

Moving Toward Resolution for TP2 Uncorrelated Jitter

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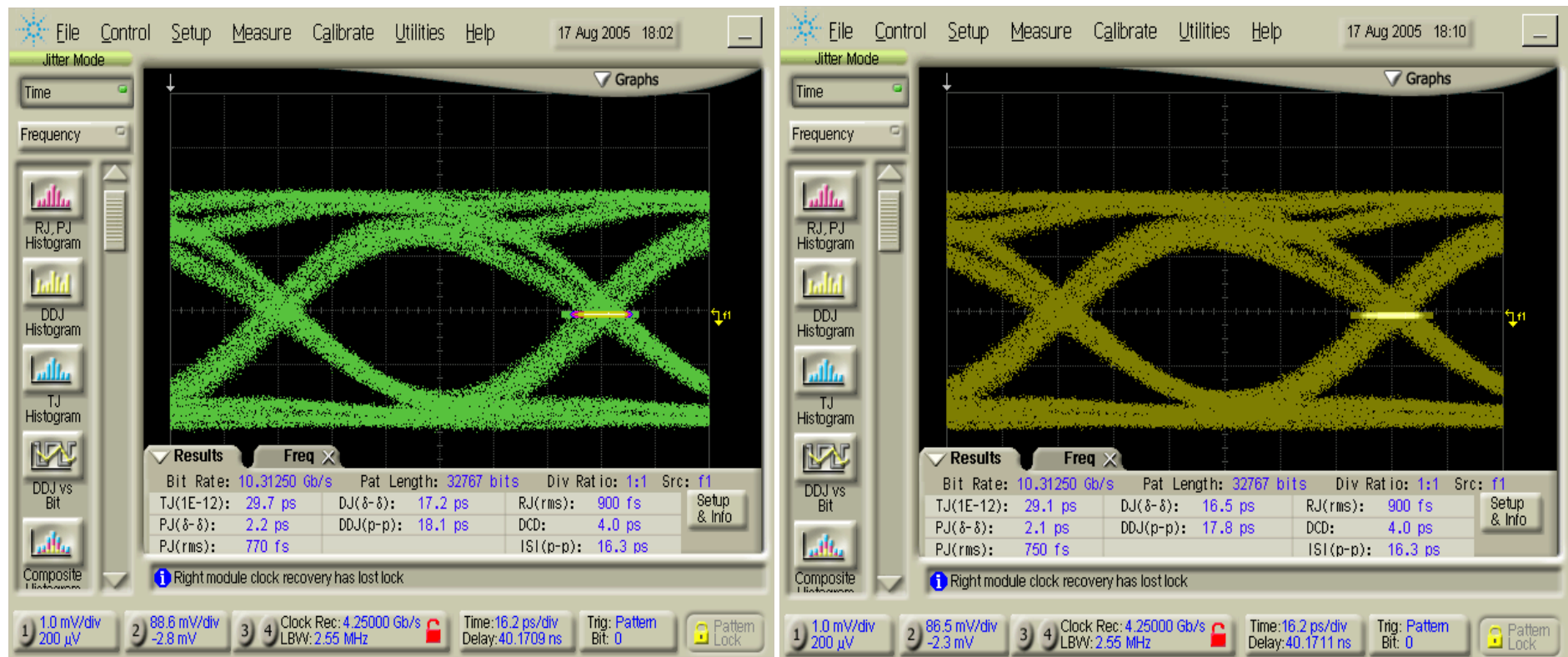
Nashua, NH

Statement of the Problem

- Current TP2 Uncorrelated Jitter (UJ) (RMS)=0.033 UI equates to 45 ps of p-p jitter if assumed all random.
- Uncorrelated jitter will be dominated by random jitter and some periodic jitter.
- TP2 UJ specified is significantly larger than typical LR transmitter and the amount allowed by the TP3 ISI stressor.
- Periodic Jitter (PJ) is a component of the UJ. For a sinewave jitter input, the RMS jitter contribution would be SJ amount divided by $2\sqrt{2}$.
 - ⇒ Current UJ may be exceeded easily due to PJ.

Performance of Typical 10GigE XFP LR Module (Supplier 1)

PRBS 2n15

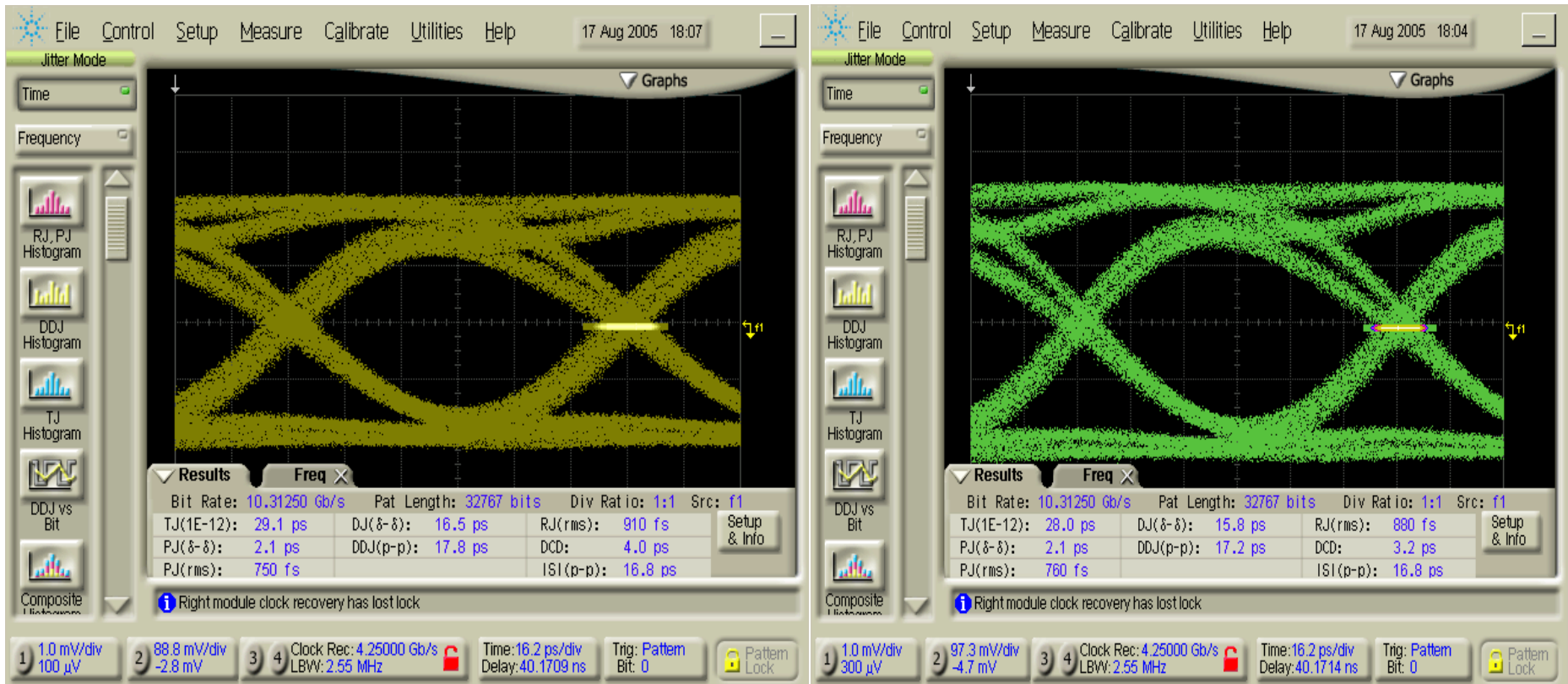


RJ = 0.9 ps , p-p= 12.6 ps
PJ = 2.2 ps

Total UJ p-p = 14.8

Performance of Typical 10GigE XFP LR Module (Supplier 2)

PRBS 2n15



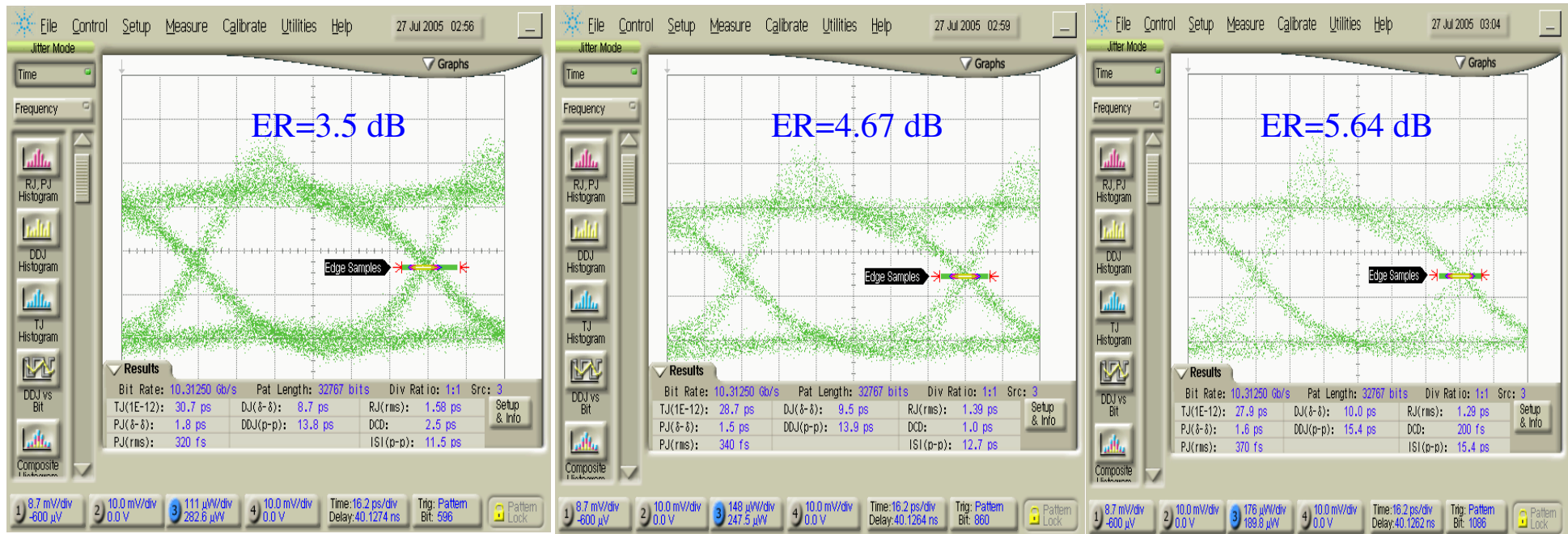
RJ = 0.91 ps , p-p= 12.74 ps
PJ = 2.1 ps

Total UJ p-p = 14.84

Performance of 10Gig TOSA

Low cost FP laser intended for LRM

⇒ Performance here is degraded as the TOSA was driven by BERT directly



TJ=30.1 ps

RJ=1.58

PJ=1.8 ps

TJ=28.7 ps

RJ=1.39

PJ=1.5 ps

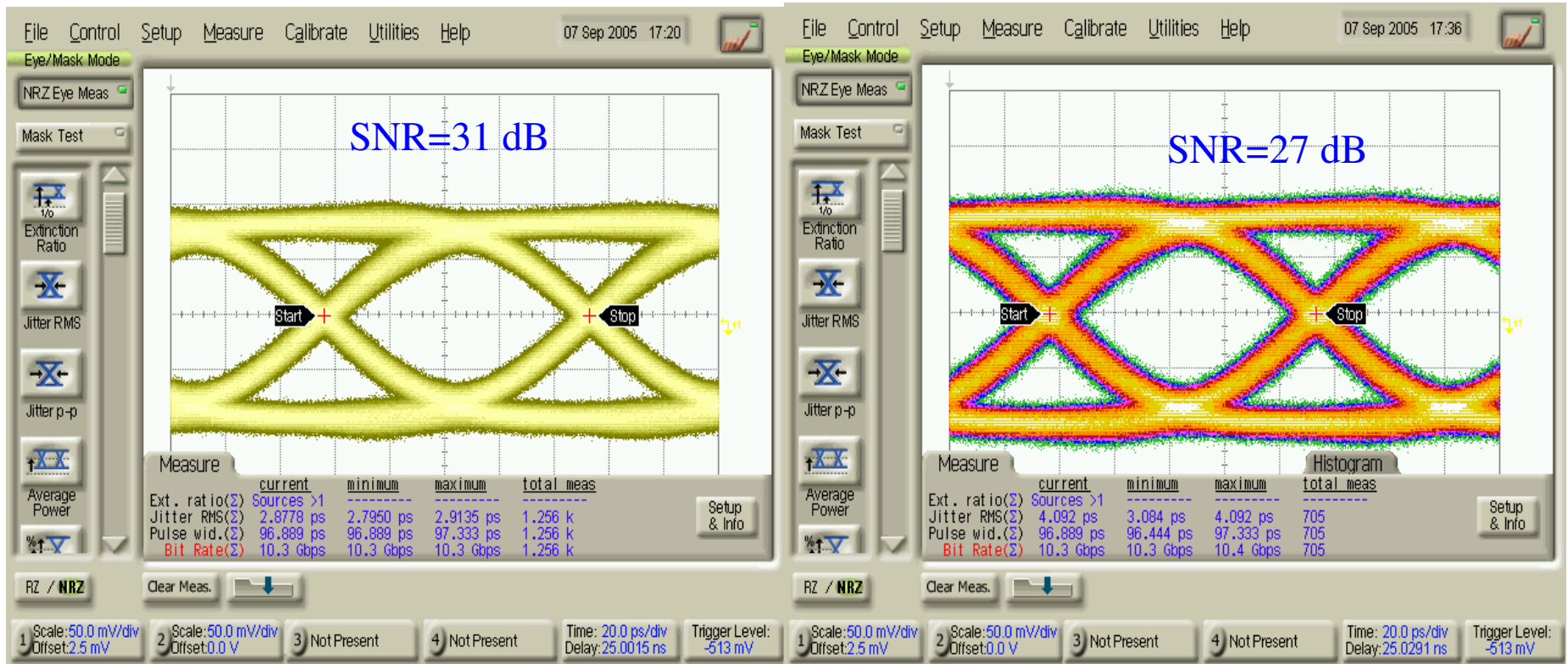
TJ=27.9 ps

RJ=1.29

PJ=1.6 ps

Output of the ISI Emulator Back to Back

□ PRBS 2n31



RJ (RMS) = 1 ps

RJ (RMS) = 1.07 ps

RJ (RMS) = 1.15 ps for SNR of 25 dB (Eye Diagram Not Shown)

Measured Random Jitter for TP3 Stressor

- Draft 2.2 specifies an SNR of 27 dB for the comprehensive stressed receiver test.
- Maximum random jitter measured was in the range of 1.07-3.01 ps (RMS) for the same SNR.

SNR(dB)	B2B(RMS)	B2B(UI)	Post Str. (RMS) *	Post Str. (UI) *	Post Str. (RMS)	Post Str. (p-p)
25	1.15	0.012	1.73	0.018	3.15	0.032
27 (spec)	1.07	0.011	1.68	0.017	3.01	0.031
31	1	0.010	1.62	0.017	2.68	0.028

* This data is with 16 averages. Since, jitter with stressor enabled 1 sigma increased by about 3x to determine if the contribution is due to phase difference between the stressor arm the waveform was averaged.

Considering the Corner Cases for UJ

□ Scenario 1, High RJ Transmitter

⇒ Lets assume all of 0.033 UI UJ is random.

- The the peak to peak random jitter will then be 44.8 ps. This amount of random jitter will add additional penalty to the EDC.

□ Scenario 2, high PJ Transmitter

⇒ Lets assume the total PJ of 0.06 ps p-p

- The RMS PJ contribution to the UJ (RMS) then would be 0.021 UI, which then limit maximum RJ contribution.

□ Not a good idea to specify bonded and unbounded jitter sum in RMS!

Closing the Discrepancy Between TP2 and TP3

- **The uncorrelated jitter in Table 68-3 should be broken in to two line items: Random Jitter (RJ) and Periodic Jitter (PJ).**

- **The RJ should be in the range of 0.02-0.025 UI RMS based on our current measurements**
 - ⇒ During the testing DCA J not available to break down the jitter components but we plan to do further testing and a specific value for RJ.

- **Add a line item to Table 68-3 for “Periodic Jitter” with 0.06 UI p-p.**

- **With the recommended RJ range plus the PJ the total jitter will still be ~ 0.033 UI (RMS) but eliminates the pathological scenarios**
 - ⇒ High RJ – Will degrade EDC performance
 - ⇒ High PJ – Good transmitter may fail the test.