Worst Case Signal Amplitude Calculations Spreadsheet T10/00-350r0

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Worst Case Calculations

- One cannot just take all worst cases and apply them simultaneously as some are mutually exclusive
- Even when excluding the above, the union of all remaining events becomes infinitesimally small
- One needs to comprehend the entire specification when selecting cases

Weather Analogy

- What would you say is the worst case weather/natural disaster?

  Monsoon?

  Temperature -40 degrees w/ -20 degrees wind chill?

  Hurricane? Tornado?

  Blizzard?

  Earthquake?

  Volcano?

Any more ideas?

- What about hearing from our friends from Mass.?
  - A Russian ICBM might hit at the same time - who can guarantee it won't?
- If all these hit at once the population would be wiped out at that location
- How likely are the to occur simultaneously - even though they happen many times a year separately or a few at a time

What about our worst case calculations

- Crosstalk - The worst crosstalk happens with the largest interfering signals on adjacent lines.
- What about worst case noise and driver asymmetry
  - Worst case noise occurs with all drives accessing
  - Worst case asymmetry happens at WC-slow (i.e. 0 degrees Centigrade)

Worst Case Spreadsheet Components

- We have found through extensive testing of actual subsystems that the practical worst case attenuation is about 30%
- 60 mv (120 mv p-p) crosstalk with this amount of attenuation is unrealistic (say 30 mv). We have tested with severe crosstalk and noise, increase it by 20 mv?

Update to worst case

Driver Precomp Proposal, Review[2]									
Update to									
Paul Aloisi - TI/ABM-Seagate	427	500	600	700	800	Millivolt drive			
Nominal Voltage									
No driver imbalance, matched assertion and negation									
Driver fall back 15%	363	425	510	595	680	376	mV	**First step min ~~650 mV~~ 427 mV with**	
Driver fall back 25%	320	375	450	525	600	427	mV	**cable loss at proposed cutback**	
Driver Fall back 33%	282	330	396	462	528	485	mV		
Driver Fall Back 40%	256	300	360	420	480	533	mV		
Worst case						Min high drive, for 320 mV			
Cable roll off to 71% signal									
Trans FB 15% roll off to 71%	**198**	**232**	**278**	**324**	**371**				
	178	**209**	**250**	**292**	**334**	10% cable / system loss			
Trans FB 40% roll off to 71%	**229**	**246**	**296**	**345**	**394**	mV signal at the receiver minus cable loss			
	206	**222**	**266**	**310**	**355**	10% cable / system loss			
Blue 80 mV receiver									
80 mV @ receiver									
60 mV noise+crosstalk	**140**	**140**	**140**	**140**	**140**	**mV**	Signal required with Noise + Crosstalk		
20 mV noise+crosstalk	**100**	**100**	**100**	**100**	**100**	**mV**			
Tolerance driver									
Cable roll off to 71% signal									
Trans fb 15% roll off to 71%	**188**	**214**	**250**	**285**	**321**	mV signal at the receiver minus cable loss			
	169	**193**	**225**	**257**	**289**	10% cable / system loss			
Trans fb 40% roll off to 71%	**219**	**250**	**293**	**336**	**379**	mV signal at the receiver minus cable loss			
	197	**225**	**264**	**303**	**341**	10% cable / system loss			
Drive tolerance calculation			**((0.85*V)+50+Vfb)*0.71)-Vfb**				Signal at the receiver		

Conclusions

- Precompensation works at worst case extremes which will actually occur (even those with very small probability)
- Precomp has extra margin even under these conditions

Invitational Challenge

- We set up our lab to facilitate these kind of measurements - and partially automated the collection of data and its presentation
  - First Pulse
  - Frequency attenuation
  - Cable measurements
- We invite you to use our lab
  - Send us you materials and we will measure
  - Come with your materials and we can measure together
  - (If Quantum - we'll set it up in the park next door)