

Optical Components for 12.5 GBaud Serial Links

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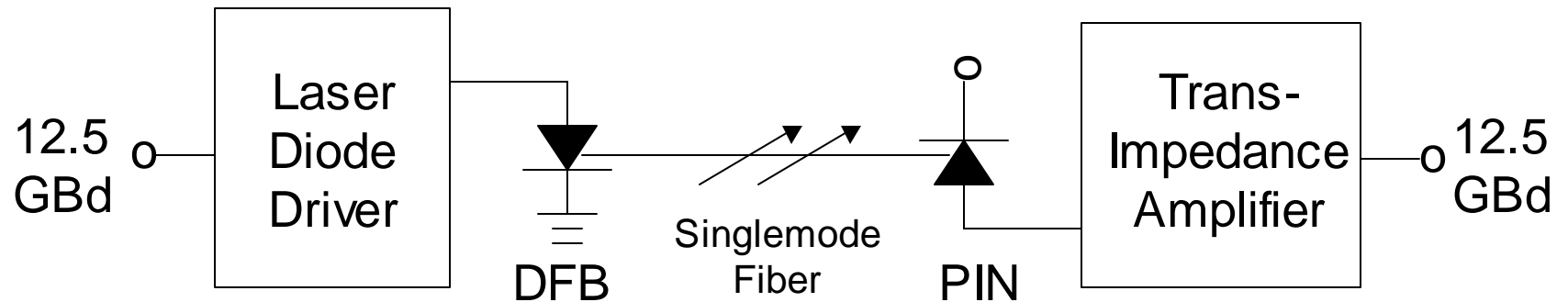
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Why Serial Links?

- 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

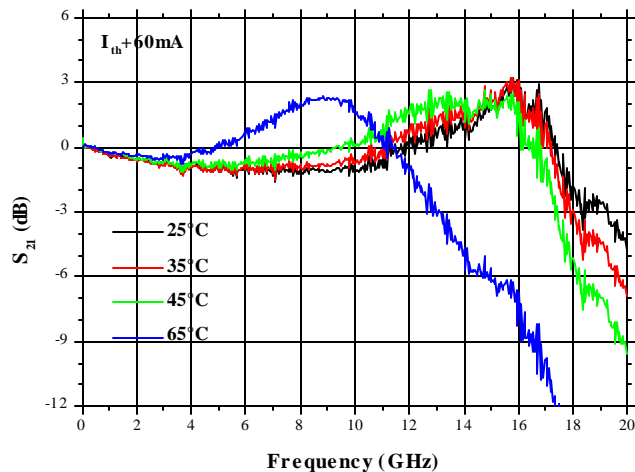
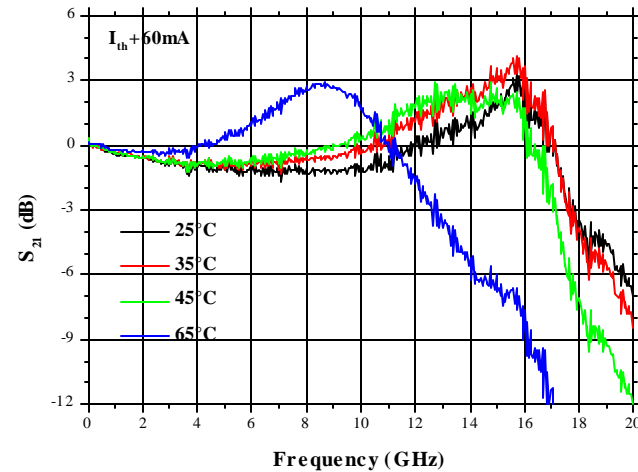
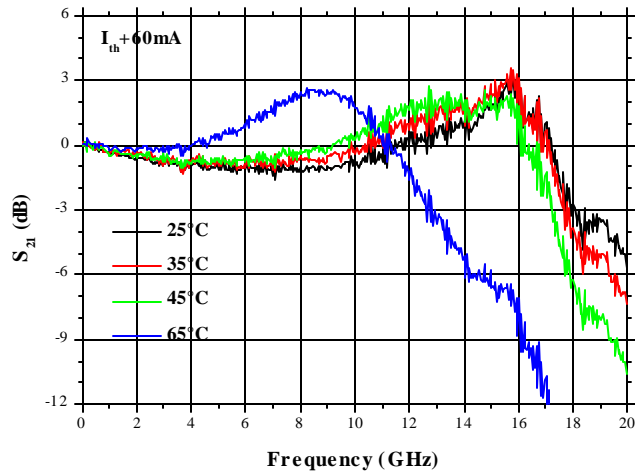


Serial PMD

Why DFB Lasers?

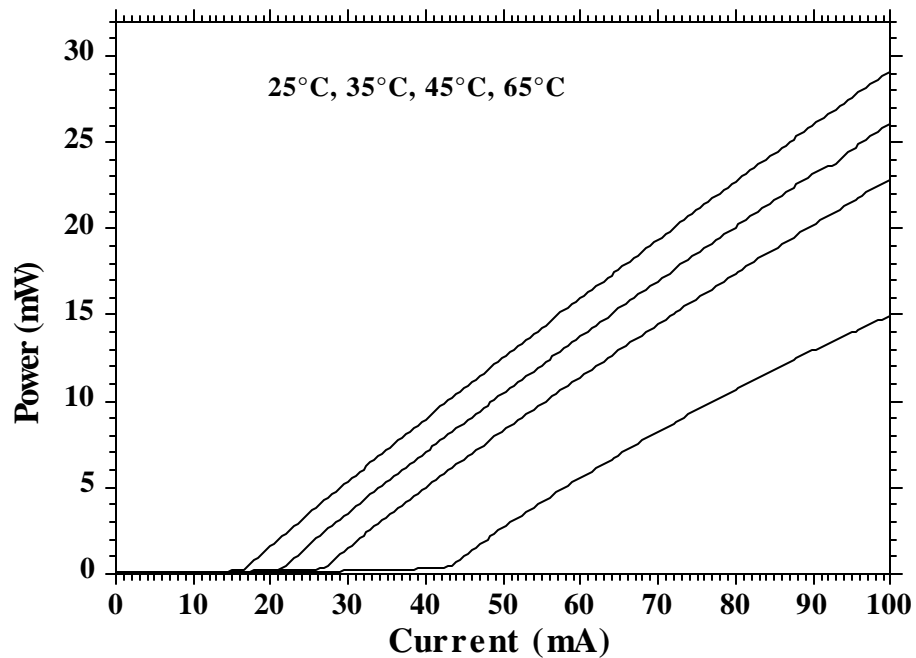
- Useful for all distances up to and including 40 km
 - **No mode partition noise penalty**
 - **No dispersion penalty**
 - **Standard component resulting in economy of scale**
- Operation at 1310 nm
 - **Extendable to 1550 nm for longer links**
- Long history of use in high speed applications
- No “Speed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

Laser Frequency Response over Temperature

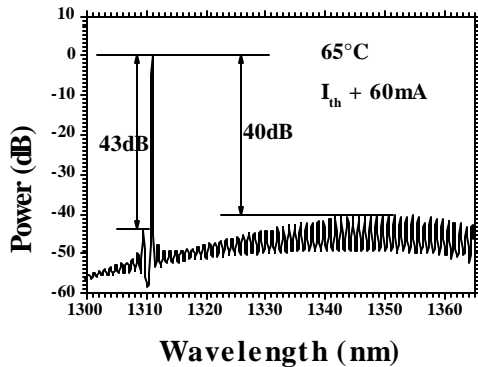
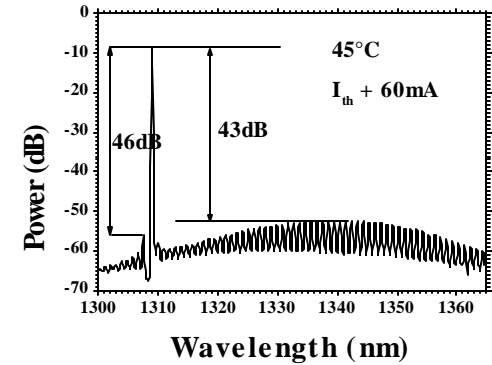
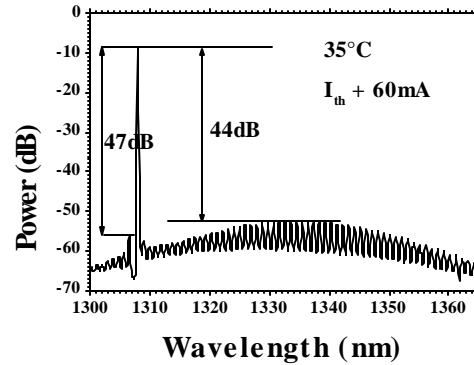
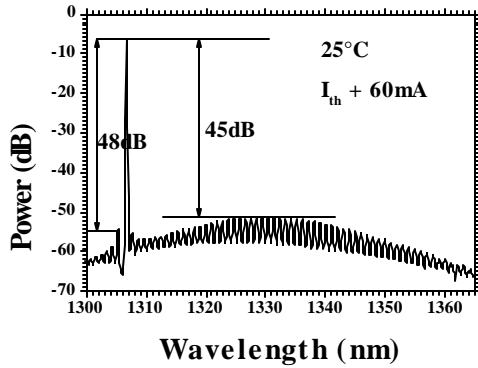


3dB Bandwidth Exceeding 12 GHz at 65°C

Laser Optical Power vs Current over Temperature



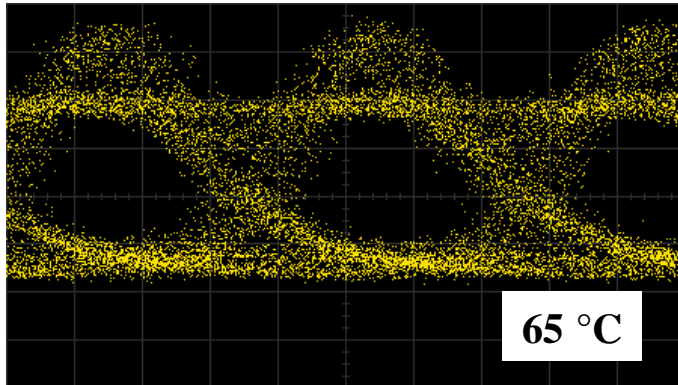
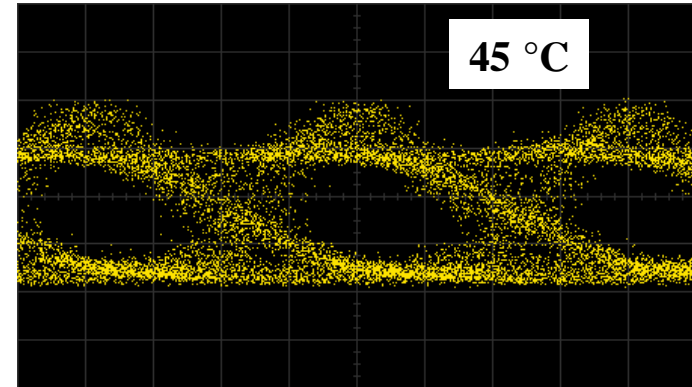
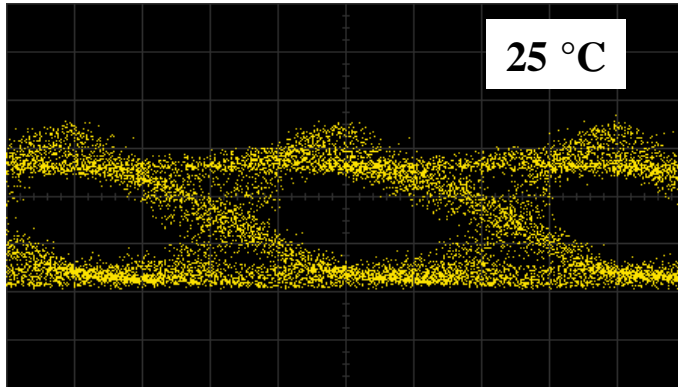
Laser Spectrum over Temperature



Single mode over temperature

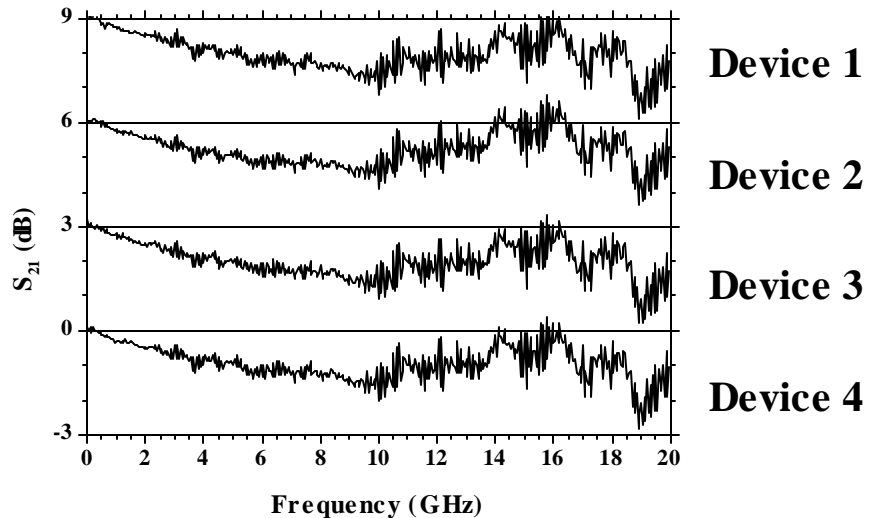
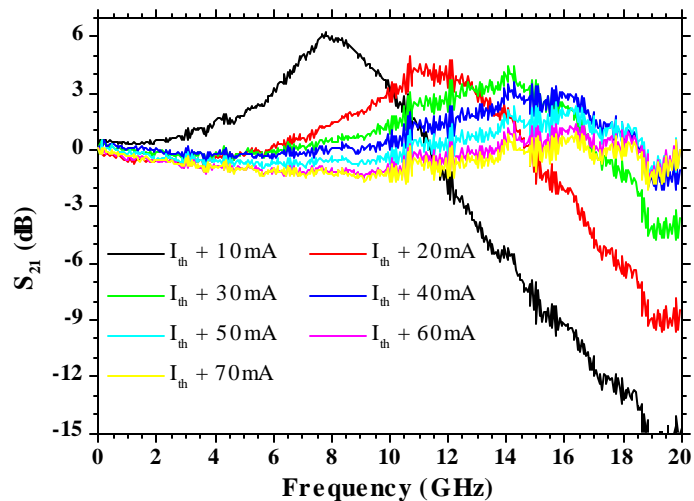
High Side Mode Suppression Ratio

12.5Gb/s Laser Eye Patterns over Temperature



Modulation = 40mA peak to peak
Extinction Ratio \gg 8.2dB

Laser Frequency Response on High Speed Carrier



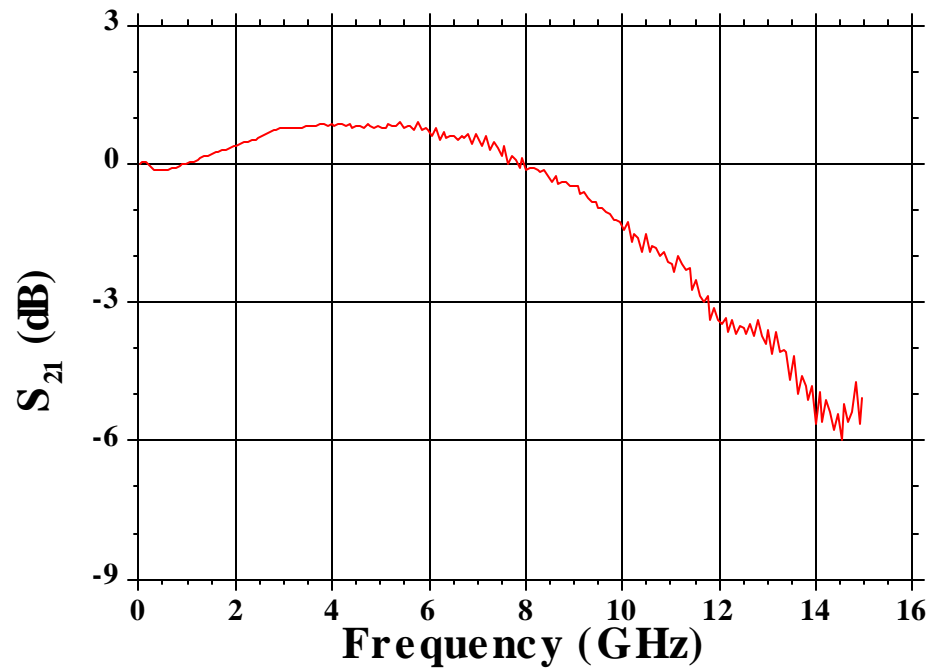
Room Temperature

3dB Bandwidth Exceeding 20GHz

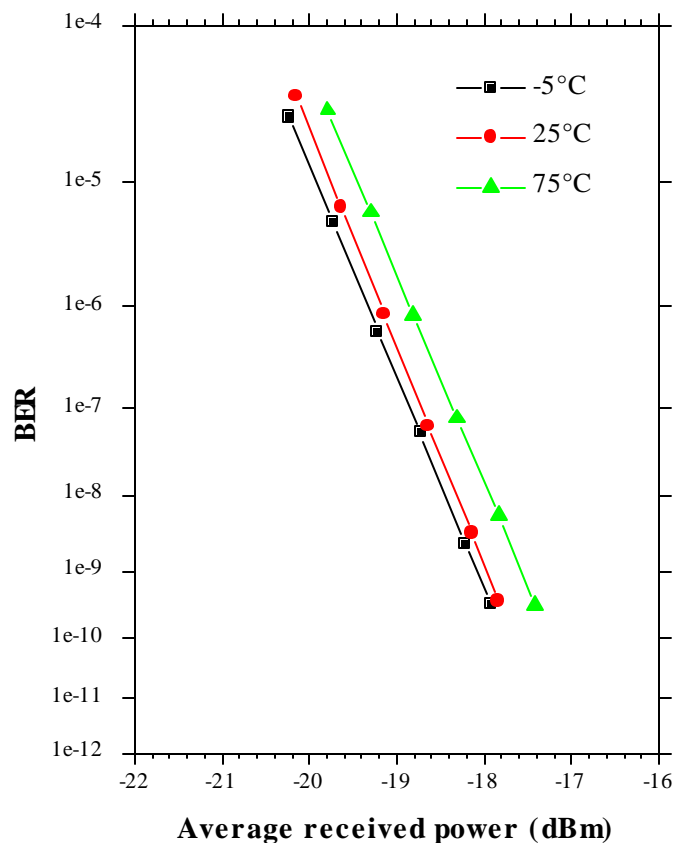
Why PIN-Based Receivers?

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

Receiver Frequency Response



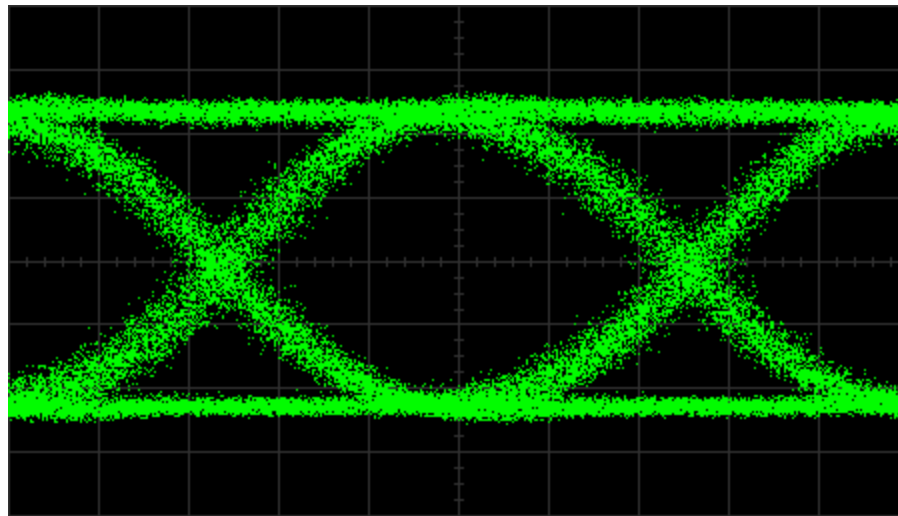
Receiver Sensitivity



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