TI Designs: TIDA-00138

Uncompressed Digital Video SerDes over twisted pair for automotive camera systems

TEXAS INSTRUMENTS

System Description

The design is a high speed serial camera interface to connect a remote automotive camera module to a display or machine vision processing system. It uses TIs FPD-Link III SerDes technology to transmit uncompressed video data and bidirectional control signals over a twisted pair cable. Application examples are back-up camera, rear view camera, surround view system, arround view monitor, camera based park assist ssytems, mirror replacement, blind spot detection.

Featured Applications

- ADAS Back-up Camera
- Rear View Camera
- Surround View System
- Around View Monitor
- Camera Based Park Assist Systems

Design Resources

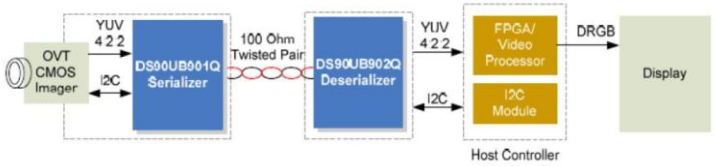
DS90UB901-Q1	Product Folder
EVM User's Guide	Document
DS90UB902-Q1	Product Folder

Design Features

- Support up to WVGA at 30 fps
- Equalizer compensates transmission medium losses
- OmniVision image sensor applications
- 14 bit Parallel Interface Solution
- Built In Self-Test (BIST)

Design Photo

Block Diagram



Jump start system design and speed time to market

Comprehensive designs include schematics or block diagrams, BOMs, design files and test reports by experts with deep system and product knowledge. Designs span TI's portfolio of analog, embedded processor and connectivity products and supports a board range of applications including industrial, automotive, medical, consumer, and more. To explore the designs, go to http://www.ti.com/tidesigns

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Associated Part Numbers

Part Number	Part Description	EVM Link
DS90UB901-Q1	10 - 43MHz 14 Bit Color FPD-Link III Serializer with Bidirectional Control Channel	EVM User's Guide
DS90UB902-Q1	10 - 43MHz 14 Bit Color FPD-Link III Deserializer with Bidirectional Control Channel	EVM User's Guide

Design Considerations:
Connecting one or multiple remote cameras to a surround view system does not only require a data line with sufficient bandwith and the capability to drive several meters of cable, there additional other aspects to consider. To configure the remote camera or to return diagnostic information from the camera to the video processing ECU, an additional control channel is required. With TI's FPD-Link III SerDes family of products the video signal, a bidirectional I2C channel and the clock can all be transmitted through the same twisted pair cable. This reduces weight, space and cost of the wiring harness and connectors. Input equalization provides compensation for transmission medium losses and aging effects of the cable and reduces the medium-induced deterministic jitter.

Quick Start Guide
What's Needed:

1. OmniVision camera sensor module
   - OV10620, OV7710, OV9715
2. Host Controller with I2C interface bus (I2C master)
   - FPGA, Electronic Control Unit (ECU), Video Processor, Microcontroller
   - Slave clock stretching must be supported by the I2C master controller
3. CAT6 cable
4. External +5VDC 1A Power Supply

Before the system is powered up, please make sure all hardware is configured properly. Check that all jumpers and headers are connected appropriately. For a detailed description of configurations, see EVM user's guide.

1. Connect the DS90UB901Q Serializer board to the Omnivision module via the J1 32-pin header (16 x 2 x 0.1").Ensure that the camera module and the Serializer board are connected properly by matching the ground (GND) pins.
2. Connect the DS90UB902Q Deserializer board to the Host Controller.
3. Connect the DS90UB901Q Serializer board to the DS90UB902Q Deserializer board via CAT6 cable on the RJ45 connectors.
4. Apply 5V power supply to the Deserializer board J10 power jack.
5. Push "ON" button (S4) on Deserializer board. Green light should now be visible on RJ45 connectors at Serializer (J4) board and Deserializer (J7) board to indicate power is applied to the boards.
6. Initialize the Deserializer. Refer to the DS90UB901Q/902Q datasheet for startup procedure and the definition of each register.
7. Verify that LOCK LED on D5 and the RJ45 orange lights are lit. This indicates the chipset is Locked and ready to begin I2C communication with the image sensor.
8. Initialize the OmniVision image sensor. Refer to the appropriate sensor datasheet for specific information.
9. Start video capture (or alternate control application).

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