

Industrial PC Debian 8.10 OS on iMX6UL User Manual

For iMX6UL Products

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Chipsee Debian 8.10 User Manual

Chipsee

Revision	Date	Author	Description
V1.0	2018-4-14	Madi	Initial Version

SUPPORTED BOARDS:

CS10600U070-V1.0

PREBUILT FILES PACKAGE:

prebuilt-cs10600u070v1-debian-emmc-20210201.tar.gz

System Features

Feature	Comment
Kernel	Kernel version: 3.14.52
Bootloader	Uboot 2015.04
System	Debian8.10
Python	Python version: 2.7.9
Qt	Needs to be installed
Desktop	lxde
user/password	[root/root] or [chipsee/chipsee]

Preparation

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

- Power Supply Unit (PSU) with the appropriate voltages, as follows:
 - Products with 7" display panel require 6V to 36V PSU
 - Products with 10" display panel and larger require 15V to 36V PSU
- USB to serial cable for debugging Chipsee Industrial Embedded Computers (Chipsee IPC)
- TF Card to create a bootable storage for reflashing the system

Use the Prebuilt Files Package from the link above to reflash the system. You can use the XShell terminal emulator to debug Chipsee IPC in Windows. You can also use VNC[®] Viewer to control Chipsee IPC remotely, over Ethernet. The Cross-toolchain software is used to compile the software for flashing.

Hardware Requirements

- Chipsee Industrial (Embedded) Panel PC
- PSU according to the instructions above
- USB-to-serial or other serial cable for debugging
- TF Card (at least 4GB)

Software Requirements

- Prebuilt Files Package (from the link above)
- XShell or similar terminal emulation software
- Cross-toolchain
- VNC-Viewer

Debug

This documentation covers the use of XShell terminal emulation software to debug Chipsee IPC. However, you can use other tools as well, such as SecureCRT or Minicom.

Serial Debug

The first serial port is used for debugging (serial port 1). It consists of *RS232_1_TXD*, *RS232_1_RXD* and, *GND* terminals. Please refer to 1.6.1. RS232/RS485/CAN chapter in the EPC/PPC-A7-070HB-C Hardware Documentation for additional information on serial ports.



After the connection is successfully established, set up the XShell terminal as shown in figures below:



Figure 342: Figure 1: Add Session

egory:			
Connection	Connection		
Authentication	General		
Login Prompts	Name:	Chipsee	
⊟- SSH	Protocol:	SERIAL	-
Security Tunnelina	Host:		
SFTP	Port Number:		
TELNET		· · · · · · · · · · · · · · · · · · ·	
SERIAL	Description:		
Proxy			
Keep Alive			
w Session Properties			<u>୍ୟ</u> 🗾
Connection	Connection >	SERTAL	
- Authentication			
	Conservat		
Login Prompts	General		
Login Prompts Login Scripts	General <u>P</u> ort:	COM7 👻	
Login Prompts Login Scripts SSH Security	General <u>P</u> ort: <u>B</u> aud Rate:	COM7 - 115200 -	
Login Prompts Login Scripts SSH Security Tunneling	General Port: Baud Rate: Data Bits:	COM7 • 115200 •	
Login Prompts Login Scripts SSH Security Tunneling SFTP TFI NET	General Port: Baud Rate: Data Bits: Stop Bits:	COM7 • 115200 • 3 •	
Login Prompts Login Scripts SSH Scruty SFTP TELNET RLOGIN	General <u>P</u> ort: <u>B</u> aud Rate: <u>D</u> ata Bits: <u>S</u> top Bits:	COM7 • 115200 • 3 • 1 •	
Login Prompts Login Scripts SSH Security Tunneling SFTP TELNET RLOGIN SERIAL	General Port: Baud Rate: Data Bits: Stop Bits: Parity: [COM7 • 115200 • 3 • 1 •	

Figure 343: Figure 1a: Session Properties

🎯 Chipsee-SSH - root@1	trusty-arm	hf: ~ - Xs	hell 5			L		x
File Edit View To	ols Tab	Window	Help					
🖬 🖬 • 🔗 🥖 [* • 0	0	₽•₽	- 🛈 -	A • S	Ø 55	d	
• <u>1</u> Chipsee-SSH ×	+						4	6 - -
root@imx6ulevk:~# root@imx6ulevk:~# una Linux imx6ulevk 3.14. 2017 armv7l GNU/Linu root@imx6ulevk:~# root@imx6ulevk:~#	ame -ra 52-1.1.1 IX	_ga+gdb]	bcba #1	SMP PREEM	IPT Mon Nov	v 20 17:	16:40 C	ST E
Send text to the current	nt tab only						÷	≡
ssh://root@192.168.6.4:22	🗄 SSH2	xterm	t⁺ 79x7	<u>n</u> 7,22	1 session	++	CAP NU	M iii



SSH Debug

Connect Chipsee IPC to the Internet and get the IP address. Then config XShell or use the SSH tool on the Linux PC host directly. In this documentation, we will cover XShell SSH debugging procedure.

You must first add a new session, as shown in *Figure 1*. The new session should be set as in *Figure 2* below.

egory:						
Connection	Connection					
Authentication	General					
Login Prompts Login Scripts	<u>N</u> ame:	Chipsee-SSH				
SSH SSH	Protocol:	SSH	- 52			
Tunneling	Host:	192.168.6.4				
SFTP TELNET	P <u>o</u> rt Number:	22				
RLOGIN SERIAL Proxy Keen Alive	Description:					
Session Properties			8			
egory:						
Connection Authentication Login Prompts Cogin Scripts SSH Security	Connection > A	uthentication				
Connection Authentication Cogin Prompts Cogin Scripts SSH Security	Select an authenti This section is pro recommend you le	cation method and other related pa vided for a more convenient login pr ave the following fields empty if sec	rameters. ocedure. However, we purity is a concern.			
Connection Authentication Login Prompts Cogin Scripts SSH SSH Security SFTP	Select an authenti This section is pro- recommend you le	cation method and other related pa vided for a more convenient login pr ave the following fields empty if sec Password	rameters. ocedure. However, we urity is a concern.			
Connection Authentication Login Prompts Login Scripts SSH SSH Security Tunneling SFTP TELNET PLOGIN	Select an authenti This section is pro- recommend you le <u>M</u> ethod: <u>U</u> ser Name:	cation method and other related pa vided for a more convenient login pr ave the following fields empty if sec Password root	rameters. rocedure. However, we purity is a concern.			

Figure 345: Figure 2: SSH Settings

Chipsee - Xshell 5 (Free for Hom	e/School)	T 4-1				X
File Edit View Tools Tab	Window H	Help				
🛛 🖬 🖬 📲 📲 🔊 🖉 🖉 🖉 🖉 🖓 🖉 🖓 🖓 🖓 🖓 🖓	0,	• 🗈 • 🔞	• 1/4 •	0 0 5	C 🖯 🖿 📩	*
• <u>1</u> Chipsee × +					4	F
root@imx6ulevk:~# root@imx6ulevk:~# uname -ra Linux imx6ulevk 3.14.52-1.1.1 2017 armv7l GNU/Linux root@imx6ulevk:~# root@imx6ulevk:~#	_ga+gdblbcb	oa #1 SMP P	REEMPT Mon	Nov 20 1	7:16:40 C	ST
Send text to the current tab on	ly				•	

Figure 346: Figure 2a: SSH Debug

VCN Debug

You can use VNC Viewer in Windows to control Chipsee IPC over Ethernet, as mentioned above.

- Use XShell serial or SSH to connect to Chipsee IPC
- Login with the default credentials, using the commands below
- The default login credentials are: chipsee/chipsee

\$ x11vnc -storepasswd

- -set password for VNC-Viewer access-

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

• Use VNC Viewer in Windows to control Chipsee IPC over Ethernet, as shown in figures 2b, 2c, and 2d.

V2 VNC Viewer	
<u>File View H</u> elp	
192.168.6.4:5900	\$ <u>S</u> ign in ▼
Enter address and port	
There are no computers in your addres	ss book at present.
Sign in to your RealVNC account to automatically	v discover team computers,
als of the distance to the t	

Figure 347: Figure 2b: VNC Viewer Connect

V2 Authentication		25
VNC Server: 192.168.6.4: Username: Password: Password: Remember password	assword for V	NC access Cancel

Figure 348: Figure 2c: Authentication



Figure 349: Figure 2d: VNC Desktop

Downloading Images

Chipsee IPC supports booting from an integrated eMMC or an external TF Card (also known as the micro SD card). Booting from the external TF Card allows flashing the system OS.

DIP Switch Configuration

Set the boot DIP switch as shown in *Figure 3* to boot the system from the external TF Card.



Figure 350: Figure 3: Boot Mode Setup

Prebuilt Files Package

You can get the Prebuilt Files Package from the Prebuilt Files Package link mentioned at the beginning of this documentation. You can also get the Prebuilt Files Package from the DVD in /Debian8.10/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 (*Table 1*):

Contents	Comment
boot/imx6ulipc.dtb	TF Card boot dtb file
boot/u-boot.imx	TF Card boot bootloader
boot/zImage	TF Card boot kernel 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

Contents	Comment
emmc-flash/emmc/rootfs.tar.gz	RootFS in target eMMC
emmc-flash/emmc/u-boot.imx	Bootloader in target eMMC
emmc-flash/emmc/zImage	Kernel file in target eMMC
emmc-flash/emmc/imx6ul-eisd.dtb	dtb file in target eMMC
emmc-flash/mkemmc.sh	Shell tools to download images

Table 73 Table 1: Prebuilt Files Package



The default zImage and imx6q-sabresd.dtb files support *keep the logo from uboot to kernel* but do not support framebuffer. Chipsee provides zImage_framebuffer and imx6q-eisd.dtb_framebuffer file versions that support the framebuffer function but do not support the *keep the logo from uboot kernel* feature. If you need the framebuffer, just rename these two files to zImage and imx6q-eisd.dtb.

Downloading images onto the TF Card

The Prebuilt Files Package has a shell tool that can help create a bootable TF card on the Linux platform (such as desktop PC or Virtual Machine running Ubuntu 14.04 distribution). Use the TF Card to download the bootable system image onto it:

- Copy the Prebuilt Files Package to a Linux environment (such as Ubuntu 14.04)
- Insert the TF Card and check the device node, (e.g., /dev/sdc or /dev/sdb , be sure to use the right one)
- Un-tar the prebuilt package and use the following command:

\$ sudo ./mksdcard.sh -device /dev/sdc

- The bootable TF Card is now ready. Power OFF the IPC and insert the TF Card
- Set the DIP switch to SD BOOT mode (refer to *Figure 3* above)
- Power ON the IPC: the message below indicates that the system image was downloaded correctly to the eMMC

>>>>>> eMMC Flashing Completed <<<<<<

• Power OFF the IPC and set the DIP switch to eMMC BOOT mode (refer to *Figure 3* above).

System Resources

This chapter covers the resources available on Chipsee IPC.

TF Card/USB Storage

Both the TF Card and USB storage support the hot plug functionality. They will be automatically mounted on /media/chipsee/, as in *Figure 4*. Also, both storage types support NTFS and FAT32 file system.

	4		rootfs			= 0 X	
Trash	File Edit View Bool	kmarks Go	Tools Help	-		1000	
		1 /media	/chipsee/rootfs			1	
	Places ¥	J.	J	d	emmc-flash	etc	
	Trash Can	home	JI.b	Lost+found	Media	M mnt	
	boot 🚔	proc	J	sbin	Sys	tmp	
		USF .	J. var			1.000	
	to a second second						

Figure 351: Figure 4: TF Card Contents

Network

The system uses WICD Network Manager to control Ethernet configuration. You can get the assigned IP address from DHCP, or you can set static IP. After you set the static IP, reboot the system to enable it (*Figure 5a* and *Figure 5b*):

V2 192.168.6.4 (imx6	ul:0) - VNC Viewer		
Trash			
	Wicd Network Mar	nager _ o x	
	🗃 Network 📋 Switch Off Wi-Fi 🐠 Dis	sconnect All 🚫 Refresh 🗸 🗸	
	Wired Network	tes any previous default)	
	wired-default	0 🍨 Add 👖 Delete	
	Properties		
	No wireless networ	ks found.	
	Connected to wired network (IP: 192.168.6.4	0	

Figure 352: Figure 5: Ethernet Settings (Wired Network Manager)

Trash		Wired Net	work - Properties _ =	*
		Use Static IPs		
19	Wicd Network Manager	IP	192.168.6.4	
Network	📃 Switch Off Wi-Fi 🤞 Disconnect All 🥤	R Netmask	255.255.255.0	
Wie	red Network	Gateway	192.168.6.1	
R	Use as default profile (overwrites any previous	de 🗹 Use Static DNS	Use global DNS servers	
a wi	red-default	DNS domain		
25 miles demon		Search domain		
Disconnect Properties	Disconnect Properties	DNS server 1	192.168.6.1	
	the second se	DNS server 2	8.8.8.8	1
		ONS server 3		
No wireless networks found.		DHCP Hostname	[imx6ul	
		Use Encryption		
		802.1x. 2		
		identity		
		Password		
		Share and		-
		39 Scripts		
			🔞 Cancel 💦 OK	

Figure 353: Figure 5a: Setting up Static IP

Sound

The following command example is used to record sound:

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

The example above interrupts recording after 18 seconds (set by the -d parameter), records sound at a sampling rate of 44100 kHz (the -r parameter), and saves it as the test.wav file.

The following command can be used to playback the recorded sound from the example above:

\$ aplay -N -M test.wav

Serial Port

There are five serial ports on the Chipsee IPC: 2 X RS232 and 3 X RS485. Refer to *Table 2* below for the available serial device nodes.

Ports	Device Node
RS232_1	/dev/ttymxc0
RS232_2	/dev/ttymxc1
RS485_3	/dev/ttymxc2
RS485_4	/dev/ttymxc3
RS485_5	/dev/ttymxc4

Table 74 Table	2: Serial	Ports D	Device Nodes
----------------	-----------	---------	--------------

- You can install the CuteCom serial terminal to test the serial ports by using the following command:
- \$ sudo apt-get install cutecom
 - Only the root user can use the serial ports:
- \$ sudo cutecom



 120Ω termination resistors are not mounted or included with the device.

CAN

Chipsee Industrial PC is equipped with two CAN busses (CAN1 and CAN2). You can test the CAN busses by using the HT application. Two devices can be interconnected as on the *Figure* 6 below:



Figure 354: CAN connection

The following example can be used to perform testing:

• Set the bit-rate to 50kbps with triple sampling, using the following command as the root user:

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

- Bring up the device using the command:
- # ip link set can0 up
 - Transmit 8 bytes with standard packet ID number as 0x10
- # cansend can0 010#1122334455667788
 - Transmit 8 bytes with extended packet id number as 0x800
- # cansend can0 800#1122334455667788
 - Bring down the device
- # ip link set can0 down
 - Receive packets

#candump can0

GPIO Ports

There are 8 GPIO ports on the Chipsee IPC, as explained in the GPIO chapter of the EPC/ PPC-A7-070HB-C Hardware Documentation. The table below contains the related device nodes:

Pin Number	Definition
1	VDD_24V
2	GND_ISO
3	/dev/chipsee-gpio1(out)
4	/dev/chipsee-gpio2(out)
5	/dev/chipsee-gpio3(out)
6	/dev/chipsee-gpio4(out)
7	/dev/chipsee-gpio5(in)
8	/dev/chipsee-gpio6(in)
9	/dev/chipsee-gpio7(in)
10	/dev/chipsee-gpio8(in)

Table 75 Table 3: GPIO Ports

You can use the following commands to test the GPIOs easily:

• Set GPIO1 to HIGH logic level:

echo 1 > /dev/chipsee-gpio1

- Set GPIO2 to LOW logic level:
- # echo 0 > /dev/chipsee-gpio2
 - Check the input level on GPIO5:
- # cat /dev/chipsee-gpio5

Development

In this chapter, you can learn how to set up QT development environment and develop the first QT application on CS10600U070 IPC.

Set Environment

By default, there is no Qt and build environment set up in the system. Before you start the development, you need to install the environments by using the following set of commands:

\$ 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

Prepare Source Packages

There are some Qt source demo packages on the provided DVD in the /Debian8.10/QT/ folder. You can use SSH or USB storage to transfer them to Chipsee IPC.

Build & Run

We will use the hardwarewaretest_serial_ok_20170223.tar.gz demo package to demonstrate how to build and run Qt applications and projects. This demo requires Qt serial port support before it can be used. You can install it as follows:

\$ 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

After installing the Qt serial port support, copy the hardwareretest_serial_ok_20170223.tar.gz package to Chipsee IPC, as described above (using SSH or USB storage).

• Open Debian system console and use the following set of commands to build the hardwaretest_serial demo application:

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

- Modify the permission for the serial ports device node, using the following:
- \$ sudo chmod 666 /dev/ttymxc
 - Finally, run the hardwaretest_serial application
- \$ cd hardwaretest_serial \$ export DISPLAY=:0 \$./hardwaretest_serial

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