Driver Precomp Proposal, Review Matches George's proposed 00-378r0 SPI-4 numbers

00-227r10 12-Oct-00 500 mV strong driver

Paul Aloisi - TI	**370**	**475**	**495**	**500**	**560**	**620**	**700**	**740**	**800**	**Millivolt drive**
Nominal Voltage										
No driver imbalance, matched assertion and negation										
Driver Fall back 33%	244.2	313.5	326.7	**330**	**369.6**	**409.2**	**462**	**488.4**	**528**	560.6061 mV
Driver Fall Back 40%	222	285	297	300	**336**	**372**	**420**	**444**	**480**	616.6667 mV
Driver Fall Back 50%	185	237.5	247.5	250	**280**	**310**	**350**	**370**	**400**	740 Min high drive, for 370 mV
Assuming perfect driver assymetry	Signals levels below are at the connector of the receiving device, use the numbers with DC loss									
No Fall back	**14**	**35**	**39**	**40**	**52**	**64**	**80**	**88**	**100**	
Precomp off	**10.3**	**30.25**	**34.05**	**35**	**46.4**	**57.8**	**73**	**80.6**	**92**	5% DC loss from cable, connectors and terminators
Worst case, no driver tolerance				**35 mV**						**-5 mV receiver required - Adaptive Active Filter - no eye pattern**
Cable roll off to 60% signal -60 mV crosstalk & Noise										
Trans FB 33% roll off to 60%	64.32	99.6	106.32	**108**	**128.16**	**148.32**	**175.2**	**188.64**	**208.8**	mV signal at the receiver minus cable loss
Trans FB 40% roll off to 60%	59.88	93.9	100.38	102	**121.44**	**140.88**	**166.8**	**179.76**	**199.2**	10% DC loss from cable, connectors and terminators
Trans FB 40% roll off to 60%	73.2	111	118.2	120	**141.6**	**163.2**	**192**	**206.4**	**228**	10% DC loss from cable, connectors and terminators
				75 mV	**((((V+VFB)*.6)-Vfb)*0.9)-60)**					**100 mV receiver required, 60 mV Crosstalk and System Noise**

Color code

20 mV @ receiver Grey is ilegal

80 mV @ receiver Yellow would be legal with 500 mV minimum

100 mV @ receiver

Driver Assymetry caclulations

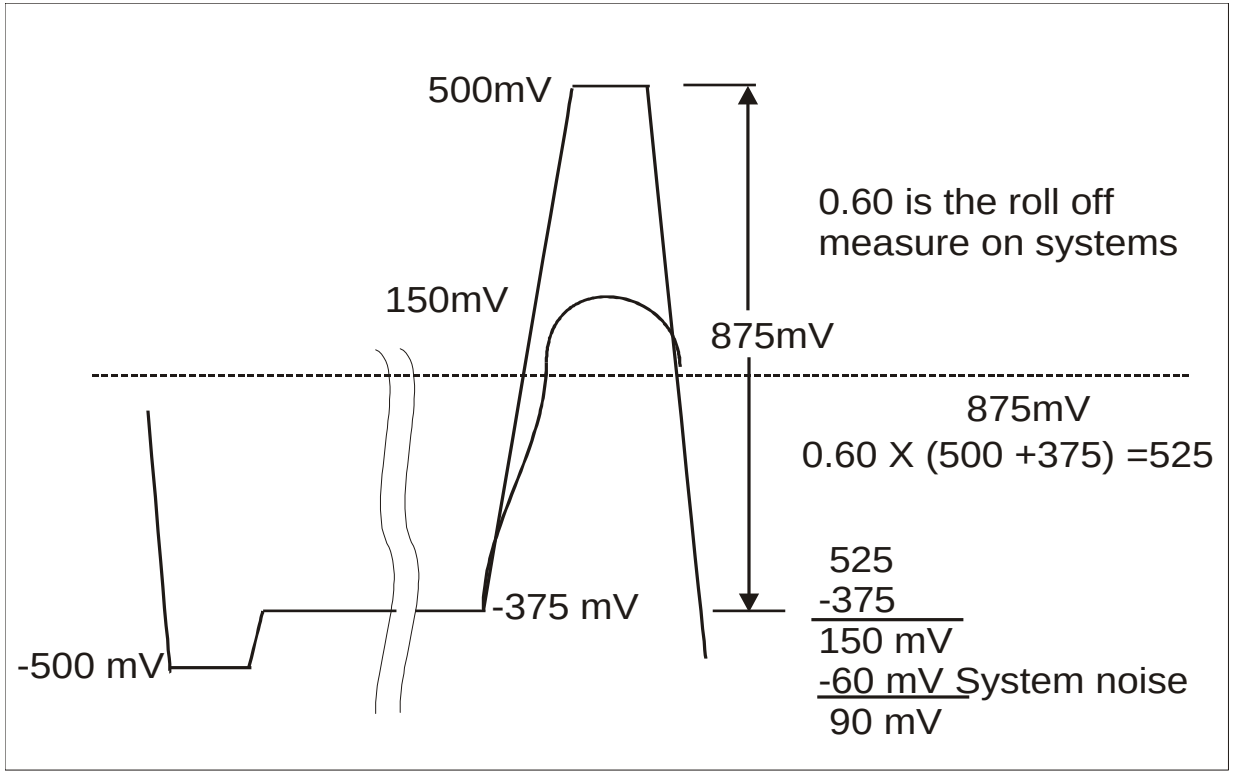
No Fall back - toleranced 10%	**-22**	**-7.3**	**-4.5**	**-3.8**	**4.6**	**13**	**24.2**	**29.8**	**38.2**	**Adaptive Active filter required, eye pattern**
Precomp off	**-27.18**	**-13.95**	**-11.43**	**-10.8**	**-3.24**	**4.32**	**14.4**	**19.44**	**27**	10% DC lo 99-295 wide pulse
Improved Tolerance driver asymmetry		**10%**		**-10 mV**						**-35 mV rec Bold Black does not work without Adaptive Active Filter**
Cable roll off to 60% signal -60 mV crosstalk & Noise										**Recomme Purple 20 mV receiver - active Filter**
Trans fb 33% roll off to 60%	18.108	44.19	49.158	**50.4**	**65.304**	**80.208**	**100.08**	**110.016**	**124.92**	10% DC lo **Red 80 mV receiver**
Trans fb 40% roll off to 60%	26.1	54.45	59.85	61.2	**77.4**	**93.6**	**115.2**	**126**	**142.2**	10% DC lo **Blue 100 mV receiver**
Trans fb 50% roll off to 60%	39.42	71.55	77.67	79.2	**97.56**	**115.92**	**140.4**	**152.64**	**171**	10% DC loss from cable, connectors and terminators
				DC & AC Loss (((0.9*(V*.9)-23)+(Vfb*.9))*0.6)-(Vfb*.9))-60						**50 mV receiver needed minimum**

Drive tolerance calculation

Fall back change minimum 45 mV receiver **50 mV with 500 mV minimum**

Seagate numbers limits configuration

Trans fb 33% roll off to 70%	67.756	108.58	116.356	**118.3**	**141.628**	**164.956**	**196.06**	**211.612**	**234.94**	10% DC loss from cable, connectors and terminators
Trans fb 40% roll off to 70%	73.75	116.275	124.375	126.4	**150.7**	**175**	**207.4**	**223.6**	**247.9**	10% DC loss from cable, connectors and terminators
Trans fb 50% roll off to 70%	83.74	129.1	137.74	139.9	**165.82**	**191.74**	**226.3**	**243.58**	**269.5**	10% DC loss from cable, connectors and terminators
				DC & AC Loss (((0.9*(V*.9)-23)+(Vfb*.9))*0.7)-(Vfb*.9))-60						**SPI-3 receiver levels are marginal, limits system loss**
				Fall back change minimum 110 mV receiver	**115 mV with 500 mV minimum**					**100 mV Receiver needed for minimum**


500mV
0.60 is the roll off
measure on systems
150mV
875mV
875mV
0.60 X (500 +375) =525
525
-375
150 mV
-60 mV System noise
90 mV
-375 mV
-500 mV

SPI-4 proposal to limit the strong driver to 500 mV minimum

SPI-3										
Nominal Voltage	320	340	400	427	485	500	600	700	800	Millivolt drive
SPI-2/3 driver	320	340	400	427	485	500	600	700	800	**320**
Isolated Transition	164	178	220	238.9	279.5	290	360	430	500	mV signal at the receiver minus cable loss
SPI-3 Receiver signal	**130.4**	**142.3**	**178**	**194.065**	**228.575**	**237.5**	**297**	**356.5**	**416**	15% cable loss
100 mV @ receiver	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**mV**
										Minimum signal at the receiver
Tolorance driver										
SPI-2/3 driver	320	340	400	427	485	500	600	700	800	320
Cable roll off to 85% signal Trans FB min to assert (85%)	122.18	130.91	157.1	168.8855	194.2025	200.75	244.4	288.05	331.7	mV signal at the receiver minus cable loss
SPI-2/3 calculations	**94.853**	**102.2735**	**124.535**	**134.5527**	**156.0721**	**161.6375**	**198.74**	**235.8425**	**272.945**	15% cable loss
Should be SPI-2/3	**76.635**	**83.1825**	**102.825**	**111.6641**	**130.6519**	**135.5625**	**168.3**	**201.0375**	**233.775**	25% cable & system loss

Additional Data on backplane losses shows that SPI-2 and SPI-3 should have been 25% loss.
Minimum drive level did not work in the worst case.

mV

First step min 320 mV