

IEEE 802.3dj: TECQ and TECQ_{cer} measurements comparison.

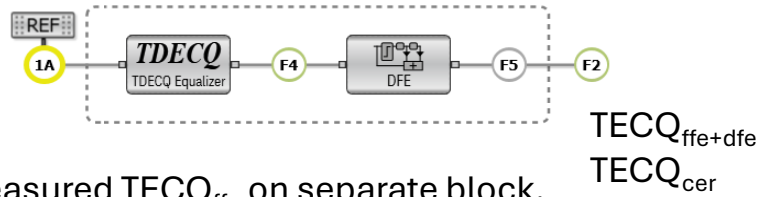
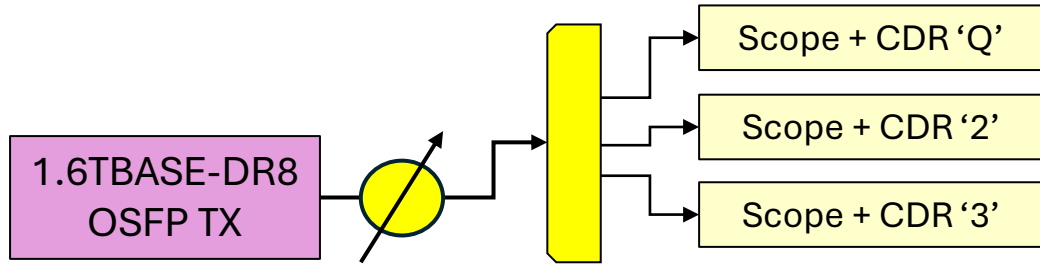
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Background

- $TDECQ_{CER}$, each lane (max) is currently defined into D3.0 .
- In the past, different contributions have been highlighting that $TDECQ_{cer}$ is very unstable measurement, so it can create false fail or pass depending on the signal, scope and number of waveforms captured.
- This presentation details $TECQ/TECQ_{cer}$ test results over two lanes of 2x800GBASE-FR4-500 and 1.6TBASE-DR8 modules, measured over three different sampling scopes of same type and SW version.

1.6TBASE-DR8 TECQ (FFE only): different scopes comparison.



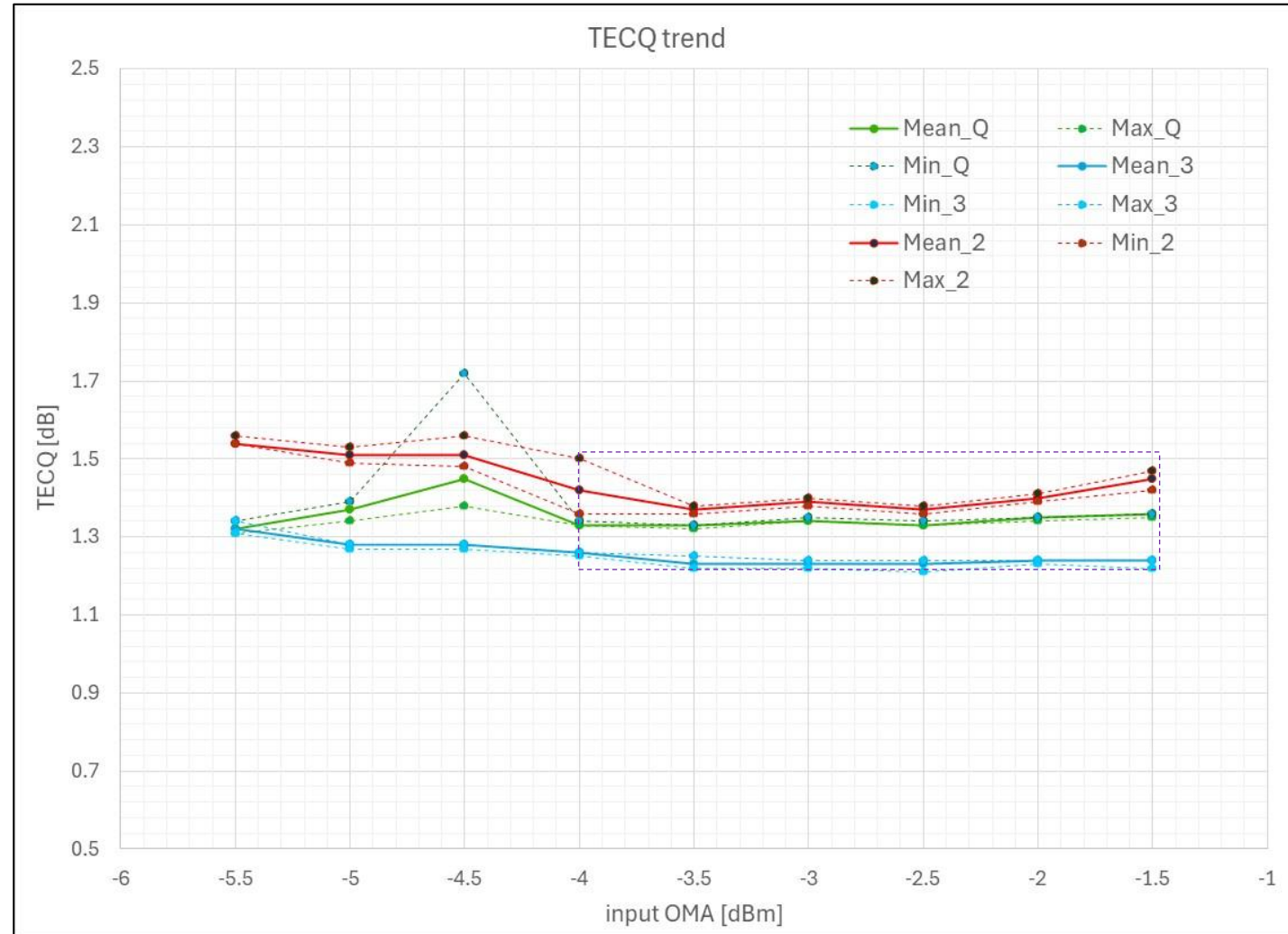
Measured $TECQ_{ffe}$ on separate block.

Testing procedure for scope at each OMA point:

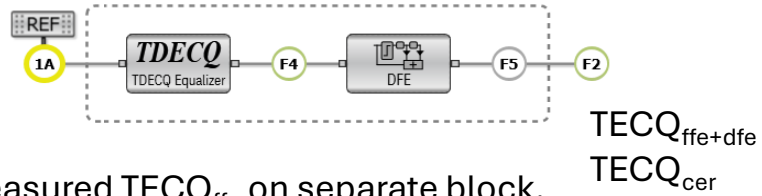
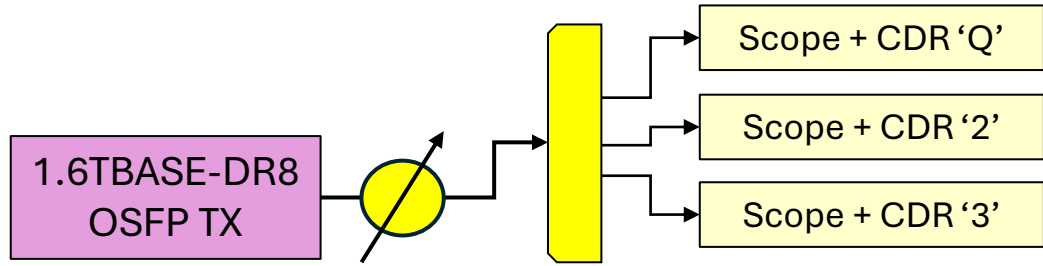
1. Lock CDR;
2. Run Auto-scale (SSPRQ pattern);
3. Accumulate 6 waveforms (63.99 samples/UI);
4. Report mean/min and max.

For $-4.0\text{dBm} < OMA_{outer} < -1.5\text{dBm}$ input, six waveforms.

- $\approx 0.3\text{dB}$ spread across unit and runs.
- Single scope's variation $\approx 0.1\text{dB}$.
- Higher OMA not tested.



1.6TBASE-DR8 TECQ (FFE+DFE): different scopes comparison.



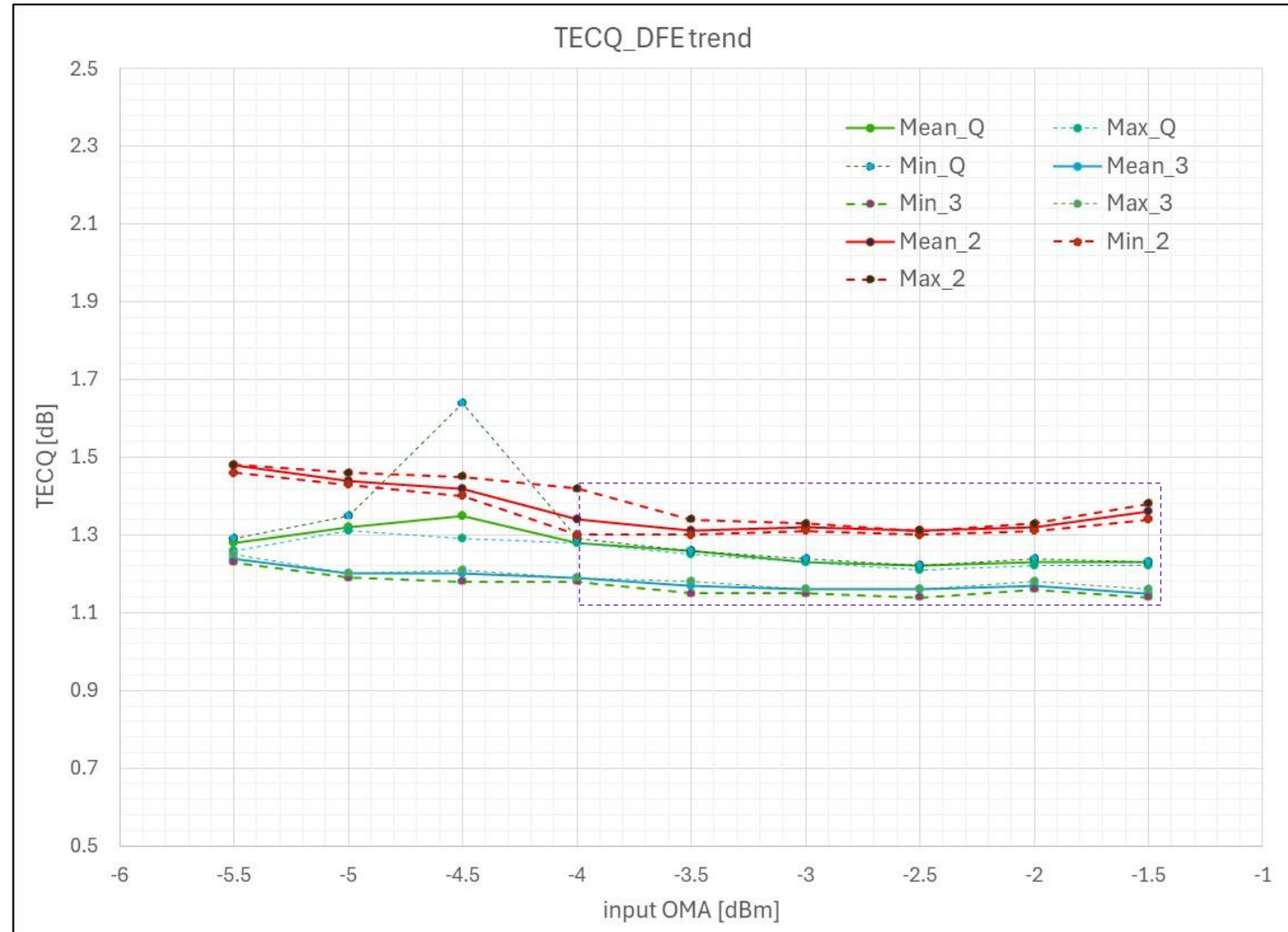
Measured $TECQ_{ffe}$ on separate block.

Testing procedure for scope at each OMA point:

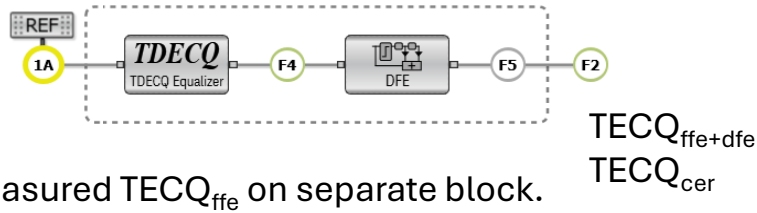
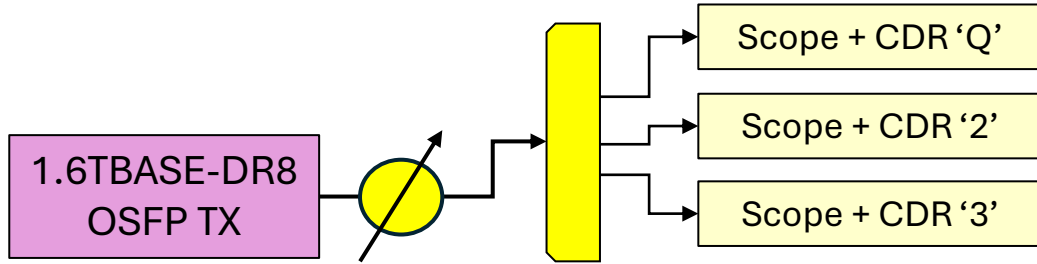
1. Lock CDR;
2. Run Auto-scale (SSPRQ pattern);
3. Accumulate 6 waveforms (63.99 samples/UI);
4. Report mean/min and max.

For $-4.0\text{dBm} < OMA_{\text{outer}} < -1.5\text{dBm}$ input, six waveforms.

- $\approx 0.3\text{dB}$ spread across unit and runs.
- Single scope's variation is $\approx 0.1\text{dB}$.
- Higher OMA not tested.



1.6TBASE-DR8 TECQ_{cer}: different scopes comparison.



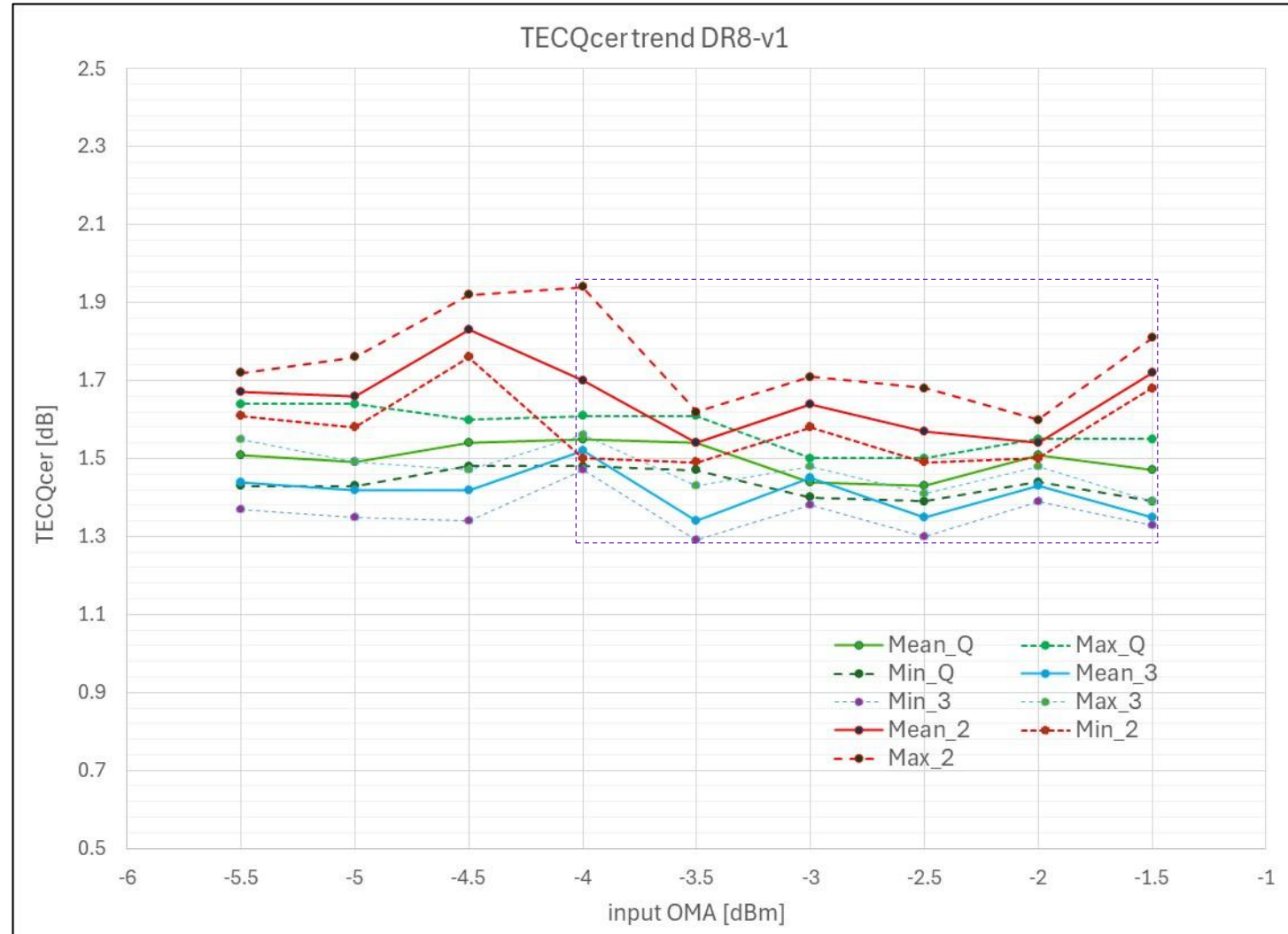
Testing procedure for scope at each OMA point:

1. Lock CDR;
2. Run Auto-scale (SSPRQ pattern);
3. Accumulate 6 waveforms (63.99 samples/UI);
4. Report mean/min and max.

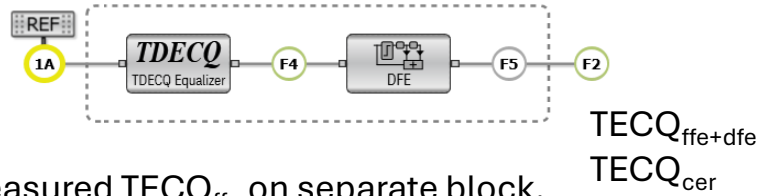
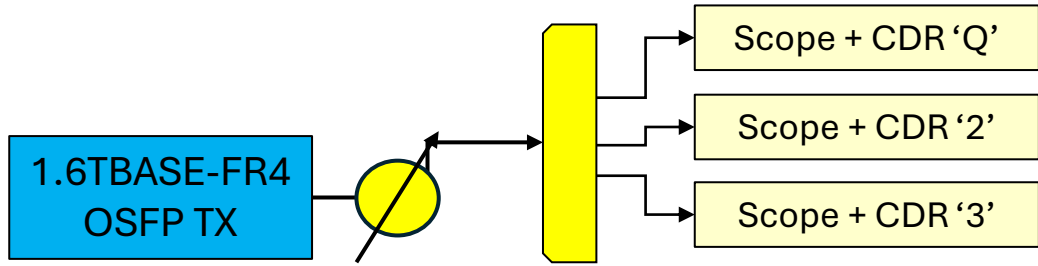
For $-4.0\text{dBm} < \text{OMA}_{\text{outer}} < -1.5\text{dBm}$ input, six waveforms.

- $> 0.6\text{dB}$ spread across unit and runs.
- Single scope's variation is $\approx 0.3\text{dB}$.
- Higher OMA not tested.

Observed lot of deviation at lower OMA.



2x800GBASE-FR4-500 TECQ (FFE+DFE): different scopes comparison.



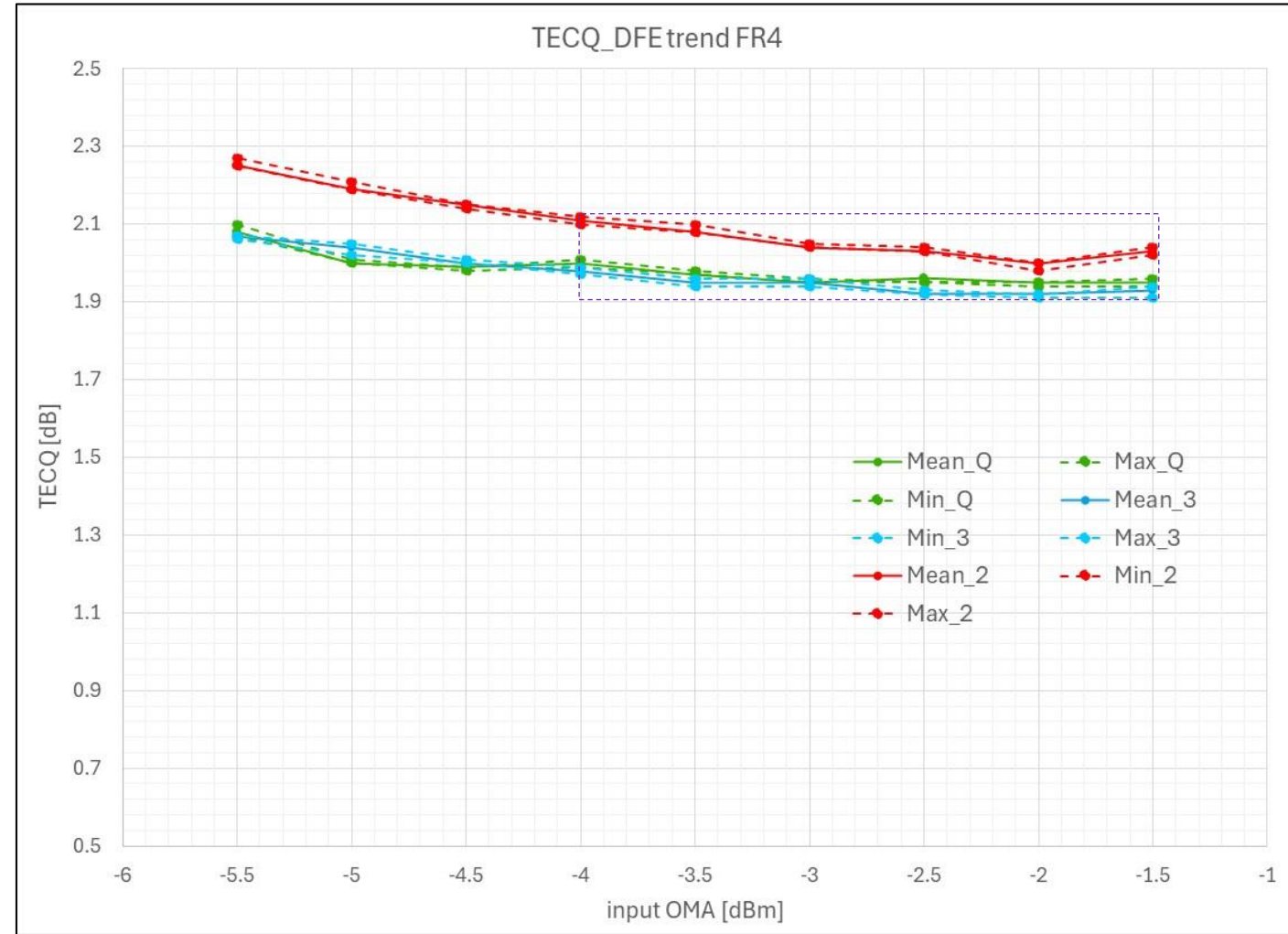
Measured $TECQ_{ffe}$ on separate block.

Testing procedure for scope at each OMA point:

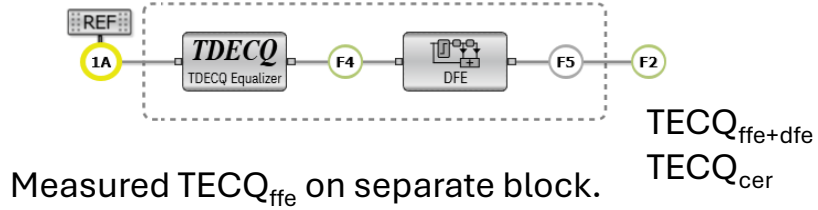
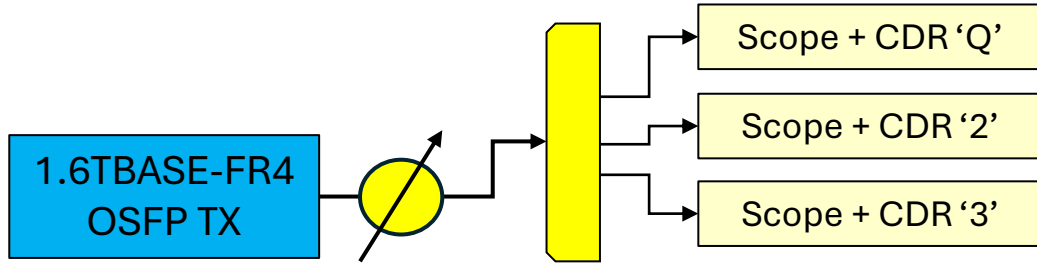
1. Lock CDR;
2. Run Auto-scale (SSPRQ pattern);
3. Accumulate 6 waveforms (63.99 samples/UI);
4. Report mean/min and max.

For $-4.0\text{dBm} < OMA_{outer} < -1.5\text{dBm}$ input, six waveforms.

- $\approx 0.2\text{dB}$ spread across unit and runs.
- Single scope's variation is $\approx 0.1\text{dB}$.
- Higher OMA not tested.



1.6TBASE-DR8 TECQ_{cer}: different scopes comparison.

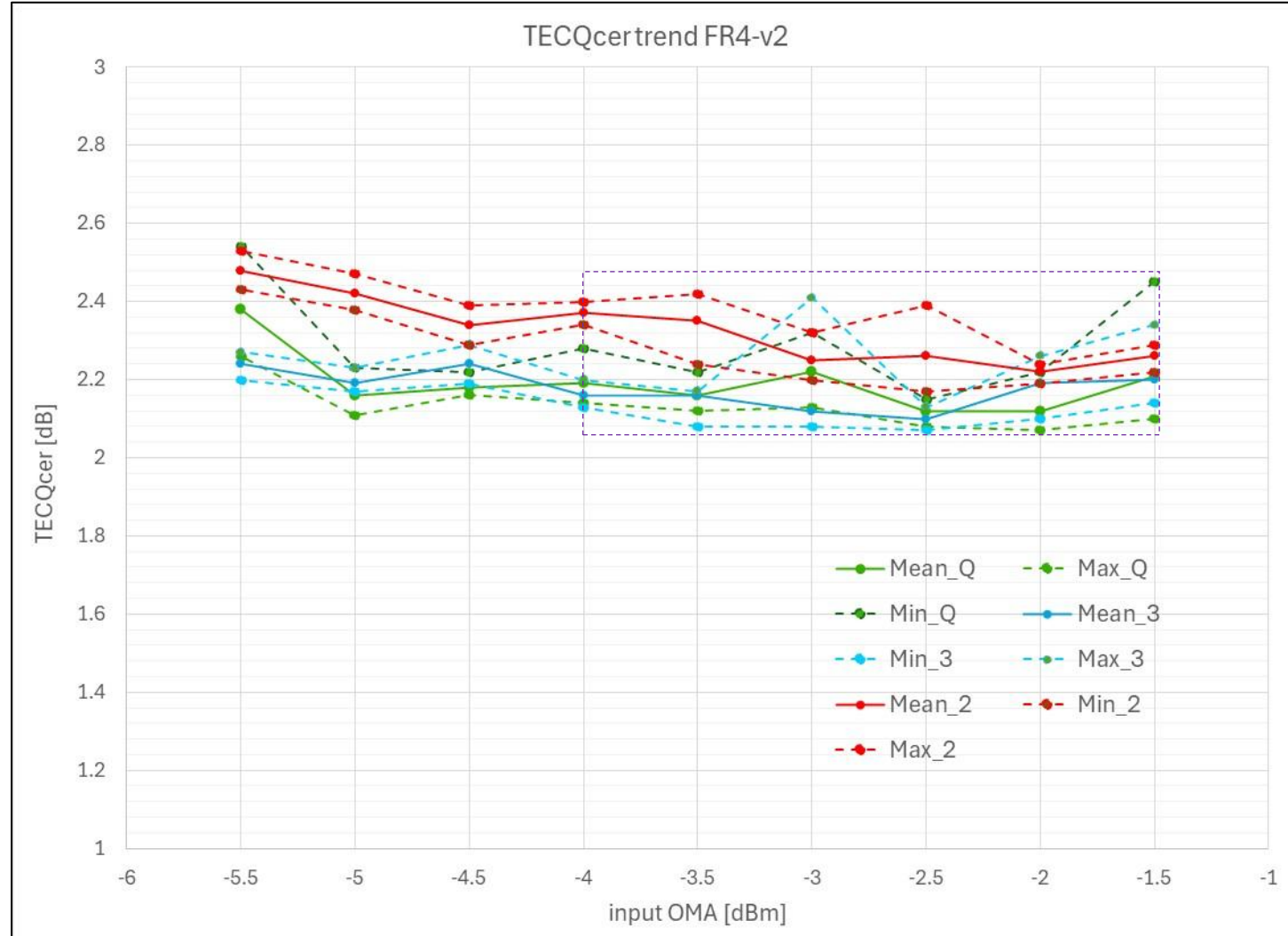


Testing procedure for scope at each OMA point:

1. Lock CDR;
2. Run Auto-scale (SSPRQ pattern);
3. Accumulate 6 waveforms (63.99 samples/UI);
4. Report mean/min and max.

For $-4.0\text{dBm} < \text{OMA}_{\text{outer}} < -1.5\text{dBm}$ input, six waveforms.

- $\approx 0.4\text{dB}$ spread across unit and runs.
- Single scope's variation is $\approx 0.3\text{dB}$.
- Higher OMA not tested.



Comments.

- Measured TECQ (FFE), TECQ (FFE+DFE) and $TECQ_{cer}$ differences three scopes of same type, set-up and SW version over two lanes of 2x800GBASE-FR4-500 and 1.6TBASE-DR8 modules.
- A limited $-4.0\text{dBm} < OMA_{outer} < -1.5\text{dBm}$ input range has been considered; below table showing summary of results.
 - TECQ almost align between scopes.
 - $TECQ_{cer}$ doesn't.

Parameter	Max-Min (dB)	StDev (max) dB
TECQ (FFE)	0.29 dB	0.04 dB
TECQ (FFE+DFE)	0.28 dB	0.04 dB
TECQ _{cer}	0.65 dB	0.12 dB

- We think $TECQ_{cer}/TDECQ_{cer}$ measurement is not stable enough to be considered into 802.3dj standard.
- Proposal: remove $TECQ_{cer}$ from:
 - clause 180, Table 180–7, row 34
 - clause 181, Table 181–5, row 28
 - clause 182, Table 182–7, row 36
 - clause 183, Table 183–6, row 37