

Design Considerations

TIDA-00271 ADAS Sensor Interconnect Board for remote camera and radar modules

Power Supplies

Power Supply Decoupling and Filters: There are five supply rails on the device. All have some decoupling capacitors which supply the device with current during transient loads. These capacitors should be placed close to each supply pin, with the smaller values being placed the closest. Larger values can be further away.

Layout: There are a few guidelines for placement and layout of the power supplies. There are not many components in this design due to the high integration of the devices.

- Generally, avoid long traces and keep the components as close to the regulators as possible
- The input capacitor should be located as close as possible to the VIN and GND pins of the devices
- The inductors should be kept close to the regulator, and the switch nodes (between the inductors and SW pins) kept short. Other traces should not be routed directly under the switch node or the inductor body on other layers. If possible, place a ground layer between the regulator and signals on other layers. This will help decouple radiated noise from the high energy switch nodes.
- Feedback resistors (where used) should be placed close to the device
- Ensure that the device is well grounded to a pour on the same layer and through vias to ground layers

For the RADAR/Video deserializer, we chose the DS90UH926Q-Q1. It can handle 24-bit color, 720p, 60Hz video and accommodate I2C communication back to a host processor. This is all done on one cable pair to reduce system interconnect cost and weight. For the automotive reference design, the connectors chosen for the serial link are from the [Rosenberger HSD](#) series.

FPD-LinkIII Deserializer

The high speed FPD-LinkIII communication is output on the DIN+/DIN- pins of the DS90UH926Q-Q1 device. The lines are coupled with small capacitors to remove DC bias from the lines. Our application uses a differential output (DIN+/-).

During layout, minimize the distance between the serial connector and the deserializer device.

The PDB pin on the DS90UH926Q-Q1 is used to hold the device in a power-down mode until the voltages in the rest of the system can stabilize. It is important that the ID(X) and MODE pins, supply rails, and oscillator are stable when the devices comes out of reset.

Some reference designs will merely use an RC circuit with a large time constant to create a delay, but this system also allows for using a GPIO from the MSP430 to control this pin.

Power over Coax Design Considerations

Coax Connector: As discussed in the BOM Analysis, TI only recommends one family of automotive coax connectors be used with our FPDLink-III SerDes devices: the Rosenberger Fakra connectors. There are several variations of the housing for the same basic connector (straight/right angle, different footprints, etc.) which can be chosen depending on the form factor needed.

Power Supply Filter: One of the most critical portions of a design which uses Power over Coax is the filter circuitry. The goal is twofold: 1) deliver a clean DC supply to the input of the switching regulators, and 2) protect the FPDLink communication channels from noise coupled backwards from the rest of the system.

The DS90UB913/914 SerDes devices used in this system communicate over two carrier frequencies, 700MHz at full speed (“forward channel”) and a lower frequency between 1.75 and 3.25MHz (“back channel”) determined by the deserializer device. The filter should attenuate this rather large band spanning both carriers, hoping to pass only DC. Luckily, by filtering the back channel frequency, we will also be filtering the frequencies from the switching power supplies on the board. For more details on choosing the inductors for your application see the application report:

<http://www.ti.com/lit/an/snla224/snla224.pdf>.

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