

Cryogenic Digital Optical Link Testing

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Summary

The following slides illustrate room temperature measurement results from twelve 1310 nm SFP+ transceivers in preparation for performing comparative measurements on the same devices at liquid nitrogen (LiN2) temperatures. In each of the slides, the first 3 samples employed Fabry-Perot (F-P) lasers. The remaining devices contained Distributed FeedBack (DFB) lasers. The devices came from 4 vendors.

The results include measurements obtained from:

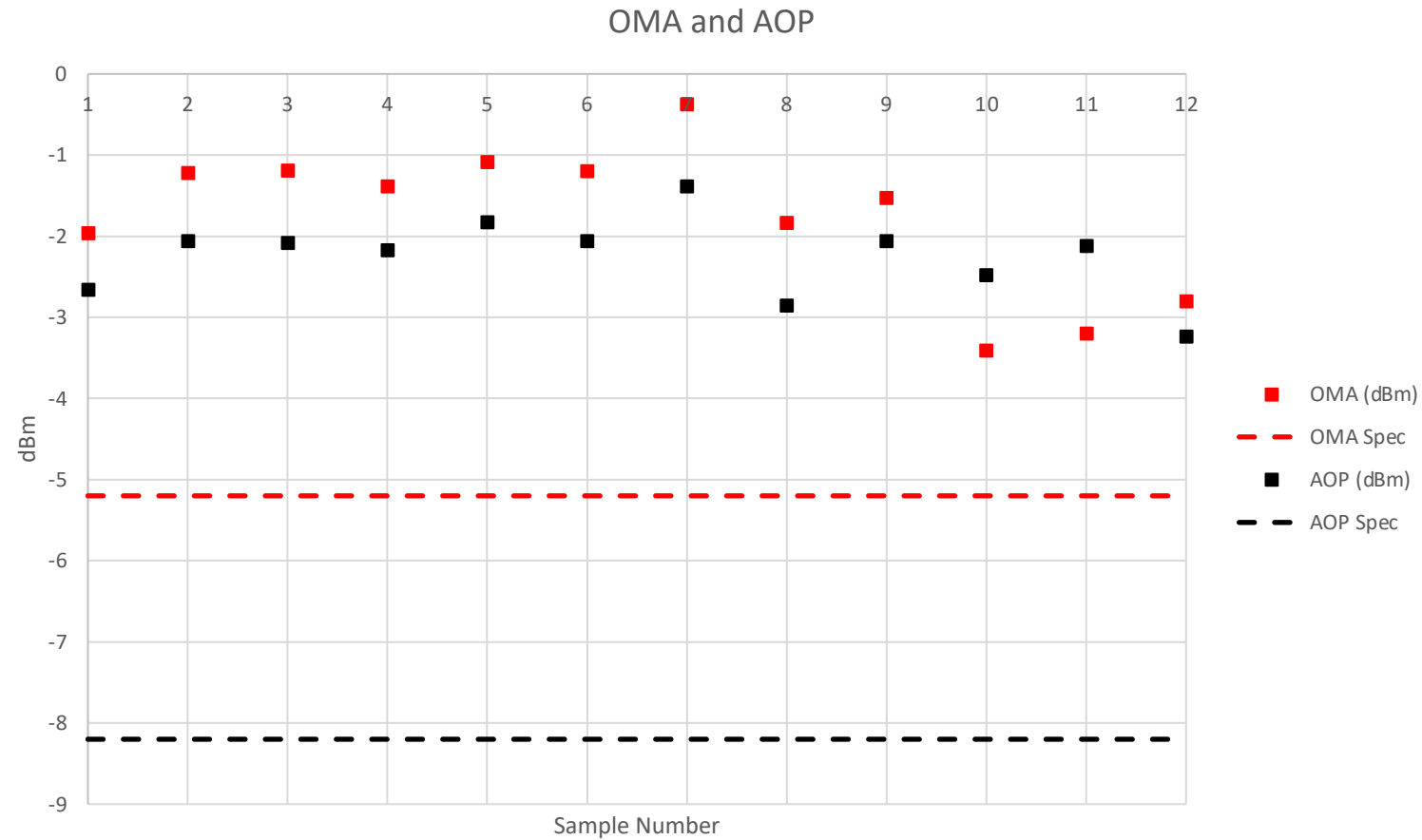
1. Optical eye pattern analysis
2. Optical jitter analysis
3. Optical loopback testing (for measurements of DC power consumption)
4. Optical spectra (not presented here today but the data has been collected)

The results reported in the slides have been adjusted, where possible, to remove the effects due to the source (pattern generator).

All measurements were made with data patterns delivered at 10 Gbps.

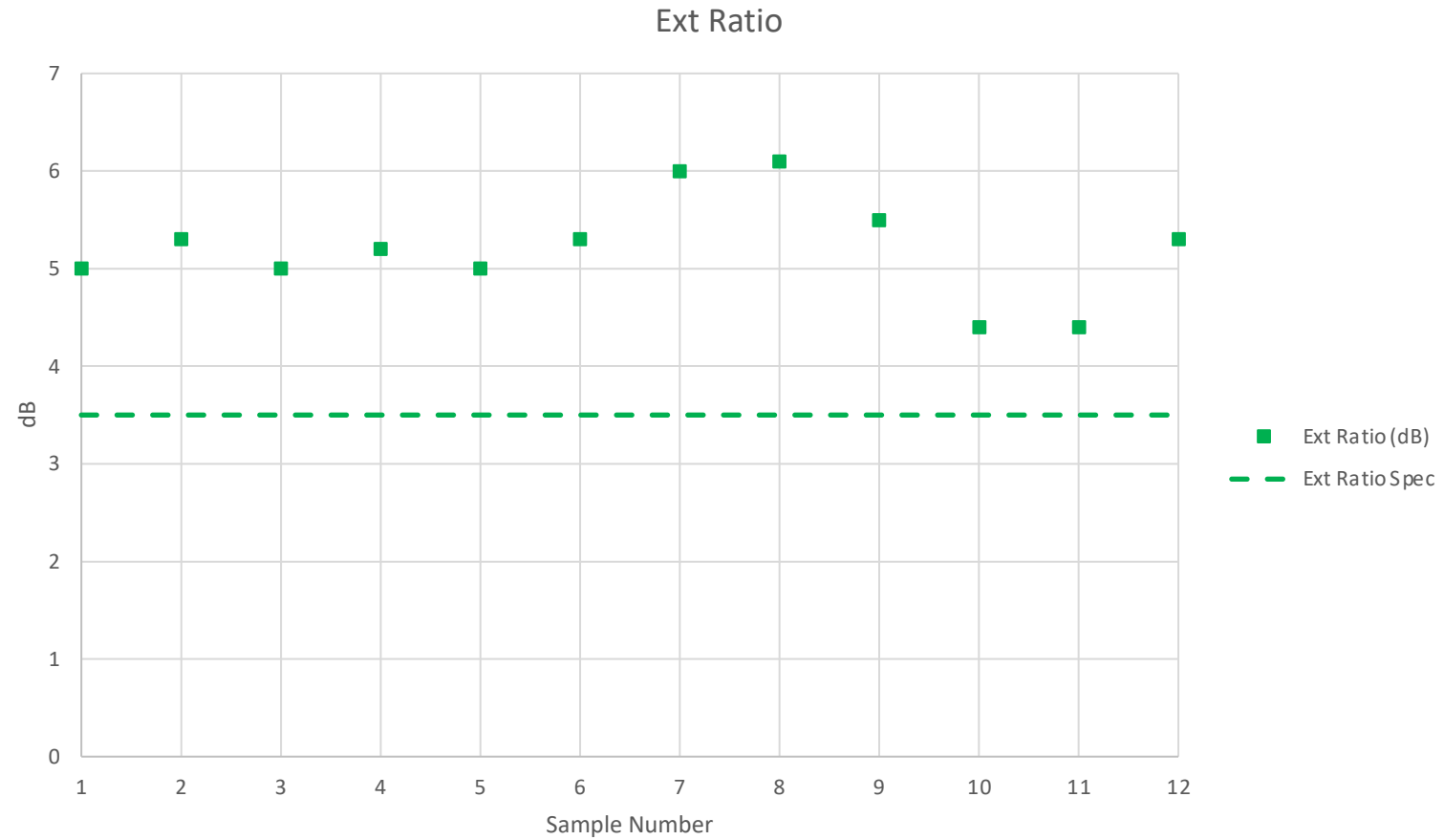
The last slide illustrates the test stand that has been moved from the Feynman Computing Center to the Proton Assembly Building to carry out the LiN2 phase of the testing.

Optical Modulation Amplitude (OMA) and Average Optical Power (AOP) Room Temperature



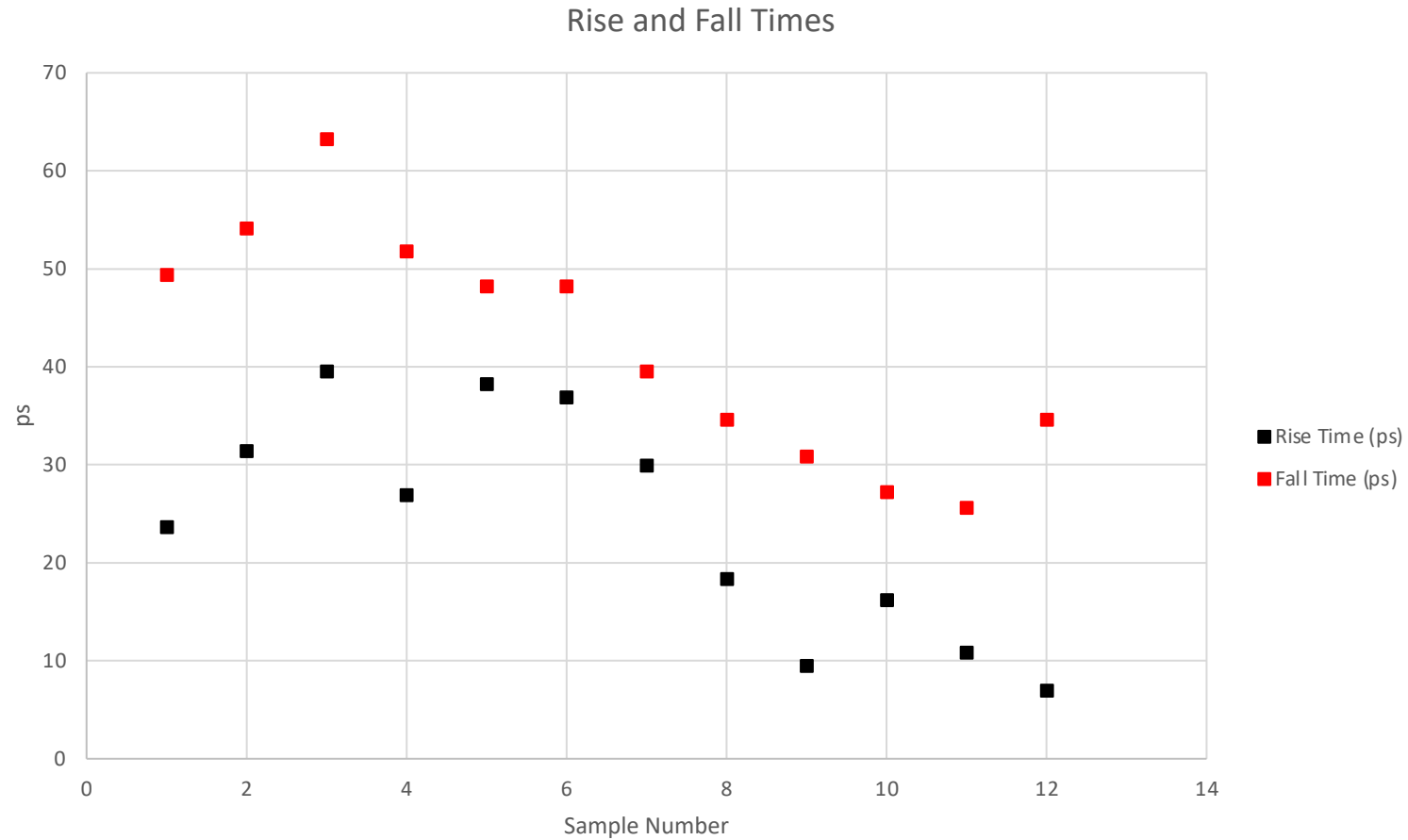
Source: LVDS Differential Signal @ 10 Gbps
PRBS7 Pattern

Extinction Ratio Room Temperature



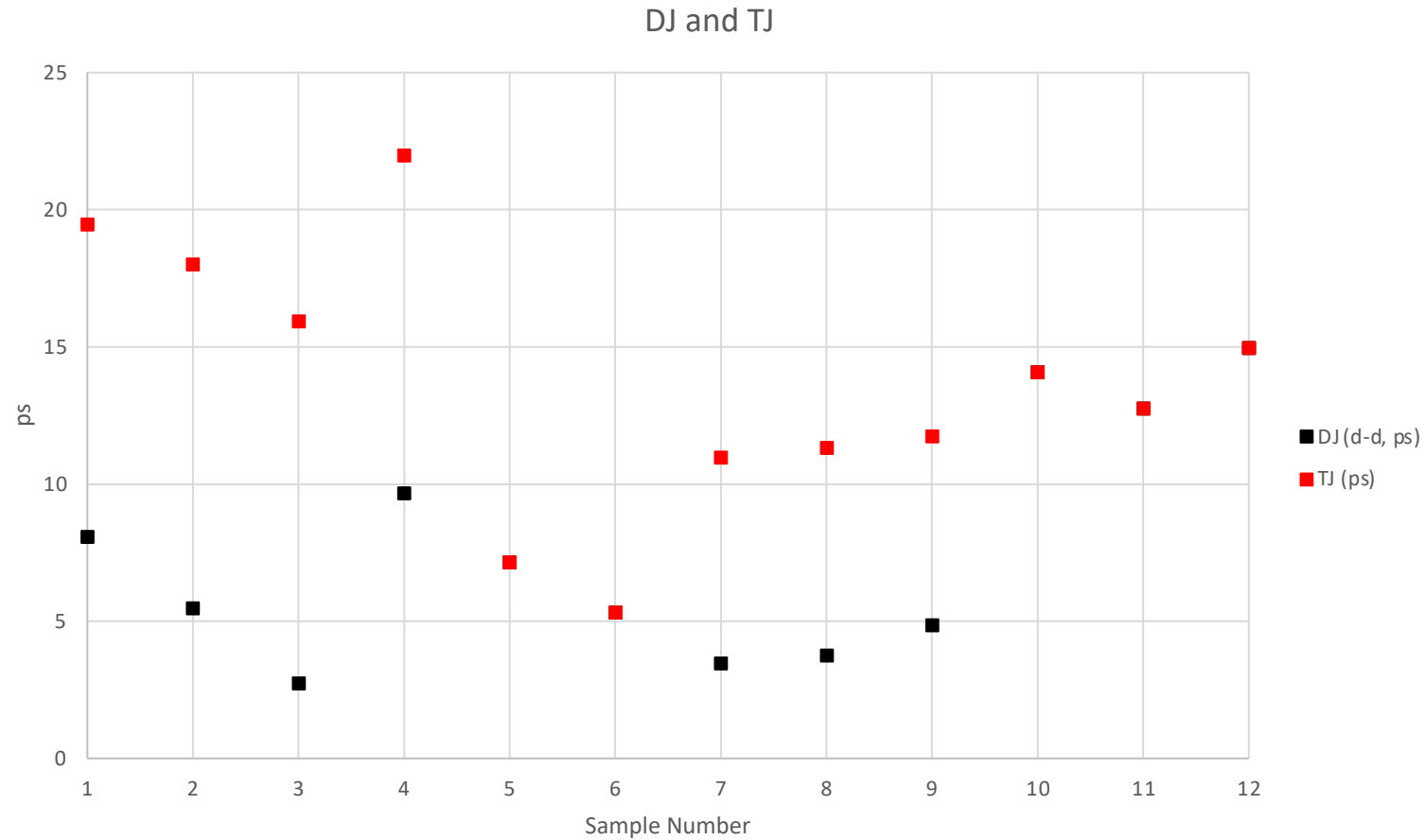
Source: LVDS Differential Signal @ 10 Gbps
PRBS7 Pattern

Transmitter Rise and Fall Times Room Temperature



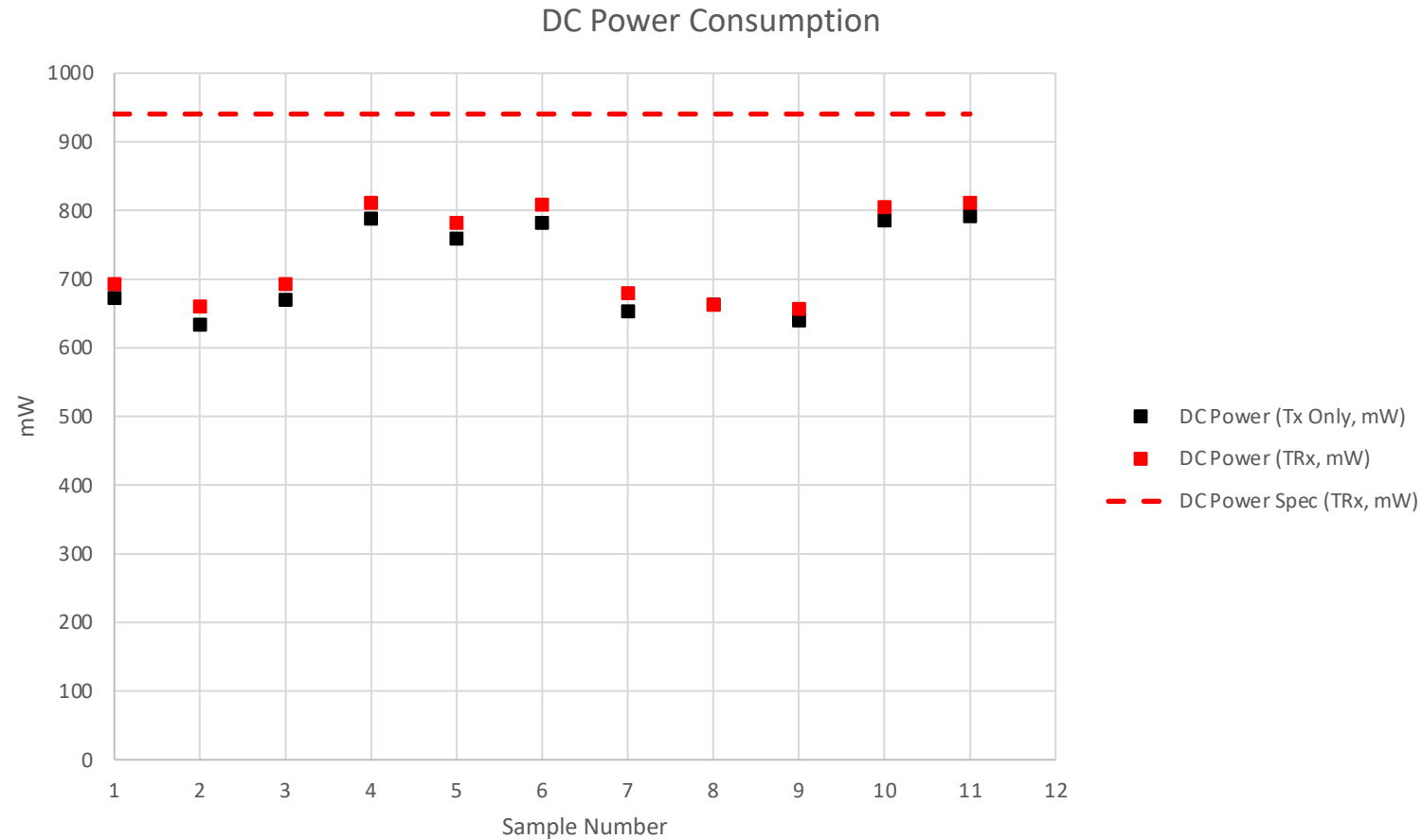
Source: LVDS Differential Signal @ 10 Gbps
OMA Pattern (Repeating ...11110000...)

Transmitter Deterministic and Total Jitter Room Temperature



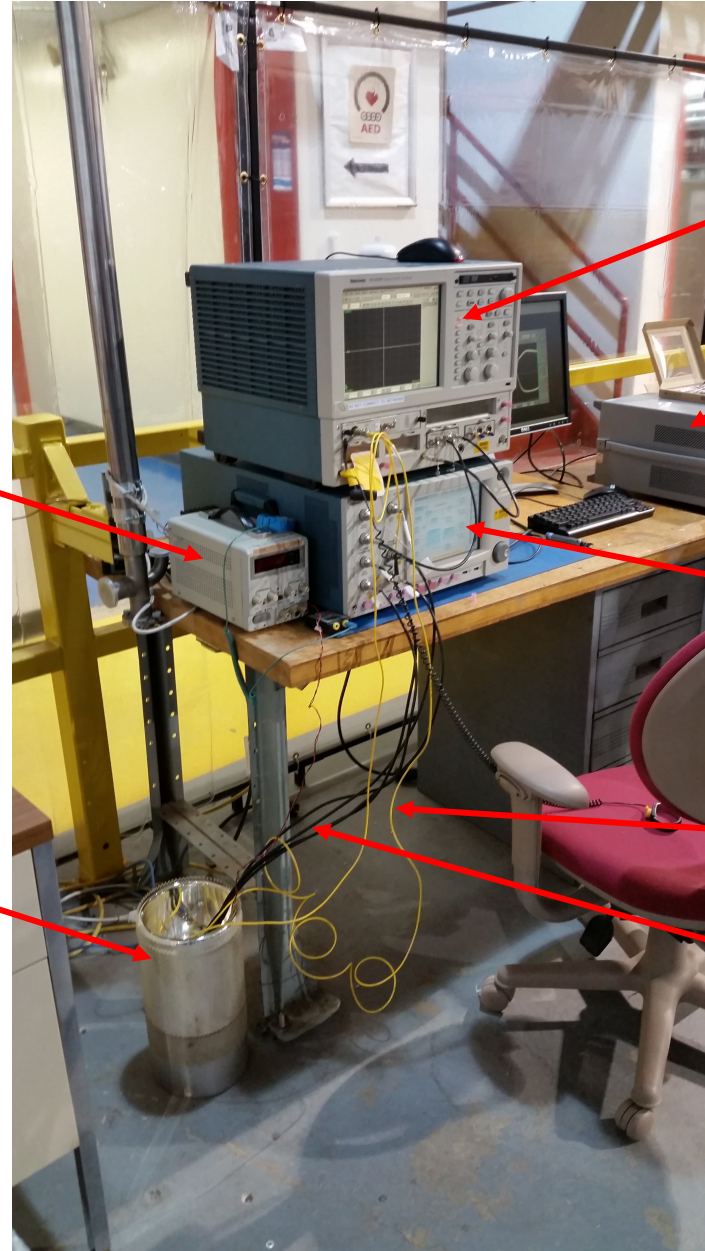
Source: LVDS Differential Signal @ 10 Gbps
PRBS7 Pattern

Transmitter Only and Transceiver DC Power Consumption Room Temperature



Source: LVDS Differential Signal @ 10 Gbps
PRBS7 Pattern
TRx Measurements Made in Optical Loopback

Test Stand at PAB



Power Supply

Dewar
(Containing
Evaluation Board
and Test Device)

Digital Signal Analyzer
(Eye pattern and jitter
analysis)

Optical Spectrum Analyzer

Bit Error Rate tester
(Pattern Generation and
Error Checking)

Single Mode Optical Fibers (yellow)

Coaxial cables for electrical pattern (black)