



X3T9.2/92-148 Rev 2

Date: July 21, 1992

To: X3T9.2 Committee

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Subject: **Active Negation Driver Requirements for SPI -- Rev 2**

Revision 2 of this proposal reflects the inputs received at the July 21st SPI Working Group meeting. There was considerable concern expressed over whether the V_{OH} of 2.0 volts at I_{OH} of 7 mA is the correct specification. The group agreed to include this specification tentatively with a note calling out that the issue is not necessarily settled.

The SPI working group agreed to include this proposal in SPI rev 6. The changes from SPI rev 5 are shown with redline (shading). The effect of this proposal is to add item e) to section 7.1.1, modify Section 7.1.2 as shown, delete the input capacitance specification from section 7.1.3, and add a new section 7.1.4 to specify the input/output characteristics, including capacitance and leakage current.

[Add item e) to 7.1.1:]

- e) Each terminator shall add a maximum of 25 pF capacitance to each signal.

7.1.2 Single-Ended Output Characteristics

All signals shall use either open-collector or active-negation drivers. Open-collector drivers have two states: asserted and high impedance. Active-negation drivers have three states: asserted, negated, and high impedance. Each signal sourced by an SCSI device shall have the following output characteristics when measured at the SCSI device's connector:

V_{OL} (low-level output voltage) = 0.0 to 0.5 volts dc at $I_{OL}=48$ mA (signal asserted)
 V_{OH} (high-level output voltage) = 2.5 to 5.25 volts dc (signal negated)

NOTE: Open-collector drivers do not source current to achieve the V_{OH} voltage level. They enter the high-impedance state and depend on the terminator circuitry to source the necessary current.

Active-negation drivers shall have the following additional output characteristics when measured at the SCSI device's connector:

V_{OH} (high-level output voltage) = 2.0 to 3.24 volts dc at $I_{OH} = 7$ mA (signal negated)
 V_{OH} (high-level output voltage) < 3.0 volts dc at $I_{OH} > 24$ mA (signal negated)

[Editor's Note: The above numbers are contentious and subject to change.]

NOTE: In words, these expressions mean: If the driver is negated and loaded at 7 mA, then the output voltage is between 2.0 and 3.24 volts dc. If the current is greater than 24 mA, the voltage is not more than 3.0 volts dc.

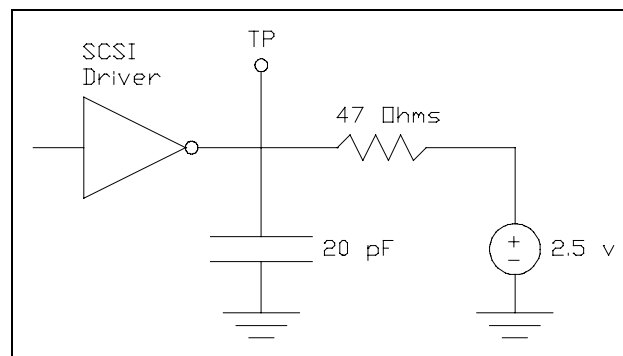
It is recommended that devices use active-negation drivers for the ACK, REQ, DATA BUS, and PARITY signals during fast synchronous data transfers.

All single-ended drivers shall maintain the high-impedance state during power-up and power-down cycles until the driver is enabled.

It is recommended that all devices meet the following specifications for all signals:

t_{rise} (rise time) = 5 ns minimum (10% to 90% of full amplitude)
 t_{fall} (fall time) = 5 ns minimum (90% to 10% of full amplitude)

The recommended test circuit for measurement of rise time is shown in Figure 6.



[Use the correct figure; Florin has requested the cap be 15 pF]

Figure 6: Rise Time Test Circuit

[The following section should be added to SPI and the Maximum input capacitance specification should be deleted from section 7.1.3:]

7.1.4 Single-Ended Input/Output Characteristics

Each signal of an SCSI device shall have the following characteristics when measured at the SCSI device's connector:

I_L (Leakage current) = -20 uA to +20 uA at $V_S = 0.0$ to 5.25 volts dc (high-impedance state)
Maximum signal capacitance = 25 pF (measured at the device connector closest to the stub, if any, within the device)