Security Class: Top-Secret (   )   Secret (   )   Internal (   )   Public (√)

RK1108_CVR Software Development Guide

File Status： [ ] Draft [√] Official Release [ ] Official Modify	Remark：	RK1108_CVR Project Use Guide
	Version：	V0.6
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	Date：	2016-10-28

Revision History

Version No.	Author	Revision Date	Revision Description
V0.1	Huaping.Liao	2016/5/26	Add project use guide
V0.2	Huaping.Liao	2016/7/31	CVR new version project use guide
V0.3	Huaping.Liao	2016/8/18	Change repo manifest document
V0.4	Zhihua.Wang	2016/9/5	Add OV4689 settings
V0.5	Huaping.Liao	2016/10/6	Delete camera setting(self-adaption), add development board interface description
V0.6	Huaping.Liao	2016/10/28	Add important functional modules introduction

Table of Content

Chapter 1 RK1108_CVR SDK Project Download

SDK is released by ROCKCHIP server. Please refer to appendix A compiler development environment setting to Build development environment.
Customer apply SDK from ROCKCHIP technology window, must provide SSH public key synchronization server certificate authority to get synchronization code after authorized at the same time. About ROCKCHIP server SSH public key authorization, please refer to appendix BSSH public key instructions.

1.1 REPO Download

Repo is a script used to manage git, which is mainly used to download warehouse management software. Make sure the repo initialization operation used is provided by ROCKCHIP. Repo engineering download address is as follows:

```
git clone ssh://git@git.rockchip.com.cn:2222/argus-release/argus/repo.git
```

Executing after Download can get into the repo:

```
cd repo
```

```
tar xvf repo.tar.gz
```

Copy extracted repo directory to any position, for the next step to use.

1.2 SDK Download and Synchronization

Use step 1.1 to initialize repo project. If the repo project directory is in/home/repo, RK1108_CVR_SDK download address is as follows:

```
/home/repo/repo init -u
ssh://git@git.rockchip.com.cn:2222/argus-release/manifest.git -b master -m
rk1108_cvr_release.xml
```

Then executing in the current directory can download the whole project code:

```
.repo/repo/repo sync
```

Chapter 2 Project directory Introduction

The project directories include app, build, common, config, docs, external, kernel, prebuildts, rockimg, tools, etc. Each directory has a corresponding git project, each subdirectory under external, app has a corresponding git project, submitting codes need to be done under its own directory. If you want to add a third-party library, an extra independent git project needs to be opened to store code.

1) **app:** Store upper applications, mainly video and some test applications
2) **external:** Related library, including audio, video, Internet, etc.
   Note: Released library, the dpp, vpu, camerahal, fs_manage head files and libraries should be put separately on respective folder, running cvr_make_first. Sh will copy resources to out directory.
3) **kernel:** Kernel code.

4) **Build:** Store build script, a few sh scripts under system root directory are copied from here when repo sync, so submitting modified script must be conducted in the build directory.
   build_all.sh: Compile all third-part libraries and applications.
   mkrootfs.sh: Package application layer libraries and root file system.
   mkfirmware.sh： Package eventually updated firmware.
5) **common:** Store root file system and the basic C library.
6) **config:** Store project configuration file.
7) **docs:** Store project help file.
8) **prebuilts:** Store gcc used for compiling kernel and cross compile tool toolschain.
9) **rockimg:** Store compiled output firmware, Image - release file is used for storing release firmware, Image-cvr directory is used for storing firmware generated when compiling packaging.
10) **tools:** Store tool for updating.
11) **out:** Compiling time.

Chapter 3 Introduction of Important Module Codes

3.1 Camera

Driver debugging and upper camerahal module detail introduction is under directory docs/Camera.

<RK1108_Camera_Cif_User_Manual_v1.0>：NVP6124, CVBSIN driver configuration and debugging introduction.

<RKISP11_Camera_IQ_User_Manua_v1.0>：IQ debugging description.

<RKISP11_Camera_ISP_User_Manual_v1.0>： ISP configuration and debugging introduction.

<RKISP11_CameraHal_Introduction_v1.0>： Introduce Camerahal module, this module processes data from driver, and adopts 3A algorithm. Demo testing is included in this document.

<RKISPV11_Camera_Module_AVL_v1.1>：Sensor list currently supported.

3.2 Streaming Media

Else package provides Ffmpeg code, please ask Rockchip FAE for this package. H264 stream obtains demo in directory app/video/example. Relevant development document is saved in directory docs/Media.

3.3 DSP

DSP upper framework interface is in directory external/dpp, test demo is directory external/dpp/test.

Relevant development document is saved in directory in docs/Ds.

3.4 Network

IOS and Android mobile app source codes are respectively stored in directory ios/, app/ of project directory mobile-app/.
Due to Ethernet interface and LCDC pin is reused (Ethernet interface and RGA screen cannot be used at the same time, can be used with MIPI screen), LCDC is enabled by default, so need to change software and hardware configuration is Ethernet interface is required, please find specific methods in <Ethernet Interface Enable Introduction.pdf> under directory docs/Newrok.

Chapter 4 Compiling Method

4.1 Cross-compiling environment configuration

4.1.1 Environmental testing

The compilation of application layer depends on the cross-compiling environment. Please remove the cross-compiling tools configured before to avoid chaos. Please enter below command to check if there is any cross-compiling tool configured before:

```
arm-linux-gcc –version
```

If something output after this command, which means system has cross-compiling tool configured before, need to remove the configured environment.

4.1.2 Configure cross-compiling environment

Cross-compiling tool is under the directory prebuilts toolschain/usr, the bin/directory and arm-rkcvr-linux-uclibcgnueabihf/bin/directory needs to be set as environment variables. Use the following command:

```
sudo vim /etc/environment
```

Will output:

```
PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin”
```

Put the absolute path of the above two directories to the front of“””of end line, with “：”separated between two directories.

Type the command again:

```
arm-linux-gcc –version
```

The following log will be printed, which stands for configuration successfully.

```
arm-linux-gcc.br_real (Buildroot 2016.05-rc2) 4.8.5
```

4.2 Kernel Compiling Steps

Enter the kernel directory, execute the following command to generate.config:

```
make rk1108_defconfig
```

Execute the following command, compile the kernel:

```
make rk1108-cvr.img
```

Compilation is completed, two mirror files kernel.img and resource.img will be generated under the root directory of kernel.

Note: If the second version SDK (green, double plate) is used, the command should be:

```
make rk1108-cvr2.img
```

4.3 The application layer compiling packaging steps

If cross-compiling environment setup is not based on step 3.1, or the server cannot build the environment, then execute commands to generate temporary compiling environment, the environment is limited to the current terminal, power down will be lost:

```
source config/envsetup.sh
```

Executing the following commands can compile all applications and libraries:

```
./build_all.sh
```

This command supports -jxx, -clean and -distclean parameters
kerne.img and application layer resources generated under step 3.2, and Firmware.img finally generared under directory \rockimg\Image-cvr , are used for updating. Execute the following command:

```
./mkfirmware.sh   rk1108-cvr
```

Note: Different SDK versions have different compilation and packaging, please refer to < SDK Development Difference Instruction of Each Versions> for more details.

Chapter 5 Script Introduction

mkrootfs.sh: Packaging application layer library and root file system, will generate rootfs. Img under directory rockimg/Image-cvr.

mkfirmware.sh: Firmware.img finally generated after packaging, will be stored under directory rockimg/Image-cvr.
Files stored under this directory includes rootfs.img, rk1108Aloader_release.bin, rk1108Ausbplug_release.bin, kernel.img.rk1108Aloader_release.bin and rk1108Ausbplug_release.bin will real-time copy to directory rockimg/Image-cvr from directory rockimg/Image-release.

If system dynamic library or executable program need to be added to firmware, mkrootfs.sh need to be modified, which can be realized by modifying variables defined in script, these variables defines resources need to be packaged to firmware from out/system:

release_bin: Executable files in directory out/system/bin

release_sbin: Executable files in directory out/system/sbin

release_etc: Configuration files in directory out/system/etc

release_lib: Libraries in directory out/system/lib

relase_share: If no special specified, default copy entire directory from out/system/share/minigui/res.

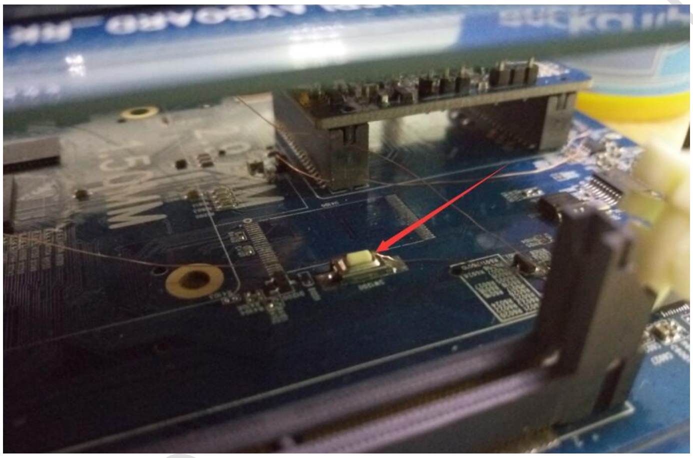
Chapter 6 Firmware FLUSH

6.1 Windows Platform

This tool can be used in winxp/win7/win8/win10.

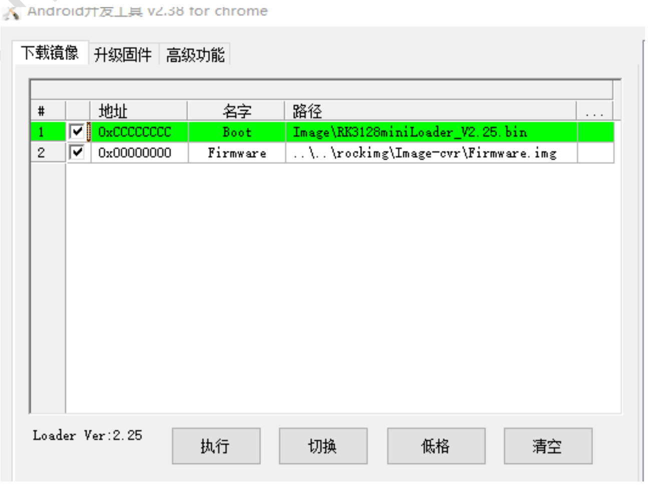
First use the development tools, need update rockchip exclusive drive, which is stored under directory “tools\CVRTools_Release_v1.00\DriverAssitant_v4.5”, running DriverInstall.exe, will be installed automatically.

Enter masrom to update all the firmware. Pressing the small white button below and power on, can enter masrom mode.



MASROM Power on Sketch

As shown in below figure, equipment detecting and current equipment mode will be prompted under the tool. Choose firmware need to be updated, and click on the execution, the firmware will be updated on the board, after the updating, system can run update power on again.



#		地址	名字	路径	...
1	☑	0xCCCCCCCC	Boot	Image\RK3128miniLoader_V2.25.bin	
2	☑	0x00000000	Firmware	..\..\rockimg\Image-cvr\Firmware.img	

Loader Ver:2.25

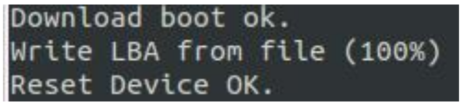
Updating Tool Instruction

6.2 Linux Platform

Enter masrom mode under Windows platform. Enter directory tools/Linux_Upgrade_Tool_v1.24/, execute the following commands to completing update:

```
./cvr_upgrade.sh
```

When below information is printed, which means the update is successful:



```
Download boot ok.
Write LBA from file (100%)
Reset Device OK.
```

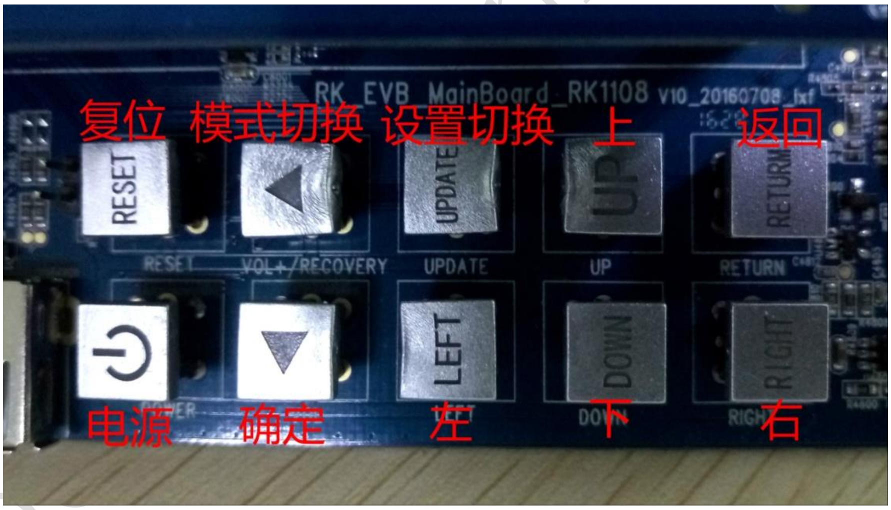
Chapter 7 Key Layout Instruction

Keys function descriptions are as shown as below:

Reset: Power on again

Mode switch: Switch between photos, videos, play mode

Setting switch: In Settings window, and switch Setting optionsVideo: under preview mode, press the "UP" start recording, press again stop.



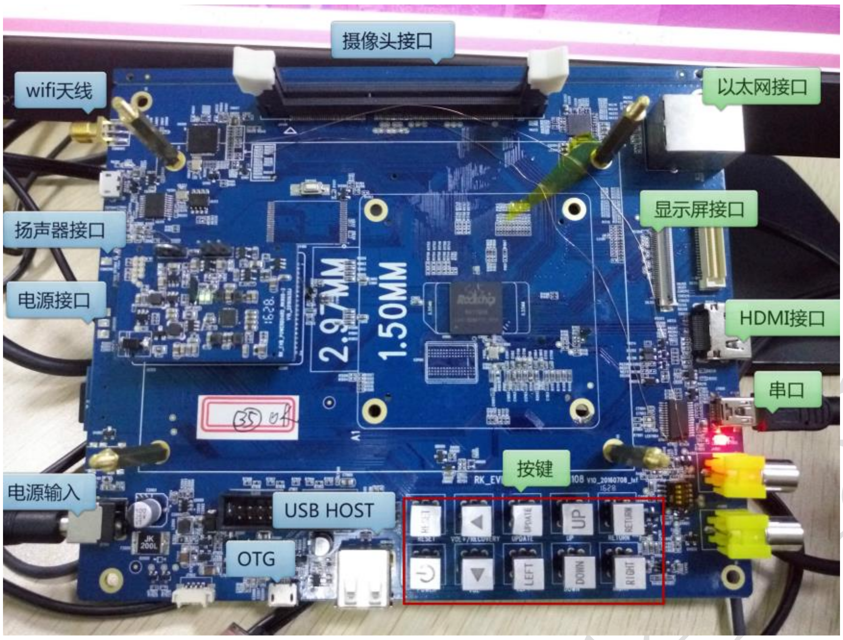
Key Layout Description

Chapter 8 SDK Hardware Interface and Interface Description

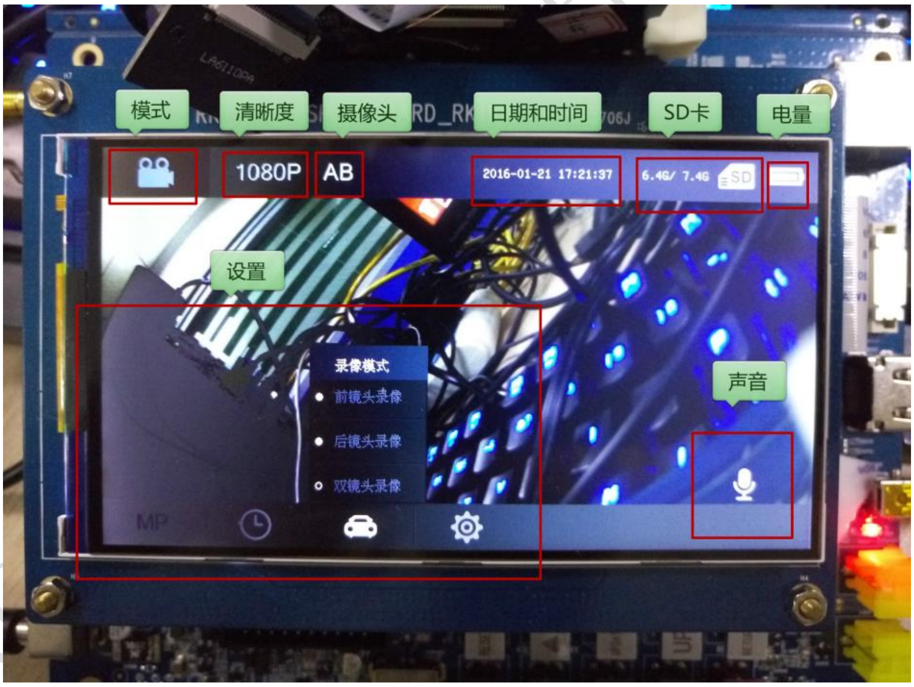
8.1 SDK Hardware Interface Introduction

OTG interface: firmware updating interface

Serial port baud rate: 1500000 BPS



8.2 UI Function Interface Introduction


模式
清晰度
摄像头
日期和时间
SD卡
电量
1080P
AB
2016-01-21 17:21:37
6.4G/ 7.4G
SD
设置
录像模式
前镜头录像
后镜头录像
双镜头录像
声音
MP