Driver Precomp Proposal, Review   50 mV removed from the equations, it is a problem for the driver spec.

00-227r7   23-Aug-00

Paul Aloisi - TI

	320	410	427	485	500	533	600	700	800 Millivolt drive
Nominal Voltage									
No driver imbalance, matched assertion and negation									
Driver fall back 22%	249.6	**319.8**	**333.06**	**378.3**	**390**	**415.74**	**468**	**546**	**624** 410.2564 mV
Driver fall back 25%	240	307.5	**320.25**	**363.75**	**375**	**399.75**	**450**	**525**	**600** 426.6667 mV
Driver Fall back 33%	211.2	270.6	281.82	**320.1**	**330**	**351.78**	**396**	**462**	**528** 484.8485 mV
Driver Fall Back 40%	192	246	256.2	291	**300**	**319.8**	**360**	**420**	**480** 533.3333 mV

Min high drive, for 320 mV

Assuming perfect driver assymetry   Signals levels below are at the connector of the receiving device, use the numbers with DC loss

	320	410	427	485	500	533	600	700	800	
No Fall back	**4**	**22**	**25.4**	**37**	**40**	**46.6**	**60**	**80**	**100**	
Precomp off	**-2.4**	**13.8**	**16.86**	**27.3**	**30**	**35.94**	**48**	**66**	**84**	10% DC loss from cable, connectors and terminators
Worst case, no driver tolerance										**-5 mV receiver required - Adaptive Active Filter - no eye pattern**
Cable roll off to 60% signal -60 mV crosstalk & Noise										
Trans FB 22% to assert (60%)	32.16	**58.08**	**62.976**	**79.68**	**84**	**93.504**	**112.8**	**141.6**	**170.4**	mV signal at the receiver minus cable loss
	22.944	**46.272**	**50.6784**	**65.712**	**69.6**	**78.1536**	**95.52**	**121.44**	**147.36**	10% DC loss from cable, connectors and terminators
Trans FB 25% roll off to 60%	36	63	**68.1**	**85.5**	**90**	**99.9**	**120**	**150**	**180**	mV signal at the receiver minus cable loss
Trans FB 33% roll off to 60%	47.52	77.76	83.472	**102.96**	**108**	**119.088**	**141.6**	**175.2**	**208.8**	mV signal at the receiver minus cable loss
Trans FB 40% roll off to 60%	55.2	87.6	93.72	114.6	**120**	**131.88**	**156**	**192**	**228**	mV signal at the receiver minus cable loss
	43.68	72.84	78.348	97.14	**102**	**112.692**	**134.4**	**166.8**	**199.2**	10% DC loss from cable, connectors and terminators

          (((V+VFB)*.6)-Vfb)-60)   **46 mV receiver required, 60 mV Crosstalk and System Noise**

	320	410	427	485	500	533	600	700	800	
20 mV @ receiver	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20** mV	**Adaptive Active filter required, eye pattern**
80 mV @ receiver	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80** mV	99-295 wide pulse
100 mV @ receiver	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100** mV	**Bold Black does not work without Adaptive Active Filter**

Purple 20 mV receiver - active Filter

Red 80 mV receiver

Driver Assymetry caclulations   **Blue 100 mV receiver**

	320	410	427	485	500	533	600	700	800	
No Fall back - toleranced 15%	**-24.8**	**-14.9**	**-13.03**	**-6.65**	**-5**	**-1.37**	**6**	**17**	**28**	
Precomp off	**-28.32**	**-19.41**	**-17.727**	**-11.985**	**-10.5**	**-7.233**	**-0.6**	**9.3**	**19.2**	10% DC loss from cable, connectors and terminators
Improved Tolerance driver asymmetry		**15%**								**-30 mV receiver required - Adaptive Active Filter - no eye pattern**
Cable roll off to 60% signal -60 mV crosstalk & Noise										**Recommended -100 mV Adaptive Active Filter**
Trans FB 22% to assert (60%)	3.36	**21.18**	**24.546**	**36.03**	**39**	**45.534**	**58.8**	**78.6**	**98.4**	mV signal at the receiver minus cable loss
	-2.976	13.062	16.0914	26.427	29.1	34.9806	46.92	64.74	**82.56**	10% DC loss from cable, connectors and terminators
Trans fb 25% roll off to 60%	7.2	**26.1**	**29.67**	**41.85**	**45**	**51.93**	**66**	**87**	**108**	
Trans fb 33% roll off to 60%	18.72	40.86	45.042	**59.31**	**63**	**71.118**	**87.6**	**112.2**	**136.8**	
Trans fb 40% roll off to 60%	26.4	50.7	55.29	70.95	**75**	**83.91**	**102**	**129**	**156**	mV signal at the receiver minus cable loss
	17.76	39.63	43.761	57.855	61.5	**69.519**	**85.8**	**110.1**	**134.4**	10% DC loss from cable, connectors and terminators

          DC & AC Loss (((0.85*(V*.9))+(Vfb*.9))*0.6)-(Vfb*.9))-60   **Adaptive Active filter required**

          (((0.85*V)+Vfb)*0.6)-Vfb)-60   **10 mV receiver needed minimum**

Drive tolerance calculation   **Recommended 0 mV Adaptive active filter**

Seagate numbers limits configuration

	320	410	427	485	500	533	600	700	800	
Trans fb 22% roll off to 70%	43.968	**73.209**	**78.7323**	**97.5765**	**102.45**	**113.1717**	**134.94**	**167.43**	**199.92**	10% DC loss from cable, connectors and terminators
Trans fb 40% roll off to 70%	59.52	93.135	99.4845	121.1475	**126.75**	**139.0755**	**164.1**	**201.45**	**238.8**	10% DC loss from cable, connectors and terminators

          DC & AC Loss (((0.85*(V*.9))+(Vfb*.9))*0.7)-(Vfb*.9))-60   **SPI-3 receiver levels are marginal, limits system loss**

          70 mV Receiver needed for minimum

500mV

150mV

875mV

0.60 is the roll off
measure on systems

875mV

0.60 X (500 +375) =525

-375 mV

-500 mV

525
-375
150 mV
-60 mV System noise
90 mV

Orange SPI-3
Black my SPI-4
Driver Limits
Quantum
proposal
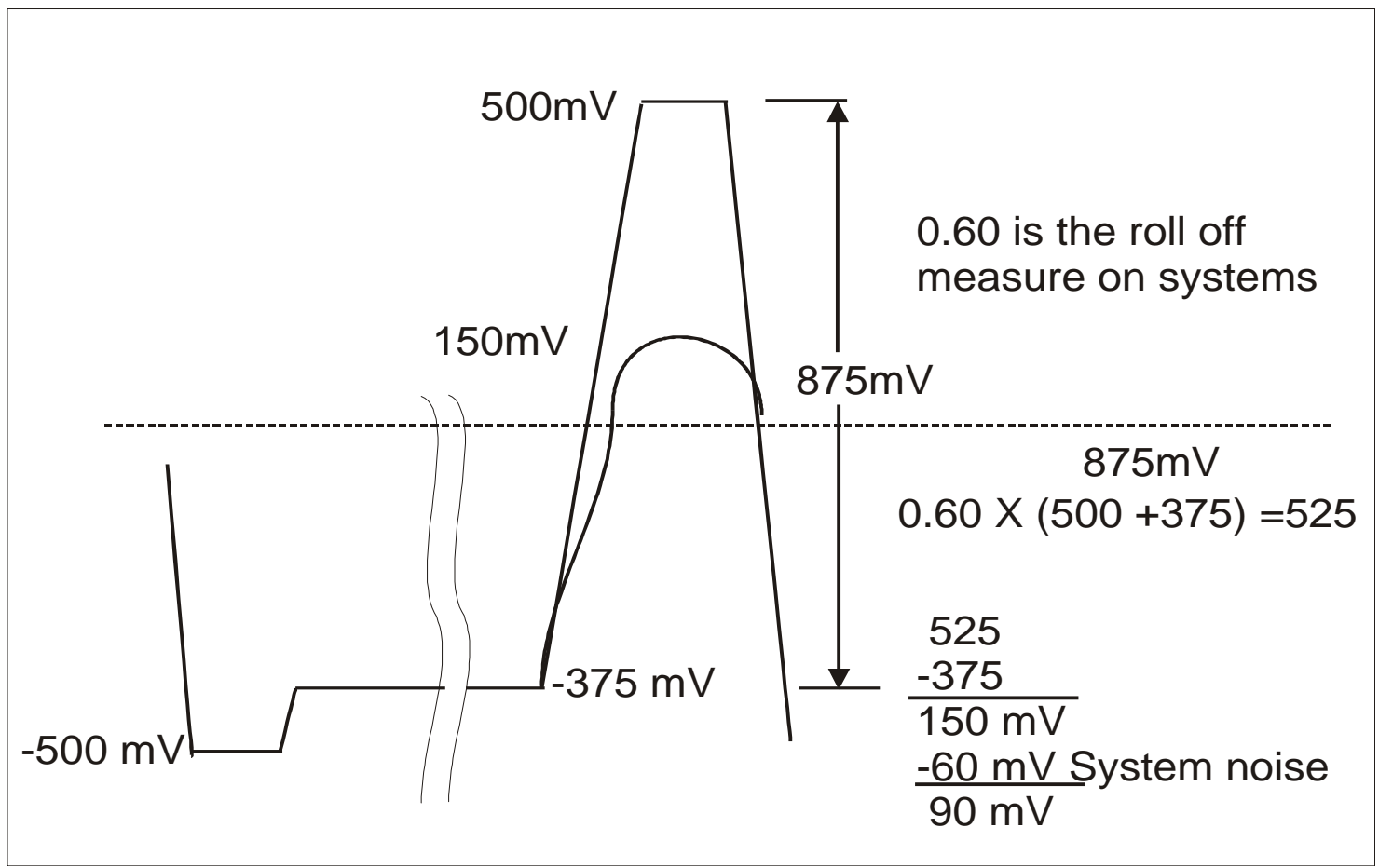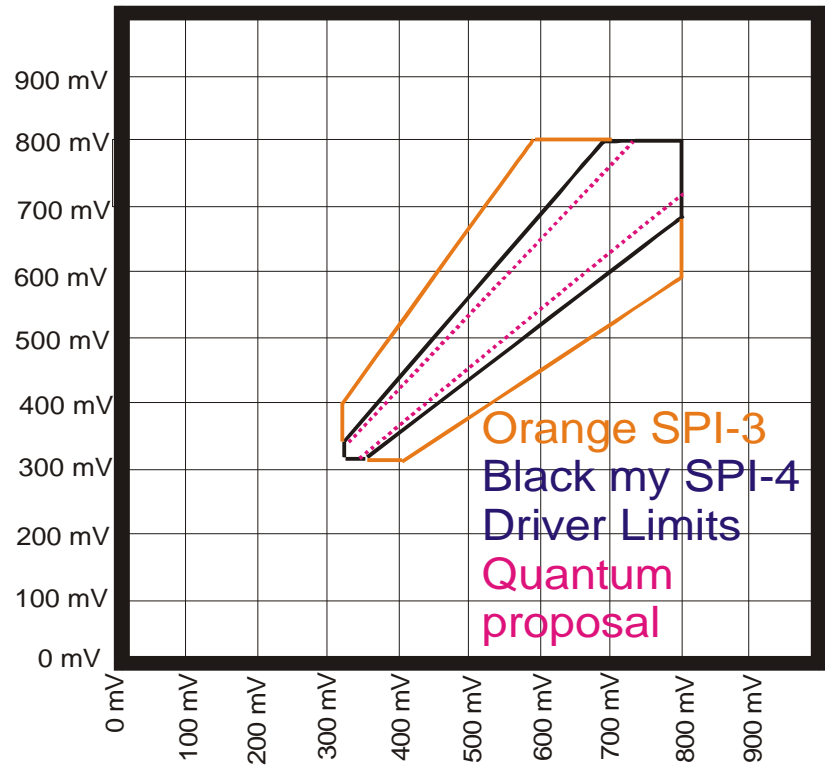
SPI-3

	320	340	400	427	485	500	600	700	800	Millivolt drive
Nominal Voltage										
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										mV
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 **First step min 320 mV**
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 320 mV marginal