EM3399 Ubuntu16.04 Reference User Manual

V1. 20190912



Boardcon Embedded Design

www.boardcon.com



Colophon

Ver	Description	Author	Date
V1.0	Initial version	Zhou Lijun	2019-09-12



1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (<u>www.boardcon.com</u>, <u>www.armdesigner.com</u>).

These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this products.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.



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1 EM3399 Introduction

This document is part of a set of reference documents providing information necessary to operate and program Boardcon EM3399 SBC.

1.1 Overview

EM3399 is a single board computer equipped with RK3399 Cortex-A72 + Quad Cortex-A53 processor coupled with 4GB RAM, 8GB eMMC, an mPCIe slot for cellular connectivity, and other interactive interfaces geared towards to AI and IoT Applications.

Display features include an eDP port, HDMI and MIPI LCD. EM3399 adopts ALC5651 dual I2S interface audio codec that supports analog/digital input. The 1x USB3.0 Type-C can be converted to HDMI/USB3.0/USB2.0. In addition, Type-C also can be used for debugging.

The board is available with a WiFi/BT module with dual-band 802.11ac/a/b/g/n and Bluetooth 4.1 connectivity.

The EM3399 SBC is equipped with a 4G model(optional) that delivers 100Mbps downlink and 50Mbps uplink data rates, and GSM/GPRS networks to ensure that it can connect even in remote areas devoid of 4G or 3G coverage. The model also combines high-speed wireless connectivity with embedded multi-constellation high-sensitivity positioning GPS+GLONASS receiver.



1.2 Hardware Introduction



Feature	Specifications
	· Rockchip RK3399. Big.Little architecture: Dual Cortex-A72 + Quad Cortex-A53, 64-bit
CPU	CPU. Frequency is over 1.8GHz (Big cluster)
	· 28nm HKMG process
	· 1MB unified L2 Cache for Big cluster, 512KB unified L2 Cache for Little cluster
GPU	· Mali-T864 GPU, OpenGL ES1.1/2.0/3.0/3.1, OpenVG1.1, OpenCL, DX11
	· Supports AFBC (ARM Frame Buffer Compression)
Memory	2GB/4GB
Flash	4GB/8GB eMMC Flash
Power	DC 12V/3A
USB	2x USB2.0 Host, 1x USB3.0 Host, 1x USB Type-C
UART	1x 3pin connector. For debug.
LCD	1x eDP LCD via 40-pin header interface, 1x 2-CH MIPI
Ethernet	1000M High performance Ethernet (RTL8211E), RJ45 interface
HDMI IN	Adopt Toshiba TC358749XBG bridge device
HDMI OUT	HDMI 1.4 /2.0
MIPI Camera	2-CH MIPI RX, Support 3-D video capture
Audio codec	Adopt ALC5651 Audio chip, 3.5mm Audio I / O interface
RTC	Real Time Clock, powered by external lithium battery
SD card	1x T-Flash card
SIM card	1x SIM card slot
Buttons	3x User Buttons, for Recover, Power, Reset
PCI-E x4	For Video card
WIFI&BT	AP6356S Module. 2.4/5G WiFi, Bluetooth 4.1
SSD (optional)	PCI-E connector. Shared interface with 4G.
WLAN	PCI-E connector. Supporting 3G/4G WLAN module
GPIO	5 groups of GPIO (GPIO0~GPIO4), total 122 GPIOs
Dimension	100mm x 145mm

2 Compiler Environment

2.1 Vmware10.0+ubuntu16.04

Install Vmware10.0 in windows OS first, and then install ubuntu16.04 in vmware and compile. There is no longer describes how to install Ubuntu system, if cannot understand, please visit the official website of Ubuntu, the operating system is also available for free download at the official website. http://www.ubuntu.com/

Note: It is suggested to install Ubuntu directly to the computer and compile due to running slowly in the



virtual machine and memory limited. ubuntu16.04 should be complied by ubuntu 64bit OS.

2.2 Install Compiler

Installing commands:

apt-get install git gnupg flex bison gperf build-essential zip curl

- # apt-get install libc6-dev libncurses5-dev:i386 x11proto-core-dev libx11-dev:i386
- # apt-get install libreadline6-dev:i386 libgl1-mesa-dri:i386 libgl1-mesa-dev g++-multilib

apt-get install tofrodos python-markdown libxml2-utils xsltproc zlib1g-dev:i386 dpkg-dev

apt-get install libncurses5-dev

3 Compile Source

Path

Uboot and Kernel: Source\em3399_ubuntu16.04.tar.bz2 Rootfs: Source\ubuntu16.04.tar.bz2

3.1 Compile u-boot

After setting and the compiler is effective, execute the follow commands to compile uboot:

tar xvf em3399_ubuntu16.04.tar.bz2

cd em3399_ubuntu16.04

cd u-boot

./make.sh evb-rk3399

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✓ 192.168.0.21 ✓ 192.168.0.21 (1) ×		4 Þ
<pre>[root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop# rm -rf rootfs root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop# ls em3399_ubuntu16.04 tmrt rootfs.img ubuntu16.04 ubuntu16.04.tar.bz2 root@boardcon:/home/yangiing/opt/rk2300_Ubuntu_nodesktop# ls</pre>		^
root@boardcon:/home/yangjing/opt/tk3599/Em3599_abuntu_nodesktop#) bz2	+
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roor@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04# ls	*
<pre>root@boardcon:/home/yangjing/opt/rk3399_ubuntu_nodesktop/em3399_ubuntu16.04# cd u-boot/ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ls api common doc erv kbuild MAINTAINERS pack_resource.sh scripts arch configs.mk Documentation examples Kconfig Makefile post snapshot.commit board configs drivers fs lib make.sh PREUPLOAD.cfg test cmd disk dts include Licenses net README tools root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# .make.sh evb-rk3399_Ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot# ./make.sh evb-rk3399_ root@boardcon:/home/yangjing/opt/rk3399_resource</pre>	ш
Ready ssh2: AES-256-CTR 10, 112 10 Rows, 121 Cols VT100	CAP NUM



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✓ 192.168.0.21 ✓ 192.168.0.21 (1) ×
OBJCOPY spl/u-boot-spl-nodtb.bin CAT spl/u-boot-spl-dtb.bin COPY spl/u-boot-spl.bin CFGCHK u-boot.cfg comm: file 2 is not in sorted order
<pre>load addr is 0x200000! pack file size: 780679 crc = 0xb4eaflcb uboot version: v2017.12 Dec 11 2017 pack uboot okay! Input: ./u-boot.bin out:rk3399_loader_v1.12.112.bin fix opt:rk3399_loader_v1.12.112.bin merge success(rk3399_loader_v1.12.112.bin) /home/yangjing/opt/rk3399/Ew3399_ubuntu_nodesktop/em3399_ubuntu16.04/u-boot pack loader okay! Input: /home/yangjing/opt/rk3399_Lbuntu_nodesktop/em3399_ubuntu16.04/u-boot ini</pre>
<pre>Image: control co</pre>
Ready ssh2: AES-256-CTR 34, 92 34 Rows, 121 Cols VT100 CAP NUM

After compile finish, it will get trust.img, rk3399_loader_v1.12.112.bin, uboot.img in the directory.

3.2 Compile Kernel

After setting and the compiler is effective, execute the follow commands to compile kernel:

cd kernel

- # make rockchip_linux_defconfig
- # make rk3399-sapphire-excavator-linux.img -j8

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disk include net spi roordboardcon:/home/vanging/opt/rk3399/EM3399_ubuntu_nodeskton/em3399_ubuntu[6.04/u=hoots.sym	*
root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04# 15	
root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodeskton/em3399_ubuntu16.04# cd kernel/	
android centry serging (mg/) oper factory formware Kconfig Makerine Scripts virt	
backported-features CREDITS include ib net sound	
build.config.cuttlefish.aarch64 Documentation ipc logo_kernel.bmp README usr	
puild.config.cuttleftsn.x86_64 drivers Kutild AdhatAINERS samples veritt dev kevs.x509 root8boardcon:/home/yangiing/opt/rk3399/EM3399_bubuntu_nodesktop/em3399_bubuntu.6.04/kernel# make rockchip_linux_defconfig	
HOSTCC scripts/basic/fixdep Lost	
SHIPPED scripts/kconfig/zconf.tab.c SHIPPED scripts/kconfig/zconf.tab.c	
HIPFED scripts/kconfig/zconf.hash.c H05TCC scripts/kconfig/zconf.tab.o	
# HOSTLD scripts/kconfiğ/conf	
# configuration written to .config	
root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/em3399_ubuntu16.04/kernel# make rk3399-sapphire-excavator-lin	ux.img –j8
WRAP arch/arm64/include/generated/asm/bug.h	
wRAP ar Ch/ar m04/include/generated/asm/bugs.n/	
WRAP archyarmbd/include/generated/asm/clkdev.n CHK include/config/kenel.relase	
WRAP arch/arm64/include/generated/asm/cputime.h WRAP arch/arm64/include/generated/asm/current.h	
WRAP arch/arm64/include/generated/asm/delay.h WRAP arch/arm64/include/generated/asm/div64.h	-
Ready ssh2: AES-256-CTR 34, 92 34 Rows, 138 Cols VT100	CAP NUM



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€ 192.168.0.21 ♥ 192.168.0.21 (1) ×						₫ ▷
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android arch backported-features block block bot.img build.config.cuttlefish.aarch64 build.config.cuttlefish.x86_64 certs COPYING CREDITS root@boardcon:/home/yangjing/opt,	/rk3399/EM3399_ crypto Documentation drivers firmware fs include init ipc kbuild kconfig /rk3399/EM3399_	Wernel.img kernel.img lib logo.bmp logo.bmp logo.kernel.bmp MAINTAINERS Makefile mm modules.builtin modules.order ubuntu_nodesktop/	emssy_uburtuto. Module.symvers net README REPORTING-BUGS resource.img samples scripts security sound System.map em3399_uburtu16.0	Jaykernel# 1 tools usr verity_dev_ virit vmlinux vmlinux.o zboot.img	keys.x509	
Ready		ssh2: AES-256-CTR 2	3, 92 23 Rows, 104 Col	s VT100	CAP	NUM

After compile finish will get **boot.img** in the directory.

3.3 Cure File System

Cure the file system required root user. Execute the follow command to Cure File System:

- # tar xvf ubuntu16.04.tar.bz2
- # dd if=/dev/zero of=rootfs.img bs=1M count=4096 (4GB)
- # mkfs.ext4 -F -L rootfs rootfs.img
- # mkdir mnt
- # mount rootfs.img mnt
- # cp -rfp ubuntu16.04/* mnt/
- # umount mnt
- # /sbin/e2fsck -p -f rootfs.img
- # /sbin/resize2fs -M rootfs.img

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✓ 192.168.0.21 × 0 192.168.0.21 (1)	4 Þ
boardcon@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktops sudo su sudo: unable to reselve host boardcon [sudo] password for boardcon: root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop#]s root user em3399_ubuntu16.04.tar.bz2 mnt rootfs.img ubuntu16.04 ubuntu16.04.tar.bz2 root@boardcon:/home/yangjing/opt/rk3399_eM3399_ubuntu_nodesktop# tar xvf ubuntu16.04.tar.bz2	z2
Ready ssh2: AES-256-CTR 6, 94 6 Rows, 104 Cols VT100	CAP NUM

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✓ 192.168.0.21 × ④ 192.168.0.21 (1)	4 0	,
<pre>root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop# lc em3399_ubuntu16.04 em3399_ubuntu16.04.tar.bz2 mmt rootfs.img ubuntu16.04 ubuntu16.04.tar.bz2 root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop# (c ubuntu16.04 root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/ubuntu16.04# 15 bin dev firstboot lib mmt proc run srv tmp var boot etc home media opt root sbin sys usr vendor root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/ubuntu16.04# 15</pre>		
Ready ssh2: AES-256-CTR 7, 78 7 Rows, 104 Cols VT100 C	AP NUM	



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File Edit View Options Transfer Script Tools Window Help
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✓ 192.168.0.21 × 192.168.0.21 (1) ↓
<pre>[root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop# cd ubuntu16.04</pre>
bin dev firstboot lib mnt proc run srv tmp var
root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop/ubuntu16.04# cd
em3399_ubuntu16.04 em3399_ubuntu16.04.tar.bz2 mnt rootfs.img ubuntu16.04 ubuntu16.04.tar.bz2
root@boardcon:/home/yangjing/opt/rk3399/EM3399_ubuntu_nodesktop#_chroot_ubuntu16.04 root@boardcon:/# ls
bin dev firstboot lib mot proc run srv tmp var boot etc home media opt root sbin sys usr vendor If want to ubuntu system install
root@boardcon:/# apt-get install vim
Ready ssh2: AES-256-CTR 12, 37 12 Rows, 104 Cols VT100 CAP NUM







After compile finish will get **rootfs.img** in the directory.

4 Images Introduction

4.1 Pack Update.img

Step 1, unzip AndroidTool_Release_v2.55.rar in windows.

Step 2, Copy trust.img, rk3399_loader_v1.12.112.bin, uboot.img, boot.img, rootfs.img to

development tools rockdev/Image directory.

Step 3, Double click

Tool\AndroidTool_Release_v2.55\AndroidTool_Release_v2.55\rockdev\mkupdate.bat to pack update.img

🛤 Android Firmware Package Tool v1.65	- 🗆	1 X	٢
C:\Documents and Settings\Administrator\Tool\AndroidTool_Release_v2.55\Androi	ldT	0	•
ol_Release_v2.55\rockdev>Afptool -pack ./ Image\update.img			1
Android Firmware Package Tool v1.65			I
PACKAGE			7
Add file: .\package-file			
Add file: .\package-file done,offset=0x800,size=0x290,userspace=0x1			
Add file: .\Image/rk3399_loader_v1.12.112.bin			
Add file: .\Image/rk3399_loader_v1.12.112.bin done,offset=0x1000,size=0x4294e	, u	S	
erspace=0x86			
Add file: .\parameter.txt			
Add file: .\parameter.txt done,offset=0x44000,size=0x1f8,userspace=0x1			
Add file: .\image/trust.img			
Add file: .\image/trust.img done,offset=0x44800,size=0x400000,userspace=0x801			
Add file: .\Image/uboot.img			
Add file: .\Image/uboot.img done,offset=0x445000,size=0x400000,userspace=0x80	1		
Add file: .\Image/boot.img			
Add file: .\Image/boot.img done,offset=0x845800,size=0x1050800,userspace=0x20	Ja2		
Add file: .\Image/rootfs.img			

Android Firmware Package Tool v1.65	- 🗆 🗙
Make firmware OK!	
ок	
C:\Documents and Settings\Administrator\Tool\AndroidTool_Release_v2.55\Androi ol_Release_v2.55\rockdev>RKImageMaker.exe -RK330C Image\rk3399_loader_v1.12.1 bin Image\update.img update.img -os_type:androidos *********RKImageMaker ver 1.66 *******	idTo 112.
Generating new image, please wait	
Writing head info	
Writing boot file	
Writing firmware	
Generating MD5 data	
MD5 data generated successfully!	
New image generated successfully!	
C:\Documents and Settings\Administrator\Tool\AndroidTool_Release_v2.55\Androi ol_Release_v2.55\rockdev>rem update.img is new format, Image\update.img is ol ormat, so delete older format	idTo Id f
C:\Documents and Settings\Administrator\Tool\AndroidTool_Release_v2.55\Androi ol_Release_v2.55\rockdev>del Image\update.img	idTo
C: Documents and Settings Administrator \Tool AndroidTool_Release_v2.55 Androi ol_Release_v2.55 \rockdev>pause 请按任意键继续	idTo T





After pack finish will get update.img in the

Tool\AndroidTool_Release_v2.55\AndroidTool_Release_v2.55\rockdev directory.

4.2 Unzip Firmware

Step 1, Open Tool\AndroidTool_Release_v2.55\AndroidTool_Release_v2.55\rockdev\cmd.exe.

Execute the commands to unzip update.img

RKImageMaker.exe -unpack ./update.img ./ AFPTool.exe -unpack firmware.img ./





After **Unzip** finish will get trust.img, rk3399_loader_v1.12.112.bin, uboot.img, boot.img, rootfs.img in the Tool\AndroidTool_Release_v2.55\AndroidTool_Release_v2.55\rockdev\ **Image** directory.



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文件)	E) 编辑(E)	查看(V)	收藏 (<u>A</u>)	工具(I) 帮)助 (H)								
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5 Install Serial Terminal Tool

The common serial terminal tool is SecureCRT.

Install SecureCRT

SecureCRT can be used directly after decompression. Suggest create a shortcut to the desktop for the APP.

Copy SecureCRT (*path:* tools\windows\SecureCRT.exe) to the PC.

Open SecureCRT.exe and click the icon Quick Connect

🕞 not connected - SecureCRT		
File Edit View Options Transfer	Script Tools Window Help	
🚡 況 🕽 🌾 Enter host <alt+r></alt+r>	Fa (Fa AA 75 75 /3 27 💥 🕴 📀 27	Ŧ
Ready	0, 0 0 Rows, 0 Cols	CAP NUM



Quick Conne	et		×
Protocol: Hostname: Pgrt: Username: Authentication Password PublicKey Keyboard In GSSAPI	SSH2 SSH2 SSH1 Telnet Telnet/SSL RLogin Serial TAPI Raw	None]
Sho <u>w</u> quick co	nnect on startup	 ✓ Save session Open in a tab Connect Cancel 	

Set the parameters as follow.

Protocol: Serial

Port: To be specified by user PC

Baud rate: 1500000

Please check XON/XOFF but not RTS/CTS

Check Save session, then click $\ensuremath{\textbf{connect}}$

Quick Con	nect	×
Protocol: Port: Baud rate: Data bits: Parity: Stop bits:	Serial COM5 Flow Control DTR/DSR T500000 COM5 RTS/CT5 None COM5 COM5 COM5 COM5 COM5 COM5 COM5 COM5	
Show quick	connect on startup V Save session Open in a tab Connect Can	icel





Illusion: When open more than one serial port tools, and they use the same serial port, there will be reported the port is busy. Solution: Turn off the serial tool that unnecessary.

6 Burn Images to iNand

24	
Image	file
AndroidTool.exe	Tools\AndroidTool_Release_V2.55
Terminal	Windows tools\SecureCRT
Fireware	Images\update.img

Burn Images required files:

6.1 Install Debug Serial Driver

Connect the EM3399 and PC with the serial cable, USB OTG cable. After power on, the PC will report that found new hardware if it never installs the serial driver (CD\EM3399\tools\CP2102xp or CP2102WIN7), install the driver.

Step 1, install CP2102 driver

Unzip CP2102WIN7.rar to the windows, double click PreInstaller.exe.





Step 2, click "Install" until the installation is finish, then click "Finish" to closing the windows. User can check whether the driver is installed successfully (Computer -> Device manager -> Port)

6.2 Install Download Driver



Step 1, install Rockchip driver assistant (AndroidTool_Release/DriverAssitant/DriverInstall.exe)

Step2, after installation is successful, it will be found the following information in the computer hardware management.





Now, the USB download driver is installed successfully.

6.3 Upgrade Firmware

Step 1, unzip AndroidTool_Release_v2.55 tools to the windows.

Step 2, open AndroidTool_Release_v2.55/AndroidTool_Release_v2.33/AndroidTool.exe

	RKDe	vIc	ool v2.55							
	Downla		Tanaga IV I		1 1 2					
	OWILLO	Jau .	umage Upgrade	firmware A	dvanced Function					
						T				
	#		Address	Name	Path					
	1		0x00000000	loader	\rockdev\Image\rk3399_loader_v1.1					
	2		0x00000000	parameter	\rockdev\parameter.txt	-				
l	3		0x00004000	uboot	\rockdev\Image\uboot.img	-				
	4	Ľ	0x00006000	trust	\rockdev\Image\trust.img					
	5		0x0000A000	boot	\rockdev\lmage\boot.img					
	7		0x0003A000	oem	\rockdev\oem.img					
	H-		0x0003A000	100012	Gockdev (Image Gootis, Img					
	Loa	der:		Run	Switch Dev Partition Clear					
	200	301.								
				No De	evices Found					

Step 3,

Method 1: Download Fireware "update.img" to the board:

Select "Upgrade Fireware" - "Firmware" then add the "update.img"



🔀 RKDevTool v2.55	
Jownload Image Upgrade Firmware Advanced Function	
Firmware Upgrade Switch EraseFlash	
2 Fw Ver: 8.1.00 Loader Ver: 1.12 Chip Info: RK330C	
Firmware: C:\Documents and Settings\Administrator\桌面\Ubuntu16.04(no de	
No Devices Found	

Keep holding the "Recover" key and connect the board to PC via USB type-C cable until pop-up **Found one LOADER Device.** Click "Upgrade" to download.

KKDevTool v2.55	
Download Image Upgrade Firmware Advanced Function Test Device Start Firmware Upgrade Switch EraseFlash Fw Ver: 8.1.00 Loader Ver: 1.12 Chip Info: RK330C Firmware: C:\Documents and Settings\Administrator\桌面\Ubuntul6.04 (no ds) Freque IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download IDB Start Download Firmware (4%) Download Firmware (4%) Download Firmware (4%)	

Method 2: Download separately.

Copy trust.img, rk3399_loader_v1.12.112.bin, uboot.img, boot.img, rootfs.img to AndroidTool_Release_v2.55\rockdev\Image directory.

Keep holding the "Recover" key and connect the board to PC via USB type-C cable until pop-up **Found one LOADER Device.** Click "Run" to download.



🐇 R	KDe					
De	wnlo	bed	mage lie musik	Ringman Ad	lever and Run stim	
			opgi ade	TIT MALE A	wanced Function	
			6.1.1	NT.	D 11	
	# 1		Address	Name	Fath	
	2	Ţ	0×00000000	narameter	\rockdev\narameter_txt	
	3	1	0x00004000	uboot	\rockdev\Image\uboot. img	
	4	-	0x00006000	trust	\rockdev\Image\trust.img	
	5	•	0x0000A000	boot	\rockdev\Image\boot.img	
	6	~	0x0003A000	oem	\rockdev\oem.img	
	7	7	0x0005A000	rootfs	\rockdev\Image\rootfs.img	
	1.0.2	dor	/or:1.12	Run	Switch Dev Partition Clear	
	Luai					
-	_	_		N D	• B I	
				No De	evices Found	
						·

wnlo	ad]	Image Upgrade	Firmware A	lvanced Function	Test Device Start Test Device Success
					Check Chip Start
#		Address	Name	Path	Check Chip Success
1	, ⊾	0x00000000	loader	\rockdev\Image\rk3399_loader_v1.1	Get FlashInfo Start
2	•	0x00000000	parameter	\rockdev\parameter.txt	Get FlashInfo Success
}	•	0x00004000	uboot	\rockdev\Image\uboot.img	Frepare LDB Start
	•	0x00006000	trust	\rockdev\Image\trust.img	Frepare LDD Success
5	•	0x0000A000	boot	\rockdev\Image\boot.img	Download IDD Start
	•	0x0003A000	oem	\rockdev\oem.img	Test Device Start
		0x0005A000	rootfs	\rockdev\Image\rootfs.img	Test Device Start
oac	ler V	/er:1.12	Run	Switch Dev Partition Clear	Download ubot(100%) Download trust(100%) Download boot(67%)
		F	ound On	e LOADER Device	

Step 4, When the following message is displayed, indicating that the download is complete.

nicad	Image Upgrade	e Firmware A	dvanced Function	Test Device Start Test Device Success
ŧ	Address	Name	Path	Check Chip Start Check Chip Success
- IV	0x00000000	loader	\rockdev\Image\rk3399_loader_v1.1	Get FlashInfo Start
: 🔽	0x00000000	parameter	\rockdev\parameter.txt	Get FlashInfo Success
· V	0x00004000	uboot	\rockdev/Image/uboot.img	Prepare IDB Start
- V	0x00006000	trust	\rockdev\Image\trust.img	Prepare IDB Success
· 🗸	0x0000A000	boot	\rockdev\Image\boot.img	DownLoad IDB Start
V	0x0003A000	o em	\rockdev\oem.img	Download IDD Success
· 🔽	0x0005A000	rootfs	\rockdev\Image\rootfs.img	Test Device Start
oader	Ver:1.12	Run	Switch Dev Partition Clear	Download uboot (100%) Download trust (100%) Download boot (100%) Download oem (100%) Download rootfs (100%) Download image OK



7 Ubuntu Application

7.1 User and Password

User: boardcon

Password: boardcon

Root user: su

Password: root



7.2 Test SD card

Insert SD card to the board then execute the follow command to cat the device.

#ls /dev



🕞 serial-com5 - Secure	CRT			
File Edit View Options	Transfer Script Tools Window D	Help		
🖏 💱 🕞 🎲 🗶 Enter host	<alt+r></alt+r>	🗐 🚰 % 📍	0	Ŧ
✓ serial-com5 ×				4 Þ
<pre>console cpu_dma_latency dri fb0 fd full fuse hdmi_hdcp1x hwrng i2c-0 i2c-1 i2c-10 i2c-11 i2c-4 i2c-9 ii0:device0 initct1 input kmsg log loop-control loop0</pre>	<pre>media0 media1 mem memory_bandwidth mmcblk0 mmcblk1 mmcblk1poot1 mmcblk1p1 mmcblk1p2 mmcblk1p3 mmcblk1p4 mmcblk1p5 mmcblk1p6 mmcblk1p7 mmcblk1p9 mmcblk1p9 mmcblk1p9 mmcblk1rpmb network_latency network_throughput null port </pre>	sdb sdc1 sdc1 shm snd stderr stdin stdout tty1 tty10 tty11 tty12 tty13 tty14 tty15 tty16 tty17 tty18 tty19	tty27 tty28 tty29 tty30 tty31 tty32 tty33 tty34 tty35 tty36 tty37 tty38 tty39 tty40 tty40 tty41 tty42 tty43 tty44 tty45 tty46	tty54 tty55 tty56 tty57 tty58 tty59 tty6 tty60 tty61 tty62 tty63 tty7 tty8 tty7 tty8 tty9 ttyFIQ ttyS0 tty52 uhid uinput urando usbmon usbmon
Ready	Serial: COM5, 1500000 22, 1 22 Row	rs, 58 Cols VT	100	CAP NUM

Execute the commands to mount the SD card.

#mkdir /mnt/sd

#mount /dev/mmcblk0 /mnt/sd
#ls /mnt/sd



🕞 serial-com5 - Secure(IRT .		
File Edit View Options	Transfer Script Tools Window 3	Help	
🏭 🔀 🕞 🏭 🗶 Enter host	<alt+r></alt+r>	🚄 🖀 💥 🕴 🞯 🛃	Ŧ
؇ serial-com5 🗙			4 ⊳
loop4 loop5 root@ubuntu:/hom .dp: [drm:cdn_dp g to load firmwa	random rfkill e/boardcon# [128.6 _request_firmware] * re	tty22 tty5 usbmo tty23 tty50 usbmo 513758] cdn-dp fec000 FERROR* Timed out try	on <u>^</u> on 00 in
root@ubuntu:/hom root@ubuntu:/hom root@ubuntu:/hom ls_/mnt/sd_root@	e/boardcon# e/boardcon# mkdir /m e/boardcon# mount /c ubuntu:/bome/boardco	nt/sd dev/mmcblk0 /mnt/sd on# ls /mnt/sd	
1.bmp 1.png 2.bmp 2.png Android LOST.DIR -boardcon_uart0. frontPicture0 9-2_all.deb frontPictureCvbs- 8 99-2 armhf deb	frontVideó0 frontVideoCvbs4 leftPicture2 leftVideo2 lockVideo parkMonitor img rearPicture1 4 rearPictureCvbs5	rearVideo1 rearVideoCvbs5 rightPicture3 scrot sun8iw11p1_linux_a4 xserver-common_1.18 xserver-xorg-core_1	Di .9 .1
root@ubuntu:/hom	e/boardcon#		~
Ready S	erial: COM5, 1500000 22, 29 22 Roy	ws, 58 Cols VT100 CAP	NUM

7.3 Test USB Host

Connect U-disk to the board and execute the follow command to cat the device (2x U-Disk for example). # Is /dev



🕞 serial-com5 - Secure	CRT				
File Edit View Options	Transfer Script Tools Window H	elp			
📸 🖏 🎧 🎲 🔏 Enter host	<alt+r></alt+r>) 🚰 🕉 🏌	0		÷
✓ serial-com5 ×					
frontPictureCvbs 8.99-2_armhf.deb	4 rearPictureCvbs5	xserver	-xorg-c	ore_1.1	^
bsg vcs	loop6	rkvdec	tty24	tty51	
bus	100р7	rtc0	tty25	tty52	
cec0	mali0	sda	tty26	tty53	
console	media0	sdb	tty27	tty54	
cpu_dma_latency	media1	sdb1	tty28	tty55	
dri	mem	sdc	tty29	tty56	
fb0	memory_bandwidth	sdc1	tty3	tty57	
fd	mmcb1k0	shm	tty30	tty58	
full	mmcblk1	snd	tty31	tty59	
fuse	mmcblk1boot0	stderr	tty32	tty6	-
<					
Ready	Serial: COM5, 1500000 22, 29 2	2 Rows, 60 Cols	VT100	CAP	NUM

Execute the commands to mount the USB devices.

#mkdir /mnt/udisk1
#mkdir /mnt/udisk2
#mount /dev/sdb1 /mnt/udisk1
#ls /mnt/udisk1
#mount /dev/sdc1 /mnt/udisk2
#ls /mnt/udisk2





7.4 Test Ethernet

Connect ethernet cable to the board and power on. Execute the commands in serial terminal after system booting.

ifconfig eth0 192.168.0.169 up

- # route add default gw 192.168.0.1 dev eth0 (192.168.0.1 is the ethernet gateway)
- # echo "nameserver 8.8.8.8" > /etc/resolv.conf



#ifconfig

ping www.baidu.com

🖬 serial-com5 - SecureCRT	×
<u>File Edit View Options Transfer Script Tools W</u> indow <u>H</u> elp	
🖏 況 🖓 🎝 Enter host (41 t+R) 🛛 🗈 🏝 👫 🖓 😼 🎒 🌁 🕉 🕴 🞯	Ŧ
✓ serial-com5 X	⊳
<pre>root@ubuntu:/home/boardcon# root@ubuntu:/home/boardcon# ifconfig eth0 192.168.0.169 up root@ubuntu:/home/boardcon# route add default gw 192.168.0.1 dev eth0 root@ubuntu:/home/boardcon# echo "nameserver 8.8.8.8" > /etc/resolv.conf root@ubuntu:/home/boardcon# ifconfig eth0 Link encap:Ethernet HWaddr 9e:dc:8e:c3:82:0b inet addr:192.168.0.169 Bcast:192.168.0.255 Mask:255.255.255.0 inet6 addr: fe80::9cdc:8eff:fec3:820b/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:18 errors:0 dropped:0 overruns:0 frame:0 TX packets:15 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:2222 (2.2 KB) TX bytes:1178 (1.1 KB) Interrupt:24</pre>	■
<pre>lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:6880 errors:0 dropped:0 overruns:0 frame:0 TX packets:6880 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:509120 (509.1 KB) TX bytes:509120 (509.1 KB) root@ubuntu:/home/boardcon#</pre>	
	~
Ready Serial: COM5, 1500000 25, 29 25 Rows, 75 Cols VT100 CAP NUM	

🖬 serial-com5 - SecureCRI	
<u>File Edit View Options Transfer Script Tools Window H</u> elp	
🖏 況 🗔 🖏 Enter host (Alt+R) 🛛 🗈 🖺 👫 🕞 🧏 🎒 🐨 🕉 🕴 🞯	÷
<pre>v serial-com5 ×</pre>	
inet addr:192.168.0.169 Bcast:192.168.0.255 Mask:255.255.255.0 inet6 addr: fe80::9cdc:8eff:fec3:820b/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:18 errors:0 dropped:0 overruns:0 frame:0 TX packets:15 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:2222 (2.2 KB) TX bytes:1178 (1.1 KB) Interrupt:24	0
lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:6880 errors:0 dropped:0 overruns:0 frame:0 TX packets:6880 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:509120 (509.1 KB) TX bytes:509120 (509.1 KB)	10% @ 36°C
root@ubuntu:/home/boardcon# ping 192.168.0.1 PING 192.168.0.1 (192.168.0.1) 56(84) bytes of data. 64 bytes from 192.168.0.1: icmp_seq=1 ttl=64 time=0.645 ms 64 bytes from 192.168.0.1: icmp_seq=2 ttl=64 time=0.795 ms 64 bytes from 192.168.0.1: icmp_seq=3 ttl=64 time=0.747 ms 64 bytes from 192.168.0.1: icmp_seq=4 ttl=64 time=0.802 ms	20
	>
Ready Serial: COM5, 1500000 25, 1 25 Rows, 75 Cols VT100 CA	P NUM



7.5 Test WiFi

Connect WiFi antenna before test. Execute the follow commands after system booting.

Method1 Static IP Test

a). Config the SSID and password.

[root@ubuntu /]# wpa_passphrase Boardcon

reading passphrase from stdin

boardcon43435656

network={

ssid="Boardcon"

#psk="boardcon43435656"

psk = bafeb7f673814bf7e06002a652e6d9f1ed749312a54481b5fa8efdd53bfa1123

}

- b). Copy the "ssid" and "#psk" to replace the default SSID and PSK of /etc/wpa_supplican.conf
- c). Modify /etc/resolv.conf

echo "nameserver 8.8.8.8" > /etc/resolv.conf

d). Config static IP

[root@ubuntu /]#ifconfig eth0 down [root@ubuntu /]# ifconfig wlan0 192.168.0.169 up

e). Set the wlan0 gate way and ping URL

[root@ubuntu /]# route add default gw 192.168.0.2 dev wlan0 (Modify to User's Router

gateway)

[root@ubuntu /]# wpa_supplicant -i wlan0 -Dnl80211 -c /etc/wpa_supplicant.conf -B [root@ubuntu /]# ping www.baidu.com

 $\label{eq:starses} \ensuremath{\left[\ 1818.110000 \right] RTL871X: rtw_set_ps_mode: Leave \ 802.11 \ power \ save}$

[1818.110000] RTL871X: rtl8188e_set_FwPwrMode_cmd: Mode=0 SmartPS=2 UAPSD=0

PING www.baidu.com (180.97.33.67): 56 data bytes

64 bytes from 180.97.33.67: seq=0 ttl=52 time=25.886 ms

64 bytes from 180.97.33.67: seq=1 ttl=52 time=31.078 ms

64 bytes from 180.97.33.67: seq=2 ttl=52 time=36.742 ms

64 bytes from 180.97.33.67: seq=3 ttl=52 time=25.466 ms

Method 2 DHCP Test

Install udhcpc first.

After connect to the wired network, execute the follow command and enter "y" to install #sudo apt-get install udhcpc





a). Config the SSID and password.

[root@ubuntu /]# wpa_passphrase Boardcon

reading passphrase from stdin

boardcon43435656



network={

ssid="Boardcon"

#psk="boardcon43435656"

psk=bafeb7f673814bf7e06002a652e6d9f1ed749312a54481b5fa8efdd53bfa1123

}

- b). Copy and replace the "ssid" and "#psk" of the /etc/wpa_supplican.conf.
- c). Modify /etc/resolv.conf

echo "nameserver 8.8.8.8" > /etc/resolv.conf

d). Get dynamic IP

[root@ubuntu /]#ifconfig eth0 down

[root@ubuntu /]#ifconfig wlan0 up

[root@ubuntu /]# wpa_supplicant -i wlan0 -Dnl80211 -c /etc/wpa_supplicant.conf -B

[root@ubuntu /]# udhcpc -i wlan0



[root@ubuntu /]# ping www.baidu.com

[1818.110000] RTL871X: rtw_set_ps_mode: Leave 802.11 power save [1818.110000] RTL871X: rtl8188e_set_FwPwrMode_cmd: Mode=0 SmartPS=2 UAPSD=0 PING www.baidu.com (180.97.33.67): 56 data bytes 64 bytes from 180.97.33.67: seq=0 ttl=52 time=25.886 ms 64 bytes from 180.97.33.67: seq=1 ttl=52 time=31.078 ms 64 bytes from 180.97.33.67: seq=2 ttl=52 time=36.742 ms 64 bytes from 180.97.33.67: seq=3 ttl=52 time=25.466 ms