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# **Waveform Capture Data for TP2 Penalty Test Development**

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# Source Information and Test Conditions

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All data is for a 10G FP source in module configuration (in TOSA driven by Laser Driver IC).

Eye Diagrams and Averaged Pattern Capture are PRBS9 @ 10.3125 Gb/s

- $x^9 + x^5 + 1$ , from ITU-T V.52

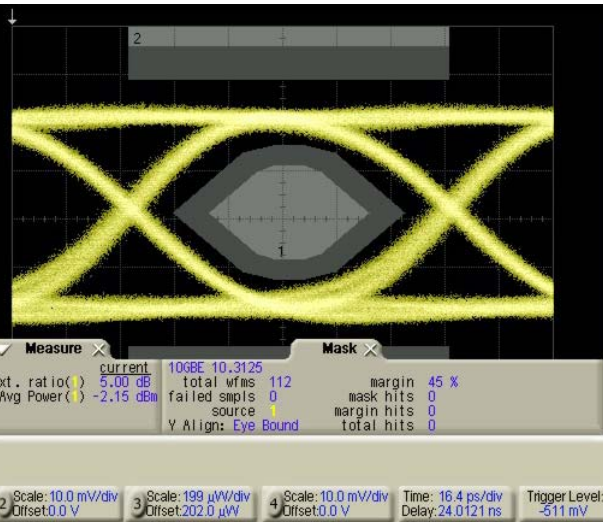
All cases are ~ Room Temperature (laser probably ~ 35C)

Waveform captures are 4050 points over a time range of 55 ns (~ 567 bits),  
Averaged over 16 captures.

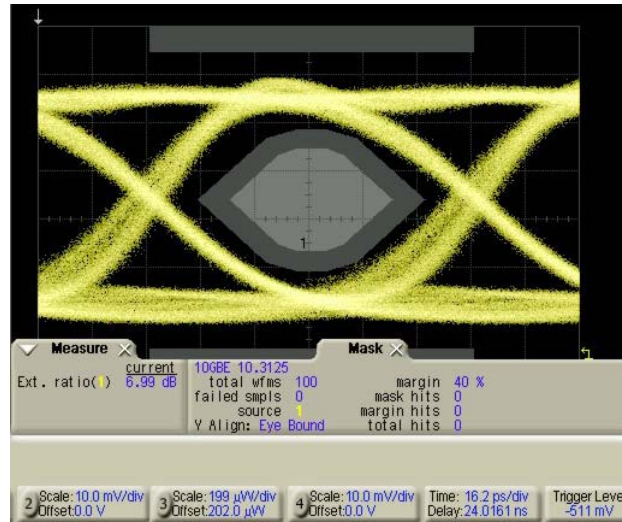
## Cases:

- **Case 1: 'Normal' biasing conditions (35 mA average bias) - 5 dB ER**
  - Likely -LRM setup if no pre-emphasis
- **Case 2: Same as Case 1 but higher modulation - 7 dB ER**
  - Chosen to show a small degree of overshoot, turn-on jitter
- **Case 3: Same as Case 1 but very underbiased (25 mA, same modulation) – 9.2 dB ER**
  - Chosen to show much more overshoot, slower laser response and turn-on jitter.
- **Case 4: Same as Case 1 but Laser Driver slowed down considerably**
  - Chosen to show a very slow overall laser response or poor packaging
- **Case 5: An even more extreme example of Case 4**
  - Seems to show a very low bandwidth transmitter
- **Case 6: High biasing conditions (45 mA average bias) - 5 dB ER**
  - Shows a particularly fast laser response

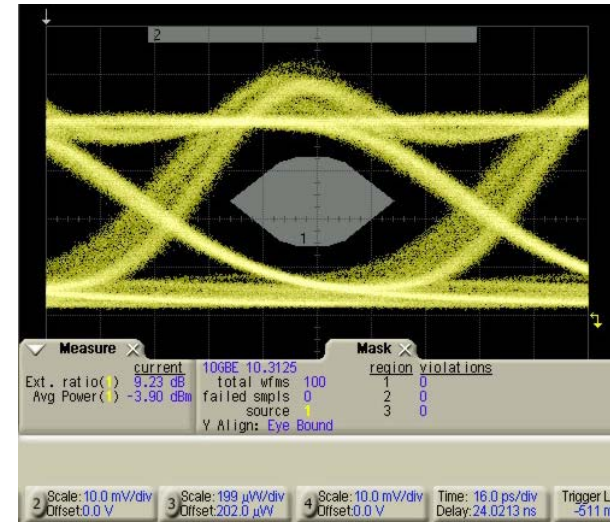
# Eye Diagrams



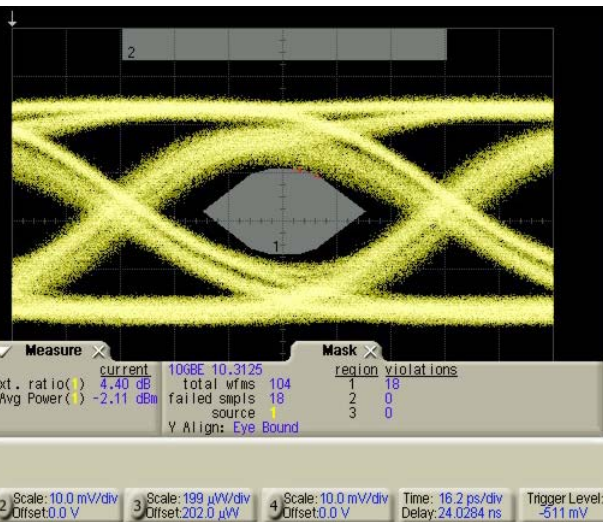
**Case 1: 5 dB ER, Normal Bias**



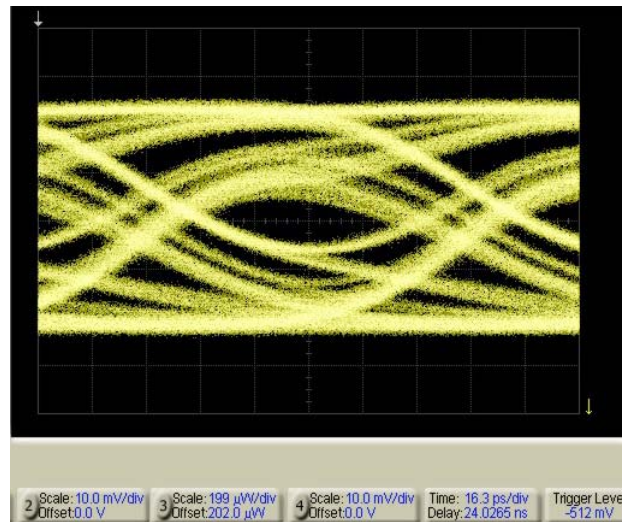
**Case 2: 7 dB ER, Normal Bias**



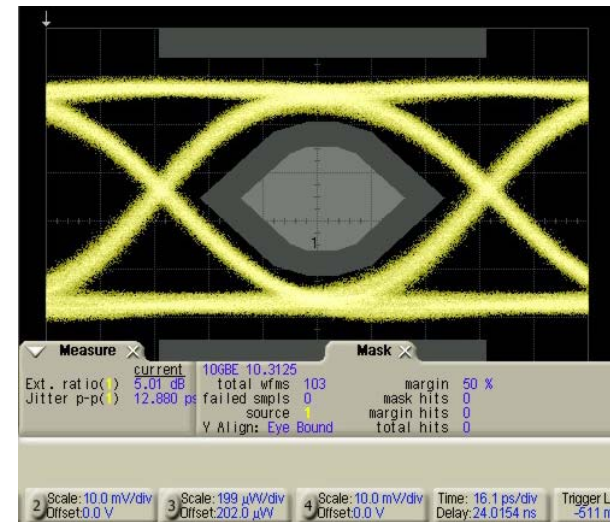
**Case 3: 9.2 dB ER, Low Bias**



**Case 4: Case 1 + Slow Drive**

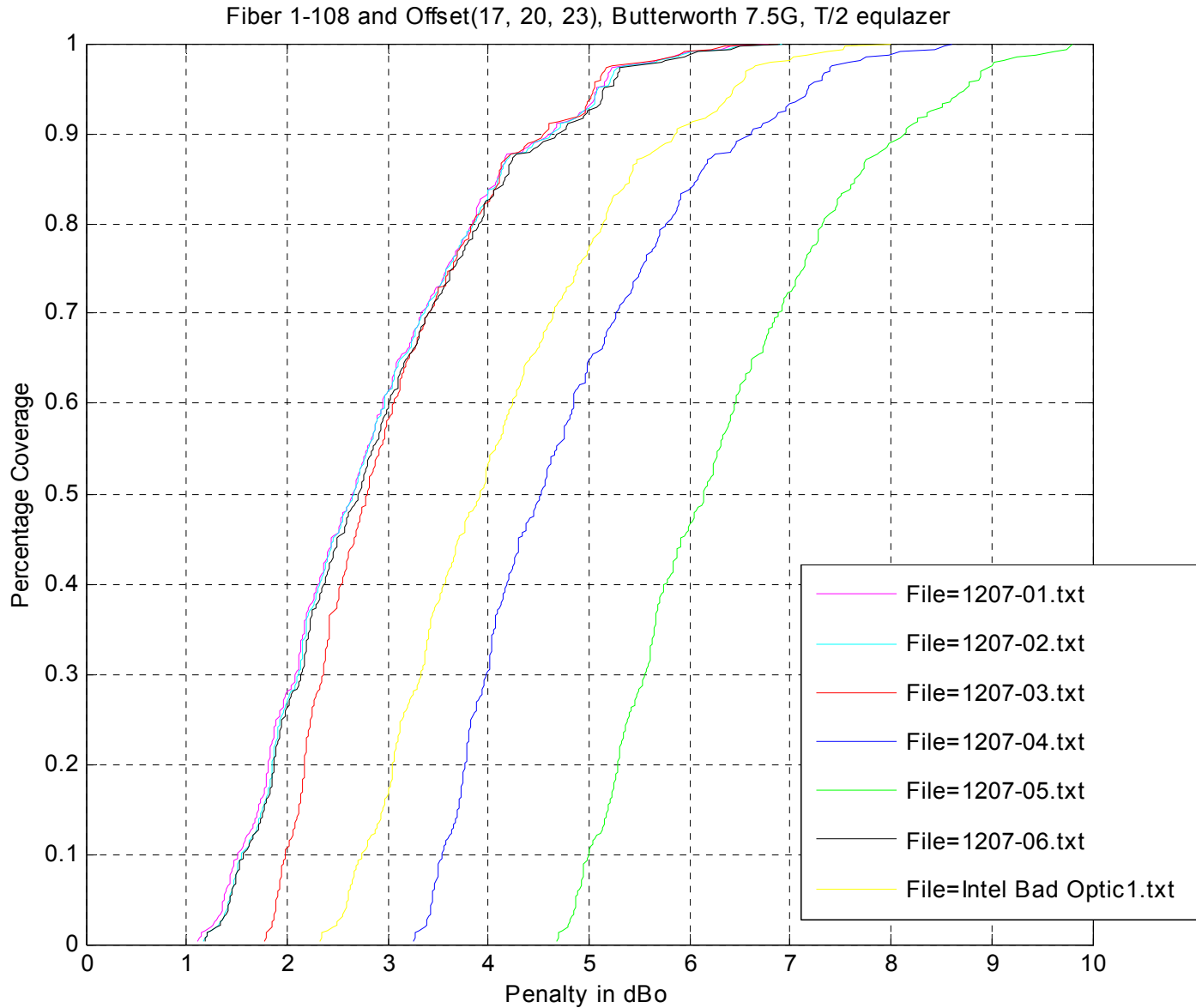


**Case 5: Case 1 + Very Slow Drive**



**Case 6: 5 dB ER, High Bias**

# Penalty analysis



- Slow lasers do not as well.

- Overshoot has no negative effect with bad fibers, where things count. If you look closely, case 3 has a slight advantage up around 90%.

- BadOptic from Intel not plotted yet as eye. It's penalty is moderate.