LUMENTUM

Extending wavelength for –VR PMD - in support of D1.1 comments 13, 14, 15, 16, and 17

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IEEE 802.3db 100 Gb/s, 200 Gb/s, and 400 Gb/s Short Reach Fiber Task Force
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Summary

- 802.3db_D1p1 has TBDs for the wavelength ranges of 100GBASE-VR, 200GBASE-VR2, and 400GBASE-VR4
  - A previous contribution, lewis_3db_01_041521 provided data on reliability testing and RIN testing for 100 Gb/s 940 nm VCSELs
  - This contribution provides additional test data on prototype 940 nm VCSELs, including S21 measurements and PAM4 optical eye diagrams

- Based on these results, the TBD for wavelength should be replaced by a range from 844 to 948 nm, enabling –VR links to deploy any center wavelength between 850 and 940 nm, with tolerance at both ends of the range.

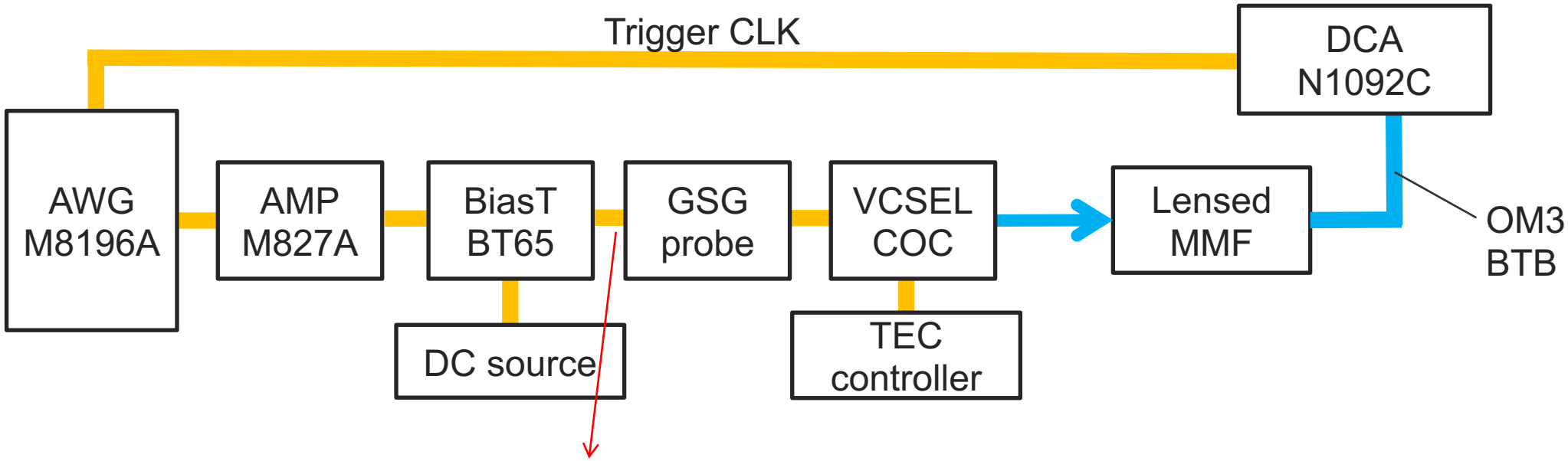
Scope bandwidth for TDECQ test needs to vary with wavelength

Wavelength	Spectral width	Fiber EMB			Fiber BWcd		Fiber BWeff			Bwtest
nm	nm	OM3_30m	OM4_50m	OM5_50m	OM3_30m	OM4/5_50m	OM3_30m	OM4_50m	OM5_50m	OM4_50m
844	0.65	63.2	76.8	76.8	94.8	56.9	52.6	45.7	45.7	23.0
863	0.65	59.3	72.9	87.1	103.2	61.9	51.4	47.2	50.4	23.1
932	0.65	37.5	33.0	50.2	141.0	84.6	36.2	30.7	43.2	20.1
948	0.65	35.0	29.8	49.8	151.8	91.1	34.1	28.3	43.7	19.4

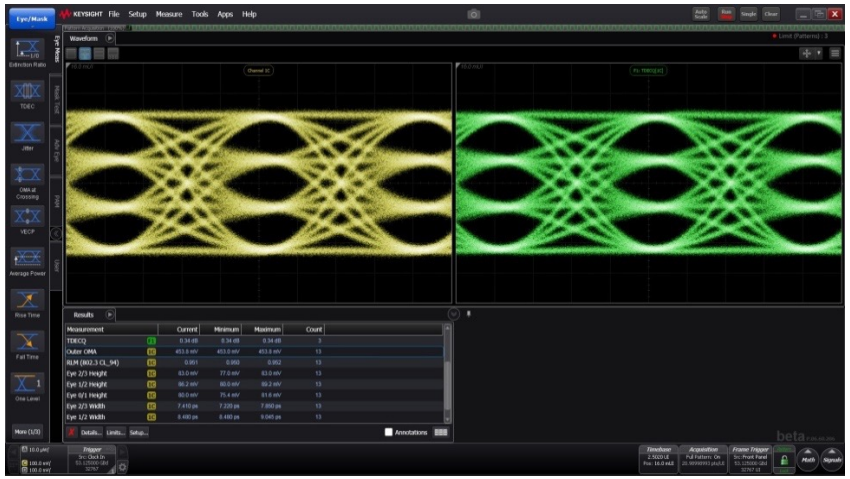
Ref: IEC60793-2-10 for EMB and worst-case chromatic dispersion
king_3cm_adhoc_01_062818 for Fiber BWeff calculation

- This requirement is similar to SMF PMDs which require TDECQ test with the worst-case dispersion at the wavelength under test

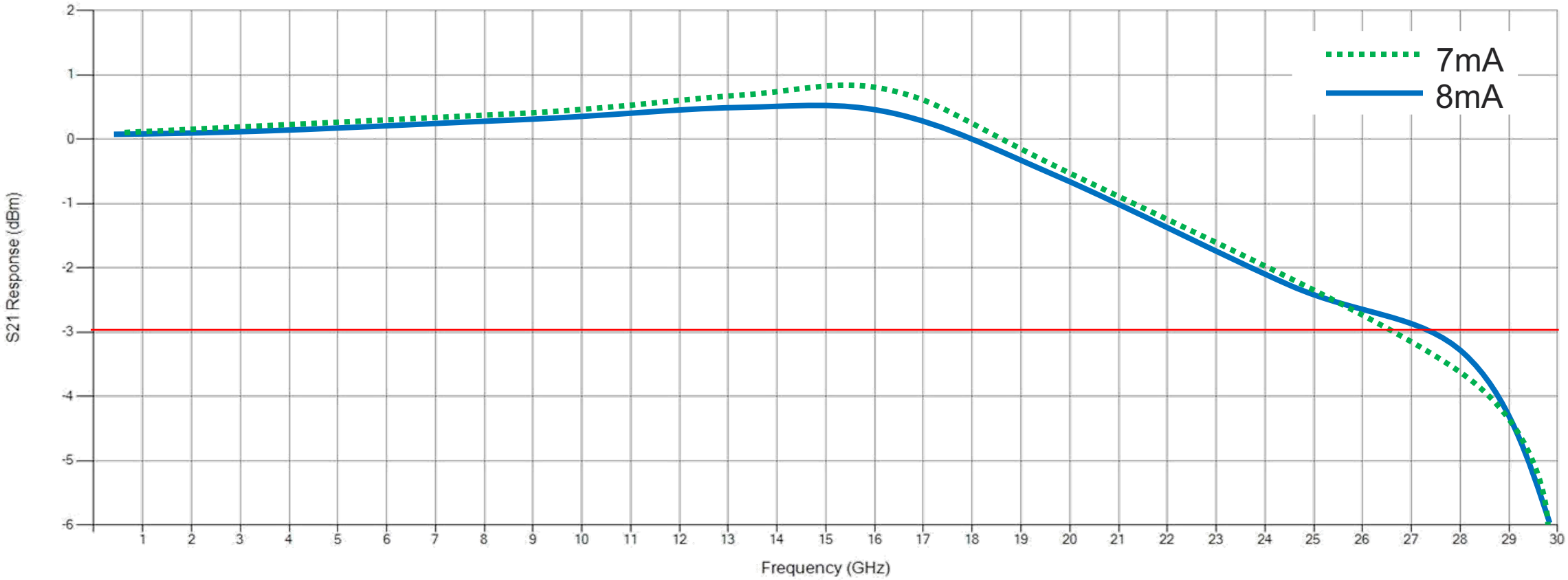
Setup for Eye/RIN-OMA Measurement



53.125-Gbd Electrical Eye Waveform



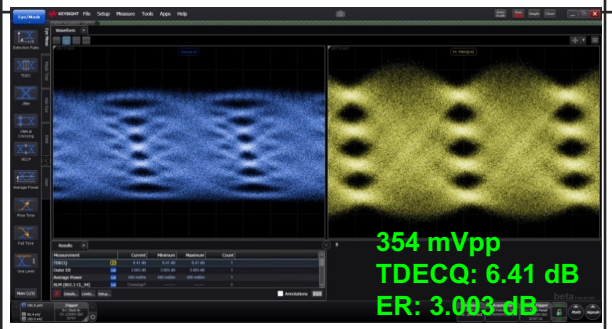
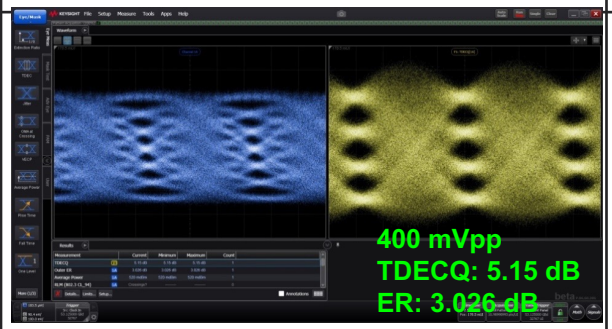
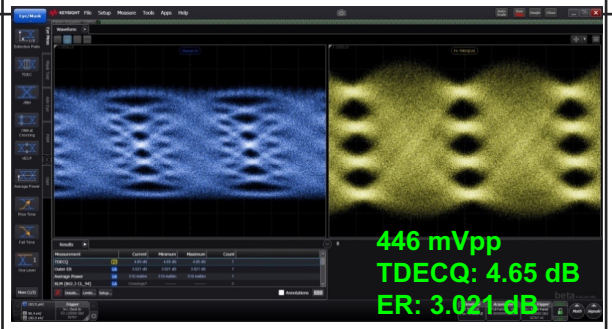
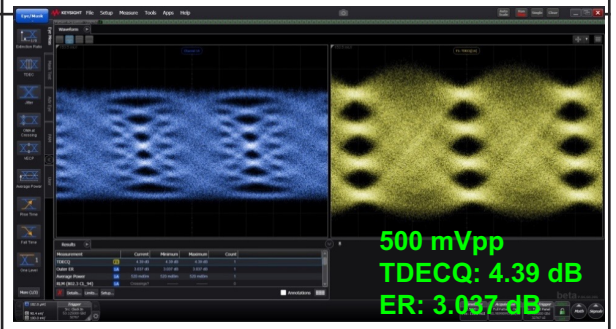
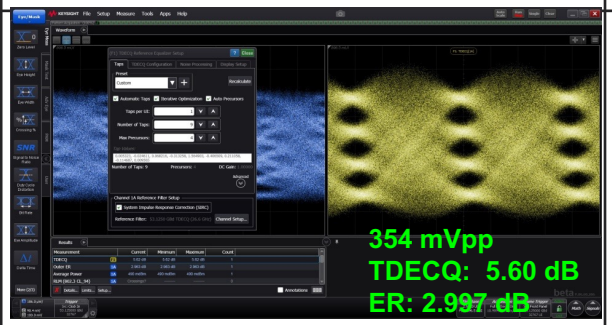
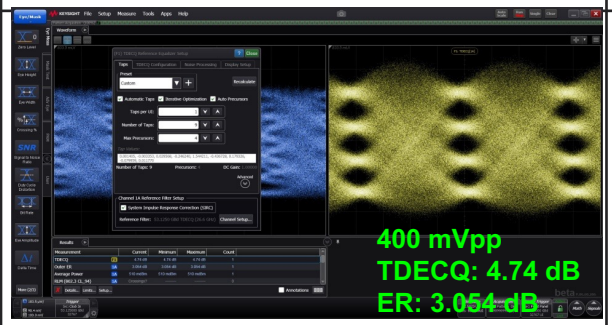
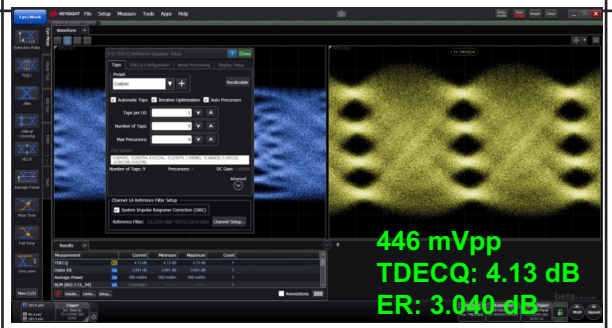
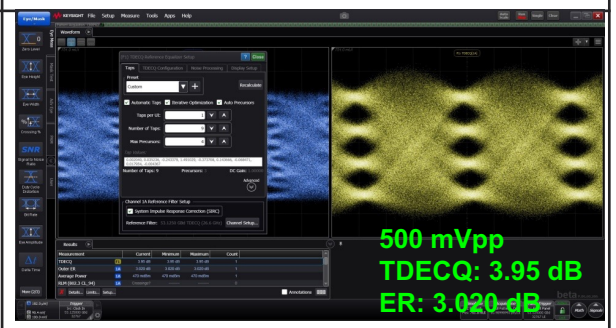
S21 measurements (smoothed)



	7 mA	8 mA
Resonance Peak:	0.8132	0.4196
Bandwidth:	25.288	25.737

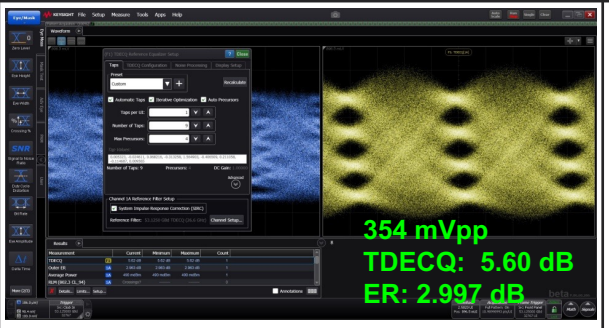
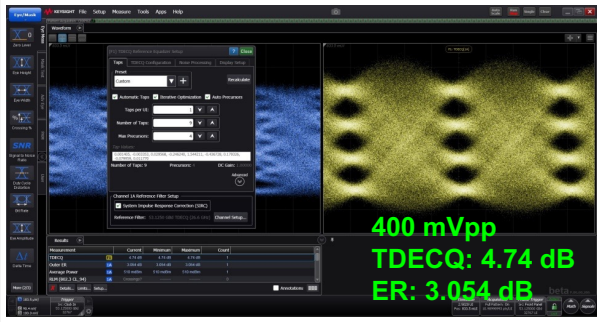
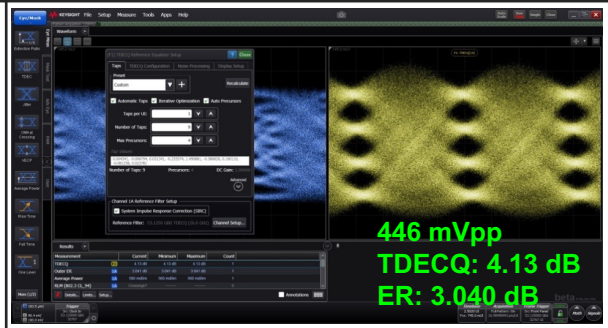
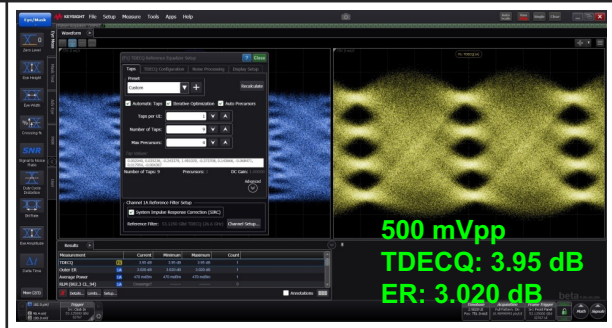
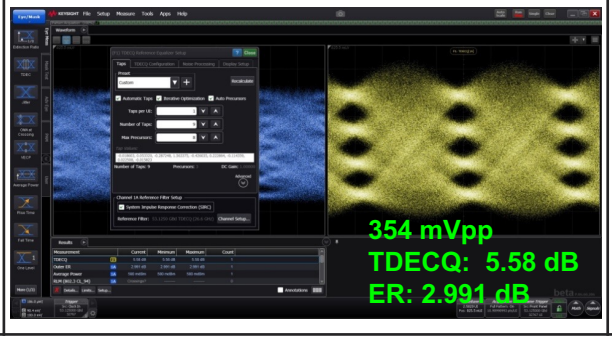
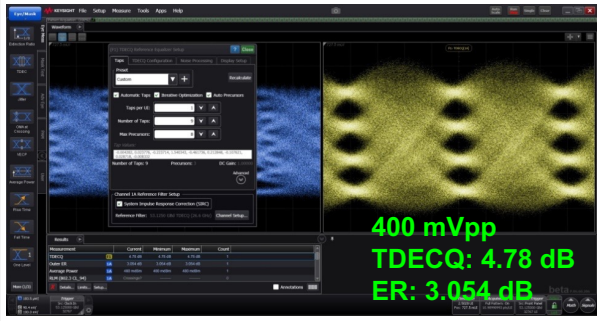
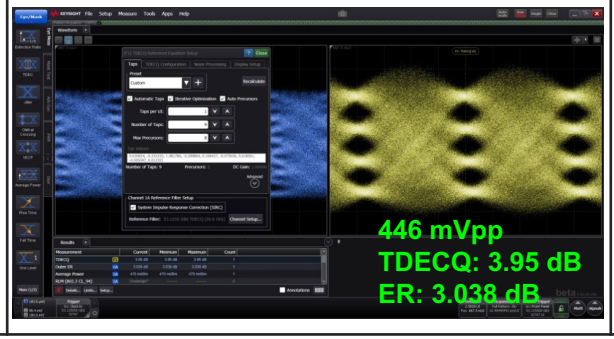
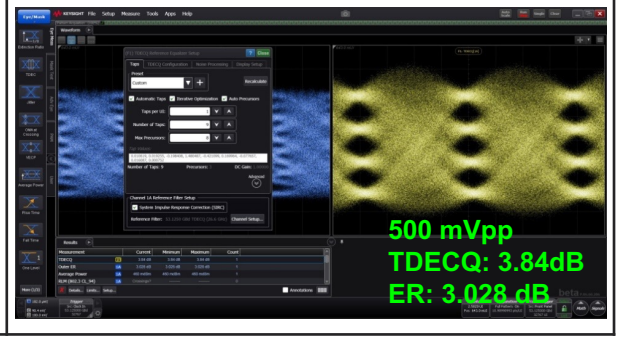
53.125-Gbd (**PRBS15**) Optical Eye Waveforms

- Tried 9-tap with the constraint that the largest tap is either 1,2,3,4 or 5.
- TDECQ was improved by around 0.5 dB with 9-tap compared to 5-tap.

	Receiver filter = 26.6 GHz			
	20C			
	7 mA	8 mA	9 mA	10 mA
5tap				
9tap				

53.125-Gbd (**PRBS15**) Optical Eye Waveforms (cont'd)

- Compared 9-tap with and w/o the constraint.
- TDECQ is almost the same with and w/o the constraint.

	Receiver filter = 26.6 GHz			
	20C			
	7 mA	8 mA	9 mA	10 mA
9tap				
9tap w/o cons traint				

Conclusions

- Preliminary test data on 940 nm 53 GBd VCSEL is encouraging
- Further work to improve performance is in progress
- Recommend that the 802.3db task force accept the suggested remedies in comments 13, 14, 15, 16, 17 with the caveat that effective fiber bandwidth changes with wavelength need to be included in the TDECQ test method

Thank you