Towards a Comprehensive Stressed Receiver Tester and TWDP Assessment

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- PIE-D Variation for Different Optical Test Signals
- Optical Eye Diagrams
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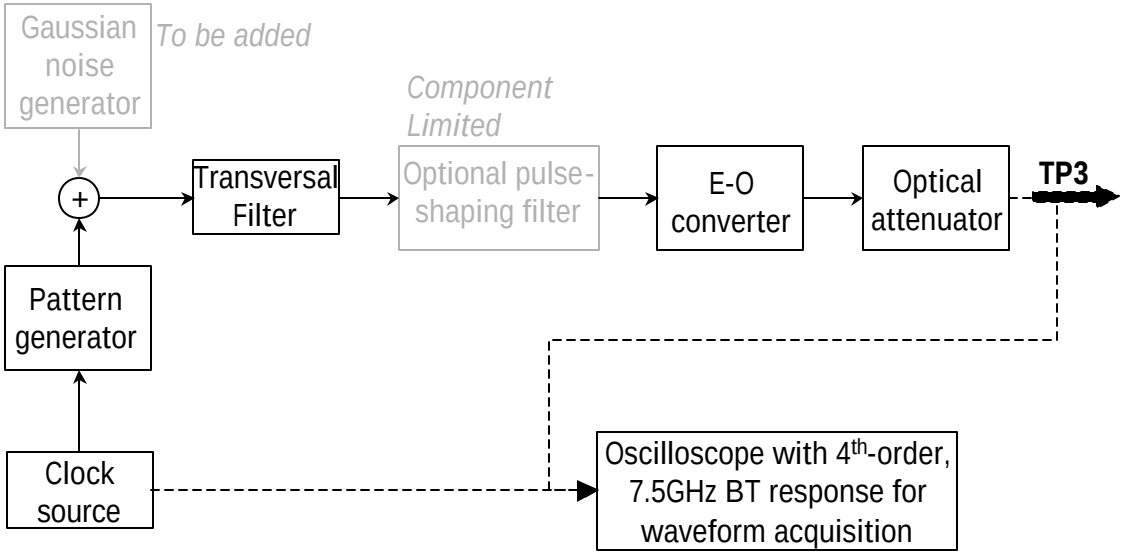
Stressed Receiver Setup

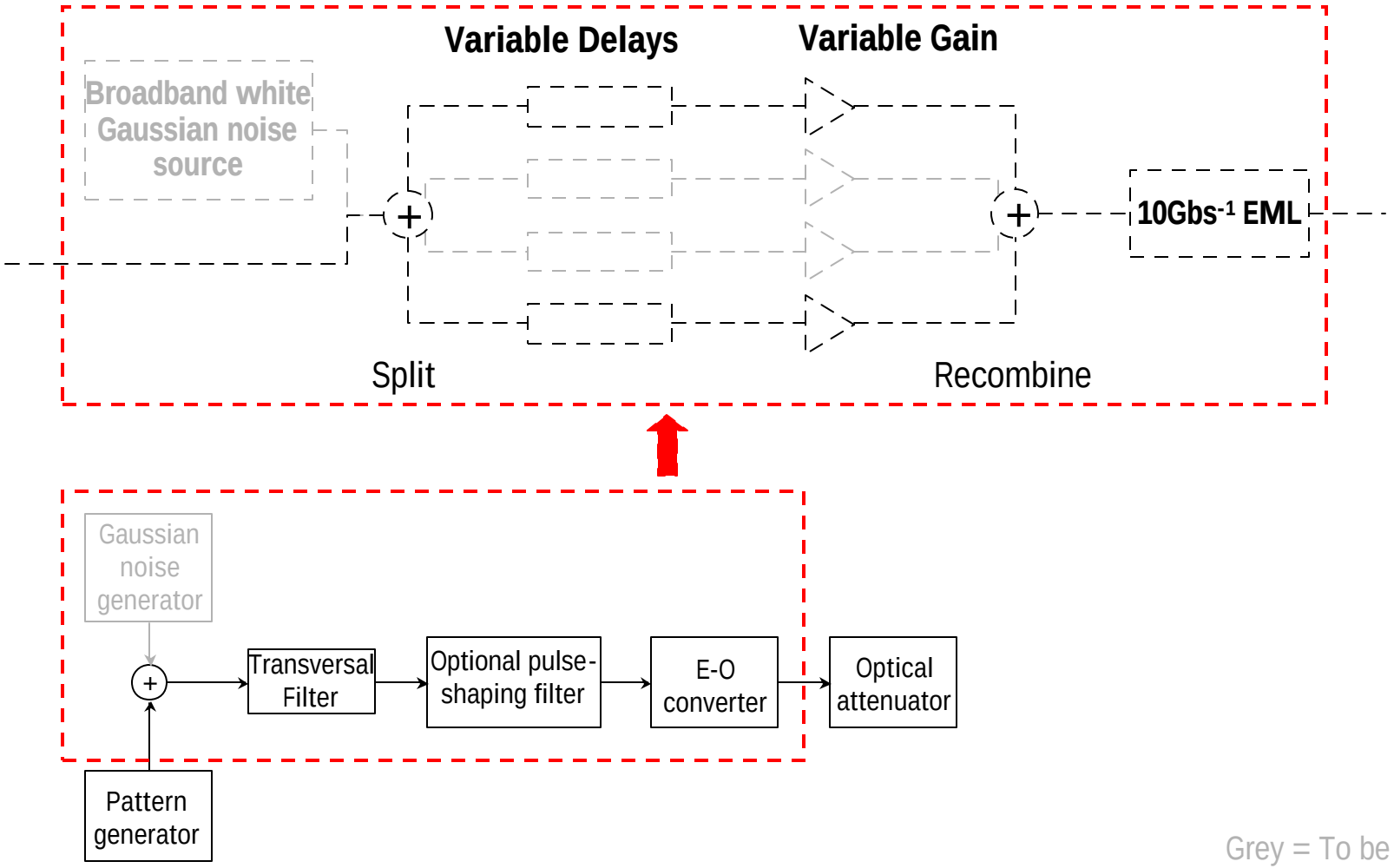
- Significant progress towards a comprehensive stressed receiver tester has been made

- The emulator comprises off-the-shelf components to implement both variable delay and gain, filtering and E-O conversion at the output



Stressed Receiver Setup

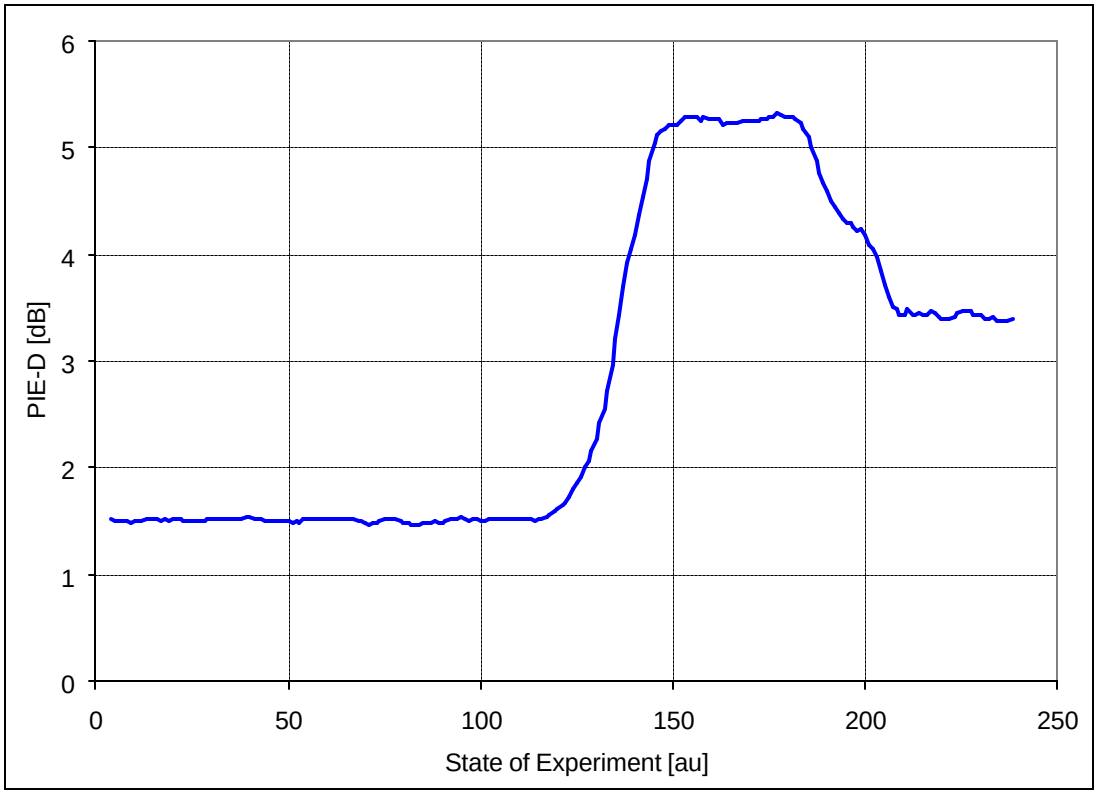
- Below is a more detailed schematic of the components used:



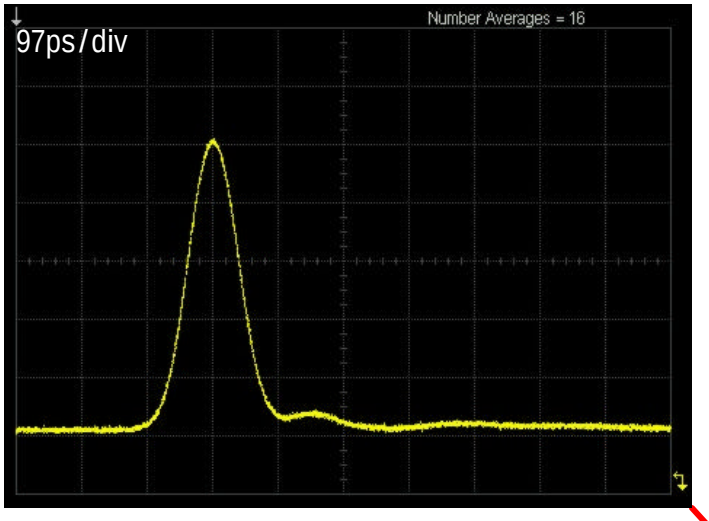
Grey = To be added

PIE-D Variation for Different Optical Test Signals

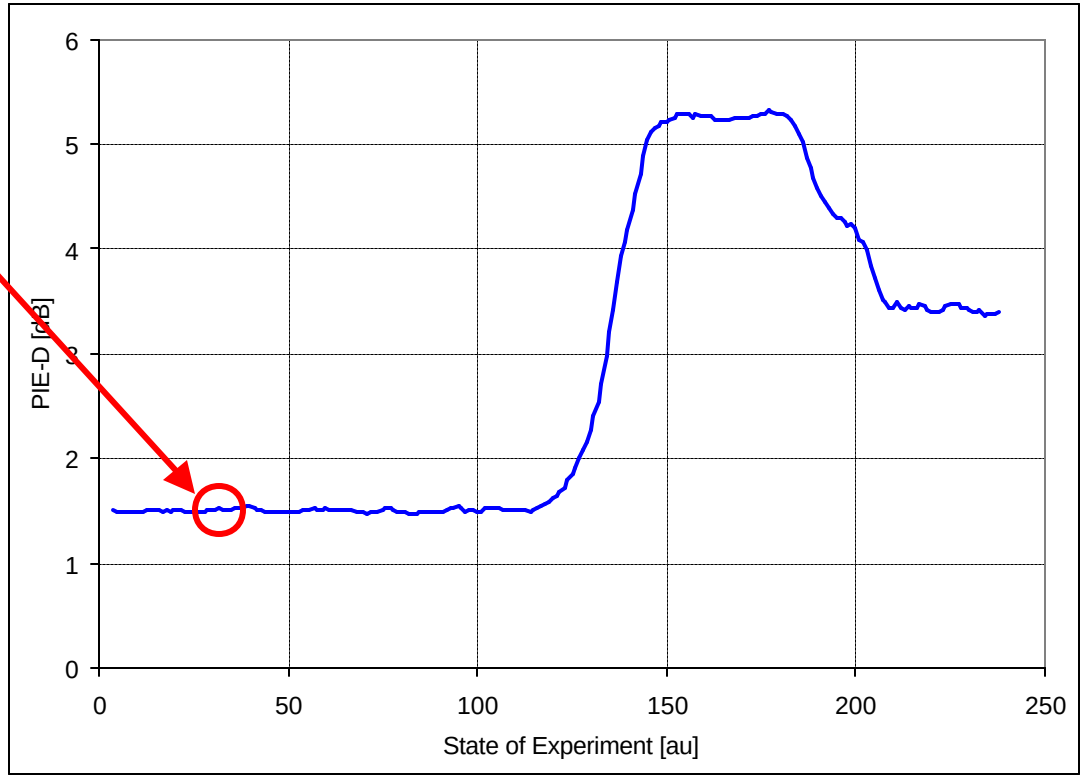
- Real-time measurement of PIE-D shown below as test-signals varied
- Technique for PIE-D calculation as per *bhoja_1_0704*



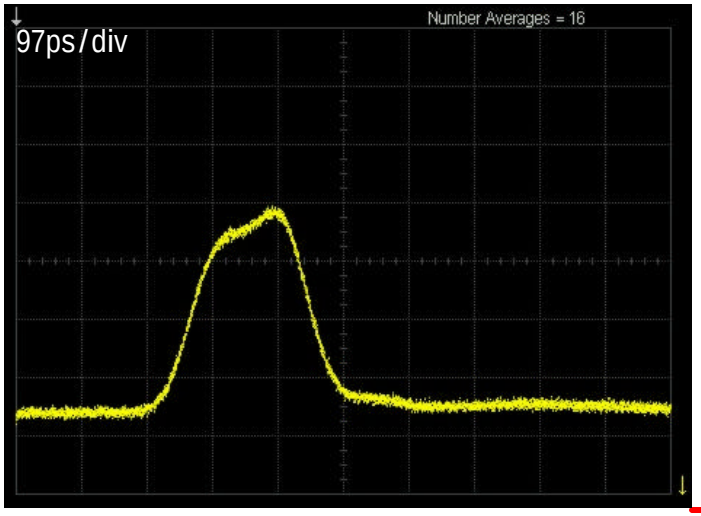
PIE-D Variation for Different Optical Test Signals



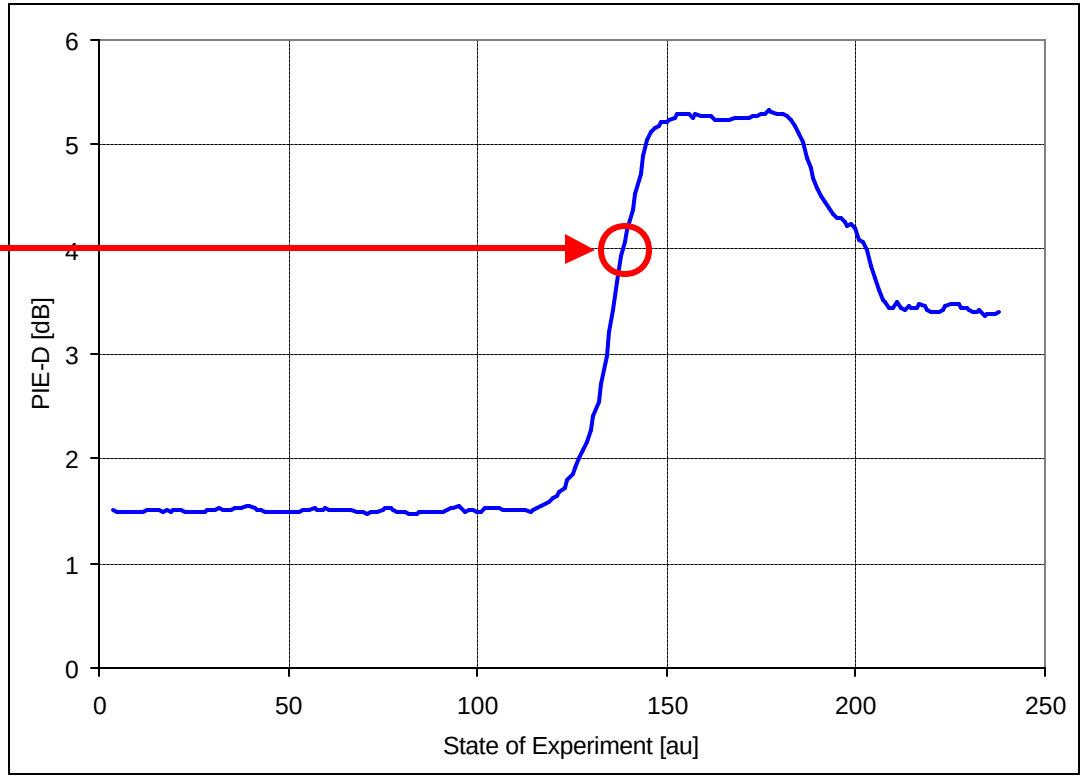
PIE-D = 1.5dB



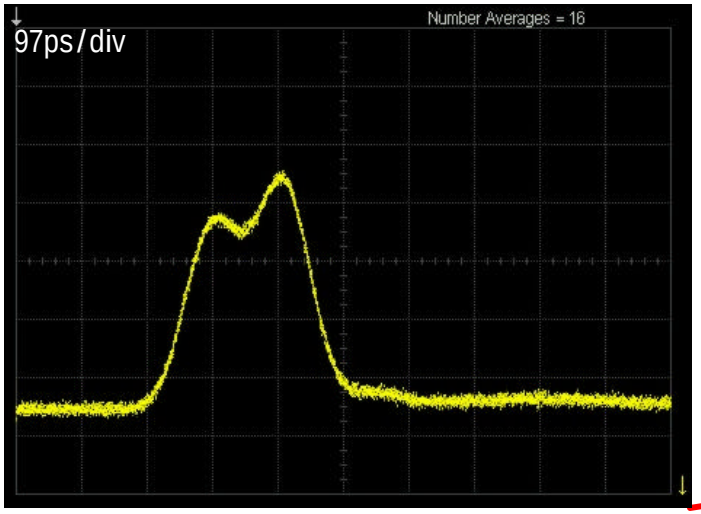
PIE-D Variation for Different Optical Test Signals



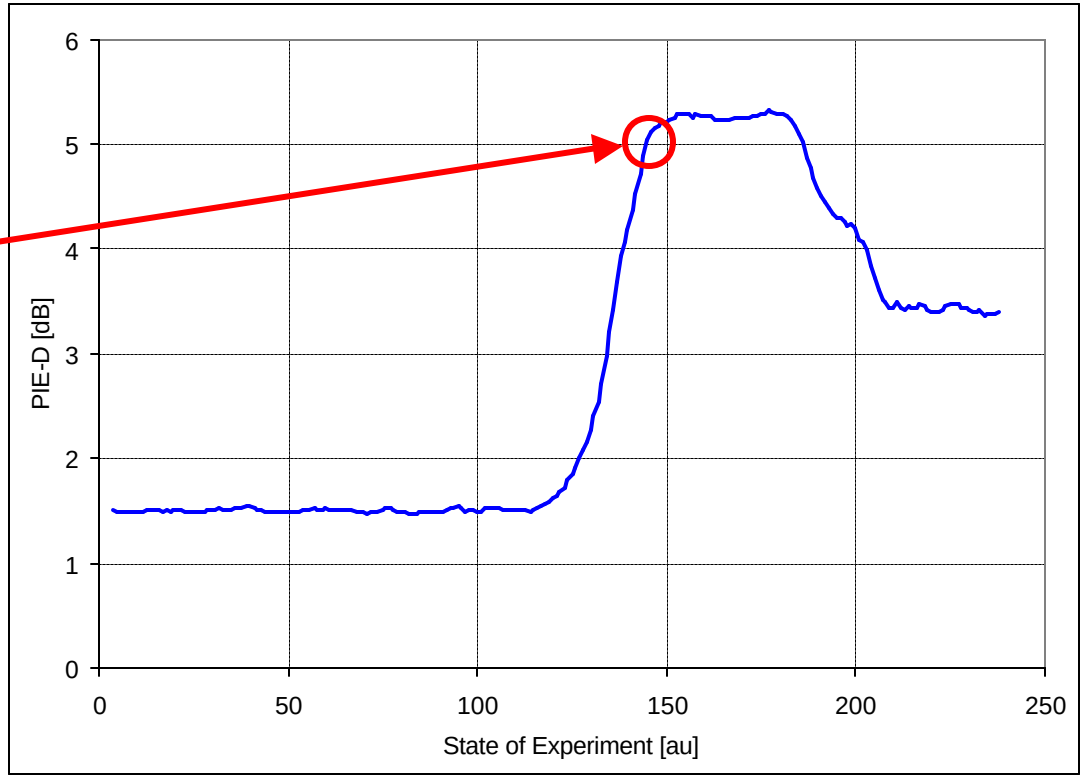
PIE-D = 4.0dB



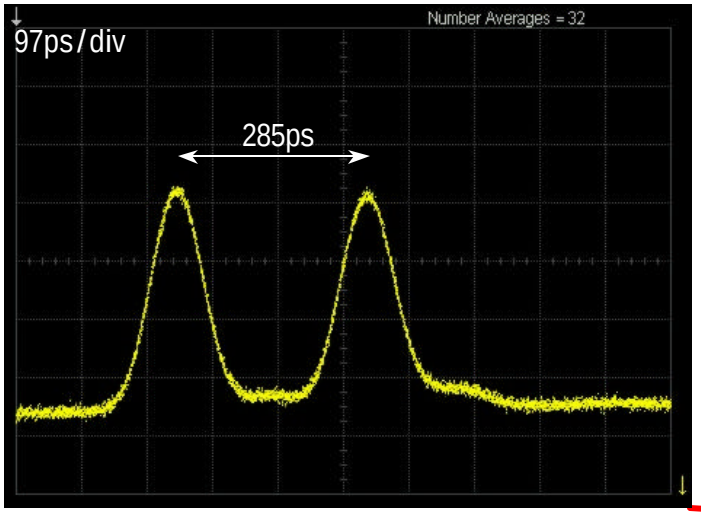
PIE-D Variation for Different Optical Test Signals



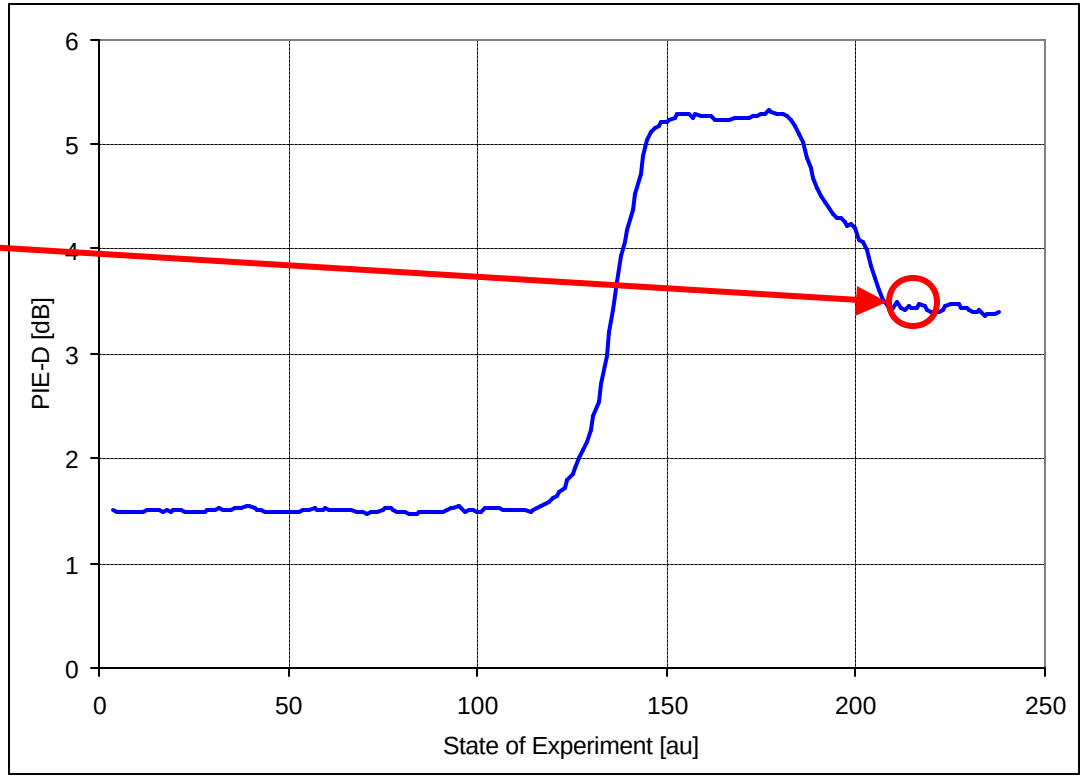
PIE-D = 5.0dB



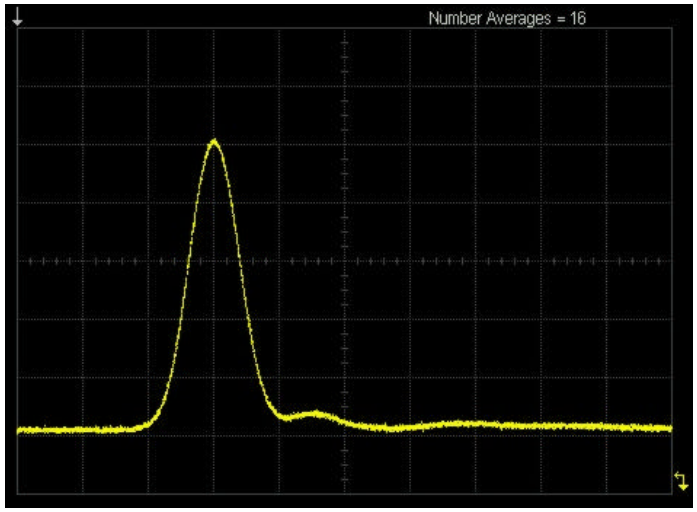
PIE-D Variation for Different Optical Test Signals

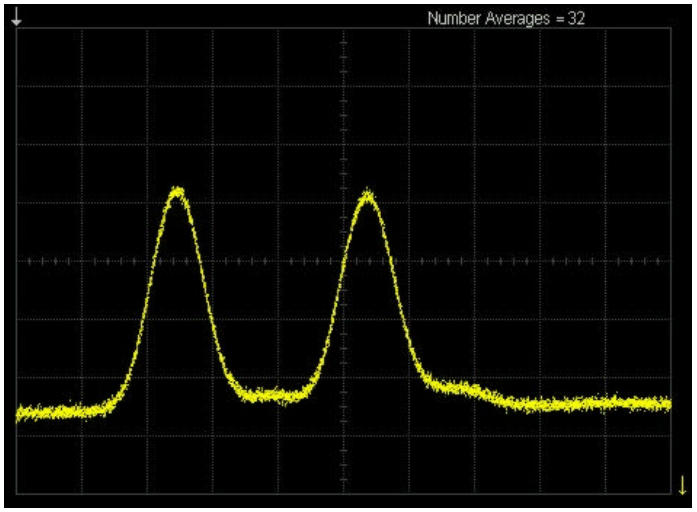


PIE-D = 3.5dB



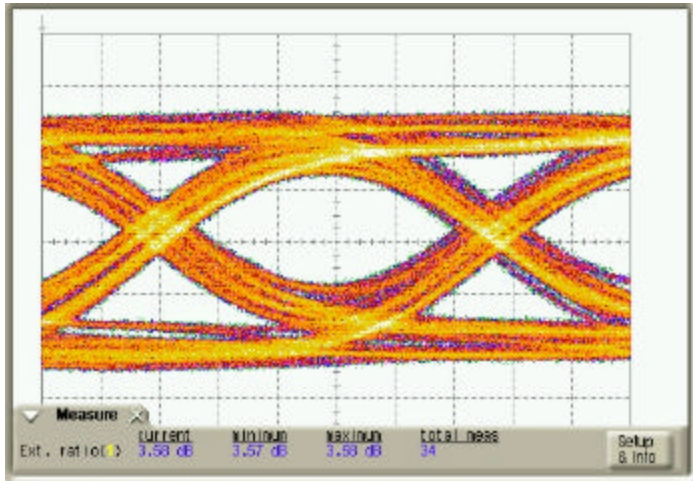
Optical Eye Diagrams [PRBS = 2^9-1]

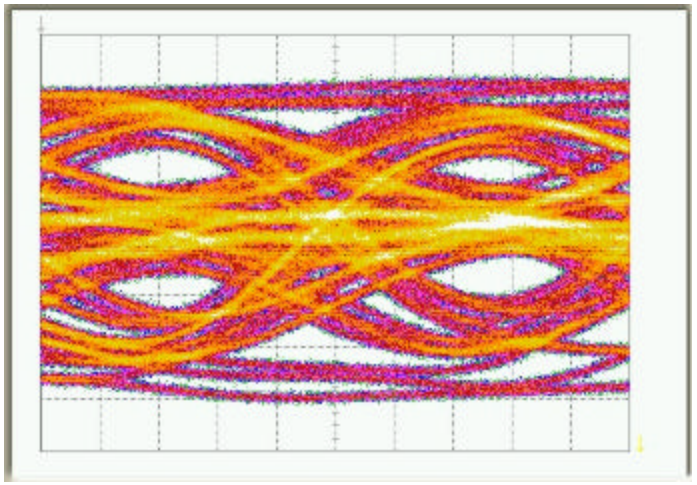




PIE-D = 1.5dB

PIE-D = 3.5dB

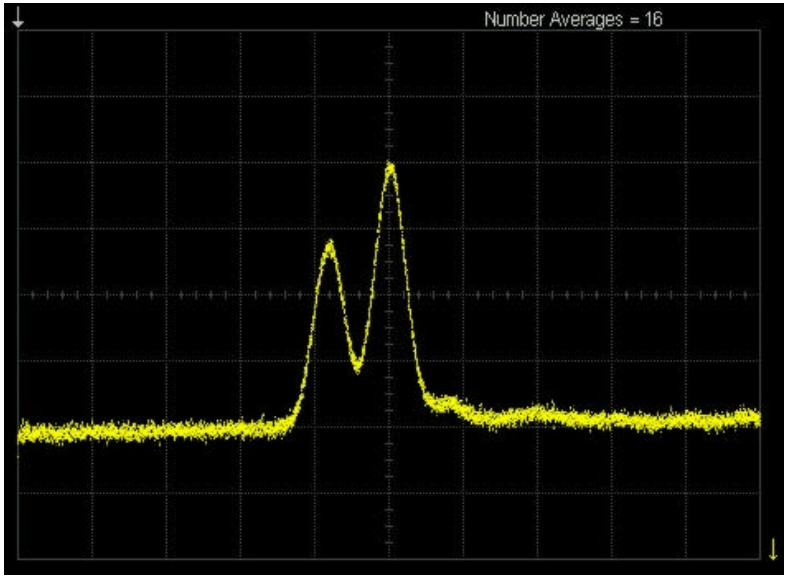




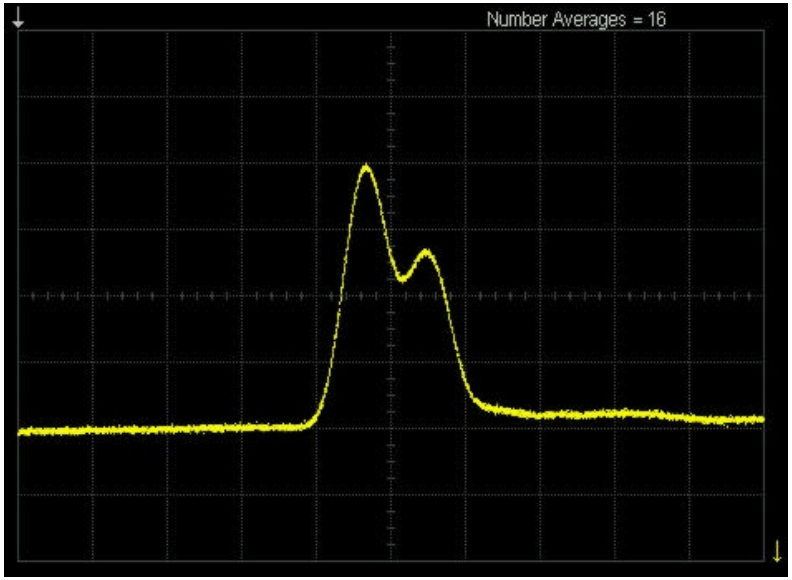
Test Signal Characteristics

- Impulse responses from each of the three signal categories [pre-cursor, symmetic and post-cursor] can be generated

Pre-Cursor

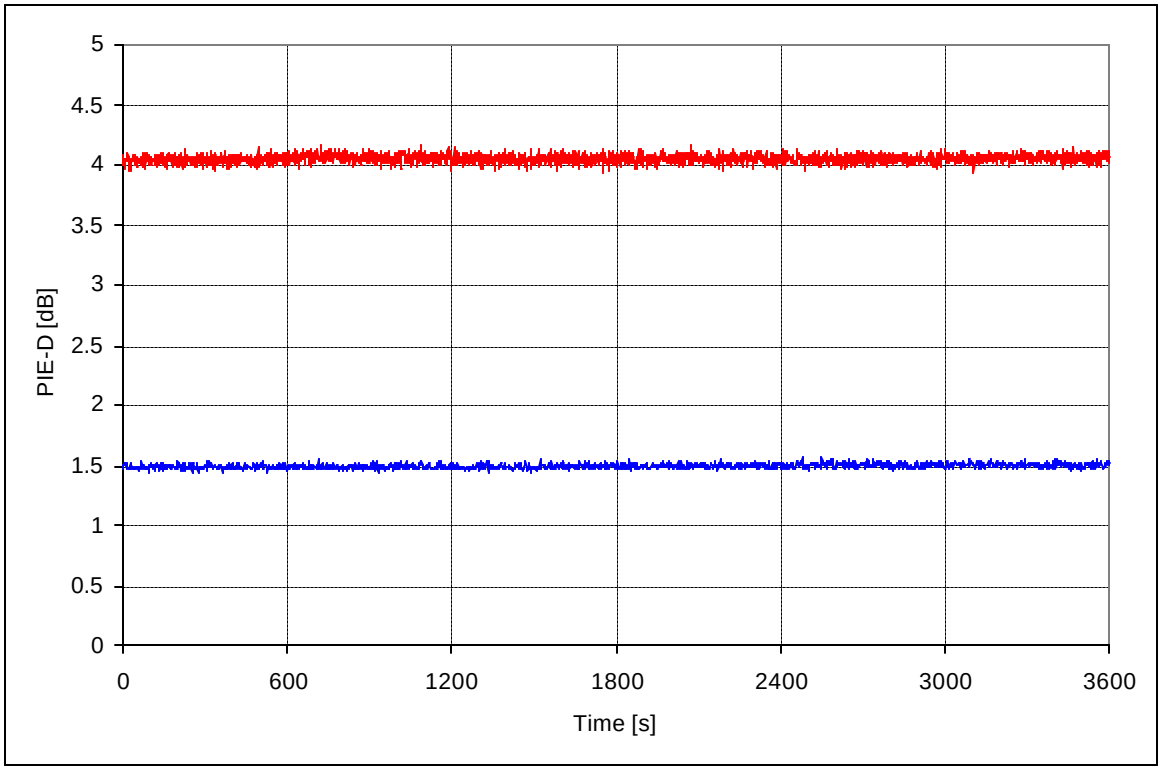


Post-Cursor



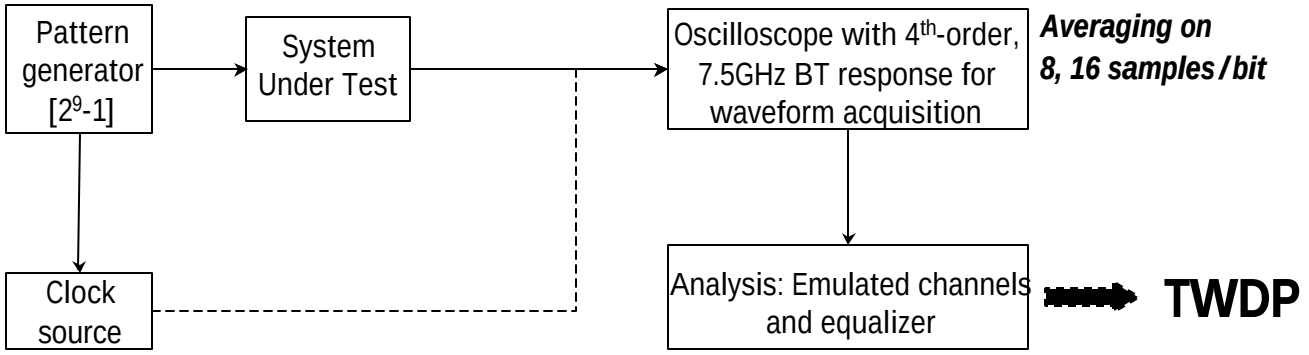
Measurement Stability

- Data collected over 1 hour show good stability in both low and high PIE-D states – *the latter being chosen due to its sensitivity to setup*
  - PIE-D = 1.5dB standard deviation <0.02dB
  - PIE-D = 4.0dB standard deviation <0.03dB



Implementation of TWDP Code

- The TWDP method has been implemented in the lab using standard test equipment
- Collected experimental data from FPs, DFBs and EMLs under a variety of setup conditions
- Straightforward procedure to integrate the TWDP code with the emulator



Implementation of TWDP Code

- Variation of 0.7dB found between “good” and marginal mask-fail waveforms
- Reported TWDP is very sensitive to variations in duty cycle distortion and crossing point [1.6dB]
- Nearly one-to-one variation in reported TWDP with errors in input OMA
- Not very sensitive to small timing offsets [±0.25UI yields <0.1dB]
- Almost no penalty affects are found for errors in the input 0-level
- Observed systematic differences with experimental data at different oversampling rates [8 vs 16 samples/UI yields ~0.13dB difference]

Summary

- Initial experiments with a 2-tap emulator to produce optical test signals have been reported

- Can input test impulses and full PRBS patterns

Next Steps

- Further extend the number of taps
- Addition of broadband white Gaussian noise source
- Implement “correct” stressor vectors
- Detailed tolerancing of the tester to baseline accuracy
- Integrate the TWDP code as a method of calibrating the emulator