# GMSL2 Serializer Camera Adapter Board

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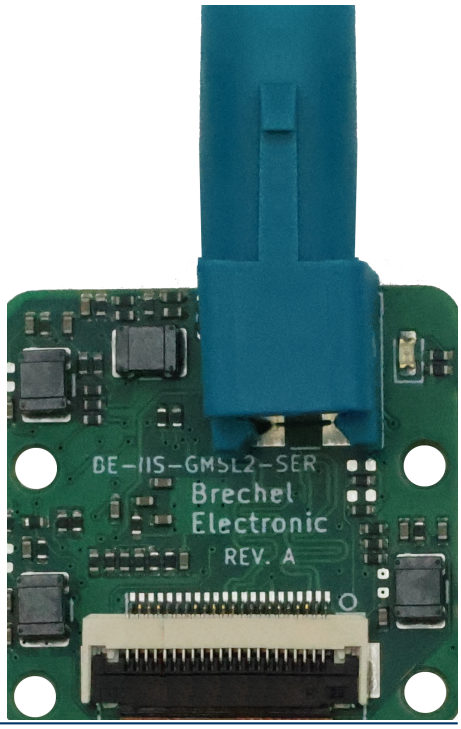


**GMSL2 enables high-speed camera links over a single automotive coaxial cable, allowing image sensors to be placed remotely from the processing unit.**

**The BE-IIS-GMSL-SER is a camera-side serializer board that converts one CSI-2 camera interface into one GMSL2 coaxial link.**

## Key Features

- Single CSI-2 camera input
- MAX96717GTJ/VY+T GMSL2 serializer
- 22-pin, 0.5 mm-pitch FFC/FPC connector
- Compatible with Raspberry Pi 5 camera connectors
- Up to four CSI-2 data lanes
- $I^2C$, camera reset, and camera-enable routing
- GMSL2 coaxial output via FAKRA connector
- PoC input filter and protection
- 90° FAKRA connector fitted; 0° version available
- RoHS compliant

## Product Description

The BE-IIS-GMSL-SER connects directly to one compatible CSI-2 camera module through its 22-pin FFC/FPC connector. It serializes the CSI-2 video stream onto a GMSL2 coaxial link and routes $I^2C$ control, camera reset, and camera-enable signals between the camera and the remote deserializer.
The board is intended for use with a compatible GMSL2 deserializer, such as the BE-IIS-GMSL-CAM2, or another host-side GMSL2 receiver. Power may be provided through the coaxial cable using Power over Coax (PoC).

## Applications

- Remote CSI-2 camera integration
- GMSL2 camera and cable evaluation
- Automotive camera prototyping
- Industrial vision systems
- Raspberry Pi 5 camera-module extension
- Camera-module bring-up and laboratory use

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# 1 Introduction

The BE-IIS-CAM-SER is a GMSL2 camera serializer interface for powered GMSL2 links. It receives one CSI-2 camera link and serializes it to GMSL using a MAX96717.

- One CSI-2 camera input, compatible with Raspberry Pi 5 camera modules, with up to four data lanes; see item 2
- One GMSL2 coaxial link with Power-over-Coax (PoC) camera supply
- $I^2C$ control and remote-camera access through the GMSL2 link
- PoC camera supply voltage from 5 V to 15 V, selected according to cable requirements
- GMSL2 data rate up to 6 Gbit/s

The enclosure uses the Raspberry Pi Camera housing mounting pattern and can be mounted directly behind a compatible Raspberry Pi camera housing.

Although the board can be used with different CSI-2 cameras and powered GMSL2 links, it is intended in particular as a Raspberry Pi GMSL2 camera-link extender.

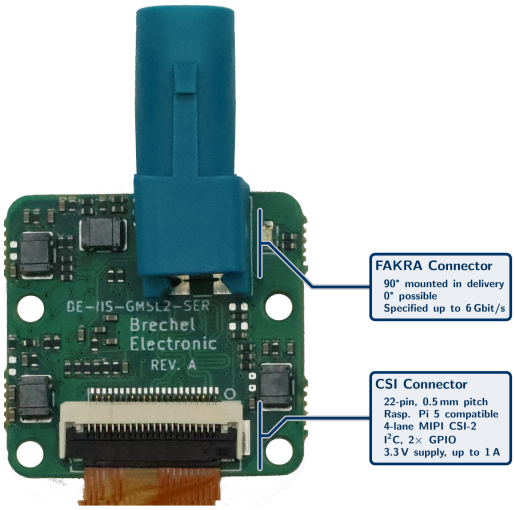
# 2 Hardware Configuration

## 2.1 Functional Overview

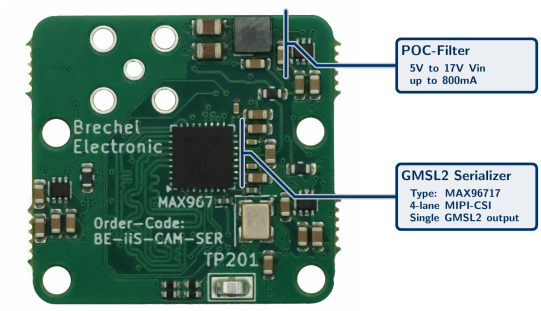
The BE-IIS-GMSL-SER converts one CSI-2 camera interface to one GMSL2 coaxial link. The serializer is a MAX96717GTJ serializer/VY+T. I²C control, camera reset, and camera-enable signals are routed between the camera connector and the serializer.
J102 is a 22-position, 0.5 mm-pitch, right-angle FFC/FPC connector. It is compatible with the Raspberry Pi 5 camera connector; see item 2.

## 2.2 CSI-2 Camera Interface

J102 provides one CSI-2 input with one clock lane and up to four data lanes. The differential pairs are routed directly to the MAX96717 CSI-2 input. No CSI lane swap and no differential-pair polarity swap are implemented.




Top side (FAKRA mounted)




Bottom side

Table 1: J102 CSI-2 and control signals

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 2 | D0- | 3 | D0+ |
| 5 | D1- | 6 | D1+ |
| 8 | CLK- | 9 | CLK+ |
| 11 | D2- | 12 | D2+ |
| 14 | D3- | 15 | D3+ |
| 17 | CAM_RESET_N | 18 | CAM_ENA |
| 20 | I²C SCL | 21 | I²C SDA |
| 22 | +3.3 V | – | – |

All remaining J102 pins are connected to GND.

## 2.3 MAX96717 Multifunction Pins

Table 2: Connected MAX96717 multifunction pins

| Pin | Function | Board signal / use |
|---|---|---|
| 17 | MFP3 / GPIO3 | CAM_ENA; camera-supply enable |
| 18 | MFP4 / GPIO4 | CAM_RESET_N; camera reset |
| 5 | MFP9 / SDA_RX | $I^2C$ SDA |
| 6 | MFP10 / SCL_TX | $I^2C$ SCL |

All other multifunction pins are not connected.

## 2.4 $I^2C$ Routing

The $I^2C$ signals at J102 are routed to MFP9 (SDA) and MFP10 (SCL) of the MAX96717. MAX96717 provides remote $I^2C$ access through the GMSL2 link to the Camera connector.

CFG0 selects the default $I^2C$ address of the MAX96717 and is configured to 0x80. CFG1 is pulled ub by 10k to select coax communication by 6 Gbit/s.

## 2.5 GMSL2 Link and Camera Power

The GMSL2 serial interface is connected to SIOP (GMSL+) and SION (GMSL-). Camera power is provided by Power-over-Coax (PoC) and enabled by `CAM_ENA`. The supported camera-supply range is 5 V to 15 V; select the supply voltage according to the camera and cable requirements.

# 3 Electrical Specifications (Preliminary)

The serializer board is powered through Power over Coax (PoC) from the connected deserializer system. The available input voltage at the serializer depends on the PoC supply voltage, coaxial cable length, and cable losses.

| Parameter | Min | Typ | Max |
|---|---|---|---|
| PoC voltage | 5.0 V | 12.0 V | 15.0 V |
| Camera supply voltage | 3.0 V | 3.3 V | 3.6 V |
| Camera supply current | – | – | 1.0 A |

Table 3: Recomanded Operation Conditions

## 3.1 Absolute Maximum Ratings

| Parameter | Min | Max |
|---|---|---|
| PoC input voltage | – | 17.0 V |
| PoC input current | – | 800 mA |
| Camera supply output current | – | 1.0 A |

Table 4: Absolute maximum ratings

Operation outside the recommended operating conditions is not specified. Stresses above the absolute maximum ratings may cause permanent damage to the board. The maximum usable camera-supply current may be limited by the available PoC voltage and by voltage drop in the coaxial cable.

# 4 Environmental Conditions and Compliance (Preliminary)

## 4.1 Conditions

| Condition | Min | Max |
|---|---|---|
| Operating temperature [°C] | -40 | +85 |
| Storage temperature [°C] | -40 | +105 |
| Relative humidity [%] | 5 | 95 |

Table 5: Operating conditions

## 4.2 Usage

| Condition | Parameter |
|---|---|
| Usage | indoor |
| Pollution degree | 2 |
| Operating altitude | up to 2000m |

Table 6: Operating usage

## 4.3 EMC and Environmental Compliance

The standard product is provided without formal EMC or safety certification. The hardware design is developed with consideration of commonly applied IEC standards, including IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-6-2 and IEC 61000-6-4. These standards are not verified for the standard product variant.
Compliance with specific standards, test levels or safety requirements is not guaranteed unless explicitly specified. Application-specific validation, testing and certification can be supported where defined requirements are provided.

# 5 Delivery

The product is delivered as one fully assembled BE-IIS-GMSL-SER camera-side serializer adapter board with one integrated FAKRA connector.
Camera module, camera FFC cable, GMSL2 coaxial cable, deserializer HAT, and host computer are not included unless explicitly stated in the order confirmation.

| Order Code | BE-IIS-GMSL-SER |
|---|---|
| Condition | Assembled camera-side serializer board |
| Status | Assembled |
| Included Items | 1× BE-IIS-GMSL-SER PCBA with 1× FAKRA connector |
| REACH & RoHS | Compliant with EU Directive 2011/65/EU and REACH Regulation (EC) No 1907/2006 |

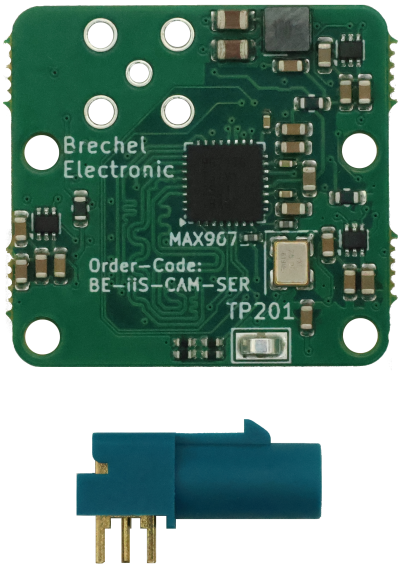



Figure 1: BE-IIS-GMSL-SER camera-side serializer board with FAKRA connector

## 5.1 GMSL2 Connector

The board provides one 50 Ω FAKRA coaxial connector for the combined GMSL2 data link and Power over Coax (PoC) supply.

| Parameter | Specification | Approved component |
|---|---|---|
| Connector type | FAKRA PCB receptacle | – |
| Number of connectors | 1 | – |
| Characteristic impedance | 50 Ω | – |
| Primary connector | Right-angle PCB receptacle | Rosenberger 59S22B-40MT5-Z |
| Alternative connector | Right-angle PCB receptacle | Amphenol RF FA1-NZRP-PCB-8 |

Table 7: GMSL2 FAKRA connector

# 6 Mechanical

## 6.1 Board Format

- Form factor: camera-side GMSL2 adapter board
- Mounting holes: four
- Mechanical dimensions: TBD – see released mechanical drawing
- Raspberry Pi HAT compatibility: not applicable

### 6.2 3D Data

- Available on the BE-IIS product page after release [4]

### 6.3 Board Overview

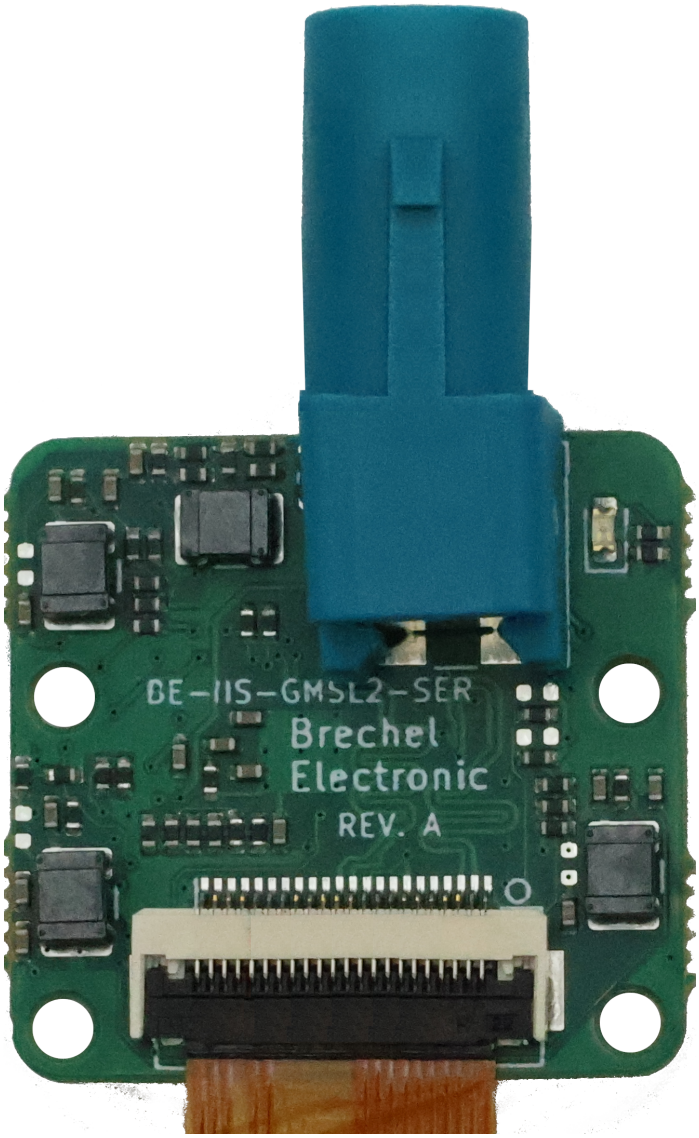



Figure 2: BE-IIS-GMSL-SER – board overview

## 7 References

1. Analog Devices MAX96717 Datasheet
2. Raspberry Pi Camera Software and CSI-2 Connector Documentation
3. BE-IIS Camera Installer
4. Schematic, PCB Viewer, BOM and 3D Model

## 8 Revision History

| Revision | Date | Description |
|---|---|---|
| A.00 | 2026-07-28 | Initial draft for BE-IIS-GMSL-SER |

### Company Information

## Manufacturer

BE-IIS welcomes technical feedback, suggestions and improvement ideas. Business inquiries, cooperation requests and distribution opportunities are welcome.

| | |
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