

Overview of In-vehicle Camera

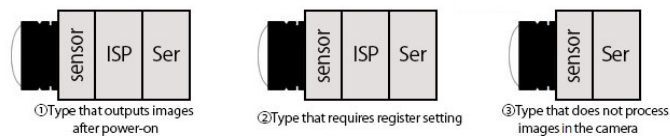
SerDes Environment



The camera on the left is an in-vehicle camera equipped in a German luxury car. We purchased it from a foreign website. In order to select an in-vehicle camera, you need to obtain various information about it. First you need to get information of the connector and the serializer manufacturer name, then the IC model number and register configuration file. With all these information, you can finally capture the images.

This page is for ones who use SerDes (serializer/deserializer) products for the first time. In recent years, SerDes ICs used mainly in automotive products are manufactured by TI, Analog Devices (formerly Maxim), and Sony.

① In-vehicle Camera System



There are several types of in-vehicle cameras. They work in a similar way, Even if the manufacturers of Sensor, ISP (Image Signal Processor), and Serializer are different.

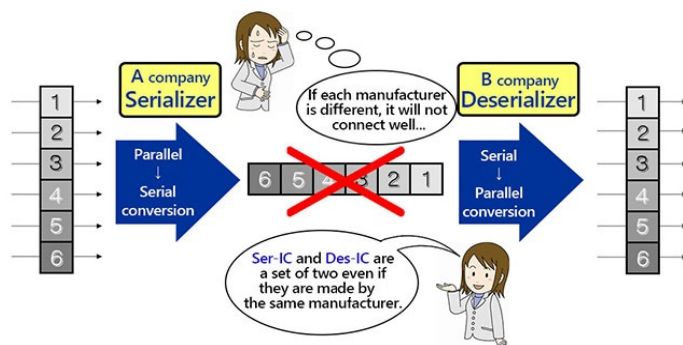
1. Type that outputs images after power-on
 This is a type that converts the output from the sensor to YUV format by ISP and outputs it. When transitioning from NTSC, this was the most common type of camera.
2. Type that requires register setting
 This is a type that processes the output from the sensor by ISP and outputs it. The pixel format supports each format such as YUV, RAW, and HDR. This camera requires the register settings of Sensor, ISP and Ser after the power is turned on.
3. Type that does not process images in the camera
 This is a type that outputs the output from the sensor as it is. The pixel format is the RAW format, and you can choose the depth and output format. This camera requires the register settings of Sensor and Ser after the power is turned on.

② What is SerDes

SerDes is not very common, so we will explain it from the meaning of words. SerDes is the name combining two products, Ser and Des. Ser is an abbreviation for Serializer or "parallel-serial converter", and Des is an abbreviation for Deserializer or "serial-parallel converter".

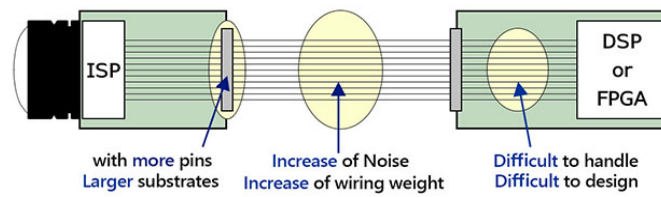


The serialization method is a manufacturer-specific method. It is different from LVDS transmission.

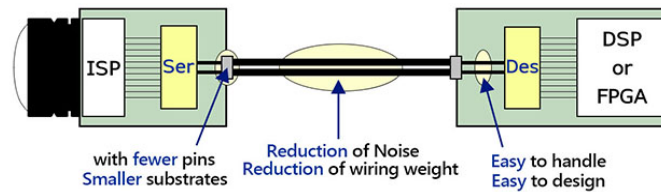


③ Purpose of Using SerDes

Generally, devices (substrates) are connected by many wires, but increasing the number of wires has disadvantages in cost and design.



By using SerDes, the increased wiring (bus width) can be put together (serialized) and data can be transferred.



④ What are SerDes Products

For automotive SerDes, Texas Instruments FPD-Link series, Analog Devices (formerly Maxim) GMSL series, and SONY GVIF series are popular. In addition, there are two types of SerDes: one for ADAS and the other for displays. We mainly support for ADAS.

⑤ Types of In-vehicle Camera Connector

Several types of connectors are used for in-vehicle cameras as standard. Typical connectors are shown below. Since there is no common standard for each connector, pin assignments also differ depending on the user. You need to be careful.

① Single-ended type : COAX (Coaxial)



FAKRA connector

This is a commonly used connector for single-ended transmission.



SMA connector

This is Used by persistent customers.
Many coaxial cable manufacturers use this.

② Differential type : STP (Shielded Twist Pair)



HSD connector

This is the connector used for differential transmission.
Please note that there is no compatibility if the key type is different.



MX connector

This is the connector used for differential transmission.
It is difficult to obtain in small quantities.
Please note that there is no compatibility if the key type is different.