Proposal for SPI-5 Programmable Termination T10/01-270r1

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Purpose: The high frequency attenuation of signals for Fast-320 and higher speeds, in cable and backplane systems is a major problem. The high frequency signal can be smaller than the reflected wave from the termination. The loaded cable and backplane high frequency impedance is often much lower than the 85 ohm specification due to the effects of Periodic Structures that create a Comb filter at these frequencies. The 100 -110 ohm termination needs to adjust to the impedance of the loading of the backplane. The backplanes are often designed a the upper range of the impedance limits of 135 ohms, but with the loading of the drives impedances in the 55 ohm range have been commonly seen on these systems.

This proposal changes the differential bias from a voltage to a current specification.

This proposal leaves the nominal termination at 100 to 110 ohms, but allows for an adjustable terminator that is set during the SCSI Domain Validation procedure.

Changes to section 7.3.1 LVD Terminations
Table 20 I-V requirements for differential impedance, common mode impedance, and V_{BIAS} tests.

Note: This table shows the Power up or reset Termination values for Differential impedance. S_1, S_2, V_1, V_2, I_{MAX} and I_{MIN} may be adjusted to match cable and backplane impedance. The values in the table are the power up or reset terminator values.

V_1 and V_2 should be changed to current values for better accuracy, V_1 and V_2 are the effects of current and impedance and should be changed to reflect just the current. V/S = I for I_1 to I_2 range of 1.0 to 1.1 mA.

Table 20 changes

Table 20 - I-V requirements for differential impedance, common mode impedance, and V_{BIAS} tests

Values (figure 33)	Differential impedance and V_{BIAS} tests [a] (figure 32)	Common mode impedance and V_{BIAS} tests (figure 34)
V_1 (mV)	~~100~~ N/A	1125
V_2 (mV)	~~125~~ N/A	1375
I_1 (mA) *	1.0	N/A
I_2 (mA) *	1.1	N/A
V_3 (V)	1, 0	2,0
V_4 (V)	-1,0	0,5
I_{max} (mA)	9,00	N/A
I_{min} (mA)	-11,25	N/A
S_1 (Ohms)	100	100 **
S_2 (Ohms)	110	300 **
Measurement	D.C.	D.C.
[a] $V_A + V_B = 2,5 \pm 0,2$ V (figure 32)		
* I = V/S ** Initial values, when S1 and S2 are changed with Domain validation the range is 75 to 400 ohms.		
Note: S_1, S_2, I_1 and I_2 are initial Differential values that are adjusted with Domain Validation to minimize reflections.		

Note: The driver specifications should be changed to current drive, not the voltage into one termination arrangement. The drivers should be rated for system impedances from 55 to 130 ohms, not for a nominal impedance to insure the output cells will perform correctly over the system load range. A loaded backplane may see 55 ohm termination on both ends of the bus, versus 105 ohms. (this is a recommendation for another proposal, but not part of this proposal.)

Add a paragraph below Table 20

Programmable terminators shall be adjustable in nominal 5 ohm monotonic steps from the nominal value of 105 ohms to a range between 55 and 130 ohms.

Bias current shall be adjustable in nominal 50 uA monotonic steps from 0.70 mA to 1.45 mA.