Optical Components for 12.5 GBaud Serial Links

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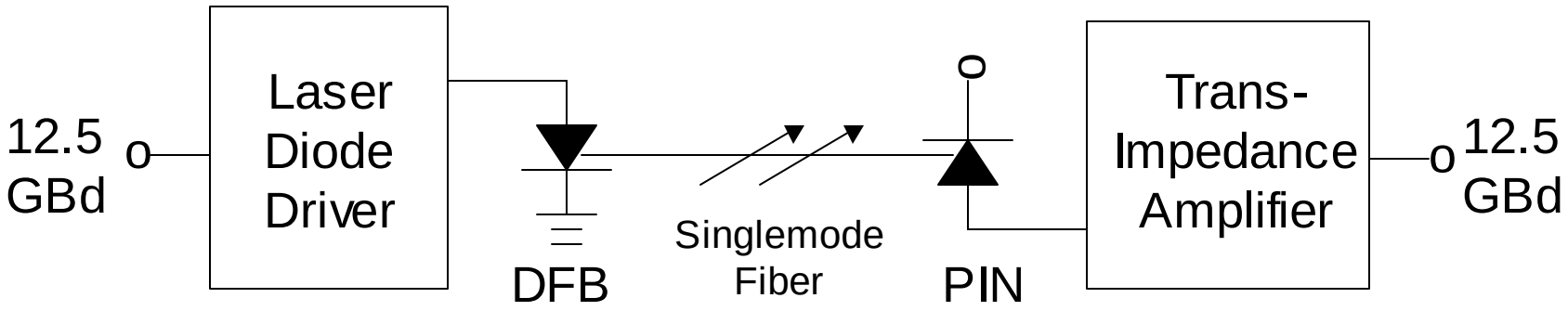
Why Serial Links?

- Single fiber solution
- Low complexity
  - **Small part count**
  - **High reliability**
  - **Small size**
  - **Low power consumption**
- Within reach of existing technology
- “Serial PMD Consortium” has significant industry participation

Optical Component Selection

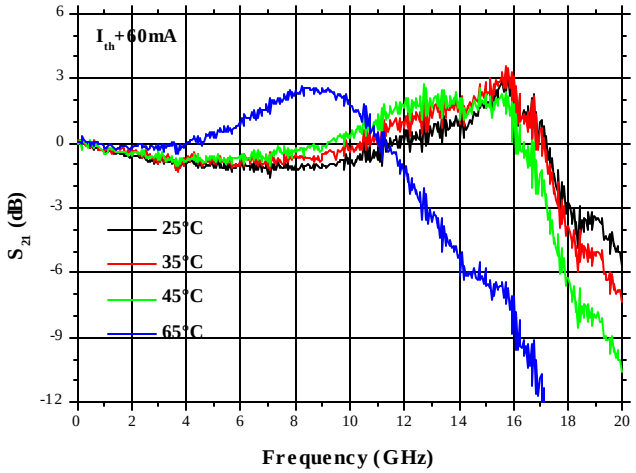


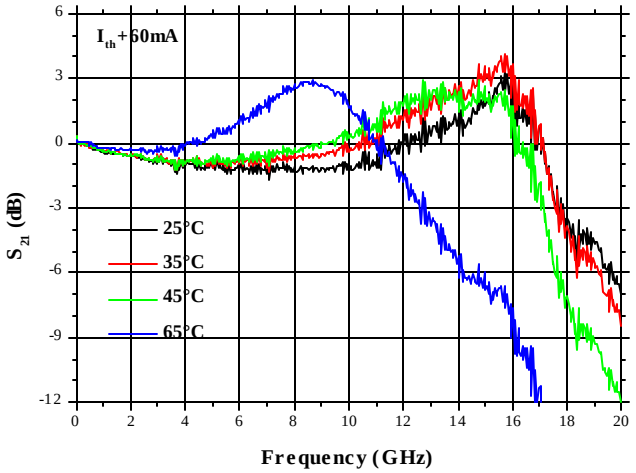
Serial PMD

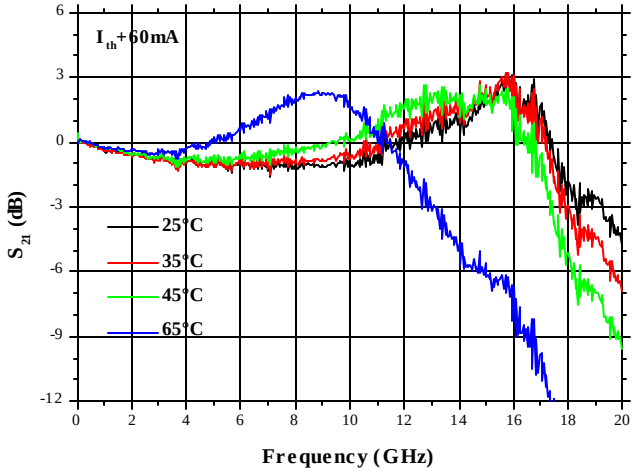
Why DFB Lasers?

- Useful for all distances up to and including 40 km
  - **No mode partition noise penalty**
  - **No dispersion penalty**
  - **Standard component resulting in economy of scale**
- Operation at 1310 nm
  - **Extendable to 1550 nm for longer links**
- Long history of use in high speed applications
- No “Speed Cliff” limiting 12.5 GBd operation

Laser Frequency Response over Temperature

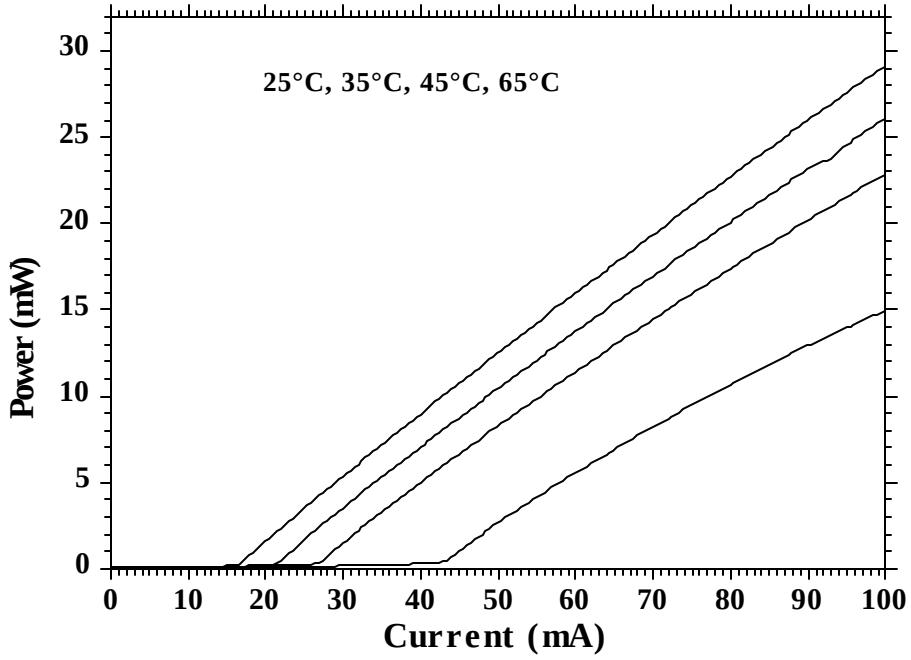




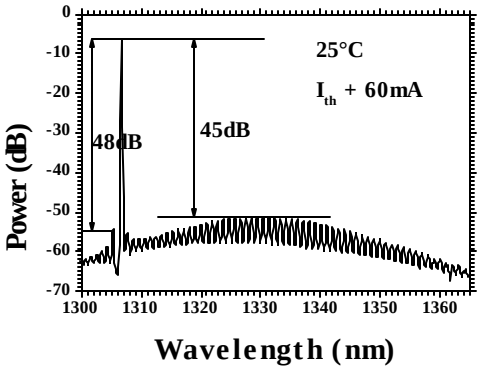


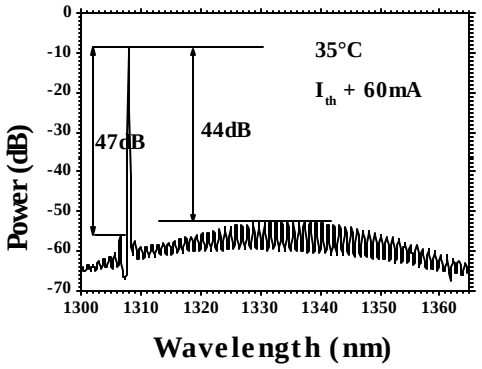
3dB Bandwidth Exceeding 12 GHz at 65°C

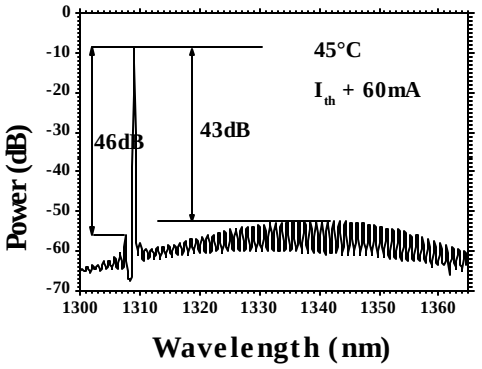
Laser Optical Power vs Current over Temperature

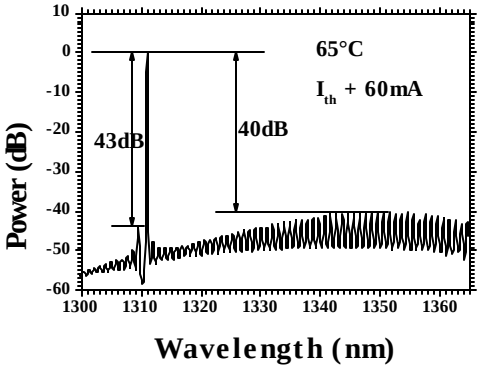


Laser Spectrum over Temperature





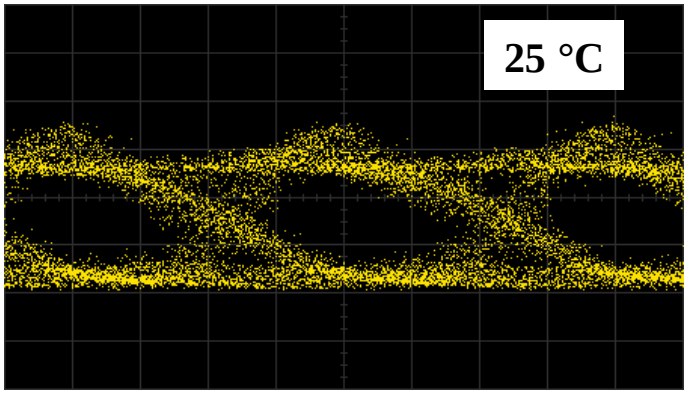


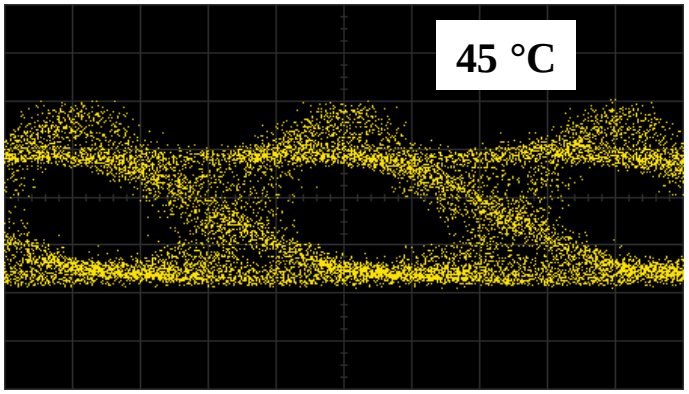


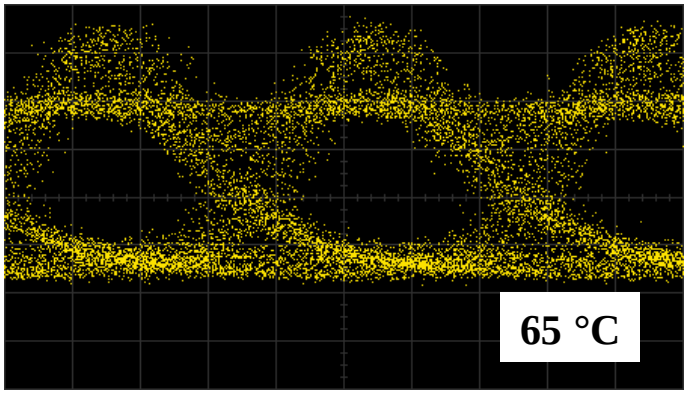
Single mode over temperature

High Side Mode Suppression Ratio

12.5Gb/s Laser Eye Patterns over Temperature

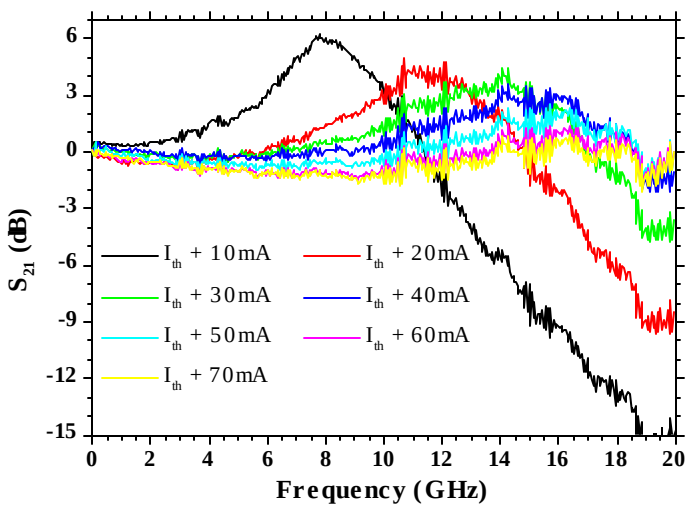


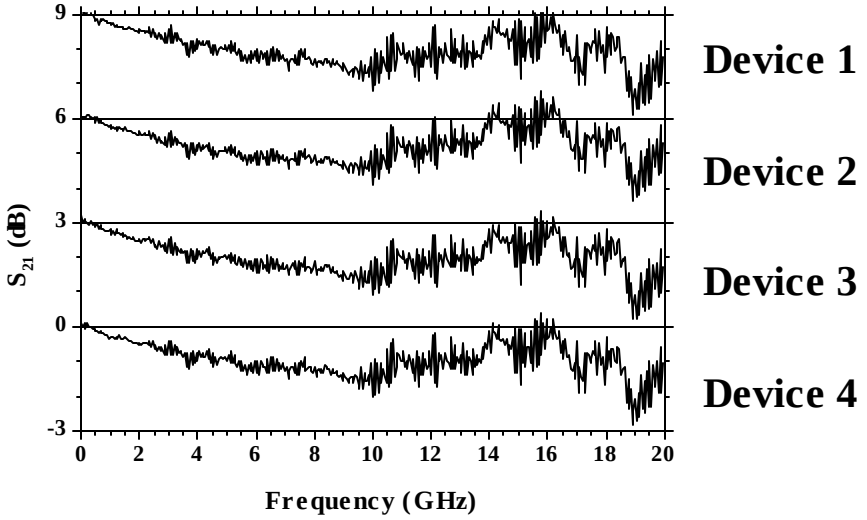




Modulation = 40mA peak to peak
Extinction Ratio »8.2dB

Laser Frequency Response on High Speed Carrier





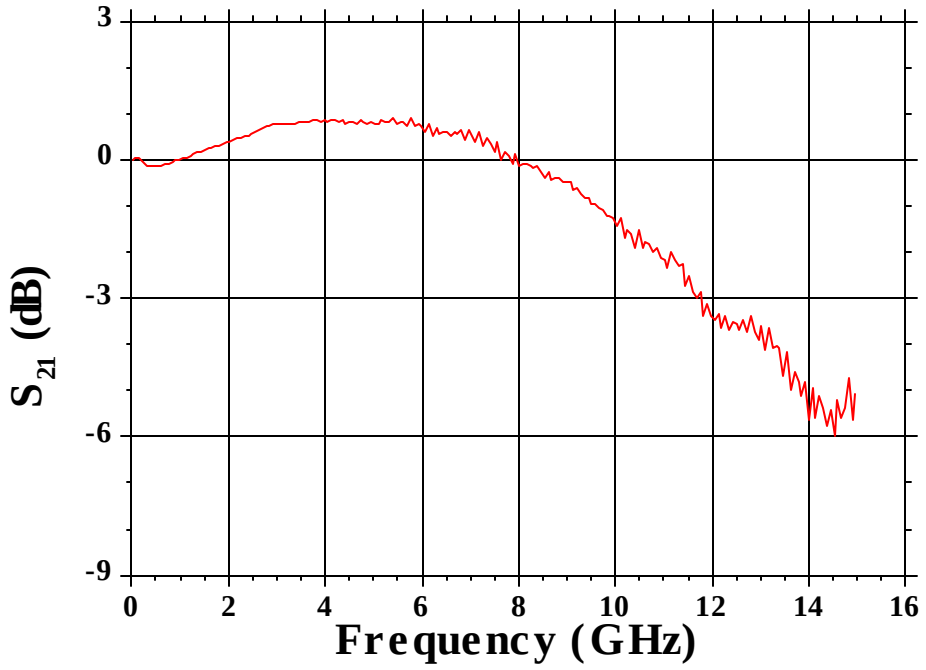
Room Temperature

3dB Bandwidth Exceeding 20GHz

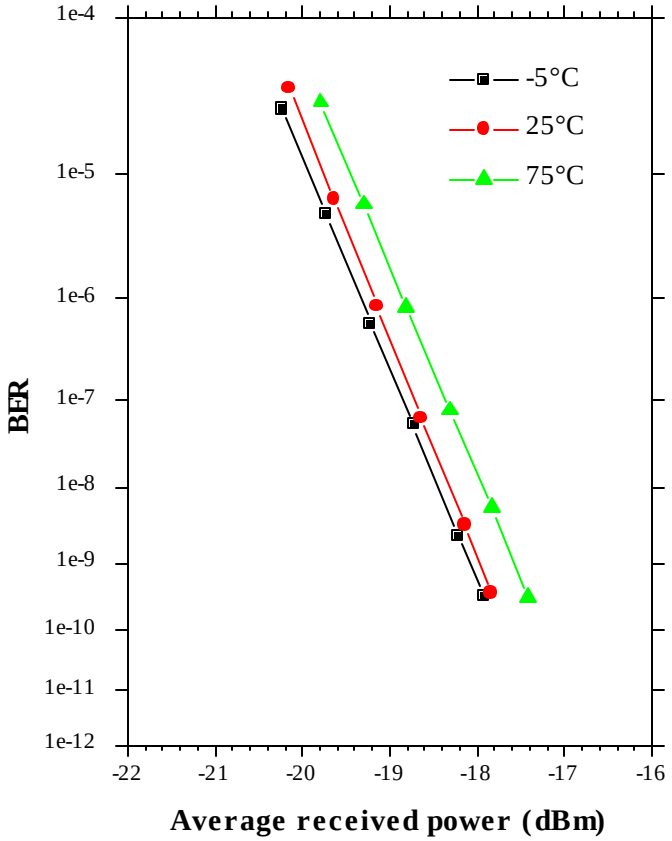
Why PIN-Based Receivers?

- Consistent with 0 ~ 40 km link designs
- Mature photodiode technology
- High speed ICs available in low cost technology
  - **SiGe**
  - **GaAs HBT**

Receiver Frequency Response



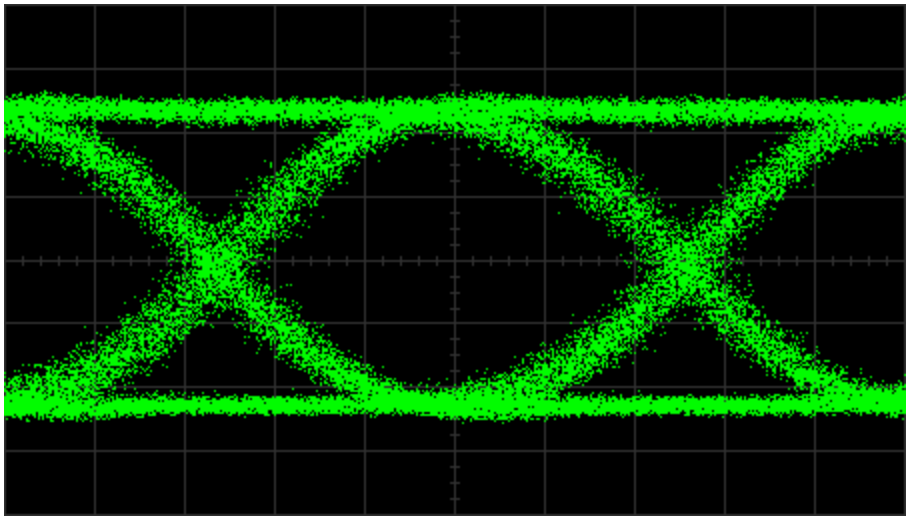
Receiver Sensitivity



Data at 10 Gb/s

Expect only 1dB degradation at 12.5 Gb/s

12.5 Gb/s Receiver Eye Diagram



Conclusion

- DFB lasers and PIN photodiodes are manufacturable components that can well serve the needs of 12.5 GBaud serial links