

Industrial PC

Ubuntu 14.04 OS on iMX6Q User Manual

For iMX6Q Products

Content can change at anytime, check our website for latest information of this product. **www.chipsee.com**

Contents

| Ubuntu 14.04 OS | 4 |
|--|----|
| 1. Preparation | 6 |
| 1.1. Hardware Requirements | 6 |
| 1.2. Software Requirements | 6 |
| 2. Debug | 8 |
| 2.1. Serial Debug | 8 |
| 2.2. SSH Debug | 10 |
| 2.3. VNC Debug | 12 |
| 3. Downloading images | 15 |
| 3.1. Boot Switch Configuration | 15 |
| 3.2. Prebuilt Files Package | 15 |
| 3.3. Downloading Images by using MFGTool | 16 |
| 3.3.1. Configuring MFGTool | 16 |
| 3.3.1.1. Copy Image To Android Directory | 17 |
| 3.3.1.2. Using MFGTool | 18 |
| 3.4. Downloading Images by using the TF card | 21 |
| 4. System Resource | 22 |
| 4.1. TF Card/USB/SATA Disk | 22 |
| 4.2. Network | 23 |
| 4.2.1. Wired Ethernet | 23 |
| 4.2.2. Wi-Fi | 23 |
| 4.2.3. Remove and Install Network-manager Packages | 25 |
| 4.2.4. Networking — Wired Ethernet | 25 |
| 4.2.5. Networking — WIFI | 26 |
| 4.3. Multimedia | 28 |
| 4.3.1. Audio Test | 29 |
| 4.4. HDMI | 31 |
| 4.5. Serial Port | 33 |
| 4.6. CAN Bus | 34 |
| 4.7. GPIO | 36 |

| | 4.8. Buzzer | 38 |
|----|---|----|
| | 4.9. Modify Logo | 39 |
| | 4.9.1. Method 1 - Downloading images | 39 |
| | 4.9.2. Method 2 - Don't Download Images | 39 |
| 5. | Development | 41 |
| | 5.1. Python | 41 |
| | 5.2. Qt Environment | 43 |
| 6. | Q&A | 45 |
| | 6.1. How to rotate the display | 45 |
| | 6.2. How to disable the Screensaver | 46 |
| | 6.3. Autostart Application after Boot | 47 |
| 7. | Disclaimer | 48 |
| 8. | Technical Support | 48 |
| | | |

Ubuntu 14.04 OS

Ubuntu 14.04 OS User Manual



This manual provides users with a fast guide of Chipsee Industrial Computer (Abbreviate as IPC) about Ubuntu 14.04 OS development. Through this manual, users can quickly understand the hardware resources; users can build a complete compilation of Linux development environment; users can debug Ubuntu 14.04 OS via serial and Internet.

| Revision | Date | Author | Description |
|----------|------------|--------|-----------------|
| V1.1 | 2021-12-30 | Randy | Revised |
| V1.0 | 2018-05-14 | Madi | Initial Version |

SUPPORTED BOARDS:

CS10600F070 CS10768F097 CS12800F101 CS10768F121 CS10768F121-U CS10768F150 CS12102F170 CS19108F215

PREBUILT FILES PACKAGE:

Prebuilt files for the various industrial PCs can be found in the OS Downloads. Below are the links to the prebuilt files for each industrial PC model.

- CS10600F070
- CS10768F097
- CS12800F101
- CS10768F121
- CS10768F121-U

- CS10768F150
- CS12102F170
- CS19108F215

System Features

| Feature | Comment |
|---------------|------------------------------|
| Kernel | Kernel 3.14.52 |
| Bootloader | Uboot 2015.04 |
| System | Ubuntu 14.04 LTS |
| Python | Python 2.7.9 / Python 3.4.0 |
| Qt | Need to be installed by user |
| GCC | 4.8.2 |
| Desktop | matchbox |
| user/password | [chipsee/chipsee] |

Preparation

You will need to prepare the following items before you can start using the Prebuilt Files Package to re-flash the system.

Power Supply Unit (PSU) with the appropriate voltages, as follows:

- These products: CS10768F121, CS10768F121-U, CS10768F150, CS12102F170, and CS19108F215 requires a 15V to 36V power adapter.
- These products: CS10768F097 and CS12800F101 product needs a 12V to 36V power adapter.
- The CS10600F070 product needs a 6V to 36V power adapter.

You need to prepare the Power Adapter by yourself

Hardware Requirements

- Chipsee Industrial PC
- PSU according to the instructions above
- USB-to-serial or other serial cable for debugging
- USB A-A cable (used only if the hardware configured as OTG)
- Windows 7 PC
- Mini-B USB OTG Cable
- TF Card (at least 4GB) and card reader

Software Requirements

- Ubuntu 14.04 OS Prebuilt Files Package (from the link above)
- Xshell or other terminal emulation software
- VNC-Viewer
- Cross-toolchain
- MFGTools
- · Useful tools for Qt development



- If you want to re-flash the system, you need the Prebuilt image package.
- You can use MFGTools on the Windows PC to download system images to the IPC.
- You can use Xshell or other terminal emulation software to debug Chipsee Industrial PC products in Windows.

- You can use VNC-Viewer to to remote control Chipsee Industrial PC over Ethernet.
- The cross-toolchain can compile a program for Chipsee Industrial PC.



In this documentation, all the commands are executed with <code>root</code> user privileges.

Debug

In this document, we use Xshell to debug the Chipsee Industrial Computer. You can also use other tools such as Putty, Minicom, SecureCRT or any terminal emulation software.

Serial Debug

You can refer to the RS232/RS485/CAN Connector section under the EPC/PPC-A9-070-C manual to understand the serial ports of the IPC. The debug serial port of Chipsee Industrial Computer is the first RS232 port. You can use it to debug directly, and the default user and password is [chipsee/chipsee]. You can use RS232_1_TXD, RS232_1_RXD, GND.

Follow these steps to perform serial debugging:

- Connect your Windows PC to the Chipsee IPC over a serial cable. Please reference the
 How To Connect Board By Serial manual to connect your PC and Chipsee Industrial
 Computer over a serial cable.
- · Open XShell and use the session properties as shown on the figure below.

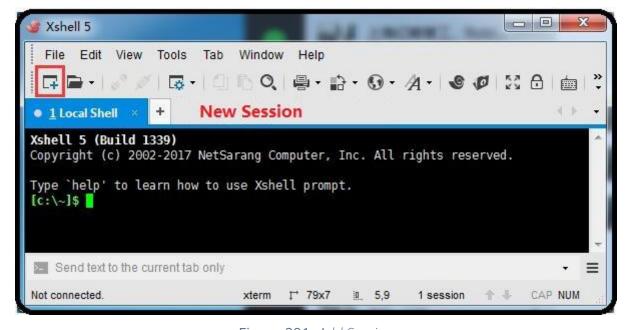


Figure 291: Add Session

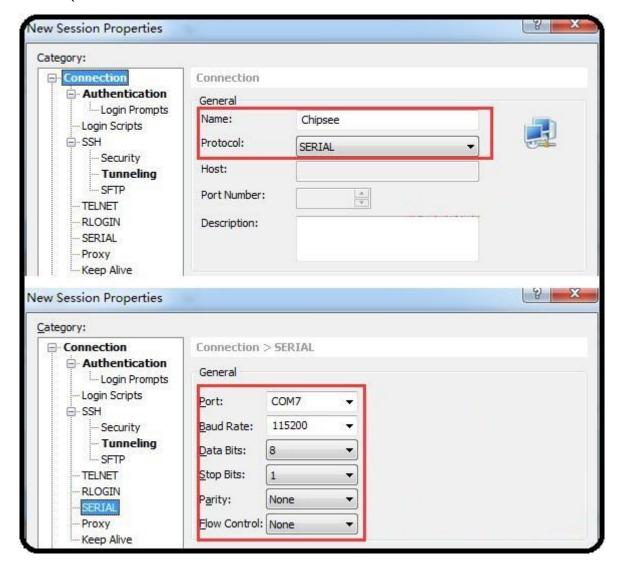


Figure 292: Session Properties

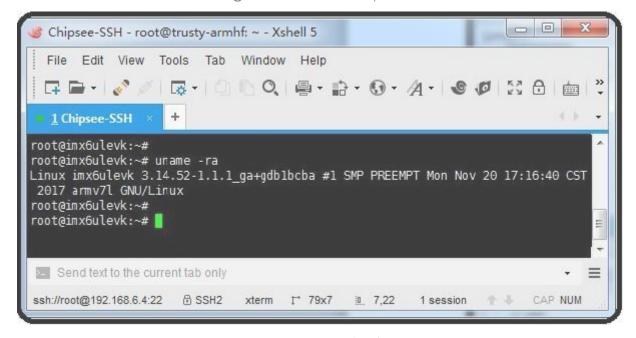


Figure 293: Serial Debug

SSH Debug

To perform SSH debugging on the Chipsee IPC, you must first connect the product to the Internet.

Continue the debugging by follow these steps:

- Get the IP address of the Chipsee IPC product.
- You can configure XShell or you can directly use the SSH tool in Linux OS. In this tutorial, we will use the XShell tool to perform SSH debugging.
- Open XShell and add a new session and set it as shown on the figure below.

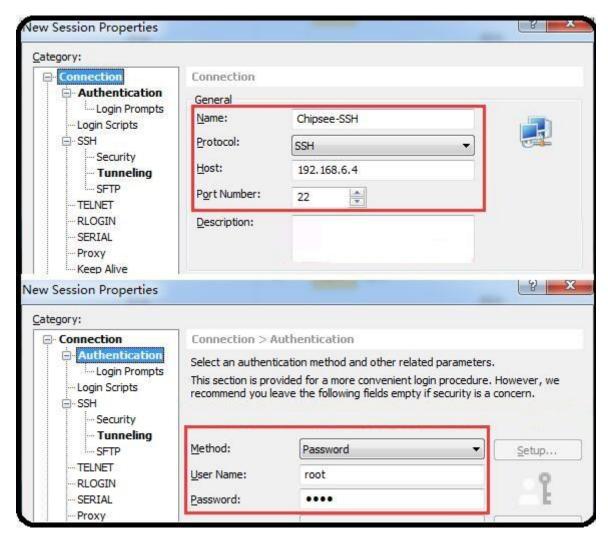


Figure 294: SSH Setting

Now we can perform SSH debugging using XShell.

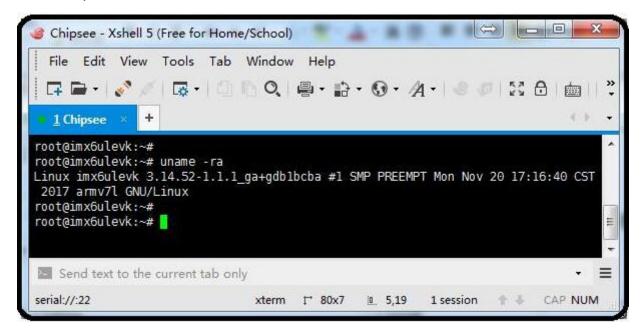


Figure 295: SSH Debug

VNC Debug

You can use the VNC-Viewer software in Windows to control Chipsee IPC over Ethernet.

Follow the steps below to perform VNC debug.

- Use XShell Serial or SSH to connect to the Chipsee IPC by logining as chipsee user.
- Use the following command to install x11vnc:

```
$ sudo apt-get update
$ sudo apt-get install x11vnc
```

• Set the password for VNC-Viewer access. Save the password to default file: ~/.vnc/passwd, as shown in the figure below.

```
$ sudo x11vnc -storepasswd
```

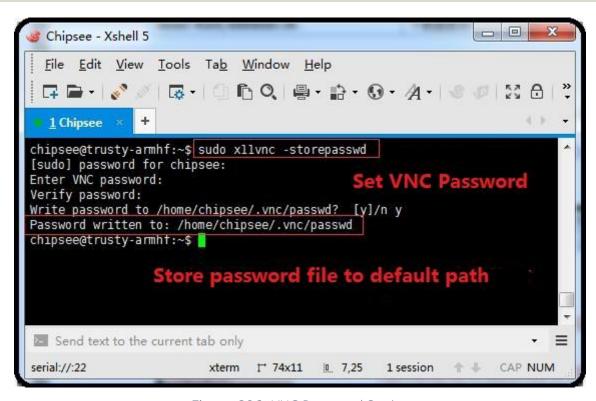


Figure 296: VNC Password Setting

• Add the command below to /etc/rc.local to enable the x11vnc execute after the system booted.

```
x11vnc -display :0 -forever -bg -rfbauth /home/chipsee/.vnc/passwd -rfbport 5900 -o /home/chipsee/.vnc/x11vnc.log
```

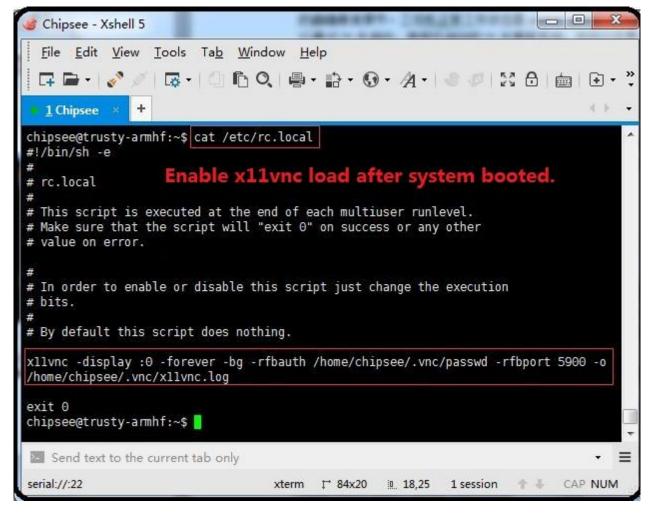


Figure 297: x11vnc auto load

• Use VNC-Viewer in Windows to control it over Ethernet, as shown on the figure below.

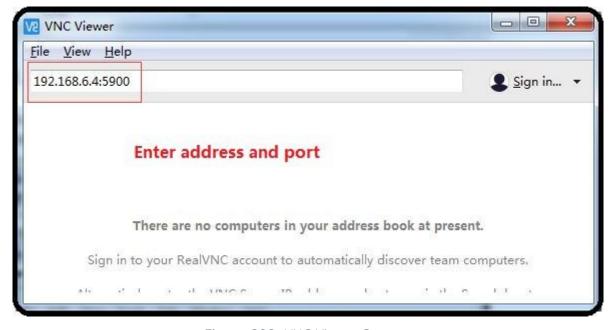


Figure 298: VNC-Viewer Connect

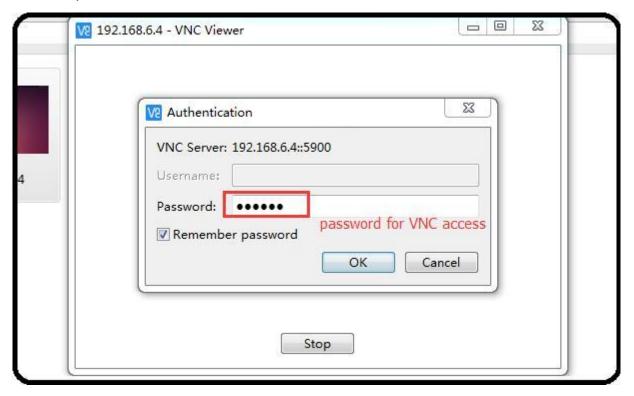


Figure 299: Authentications

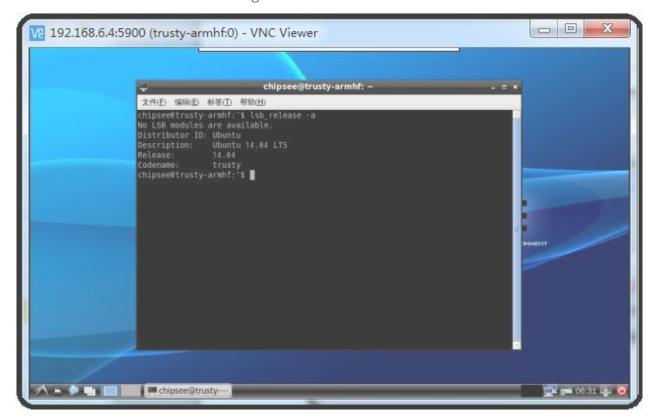


Figure 300: VNC Desktop

Downloading images

Boot Switch Configuration

CS-IMX6 has a boot configuration select switch, as shown on the figure below. You can use the boot select switch to change between three modes, namely

- TF Card
- eMMC Boot
- Download

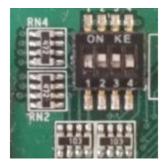


Figure 301: Boot Mode Setup

| SW Mode | 1 | 2 | 3 | 4 |
|----------|---|---|---|---|
| TF Card | 1 | 0 | 0 | 0 |
| еММС | 1 | 1 | 0 | 1 |
| Download | 0 | 1 | 1 | 0 |

Table 61 Boot Configuration Selection



The user can use both the pre-built Ubuntu 14.04 image files and the MFGTools software to download new images to the system, boot system and perform necessary software and hardware test.

Prebuilt Files Package

You can get the Prebuilt Files Package for each model from links mentioned at the beginning of this documentation. You can also get the Prebuilt Files Package from the DVD in /Ubuntu 14.04/Prebuilds folder. However, it may be outdated so always compare the versions (the last number in the filename is the release date).

The prebuilt package has the following content:

| Contents | Comment |
|--|---------------------------------------|
| boot/imx6q-eisd.dtb | TF Card boot dtb file |
| boot/u-boot-sd.imx | TF Card boot bootloader |
| boot/zImage | TF Card boot kernel file |
| boot/logo.bmp | TF Card boot logo file |
| filesystem/rootfs-emmc-flasher.tar.bz2 | TF Card boot rootFS |
| mksdcard.sh | Shell tools to make bootable TF Card |
| README | Simple guidelines |
| S1.jpg | Boot Switch Config Figure |
| emmc-flash/emmc/rootfs.tar.bz2 | RootFS in target eMMC |
| emmc-flash/emmc/u-boot-emmc.imx | Bootloader in target eMMC |
| emmc-flash/emmc/zImage | Kernel file in target eMMC |
| emmc-flash/emmc/zImage_framebuffer | Kernel file with frame-buffer |
| emmc-flash/emmc/imx6q-eisd.dtb | Dtb file in target eMMC |
| emmc-flash/emmc/imx6q-eisd.dtb_framebuffer | Dtb file with frame-buffer |
| emmc-flash/emmc/logo.bmp | Logo file in eMMC |
| emmc-flash/mkemmc.sh | Shell tool to download images to eMMC |

Table 62 Prebuilt Files Package



- The default <code>zImage</code> and <code>imx6q-sabresd.dtb</code> files support 'keep the logo from uboot to kernel' but don't support framebuffer.
- We also provide <code>zImage_framebuffer</code> and <code>imx6q-eisd.dtb_framebuffer</code> file versions that support the framebuffer function but do not support the <code>keep the logo from uboot kernel</code> feature. If you need the framebufer, just rename these two files to <code>zImage</code> and <code>imx6q-eisd.dtb</code>.

Downloading Images by using MFGTool

The MFGTools can be used to download images into a target device. It is a quick and easy tool for downloading images.

Before downloading images with the MFGTools, set the boot switch to download mode. (refer to Boot Switch Configuration above)

Configuring MFGTool

To configure MFGTool, follow these steps:

• Untar Mfgtools-K31452-Vx.x.tar.gz file.

- Open the extracted folder Mfgtools-K31452-Vx.x and edit cfg.ini file.
- In the cfg.ini file, ensure the name and display variables are set to eMMC-Ubuntu and 1024600 respectively, as shown on the figure below.

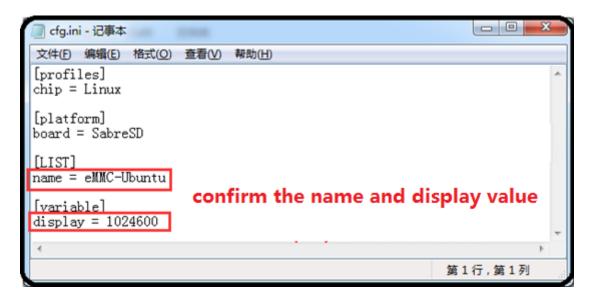


Figure 302: Cfg.ini file



You can get the supported display from *Mfgtools-K31452-V1.0\Profiles\Linux\OS Firmware\firmware* directory. Modify config <code>UICfg.ini</code> file. This file has only one line: <code>PortMgrDlg=1</code> that indicates you can download the images to one board at the same time. The max value is 4.

COPY IMAGE TO ANDROID DIRECTORY

Follow these steps to copy image to Linux directory:

• Copy the images from prebuilt-xxx/emmc-flash/emmc/ to Mfgtools-K31452-V1.0\Profiles\Linux\OS Firmware\files\ubuntu directory.

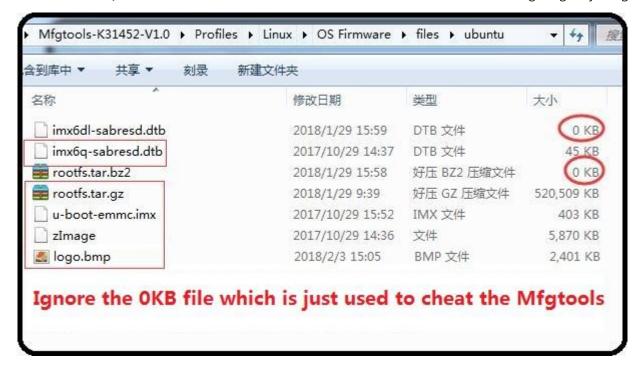


Figure 303: Prepare Images

USING MFGTOOL

- 1. Connect a USB OTG cable from a Windows PC to the USB OTG port on the IPC.
- 2. Change the boot select configuration to 0 1 1 0, as shown on the figure below.

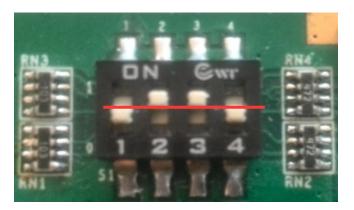


Figure 304: Boot Switch Config

- 3. Connect a 12V-2A power adapter to the IPC and power ON.
- 4. On your Windows PC, open the Mfgtools-Rel-XXX_XXXXXX_MX6Q_UPDATER_VXX directory and run the MfgTool2.exe file, as shown on the figure below.

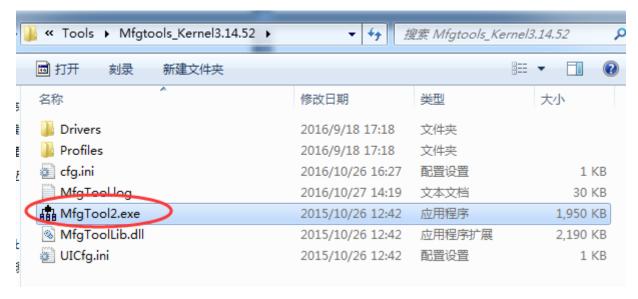


Figure 305: Run MfgTools2.exe file



Figure 306: Prepare to start

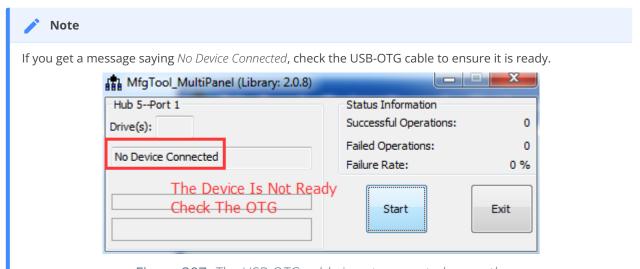


Figure 307: The USB-OTG cable is not connected correctly.

5. Click on Start button to download the Image.

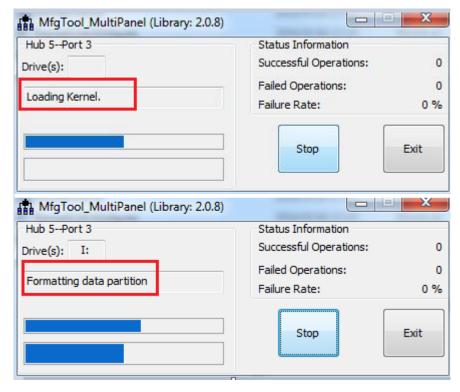
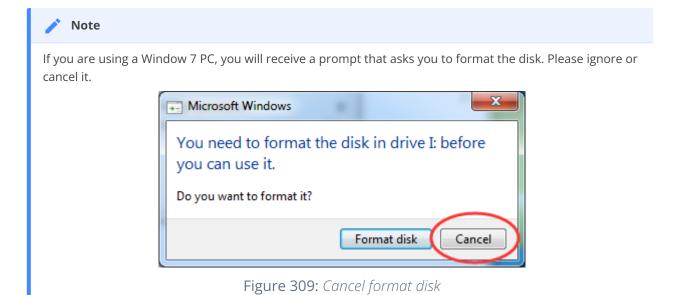


Figure 308: Downloading Images



6. When the process is complete, you click the Stop button to stop downloading Image and exit.

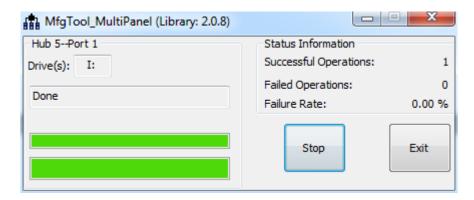


Figure 310: Download Image is finished

Downloading Images by using the TF card

Follow the steps below to download images onto the eMMC by using the TF Card:

- 1. Copy the Prebuilt Files Package to a Linux environment (such as Ubuntu 14.04).
- 2. Insert the SD card into your computer. If you are using virtual machines, please ensure the SD card is mounted to the Linux operating system.
- 3. Confirm the SD card mount point, $\sqrt{\text{dev/sdX}}$ (e.g., $\sqrt{\text{dev/sdc}}$ or $\sqrt{\text{dev/sdb}}$, be sure to use the right one). In a Linux system, you can use the command below to find out what X is.

```
$ sudo fdisk —l
```

- 4. Copy the prebuilt-imxv1-csXXXXXfXXXvX-android6-emmc-YYYYMMDD.tar.gz to somewhere(such as \$HOME) on the Ubuntu PC.
- 5. **Extract the** prebuilt-imxv1-csXXXXXfXXXvX-android6-emmc-YYYYMMDD.tar.gz

```
$ tar -xzvf prebuilt-imxv1-csXXXXXfXXXvX-android6-emmc-YYYYMMDD.tar.gz
```

6. Go to the folder

```
$ cd prebuilt-imxv1-csXXXXXfXXXvX-android6-emmc-YYYYMMDD
```

7. Use the following command to flash the Ubuntu 14.04 OS to the SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```



- sd<?> means the SD card mount point, (e.g., /dev/sdc or /dev/sdb) in Ubuntu system.
- The recommended SD card should be Sandisk Class4 level SD card or above.
- 8. The bootable SD Card is now ready. Power OFF the industrial PC and insert the SD Card.
- 9. Set the switch S1 to TF card boot mode. (refer to Boot Switch Configuration above)
- 10. Connect the industrial PC to PC via COM1. Power ON the IPC.
- 11. After 20 minutes, if the LED on industrial PC stays lit, flashing is completed. Using COM1, you can also find this message >>>>> **eMMC Flashing Completed** <<<<< which indicates that the system image was downloaded correctly to the eMMC.
- 12. Power OFF and set the switch S1 to eMMC boot mode. (refer to Boot Switch Configuration above)

System Resource

TF Card/USB/SATA Disk

The TF Card and USB Storage supports hot-plug but the SATA Disk does not support hot-plug. These devices will be automatically mounted on <code>/media/chipsee/</code>, as shown in the figure.

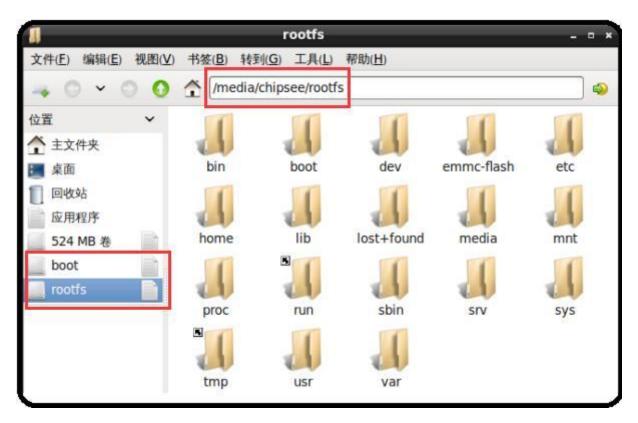


Figure 311: TF Card



The TF card and USB Storage do not support NTFS format. Please format it to FAT32 first before plugging into IPC.

Network

This system uses a networking service to control Ethernet and uses wpa_supplicant to control the WIFI network.

Wired Ethernet

You can get the IP address from the following application, as shown on the figure below.

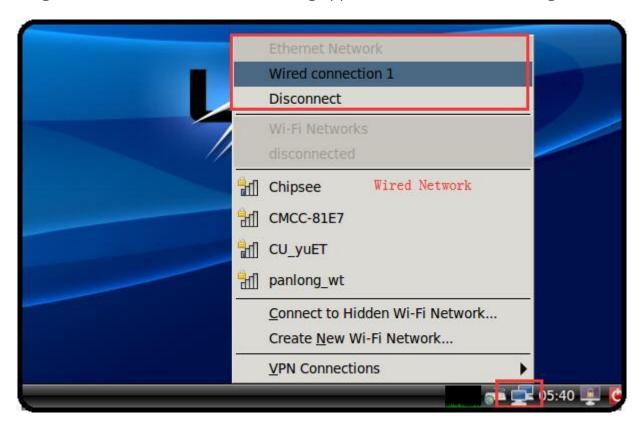


Figure 312: Wired Connection

Wi-Fi

• Disconnect wired connection before you use Wi-iI. We will connect to the *Chipsee* network. Fill in the password, as shown on the figure below.



Figure 313: Wi-Fi Password

 Next, you will get the dialog which will request you to set the password for the new keyring. Just leave it blank or set a password for yourself, as shown on the figure below. We advise you to leave it blank, in order for the WiFi to connect automatically during the next boot.



Figure 314: Keyring setting

If you set the keyring and want to reset it, do the following:

Open Preferences->Passwords and Keys, as shown on the figure below:



Figure 315: Passwords and Keys

• Right click Default keyring tab to change the Password, and set it to blank, as shown on the figure below.



Figure 316: Change the keyring password

Remove and Install Network-manager Packages

If you want to set a static IP, you can use the Networking Service to manage your network. Before that, you need to remove the Network-manager Package and reboot the IPC board. You can use this command to remove the packages:

```
$ sudo apt-get remove --purge network-manager
$ sudo apt-get autoremove --purge network-manager
```

If you want to reinstall it, use this commands:

```
$ sudo apt-get install network-manager
```

Networking — Wired Ethernet

You can get the <u>interfaces</u> file from /etc/network/ directory, this is the config file for the Networking service.

The following are some examples on how to set the network.

• Set wired Ethernet to use DHCP in obtaining IP. Edit the interfaces file by adding these lines

```
### ethX demo
### For ethX uncomment follow two lines.
allow-hotplug eth0
auto eth0
## ethX dhcp demo
iface eth0 inet dhcp
```

• Set wired Ethernet to use Static IP. Edit the interfaces file by adding these lines

```
### ethX demo
### For ethX uncomment follow two lines.
allow-hotplug eth0
auto eth0
## ethX static demo
iface eth0 inet static
```

```
pre-up ifconfig eth0 hw ether 00:22:44:66:88:AA //Set MAC address 192.168.6.98 netmask 255.255.255.0 gateway 192.168.6.1 dns-nameservers 8.8.8.8 // set DNS
```

Networking — WIFI

You can get the <u>interfaces</u> file from /etc/network/ directory, this is the config file for the Networking service.

The following are some examples on how to set the network.

- Enable Wi-Fi and set it to use DHCP to obtain IP. Edit the <u>interfaces</u> file by adding these lines
 - Use the following command to set the SSID and Password of Wi-Fi, and generate /etc/wpa_supplicant.conf.

```
# wpa_passphrase "your ssid" " your password " > /etc/
wpa_supplicant.conf
```

Modify /etc/network/interfaces , like this:.

```
auto wlan0
iface wlan0 inet dhcp
wireless_mode managed
wireless_essid any
wpa-driver nl80211
wpa-conf /etc/wpa_supplicant.conf
```

• Enable Wi-Fi and set it to use a Static IP. Edit the interfaces file by adding these lines

```
iface wlan0 inet static

address 192.168.1.98
netmask 255.255.255.0
gateway 192.168.1.1
dns-nameservers 8.8.8.8

wireless_mode managed
wireless_essid any
wpa-driver nl80211
wpa-conf /etc/wpa_supplicant.conf
```

```
✓ Note
```

This system uses <code>wpa_cli</code> and <code>wpa_supplicant</code> to manage Wi-Fi that supports <code>nl80211</code> . There is no wireless tools and you can't use iwconfig and iwlist.

Multimedia

This system supports NXP Gstreamer-imx Multimedia library and its various plugins.

```
root@imx6qsabresd:~# gst-inspect-1.0 | grep imx overlaysink.imx: overlaysink: IMX Video (video compositor) Sink imxmp3enc.imx: imxmp3enc: imx mp3 audio encoder beep.imx: ac3: [Invalid UTF-8] `Z\xc7s beep.imx: 3ca: [Invalid UTF-8] `Z\xc7s beep.imx: beepdec: Beep universal decoder imxcompositor.imx: imxcompositor_ipu: IMX ipu Video Compositor imxcompositor.imx: imxcompositor_g2d: IMX g2d Video Compositor vpu.imx: vpuenc_h264: VPU-based AVC/H264 video encoder vpu.imx: vpuenc_mpeg4: VPU-based MPEG4 video encoder vpu.imx: vpuenc_h263: VPU-based H263 video encoder vpu.imx: vpuenc_jpeg: VPU-based JPEG video encoder vpu.imx: vpuenc_jpeg: VPU-based video decoder imxvideoconvert.imx: imxvideoconvert_ipu: IMX ipu Video Converter imxvideoconvert.imx: imxvideoconvert_g2d: IMX g2d Video Converter aiur.imx: webm: [Invalid UTF-8] \xa0!\xf0u aiur.imx: aiurdemux: Aiur universal demuxer imxv412.imx: imxv412sink: IMX Video (video41inux2) Sink imxv412.imx: imxv412sink: IMX Video (video41inux2) Source root@imx6qsabresd:~#
```

Figure 317: GStreamer Plugins

Audio Test

You can use the command below to record music. The _-d parameter means interrupt after # seconds. In this example, _-d is equal to 18 seconds.

```
$ sudo arecord -N -M -r 44100 -f S16_LE -c 2 -d 18 test.wav
```

You can use the command below to playback the recorded sound above.

```
$ sudo aplay -N -M test.wav
```

You can also use the **LXMusic** to playback audio.



Figure 318: LXMusic

Set output as ALSA, as shown on the figure below.

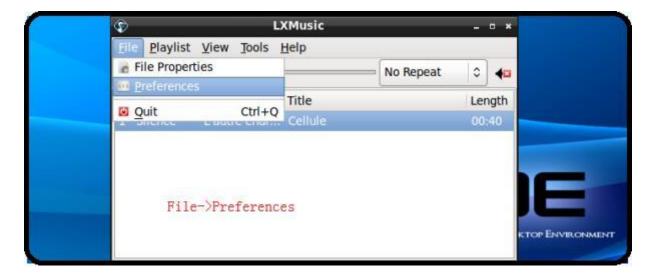


Figure 319: Set Audio Plugin

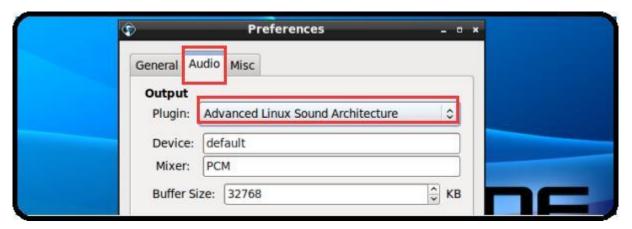


Figure 320: Set Audio Plugin

HDMI

You can follow the steps below to display the IPC output onto an external display via HDMI.

- Power OFF IPC. Connect the external display to the IPC using an HDMI cable.
- Refer to the Serial Debug section to set serial debug.
- Power ON IPC. In XShell, hit any key to stop auto boot and input the uboot command mode, as shown on the figure below.

```
U-Boot 2015.04-14469-g9433975-dirty (Oct 25 2016 - 14:12:01)

CPU: Freescale i.Mx6Q rev1.5 at 792 MHz

CPU: Temperature 28 C
Reset cause: POR
Board: Mx6-sabreSD
I2C: ready

DRAM: 2 GiB
MMC: FSL_SDHC: 0, FSL_SDHC: 1, FSL_SDHC: 2

*** Warning - bad CRC, using default environment

Display: CHIMEI215 (1920x1080)
In: serial
Check_and_clean: reg 0, flag_set 0
Fastboot: Normal
flash target is MMC:2
Net: Phy 1 not found
PHY reset timed out
FEC [PRIME]
Error: FEC address not set.

Normal Boot
fit any key to stop autoboot: 0
```

Figure 321: Uboot



HDMI does not support hot-plug. The sound comes from the HDMI monitor, neither the speaker nor the headset on board.

- Use the following command to set different resolution
 - For 1080p

```
=> setenv displayargs video=mxcfb0:dev=hdmi,1920x1080M@60
video=mxcfb1:dev=off video=mxcfb2:off
=> saveenv
=> boot
```

For 720p

```
=> setenv displayargs video=mxcfb0:dev=hdmi,1280x720M@60
video=mxcfb1:dev=off video=mxcfb2:off
=> saveenv
=> boot
```

• For 480p

```
=> setenv displayargs video=mxcfb0:dev=hdmi,800x480M@60
video=mxcfb1:dev=off video=mxcfb2:off
=> saveenv
=> boot
```

```
U-Boot 2015.04 (Dec 29 2017 - 11:32:31)

CPU: Freescale i.MX6Q rev1.5 at 792 MHz

CPU: Temperature 38 C
Reset cause: POR
Board: MX6-SabreSD

IZC: ready

DRAM: 2 G16
MMC: FSL_SDHC: 0, FSL_SDHC: 1, FSL_SDHC: 2

Display: CHIMEIIO1 (1280x800)

In: serial

Err: Serial
```

Figure 322: HDMI Output Setting

- Reboot the IPC.
- Use the following command to reset the output from LDB.

```
=> setenv displayargs video=mxcfb0:dev=ldb video=mxcfb1:dev=off
video=mxcfb2:off
=> saveenv
=> boot
```

Serial Port

There are five serial ports on the Chipsee IPC: 2 x RS232 and 3 x RS485 (can be customised). Refer to the table below for the available serial device nodes.

The default serial port configuration is $2 \times RS232$, $2 \times RS485$, $1 \times RS485$ which is shared with Bluetooth.

Contact us if you need help with changing the default serial port configuration

| Ports | Device Node |
|--------------------|--------------|
| COM1(RS232, Debug) | /dev/ttymxc0 |
| COM2(RS485) | /dev/ttymxc1 |
| COM3(RS232) | /dev/ttymxc2 |
| COM4(RS485) | /dev/ttymxc3 |
| COM5(RS485) | /dev/ttymxc4 |

Table 63 Serial Ports Nodes on the System



If you use COM2(RS485), you can't use Bluetooth because COM2(RS485) share pin with Bluetooth.

You can install **cutecom** to test the serial port:

\$ sudo apt-get install cutecom

Only users with root permissions can use the serial port

\$ sudo cutecom

CAN Bus

Chipsee Industrial PC is equipped with two CAN busses (CAN1 and CAN2). Two devices can be interconnected. You can test the CAN buses by using the **HT application** but you must add one 120Ω resistor between CAN_H and CAN_L on one of the two Boards, as shown on the figure below.

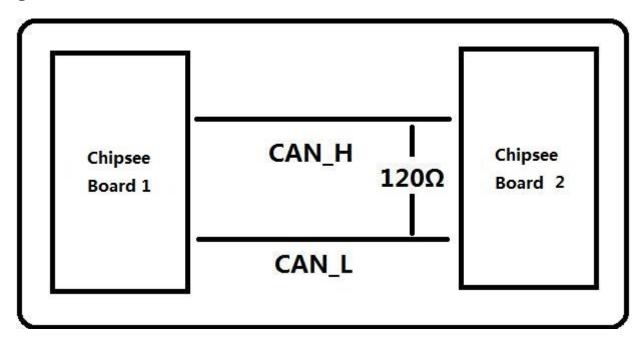


Figure 323: CAN Connect



The Chipsee IPC does not mount the 120Ω matched resistor on all CAN signals by default.

Here are a few examples to test CAN by using CAN units

• **Install** can-utils

```
$ sudo apt install can-utils
```

• Set the bit-rate to 50Kbits/sec with triple sampling using the following command (use ROOT user):

```
$ sudo ip link set can0 type can bitrate 50000 triple-sampling on
```

OR

\$sudo canconfig can0 bitrate 50000 ctrlmode triple-sampling on

• Bring up the device using the command:

```
$ sudo ip link set can0 up
```

OR

\$ sudo canconfig can0 start

Transfer packets

• Transmit 8 bytes with standard packet id number as 0x10

```
$ sudo cansend can0 -i 0x10 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88
```

• Transmit 8 bytes with extended packet id number as 0x800

```
$ sudo cansend can0 -i 0x800 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88 - e
```

• Transmit 20 8 bytes with extended packet id number as 0xFFFFF

```
$ sudo cansend can0 -i 0xFFFFF 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88 -e
--loop=20
```

Receive data from CAN bus

```
$ sudo candump can0
```

Bring down the device

```
$ sudo ip link set can0 down
```

GPIO

There are 8 GPIOs, 4 Output, and 4 Input, they are all isolated. You can control the output or input pin voltage by feeding the VDD_ISO suite voltage. The pin voltage should be from 5V to 24V. Refer to the tables below for a detailed port definition:

| Pin Number | GPIO Number |
|------------|-------------|
| 11 | 205 |
| 12 | 106 |
| 13 | 29 |
| 14 | 30 |
| 15 | 28 |
| 16 | 204 |
| 17 | 94 |
| 18 | 95 |

Table 64 CS80480F070 - V1.0 P11 Port

| Pin Number | GPIO Number |
|------------|-------------|
| 21 | 106 |
| 22 | 29 |
| 23 | 30 |
| 24 | 28 |
| 27 | 95 |
| 28 | 94 |
| 29 | 87 |
| 30 | 130 |

Table 65 CS10600F070 - V1.0 P21 Port

| Pin Number | GPIO Number |
|------------|-------------|
| 21 | 29 |
| 22 | 106 |
| 23 | 28 |
| 24 | 30 |
| 27 | 130 |

| Pin Number | GPIO Number |
|------------|-------------|
| 28 | 87 |
| 29 | 94 |
| 30 | 95 |

Table 66 CS10600F070 - V2.0 P21 Port

| Pin Number | GPIO Number |
|------------|-------------|
| 3 | 106 |
| 4 | 30 |
| 6 | 95 |
| 7 | 87 |
| 8 | 29 |
| 9 | 28 |
| 11 | 94 |
| 12 | 130 |

Table 67 CS12800F010 - V1.0 P28 Port



You need ROOT permissions to control GPIO.

Set gpio106 Output to high or low using this command

Set gpio30 Input using this command

Un-export gpio30 using this command

```
# echo 30 > /sys/class/gpio/unexport  //un-export gpio30
```

Buzzer

The buzzer is one GPIO, which has the GPIO Number as 80.

You can test the buzzer with the following commands.

You also can use the HT application to test the buzzer.

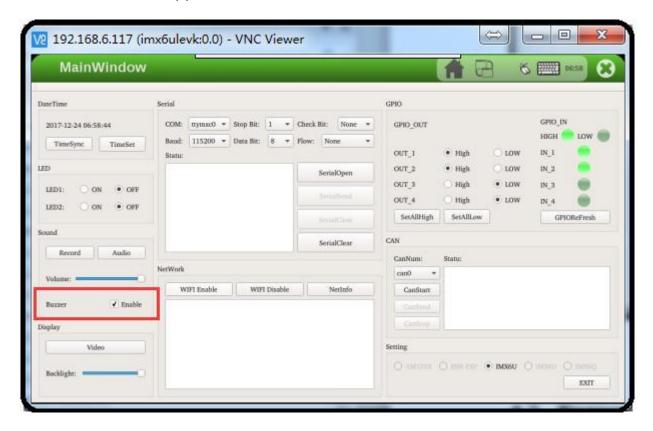


Figure 324: Buzzer

Modify Logo

This system supports changing the logo by yourself. There are two ways:

- Replace the logo file in prebuilt images packages, and download images.
- Change the logo without downloading images.



Method 1 - Downloading images

Replace the *prebuilt-xxx/emmc-flash/emmc/logo.bmp* and reference Downloading Images by using MFGTool to flash the image.

Method 2 - Don't Download Images

We will use **MFGTools** and the **Logoflasher** apps to change the logo.

Use MFGTools to Change LOGO

- Replace the logo.bmp file in Mfgtools-K31452-V1.0\Profiles\Linux\OS Firmware\files\ubuntu with your customised logo file.
- Open and edit the *Mfgtools-K31452-V1.0\cfg.ini* file and set the name variable to eMMC-Ubuntu-Logo as shown below.

```
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

[profiles]
chip = Linux

[platform]
board = SabreSD

[LIST]
name = eMMC-Ubuntu-Logo

[variable]
display = 1024600
```

Figure 325: Change name

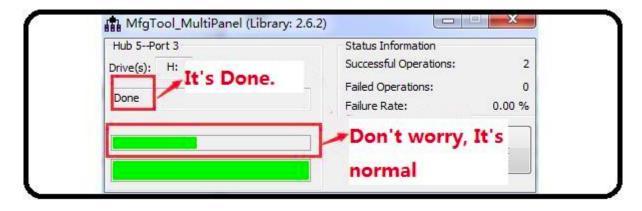


Figure 326: Logo Modify with MFGTool

Use Logoflasher to Change Logo

You can get the Logoflasher file and use these tools to make one bootable TF card. Follow the steps below to change logo

Use the following commands to make bootable TF card.

```
$ sudo tar zxvf prebuilt-imx6qdl-bootfile-update-xxx.tar.gz
$ sudo cd prebuilt-imx6qdl-bootfile-update-xxx
$ sudo ./mksdcard.sh --device /dev/sdX --display 1024600 //
resolution
```

- Put your custom logo file in the first partition boot-flash directory on the TF Card.
- Set boot mode to **TF card**. You can reference Boot Switch Configuration.
- Power ON the IPC. If you see this message, >>>>> **eMMC Flashing Completed** <<<<<, you are done:

Development

In this chapter, you will learn how to set up the Python3 and QT development environment, and develop the first QT application on Chipsee IPC boards.

Python

In this example, we will develop one Python3 GUI application.

• First, you must install the Tkinter package using this command:

```
$ sudo apt-get install python3-tk
```

Create a hello_world.py file and use the following code:

```
1 #!/usr/bin/env python3
 2 # -*- coding: UTF-8 -*-
 4 import tkinter as tk
 5
 6 \text{ rt} = \text{tk.Tk()}
 7 rt.resizable(False, False)
 8 rt.title("ChipseePython")
10 rt.update()
11 curWidth = rt.winfo regwidth()
12 curHeight = rt.winfo height()
13 scnWidth,scnHeight = rt.maxsize()
15 tmpcnf = '%dx%d+%d+%d'%(curWidth,curHeight,
16 (scnWidth-curWidth)/2,(scnHeight-curHeight)/2)
17 rt.geometry(tmpcnf)
18
19 tim=tk.Label(rt,text="Hello Chipsee",font=("Arial",
14, "bold"), bg='yellow', justify='left')
20 tim.pack(expand="yes",fill="both")
21
22 rt.mainloop()
```

• Save the file. Run it using this command.

```
$ python3 hello_world.py
```



Figure 327: Python App

Qt Environment

There is no Qt environment and build environment in this system, you need to install Qt and set a build environment first. Then we will develop one Qt application.

• Use the following command to prepare and set the Qt Environment.

```
$ sudo apt-get update
$ sudo apt-get install build-essential git libudev-dev
$ sudo apt-get install qt5-default // or qt4-default if you want to use
qt4
$ sudo apt-get clean
```

 We use hardwaretest_serial to demonstrate this development exercise. To perform this demo, we need to install qtserialport support first using this commands:

```
$ cd ~
$ git clone git://code.qt.io/qt/qtserialport.git
$ cd qtserialport
$ git checkout 5.3 // for qt4 is "git checkout qt4-dev"
$ cd ../
$ mkdir qtserialport-build
$ cd qtserialport-build
$ qmake ../ qtserialport/qtserialport.pro
$ make
$ sudo make install
```

• Use SSH or USB Storage to put hardwaretest_serial_ok_20170223.tar.gz file onto Chipsee IPC board.

Now we are in Chipsee IPC Debian system console.

• Use the following command to build the Qt application:

```
$ tar zxvf hardwaretest_serial_ok_20170223.tar.gz
$ cd hardwaretest_serial
$ qmake
$ make
```

Modify the permission of the serial ports device node

```
$ sudo chmod 666 /dev/ttymxc*
```

• Run the hardwaretest serial app using this command:

```
$ cd hardwaretest_serial
$ export DISPLAY=:0
$ ./hardwaretest_serial
```

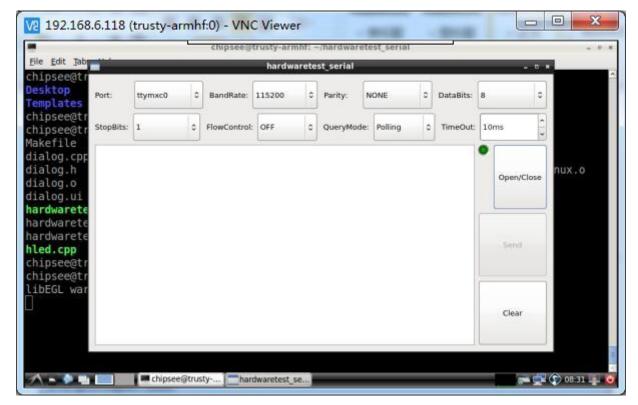


Figure 328: hardwaretest_serial App

Q&A

In this chapter, you can learn how to set up the QT development environment, and develop the first QT application on Chipsee IPC boards.

How to rotate the display

Modify /etc/X11/xorg.conf and /usr/share/X11/xorg.conf.d/10-evdev.conf to rotate the display and touchscreen. If the files do not exist, please create a new one.

/etc/X11/xorg.conf

```
Section "Device"

Identifier "Builtin Default fbdev Device 0"

Driver "fbdev"

# Option "Rotate" "CW" // 90°

# Option "Rotate" "UD" // 180°

# Option "Rotate" "CCW" // 270°

EndSection
```

• /usr/share/X11/xorg.conf.d/10-evdev.conf

```
Section "InputClass"
        Identifier "evdev touchscreen catchall"
        MatchIsTouchscreen "on"
        MatchDevicePath "/dev/input/event*"
#90°
#
        Option "SwapAxes" "True"
                                         //Swap X Axes and Y Axes
        Option "InvertY" "True"
                                          //Invert Y Axes
#180°
        Option " InvertX" "True"
#
                                          // Invert X Axes
#
        Option "InvertY" "True"
                                          //Invert Y Axes
#270°
        Option "SwapAxes" "True"
                                        //Swap X Axes and Y Axes
        Option "InvertX" "True"
                                          //Invert X Axes
        Driver "evdev"
EndSection
```

How to disable the Screensaver

Open the Screensaver Setting dialog, as shown on the figure below.

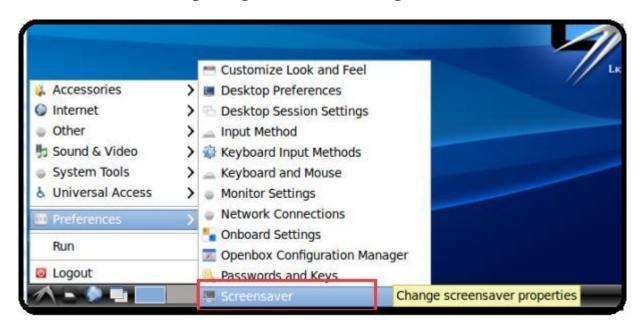


Figure 329: Screensaver

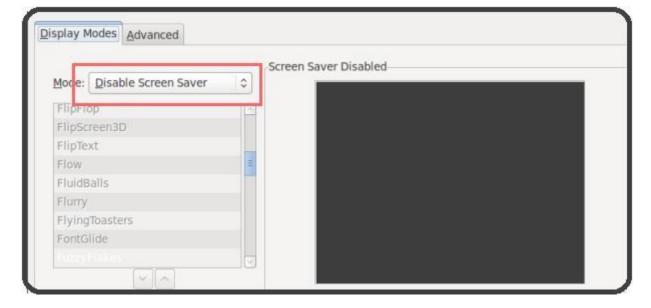


Figure 330: Disable Screen Saver

Autostart Application after Boot

We will autostart the Python hello_world.py app from Python.

• Change the mode for hello world.py and copy it to /usr/local/bin

```
$ sudo chmod a+x hello_world.py
$ sudo cp test.py /usr/local/bin/
```

• Put hello world.py in LXDE autostart file, using this command:

```
Autostart File /home/chipsee/.config/lxsession/LXDE/autostart
Add follow to the end of autostart file.

@test.py
```

• Reboot the IPC to apply changes.

Disclaimer

This document is provided strictly for informational purposes. Its contents are subject to change without notice. Chipsee assumes no responsibility for any errors that may occur in this document. Furthermore, Chipsee reserves the right to alter the hardware, software, and/or specifications set forth herein at any time without prior notice and undertakes no obligation to update the information contained in this document.

While every effort has been made to ensure the accuracy of the information contained herein, this document is not guaranteed to be error-free. Further, it does not offer any warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document, and no contractual obligations are formed either directly or indirectly by this document.

Despite our best efforts to maintain the accuracy of the information in this document, we assume no responsibility for errors or omissions, nor for damages resulting from the use of the information herein. Please note that Chipsee products are not authorized for use as critical components in life support devices or systems.

Technical Support

If you encounter any difficulties or have questions related to this document, we encourage you to refer to our other documentation for potential solutions. If you cannot find the solution you're looking for, feel free to contact us. Please email Chipsee Technical Support at **support@chipsee.com**, providing all relevant information. We value your queries and suggestions and are committed to providing you with the assistance you require.