User Guide

SG8A-ORIN-GMSL2

Version 1.0

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Revision History

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Content

Chapter 1 Environment requirement....4
Chapter 2 Support Camera List....4
Chapter 3 Hardware install....5
Chapter 4 Software Package install....6
4.1 Install v4l-util tools....6
4.2 Install Package....6
4.3 Configure Camera parameter....7
4.4 Render the preview to a screen....7
4.5 Record the preview into a file (Based on a software converter)....7
4.6 Remove module driver....7
Appendix 1 The pin relation of Max9296 and Jetson-AGX-Orin-Devkit....8

Chapter 1 Environment requirement

Manufacture	Type	Name
NVIDIA	Software package	Jetson_Linux_R35.1.0_aarch64.tbz2.
NVIDIA	Software package	Tegra_Linux_Sample-Root-Filesystem_R35.1.0_aarch64.tbz2.
NVIDIA	Software package	secureboot_R35.1.0_aarch64.tbz2.
NVIDIA	Hardware Device	Jetson-Agx-Orin-Devkit Device.
Sensing	Hardware Device	F02_GMSL2*8_V2.0 Board.
Sensing	Software package	SG8A-ORIN-GMSL-V1.0.tar.gz.

Chapter 2 Support Camera List

YUV Camera:

sensor_mode	Resolution	Format	Camera Part Number	trig_mode	trig_pin
0	1920*1080	YUV	SG2-IMX390C-5200-GMSL2	0:Rise edge	7:mfp7
		YUV	SG2-AR0233-5300-GMSL2	0:Rise edge	7:mfp7
1	1920*1536	YUV	SG3-ISX031C-GMSL2F	0:Rise edge	7:mfp7
2	2880*1860	YUV	SG2-IMX490C-5200-GMSL2	1:Fall edge	8:mfp8
3	3840*2160	YUV	SG2-AR0820C-5300-GMSL2	3:Auto Trig	8:mfp8
		YUV	SG2-OX08BC-5300-GMSL2	3:Auto Trig	8:mfp8

Note:The green item is can configure by v4l2-ctl command for each channel.
Note:One Max9296 no support two SG3-ISX031C-GMSL2F camera, default can use CAM1, CAM3, CAM5,CAM7 interface, and access by node dev/video1，dev/video3，dev/video5，dev/video7.
sensor_mode:camera resolution, default value is 0(1920*1080).

sensor_mode=1 resolution is 1920*1536;

sensor_mode=2 resolution is 2880*1860;

sensor_mode=3 resolution is 3840*2160.

trig_mode: Default value is 0, camera have two operating modes:slave and master.

In master mode trig_mode value is 3(Auto trig), video stream will continuous output.

In slave mode trig_mode value can be 0/1/2, a trigger signal enable video output, the trigger signal be configure by trig_pin .

When trig_mode=2, a periodic external frame sync trigger pulse enable video frame output.

When trig_mode=0, a single edge trigger pulse enable video stream continuous output.

When trig_mode=1, a single fall trigger pulse enable video stream continuous output.

trig_pin: default value:0xFFFF0007(bit0~7 is trig pin of maxim SER, in slaver mode bit7~15 is trig pin maxim DES max9296, please refer **Appendix 1** to select trig pin , value set 0xFFFF is invalid) .

Chapter 3 Use SGA8-ORIN-GMSL2 on Jetson-AGX-Orin-Devkit

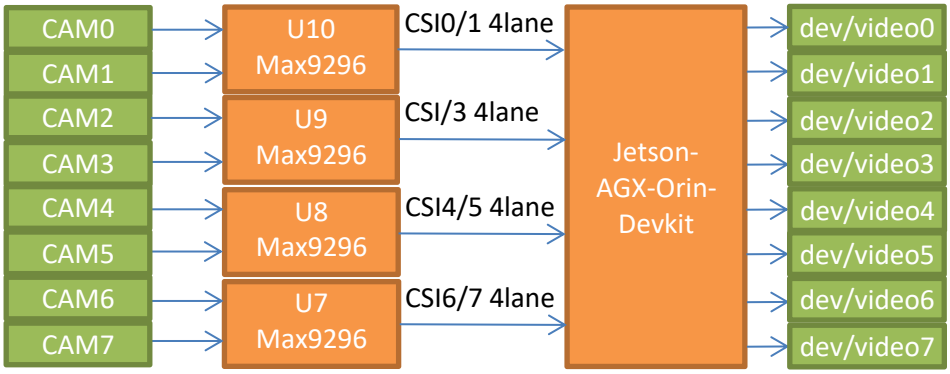


Fig-0 Block diagram

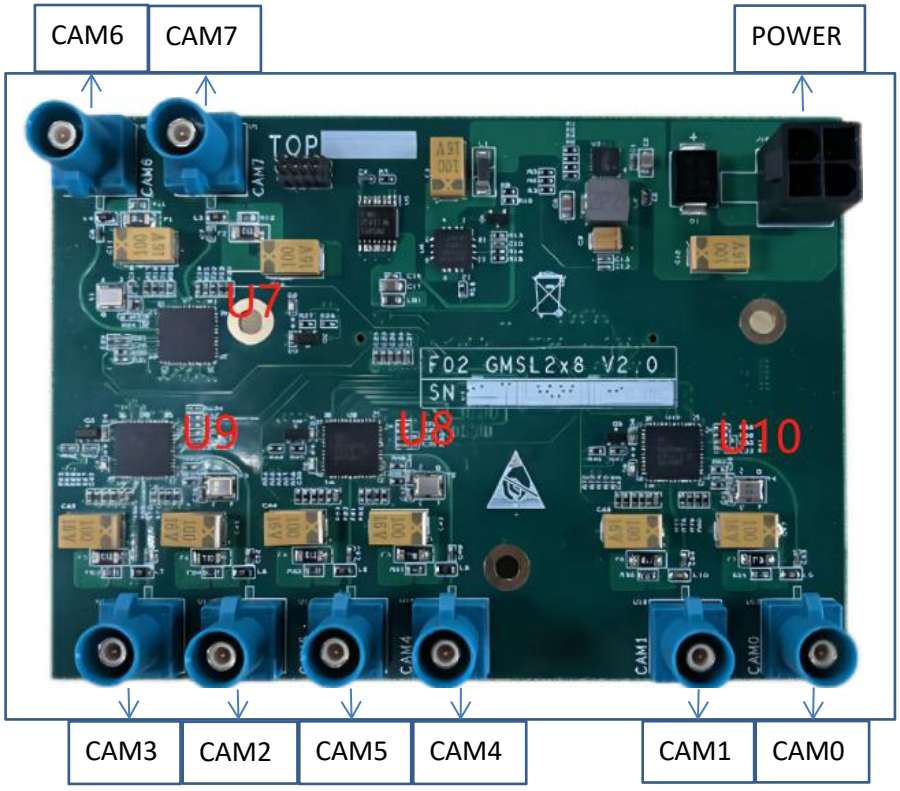
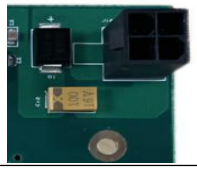
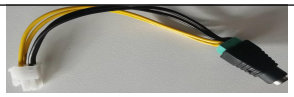


Fig-1 F02_GMSL2X8_V2.0 Board Front

Port	Description
CAM0-CAM7	Camera Fakra connector interface.
POWER	 

+12V	GND
+12V	GND

One standard wiring of DC12V3A for F02_GMSL2X8_V2.0 Board Power interface.

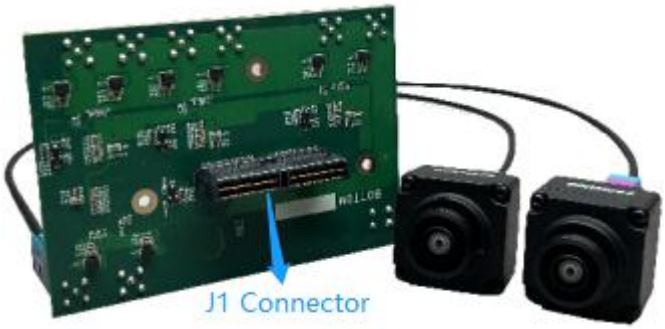


Fig-2 F02_GMSL2X8_V2.0 Board Back

Port	Description
J1 Connector	Connect to **Jetson-AGX-Orin-Devkit** Camera Interface .

Follow below step to power on:

- Make sure the **Jetson-AGX-Orin-Devkit** power adapt is disconnect.
- Camera connect to **F02_GMSL2X8_V2.0** board fakra interface.
- Insert the **F02_GMSL2X8_V2.0** board on **Jetson-AGX-Orin-Devkit**.
- Connect power adapt for **F02_GMSL2X8_V2.0** and **Jetson-AGX-Orin-Devkit**.
- Follow <**Package install for Jetson-AGX-Orin-Devkit**> step to configure camera.

Chapter 4 Install Package on Jetson-AGX-Orin-Devkit

4.1 Install v4l-util tools

This tools been use to configure camera resolution, trig mode and trig pin in each channel.

```
nv@nvidia:~$ sudo apt-get install v4l-utils
```

4.2 Install Package

Copy and decompression SG8A-ORIN-GMSL-V1.0.tar.gz to **Jetson-AGX-Orin-Devkit** board, in SG8A-ORIN-GMSL-V1.0 folder install and load module driver.

```
nv@nvidia:~$ tar -zxvf SG8A-ORIN-GMSL-V1.0.tar.gz
nv@nvidia:~$ cd SG8A-ORIN-GMSL-V1.0
nv@nvidia:~$ ./install.sh
nv@nvidia:~$ ./loadko.sh
```

Note:if camera suffix is xxxL2F(e.g. SG3-ISX031C-GMSL2F), camera is work in 3G mode(max9296 also need be configure in 3G work mode), and only interface CAM1, CAM3, CAM5, CAM7 can be use, please refer below method to fix max9296_mode in <loadko.sh> file:

sudo insmod sg_gmsl_gw5.ko max9296_mode=1,0,0,0

The array max9296_mode [0] = 1 mean's : U10 work in 3G mode.

The array max9296_mode [1] = 0 mean's : U9 work in normal mode.

The array max9296_mode [2] = 0 mean's : U8 work in normal mode.

The array max9296_mode [3] = 0 mean's : U7 work in normal mode.

Default value of max9296_mode = 0,0,0,0.

4.3 Configure Camera parameter

Please refer the **<Chapter 2:support camera list>**, for more camera parameter information refer camera's datasheet.

For example:

SG3-ISX031C-GMSL2F connect to CAM1(SG3-ISX031C-GMSL2F only connect CAM1/3/5/7).

Sensor_mode is 0(1920*1080),slave trig_mode is 0(Rise edge), trig_pin is 0xffff0007(mpf7);

```
nv@nvidia:~$ v4l2-ctl -d /dev/video1 -c sensor_mode=0,trig_pin=0xffff0007
```

For example(two different resolution camera in same max9296):

a.SG2-IMX390C-5200-GMSL connect to CAM0

sensor_mode is 0(1920*1080),slave trig_mode is 0(Rise edge), trig_pin is 0xffff0007(mpf7);

b.SG2-IMX490C-5200-GMSL connect to CAM1

sensor_mode is 2(2880*1860), trig_mode is 1(Fall edge), trig_pin is 0xffff0008(mpf8),

```
nv@nvidia:~$ v4l2-ctl -d /dev/video0 -c sensor_mode=0,trig_pin=0xffff0007
nv@nvidia:~$ v4l2-ctl -d /dev/video1 -c sensor_mode=2,trig_mode=1,trig_pin=0xffff0008
```

Note:It is better to configure two channel video at the same time for same max9296; if the camera is default resolution and trig mode, the corresponding command parameters may be omitted.

4.4 Render the preview to a screen

Enter export DISPLAY=:0 if you are operating from a remote console.

For example:SG2-IMX390C-5200-GMSL connect to CAM0.

```
nv@nvidia:~$ gst-launch-1.0 v4l2src device=/dev/video0 ! xvimagesink -ev
```

4.5 Record the preview into a file

For example:SG2-IMX390C-5200-GMSL connect to CAM0.

```
nv@nvidia:~$ gst-launch-1.0 v4l2src num-buffers=2000 device=/dev/video0 ! video/x-raw,format=UYVY,  width=1920, height=1080, framerate=30/1 ! nvvidconv ! nvv4l2h264enc ! h264parse ! qtmux ! filesink location=test.mp4 -ev
```

4.6 Remove module driver

Stop the preview&record and run below script.

```
nv@nvidia:~$ ./rmko.sh
```

Appendix 1 The pin relation of Max9296 and Jetson-AGX-Orin-Devkit

F02_GMSL2X8_V2.0 (max9296)		Jetson-AGX-Orin-Devkit 60pin
U10	mfp0	CAM_INT1
	mfp4	CAM_FRSYNC1
	mfp5	CAM_FRSYNC3
U9	mfp0	CAM_INT1
	mfp4	CAM_FRSYNC2
	mfp5	CAM_INT4
U8	mfp0	CAM_INT1
	mfp4	CAM_INT2
	mfp5	CAM_INT3
U7	mfp0	CAM_INT1
	mfp4	CAM_FRSYNC4
	mfp5	CAM_ERROR1

Contact Us

深圳森云智能科技有限公司

SHENZHEN SENSING Technology Co.,Ltd

深圳市龙岗区宝龙街道宝龙社区宝荷大道76号智慧家园B座8楼

8/F,block B, building 1,wisdom home,No.76,Baohe Avenue,Baolong street, Longgang District, Shenzhen

电话/Phone: +86-755-28990915

网站/Website: www.sensing-world.com

邮件/Email：Sales@sensing-world.com