

# 200G EML Fiber Propagation Result

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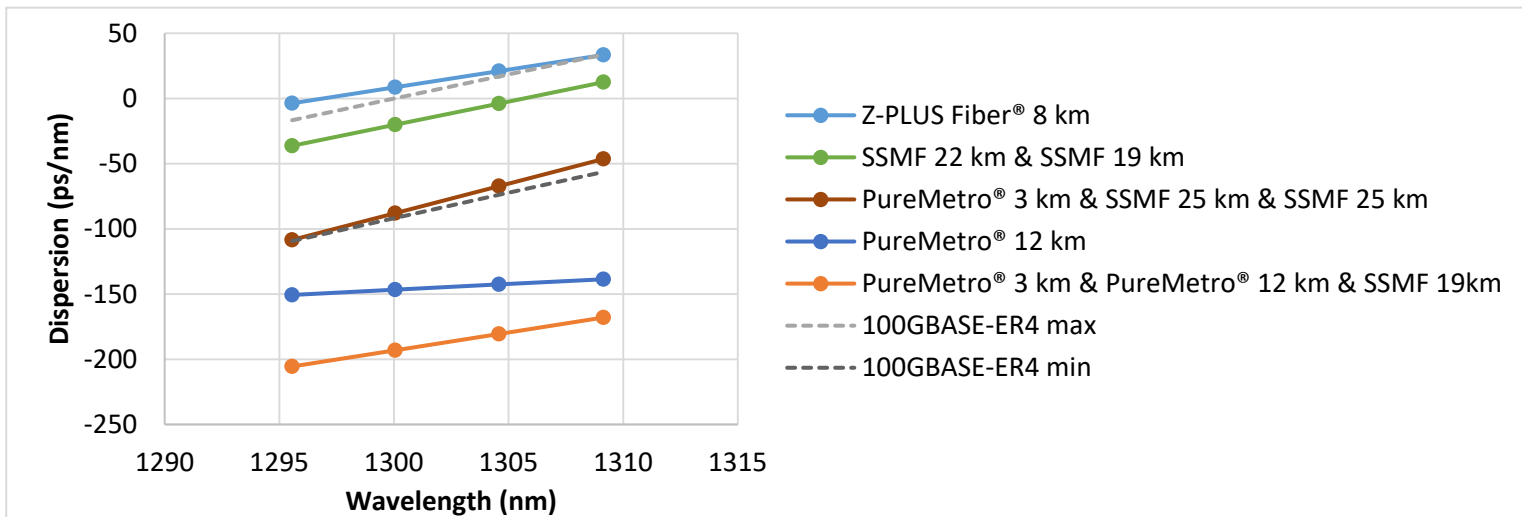
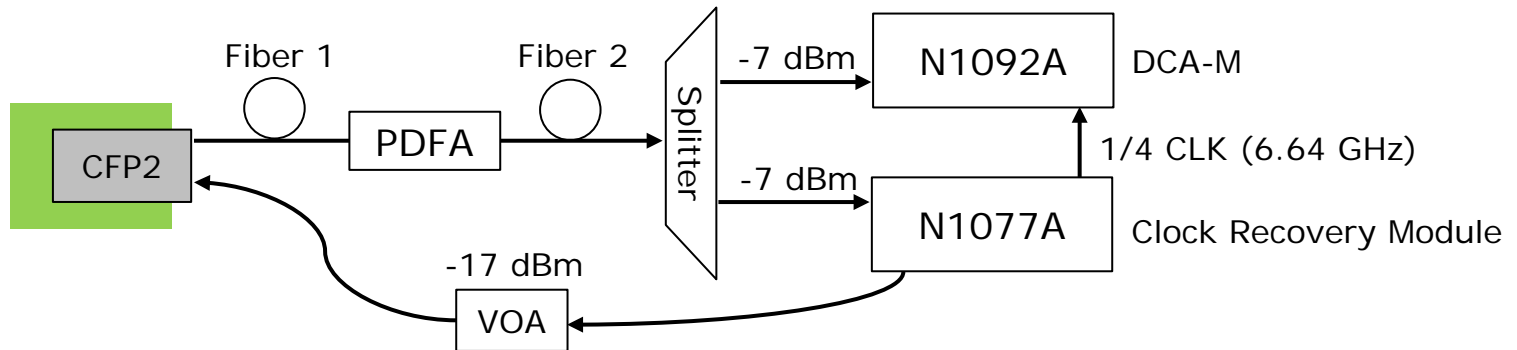
SD-HG 180609  
Sumitomo Electric Industries, Ltd.  
Transmission Devices Laboratories  
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# Background

- [wang\\_b10k\\_01d\\_1117](#) proposed 200G 40 km link budget.
- [yamamoto\\_b10k\\_01a\\_0118](#) has shown worst case fiber dispersion penalty for 200G/400G 40 km. So far, no TDECQ data after fiber transmission has been reported.
- We show TDECQ fiber dispersion results, and demonstrate 200GBASE-ER4 feasibility.

# Test Setup for TDECQ Measurement

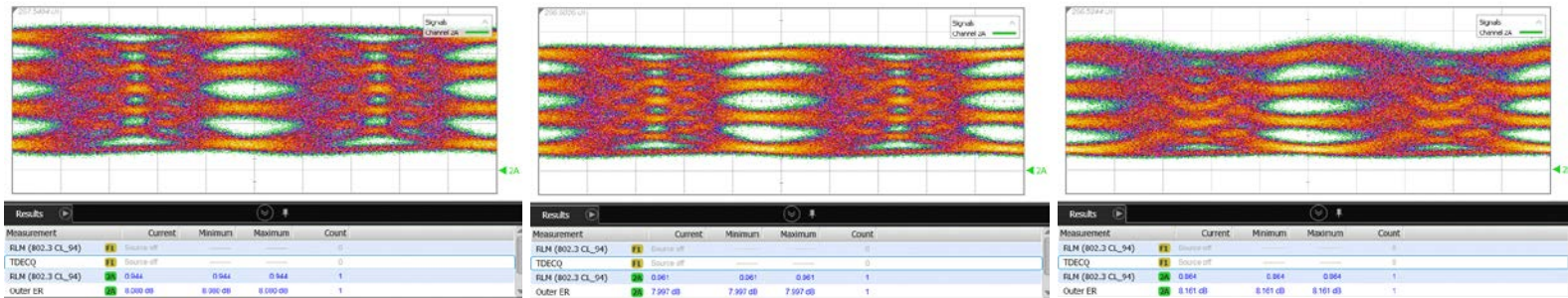
- 200G CFP2 module with 4 channel EML & APD is used.
- Various fiber combinations are used to measure dispersion penalty.
- PDFFA is used to compensate for fiber loss.



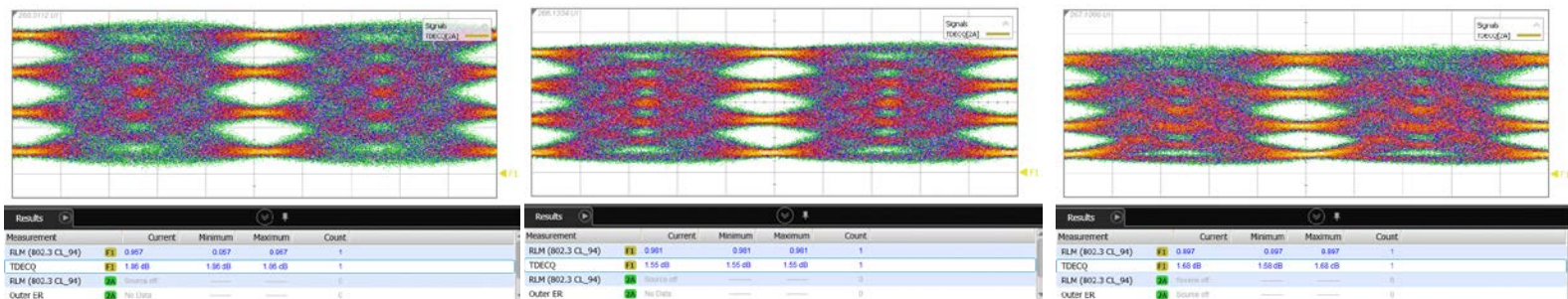
# PAM4 Waveforms with Fiber Dispersion

1309.14 nm  
26.5625 Gbaud  
PRBS15Q  
Room temp

19.4 GHz Filter  
w/o FFE



13.3 GHz Filter  
w/ 5-tap FFE



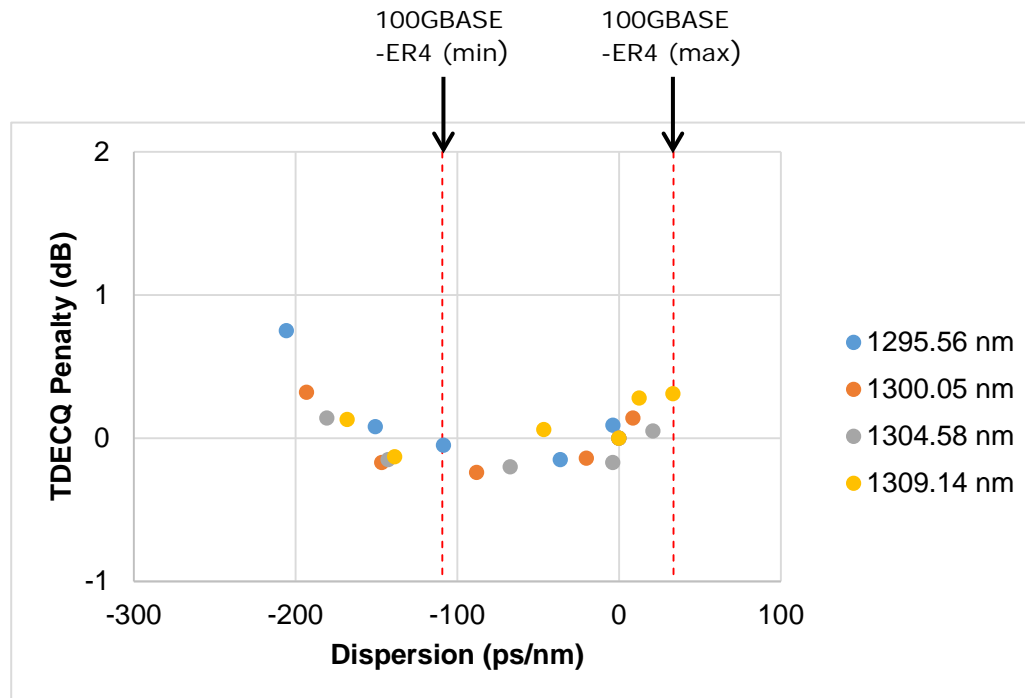
+33 ps/nm

0 ps/nm

-168 ps/nm

# TDECQ\* with Fiber Dispersion

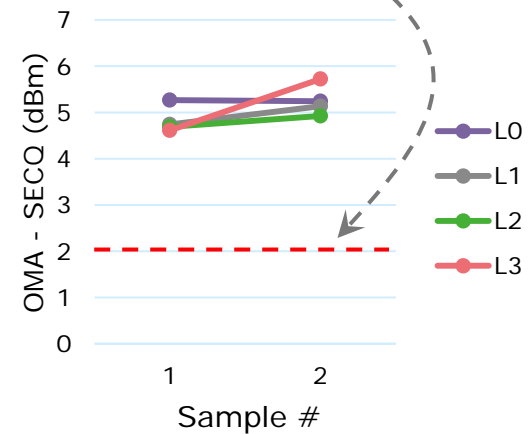
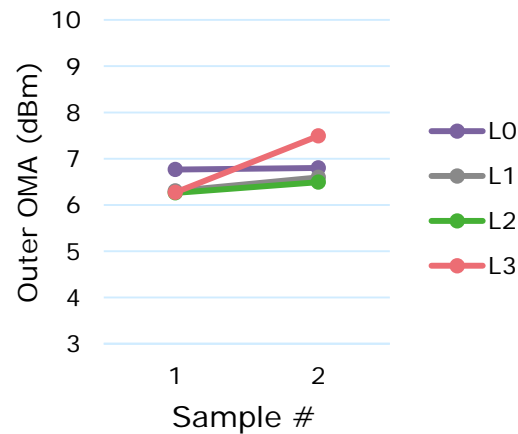
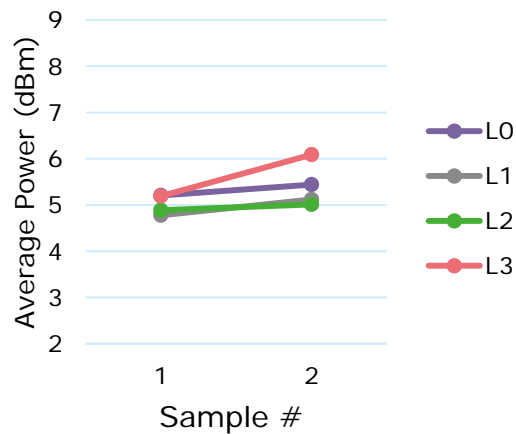
- Negative TDECQ penalty is observed for negative dispersion.
- TDECQ penalty is  $\sim 0.4$  dB at the worst case dispersion.



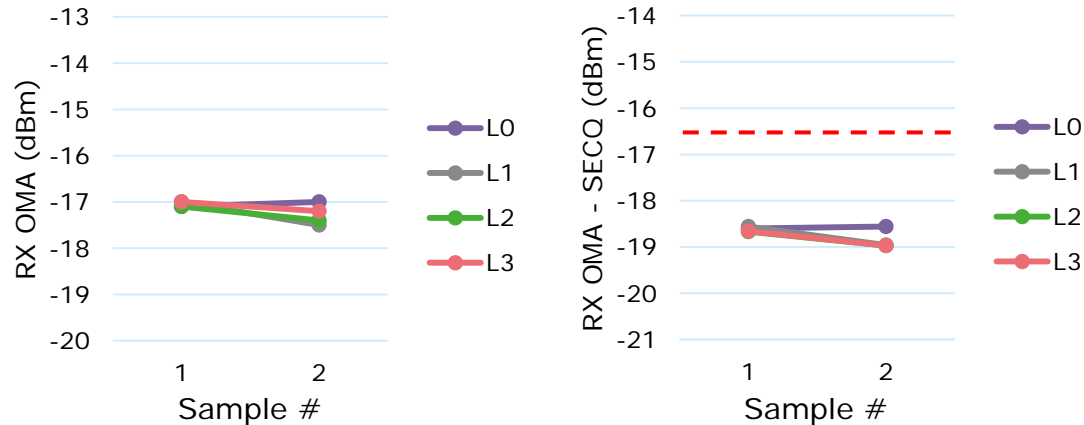
26.5625 Gbaud  
**PRBS15Q\***  
Room temp

# EML Output Power

- Output power is measured at the CFP2 output
- OMA – SECQ is around +5 dBm. Considering the worst case fiber dispersion, OMA – TDECQ > +2 dBm seems to be possible.



# RX Sensitivity



26.5625 Gbaud  
KP4 FEC  
Room temp

## Test Results of B-to-B Sensitivity

- RX Power is measured at the CFP2 input. Measured B-to-B sensitivity is around -17 dBm (OMA).
- IEEE 802.3cd has adopted receiver sensitivity as a variable function of SECQ. For 200GBASE-ER4 it is reasonable to adopt similar definition.
- Subtracting the SECQ of the TX from the measured RX sensitivity, it seems feasible an 18.5 dB loss budget for 40 km can be met.

# RX Sensitivity with Fiber Dispersion

- RX sensitivity was tested with various amounts of fiber dispersion. Similar fiber combinations as those used for the TDECQ tests were used.
- Fiber dispersion penalty shows similar tendency to TDECQ.

