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Rockchip_Camera_FAQ

（技术部，第二系统产品部）

(Technical Department, R & D Dept. II）

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福州瑞芯微电子股份有限公司
Fuzhou Rockchip Electronics Co., Ltd.
地址： 福建省福州市铜盘路软件园 A 区 18 号
网址： www.rock-chips.com
客户服务电话： +86-4007-700-590
客户服务传真： +86-591-83951833
客户服务邮箱： fae@rock-chips.com

Fuzhou Rockchip Electronics Co., Ltd.
Address: No. 18 Building, A District, No.89,software Boulevard Fuzhou,Fujian,PRC
Website: www.rock-chips.com
Customer service tel.: +86-4007-700-590
Customer service fax: +86-591-83951833
Customer service e-mail: fae@rock-chips.com

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前言 Preface

概述 Overview

本文档主要介绍 Rockchip Camera 模块的常见问题分析。

This document mainly introduces FAQ of Rockchip Camera modules.

读者对象 Applicable object

本文档（本指南）主要适用于以下工程师：

This document (the guide) is mainly suitable for the following engineers:

- 技术支持工程师

  Field application engineers

- 软件开发工程师

  Software development engineers

1 目的 Purpose

本文介绍 RK 平台上已有的调试文档，总结以往处理 Camera 中相关问题的步骤和方法，作为后续分析和处理 Camera 调试过程中遇到问题的参考。

This document introduces the debugging documents which are already available on RK platform, and summarize the methods and steps for debugging camera related issues based on previous experience, as reference for customers to analyze and deal with the issues during camera debugging.

2 适用范围 Applicable scope

目前 RK 产品的各 Android 平台中使用的 Camera Hal，分为 2 两个大版本：

The Camera Hals currently used on various Android platforms of RK products are divided into two big versions:

- Camera Hal1 在 Android8.1 及以下版本中使用
  Camera Hal1 is used for Android8.1 and lower versions
- Camera Hal3 在 Android9.0 及以上版本中使用
  Camera Hal3 is used on Android9.0 and later versions

本文档仅适用于 Android 平台上，Camera Hal3 及对应新框架的 Camera Sensor 驱动常见问题分析排查和处理方法。

This document is only suitable for debugging and dealing with FAQ related with Camera Hal3 and the Camera Sensor driver with the corresponding new framework on Android platform.

3 SDK 已有 Camera 文档说明 Camera documents available in SDK

文档目录：SDK/RKDocs/common/camera/HAL3

Document directory: SDK/RKDocs/common/camera/HAL3

3.1 camera_hal3_user_manual_vx.x.pdf

文档介绍 RK CameraHal3 框架、camera3_profiles.xml 文件配置、HAL 层数据 DUMP 及部分调试案例。对应代码目录：SDK/ hardware/rockchip/camera

This document introduces RK CameraHal3 framework, camera3_profiles.xml file configuration, HAL layer data DUMP and some debugging examples. The corresponding code directory is: SDK/ hardware/rockchip/camera

3.2 camera_engine_rkisp_user_manual_vx.x.pdf

文档介绍 RK CameraHal3 Engine 框架、API 简要说明及 IQ 效果文件相关的规则等。

This document introduces RK CameraHal3 Engine framework, API brief introduction and IQ effect file related rules.

对应代码目录：SDK/ hardware/rockchip/camera_engine_rkisp

The corresponding code directory is: SDK/ hardware/rockchip/camera_engine_rkisp

3.3 RKCIF_Driver_User_Manual_v1.xx.pdf

文档介绍 RKCIF 驱动框架、DTS 配置、驱动中部分数据类型及 API 简介。

This document introduces RKCIF driver framework, DTS configuration, some data type and API brief introduction in the driver.

对应代码目录：SDK/kernel/drivers/media/platform/rockchip/cif

The corresponding code directory is: SDK/kernel/drivers/media/platform/rockchip/cif

3.4 RKISP_Driver_User_Manual_v1.xx.pdf

文档介绍 RKISP1 驱动框架、CIS(CMOS IMAGE SENSOR)驱动、马达驱动、闪光灯驱动、RK1608 AP 驱动的 DTS 配置、部分数据类型及 API 简要说明和 FAQ。

This document introduces RKISP1 driver framework, CIS(CMOS IMAGE SENSOR) driver, motor driver, flash led driver, DTS configuration of RK1608 AP driver, some data type and API brief introduction and FAQ.

RKISP1 驱动对应代码目录：SDK/kernel/drivers/media/platform/rockchip/isp1

The corresponding code directory of RKISP1 driver is: SDK/kernel/drivers/media/platform/rockchip/isp1

4 FAQ

4.1 如何查看 camera 相关版本号？ How to check camera related version?

4.1.1 查看 rkisp1/rkcif 驱动的版本号 Check the version number of rkisp1/rkcif driver

rkisp1 驱动获取版本号命令：`cat /sys/module/video_rkisp1/parameters/version`

The command to acquire the version number of rkisp1 driver: `cat /sys/module/video_rkisp1/parameters/version`

图 1 rkisp1 驱动版本号

Picture 1 version number of rkisp1 driver

rkcif 驱动获取版本号命令：`cat /sys/module/video_rkcif/parameters/version`

The command to acquire the version number of rkcif driver: cat /sys/module/video_rkcif/parameters/version

4.1.2 查看 Camera Hal3 版本号 Check the version number of Camera Hal3

获取版本号命令：getprop | grep cam.hal3.ver

The command to acquire the version number: getprop | grep cam.hal3.ver

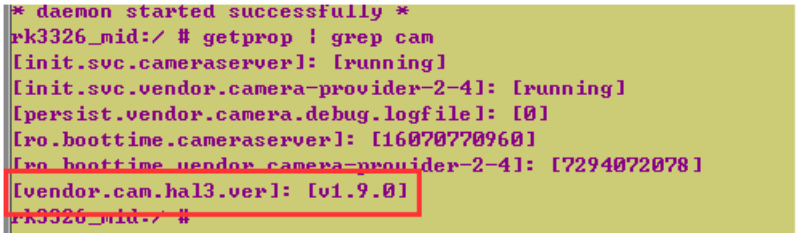

图 2 Camera Hal3 版本号

Picture 2 version number of Camera Hal3

4.1.3 查看 Camera_engine_rkisp 版本号 Check the version number of Camera_engine_rkisp

获取版本号命令：strings /vendor/lib/librkisp.so | grep v1. 或 grep v2.

The command to acquire the version number: strings /vendor/lib/librkisp.so | grep v1. or grep v2.

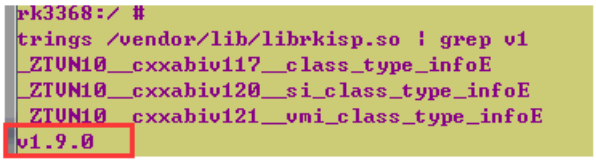

图 3 librkisp 版本号

Picture 3 version number of librkisp

4.1.4 查看 3A 库版本号 Check the version number of 3A library

获取版本号命令：

The command to acquire the version number:

strings /vendor/lib/rkisp/ae/librkisp_aec.so | grep v0

strings /vendor/lib/rkisp/af/librkisp_af.so | grep v0

strings /vendor/lib/rkisp/awb/librkisp_awb.so | grep v0

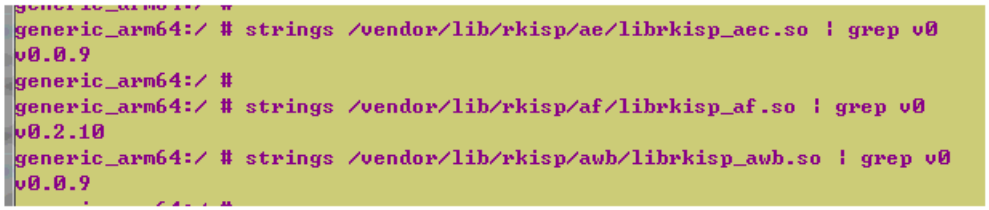

图 4 3A 库版本号

Picture 4 version number of 3A lib

4.1.5 Android10.0 后查看上述版本号方法 The way to check above version number after Android10.0

首先确保：SDK/hardware/rockchip/camera_engine_rkisp 目录包含如下提交：

Firstly make sure the following commit is included in the directory of SDK/hardware/rockchip/camera_engine_rkisp:

commit 41670de2aa53f72d00eae837ecd1275e93fd7182

Author: Wang Panzhenzhuan <randy.wang@rock-chips.com>

Date: Tue Sep 3 10:32:03 2019 +0800

add properties to show rkisp & 3A lib version

Change-Id: Iccfe8a0fc773489eb9a327d1ba192dc572c4c89f

Signed-off-by: Wang Panzhenzhuan randy.wang@rock-chips.com

需要使用 su 权限，获取版本命令：getprop | grep cam，结果如图：

Need to use su authority, the command to acquire the version number: getprop | grep cam, the result is shown as below:

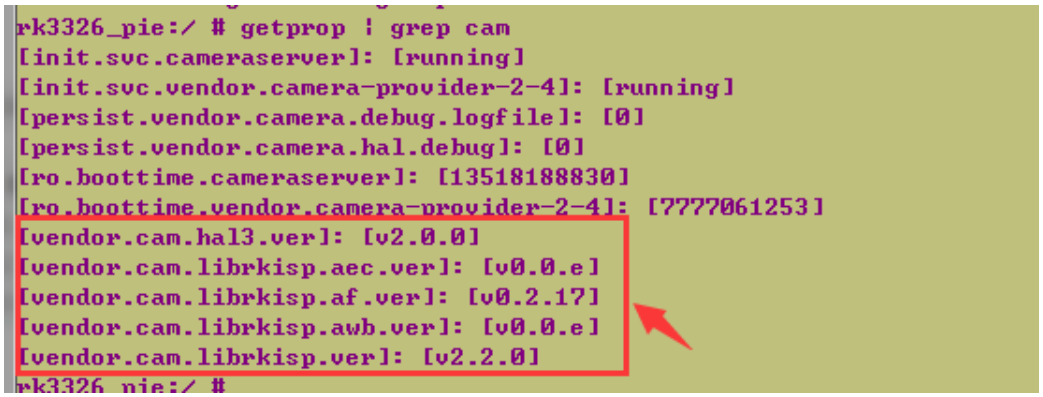

图 5 Hal3、ISP 和 3A 库版本号

Picture 5 version number of Hal3, ISP and 3A lib

4.2 如何打开 debug 开关抓取 LOG？ How to enable debug switch to capture LOG?

4.2.1 camera hal3 的 LOG 抓取 Capture LOG of camera hal3

打开 camerahal 的 debug 命令；
The command to enable debug of camerahal:
setprop persist.vendor.camera.hal.debug 5
关闭命令
Disable command:
setprop persist.vendor.camera.hal.debug 0
具体参考 SDK 下文档：
For details, refer to the following document in SDK:
RKDocs\common\camera\HAL3\camera_hal3_user_manual_vx.x.pdf

4.2.2 camera_engine_rkisp 的 LOG 抓取 Capture LOG of camera_engine_rkisp

打开 camera_engine_rkisp 的 debug 命令
The command to enable debug of camera_engine_rkisp
setprop persist.vendor.rkisp.log 4
关闭命令
Disable command
setprop persist.vendor.rkisp.log 0
如果 SDK/hardware/rockchip/camera_engine_rkisp 目录包含如下提交：
If there is the following commit in the directory of SDK/hardware/rockchip/camera_engine_rkisp:

```
commit 050834ce2614f8533cdd774fbdf920fbbe910395
Author: ZhongYichong <zyc@rock-chips.com>
Date:   Tue Jun 11 15:35:28 2019 +0800

    use new log system, support module logs
…
set debug level example:
        eg. set module afc log level to debug, and others to error:
            Android:
              setprop persist.vendor.rkisp.log 0x4000
            Linux:
              export persist_camera_engine_log=0x4000

    Change-Id: I702bc8de878bef021f58de42b5ceb0d71d1a3439
    Signed-off-by: ZhongYichong <zyc@rock-chips.com>
```

则 debug 开关打开命令如下：

Then the command to enable debug is as below:

setprop persist.vendor.rkisp.log 0x444444

具体参考 SDK 下文档：

For details, refer to the document in SDK:

RKDocs\common\camera\HAL3\ camera_engine_rkisp_user_manual_vx.x.pdf

4.2.3 rkcif 控制器驱动 LOG 抓取 Capture LOG of rkcif controller driver

通过如下命令打开 debug 开关：

Use the following command to enable debug:

echo 1 > /sys/module/video_rkcif/parameters/debug

或者修改 SDK/kernel/drivers/media/platform/rockchip/cif/dev.c 中 int rkcif_debug = 1;

Or change int rkcif_debug = 1; in SDK/kernel/drivers/media/platform/rockchip/cif/dev.c

具体参考 SKD 下文档：

For details, refer to the document in SDK:

SDK\RKDocs\common\camera\HAL3\RKCIF_Driver_User_Manual_v1.xx.pdf

4.2.4 rkisp 控制器驱动的 LOG 抓取 Capture LOG of rkisp controller driver

通过如下命令打开 debug 开关：

Use the following command to enable debug:

echo 1 > /sys/module/video_rkisp1/parameters/debug

或者修改 SDK/kernel/drivers/media/platform/rockchip/isp1/dev.c 中 int rkisp1_debug = 1;

Or change int rkisp1_debug = 1; in SDK/kernel/drivers/media/platform/rockchip/isp1/dev.c

具体参考 SKD 下文档：

For details, refer to the document in SDK:

SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf

4.3 如何配置 camera3_profiles.xml 文件？ How to configure camera3_profiles.xml file?

一般是在各平台默认的 camera3_profiles.xml 基础上进行修改，修改参考 CameraHal 文档：

Generally it is modified based on the default camera3_profiles.xml of each platform. Modify referring to CameraHal document:

SDK\RKDocs\common\camera\HAL3\camera_hal3_user_manual_vx.x.pdf

或 https://redmine.rockchip.com.cn/documents/53 上的 camera_hal3_user_manual_vx.x.pdf 文档

or camera_hal3_user_manual_vx.x.pdf document in https://redmine.rockchip.com.cn/documents/53

camera3_profiles.xml 里面<Android_metadata>中的参数详细含义及配置说明，

For the parameter definition and configuration instruction of <Android_metadata> in

camera3_profiles.xml, you can refer to Google official document in SDK: SDK/system/media/camera/docs/docs.html

可参考 SDK 中 Google 官方文档：SDK/system/media/camera/docs/docs.html

4.4 各平台 Camera 驱动调试可参考的 dts 配置 dts configuration reference for debugging Camera driver on each platform

RK Android9.0 中各平台样机对应 dts 及所配置 Sensor 情况如下：

The corresponding dts and Sensor configuration of RK Android9.0 platforms device are as below:

- rk3126c 平台可参考 rk3126-bnd-d708.dtsi，默认配置前置 GC0329+后置 GC2145
  rk3126c platform can refer to rk3126-bnd-d708.dtsi, with the default sensor configuration front GC0329 + back GC2145
- rk3288w 平台可参考 rk3288-th804-avb.dts，默认配置前置 GC2145+后置 OV8858
  rk3288w platform can refer to rk3288-th804-avb.dts, with the default sensor configuration front GC2145 + back OV8858
- rk3326 平台可参考 rk3326-863-lp3-v10-avb.dts，默认配置前置 GC0312+后置 GC2145
  rk3326 platform can refer to rk3326-863-lp3-v10-avb.dts, with the default sensor configuration front GC0312 + back GC2145
- rk3368 平台可参考 rk3368-xikp-avb.dts，默认配置前置 GC2145+后置 OV8858
  rk3368 platform can refer to rk3368-xikp-avb.dts, with the default sensor configuration front GC2145 + OV8858
- rk3399 平台可参考 rk3399-tve1030g-avb.dts，默认只配置前置 GC2355
  rk3399 platform can refer to rk3399-tve1030g-avb.dts, with the default sensor configuration only front GC2355

dts 具体配置参考文档：

The dts configurations refer to the documents:

- SDK/RKDocs/common/camera/HAL3/RKISP_Driver_User_Manual_v1.xx.pdf
- SDK/RKDocs/common/camera/HAL3/RKCIF_Driver_User_Manual_v1.xx.pdf
- SDK/kernel/Documentation/devicetree/bindings/media/rockchip-mipi-dphy.txt
- SDK/kernel/Documentation/devicetree/bindings/media/rockchip-cif.txt
- SDK/kernel/Documentation/devicetree/bindings/media/rockchip-isp1.txt

4.5 马达常见问题调试/分析 Motor FAQ debugging/analyzing

可以参考驱动调试文档：

You can refer to the driver debugging document:

“SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf”，

文档中对马达驱动做了一些说明；调试方法/步骤总结如下三点：

There is some introduction about motor driver in the document. Summarize the debugging

method/steps as below three points:

4.5.1 如何查看马达驱动是否注册？ How to check if the motor driver is registered or not?

以马达 vm149c 为例，使用命令：media-ctl -p，查看是否包含如图的 entity

Take motor vm149c as example, use the command: media-ctl -p, to check if entity in the following picture is included or not

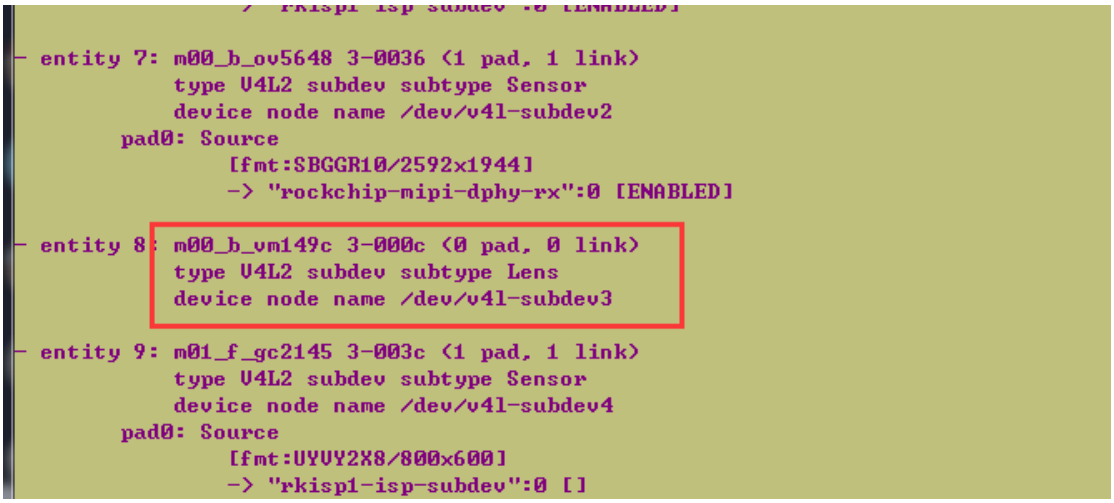

图 6 vm149c 马达注册上示例图

Picture 6 example of vm149c motor is registered successfully

如果有，说明调用到马达驱动注册成功；

If yes, it means the motor driver is registered successfully.

如果没有请参考 SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf 文档正确配置 dts，及移植对应的马达驱动。

If no, please refer to SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf file to configure dts correctly, and port the corresponding motor driver.

4.5.2 如何使用 V4l2 工具控制马达移动？ How to use V4l2 tool to control the movement of the motor?

打开包含马达的摄像头，使用如下命令：控制马达移动

Enable the camera with the motor, use the following command to control the movement of the motor:

```
v4l2-ctl -d dev/video5 --set-ctrl 'focus_absolute=32' (0~64)
```

如果会移动，说明底层马达控制 OK；

If it can move, that means the bottom layer motor control is OK.

如果马达不移动说明马达底层驱动调用有问题； 需要在马达驱动的 static int xxxx_set_ctrl()和 static int xxxx_set_pos()这两个函数中加打印信息调试；

If the motor cannot move, it means the call of the motor’s bottom layer driver has something wrong. Need to add print information in static int xxxx_set_ctrl() and static int xxxx_set_pos() functions of the

motor driver for debugging.

以 vm149c 为例：控制命令肯定会调到如下函数中

Take vm149c as example: control command will definitely be called into the following function

```
static int vm149c_set_ctrl(struct v4l2_ctrl *ctrl)
{
    struct vm149c_device *dev_vcm = to_vm149c_vcm(ctrl);
    struct i2c_client *client = v4l2_get_subdevdata(&dev_vcm->sd);
    unsigned int dest_pos = ctrl->val;
    int move_pos;
    long int mv_us;
    int ret = 0;

    if (ctrl->id == V4L2_CID_FOCUS_ABSOLUTE) {
        if (dest_pos > VCMDRV_MAX_LOG) {
            dev_info(&client->dev,
                "%s dest_pos is error. %d > %d\n",
                __func__, dest_pos, VCMDRV_MAX_LOG);
            return -EINVAL;
        } else {
            /* calculate move time */
            move_pos = dev_vcm->current_related_pos - dest_pos;
            if (move_pos < 0)
                move_pos = -move_pos;

            ret = vm149c_set_pos(dev_vcm, dest_pos);
```

图 7 马达移动调用函数

Picture 7 motor movement call function

4.5.3 camera3_profiles.xml 如何配置？ How to configure camera3_profiles.xml?

只有 RAW Sensor 才支持马达控制，如果支持马达，camera3_profiles.xml 中需要如下配置：

Only RAW Sensor supports motor control. If the motor does support, the following configuration is required in camera3_profiles.xml:

<control.afAvailableModes value="OFF,AUTO,MACRO,CONTINUOUS_VIDEO,CONTINUOUS_PICTURE,EDOF"/>

<control.maxRegions value="1,0,1"/>

<lens.info.minimumFocusDistance value="0.1"/> <!-- HAL may override this value from CMC for RAW sensors -->

如果录像中不需要马达对焦，可以尝试将 CONTINUOUS_VIDEO 关键字去掉；

If the motor focus is not required for video recording, you can try to remove the key word CONTINUOUS_VIDEO.

<request.availableRequestKeys 中需要包含：control.afRegions 字段

<request.availableRequestKeys should include: control.afRegions field

<request.availableResultKeys 中需要包含： control.afRegions 字段

<request.availableResultKeys should include: control.afRegions field

<sensorType value="SENSOR_TYPE_RAW"/> // SENSOR_TYPE 需要是 RAW 的而不是 SOC；

<sensorType value="SENSOR_TYPE_RAW"/> // SENSOR_TYPE should be RAW but not SOC.

不然调用不到 3A 库，从而不会调到底层马达进行自动对焦；

Otherwise it cannot invoke 3A lib, therefore cannot invoke the bottom layer motor to do the auto

focus.

4.5.4 示例案例：无马达 OV2680 模组配置错误导致切换到录像卡住问题 Example: Device halt issue when switch to video recording caused by the configuration error of OV2680 module without motor

4.5.4.1 问题描述 Issue description

RK3326-9.0 机器，使用不带马达的 OV2680 模组，切换到录像界面出现卡住问题。

RK3326-9.0 device, using OV2680 module which doesn't have motor, halts when it is switched to video recording interface.

卡住打印的关键 log 如下：

The key log are as below:

W CAM2PORT_CamCapabs: Focus mode not supported:AUTO

W CAM2PORT_CamCapabs: Focus mode not supported:AUTO

W CAM2PORT_CamAgnt: Unsupported settings in applySettings()

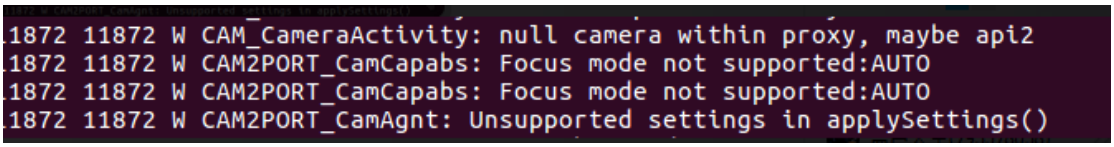

图 8 关键 LOG 截图

Picture 8 key LOG screenshot

4.5.4.2 问题分析 Issue analysis

因为客户机器不带 VCM 马达，所以修改 camera3_profiles.xml 配置

Customer device doesn't have VCM motor, so they modified the configuration of camera3_profiles.xml

<control.afAvailableModes value="OFF,AUTO,MACRO,CONTINUOUS_VIDEO,CONTINUOUS_PICTURE,EDOF"/>

改成了：

to be:

<control.afAvailableModes value="OFF"/>

但还漏了其他地方没有修改；

But missed some other modifications.

4.5.4.3 解决办法 Solution

camera3_profiles.xml 配置还需要如下修改：

camera3_profiles.xml configuration also needs the following modifications:

<control.afAvailableModes value="OFF"/>

<lens.info.minimumFocusDistance value="0.0"/>

不支持 af 时，minimumFocusDistance 必须为 0.0

When af is not supported, minimumFocusDistance must be 0.0

```
<control.maxRegions value="1,0,1"/>
```

改成

Change to:

```
<control.maxRegions value="1,0,0"/>
```

4.6 闪光灯常见问题调试/分析 Flash led FAQ debugging/analyzing

首先参考驱动调试文档：“SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf”文档中对闪光灯驱动做了一些说明。根据实际使用的 led_flash 类型定义 flash 节点；

First refer to the driver debugging document: SDK\RKDocs\common\camera\HAL3\RKISP_Driver_User_Manual_v1.xx.pdf which includes some introduce on the flash led driver. Define flash node according to the actually used led_flash type.

- 如果是 i2c 控制的 led_flash 设备，定义在 i2c 节点中；

  If it is led_flash device controlled by i2c, define in i2c node.

- 如果是简单 gpio 设备，定义在根节点中；

  If it is simple gpio device, define in root node.

目前支持的 2 种 led_flash 驱动

Currently support two kinds of led_flash drivers.

1、sgm3784（i2c 控制类型，双色温）；

sgm3784 (i2c control type, dual color temperature)

I2C 控制的 LED FLASH 示例参考文档为：

The reference document of LED FLASH example controlled by I2C is:

SDK/kenrel/Documentation/devicetree/bindings/media/i2c/sgm3784.txt

2、flash_rgb13h (gpio 控制类型，简单 led)；

flash_rgb13h (gpio control type, simple led)

GPIO 控制的 LED FLASH 示例参考文档为：

The reference document of LED FLASH example controlled by GPIO is:

SDK/kernel/Documentation/devicetree/bindings/leds/leds-rgb13h.txt

调试方法/步骤总结如下三点：

Summarize the debugging method/steps as below three points:

4.6.1 如何查看闪光灯驱动是否注册？ How to check if the flash led is registered or not?

使用命令：media-ctl -p 查看是否包含如图的 entity：

Use the command: media-ctl -p to check if entity in the following picture is included or not.

I2C 控制的 sgm3784 注册后如下：

sgm3784 controlled by I2C after registered is as below:

```
- entity 10: m00_b_sgm3784_led1 1-0030 (0 pad, 0 link)
        type V4L2 subdev subtype Flash
        device node name /dev/v4l-subdev4

- entity 11: m00_b_sgm3784_led0 1-0030 (0 pad, 0 link)
        type V4L2 subdev subtype Flash
        device node name /dev/v4l-subdev5
```

图 9 sgm3784 注册上示例图

Picture 9 example of sgm3784 is registered successfully

GPIO 控制的 flash_rgb13h 注册后如下：

flash_rgb13h controlled by GPIO after registered is as below:

```
- entity 10: m00_b_ov8858 2-0036 (1 pad, 1 link)
             type V4L2 subdev subtype Sensor
             device node name /dev/v4l-subdev3
        pad0: Source
                [fmt:SBGGR10/3264x2448]
                -> "rockchip-mipi-dphy-rx":0 [ENABLED]

- entity 11: m00_b_gpio-flash flash-rgb13h (0 pad, 0 link)
             type V4L2 subdev subtype Flash
             device node name /dev/v4l-subdev4
```

图 10 rgb13h 注册上示例图

Picture 10 example of flash_rgb13h is registered successfully

4.6.2 如何使用 V4l2 工具控制闪光灯模式？ How to use V4l2 tool to control the flash led mode?

使用 V4l2 工具控制闪光灯模式

Use V4l2 tool to control the flash led mode

闪光灯驱动添加后，可以使用如下命令查看闪光灯是否变化；

After adding the driver of the flash led, you can use the following command to check if the flash led changes or not.

Flash off 模式：

Flash off mode:

```
v4l2-ctl -d dev/video0 --set-ctrl 'led_mode=0'
```

Flash 模式：会闪一下

Flash mode: it will flash once

```
v4l2-ctl -d dev/video0 --set-ctrl 'led_mode=1'
v4l2-ctl -d dev/video0 --set-ctrl 'strobe=1'
```

Torch 模式：常亮

Torch mode: always on

```
v4l2-ctl -d dev/video0 --set-ctrl 'led_mode=2'
```

如果没有，自己先添加打印信息，排查调试闪光灯驱动；

If no change, add print information by yourself to debug the flash led driver.

4.6.3 camera3_profiles.xml 如何配置？ How to configure camera3_profiles.xml?

如果需要支持 flash，camera3_profiles.xml 需要修改如下配置项：

If need to support flash, need to modify the following configuration items in camera3_profiles.xml:

<control.aeAvailableModes value="ON,OFF,ON_AUTO_FLASH,ON_ALWAYS_FLASH"/>

<flash.info.available value="TRUE"/>

然后清理 camera APK，重启；

Then clean camera APK, restart.

配置好后：抓取关键 log：例如：闪光灯挂载在 OV8858 上时候的 log 如下：

After configuration, capture the key log, for example, the log when the flash led is loaded to OV8858 is as below:

开启 Camera Hal3 的 log 开关：

Enable log of Camera Hal3:

抓取 LOG：

Capture LOG:

logcat -c;pkill provider;logcat | grep flash

或者：

Or:

logcat -c;pkill provider;logcat | grep -i attach

抓取的关键 LOG 如下：

The key LOG captured is as below:

D RkCamera: <HAL> PlatformData: findAttachedSubdevs:827,found **flashlight m00_b_gpio-flash flash-rgb13h** attatched to sensor ov8858

4.6.1 示例案例：camera flash 如何配置默认关闭？ Example: How to disable camera flash by default?

4.6.1.1 问题描述 Issue description

相机 APK 默认闪光灯是开启的，要求默认关闭。

Camera APK enabled the flash led by default. The requirement is to disable it by default.

4.6.1.2 问题分析 Issue analysis

查看 camera3_profiles.xml 中支持闪光灯的配置如下：

The configuration to check the flash led supported in camera3_profiles.xml is as below:

<control.aeAvailableModes value="ON,ON_AUTO_FLASH,ON_ALWAYS_FLASH "/> <!--remove ON_AUTO_FLASH,ON_ALWAYS_FLASH if flash is not available-->

按照 SDK/system/media/camera/docs/docs.html 配置正确

Configure correctly according to SDK/system/media/camera/docs/docs.html

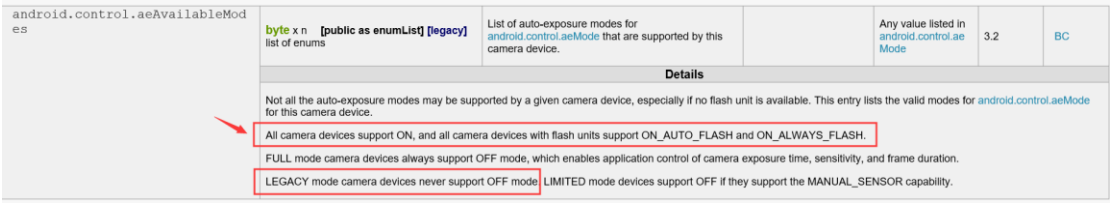

图 11 aeAvailableModes 配置说明

Picture 11 aeAvailableModes configuration instruction

需要清除 APK 缓存再确认下，其他带闪光灯的客户应该都是这么配置的； 需要排查看下 APK 默认的 flash 选项是在哪里配置的。

Need to clean APK buffer and check again. Other customers with flash led are supposed to configure like this. Need to check where APK default flash option is configured.

4.6.1.3 解决办法 Solution

SDK/packages/apps/Camera2/res/values/strings.xml 需要默认配置成 false；

Need to configure SDK/packages/apps/Camera2/res/values/strings.xml as false by default.

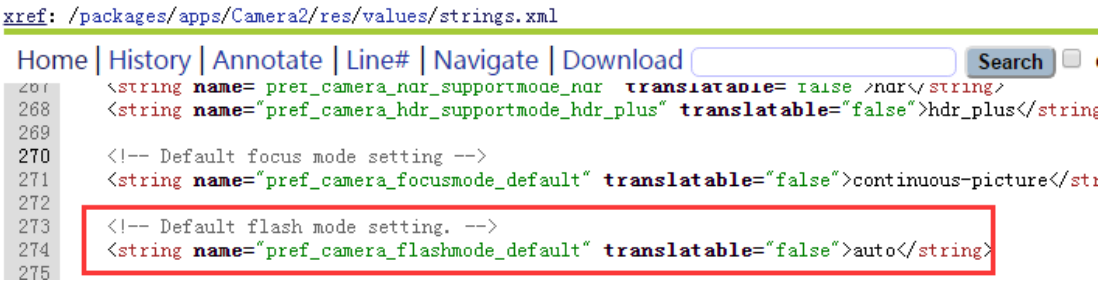

图 12 默认配置位置

Picture 12 Default location of the configuration

4.7 I2C 不通，如何确认相关信号？ I2C doesn’t work, how to confirm relative signals?

Camera Sensor 的 I2C 不通，则需要测量确认如下信号：Power/PowerDown/Reset/Mclk/I2cBus，以 OV5648 正常调试为例进行说明。

If I2C of Camera Sensor doesn’t work, need to measure and confirm the following signals: Power/PowerDown/Reset/Mclk/I2cBus. Take OV5648 normal debugging as example to introduce.

需要将__ov5648_power_off()函数中相关下电操作屏蔽如下：

Need to comment out power off related operations in __ov5648_power_off() function as below:

```
1024:
1025: static void __ov5648_power_off(struct ov5648 *ov5648)
1026: {
1027: #if 0
1028:     if (!IS_ERR(ov5648->pwdn_gpio))
1029:         gpiod_set_value_cansleep(ov5648->pwdn_gpio, 0);
1030:     clk_disable_unprepare(ov5648->xvclk);
1031:     if (!IS_ERR(ov5648->reset_gpio))
1032:         gpiod_set_value_cansleep(ov5648->reset_gpio, 1);
1033:     regulator_bulk_disable(OV5648_NUM_SUPPLIES, ov5648->supplies);
1034: #endif
1035: }
1036:
```

图 13 代码下电位置屏蔽示例图

Picture 13 example of comment out power off code

4.7.1 测量 Power 情况 Measure Power status

查看 OV5648 的 Datasheet：AVDD、DVDD、DOVDD 的供电要求分别如下：

Check OV5648 Datasheet: the power supply requirements of AVDD, DVDD, DOVDD are as below:

01	DVDD	power	digital circuit power	1.5V
02	AGND	ground	analog ground	
03	AVDD	power	analog power	2.8V
04	DOGND	ground	I/O ground	
05	SIOD	I/O	SCCB interface data	
06	SIOC	input	SCCB interface input clock	
07	DVDD	power	digital circuit power	1.5V
08	SCK	I/O	SPI interface input clock	
09	SDI0	I/O	SPI interface data input 0	
10	SDI1	I/O	SPI interface data input 1	
11	DOVDD	power	I/O power	1.8/2.8V

图 14 OV5648 供电要求

Picture 14 OV5648 power supply requirement

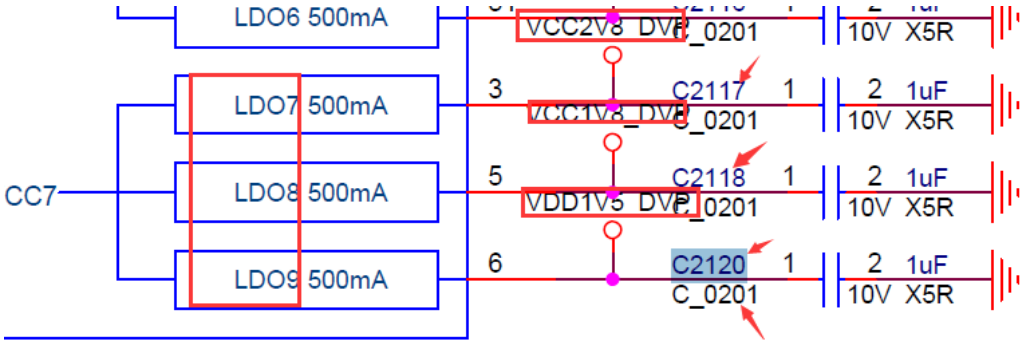

图 15 原理图供电电源

Picture 15 Power in the schematic

依次测量结果如下：

The measure results are as below:

VCC2V8_DVP：2.8V，对应 OV5648 的 AVDD； corresponding to AVDD of OV5648

VCC1V8_DVP：1.8V，对应 OV5648 的 DOVDD； corresponding to DOVDD of OV5648

VDD1V5_DVP：1.5V，对应 OV5648 的 DVDD； corresponding to DVDD of OV5648

和 Datasheet 的供电要求一致，正常。

The results are consistent with the power supply requirement of Datasheet, which is normal.

4.7.2 PowerDown

查看 OV5648 的 Datasheet：有效时候为低电平：

Check Datasheet of OV5648: low effective

图 16 PWDNB

那说明 Sensor 工作的时候需要为：高电平

That means it should be high level while Sensor is working.

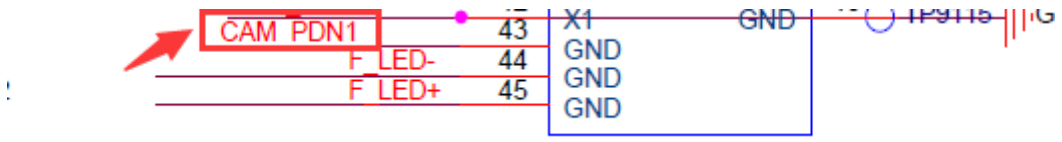

图 17 原理图 PWD 引脚

Picture 17 PWD pin in the schematic

测量结果为：1.8V；正常

The measure result is 1.8V, which is normal.

4.7.3 Reset

查看 OV5648 的 Datasheet：有效时候为低电平

Check Datasheet of OV5648: low effective

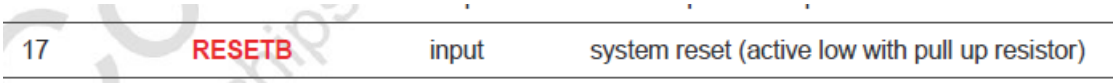

图 18 RESET

那说明 Sensor 工作的时候需要为：高电平

That means it should be high level while Sensor is working.

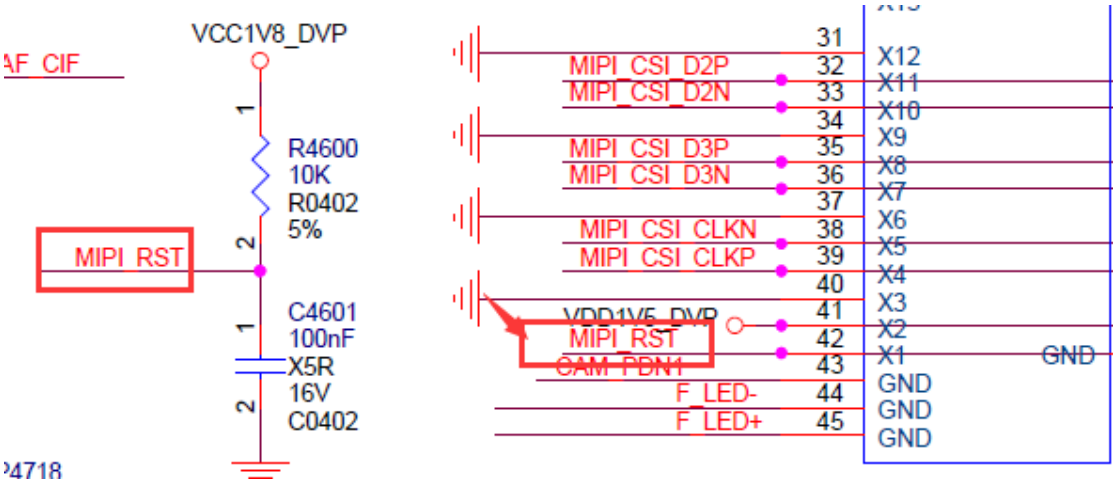

图 19 原理图 RESET 引脚

Picture 19 RESET pin in the schematic

测量结果为：1.8V，被固定拉成 1.8V 了；正常。

The measure result is 1.8V which is pulled up to 1.8V constantly. It is normal.

4.7.4 Mclk

测量结果如图：

The measure result is shown as below:

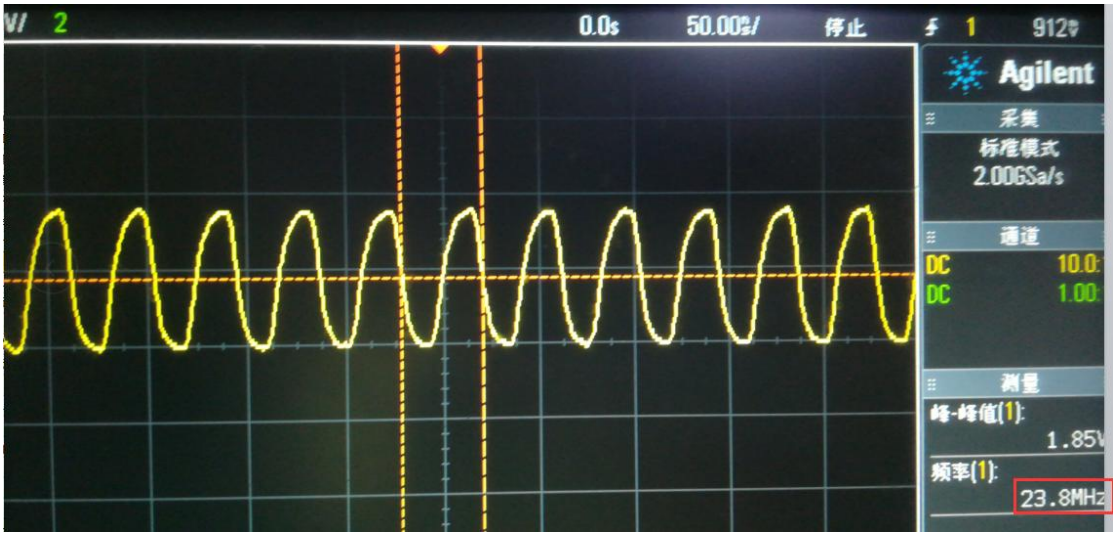

图 20 正常 MCLK 示例

Picture 20 Example of normal MCLK

24MHZ，1.8V 左右，正常。

24MHz, around 1.8V, normal.

4.7.5 I2cBus

根据原理图确认是 I2C2。

It is I2C2 confirmed according to the schematic.

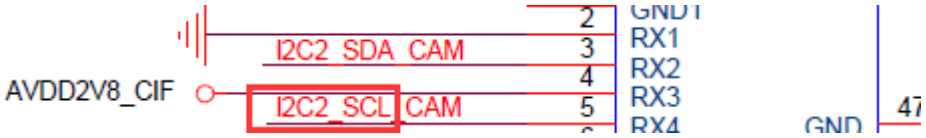

图 21 原理图 I2C 编号示例

Picture 21 I2C number example in the schematic

查看 DTS 中 OV5648 确实配置在 I2C2 结点下，配置正确。

Check OV5648 is actually configured to I2C2 node in DTS. The configuration is correct.

```
32
33  &i2c2 {
34      status = "okay";
35
36      ov5648: ov5648@36 {
37          status = "okay";
38          compatible = "ovti,ov5648";
39          reg = <0x36>;
40          clocks = <&cru SCLK_CIF_OUT>;
41          clock-names = "xvclk";
42
```

图 22 I2CBus 正确示例图

Picture 22 Example of correct I2CBus

4.8 如何使用 v4l2 获取底层数据流？ How to use v4l2 to acquire the bottom layer data flow?

4.8.1 首先配置链路 First configure the link

目前 RK 的 Camera 驱动使用的 media-ctl 框架，有以下四种常见链路：

Currently RK camera driver uses media-ctl framework, and there are the following four common chain links:

1、 MIPI-RAW-Sensor -> MIPI 接口->ISP

MIPI-RAW-Sensor -> MIPI interface->ISP

2、 MIPI-YUV-Sensor -> MIPI 接口->ISP

MIPI-YUV-Sensor -> MIPI interface->ISP

3、 Parallel-Sensor ->ISP

4、 Parallel-Sensor ->CIF

4.8.1.1 MIPI-RAW-Sensor -> MIPI interface->ISP

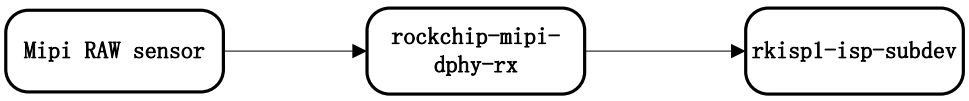

图 23 示例拓扑图 1

Picture 23 example of topological graph 1

以 ov5648 为例：配置链路命令如下：

Take ov5648 as example, the command to configure the link is as below:

media-ctl -l '"ov5648 2-0036":0->"rockchip-mipi-dphy-rx":0[1]'

配置好后，使用 media-ctl -p 命令查看如下：会显示 ENABLED（下同），说明链路配置连接成功。

After configuring, use media-ctl -p command to check as below: it will display ENABLED (same hereinafter), which means the link is configured successfully.

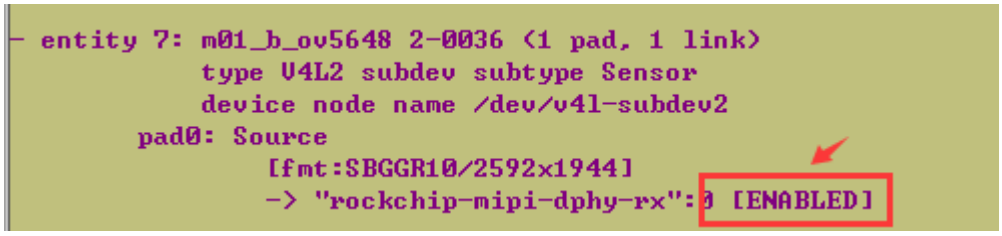

图 24 链路配置 OK 示例图

Picture 24 example of link is configured OK

其他所需链路配置的命令：

Other commands required for the link configuration:

```
media-ctl -l '"rockchip-mipi-dphy-rx":1->"rkisp1-isp-subdev":0[1]'
media-ctl -l '"rkisp1-input-params":0->"rkisp1-isp-subdev":1[1]'
media-ctl -l '"rkisp1-isp-subdev":2->"rkisp1_selfpath":0[1]'
media-ctl -l '"rkisp1-isp-subdev":2->"rkisp1_mainpath":0[1]'
media-ctl -l '"rkisp1-isp-subdev":3->"rkisp1-statistics":0[1]'
```

4.8.1.2 MIPI-YUV-Sensor -> MIPI interface->ISP

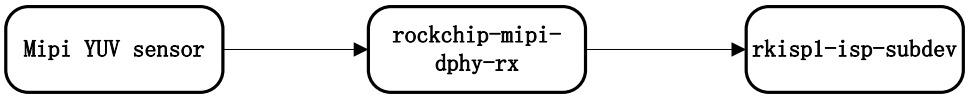

图 25 示例拓扑图 2

Picture 25 example of topological graph 2

以 GC2145-MIPI-YUV 为例：配置链路命令如下：

Take GC2145-MIPI-YUV as example, the command to configure the link is as below:

```
media-ctl -l '"gc2145 2-003c":0->"rockchip-mipi-dphy-rx":0[1]'
media-ctl -l '"rockchip-mipi-dphy-rx":1->"rkisp1-isp-subdev":0[1]'
```

其他同 1

Others are same as 1.

4.8.1.3 Parallel-Sensor ->ISP

图 26 示例拓扑图 3

Picture 26 example of topological graph 3

以 GC2145-DVP 为例：

Take GC2145-DVP as example:

```
media-ctl -l "'gc2145 2-003c":0->"rkisp1-isp-subdev":0[1]'
media-ctl -l "'rkisp1-input-params":0->"rkisp1-isp-subdev":1[1]'
media-ctl -l "'rkisp1-isp-subdev":2->"rkisp1_selfpath":0[1]'
media-ctl -l "'rkisp1-isp-subdev":2->"rkisp1_mainpath":0[1]'
media-ctl -l "'rkisp1-isp-subdev":3->"rkisp1-statistics":0[1]'
```

4.8.1.4 Parallel-Sensor ->CIF

图 27 示例拓扑图 4

Picture 27 example of topological graph 4

以 GC0329 为例：

Take GC0329 as example:

```
media-ctl -l "'gc0329 0-0031":0->"stream_cif":0[1]'
```

4.8.2 配置各 entity 格式 Configure each entity format

4.8.2.1 MIPI-RAW-Sensor -> MIPI interface->ISP

以 ov5648 为例：全分辨率 2592x1944 输出，配置各 entity 和 pad 的格式如下：

Take ov5648 as example: output with full resolution 2592x1944, configure each entity and pad format as below:

```
media-ctl --set-v4l2 "'ov5648 2-0036":0[fmt:SBGGR10/2592x1944]'
media-ctl --set-v4l2 "'rkisp1-isp-subdev":0[fmt:SBGGR10/2592x1944]'
media-ctl --set-v4l2 "'rkisp1-isp-subdev":0[fmt:SBGGR10/2592x1944]' --set-v4l2
"'rkisp1-isp-subdev":0[crop:(0,0)/2592x1944]'
media-ctl --set-v4l2 "'rkisp1-isp-subdev":2[fmt:YUYV2X8/2592x1944]'
media-ctl --set-v4l2 "'rkisp1-isp-subdev":2[fmt:YUYV2X8/2592x1944]' --set-v4l2
"'rkisp1-isp-subdev":2[crop:(0,0)/2592x1944]'
```

使用命令：media-ctl --get-v4l2 "'rkisp1-isp-subdev":0’ 或 media-ctl -p

Use the command: media-ctl --get-v4l2 "'rkisp1-isp-subdev":0’ 或 media-ctl -p

查看设置的格式是否正确

to check if the format set is correct or not

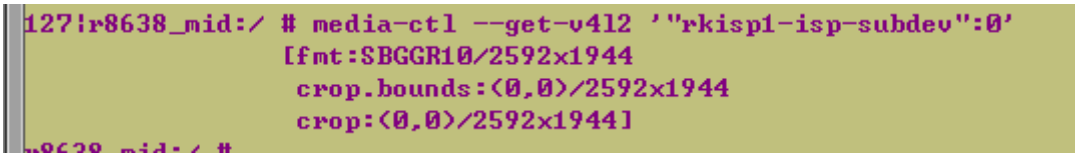

图 28 分辨率配置正确示例图

Picture 28 example of resolution is configured correctly

4.8.2.2 MIPI-YUV-Sensor -> MIPI interface->ISP

以 GC2145-MIPI-YUV 为例：800x600 输出

Take GC2145-MIPI-YUV as example: output with 800x600

```
media-ctl --set-v4l2 '"gc2145 3-003c":0[fmt:UYVY2X8/800x600]'
media-ctl --set-v4l2 '"rkisp1-isp-subdev":0[fmt:UYVY2X8/800x600]'
media-ctl --set-v4l2 '"rkisp1-isp-subdev":0[fmt:UYVY2X8/800x600]' --set-v4l2
'"rkisp1-isp-subdev":0[crop:(0,0)/800x600]'
media-ctl --set-v4l2 '"rkisp1-isp-subdev":2[fmt:YUYV2X8/800x600]'
media-ctl --set-v4l2 '"rkisp1-isp-subdev":2[fmt:YUYV2X8/800x600]' --set-v4l2
'"rkisp1-isp-subdev":2[crop:(0,0)/800x600]'
```

4.8.2.3 Parallel-Sensor ->ISP

以 GC2145-DVP 为例：同 2

Take GC2145-DVP as example: same as 2

4.8.2.4 Parallel-Sensor ->CIF

```
media-ctl --set-v4l2 '"gc0329 0-0031":0[fmt:YUYV2X8/640x480]'
```

4.8.3 使用 V4l2 命令获取数据流 Use V4l2 command to acquire the data flow

以上四种通路最后获取数据流的命令基本一致：使用命令：v4l2-ctl -h，查看使用方法，以 ov5648 为例：

The command for above four links to acquire the data flow are basically consistent: use the command: v4l2-ctl -h, check the usage, take ov5648 as example:

```
v4l2-ctl --verbose -d /dev/video0 --set-fmt-video=width=2592,height=1944,pixelformat='NV12'
--stream-mmap=4 --set-selection=target=crop,flags=0,top=0,left=0,width=2592,height=1944
```

如果是其他分辨率，需要修改下 width 和 height；

If for other resolutions, need to modify width and height.

如果数据流正常，打印如下：会打印出帧率。

If the data flow is normal, it will print as below: will print out the frame rate.

```
idx: 1 seq:    997 bytesused: 11985408 ts: 471.372915 delta: 66.655 ms fps: 15.00
idx: 2 seq:    998 bytesused: 11985408 ts: 471.439573 delta: 66.658 ms fps: 15.00
idx: 3 seq:    999 bytesused: 11985408 ts: 471.506243 delta: 66.670 ms fps: 15.00
idx: 0 seq:   1000 bytesused: 11985408 ts: 471.572785 delta: 66.542 ms fps: 15.00
VIDIOC_STREAMOFF: ok
```

图 29 正常数据流输出示例图

Picture 29 example of normal data flow output

4.8.4 v4l2-ctl 及 media-ctl 工具说明 v4l2-ctl and media-ctl tool introduction

media-ctl 以及 v4l2-ctl 是 v4l-utils 中包含的两个命令行工具。

media-ctl and v4l2-ctl are the command line tools involved in v4l-utils.

- media-ctl，用以查看、配置拓扑结构

  media-ctl, used to check and configure topological structure

- v4l2-ctl， 用以配置 v4l2 controls， 可抓帧， 设置 cif， isp， sensor 参数

  v4l2-ctl, used to configure v4l2 controls, can capture the frame, set cif, isp, sensor parameter

v4l-utils 工具是由 Linuxtv 维护的一个 V4L2 开发套件， 它提供一系列 V4L2 及 media framework 相关的工具，用来配置 V4L2 子设备的属性，测试 V4L2 设备，并提供如 libv4l2.so 开发库等等。代码下载地址：https://w ww.linuxtv.org/downloads/v4l-utils/

v4l-utils tool is V4L2 development kit maintained by Linuxtv. It provides a series of tools related with V4L2 and media framework, which are used to configure the sub-device property of V4L2, test V4L2 device, and provide development libraries such as libv4l2.so. The download link of the code is: https://w ww.linuxtv.org/downloads/v4l-utils/

media-ctl 以及 v4l2-ctl 两个命令工具可以通过上述地址自己下载编译或找 FAE 获取 RK 平台编译好的可执行文件。

You can download and compile media-ctl and v4l2-ctl command tools through the above link by yourself or acquire the executable file compiled on RK platform from FAE.

4.9 常见更新 SDK 后，摄像头打不开问题分析排查步骤 Steps to analyze the issue of failing to open the camera after updating SDK

4.9.1 先将 camera3_profiles.xml 中 先改成 SOC 类型 First change the sensor type to SOC in camera3_profiles.xml

```
<Sensor_info_RKISP1> <!-- Information that parametrizes the behavior or qualities of t
    <sensorType value="SENSOR_TYPE_SOC"/> <!-- SENSOR_TYPE_SOC or SENSOR_TYPE_RAW -->
    <exposure.sync value="true"/> <!-- compensate expsure sync-->
    <sensor.digitalGain value="false"/> <!-- digital gain support on sensor-->
    <gain.lag value="2"/> <!-- camera3 HAL CPF parameters moved here start-->
    <exposure.lag value="2"/>
    <fov value= "54.8" value_v="42.5"/>
    <statistics.initialSkip value="1"/> <!-- camera3 HAL CPF parameters moved here end
    <frame.initialSkip value="3"/> <!-- camera3 HAL CPF parameters moved here end-->
    <isoAnalogGain1 value="75"/> <!--Pseudo ISO corresponding analog gain value 1.0. -
    <cITMaxMargin value="10"/> <!--coarse integration time max margin -->
</Sensor_info_RKISP1>
```

图 30 SENSOR TYPE 修改示例图

Picture 30 example of SENSOR TYPE modification

如果不会报错，说明 tuning 文件版本不对；请联系对应 tuning 调试工程师进行版本更新。因为对于输出 RAW 格式的 Camera 来说，SDK 更新过程中，camera_engine_rkisp 的代码有更新 tuning 参数结构可能有修改，从而导致更新 SDK 后摄像头打不开问题。

If it doesn't report error, it means tuning file version is incorrect. Please contact with the corresponding tuning engineer to update the version. Because for the camera outputting RAW format, during SDK updating process, camera_engine_rkisp code is updated and the tuning parameter structure may change, which will cause the issue that the camera fails to work after updating SDK.

如果是 SOC 的 Camera，可以忽略这步，跳到下一步排查。

If for SOC Camera, you can skip this step.

4.9.2 如果还报错，先重启，然后使用 v4l2-ctl 工具底层抓数据流,看下是否正常 If still error, first restart, then use v4l2-ctl tool to capture bottom layer data flow to see if it is normal

如果正常，说明是 camera3_profiles.xml 配置问题，对照最新 SDK 目录下对应平台的 xml 配置进行修改；

If normal, it means it is camera3_profiles.xml configuration issue. Modify according to xml configuration of the corresponding platform in the latest SDK directory.

如果不正常，说明底层驱动问题，排查 dts 是否配置正确，驱动和最新 SDK 目录下驱动对照修改。

If it is abnormal, it means it is the bottom layer driver problem. Check if dts is configured correctly or not. Modify the driver according to the driver in the latest SDK directory.

4.10 如何判断驱动中摄像头配置是 RAW 还是 SOC 类型？ How to judge the sensor type configured in the driver is RAW or SOC?

如果驱动中 xxxx_enum_mbus_code 配置为 MEDIA_BUS_FMT_UYVY/YUYV/VYUY 等，则为 SOC 摄像头；如果需要调试效果，找对应 Sensor 原厂。

If xxxx_enum_mbus_code in the driver is configured as MEDIA_BUS_FMT_UYVY/YUYV/VYUY, it is SOC camera. If need camera tuning, please ask Sensor vendor for help.

例如：GC2145 输出 YUV 数据配置如下：

For example: configure as below for GC2145 to output YUV data:

```
1935: static const struct gc2145_pixfmt gc2145_formats[] = {
1936:     {
1937:         .code = MEDIA_BUS_FMT_UYVY8_2X8,
1938:     }
1939: };
```

图 31 SOC 类型示例

Picture 31 example of SOC type

如果驱动中 xxxx_enum_mbus_code 配置为 MEDIA_BUS_FMT_SBGGR/SRGGB/SGBRG 等，则为 RAW 摄像头，如果需要调试效果，找业务申请；

If xxxx_enum_mbus_code in the driver is configured as MEDIA_BUS_FMT_SBGGR/SRGGB/SGBRG, it is RAW camera. If need camera tuning, ask sales to apply.

例如：OV5648 输出 RAW 数据配置如下：

For example: configure as below for OV5648 to output RAW data:

```
685: static int ov5648_enum_mbus_code(struct v4l2_subdev *sd,
686:                                  struct v4l2_subdev_pad_config *cfg,
687:                                  struct v4l2_subdev_mbus_code_enum *code)
688: {
689:     if (code->index != 0)
690:         return -EINVAL;
691:     code->code = MEDIA_BUS_FMT_SBGGR10_1X10;
692:
693:     return 0;
694: }
```

图 32 RAW 类型示例

Picture 32 example of RAW type

5 调试案例 Debugging example

5.1 SDK 自带驱动，使用 v4l2-ctl 命令获取数据流出现 kernel 崩溃问题

SDK built-in driver, kernel panic when using v4l2-ctl command to acquire the data flow

5.1.1 问题描述 Issue description

在 Android 9.0 中使用已调试好的驱动，配置好链路后，使用 v4l2-ctl 命令获取数据流出现 kernel 奔溃问题。关键崩溃 LOG 如下：

Use the available driver in Android 9.0, after configuring the link, use v4l2-ctl command to acquire the data flow, but kernel panic issue happens. The key panic LOG are as below:

```
[    37.667090] Internal error: Oops: 96000005 [#1] PREEMPT SMP
[    37.669853] dwmmc_rockchip ff0f0000.dwmmc: Unexpected interrupt latency
[    37.679306] Modules linked in: 8723cs
[    37.683058] CPU: 0 PID: 0 Comm: swapper/0 Not tainted 4.4.167 #13
[    37.689164] Hardware name: Rockchip rk3368 xkp avb board (DT)
[    37.694936] task: ffffff80091757d0 task.stack: ffffff8009160000
[    37.700893] PC is at camsys_mrv_irq+0x2c/0x308
[    37.705378] LR is at handle_irq_event_percpu+0x9c/0x250
```

5.1.2 问题分析 Issue analysis

查看 LOG 中有 camsys_mrv_irq 字样，camsys_mrv 这个为 Android8.1 及更低版本使用的 isp 驱动代码中包含的；所以分析是 dts 中旧的 isp 结点和新的 rkisp1 结点同时配置，出现冲突导致异常。

We can see there is camsys_mrv_irq existing in LOG. camsys_mrv is included in isp driver code of Android8.1 or lower versions. So the issue is caused by the conflict due to the old isp node and new rkisp1 node are configured at the same time in dts.

5.1.3 解决办法 Solution

如果是 RK3326 平台，需要将如下结点 disabled 掉：

For RK3326 platform, need to disable the following node:

```
&rk_isp {
        status = "disabled";
};
```

如果是 RK3288、RK3368 平台，需要 disabled 的结点如下：

For RK3288, RK3368 platform, need to disable the following node:

```
&isp {
        status = "disabled";
};
```

如果是 RK3399 平台，因为包含两个 ISP，需要 disabled 的结点如下：

For RK3399 platform, because it includes two ISP, need to disable the node as below:

```
&isp 0 or 1{
        status = "disabled";
};
```

5.2 RK3126C-9.0-GC0312- 预览必现分屏显示问题 RK3126C-9.0-GC0312- preview screen split issue with 100%

5.2.1 问题描述 Issue description

GC0312 预览分屏显示异常如图，并且每次打开都是分屏。

GC0312 preview screen split is displayed as below picture, and every time the screen is split.

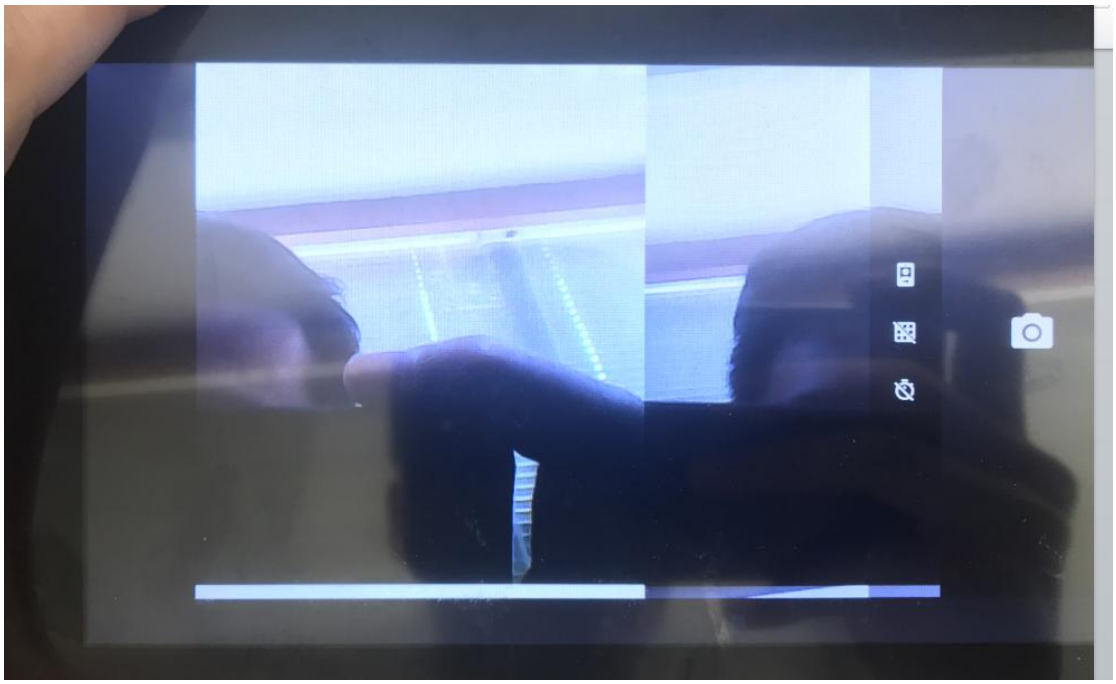

图 33 分屏显示异常图

Picture 33 abnormal picture of screen split

5.2.2 问题分析 Issue analysis

因为是必现，分析可能是 vsync/hsync 极性配置不对导致，尝试修改 DTS 中配置的极性试试。

Because the probability is 100%, maybe it is caused by wrong polarity configuration of vsync/hsync. Try to modify the polarity configuration in DTS

5.2.3 解决办法 Solution

修改 dts 中 vsync 极性，原始极性配置如下：

Modify the polarity of vsync in dts. The original polarity configuration is as below:

```
209     ports {
210         port@0 {
211             cif_in_fcam: endpoint@0 {
212                 remote-endpoint = <&gc0312_out>;
213                 vsync-active = <1>;
214                 hsync-active = <1>;
215             };
```

图 34 原始 vsync 极性

Picture 34 original polarity of vsync

改成如下：

Change to:

```
ports {
    port@0 {
        cif_in_fcam: endpoint@0 {
            remote-endpoint = <&gc0312_out>;
            vsync-active = <0>;
            hsync-active = <1>;
        };
```

图 35 修改后的 vsync 极性

Picture 35 modified polarity of vsync

5.3 RK3126C-9.0-GC2145- 预览概率性分屏显示问题

RK3126C-9.0-GC2145- preview screen split issue

5.3.1 问题描述 Issue description

GC2145-预览概率性分屏显示如图，而且如果打开 Touch Point 触摸屏划线，概率会加大。

GC2145- preview screen split occurs with probability as below picture, and if enable Touch Point to draw line, the probability will become bigger.

图 36 分屏显示示例图 1

Picture 36 example 1 of screen split display

图 37 分屏显示示例图 2

Picture 37 example 2 of screen split display

5.3.2 问题分析 Issue analysis

和 5.2 中现象不同的是，打开 Camera 预览是概率性的分屏显示；而且打开 TP 触摸屏划线概率增大。概率性出现分屏显示时候，rkcif 驱动有如下 LOG 打印：

Different from the phenomenon in 5.2, the screen split happens with probability, and enable TP will enlarge the probability. When the issue happens, rkcif driver will print the following LOG:

```
rkcif: Bad frame, irq:0xf frmst:0x10001 size:605x3200
```

初步分析可能原因：

Analyze the possible reason:

1、跟 DDR 带宽有关系；

Related with DDR bandwidth.

2、VSYNC 和 HSYNC 可能配置不对没问题；

VSYNC and HSYNC configuration may have some problem.

3、CIF 控制器和 CIS（CMOS IMAGE SENSOR）的开启时序可能不对；

Start timing of CIF controller and CIS (CMOS IMAGE SENSOR) may be incorrect.

根据分析的可能原因做如下尝试：

According to the possible reasons, try as below:

1、尝试提高 DDR 频率，概率性分屏显示问题有改善，但多测试还是会出现；

Try to increase DDR frequency. The screen split issue can be improved, but still happens.

2、尝试修改 VSYNC 和 HSYNC 极性，出现打不开摄像头，说明跟 VSYNC 和 HSYNC 无关；

Try to modify the polarity of VSYNC and HSYNC, then the camera cannot work. That means it is not related with VSYNC and HSYNC.

3、尝试调整 CIF 控制器和 CIS（CMOS IMAGE SENSOR）的开启数据流的时序，有效；

Try to adjust the timing for CIF controller and CIS (CMOS IMAGE SENSOR) to start the data flow. It works.

5.3.3 解决办法 Solution

调整 CIF 控制器和 CIS（CMOS IMAGE SENSOR）开启数据流的时序，先将 SENSOR 的数据流开启，然后再开启 CIF 控制器，CIF 控制器驱动代码修改如下：

Adjust the timing for CIF controller and CIS (CMOS IMAGE SENSOR) to start the data flow, first enable the data flow of SENSOR, and then enable CIF controller. Modify CIF controller driver code as below:

```
--- a/drivers/media/platform/rockchip/cif/capture.c
+++ b/drivers/media/platform/rockchip/cif/capture.c
@@ -536,9 +536,6 @@ static int rkcif_start_streaming(struct vb2_queue *queue, unsigned int count)
                        v4l2_err(v4l2_dev, "Failed to get runtime pm, %d\n", ret);
                        goto destroy_dummy_buf;
                }
-               ret = rkcif_stream_start(stream);
-               if (ret < 0)
-                       goto runtime_put;

                /* start sub-devices */
                sd = dev->active_sensor->sd;
@@ -549,6 +546,10 @@ static int rkcif_start_streaming(struct vb2_queue *queue, unsigned int count)
                if (ret < 0)
                        goto subdev_poweroff;

+               ret = rkcif_stream_start(stream);
+               if (ret < 0)
```

```
+                       goto runtime_put;
+
        return 0;

 subdev_poweroff:
```

5.4 RK3126C-9.0-GC2145 录像帧率只有 20fps 左右，不到 30fps 问题

RK3126C-9.0-GC2145 video recording frame rate is only around 20fps, cannot reach 30fps

5.4.1 问题描述 Issue description

打开 CameraHal3 的 debug 开关，然后打开 Camera APK 切换到录像预览界面；使用命令查看帧率： logcat | grep FPS ，结果如下，只有 20fps 左右。

Enable debug of CameraHal3, then open Camera APK to switch to the preview interface of video recording. Use the command to check the frame rate: logcat | grep FPS. The result is shown as below, only 20fps around.

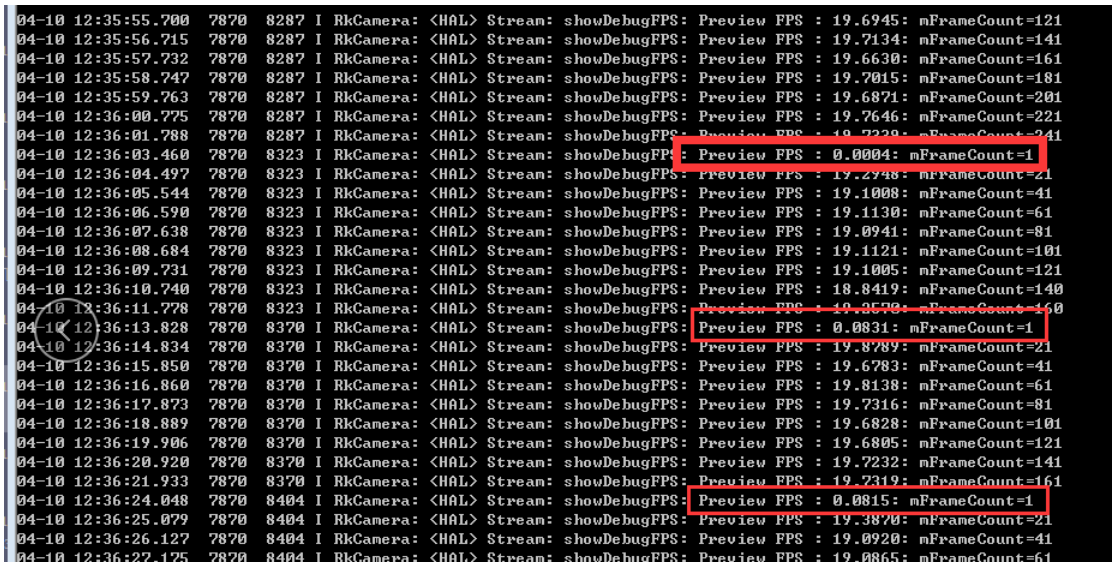

图 38 录像预览帧率图

Picture 38 picture of video recording preview frame rate

5.4.2 问题分析 Issue analysis

RK3126C-9.0 的 SDK 代码中，GC2145 驱动有 1600x1200@20fps 和 800x600@20fps 这两组 20fps 的寄存器配置，在 GC2145 驱动里面加下如下打印信息；

In RK3126C-9.0 SDK code, GC2145 driver includes 1600x1200@20fps and 800x600@20fps two groups of 20fps register configuration. Add the following print information in GC2145 driver.

```
@@ -2095,7 +2098,11 @@ static int gc2145_s_stream(struct v4l2_subdev *sd, int on)
        struct gc2145 *gc2145 = to_gc2145(sd);
```

```
        int ret = 0;

-       dev_dbg(&client->dev, "%s: on: %d\n", __func__, on);
+       //dev_dbg(&client->dev, "%s: on: %d\n", __func__, on);
+       dev_info(&client->dev, "%s: on: %d, %dx%d@%d\n", __func__, on,
+                                gc2145->frame_size->width,
+                                gc2145->frame_size->height,
+                                gc2145->frame_size->fps);

        mutex_lock(&gc2145->lock);
```

看录像预览调下来的分辨率和帧率是多少，结果如下：

Check what the resolution and frame rate of the video recording are. The results are as below:

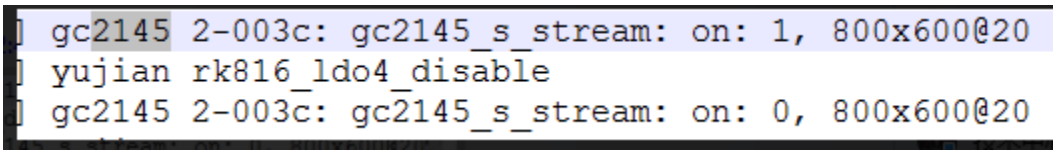

图 39 录像预览分辨率帧率选择

Picture 39 Select video recording preview resolution and frame rate

说明录像预览的时候 Camera Hal 层下发的预览帧率只有 20fps，经定位分析是 camera3_profiles.xml 中的 entity 没配对导致异常。

It means preview frame rate of Camera Hal while video recording is only 20fps. After analyzing, the issue is caused by entity which is not configured correctly in camera3_profiles.xml.

5.4.3 解决办法 Solution

camera3_profiles.xml 中的原始配置的 entity name 如下：为 gc2145 0-003c

The entity name in camera3_profiles.xml is originally configured as below: it is gc2145 0-003c

图 40 原始配置的 entity name

Picture 40 originally configured entity name

而通过 media-ctl -p 命令查看结果如下：

But the result checked by the command media-ctl -p is as below:

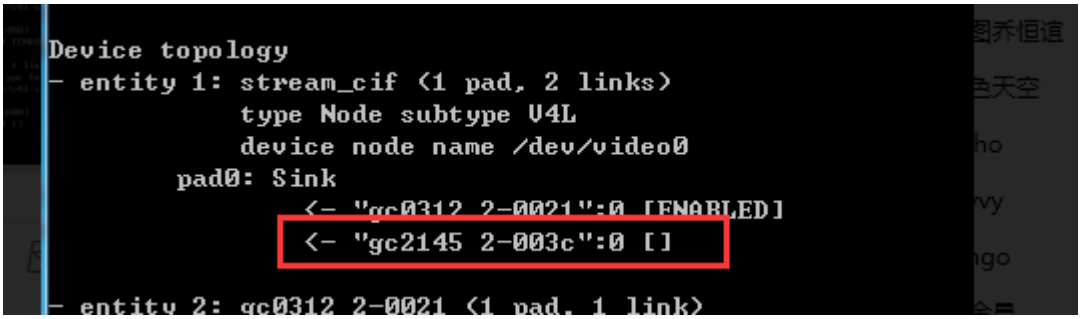

图 41 板子查看的 entity name

Picture 41 check entity name of the board

所以上面的 entity name 应该修改成：gc2145 2-003c。

So the above entity name should be changed to: gc2145 2-003c.

5.5 v4l2 命令获取数据流失败问题常见原因及调试方法 The common reason of failing to use v4l2 command to acquire the data flow and debugging method

5.5.1 可能原因 1：DVP 接口相关的 IOMUX 未进行配置 Possible reason 1: DVP interface related IOMUX is not configured

以 RK3368 上调试 GC2145-DVP 为例进行说明。

Take GC2145-DVP debugging on RK3368 as example to introduce.

5.5.1.1 问题现象 Issue phenomenon

使用如下命令进行数据流获取：

Use the following command to acquire the data flow:

```
v4l2-ctl --verbose -d /dev/video0 --set-fmt-video=width=800,height=600,pixelformat='NV12'
--stream-mmap=4 --set-selection=target=crop,flags=0,top=0,left=0,width=800,height=600
```

但是结果如下：

But the result is as below:

```
VIDIOC_QUERYCAP: ok
VIDIOC_G_FMT: ok
VIDIOC_S_FMT: ok
Format Video Capture Multiplanar:
        Width/Height      : 800/600
        Pixel Format      : 'NV12'
        Field             : None
        Number of planes  : 1
        Flags             :
        Colorspace        : Default
        Transfer Function : Default
        YCbCr Encoding    : Default
        Quantization      : Full Range
        Plane 0           :
           Bytes per Line : 800
           Size Image     : 720000
VIDIOC_REQBUFS: ok
VIDIOC_QUERYBUF: ok
VIDIOC_QUERYBUF: ok
VIDIOC_QBUF: ok
VIDIOC_QUERYBUF: ok
VIDIOC_QBUF: ok
VIDIOC_QUERYBUF: ok
VIDIOC_QBUF: ok
VIDIOC_QUERYBUF: ok
VIDIOC_QBUF: ok
VIDIOC_STREAMON: ok
select timeout
```

就是没有数据流抓出来；

There is no data flow output.

测量 GC2145 输出及输入的信号： CIF_CLKIN = 61MHZ

Measure GC2145 output and input signals: CIF_CLKIN = 61MHZ

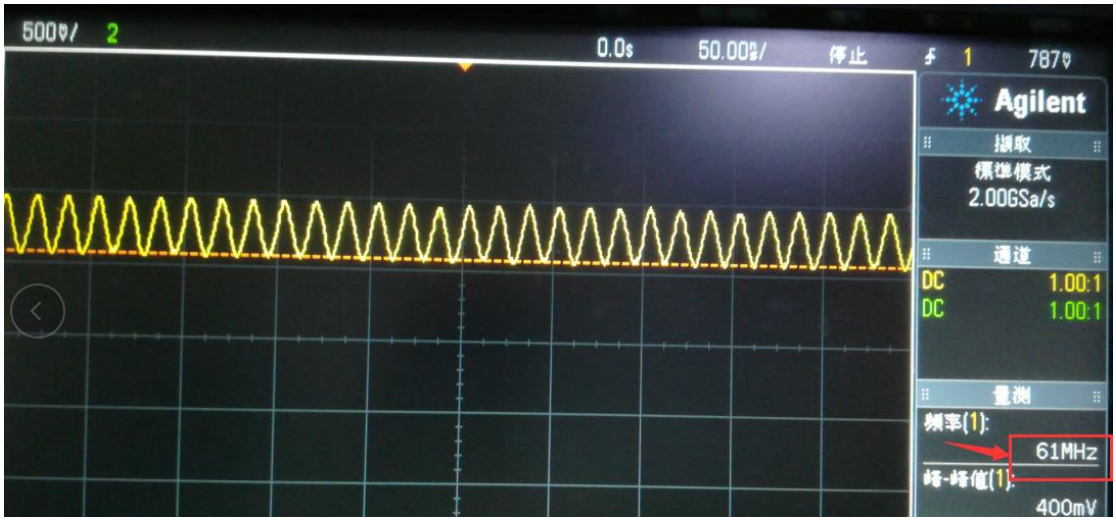

图 42 PCLK 信号

Picture 42 PCLK signal

输入给 GC2145 的 CIF_CLKOUT = 24MHZ 正常，CIF_DATA 引脚均有数据输出。

CIF_CLKOUT = 24MHZ input to GC2145 is normal. CIF_DATA pin has data output.

5.5.1.2 调试方法 Debugging method

使用 IO 命令查看当前 DVP 相关的 GPIO 的 IOMMU 是否正确

Use IO command to check if IOMMU of current DVP related GPIO is correct or not.

```
isp_dvp_d2d9: isp-dvp-d2d9 {
    rockchip,pins =
        <1 0 RK_FUNC_1 &pcfg_pull_none>,//cif_data2
        <1 1 RK_FUNC_1 &pcfg_pull_none>,//cif_data3
        <1 2 RK_FUNC_1 &pcfg_pull_none>,//cif_data4
        <1 3 RK_FUNC_1 &pcfg_pull_none>,//cif_data5
        <1 4 RK_FUNC_1 &pcfg_pull_none>,//cif_data6
```

图 43 DVP 接口部分 GPIO 示例

Picture 43 example of DVP related GPIO

查看 RK3368 的 Datasheet 找到对应 GPIO 口 IOMUX 的寄存器地址：

Check RK3368 Datasheet to find the register address of IOMUX of the corresponding GPIO port:

GRF 基地址：

GRF basic address

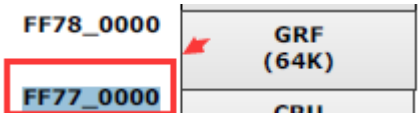

图 44 GRF 基地址

Picture 44 GRF basic address

对应 GPIO_IOMUX 地址:

Corresponding GPIO_IOMUX address:

GRF_GPIO1A_IOMUX	0x00000	W	0x00000000	GPIO1A iomux control
GRF_GPIO1B_IOMUX	0x00004	W	0x00000000	GPIO1B iomux control

图 45 GPIO_IOMUX 地址

Picture 45 GPIO_IOMUX address

0xFF770000 + 0x00000= 0xff770000

3:2	RW	0x0	gpio1a1_sel GPIO1A[1] iomux select 2'b00: gpio 2'b01: cif_data3 2'b10: ts_data1 2'b11: reserved
1:0	RW	0x0	gpio1a0_sel GPIO1A[0] iomux select 2'b00: gpio 2'b01: cif_data2

图 46 IOMUX 复用位说明

Picture 46 IOMUX reuse bit instruction

使用命令：io -4 0xff770000，查看 GPIO 复用情况，结果如下：没有被赋值为：CIF_DATA;

Use the command io -4 0xff770000, to check GPIO reuse status. The result is as below: it is not configured as: CIF_DATA;

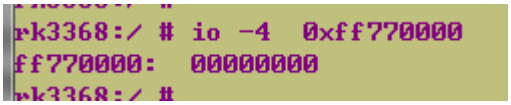

图 47 异常 IOMUX 结果

Picture 47 abnormal result of IOMUX

而正常的如下：IOMUX 正常赋值成了 CIF_DATA 引脚；

The normal result is as below: IOMUX is normally configured as CIF_DATA pin.

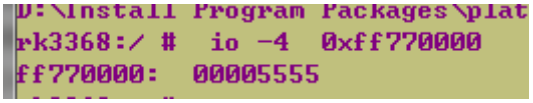

图 48 正常 IOMUX 结果

Picture 48 normal result of IOMUX

5.5.1.3 解决办法 Solution

在 dts 的 rkisp1 结点中把相应的 pinctrl 加上即可。

Just need to add the corresponding pinctrl in rkisp1 node in dts.

```
&rkisp1 {
    status = "okay";
    pinctrl-names = "default";
    pinctrl-0 = < &cif_clkout &isp_dvp_d2d9 &isp_dvp_d10d11 >;
```

5.5.2 可能原因 2：模组供电少了 Possible reason 2: power supply of the module is missing

5.5.2.1 问题现象 Issue phenomenon

以调试 OV5648 为例，导致 Check ID 虽然成功了，但后面寄存器写失败。

Take OV5648 debugging as example, although Check ID succeeds, the register fails to write later.

5.5.2.2 调试方法 Debugging method

在 static int ov5648_write_reg()函数中添加调试 LOG 如下：

Add debugging LOG in static int ov5648_write_reg() function as below:

```
687: static int ov5648_write_reg(struct i2c_client *client, u16 reg,
688:                u32 len, u32 val)
689: {
690:     u32 buf_i, val_i;
691:     u8 buf[6];
692:     u8 *val_p;
693:     __be32 val_be;
694:
695:     dev_info(&client->dev, "%s(%d) enter!\n", __func__, __LINE__);
696:     dev_info(&client->dev, "ov5648 write reg(0x%x val:0x%x)!\n", reg, val);
697:
```

图 49 打印信息添加示例

Picture 49 example of adding print information

然后核对打印信息，查看寄存器值是否写入 OK。因为 OV5648 模组需要 1.5v 供电；而 dts 中如果未提供，可能导致 Check ID 虽然成功了，但后面寄存器写失败。

Then compare the print information, and check if the register value is written OK. Because OV5648 module requires 1.5V power, but if it is not provided in dts, it may cause the register fails to write although Check ID successfully.

5.5.2.3 解决办法 Solution

参考原理图，在 Sensor 的结点配置加上对应供电：dvdd-supply = <&vcc1v5_dvp>。

Refer to the schematic, configure the corresponding power in Sensor node: dvdd-supply = <&vcc1v5_dvp>

```
45
46          avdd-supply = <&vcc2v8_dvp>;
47          dovdd-supply = <&vcc1v8_dvp>;
48          dvdd-supply = <&vcc1v5_dvp>;
49
```

图 50 添加 DVDD 供电

Picture 50 add power supply of DVDD

5.5.3 可能原因 3：驱动中配置的 MIPI 速率不对 Possible reason 3: MIPI rate configured in the driver is incorrect

5.5.3.1 问题现象 Issue phenomenon

以 RK3326-Android9.0 上调试 OV5648 为例。

Take OV5648 debugging on RK3326-Android9.0 as example.

使用命令：cat /proc/interrupts | grep isp ，查看 ISP 中断情况如下：

Use the command cat /proc/interrupts | grep isp to check ISP interrupt status as below:

```
console:/ # cat /proc/interrupts | grep isp
 37:          0          0          0          0     GICv2 102 Level     rkisp1
console:/ #
console:/ #
console:/ #
```

图 51 isp 中断

Picture 51 isp interrupt

没有中断过来，说明 isp 这边没有收到数据。

There is no interrupt coming, which means isp doesn't receive data.

5.5.3.2 调试方法 Debugging method

使用如下命令进行数据流获取：

Use the following command to acquire the data flow:

```
v4l2-ctl --verbose -d /dev/video0 --set-fmt-video=width=2592,height=1944,pixelformat='NV12'
--stream-mmap=4 --set-selection=target=crop,flags=0,top=0,left=0,width=2592,height=1944
```

配置好后，使用命令： io -4 -l 0x100 0xff4a1c00，查看 ISP 识别数据情况；

After configuration, use the command io -4 -l 0x100 0xff4a1c00 to check the data status recognized by ISP.

```
r8638_mid:/ # io -4 -l 0x100 0xff4a1c00
ff4a1c00:  00021001 00002c00 03f33333 00200332
ff4a1c10:  00200332 00000000 00000000 000000c2
ff4a1c20:  0000002b 000000ff 000000ff 000000ff
ff4a1c30:  000000ff 00000000 00000000 00000000
ff4a1c40:  00000000 00000000 00000000 00000000
ff4a1c50:  00000000 00000000 001f6ad3 22222222
ff4a1c60:  000002f7 00000000 00000000 00000000
ff4a1c70:  00000000 00000000 00000000 00000000
```

图 52 ISP 识别数据类型情况

Picture 52 data type status recognized by ISP

识别到的数据类型异常。

The data type recognized is abnormal.

5.5.3.3 尝试解决办法 Try the solution

将 MIPI_FREQ 改成 210MhZ。

Change MIPI_FREQ to 210MHz.

```
41: /* pixel_rate = link_frequency * 2 * lanes / BITS_PER_SAMPLE */
42: #define MIPI_FREQ    210000000U
```

```
471:
472: static const s64 link_freq_menu_items[] = {
473:     MIPI_FREQ
474: };
```

图 53 MIPI 速率配置修改

Picture 53 modify MIPI rate configuration

结果如下：数据流通了；

The result is as below: the data flow is normal now.

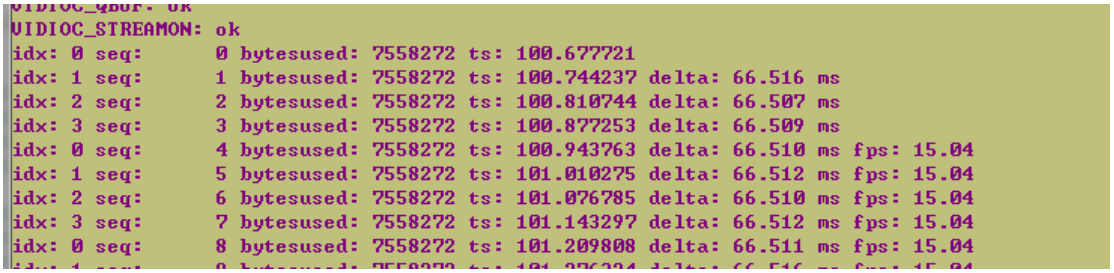

图 54 数据流通示例

Picture 54 example of normal data flow

5.6 RK3326-9.0-GC2145 烧完机后进 camera 概率性报错问题 Error happens with probability while entering camera after flashing RK3326-9.0-GC2145

5.6.1 问题描述 Issue description

RK3326-9.0 烧完机后进 camera 概率性报错，刷 5 台有 1 台的样子报错，重启机器、或恢复出厂设置就好了，2019 年 8 月 5 号的安全补丁。

After flashing RK3326-9.0, with 2019-8-5 security patch, open camera will report error with the probability 1 out of 5, reboot the device, or factory reset can recover.

5.6.2 问题分析 Issue analysis

将 CameraHal 的 log 打开，查看有如下关键 LOG：

Enable log of CameraHal, and there is the following key LOG:

```
D RkCamera: <HAL> FlashLight: @getFlashLightInfo : hasFlash 1, flashNode0: , flashNode1:
E RkCamera: <HAL> FlashLight: init: Unable to open node ''
```

分析可能跟 FLASH 相关参数初始化有关。

It may be related with the initialization of FLASH related parameters.

5.6.3 解决办法 Solution

在 SDK/hardware/rockchip/camera 目录查看是否有如下提交： 如果没有找 FAE 获取

Check if there is the following commit existing in SDK/hardware/rockchip/camera directory: if not, contact FAE to acquire

```
commit 2fb29b54b6e94ee6303bc4988abaf085247fb87b
Author: Zhong Yichong <zyc@rock-chips.com>
Date:   Thu Oct 10 08:28:24 2019 +0800

    fix hal crashed by uninitialized var mFlashNum

    Change-Id: I3fc16e8dada0201eb2158ab500e5c95a1ec401bc
    Signed-off-by: Zhong Yichong <zyc@rock-chips.com>
```

图 55 问题解决提交点

Picture 55 commit to resolve this issue

或者直接使用如下增加 mFlashNum 初始化修改：

Or directly add the following mFlashNum initialization modification:

```
diff --git a/common/platformdata/PlatformData.cpp b/common/platformdata/PlatformData.cpp
index b183dff..a416061 100644
--- a/common/platformdata/PlatformData.cpp
+++ b/common/platformdata/PlatformData.cpp
@@ -747,6 +747,8 @@ status_t CameraHWInfo::findAttachedSubdevs(const std::string &mcPath,

     LOGI("@%s", __FUNCTION__);

+    drv_info.mFlashNum = 0;
+
     int fd = open(mcPath.c_str(), O_RDONLY);
     if (fd == -1) {
         LOGW("Could not openg media controller device: %s!", strerror(errno));
```

5.7 RK3399-9.0-IMX214 调试中 binning 分辨率 2104x1560 拍照，一拍照相机 APK 立马退出问题 RK3399-9.0-IMX214 debugging binning photo resolution 2104 x1560, APK quits immediately when taking photo

5.7.1 问题描述 Issue description

相机中选择拍照分辨率：3.3M

Select photo resolution in camera: 3.3M

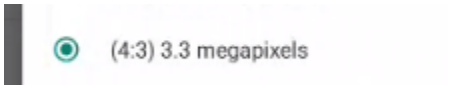

图 56 APK 选择 3.3M

Picture 56 Select 3.3M in APK

然后一点击拍照，相机立马退出。

Then click to take photo, and the camera quits immediately.

5.7.2 问题分析 Issue analysis

查看问题 LOG：

Check LOG of the issue:

```
D        : (pCfgFull->inputWidth & (15)) != 0
D        : JpegEncSetPictureSize: ERROR Out of range image dimension(s)
E hw_jpeg_encode: JPEGENCDOER: JpegEncSetPictureSize fail.
D        : JpegEncRelease#
D        : JpegEncRelease: OK
D hw_jpeg_encode: --- RUN OUT JPEGENCDOER. jpeg len : 0
E RkCamera: <HAL> ImgHWEncoder: @encodeSync 263: hw jpeg encode fail.
E RkCamera: <HAL> PostProcessPipeline: @processFrame, JPEG conversion failed!
[-2147483648]!
```

关键 LOG：(pCfgFull->inputWidth & (15)) != 0

Key LOG: (pCfgFull->inputWidth & (15)) != 0

分析应该是因为 HWENC 编码 JPEG 要求 16 位对齐。

Suppose it is because JPEG requires 16 bit alignment for HWENC encoding.

5.7.3 解决办法 Solution

把 camera3_profiles.xml 里面的拍照分辨率：2104x1560 改成：2096x1560，修改后 3.3M 拍照 OK；

Change the photo resolution in camera3_profiles.xml from 21040 x1560 to 2096x1560. After modifying, it is OK to take photo with 3.3M.

5.8 RK3399-9.0-OV8858-4lane 录像 1080P 帧率只有 15FPS 问题

RK3399-9.0-OV8858-4lane video recording 1080P frame rate is only 15FPS

5.8.1 问题描述 Issue description

RK3399 上两个 ISP 均连接有 Camera，一个 ISP 接 hm2051，一个 ISP 接 OV8858。如果 dts 中两个都配置上，OV8858-4lane 只能到 15FPS；而如果不配置 H2051，只配置 OV8858-4lane 就能到 30FPS。

Both ISP of RK3399 connect camera, one ISP connects with hm2051, and the other connects with OV8858. If they are both configured in dts, OV8858-4lane can only reach 15FPS. But if H2051 is not configured and only configure OV8858-4lane, it can reach 30FPS.

5.8.2 问题分析 Issue analysis

逻辑上 Sensor 输出的帧率只跟写入 OV8858 的寄存器配置一样，驱动及配置一样的话，帧率应该一样的，分析可能跟 MCLK 有关。经分析定位最终发现前置 hm2051 驱动里面用的 MCLK 是用 12MHZ，而 OV8858 所需 MCLK 为 24MHZ；但是摄像头驱动中只在 probe 的时候设置了一次 MCLK，导致后置摄像头中的 MCLK 设置被前置覆盖，从而导致 OV8858 的输出帧率减半。

Logically the output frame rate of Sensor is only the same as the configuration written into the register of OV8858. If the driver and the configuration are the same, the frame rate should be the same. So it may be related with MCLK. After analyzing, it is finally found that MCLK used in the driver of front hm2051 is 12MHz, but MCLK required for OV8858 is 24MHz. but the camera driver only set MCLK once when probe, which cause MCLK setting of back camera is overridden by front camera, and then cause the output frame rate of OV8858 is halved.

5.8.3 解决办法 Solution

参考 ov5695 驱动在 xxxx_power_on 或 xxxx_s_power 中重新设置 clk;

Re-configure clk in xxxx_power_on or xxxx_s_power referring to ov5695 driver:

```
ret = clk_set_rate(ov5695->xvclk, OV5695_XVCLK_FREQ);
if (ret < 0) {
        dev_err(dev, "Failed to set xvclk rate (24MHz)\n");
        return ret;
}
if (clk_get_rate(ov5695->xvclk) != OV5695_XVCLK_FREQ)
        dev_warn(dev, "xvclk mismatched, modes are based on 24MHz\n");
ret = clk_prepare_enable(ov5695->xvclk);
if (ret < 0) {
        dev_err(dev, "Failed to enable xvclk\n");
        return ret;
}
```

5.9 RK3399-9.0-摄像头的 clk 从 sdk 默认的 A 配到 B 是否可以问题咨询

dts 默认配置都是 GPIO2_B3 作为 cif_clkout，cif_clkoutb 没有用过

```
4860
4861  &pinctrl {
4862   isp {
4863    cif_clkout: cif-clkout {
4864     rockchip,pins =
4865
4866      <2 11 3 &pcfg_pull_none>;
4867    };
4868
```

而 cif_clkoutb 为 GPIO3_b7

			software;
15:14	RW	0x0	gpio3b7_sel GPIO3B[7] iomux select 2'b00: gpio 2'b01: mac_crs 2'b10: uart3gps_sout 2'b11: cif_clkoutb

尝试使用 GPIO3_B7 作为 cif_clkoutb 修改如下：

```
--- a/arch/arm64/boot/dts/rockchip/rk3399-android.dtsi
+++ b/arch/arm64/boot/dts/rockchip/rk3399-android.dtsi
@@ -375,7 +375,7 @@
                        cif_clkout: cif-clkout {
                                rockchip,pins =
                                        /*cif_clkout*/
-                                       <2 11 RK_FUNC_3 &pcfg_pull_none>;
+                                       <3 15 RK_FUNC_3 &pcfg_pull_none>;
                        };

                        isp_dvp_d0d7: isp-dvp-d0d7 {
```

使用命令：cat /sys/kernel/debug/pinctrl/pinctrl/pinmux-pins

查看 gpio3_b7 是否已经是 cif_clkout 功能了？结果如下：说明已经为 cif-clkout 了

```
pin 110 (gpio3-14): (MUX UNCLAIMED) (GPIO UNCLAIMED)
pin 111 (gpio3-15): ff920000.rkisp1 (GPIO UNCLAIMED) function isp group cif-clkout
pin 112 (gpio3-16): (MUX UNCLAIMED) (GPIO UNCLAIMED)
```

经测量可以正常输出 24MHZ、12MHX 的 MCLK，OK；