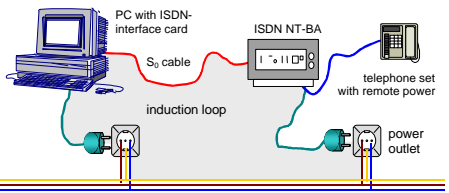


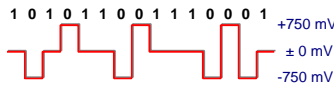
Record 1/2 km Transmission Length with PMMA based SI-POF for ISDN S₀-Bus Application

O. Ziemann, T-Nova GmbH, Deutsche Telekom, TZ, Goslarer Ufer 35, 10589 Berlin, Tel./Fax.: 030 3497 4442/-4443, e-mail: olaf.ziemann@telekom.de
 L. Giehmann, T-Nova GmbH, Deutsche Telekom, TZ, Goslarer Ufer 35, 10589 Berlin, Tel./Fax.: 030 3497 4428/-4429, e-mail: lutz.giehmann@telekom.de

Typical S₀-bus configuration with NT-BA, Personal Computer and phone set

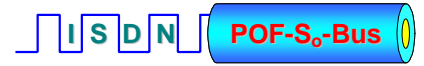


ISDN S₀-bus interface



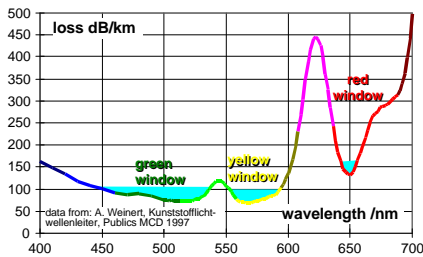
- ISDN S₀ bus work with 192 kbit/s
- 2 x 64 kbit/s (2 B) + 16 kbit/s (D) + 48 kbit/s
- ternary signal "-1"; "0" and "+1"
- modified AMI code
- with ±750/0 mV active state (±600/0 mV stand by)
- S₀ bus works with 2 pair copper cables
- including 40 V remote power supply

Basic concept for S₀-bus

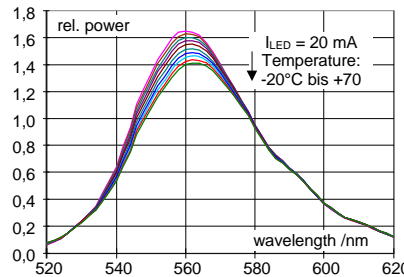


- Optical transmission system
- Duplex SI PMMA POF
- frequency modulation
- Optional electrical/optical multiplexing
- no remote powering (only for active CPE)
- operation with telco power supply at NT site

PMMA POF attenuation windows



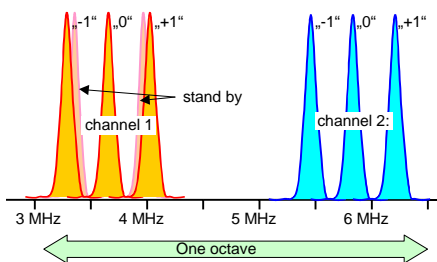
Temperature dependent spectra of 560 nm GaN-LED



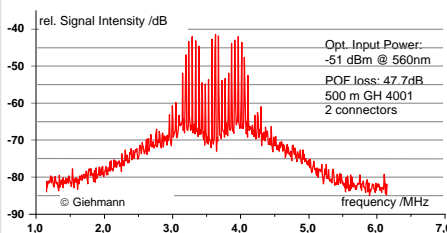
Frequency modulation of the LED

- independent of non linear P-I-characteristic
- independent of the POF link loss
- AC coupled receiver possible
- independent of receiver nonlinearities
- simple three-stage modulation
- option for electrical multiplexing
- use of VCO at the transmitter
- use of frequency discriminator at the receiver
- simple detection of active/stand by state

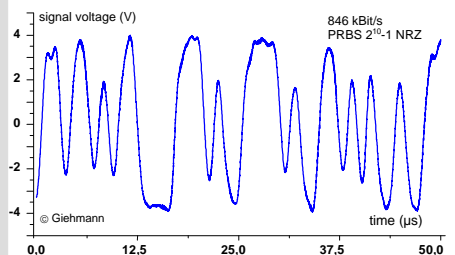
ISDN two channel allocation



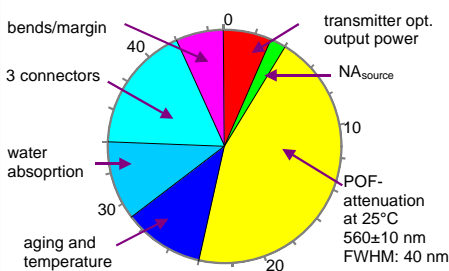
Receiver ISDN signal spectrum



NRZ signal after demodulation



Power budget for 250 m ISDN link



Application for POF in ISDN and low bit rate systems

- ☆ Electrical potential free connections of end user devices with an own power supply in private environment.
- ☆ Potential free connections of ISDN devices in high security business areas (e.g. areas with danger through explosive materials).
- ☆ Connection between nodes without common ground potential (e.g. different buildings), if a conductive connection is not allowed.

Conclusion

- ☆ self made easy installation
- ☆ potential free connection with no risk for induction loops (lightning protection)
- ☆ low weight and low space consumption
- ☆ no electromagnetic interference
- ☆ option for upgrade to high speed systems like IEEE1394 in the future without changing the cable
- ☆ highest transmission length ever reported for step index PMMA POF
- ☆ operation in the absolute POF loss minimum
- ☆ excellent parameters of the LED (low temperature coefficients for power and wavelength)
- ☆ option for optical and/or electrical multiplexing for two channel/one fiber bi-directional transmission
- ☆ product development is in process