MOST ODIN
MOST Circuit for Avago ODIN Transceiver

Application Note 5344

Objectives

This application note describes the electrical application circuit to implement the MOST MxT402 and MxR402 (x is the identifier for the used package) from Avago Technologies for a MOST node. Furthermore the application boards for the characterization are described.

For more information about MOST see www.mostcooperation.com.

Design and Layout rules

The 100nF bypass capacitors C1 and C3 must be located as close as possible between the pins VCC and GND of the Rx and Tx. Usage of ceramic caps is recommended. Also the capacitors C2 and C4 must be located as close as possible. The leads of the devices must not be longer than 10.5mm measured from the bottom side of the cavity as interface. Usage of tantalum caps with low ESR is recommended.

The ferrite beads L1 and L2 have to be connected to the power supply of Rx and Tx to reduce EMC. The DC resistance should be very low. Usage of only one ferrite bead for the Tx supply and the Rx supply together is not recommended.

A Y-structure is recommended for the ground connection. The ground planes of the transmitter, the receiver and the shielding should be separated and should be connected together behind the bypass capacitors.

The capacity of the Rx_Data line together with the input of the Network Interface Controller (NIC) should be less than 10pF.

A serial resistor in the Rx_Data and Tx_Data line reduces EMC. The resistor R1 for the Rx_Data line must be placed near the Rx. The resistor R2 for the Tx_Data line must be placed near the NIC. The value depends on the distance between the FOTs and the NIC and can be within a range up to 150 Ohm. Higher values for the resistors are not recommended. The timing parameter t_r, t_f, t_{PWV}, t_{DDJ} and t_{UJ} of the Rx_Data signal are dependant of the resistor R1 and the line capacity. Make sure that the resistor and the capacity is not too high otherwise the specification of the data sheet cannot be guaranteed.

During power_up the load on the Rx_Data line could be reduced to the resistor R1 for <=25ms without impact on the reliability of Rx device.

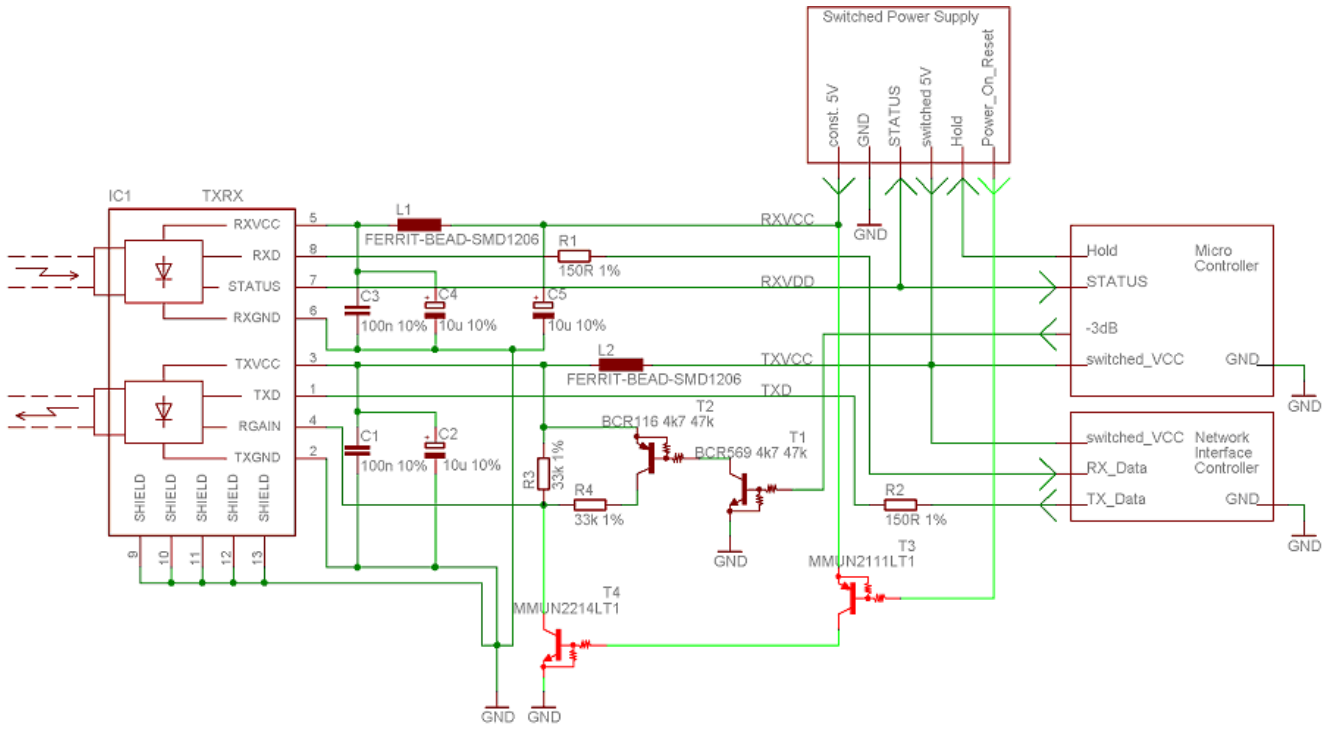
The Rx_Data and Tx_Data lines should not be routed in parallel over a long distance. Furthermore the data paths should be embedded with ground copper.

The GND pin and the R_{ext} pin of the transmitter are used for heat dissipation. Therefore there should be a good connection to the PCB. Both pins should dip into a large copper area.

The optical output power (P_{opt}) of the Tx can be controlled by the Pin Rext. The Popt is dependant on the resistors R3 and R4. If the resistors increase then the P_{opt} will decrease. The range of the resistors R3 and R4 should be between 27kOhm and 33kOhm. The proposed circuit with the transistors T1 and T2 for the –3dB attenuation is not mandatory. Also any other circuit which is able to double the value of R_{ext} is allowed.

To receive best performance a shielding of Rx and Tx is recommended.

Application Circuit example for a MOST node



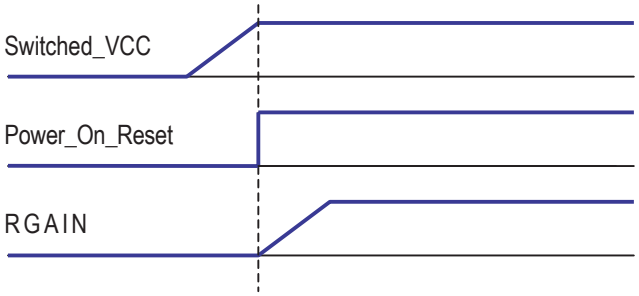
T3 /T4 optional please notice: „Power up procedure to avoid undefined operation conditions"

Power-up procedure to avoid undefined operation conditions

This paragraph is only relevant for applications which are powered-up independent of the remaining MOST ring.

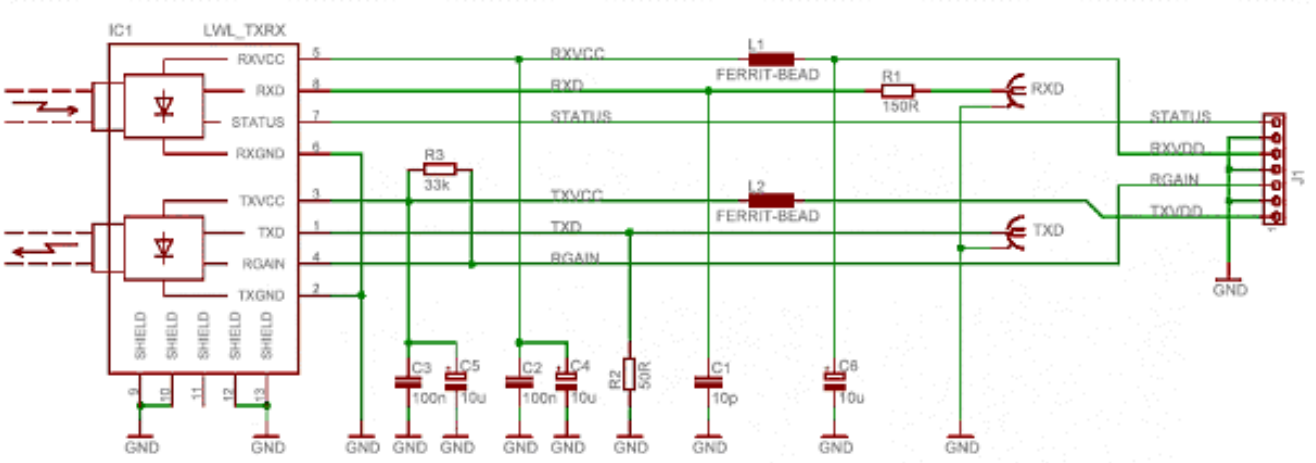
To avoid pseudo data transmission during power-up it is recommended keeping the supply at the TX RGAIN pin low until all supply voltages are within 10% of operating range.

This can be done by using a Power_On_Reset operation. In the schematic "Application Circuit example for a MOST node" the Power_On_Reset signal is used to switch the transistors T3 and T4. T4 pulls the RGAIN signal to GND until the switched voltage supply reaches the operation level.



In practice a circuitry which is suitable to achieve this Power_On_Reset functionality is used to reset the network interface controller after power-up. Typically adding transistor T4 to this standard circuitry will perform.

Furthermore, the minimum rise time (10-90%) of switched Tx Vcc must not be less than 40µs.



Note that C1 represents the whole capacitive load at RXD. As the parasitic capacitance is around 5pF (subject to measure) a 5pF capacitor should be used (to achieve a total of 10pF).

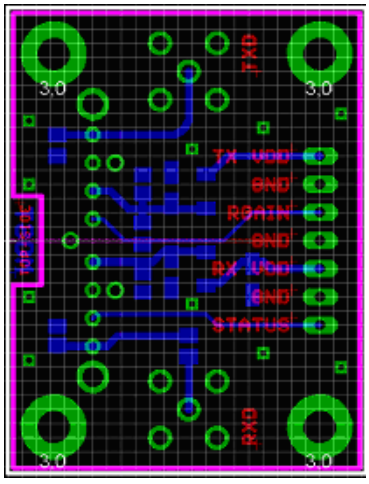
MOST Characterization Board

Circuit

The MOST ODIN Transmitter and Receiver have been characterized with the following circuit. The used R1 resistor was 4.7kOhm for the characterization. The oscilloscope was coupled with 50 Ohm to the Rx Data output. Therefore a voltage divider of 94:1 is realized. The voltage level on the oscilloscope is then around 30mV. The input resistance to the the Data input of the Tx is around 50 Ohm due to the resistor R2. Therefore the signal source has to drive a high current.

Layout

The following figure shows the board layout.



Revision History

Current Document:	AV02-0988EN - June 19, 2009
Previous Version:	AV02-0988EN - January 11, 2008
Page	Subjects (major changes since last revision)
1	Additional sentence at end of“Power-up procedure to avoid undefined operation conditions” section

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**