

# Extinction Ratio for the PR Type ONU PMD

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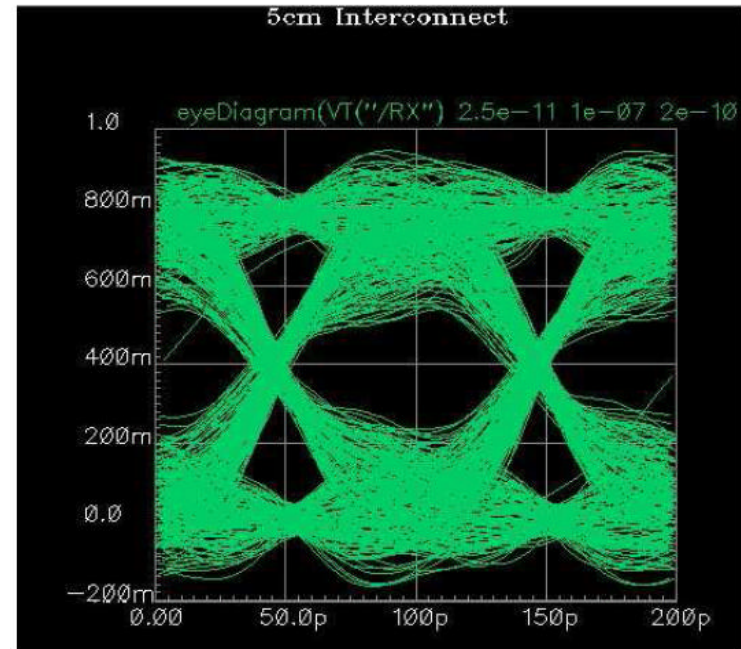
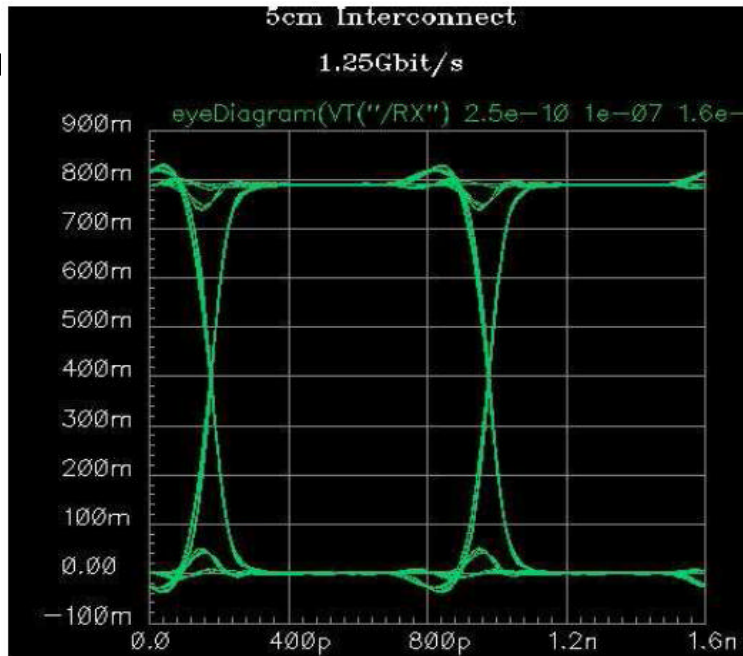
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# Overview

- Which ER value is better for the PR type ONU?
  - 6dB
    - Theoretically, the sensitivity is 0.5dB relaxed
  - 4.5dB
    - practical
    - Reliable
    - Low cost
    - Overload performance is better, especially for the –6dBm (PR-30) upstream overload spec
- IEEE802.3ae ER Specification 10GBase-LR 3.5dB
- ITU-T G.959 Specification S-64.1 6dB

# Problems for 10G Eye Pattern – Electrical Domain/Test Equipment

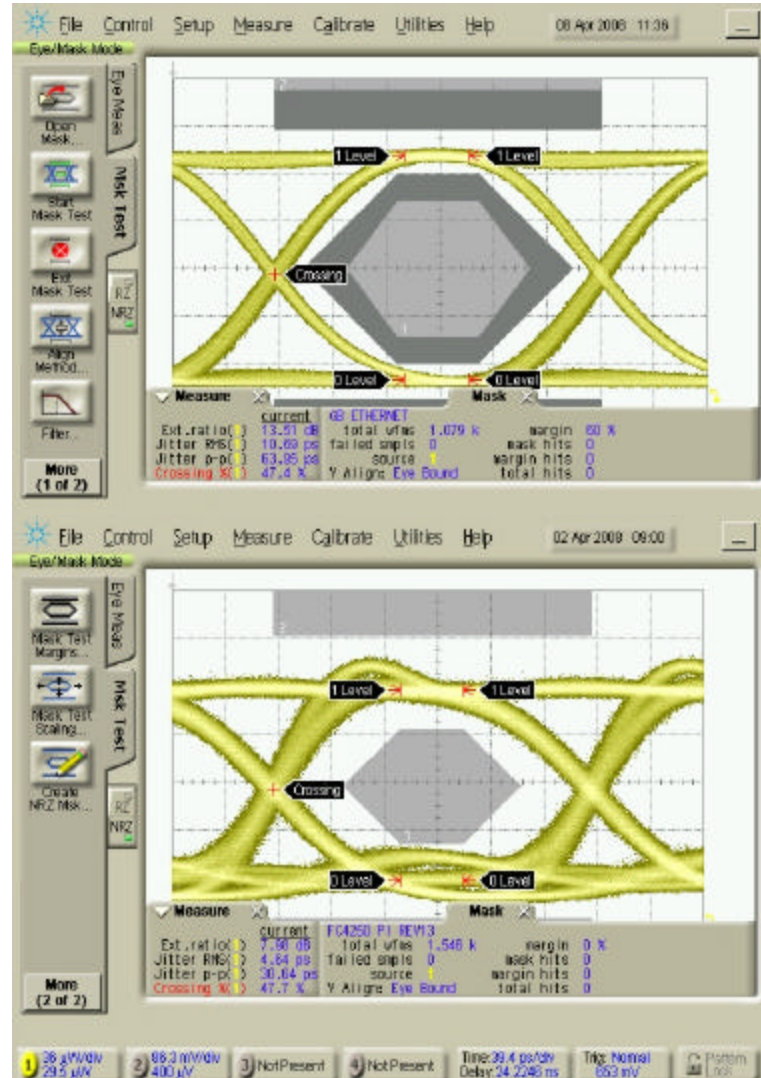
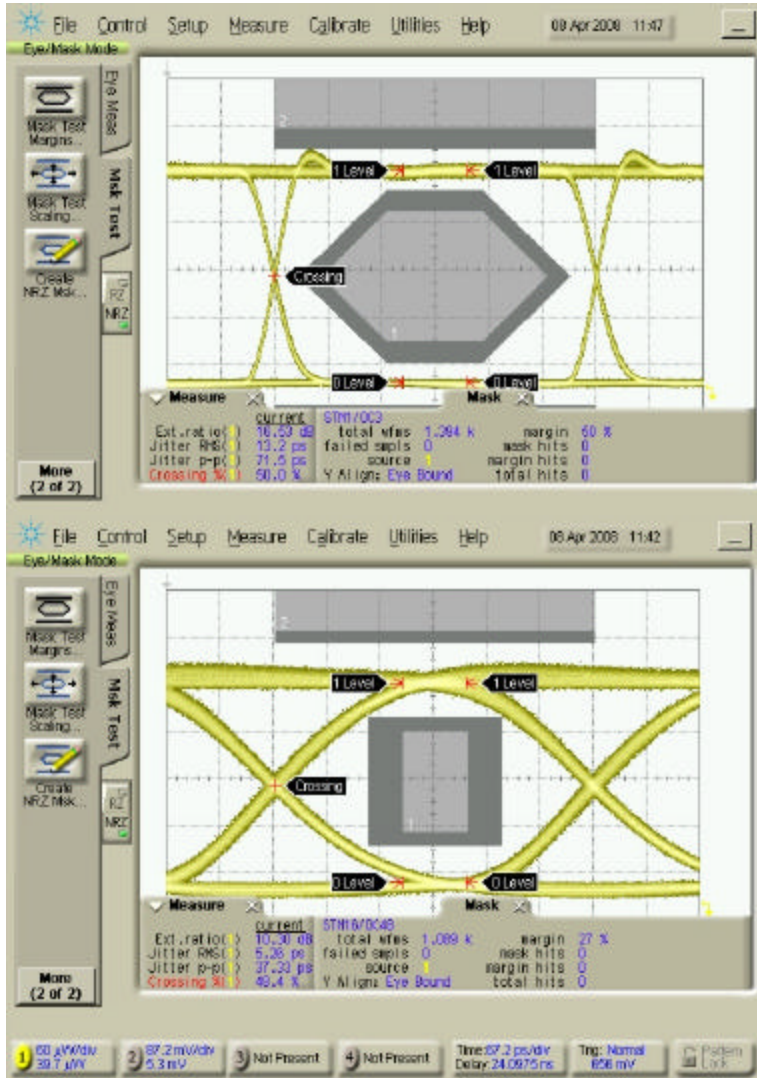
## 3av\_0804\_benamram\_2



**10G signal is much noisy**

**– Electrical, Optical, Test Equipment**

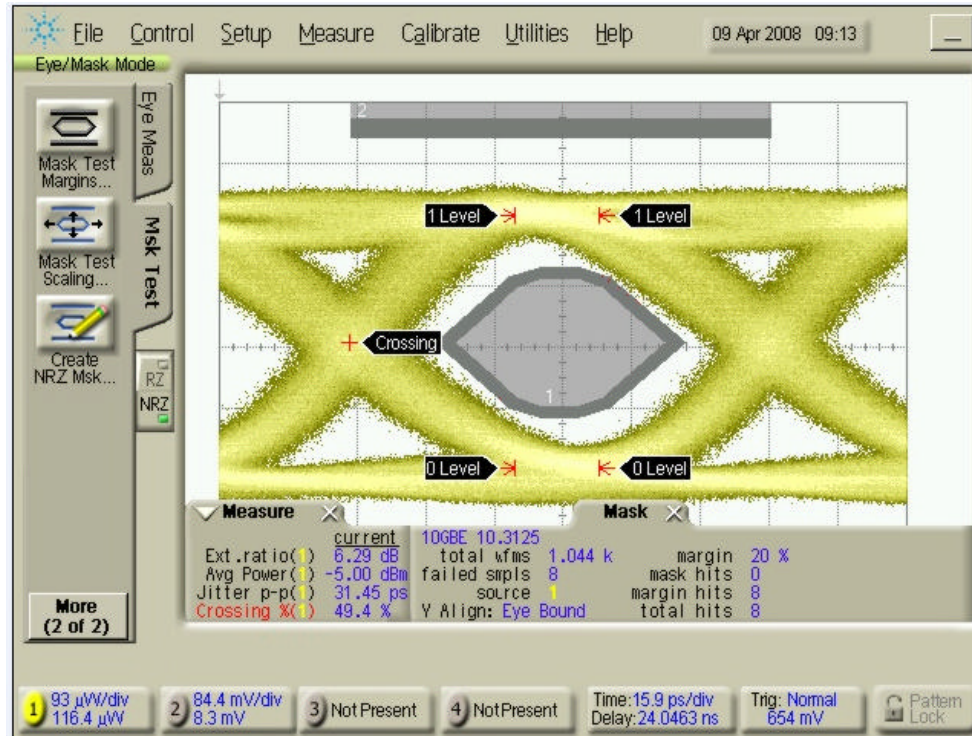
# Problems for 10G Eye Pattern – Optical Domain



# Disadvantage to Increase the ER

1. Temperature range and tracking error
2. Production tuning and yield (ER control)
3. Increase the “1” level
  - The PR ONU TX average power
    - PR-U1 > 2dBm
    - PR-U2 > 4dBm
  - Cost increase – high power laser
  - Reliability issue
4. Lower the “0” Level
  - Eye distortion
  - Overshoot

# Preliminary 10G ONU with direct modulated DFB laser



**Upstream link overload (with APD/TIA) will get worse if the ER in 10G direct modulated laser is high**



# Summary

- Higher ER does not guarantee the performance
  - Trade-off among ER, pattern distortion, jitter, overshoot, with RX bandwidth, overload and sensitivity
- ER (min) 4.5dB is the “right” value for PR type low-cost 10G ONU with direct modulated DFB laser