Infineon Fiber Optics

10 Gb/s serial -

A Feasible Low Cost Technology

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Outline

- Status of Technology
- Measurement Results
- Outlook
- Conclusion

Status of Technology

- Components available:
  - Directly modulated uncooled DFB laser (originally designed for 2.5G application) used in high volume standard TO package
  - Laser diode driver
  - Transimpedance amplifier
  - Chipset Mux/Dmux 4:1 under development (16:1 available)
- TO and laserdiode driver chip mounted on ceramic substrate,

  (Next step: IC assembly on standard PCB)
- First measurement performed for 10 and 12.5Gb/s
- Temperature range for evaluation 0…70°C

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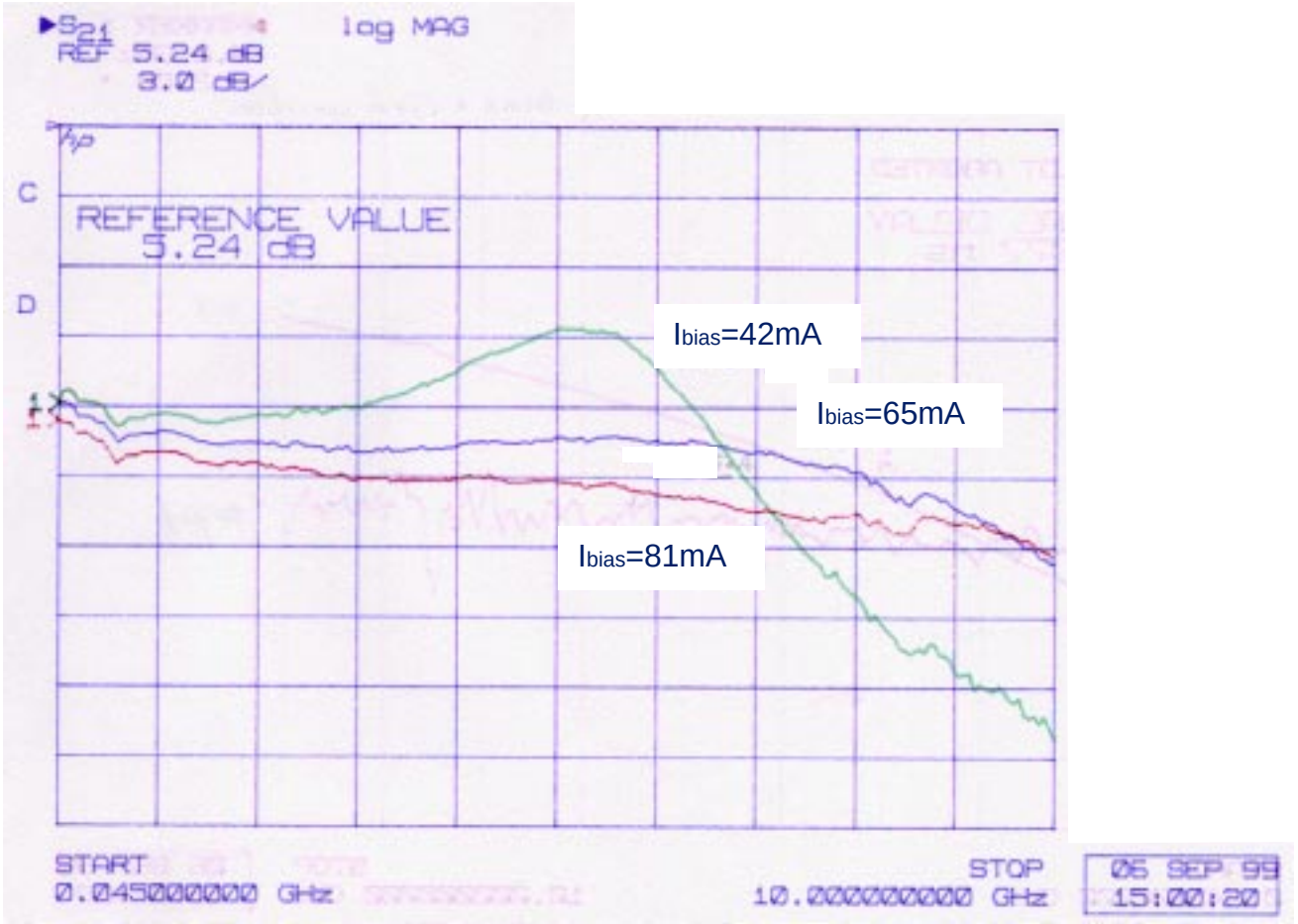
Measurement Results

Frequency Response vs. I_{bias} at 25°C



Measurement with TO-canned 2.5Gb DFB Laser

The perfect optical link!

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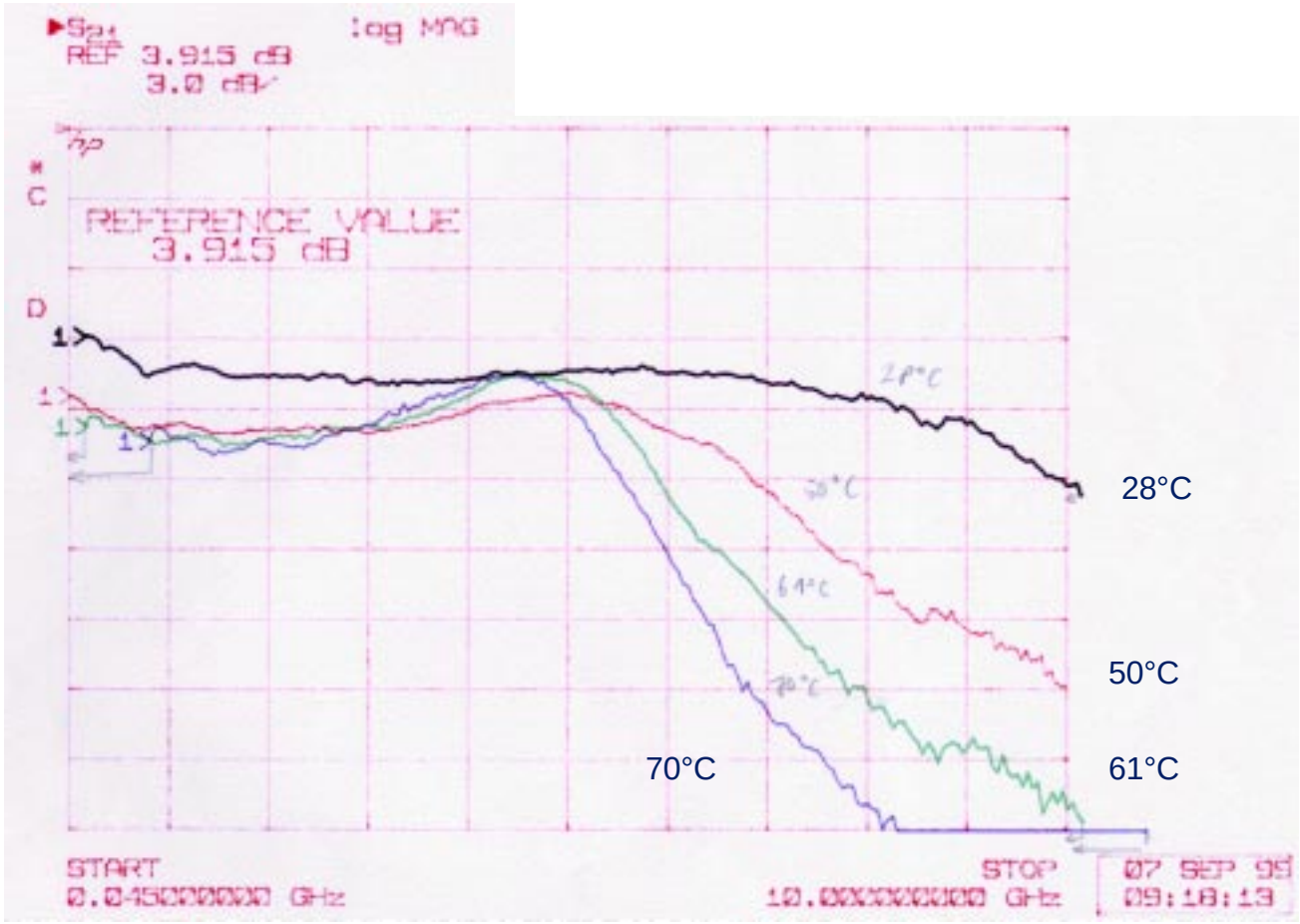
Measurement Results

Frequency Response vs. Temperature (I_{bias}=65mA)



28°C

50°C

61°C

70°C

Measurement with TO-canned 2.5Gb DFB Laser

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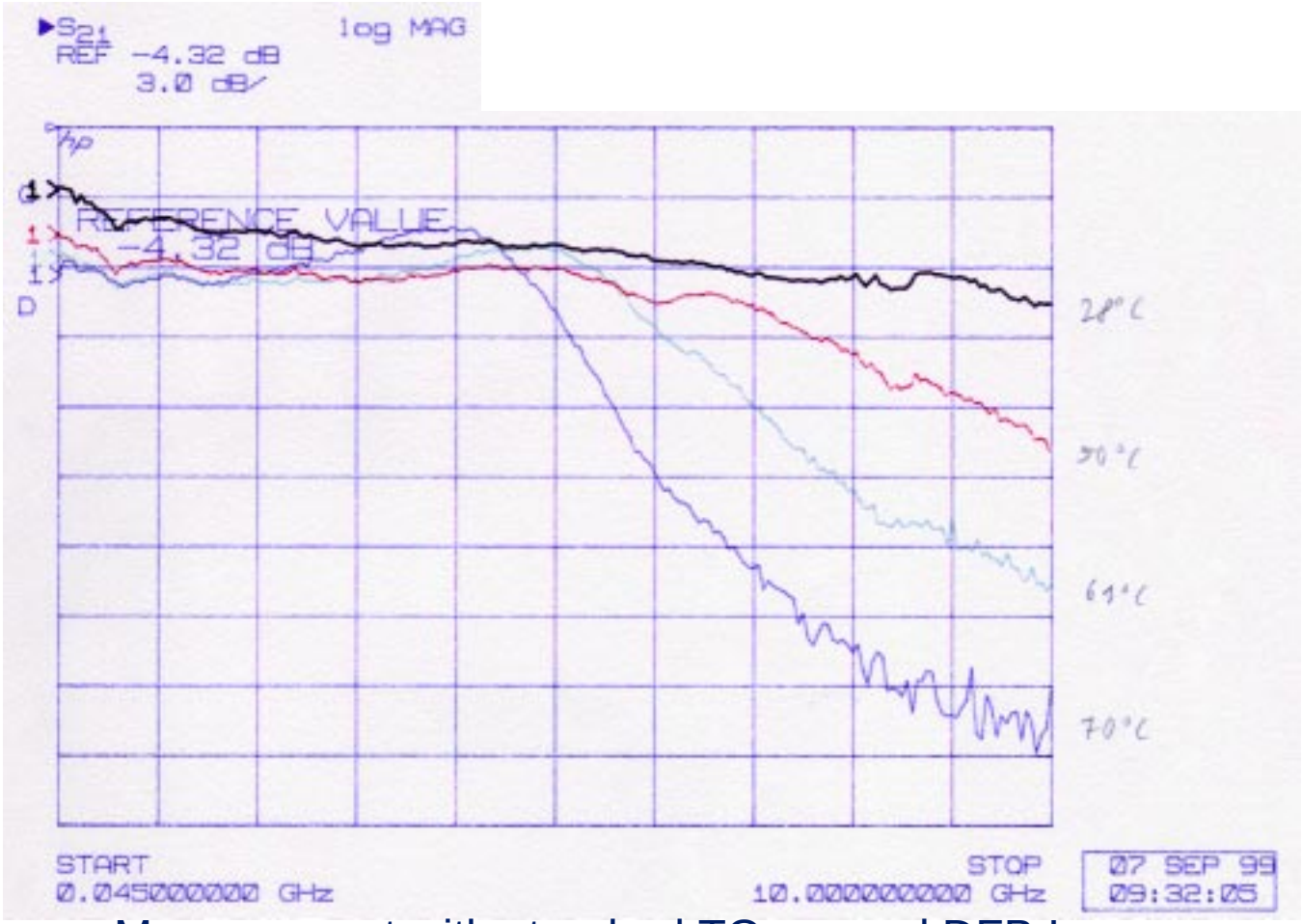
Measurement Results

Frequency Response vs. Temperature (I_{bias}=81mA)



Measurement with standard TO-canned DFB Laser

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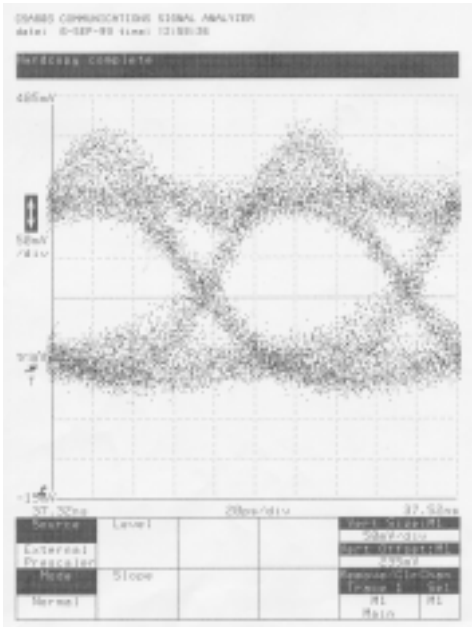
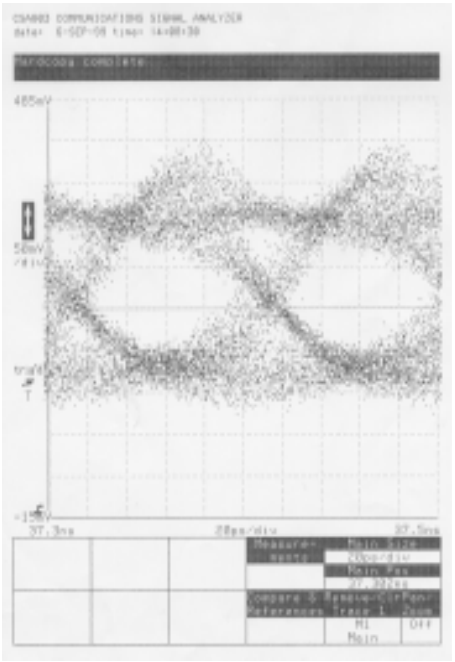
Measurement Results
10Gb/s at 0…70°C (preliminary test setup)

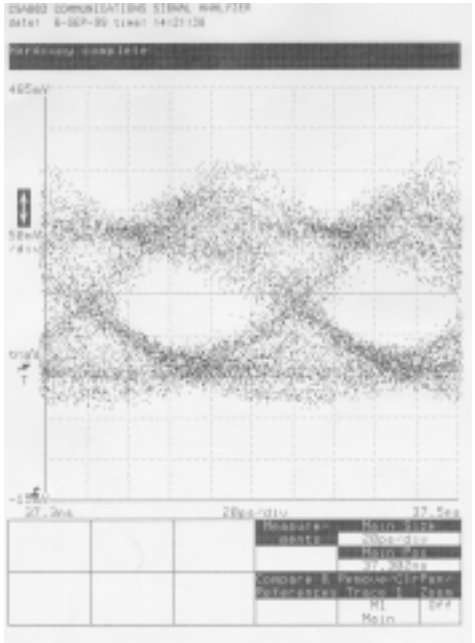
26°C



62°C



70°C



Measurement with standard TO-canned DFB Laser

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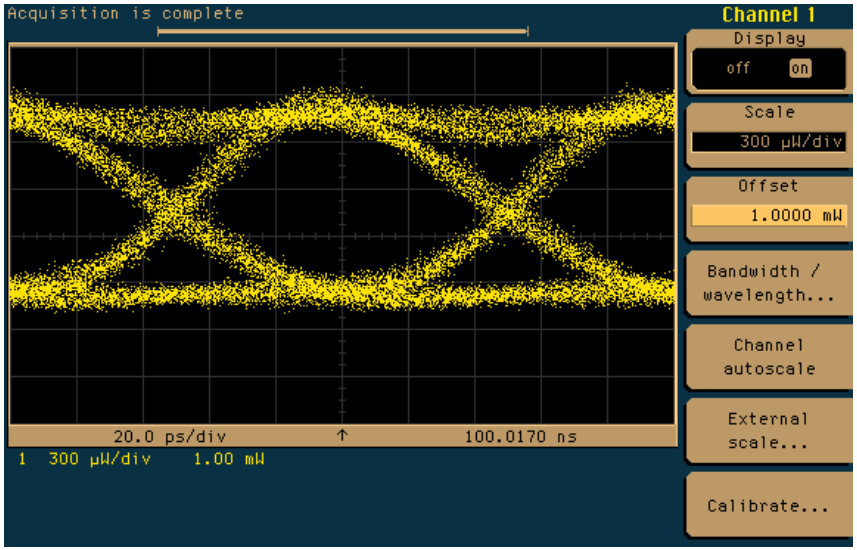
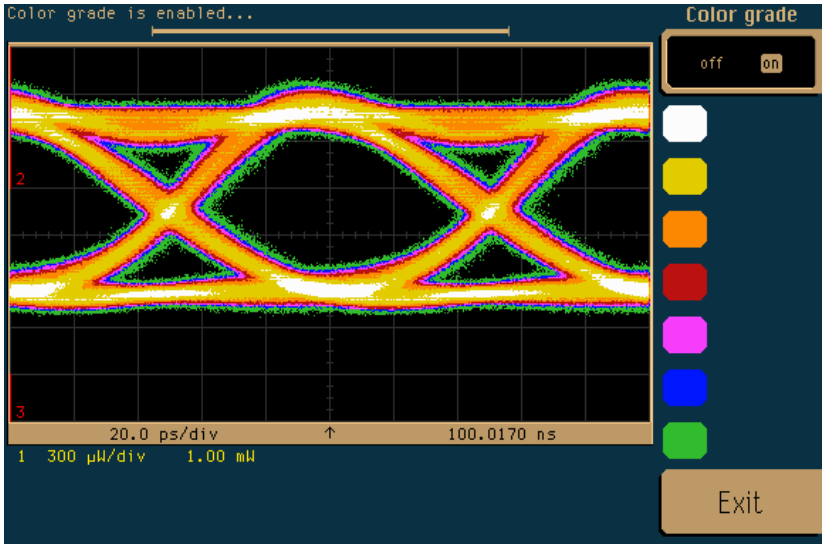
Measurement Results

10Gb/s (optimized test setup)





10 Gb/s becomes Reality !

Measurement with standard TO-canned DFB Laser

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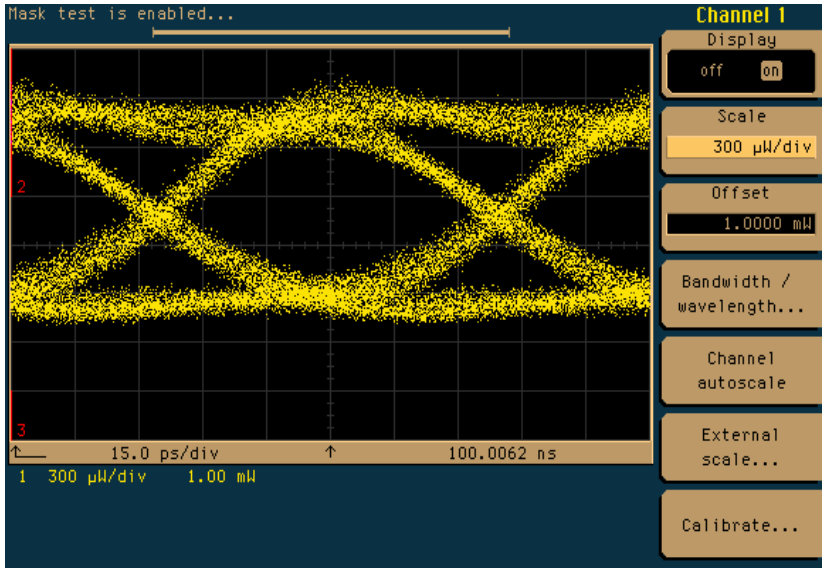
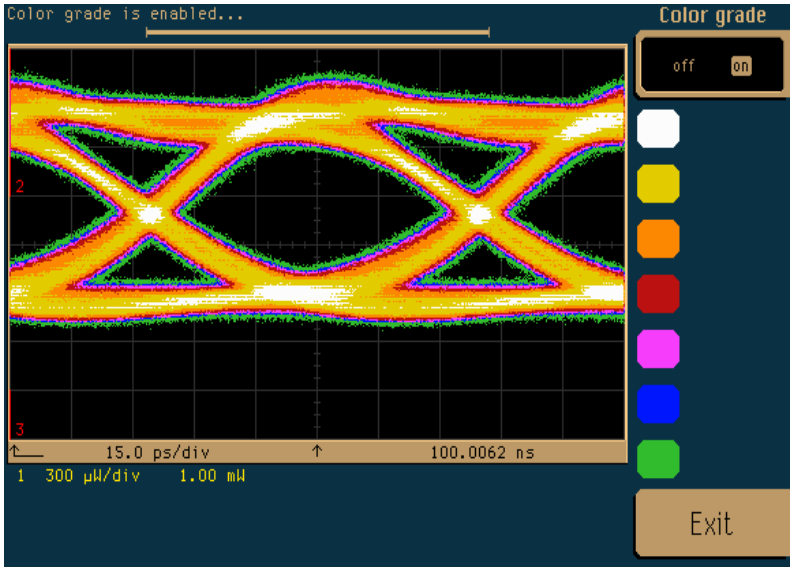
Measurement Results

12.5Gb/s (optimized test setup)





And even 12.5 Gb/s is Reality !

Measurement with standard TO-canned DFB Laser

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Measurement Results
Summary

- Technology proven in the temperature range 0…50°C ambient with a plain 2.5Gb/s DFB laser in low cost package

- Performance improvement for higher temperature targeted with new laserdiode design

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Outlook

1.3µm DFB Laserdiodes for 10Gb/s Applications

10Gb/s-relevant data from commercial quality samples

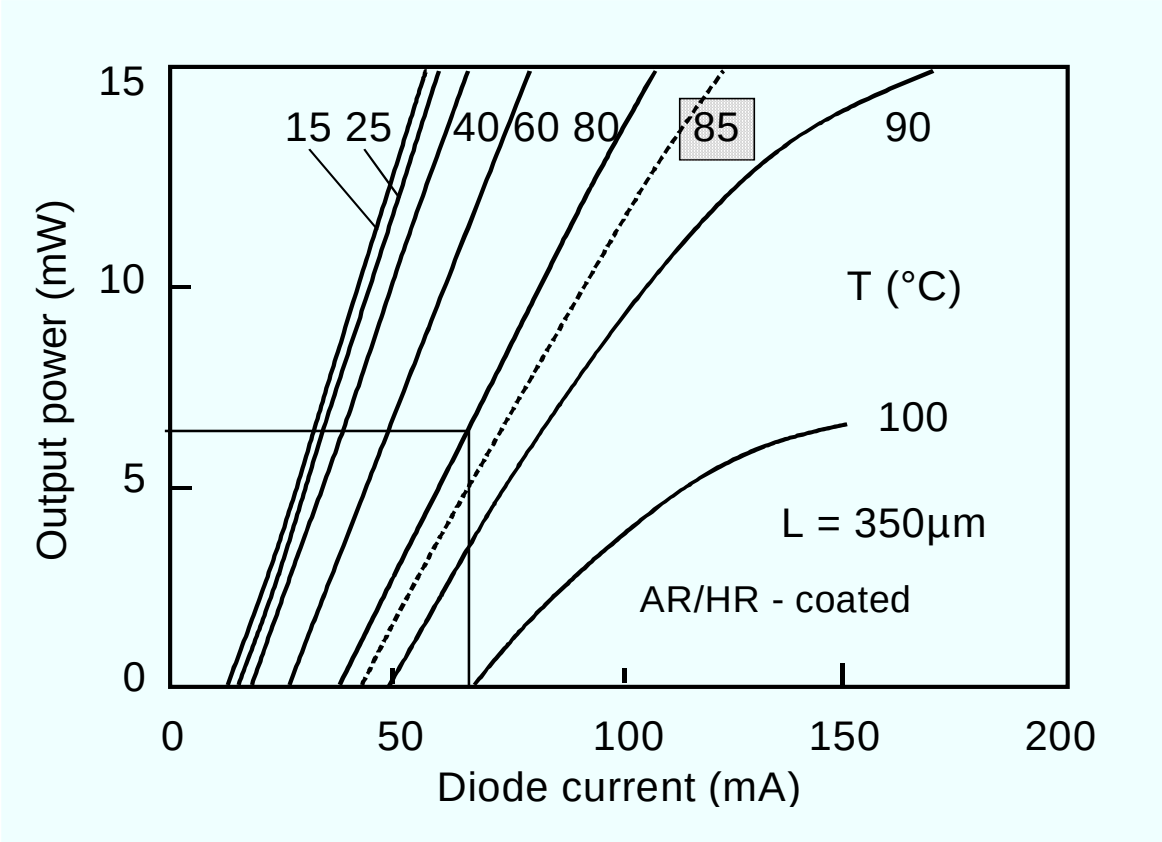
(No. of samples: 20)

- 3dB-bandwidths throughout > 10GHz for I - Ith > 60mA
- Maximum 3dB-bandwidths ∈ [11.5GHz, 14GHz]
- RIN-level ≤ -130dB/Hz for I - Ith > 10mA

- Chip-redesign under way: Samples in 4Q99 available

Outlook

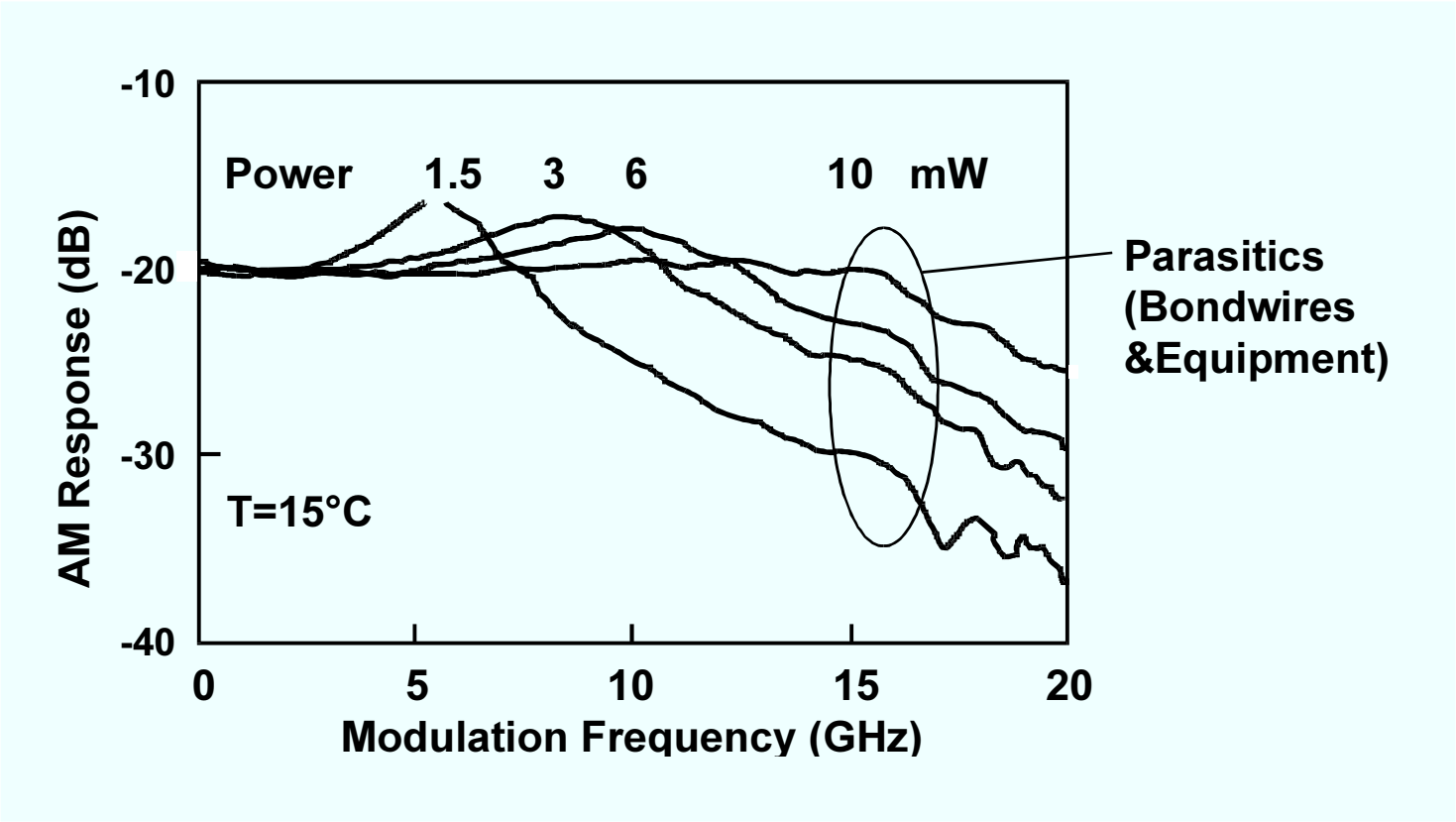
1.3µm DFB Laserdiodes for 10Gb/s Applications



High Temperature Operation of 1.3µm CC DFB Laser

Outlook

1.3µm DFB Laserdiodes for 10Gb/s Applications



Small-Signal Response of 1.3µm CC-DFB Laser

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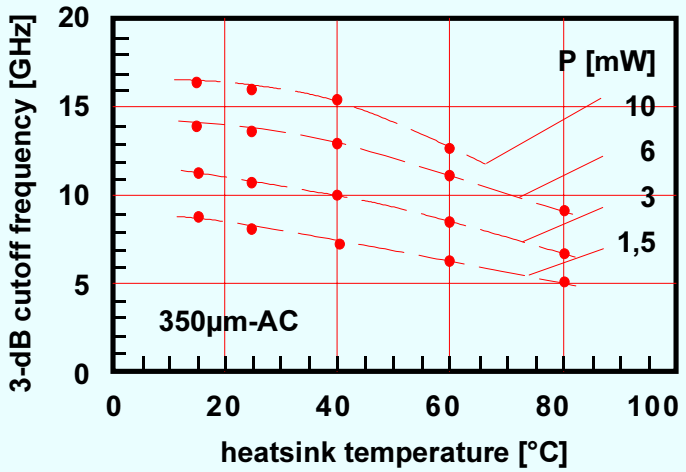
Outlook

1.3µm DFB Laserdiodes for 10Gb/s Applications

1.3µm MQW-RWG Laserdiodes

CC-DFB structure



5x6nm SL-MQW

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Outlook

1.3µm DFB Laserdiodes for 10Gb/s Applications

New laserdiode will perform:

- Higher bandwidth
- Improved performance at high temperature
- Lower laser current

Conclusion 1

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10G serial:

- Proven as reasonable solution, also for 12.5Gbd
- With low cost capability due to lowest complexity and lowest number of components
- With best time to market approach

Conclusion 2

Therefore:

- We suggest that electrical interface activities should support 10G serial
  - Otherwise Ethernet would restrict to fewer applications (excluding MAN,WAN)
- By the use of single mode fiber - 10G serial could cover all applications from 1m to 40km and beyond)
- Single mode fiber will be necessary for future applications and high bandwidth links anyway

  - why not use it now?

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⇒ 10G serial -

a chance for one single low cost solution

covering all applications!