OPT3101 Schematic Considerations

When supplying schematics to TI for review please include all component part numbers. Components with missing part numbers will not be able to be checked.

Layout needs to be supplied if it is to be reviewed as well.

Refer to the system design doc sections 4 through 8 for all guidelines to be followed. This document is available here: https://www.ti.com/lit/ug/sbau305b/sbau305b.pdf

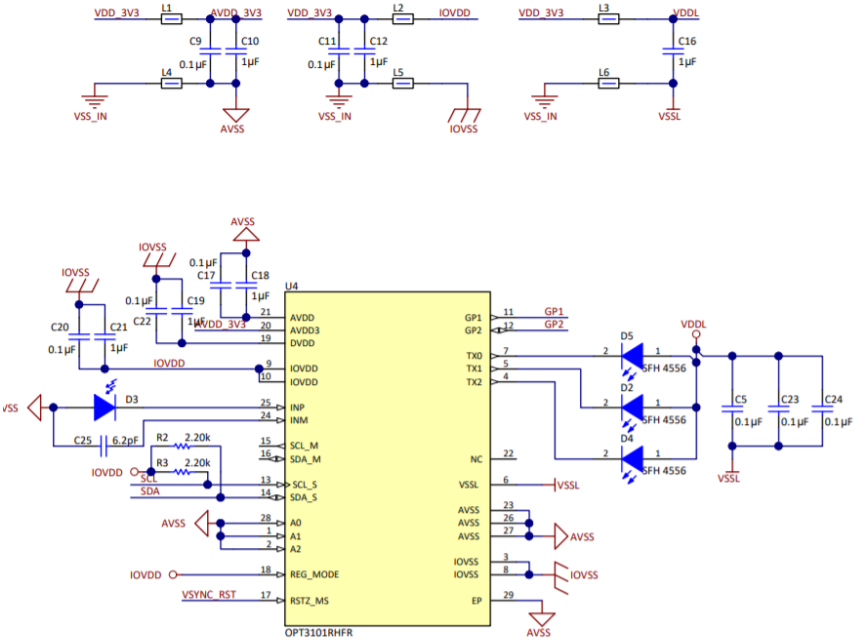
Passives, supply and ground isolation

Ferrite core beads with high impedance (500 Ohms or more) at 10MHz is important for effective performance. Decoupling capacitors with low ESR (<30mohms) at 10MHz would yield better decoupling.

An updated example of minimum passives needed and supply/ground isolation can be found here (and shown below): https://www.ti.com/tool/TIDA-010021

The EVM design online can also be used as a reference for this as well. The EVM was an earlier design that has more components and this has been optimized to reduce component count on the TIDA board linked to above.

Figure 13. Sensor Module Schematic



Depending on whether the internal LDO is used or 1.8V supply is supplied externally, be sure to set the reg_mode pin appropriately.

Photodiode

If SMD photodiode is used check to make sure optics are integrated or external lens is added. Field of view of photodiode and LED should be simulated in the system estimator tool to ensure performance is met. Refer to section 5.8 ‘Lens Integration and Field of View’ in the system design doc: https://www.ti.com/lit/ug/sbau305b/sbau305b.pdf

Be sure to wire photodiode as shown in figure 13 above. Be sure to choose matching capacitor value according to the photodiode and instructions in the system design doc.

LED

Refer to section 6 ‘Illuminator Selection’ in the system design guide for the LED component selection.

Shielding, isolation, and crosstalk

Refer to section 7.2 ‘Optical Isolation’ in the system design guide for a list of guidelines that need to be followed for shielding and isolation.

Use of vias

Use of vias on the TX/RX nets will increase crosstalk. If through hole components are used vias are not needed as the component hole can be used as a via (see OPT3101EVM design docs online). With through hole, it is recommended to keep OP3101 IC on opposite side of PCB from the LED and photodiode to allow for shorter routing.

For surface mount components vias should be avoided. It has been found crosstalk is better by keeping OPT3101 on the same side as the optics on the board. As always trace loop length should be minimized and all guidelines in section 8 ‘PCB Design’ of the system design doc should be followed.