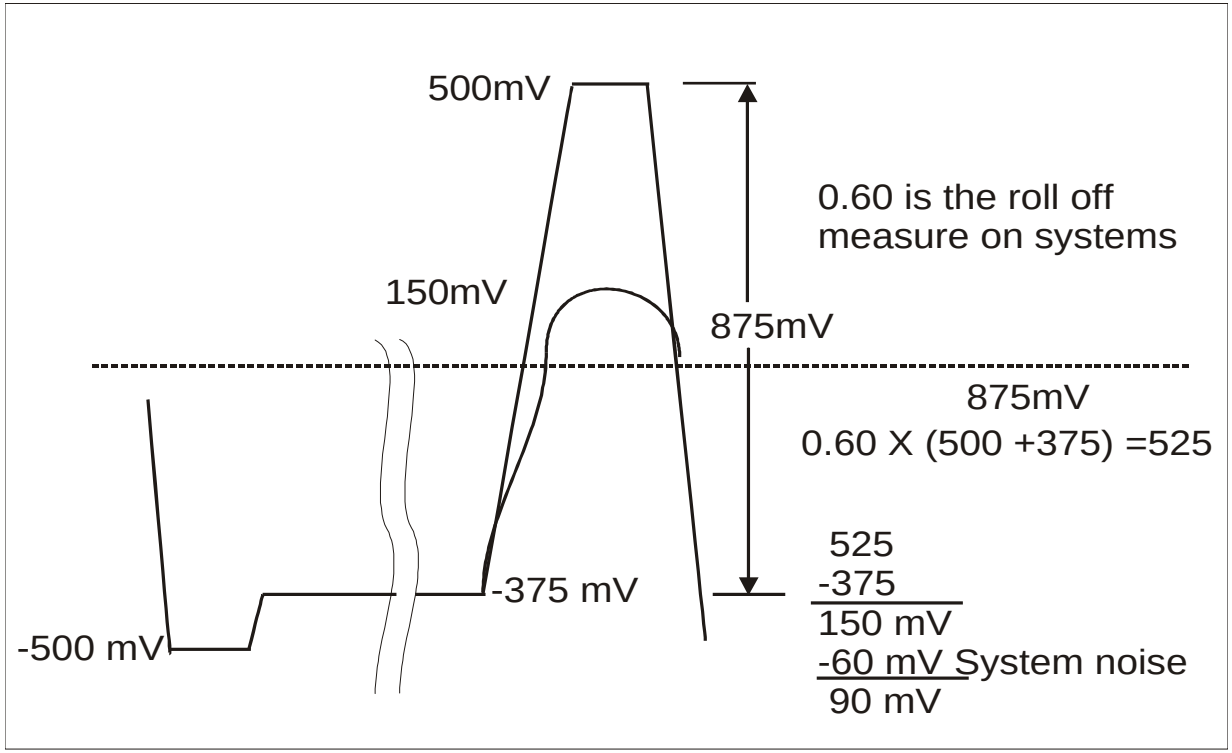
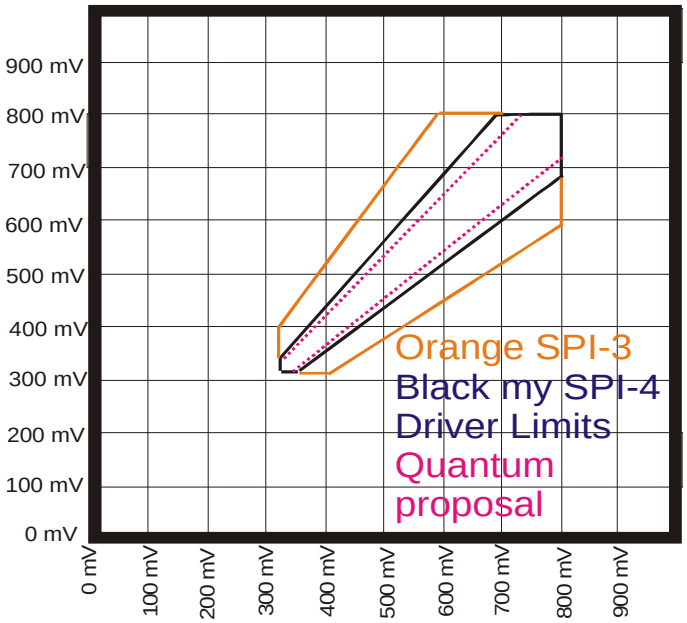
Driver Precomp Proposal, Review

00-227r6 12-July-2000

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									
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**
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
Driver Assymetry caclulations										**Red 80 mV receiver**
No Fall back - toleranced 15%	**5.2**	**15.1**	**16.97**	**23.35**	**25**	**28.63**	**36**	**47**	**58**	**Blue 100 mV receiver**
Precomp off	**-1.32**	**7.59**	**9.273**	**15.015**	**16.5**	**19.767**	**26.4**	**36.3**	**46.2**	10% DC loss from cable, connectors and terminators
Improved Tolerance driver asymmetry		**15%**								**-5 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%)	33.36	**51.18**	**54.546**	**66.03**	**69**	**75.534**	**88.8**	**108.6**	**128.4**	mV signal at the receiver minus cable loss
	24.024	**40.062**	**43.0914**	**53.427**	**56.1**	**61.9806**	**73.92**	**91.74**	**109.56**	10% DC loss from cable, connectors and terminators
Trans fb 25% roll off to 60%	37.2	56.1	**59.67**	**71.85**	**75**	**81.93**	**96**	**117**	**138**	
Trans fb 33% roll off to 60%	48.72	70.86	75.042	**89.31**	**93**	**101.118**	**117.6**	**142.2**	**166.8**	
Trans fb 40% roll off to 60%	56.4	80.7	85.29	100.95	105	**113.91**	**132**	**159**	**186**	mV signal at the receiver minus cable loss
	44.76	66.63	70.761	84.855	88.5	**96.519**	**112.8**	**137.1**	**161.4**	10% DC loss from cable, connectors and terminators
										Adaptive Active filter may be required
Drive tolerance calculation						**(((0.85*V)+50+Vfb)*0.6)-Vfb)-60**				**40 mV receiver needed minimum**
										Recommended 0 mV Adaptive active filter
Seagate numbers limits configuration										
Trans fb 22% roll off to 70%	**75.468**	**104.709**	**110.2323**	**129.0765**	**133.95**	**144.6717**	**166.44**	**198.93**	**231.42**	10% DC loss from cable, connectors and terminators
Trans fb 40% roll off to 70%	**91.02**	**124.635**	**130.9845**	**152.6475**	**158.25**	**170.5755**	**195.6**	**232.95**	**270.3**	10% DC loss from cable, connectors and terminators
						(((0.85*V)+50+Vfb)*0.7)-Vfb)-60				**SPI-3 receiver levels, limits system loss**


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-3

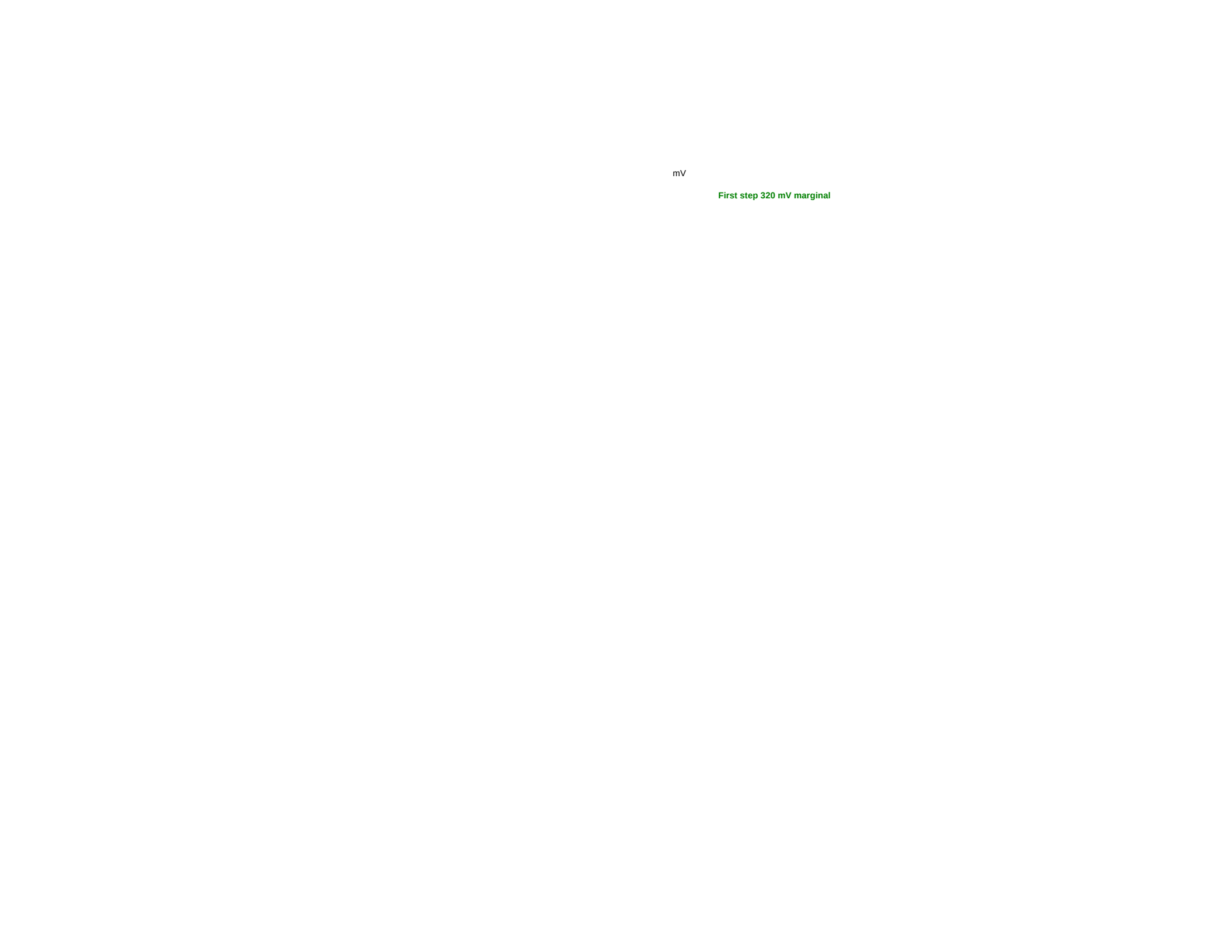
	320	340	400	427	485	500	600	700	800	Millivolt drive
Nominal Voltage										
SPI-2/3 driver	320	340	400	427	485	500	600	700	800	**320**
Isolated Transition	164	178	220	238.9	279.5	290	360	430	500	mV signal at the receiver minus cable loss
SPI-3 Receiver signal	**130.4**	**142.3**	**178**	**194.065**	**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