

Part Number: SP483

Date: Aug29-06

Question:

We have an application where we are currently using a TI SN65LBC182D. We would like to change to the SP483EEN, but I cannot see the receiver output current drive stated in the datasheet. I need to know what current the RO pin can sink because we will be using that pin to drive an optocoupler for an isolated RS485 application.

Answer:

The current is not guaranteed directly on the datasheet but the drive capability must comply with the EIA standard. The way compliance is met is through the specifications of minimum output voltage (3.5V) and the load on the timing parameters (54 Ohms). This gives 64.8mA DC. (The AC peak current would be the slew rate and the capacitive load). Another indirect specification that shows drive capability is the short circuit protection (95mA).

Question:

When the Bus was biased with a lower resistance it worked better. Why?

Answer:

We believe that when the cable is connected and the two bias networks are in parallel with the receiver input resistance the loading may be causing the problem. New SP485 devices are not as strong as some older versions. The minimum resistance that the device can drive on a bus according to the ITU V.35 standard is 375 Ohms from bus to ground. This includes all of the loading from the receivers also connected to the line. The total load is the sum of the bias networks and receivers and must not exceed 375 Ohms.

The following debugging exchange with the customer is instructive for narrowing down the issue as well as generating the solution.

Customer: We are using one device with RS485 based on your SP483E chip. I have a problem when I'm trying to interface SP483E with one SN75176 device. The SP483E has a 681 ohm pull-up and pull-down resistors and one 220 ohm terminator. The SN75176 have 4.7k pull-up and pull-down resistors and one 120ohm terminator. Please tell me what is the problem?

Sipex: Please forward a schematic drawing of your circuit. It may be that only one bias network is required. How long is the cable between the SP483 and the SN75176? Be sure that there is no contention on the bus. Only 1 Driver can be active at a time.

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Customer: The Sipex parts have 680 ohm pull-up and pull-down resistors and the SN75176 has 4.7k ohm pull-up and pull-down resistors. I replaced the 4.7k resistors on the SN75176 with 0.5k Ohm resistors and it's working good. But why would the Sipex device work only if the line is pulled up and down with 4.7k || 0.5k ?

Sipex: Do both SP and SN devices use VCC=5V? Are the grounds connected through the bus?

Customer: Yes, the SP and SN have the same GND and they have the same 5V power supply.

Sipex: It does not seem like it should be better -- why with less resistance is it better? I expect it should be worse. It seems only one pull up and pull down is needed. The resistors most likely are not be the cause of the problem. Is the cable in good working order or is there any short on the board?

Customer: I verified all connections. I changed devices. But the problem is the same. The problem is that if I replace the SP with the SN, all is ok. It works only with 2x4.7k pullups/pulldowns. But I think the SP is different. It's very strange. It's sure a problem with compatibility. But what? If I put 470 ohm resistors on my device with SN all is ok. Do you think it's a problem if I'll do that ?

So the network will be:

- 1 master with SP and 2 x 680 ohm resistors.
- 1 slave with SN and 2 x 470 ohm resistors.
- the rest of slaves with SN's without resistors.

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