Comments #46-49 : Clause 87 Stressed Receiver Eye

Inphi

Think fast.

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Overview

- The consolidation of the 40GBASE-LR and 100GBASE-LR/ER stressed receiver eye text into clause 87 is a great improvement
  - Much thanks to Jonathan King & Chris Cole for this work
- However, now everything is consolidated the difficulties in creating a stressed receiver eye compliance environment are clearer
  1. There are a lot of parameters than can be varied to create a compliant stressed eye
     - There are many different recipes that create a stressed eye
  2. It is not clear whether compliance requires testing of all possible stressed eyes, or just one

Comment resolutions

1. Restrict the number and range of parameters than can be varied to create a compliant stressed eye
   - Limit the range of the BT filter contribution to between 0.6 and 0.7 of the dB value of the VECP (comment #46)
   - Select a fixed sinusidal amplitude interferer frequency of 1GHz (comment #48)

2. It is not clear whether compliance requires testing of all possible stressed eyes, or just one
   - (comment #49) State explicitly in the draft :
     - An implementation that passes with any combination of the stressed eye parameters is compliant

3. Remove non-normative minimum DCD requirement
   - (comment #47)
     - Delete : " The sinusoidal jitter added should result in at least 0.05 UI peak to peak DCD."

Comment #49

- " Stressed receiver sensitivity shall be within the limits given in Table 87-8 for 40GBASELR4 if measured using the method described in 87.8.11.1 and 87.8.11.5 with the conformance test signal at TP3 as described in 87.8.11.2.."
- Stressed receiver sensitivity compliance is a normative requirement, but the test setup has a number of variable parameters : BT filter parameters, sinusoidal jitter frequency, sinusoidal amplitude interferer frequency and amplitude, etc.
- Given the wide range of alternative configurations that could meet the stressed eye VECP and SEJ values, is it the intention of the committee that all such test setups be tested against the Stressed receiver sensitivity requirement ? i.e. In order to be compliant is it sufficient to demonstrate compliance at just one such configuration, or does failure at any such configuration mean an implementation is noncompliant.
- I see hazards in either position.
  - A single pass might allow an implementation to select a set of parameters particularly favorable in order to pass.
  - Conversely demonstrating that there is no single combination of parameters that does not cause a failure would cause testing to take an impracticable amount of time.
- *SuggestedRemedy*
  - Add some text indicating the committees intention.

Comment #46

- " With the sinusoidal interference and sinusoidal jitter turned off, greater than two thirds of the dB value of the VECP should be created by the selection of the appropriate bandwidth for the fourth-order Bessel-Thomson filter."
- Provide a range rather than a limit for the Bessel-Thomson Filter contribution. We recommend :
  - “between 0.6 and 0.7 of the dB value”
- This limits the variability of the BT contribution to the stressed eye producing a more consistent compliance test.

Comment #48

- "The sinusoidal amplitude interferer may be set at any frequency between 100 MHz and 2 GHz"
  - Providing such a wide range of frequency (in addition to amplitude) makes compliance testing difficult.
- SuggestedRemedy
  - Select a single sinusidal amplitude interferer frequency of 1GHz.

Comment #47

- " The sinusoidal jitter added should result in at least 0.05 UI peak to peak DCD."
  - This is the only indication of a minimum DCD requirement in the draft and is not normative anyway.
- This sentence is redundant and should be removed.

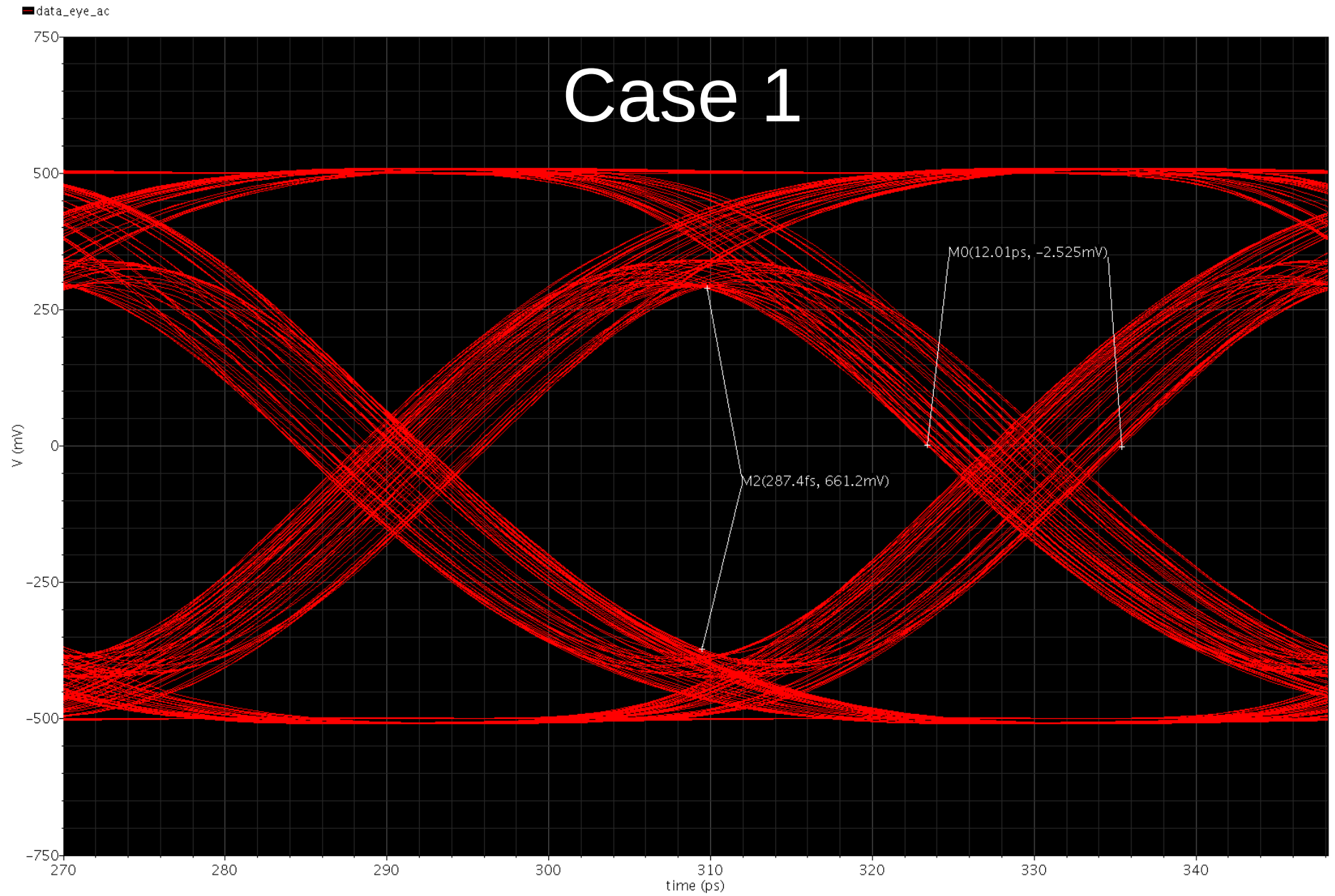
Supporting Simulations

3 Simulation examples

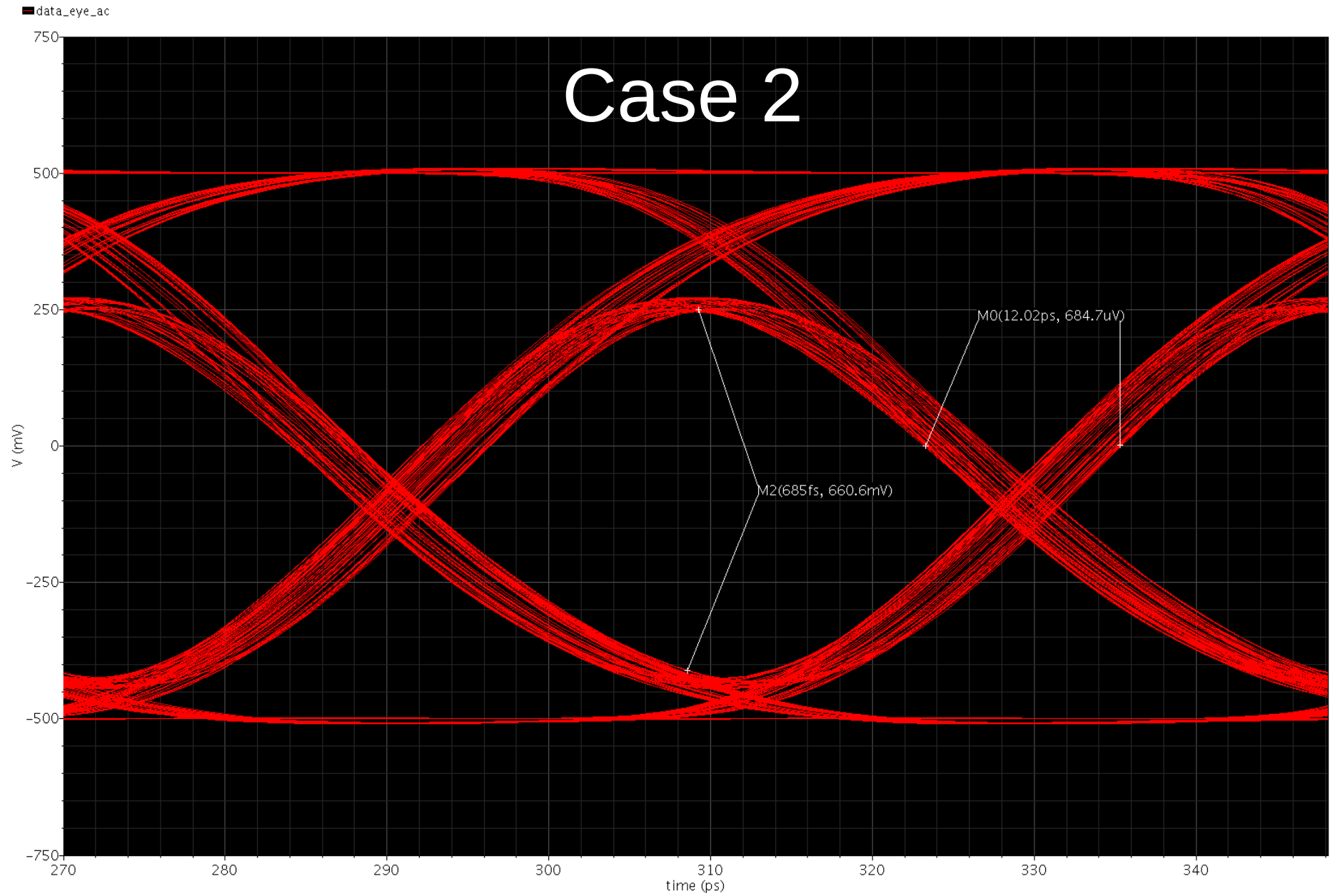
	BT filter BW (UI)	Sinusoidal Jitter (S)	DCD (UI)	Random jitter (UI)
Case 1	0.41	0.10	0.05	0
Case 2	0.41	0.05	0.10	0
Case 3	0.42	0.05	0.075	0.075

- The next 3 slides show 3 recipes that meet the stressed receiver eye mask
- These are Cadence Spectre simulations based on a PRBS9 pattern (to limit simulation time)
- The First parameter/column is the -3dB frequency corner of the 4th order Bessel-thompson filter expressed in UI.
- The Second parameter/column is the sinusoidal jitter amplitude “S” (@ 1Ghz)
- The Third parameter/column is Duty Cycle distortion
- The Fourth parameter/column is random jitter (Adding sinusoidal amplitude interferer is difficult in simulation)
- My thanks to Jeff Sanders (Inphi) for these simulations

clk_freq=25.6GHz bt_filt_fc_ui=0.41 sine_jit_ui=0.1 dcd_ui=0.05 rand_jit_ui=0



clk_freq=25.6GHz bt_filt_fc_ui=0.41 sine_jit_ui=0.05 dcd_ui=0.1 rand_jit_ui=0




data_eye_ac
Case 3
M4(12.11ps, 1.265mV)
M6(774.3fs, 662.2mV)
750
500
250
0
-250
-500
-750
V (mV)
270
280
290
300
310
320
330
340
time (ps)