

# Addressing the Proposed Overshoot Modification

- Comments #248, #249, #250 and #251

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802.3dj interim

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# Supporters

- Michael He, Terahop
- Guangcan Mi, Huawei
- Mike Dudek, Marvell
- Chris Cole, Coherent
- John Johnson, Broadcom
- Frank Chang, SourcePhotonics
- Yuxin Zhou, Lumentum
- Pavel Zivny, Multilane
- Ali Ghiasi, Marvell

# Related comment and supporting presentation

[ghiasi\\_3dj\\_01a\\_2603](#)

CI 180 SC 180.7.1 P468 L38 # I-248

Ghiasi, Ali

Ghiasi Quantum LLC, Marvell Semiconductor, Inc.

Comment Type TR Comment Status X

In D2.0 1T DFE was added to the TDECQ equalizer where DFE is superior to improve TDECQ for bandlimited transmitters over using large overshoot/undershoot which can have 1-2 dB of SNR penalty given TDECQ doesn't incorporate peak-to-average penalty. Overshoot/undershoot of 22% at 1E-2 hit ratio can also result in clipping and frame loss.

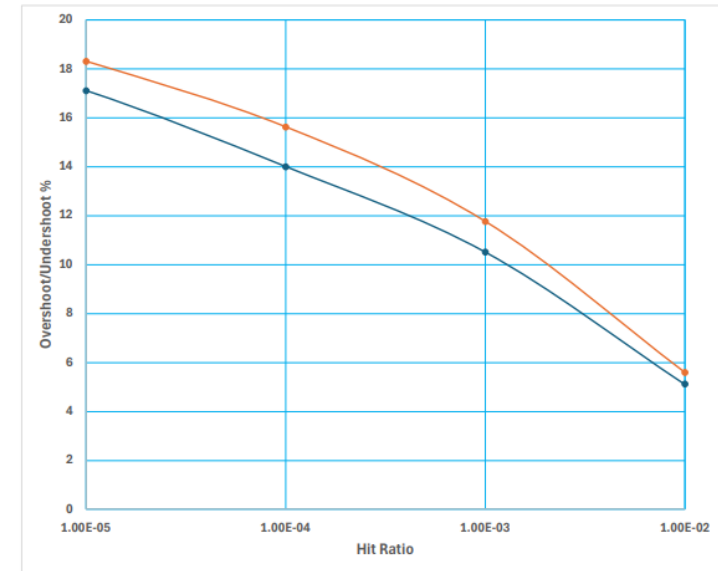
#### Suggested Remedy

Hit ratio of 1E-2 has no merits given SSPRQ and Ethernet scrambled data. Peak-peak amplitude for example are measured at hit ratio of 1E-7 in DJ. Change hit ratio from 1E-2 to 1E-4 and reduce overshoot/undershoot from 22% to 18% given that TDECQ has DFE no longer such high overshoots are necessary. see [ghiasi\\_3dj\\_02\\_2605](#)

Proposed Response

Response Status

200G-DR8 Transmitter



- Even for SSPRQ moderate size pattern (65,535 bits ) overshoot triples from ~5% at hit ratio of  $10^{-2}$  to ~15% at hit ratio of  $10^{-4}$ 
  - A typical transmitter with 15%, 20%, or 22% overshoot at  $10^{-2}$  hit where the overshoot is >50% at  $10^{-4}$  hit is problematic

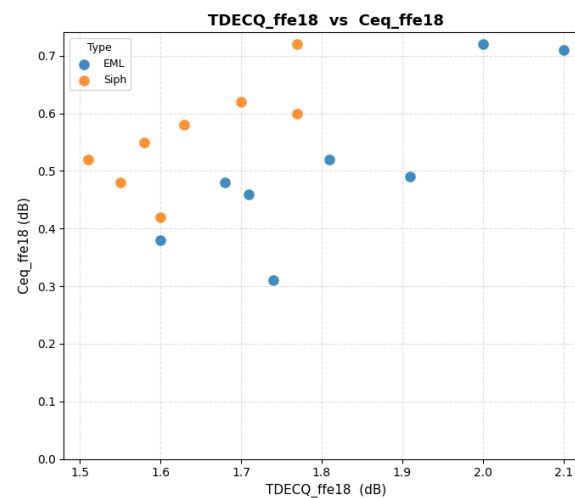
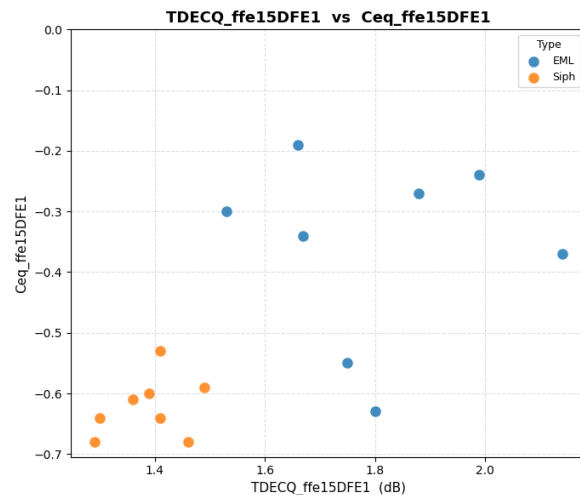
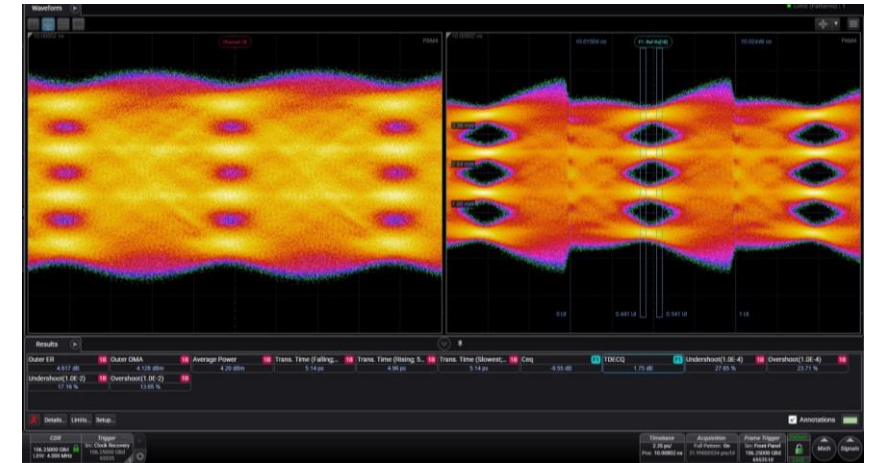
**Ali's Proposal:** Reduce hit ratio from 1e-2 to 1e-4 and spec value change from 22% to 18%

# Test Description – Overshoot/Undershoot Measurement

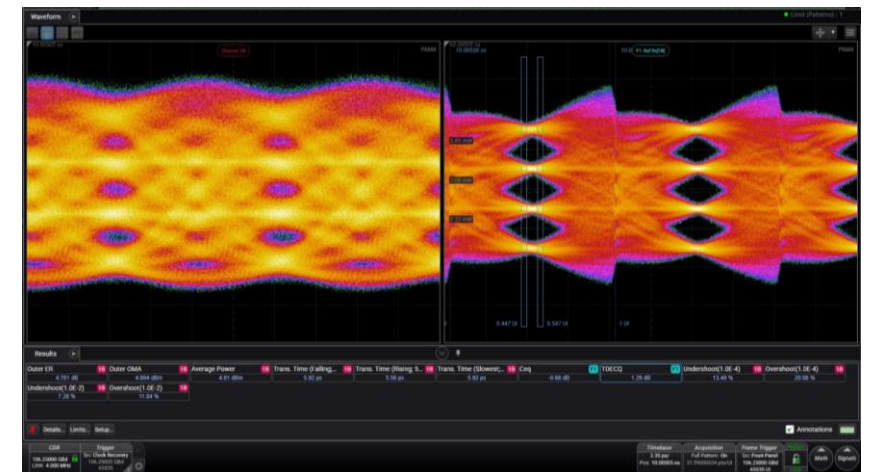
- 200G/lane OSFP modules
- 16 lanes: 8 EML and 8 SiPho
- Hit ratios: 1e-2 and 1e-4
- Standard TDECQ and Ceq
- TDECQ and Ceq with FFE only for indirect bandwidth estimation
- Clean Tx: ~0.5 dB Ceq (FFE only) and <2 dB TDECQ

EML eyediagrams

Reference Receiver Output      Reference Equalizer Output

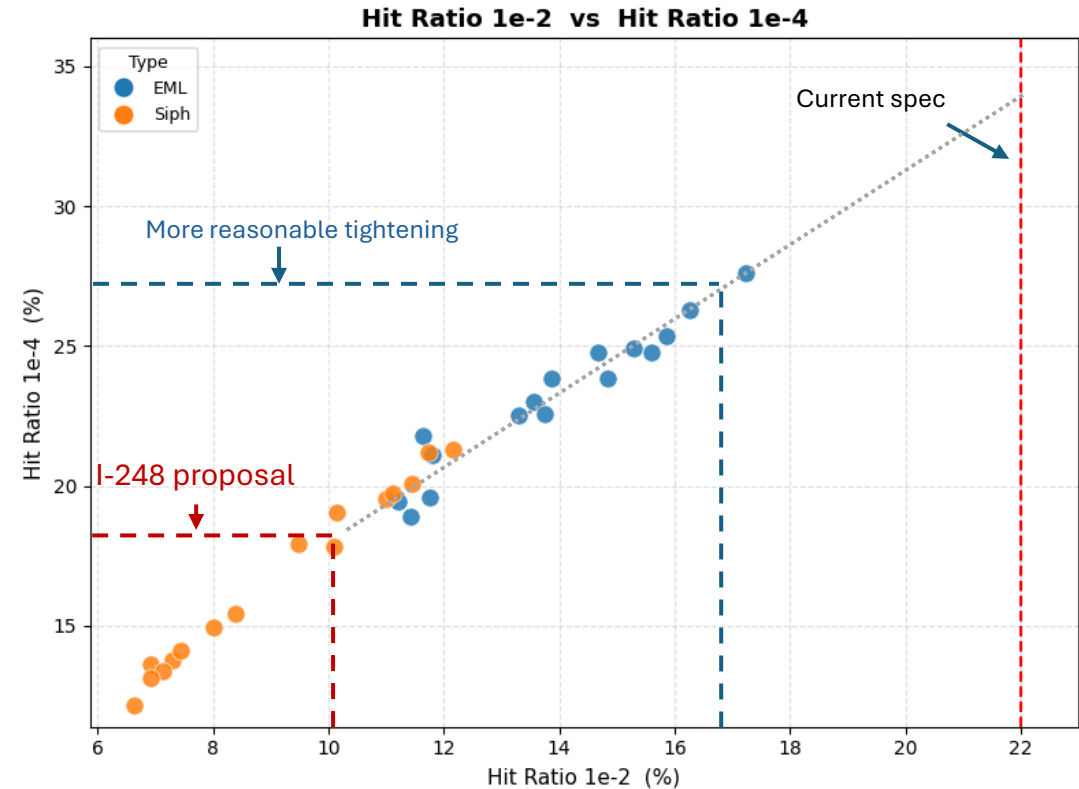


SiPho eyediagrams



# Overshoot/Undershoot Results

- The proposed tightening by Ali represents roughly a 55% reduction from the current overshoot specification. Such a reduction would significantly impact existing Tx implementations. Therefore, to make such change this late in the project, strong technical justification and evidence should be provided.
- While changing the hit ratio from  $1e-2$  to  $1e-4$  may improve the robustness of the specification, it should be paired with a corresponding adjustment to the allowable spec limit.
- **This presentation proposal:**
  - Adopt a hit ratio of  $1e-4$  with a spec limit of 27%
- A hit ratio of  $1e-4$  with a spec limit of 27% would address concerns about potential 50% overshoot claims noted in [ghiasi\\_3dj\\_01a\\_2603](#), while remain achievable for current designs



# Conclusion

- I-248 proposes an aggressive change that could impact current implementations without sufficient data to demonstrate that it is technically necessary.
- A more balanced approach would be to set the overshoot limit to 27% at a  $1e-4$  hit ratio.
- Alternatively, the current specification should be maintained until a more comprehensive analysis is completed to justify the change.