroot, Bluetooth is by default configured to be used as a Bluetooth speaker.

Step 1: Set the Bluetooth adapter to be discoverable.

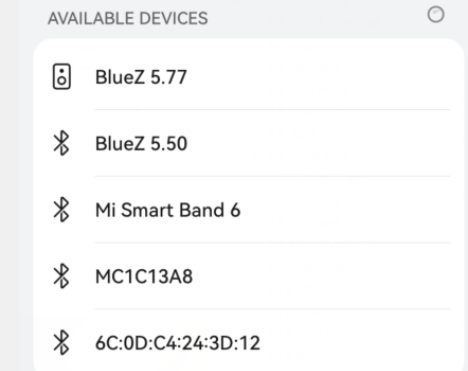
```
# hciconfig hci0 piscan
```

Step 2: Control and configure the Bluetooth device.

```
# bluetoothctl
```

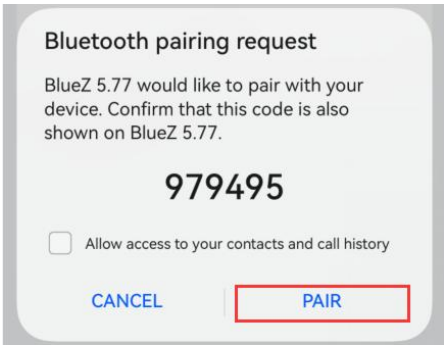
```
root@rk3566-buildroot:/# hciconfig hci0 piscan
root@rk3566-buildroot:/# bluetoothctl
hci0 new_settings: powered connectable discoverable bondable ssp br/edr le secure-conn
Agent registered
[CHG] Controller 78:22:88:D9:62:92 Pairable: yes
```

Step 3: On the phone, locate the device name of the speaker: **BlueZ 5.77**, and click to connect.



Step 4: Permissions must be confirmed on both the phone and the speaker.

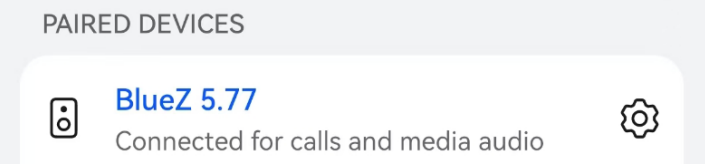
Phone:



Bluetooth speaker:

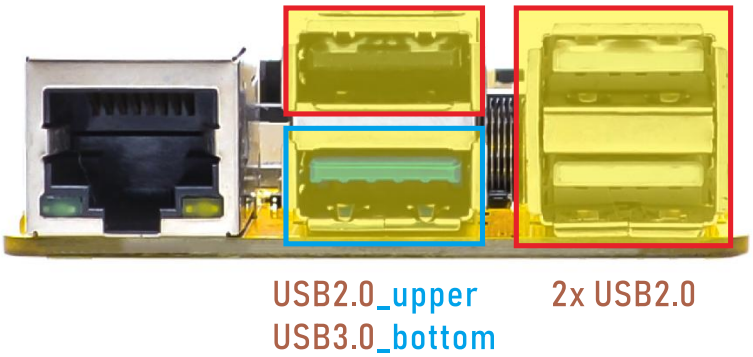
```
 root@rk3566-buildroot:/# hciconfig hci0 piscan
root@rk3566-buildroot:/# bluetoothctl
hci0 new_settings: powered connectable discoverable bondable ssp br/edr le secure-conn
Agent registered
[CHG] Controller 78:22:88:D9:62:92 Pairable: yes
hci0 A8:35:12:9A:EB:4D type BR/EDR connected eir_len 11
[NEW] Device A8:35:12:9A:EB:4D liuy
Request confirmation
[agent] Confirm passkey 843669 (yes/no): yes
hci0 new_link_key A8:35:12:9A:EB:4D type 0x05 pin_len 0 store_hint 1
hci0 device_flags_changed: A8:35:12:9A:EB:4D (BR/EDR)
     supp: 0x00000000  curr: 0x00000000
[CHG] Device A8:35:12:9A:EB:4D INFO: 0x0007 (7)
[CHG] Device A8:35:12:9A:EB:4D Bonded: yes
[CHG] Device A8:35:12:9A:EB:4D Modalias: bluetooth:v010Fp107Ed1436
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000046a-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001105-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000110a-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000110c-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001112-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001115-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001116-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000111f-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000112f-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001132-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001200-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001800-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 00001801-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 0000fe35-0000-1000-8000-00805f9b34fb
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 11c8b310-80e4-4276-afc0-f81590b2177f
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 8ce255c0-200a-11e0-ac64-0800200c9a66
[CHG] Device A8:35:12:9A:EB:4D UUIDs: 9664aa26-d76c-43ad-9775-d310f253a408
[CHG] Device A8:35:12:9A:EB:4D ServicesResolved: yes
[CHG] Device A8:35:12:9A:EB:4D INFO: 0x000f (15)
```

Step 5: The connection is successful.



7.12 USB 4G

Step 1: Connect the USB 4G module to the USB host interface.



Upon successful recognition of the USB 4G module, the system will create the following device nodes:

```
# ls /dev/ttyUSB*
```

```
root@rk3566-buildroot:/# ls /dev/ttyUSB*
/dev/ttyUSB0  /dev/ttyUSB1  /dev/ttyUSB2
```

Step 2: Initiate the PPP connection.

```
# mkdir /var/run/pppd
# mkdir /var/run/pppd/lock
# pppd call quectel-ppp &
```

```
root@rk3566-buildroot:/# mkdir /var/run/pppd
root@rk3566-buildroot:/# mkdir /var/run/pppd/lock
root@rk3566-buildroot:/# pppd call quectel-ppp &
[1] 940
root@rk3566-buildroot:/# pppd options in effect:
debug           # (from /etc/ppp/peers/quectel-ppp)
nodetach                # (from /etc/ppp/peers/quectel-ppp)
dump            # (from /etc/ppp/peers/quectel-ppp)
noauth          # (from /etc/ppp/peers/quectel-ppp)
user test               # (from /etc/ppp/peers/quectel-ppp)
password ??????         # (from /etc/ppp/peers/quectel-ppp)
remotename 3gppp                # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB2            # (from /etc/ppp/peers/quectel-ppp)
115200          # (from /etc/ppp/peers/quectel-ppp)
lock            # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect               # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect         # (from /etc/ppp/peers/quectel-ppp)
nocrtscts               # (from /etc/ppp/peers/quectel-ppp)
modem           # (from /etc/ppp/peers/quectel-ppp)
hide-password           # (from /etc/ppp/peers/quectel-ppp)
novj            # (from /etc/ppp/peers/quectel-ppp)
novjccomp               # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local               # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote              # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gppp           # (from /etc/ppp/peers/quectel-ppp)
noipdefault             # (from /etc/ppp/peers/quectel-ppp)
ipcp-max-failure 30             # (from /etc/ppp/peers/quectel-ppp)
defaultroute            # (from /etc/ppp/peers/quectel-ppp)
usepeerdns              # (from /etc/ppp/peers/quectel-ppp)
noccp           # (from /etc/ppp/peers/quectel-ppp)
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^M^M
OK
 -- got it

send (ATE0^M)
expect (OK)
^M
ATE0^M^M
OK
 -- got it

send (ATI;+CSUB;+CSQ;+CPIN?;+COPS?;+CGREG?;&D2^M)
expect (OK)
^M
^M
Quectel^M
EC200A^M
Revision: EC200AEUHAR01A13M16^M
^M
SubEdition: V02^M
^M
+CSQ: 31,99^M
^M
+CGREG: 0,1^M
^M
+CPIN: READY^M
^M
+COPS: 0,0,"Suning",7^M
^M
OK
 -- got it

send (AT+CGDCONT=1,"IP","3gnet",,0,0^M)
expect (OK)
^M
^M
OK
 -- got it

send (ATD*99#^M)
expect (CONNECT)
^M
^M
CONNECT
 -- got it
```

Step 3: Check the status of the network interfaces.

```
# ifconfig
```

```
root@rk3566-buildroot:/# ifconfig
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.142.231.78  P-t-P:10.64.64.64  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:5 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:66 (66.0 B)  TX bytes:112 (112.0 B)
```

Step 4: Test the PPP connection.

```
# ping -I ppp0 www.armdesigner.com
```

```
root@rk3566-buildroot:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.142.231.78 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=46 time=244 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=532 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=233 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=450 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=241 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=368 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=46 time=237 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6008ms
rtt min/avg/max/mdev = 232.881/329.111/532.250/113.508 ms
```

7.13 Video Playback

(1) The directory for the built-in video testing scripts in the system: */rockchip-test/video*

```
root@rk3566-buildroot:/# ls /rockchip-test/video/
test_gst_multivideo.sh  test_gst_video_fps.sh     video_stresstest.sh
test_gst_video.sh       test_gst_video_maxfps.sh  video_test.sh
```

Simply execute the script.

```
root@rk3566-buildroot:/# /rockchip-test/video/test_gst_video.sh
Setting pipeline to PAUSED ...
Pipeline is PREROLLING ...
Redistribute latency...
mpp[1471]: mpp_info: mpp version: ab796560 author: Herman Chen   2024-12-30 docs: Update 1.0.8 CHANGELOG.md
mpp[1471]: mpp_info: mpp version: ab796560 author: Herman Chen   2024-12-30 docs: Update 1.0.8 CHANGELOG.md
mpp[1471]: mpp_info: mpp version: ab796560 author: Herman Chen   2024-12-30 docs: Update 1.0.8 CHANGELOG.md
mpp[1471]: mpp: unable to create enc vp8 for soc rk3566 unsupported
mpp[1471]: mpp_info: mpp version: ab796560 author: Herman Chen   2024-12-30 docs: Update 1.0.8 CHANGELOG.md
mpp[1471]: mpp_info: mpp version: ab796560 author: Herman Chen   2024-12-30 docs: Update 1.0.8 CHANGELOG.md
Redistribute latency...
mpp[1471]: h264d_api: is_avcC=1
Pipeline is PREROLLED ...
Prerolled, waiting for async message to finish...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
Redistribute latency...
[11:05:19.952] seeing the first app
0:00:01.8 / 0:00:29.5 (6.3 %)
```

(2) Play the video using Google Chrome.

• Google Chrome supports video playback up to 4K, with support for the following

decoding formats: VP8, H.264, H.265, VP9, and AV1.

• However, it is only compatible with certain H.265 video files.

Execute the following command to play the video using Google Chrome：

```
#  chromium /media/udisk1/video/4KP30/4K30P-BLACKPINK-DDU-DU_DDU-DU.mp4
```

Command explanation:

• chromium: Launches the Chromium browser.

• /mnt/udisk/video/4KP30/4K30P-BLACKPINK-DDU-DU_DDU-DU.mp4: The media file path to be played.

```
root@rk3566-buildroot:/#
DU_DDU-DU.mp4uildroot:/# chromium /media/udisk1/video/4KP30/4K30P-BLACKPINK-DDU-D
[1629:1648:0321/110716.777707:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1648:0321/110716.778172:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1648:0321/110716.778652:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1648:0321/110716.778773:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1648:0321/110716.898893:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1648:0321/110716.899222:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1695:0321/110716.971124:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1654:0321/110716.971311:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")

(process:1629): GLib-GIO-CRITICAL **: 11:07:16.978: g_settings_schema_source_lookup: assertion 'source !=
NULL' failed
[1629:1629:0321/110717.240370:ERROR:object_proxy.cc(576)]       Failed       to       call       method:
org.freedesktop.DBus.NameHasOwner: object_path= /org/freedesktop/DBus: unknown error type:
[1629:1629:0321/110717.240501:ERROR:object_proxy.cc(576)]       Failed       to       call       method:
org.freedesktop.DBus.NameHasOwner: object_path= /org/freedesktop/DBus: unknown error type:
[1629:1644:0321/110717.241210:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server address:
Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1629:1718:0321/110717.305515:ERROR:object_proxy.cc(576)]       Failed       to       call       method:
org.freedesktop.DBus.Properties.Get:                object_path=                /org/freedesktop/UPower:
org.freedesktop.DBus.Error.ServiceUnknown: The name org.freedesktop.UPower was not provided by any .service
files
[1629:1718:0321/110717.306669:ERROR:object_proxy.cc(576)]       Failed       to       call       method:
```

(3) Use the gst-play-1.0 command to play the video.

```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --videosink="waylandsink fullscreen=true"
/media/udisk1/video/4KP60/4KP60-exist.mp4 --audiosink="alsasink device=hw:0,0"
```

Command explanation:

• export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1: Open AFBC.

• /mnt/udisk/video/4KP60/4KP60-exist.mp4: The media file path to be played.

• --audiosink="alsasink device=hw:0,0": Specifies the audio output device as hw:0,0.

```
root@rk3566-buildroot:/# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
root@rk3566-buildroot:/#
/media/udisk1/video/4KP60/4KP60-exist.mp4 --audiosink="alsasink device=hw:0,0"" /
Press 'k' to see a list of keyboard shortcuts.
Now playing /media/udisk1/video/4KP60/4KP60-exist.mp4
Redistribute latency...
Redistribute latency...
Redistribute latency...
Redistribute latency...
Redistribute latency...
0:00:13.8 / 0:04:01.9
```