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**Green transmitter LEDs for  
125 Mbit/s data transmission on  
PMMA-POF**

**Hans Kragl**

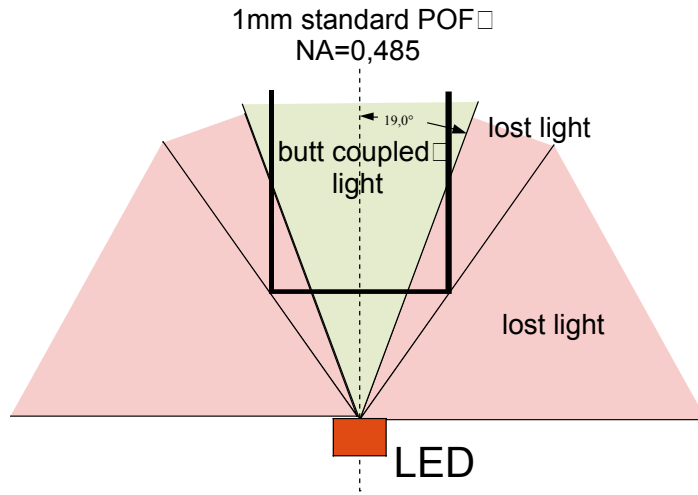
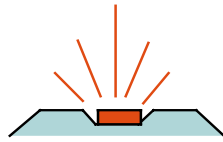
DieMount GmbH

Konrad-Zuse-Straße 14

99099 Erfurt

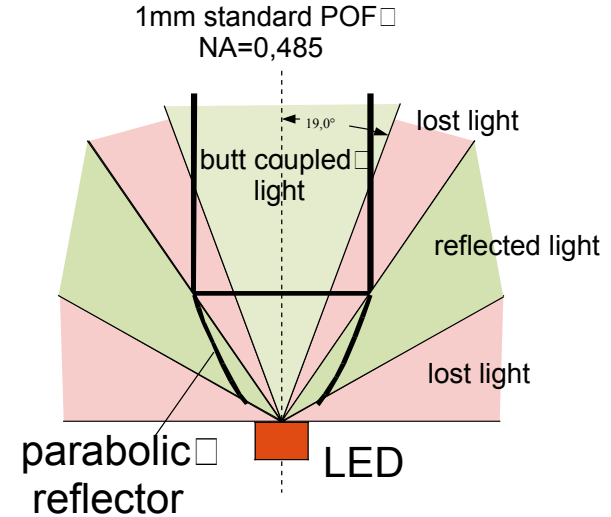
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March 2003



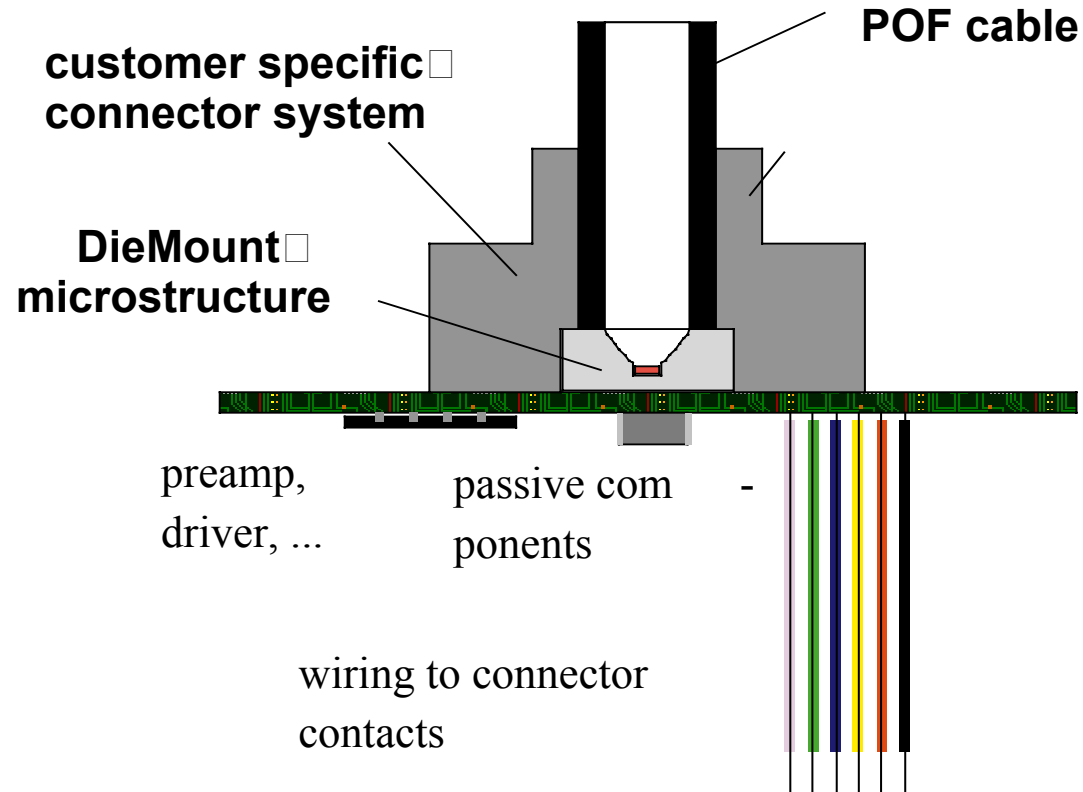
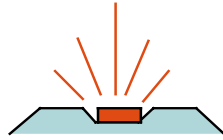
***Butt coupling***

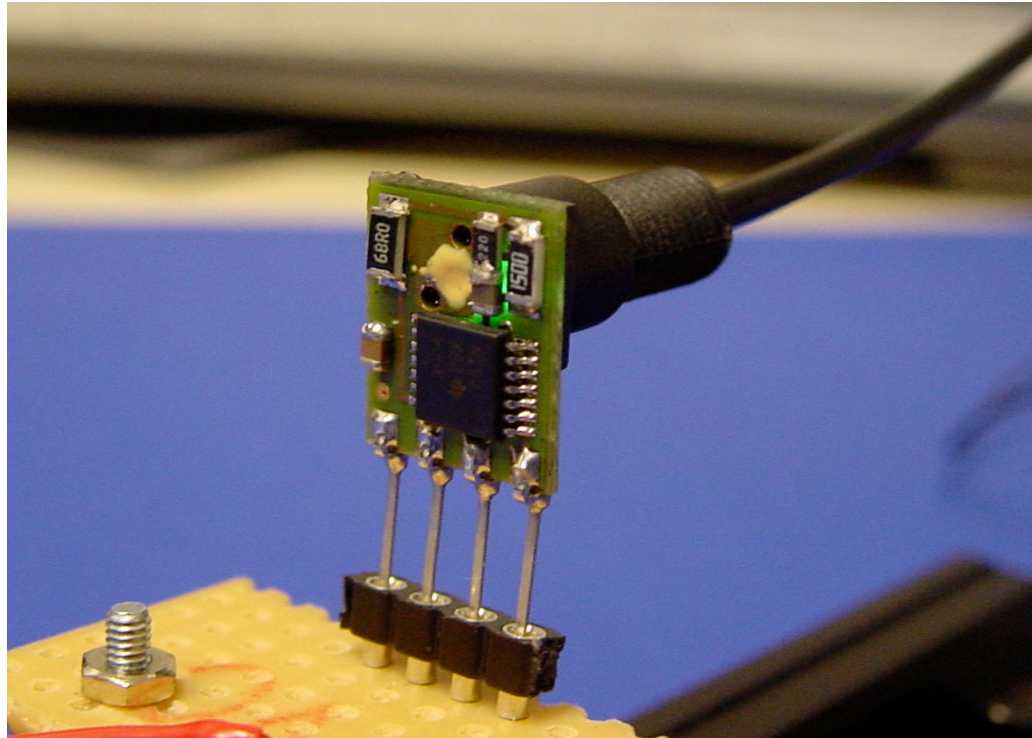
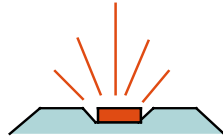
Efficiency:	11% (9.5dB)
Light loss:	89%



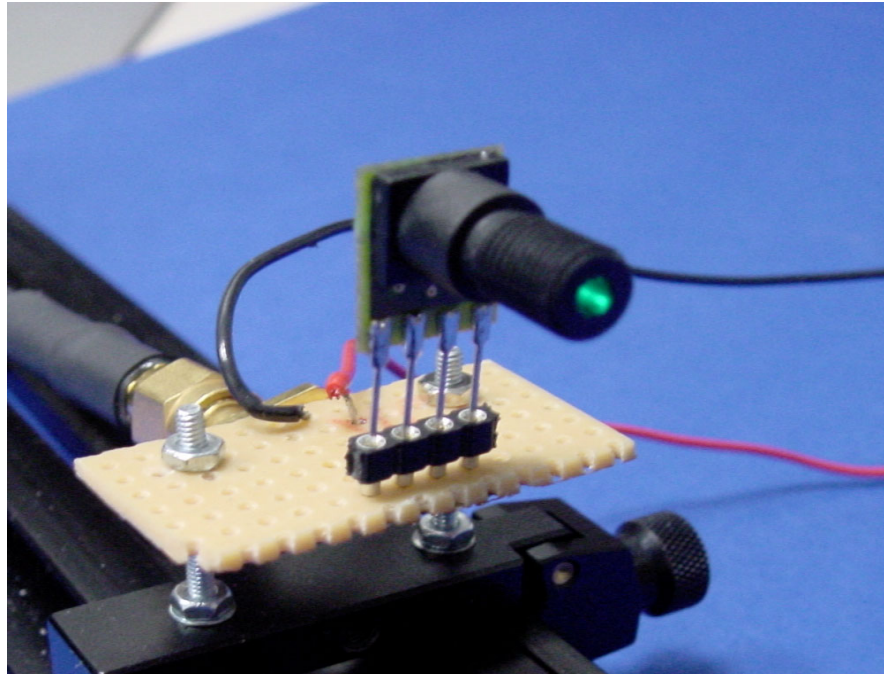
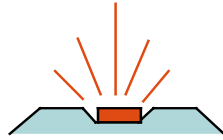
***Micro reflector coupling***

Efficiency:	58% (2.4dB)
Light loss:	42%
Gain to butt coupling:	7.1dB

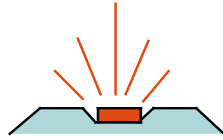




Optical connector in cooperation with:  
**Optocomponents GmbH, Ettenheim**

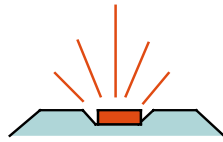


Optical connector comprises screw thread joint for sealed POF cable connection.

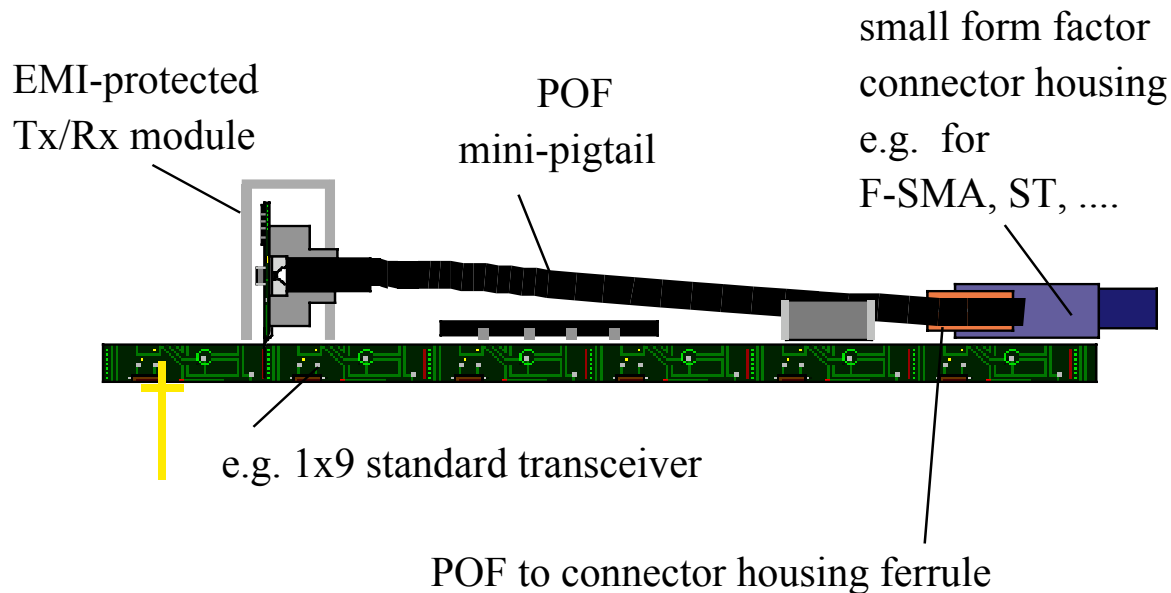


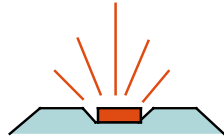
<i>Wave-length [nm]</i>	<i>Spectral width [nm]</i>	<i>Data-rate [Mbit/s]</i>	<i>Typ. link distance [m]</i>	<i>Optical power in <u>standard POF</u> [dBm]</i>
645	16	125	< 100 m	+ 1
520	50	50	~ 200 m	+ 1
520	55	125	> 100 m	- 3.5 dBm
520	40	> 300	system tests necessary	- 6.5 dBm

**Optical power figures given for „on“-state and A-selected modules.**



Mini-pigtail solutions allow the easy adaptation to small form factor connector housings.

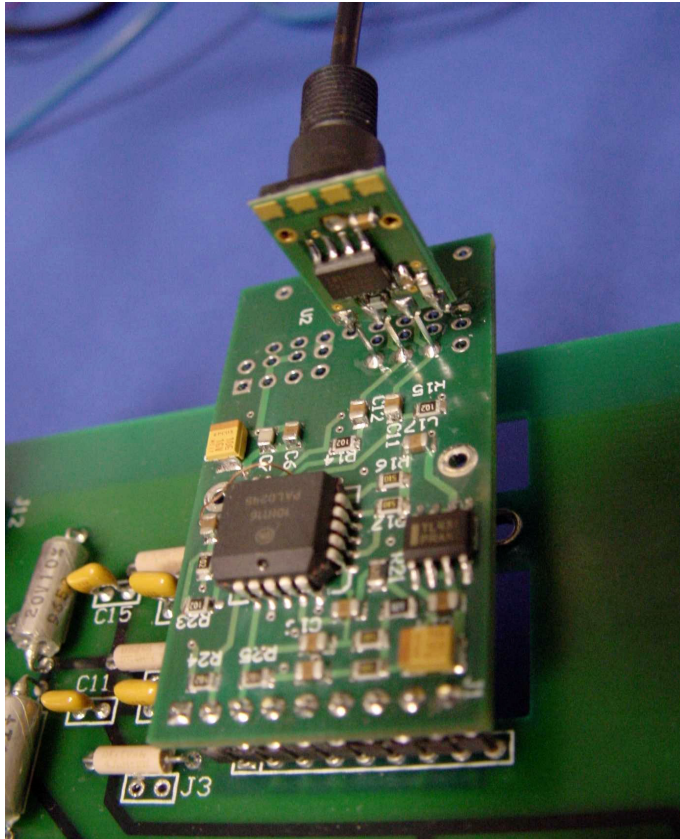
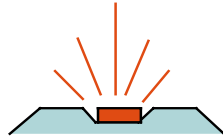




Due to glue connection in the transceiver module the optical power in the mini-pigtail is increased by 0.9 dB.

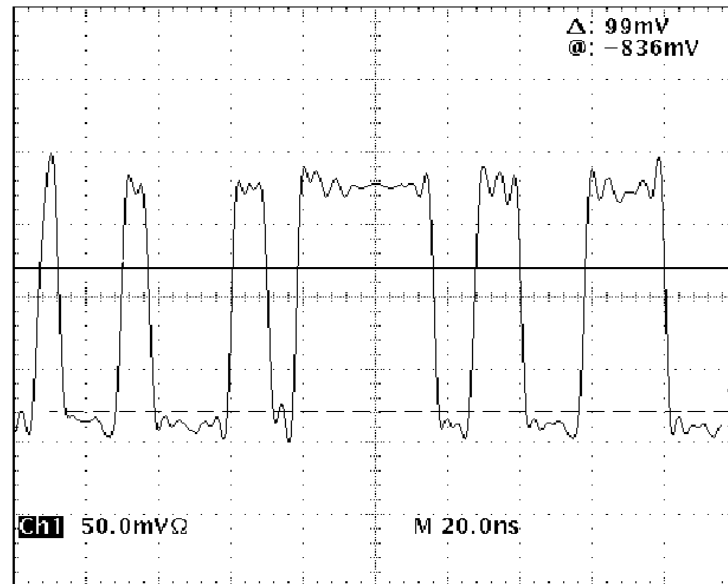
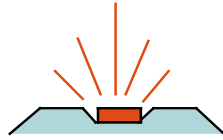
Optical power in POF, if POF is connected to transmitter module	Optical power in POF, if mini-pigtail POF is glued to transmitter module	Connector attenuation	Optical power in transmission cable
X dBm	X dBm + 0.9 dB	Y dB (0.6 dB < Y < 1.5 dB)	X dBm + 0.9 dB - Y dB

The mini-pigtail design generates a gain/loss of  
***0.9 dB - connector loss***  
 in comparison to a direct connection system.



## Test Set-Up at POF AC, Nürnberg:

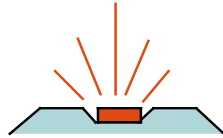
- DieMount PIN/TIA receiver module
- Agilent standard postamplifier (comprises 10H116)
- 520 nm transmitter for 125 Mbit/s
- 125 Mbit/s 4B5B code signal
- 100 m AC 1000 (i) Nichimen, LowNA POF (NA = 0.25)
- Bit error rate tester



Optical power at receiver: **-21 dBm**

0% bit error rate: **up to -28 dBm**

All system investigations done by POF AC, Nürnberg.



- Evaluate system limits at 520 nm:
  - Maximum transmission distance
  - System margin in temperature and lifetime range
  - Other types of POF? (standard, different LowNA, ...)
- Test system at 650 nm
- Improve receiver circuitry:
  - PIN/TIA module for -35dBm sensitivity?
  - Specialized postamp circuits
- System optimization, e.g.:
  - Tx: Modulation and peaking
  - Rx: Electronic dispersion compensation
  - POF: Mode filters?