Overshoot and Tx Power Excursion

(in support of comments 179 and 180)

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Observations

- Overshoot/undershoot is maximum at short length (2 m) and decreases with fiber length because fiber acts as a low pass filter.

- Transceivers have to pass overshoot/undershoot (at 2m), TECQ, and TDECQ with the same drive setting. Passing TDECQ requires more pre-emphasis leading to more overshoot/undershoot at 2 m.

- Photodiode responsivity at 850 – 940 nm is smaller than 1310 nm leading to a smaller current swing into the TIA.

- Overshoot is specified using a hit ratio, and there is a correlation between the values at different hit ratios. In D2.0, overshoot/undershoot (max) is 26% at 3E-3 hit ratio which is equivalent to 20% at 1E-2 hit ratio. Hit ratio is 3E-3 in 802.3db D2.0 and 1E-2 in 802.3cu.

- This comment (#179) proposes overshoot/undershoot (max) of 29% at 3E-3 HR, equivalent to 22% at 1E-2 HR defined in 802.3cu.

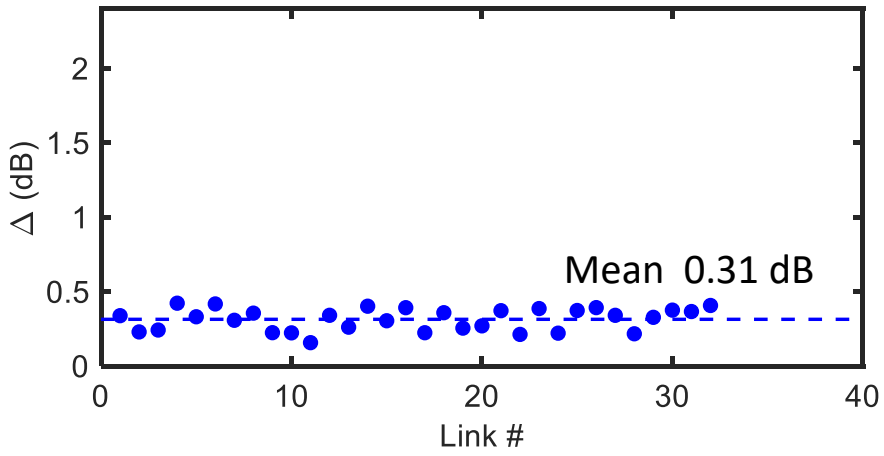
Hit Ratio

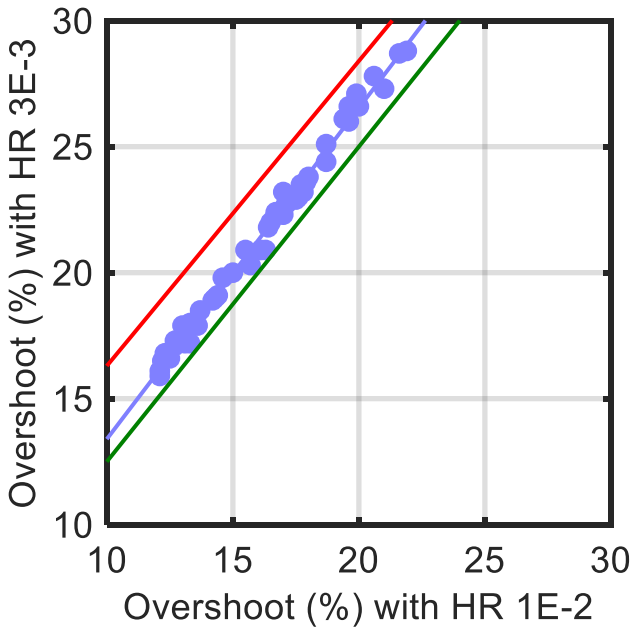
Hit ratio is used for two specifications:

a) Overshoot/undershoot (max)

b) Transmitter power excursion (max)

Δ = Tx power excursion (3E-3) – Tx power excursion (1E-2)





this study [100G VCSEL]

ghiasi_802.3db_01_092321.pdf [100G VCSEL]

rodes_3cu_01a_052620.pdf [SM link]

$$\frac{\text{Overshoot (HR 3E–3)}}{\text{Overshoot (HR 1E–2)}}$$

= 1.31

= 1.21 (+ 4.2% offset)

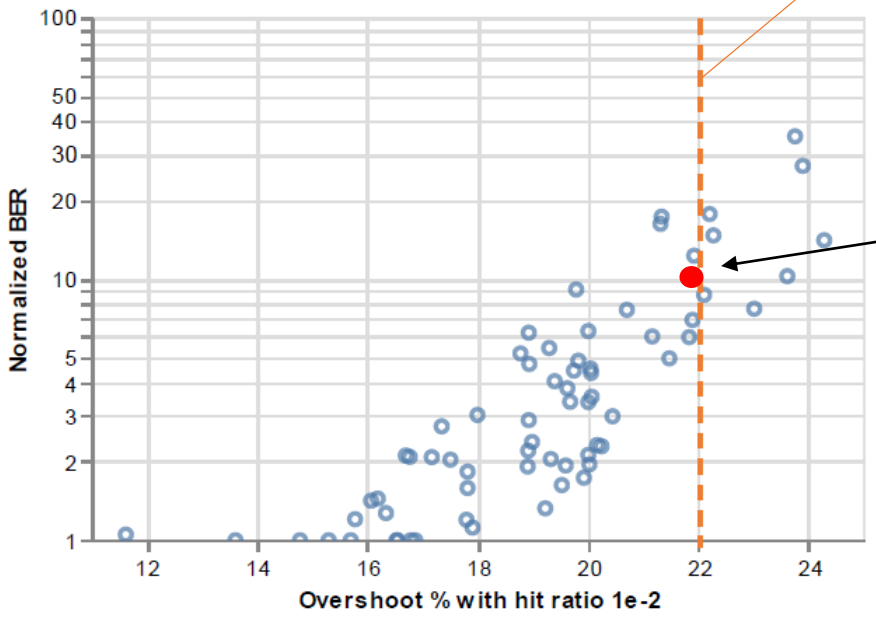
≈ 1.25 (3.3E-3 HR / 1E-2 HR)

Overshoot

Specification in P802.3cu: 22% at HR 1E-2

rodes_3cu_01a_052620.pdf

22% @HR 1E-2



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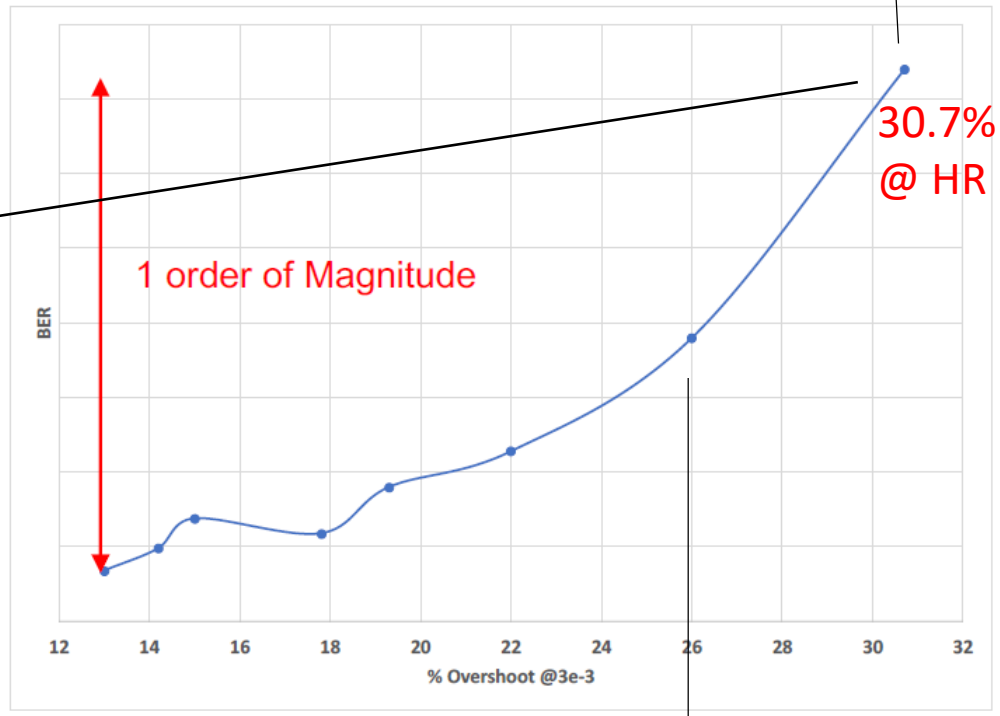
Lies within the population permitted in P802.3cu



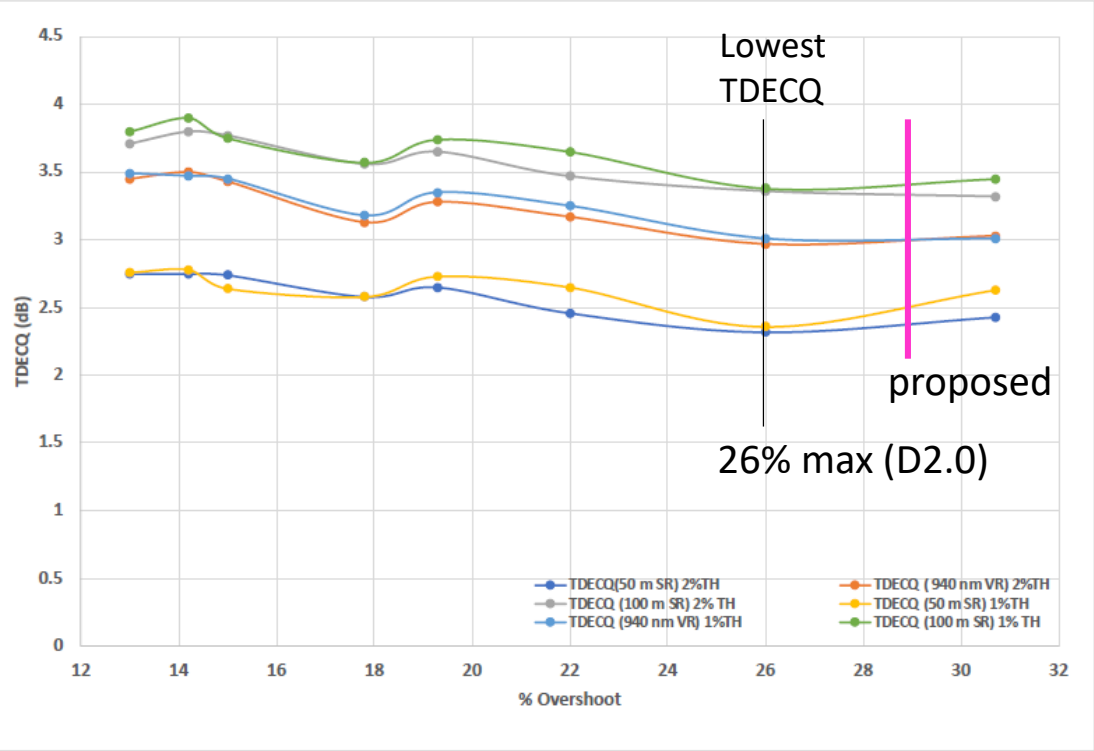
26% max (D2.0) overshoot/undershoot

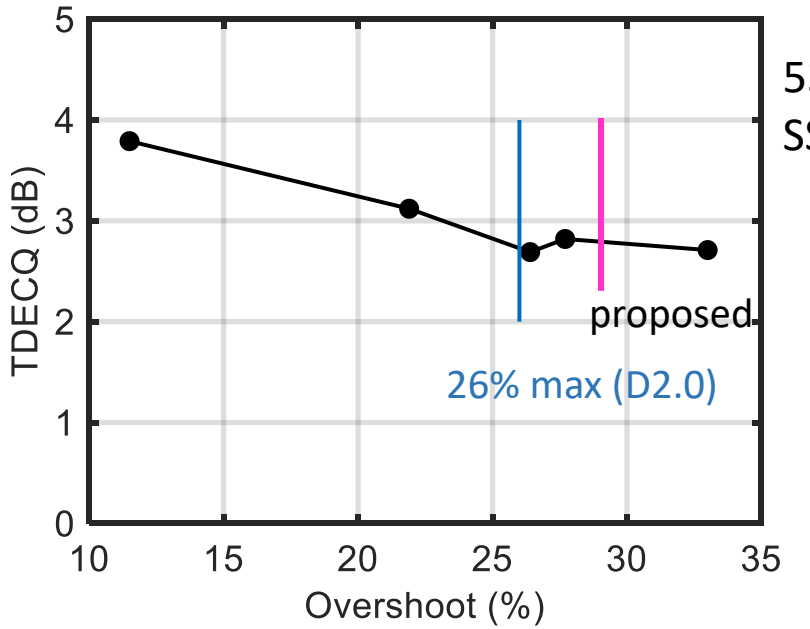
We propose a 22% spec to limit the penalty on error floor while allowing some overshoot margin for:

- ❑ Manufacturing margin
- ❑ Measurement error
- ❑ Over temperature and dispersion penalty

TDECQ vs. Overshoot

ghiasi_802.3db_01_092321.pdf





- Accessing the drive condition for lowest TDECQ requires having some margin on the set point.

- Proposal for overshoot/undershoot (max): 29% @ HR 3E-3 [equivalent to 22% @ HR 1E-2]

Tx Power Excursion

- P802.3cu

  Tx power excursion (max) 1.8 dBm @ HR 1E-2 400GBASE-FR4

- 100G VCSEL based link

  Tx power excursion (HR 3E-3) ≈ Tx power excursion (HR 1E-2) + 0.3 dB

- Proposal for Tx power excursion (max): 2.3 dBm @ HR 3E-3 [equivalent to 2 dBm @ HR 1E-2]

Table 167-7

Proposed

Overshoot/undershoot (max)	~~26~~ 29	%
Transmitter power excursion, each lane (max)	~~2~~ 2.3	dBm

Specified at hit ratio 3E-3.