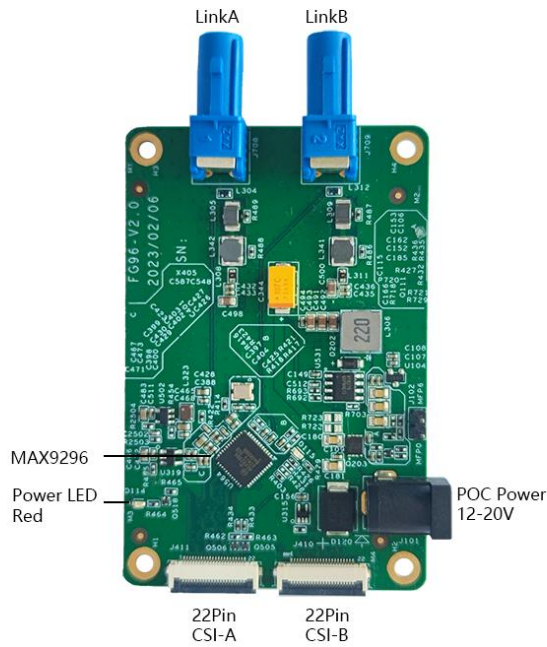




FG96-2CH GMSL Adapt Board User Guide



Project GMSL Adapt Board on NVIDIA Jetson® Orin™ NX Devkit

Product name FG96-2CH-V1.0

Submission date 2022-12-10

Change History :

Version	Date	Description	Author
V1.0	2023/02/15	First version	

Table of contents

Perface	3
Copyright Notice	3
Disclaimer	3
Technical Support	3
Warranty	3
Safety Warnings and Precautions for Use	3
Glossary	4
Introduction	5
Product specification description	5
0.5pitch 22P same orientation FFC/FPC Flat flexible cable.....	5
Product Description	6
Product Diagram.....	6
22Pin MIPI Connector definition [J2].....	7
FG96-2CH borad diagram.....	8
Software installatioin and application.....	8

Perface

Before using this manual, please read the following license agreement carefully. Only when you agree to the following license agreement can you use the products introduced in this manual.

Copyright Notice

Fangzhu Technology (Shenzhen) Co., Ltd. reserves the right of final interpretation and modification of this document and this statement. Any text descriptions, document formats, illustrations, photos, methods, processes, etc. appearing in this document, unless otherwise specified, its copyright or other related rights belong to Fangzhu Technology (Shenzhen) Co., Ltd. Without the written consent of Fangzhu Technology (Shenzhen) Co., Ltd., no one may reproduce, extract, back up, modify, disseminate, translate into other languages, or use all or part of this manual in any way or form. business use.

Disclaimer

This document is based on current information and its content is subject to change without prior notice. Fangzhu Technology (Shenzhen) Co., Ltd. has tried its best to ensure that the content of this document is accurate and reliable when writing this document. However, Fangzhu Technology (Shenzhen) Co., Ltd. is not responsible for the losses and damages caused by omissions, inaccuracies, or errors in this document. Take responsibility.

Technical Support

If you encounter problems when using our products, or you think our products have certain functional defects, you can visit the company website: www.fangzhutech.com to contact our customer service, and we will solve the problems and provide feedback for you; or if you need technical support Support guidance and have any valuable comments, please also contact us through the company website or telephone.

Warranty

Warranty period: The warranty period of Fangzhu Technology equipment is one year from the date of purchase. Warranty regulations: If the product fails due to non-human damage during the warranty period, Fangzhu Technology will provide free warranty. Please contact the purchase platform customer service or telephone to obtain warranty assistance (for details, please refer to the warranty regulations of Fangzhu Technology (Shenzhen) Co., Ltd.).

Fangzhu Technology (Shenzhen) Co., Ltd. Contact information:

Contact: Cyrus Xiao

Mobile: 18611588103

Website: www.fangzhutech.com

Address: Room 602, Runji Building, Baicai Technology Park, Xin'an Street, Bao'an District, Shenzhen, China

Safety Warnings and Precautions for Use

- Safety instructions

Before using this product, you must first read this document to have a preliminary knowledge

and understanding of the product, and you must abide by the safety instructions in the manual of this product to ensure your personal safety and avoid damage to the equipment. If blind operation causes losses or Injury, the manufacturer is not responsible for any problems of equipment and personal life and property safety caused by its wrong operation

- Voltage

FG96-8CH GMSL camera adaptation supports input power: 12V DC; current: above 2A

- Environmental requirements

Working temperature: -20°C - 85°C

Ventilation requirements: There must be good ventilation conditions around the installation of the computing platform.

- Grounding requirements

The power supply of the power adapter must be well grounded. In special scenarios, a grounding screw must be installed to connect it to the earth.

- Static Protection 

Electronic components and circuits are very sensitive to electrostatic discharge. Although our company will design anti-static protection for the main interfaces on the board when designing circuit board products, it is difficult to implement anti-static safety protection for all components and circuits. It is therefore recommended to observe anti-static safety precautions when handling any circuit board assembly. Anti-static safety protection measures include, but are not limited to the following points:

- ◆ The box should be placed in an anti-static bag during transportation and storage, and the device should not be taken out until installation and deployment;
- ◆ Before the body touches the box, the static electricity stored in the body should be discharged: wear a discharge grounding wrist strap;
- ◆ Circuit boards can only be handled in anti-static safe areas (including anti-static floors, anti-static wrist strap workbench, anti-static work clothes, etc.);
- ◆ Avoid moving this equipment in carpeted areas.

Glossary

POC	Power Over Coax
GMSL	Gigabit Multimedia Serial Links
FPDLINK	Flat Panel Display Link
SerDes	Serializer and Deserializer

Introduction

Fangzhu Technology's FG96-2CH GMSL camera platform is an expansion board that allows 2 cameras to be connected and is fully compatible with the NVIDIA Jetson® Orin™ NX development kit. Since there are many different types of GMSL cameras available, FG96-2CH can adaptively work at different frequencies and is compatible with both GMSL1 and GMSL2 protocol interfaces through software configuration. The power of the GMSL camera is provided by PoC (Power over Coax), so all data, control signals and power are sent through a single 50-ohm coaxial cable, which makes the camera's cable routing flexible and easy to install in automotive applications.

Since the 22Pin connector on the NVIDIA Jetson® Orin™ NX development kit cannot provide the voltage required by the camera, the FG96-2CH has a hot-swappable 12V-20V DC power external connector.

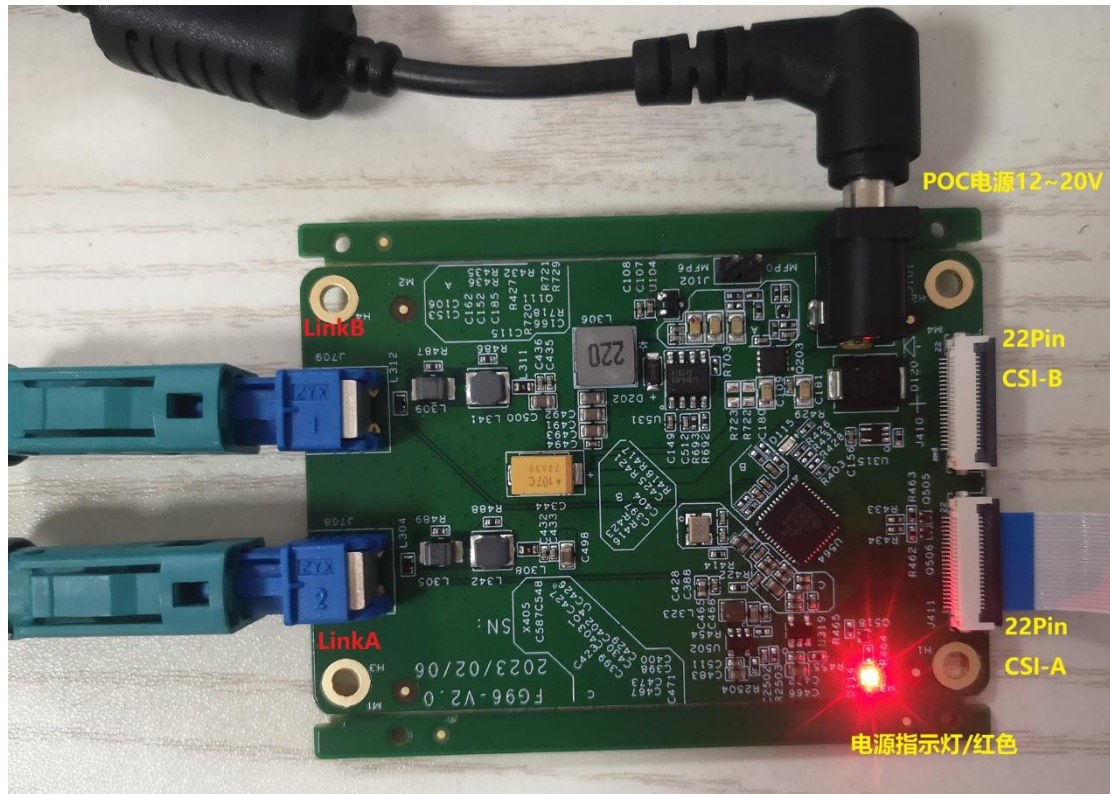
Product specification description

Product Features and Specifications	
Size	80mmx53mm
Weight	50g
Jetson® Orin™ NX Dev kit	1x22Pin ZIF connector
(GMSL) Camera Inputs	2 channel cameras(GMSL2/GMSL1)
Deserializer	MAXIM(ADI) MAX9296A
MIPI Output MIPI	Each deserializer accesses a 4-Lane MIPI CSI
Camera Input Connectors	2x MATE-AX FAKRA connector
PoC (Power-Over-COAX)	2 cameras powered by 12V PoC
Power	External 12V~20V DC power supply
Operating Temperature	-20°C to +65°C
Warranty and Support	One year warranty and technical support

Model	Description
FG96-2CH	Orin™ NX GMSL Camera development platform
FAKRA cable	Mate-AX to 1x FAKRA cable
FPC connection cable	22Pin FPC connection cable (3cm、10cm、20cm etc) 0.5pitch 22P same orientation FFC/FPC Flat flexible cable

Product Description

Product Diagram

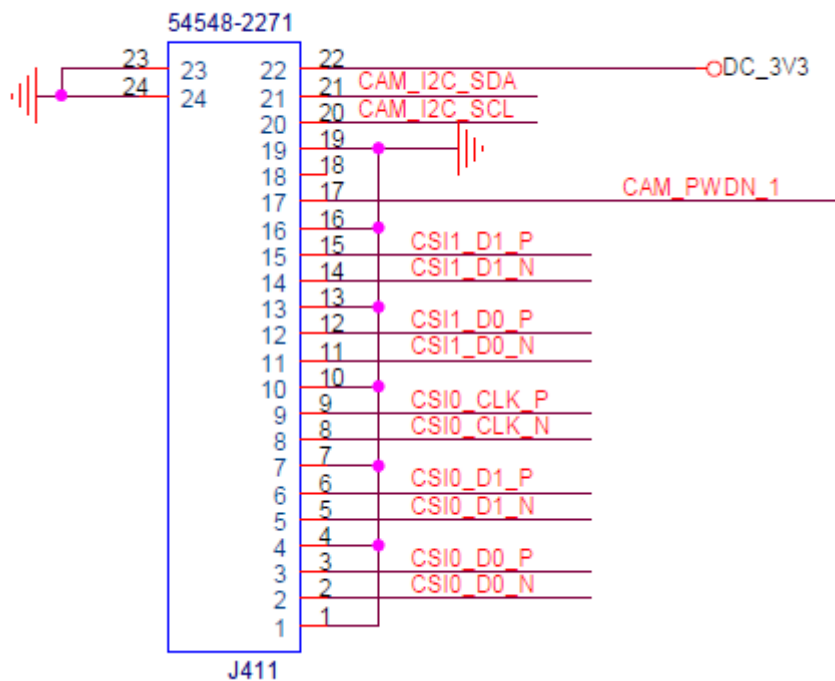


Note:

1. The coaxial power supply is shared, but each GMSL line has its own filter
2. Since the CSI definition order of CAM0 and CAM1 of the NVIDIA Jetson® Orin™ NX kit is different, FG96-2CH can only be connected to the CAM0 interface of the official development kit Devkit (for details, you can view the relevant Pin definitions and the Jetson® Orin™ kit schematic diagram CAM0/1 interface definition sequence)

22Pin MIPI Connector definition [J2]

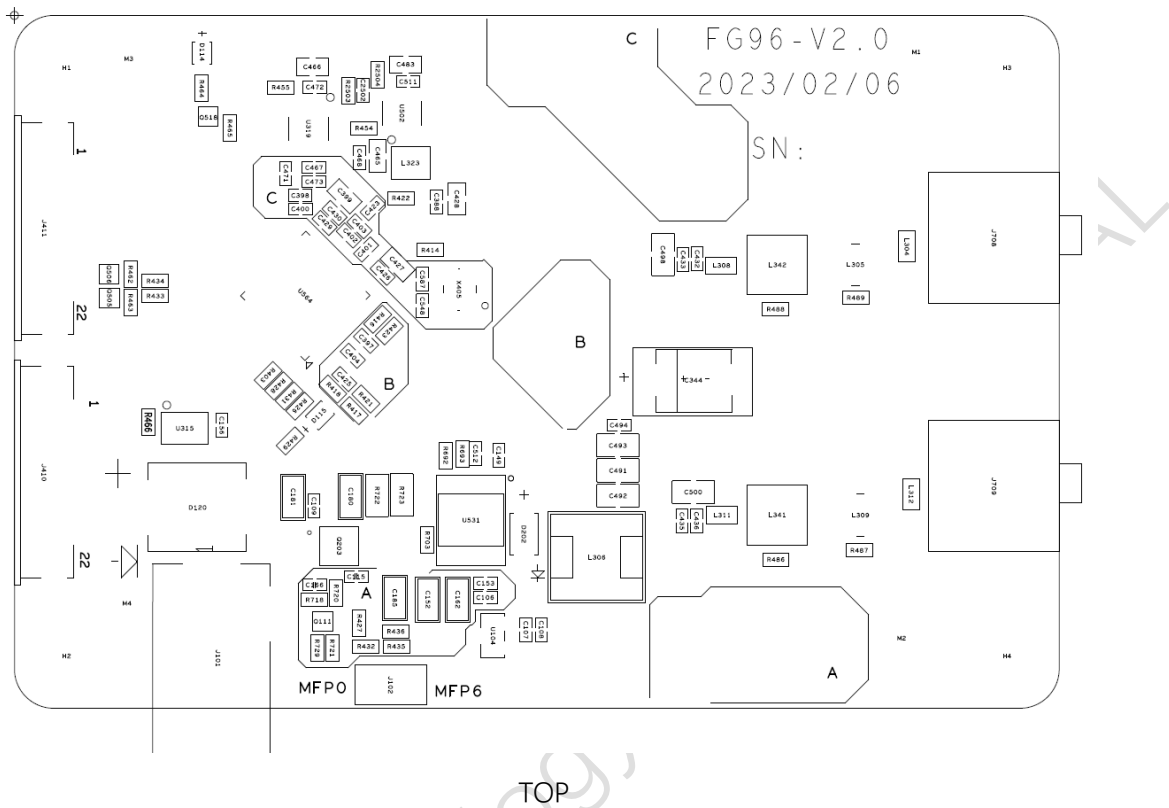
J708 22Pin 定义如下图：（CAM_PWDN_1 为 3.3V）



IDENTIAL

Fangzhu Technology

FG96-2CH board diagram



Software installation and application

Software configuration

Before hardware installation, please install the correct software on the NVIDIA Jetson® Orin™ NX module. Different cameras can be supported by upgrading the BSP firmware. GMSL1 and GMSL2 cameras require appropriate software and firmware configuration before they can be used normally (please ask the corresponding salesperson to obtain the corresponding firmware).

1. 1. Make sure all external system power supplies are turned off (Orin™ NX kit power supply and GMSL board power supply);
2. 2. Connect the FG96-2CH GMSL expansion board to the Orin™ NX 22Pin connector;
3. 3. Connect the GMSL camera to the J708/J709 connector through the FAKRA cable;
4. 4. Connect J101 to the 12V DC power supply (can support up to 20V), that is, power the camera externally;
5. 5. Turn on the power, wait for the system to start, and refer to the Readme to operate the software

Trigger configuration

The hardware design of the FG96-2CH GMSL expansion board supports external input trigger signals and also supports control through Orin NX GPIO. The specific pin definition refers to the definition of the 22Pin connector, that is, the MFP0 of the MAX9296 is linked to the 17th Pin of the 22Pin. The reference code can enable the Trigger, and the reference script (docs directory)

```
set25fps_SyncSignal_on.sh -- Turn on the Trigger and set the frequency to 25Hz
set25fps_SyncSignal_off.sh -- Turn off Trigger
```

Verified camera list

Brand	Sensor Model (YUV)	Note
Sensing world	IMX390	30fps -- 10/15cm FPC
	IMX490	30fps -- 10/15cm FPC
	OX08BC	variable frame rate -- 30fps -- 5cm FPC

Note: Since the 22Pin FPC has no impedance control, when using a high-resolution camera, the CSI rate is relatively high, and a relatively short FPC line is required. It has been verified by actual measurement that 8M cameras can only use 5cm long wires for 2-way connection at the same time, and 1-way connection You can use 10/15cm wire)

Fangzhu Technology CONFIDENTIAL

Appendix

1. Common command

Gstreamer open and preview:

1920x1080 RAW format camera

```
gst-launch-1.0 nvarguscamerasrc sensor-id=2 ! 'video/x-raw(memory:NVMM),width=1920,height=1080,framerate=30/1,format=NV12' ! nvvidconv ! fpsdisplaysink video-sink=xvimagesink sync=false
```

3840x2160 UYVY format camera

```
gst-launch-1.0 v4l2src device=/dev/video2 ! 'video/x-raw,format=UYVY,width=3840,height=2160' ! videoconvert ! fpsdisplaysink video-sink=xvimagesink sync=false
```

1920x1080 UYVY format camera

```
gst-launch-1.0 v4l2src device=/dev/video2 ! 'video/x-raw,format=UYVY,width=1920,height=1080' ! videoconvert ! fpsdisplaysink video-sink=xvimagesink sync=false
```

Fangzhu Technology CONFIDENTIAL