Optical characteristics of automotive grade plastic optical fiber

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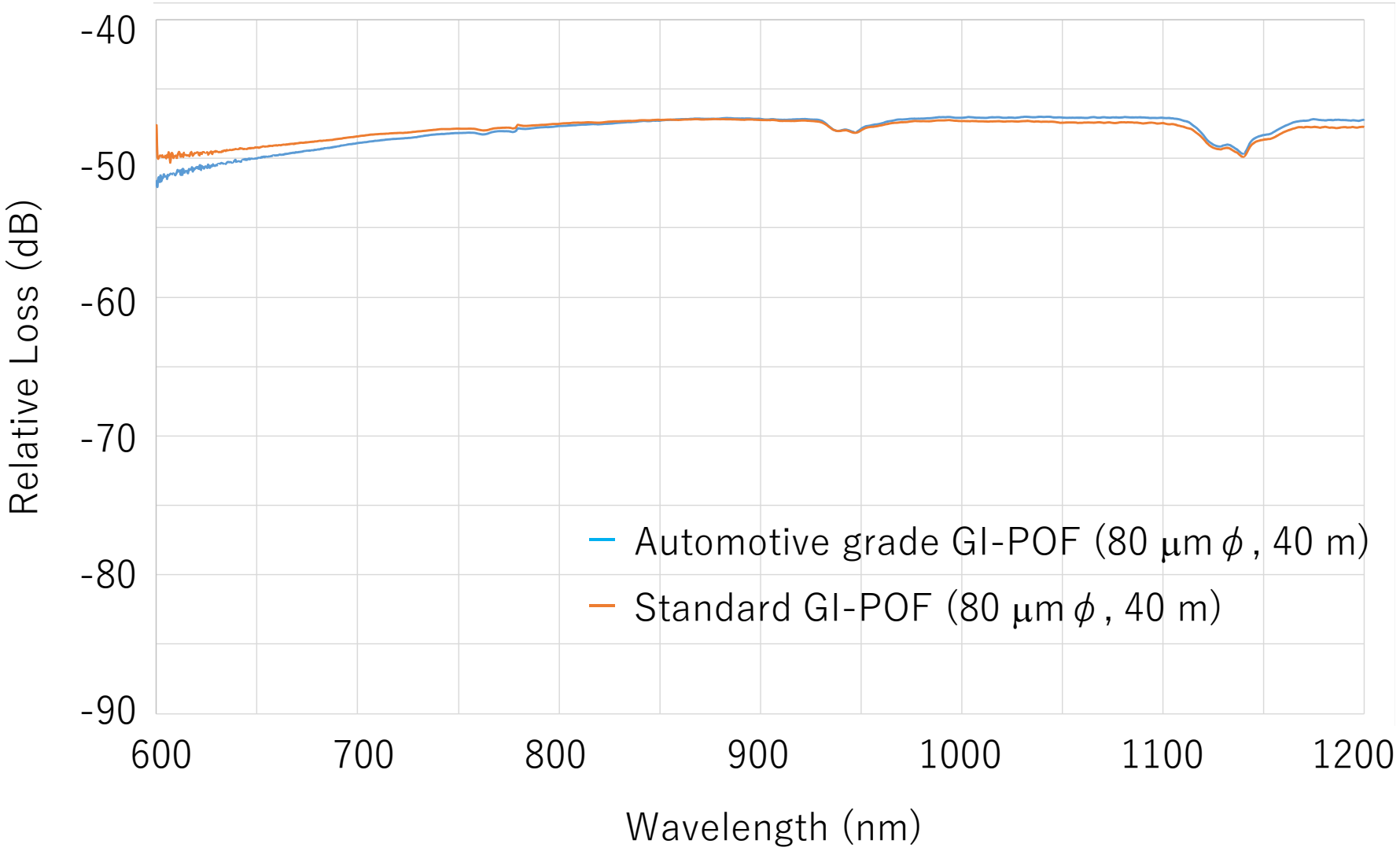
Introduction

- Optical characteristics of an automotive grade GI-POF need to be measured.
- We present optical characteristics of heat-resistant GI-POF.
- Discussions are underway with a core size of 55 μm for automotive grade, and standard GI-POF has core size of 55 μm and 80 μm. A larger core has an advantage in terms of coupling. However, the larger core is disadvantageous for coupling with 25 Gbps PD. This time we investigate the possibility of increasing the core size.

Heat-resistant GI-POF

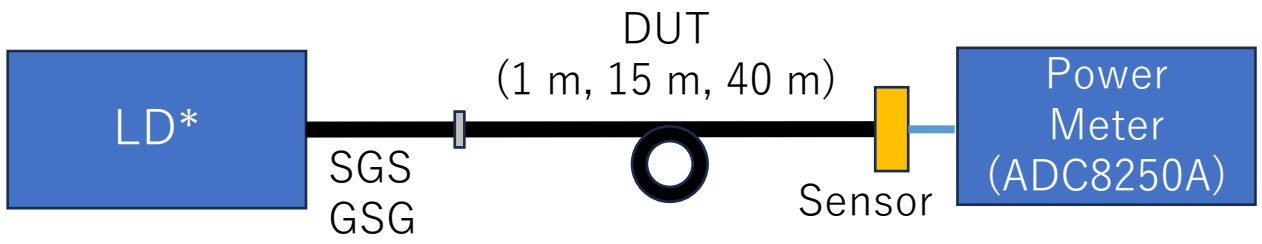
- Core/Cladding: 80/490 μm
- NA: 0.23
- Wavelength: 850 nm, 1060 nm
- Propagation loss: ~ 50 dB/km

Transmission spectra of GI-POFs

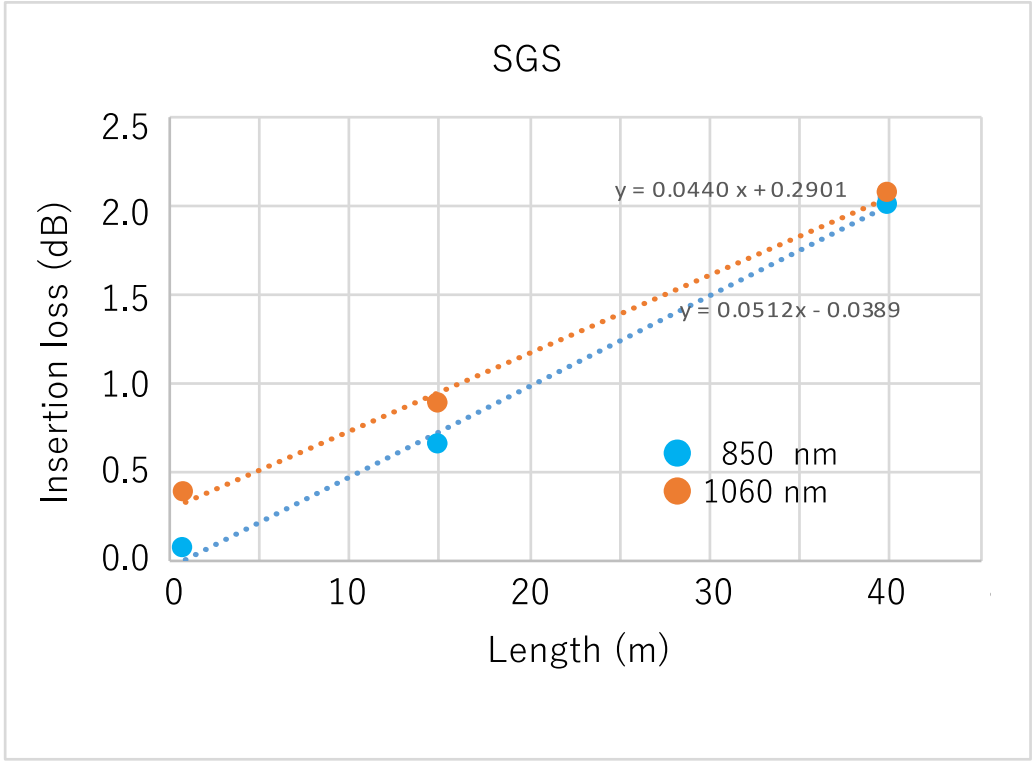


Propagation loss of automotive grade GI-POF

Measurement setup



*850 nm (Precise Gauges LDS1003_850nm)
1060 nm (Precise Gauges LDS1003_1060nm)

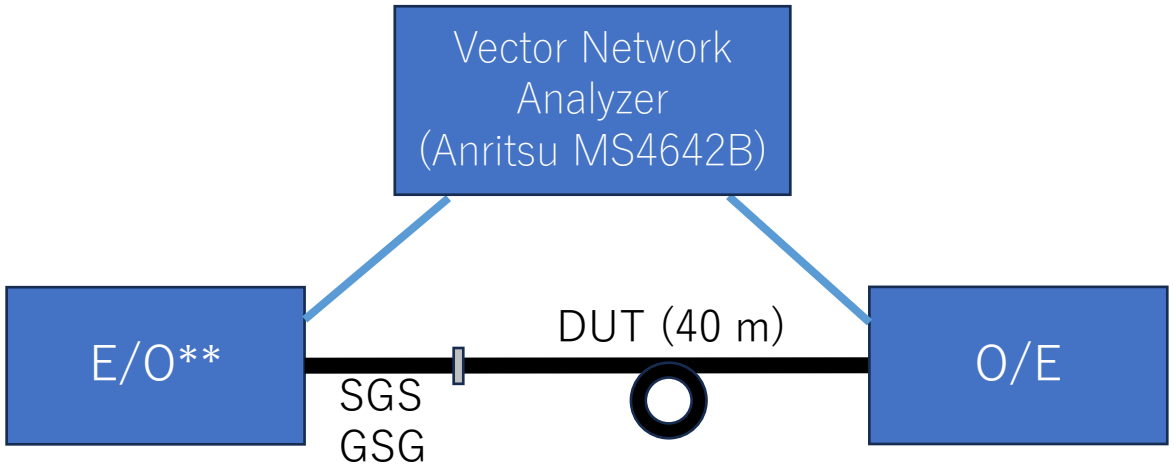


Propagation loss result

		Propagation loss (dB/m)	
		SGS	GSG
Wavelength (nm)	850	0.054	0.052
	1060	0.042	0.041

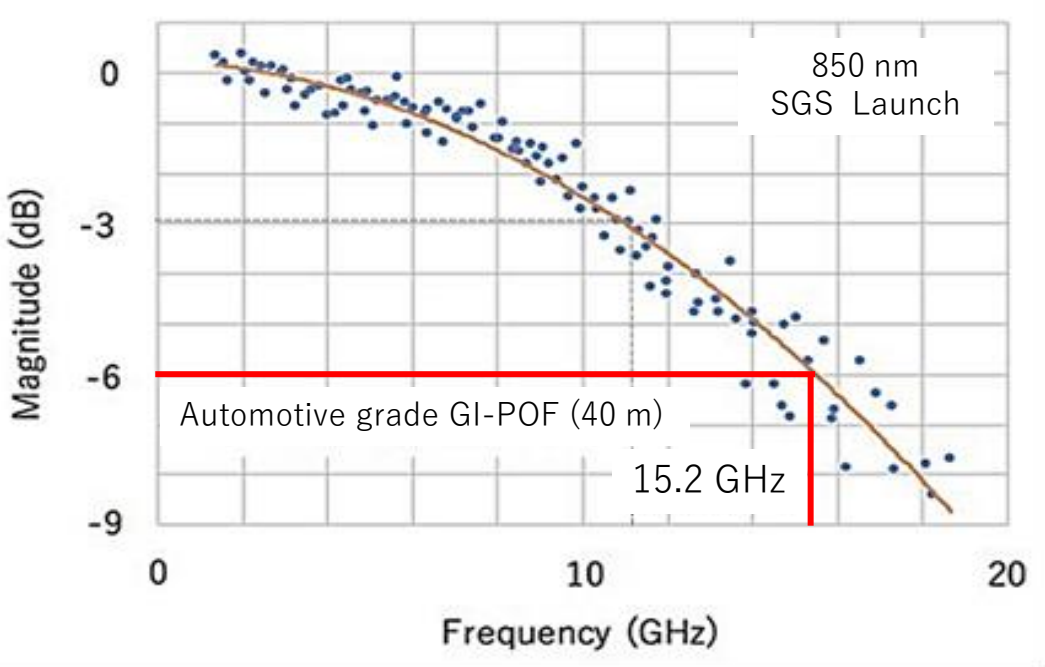
Bandwidth of automotive grade GI-POF

Measurement setup

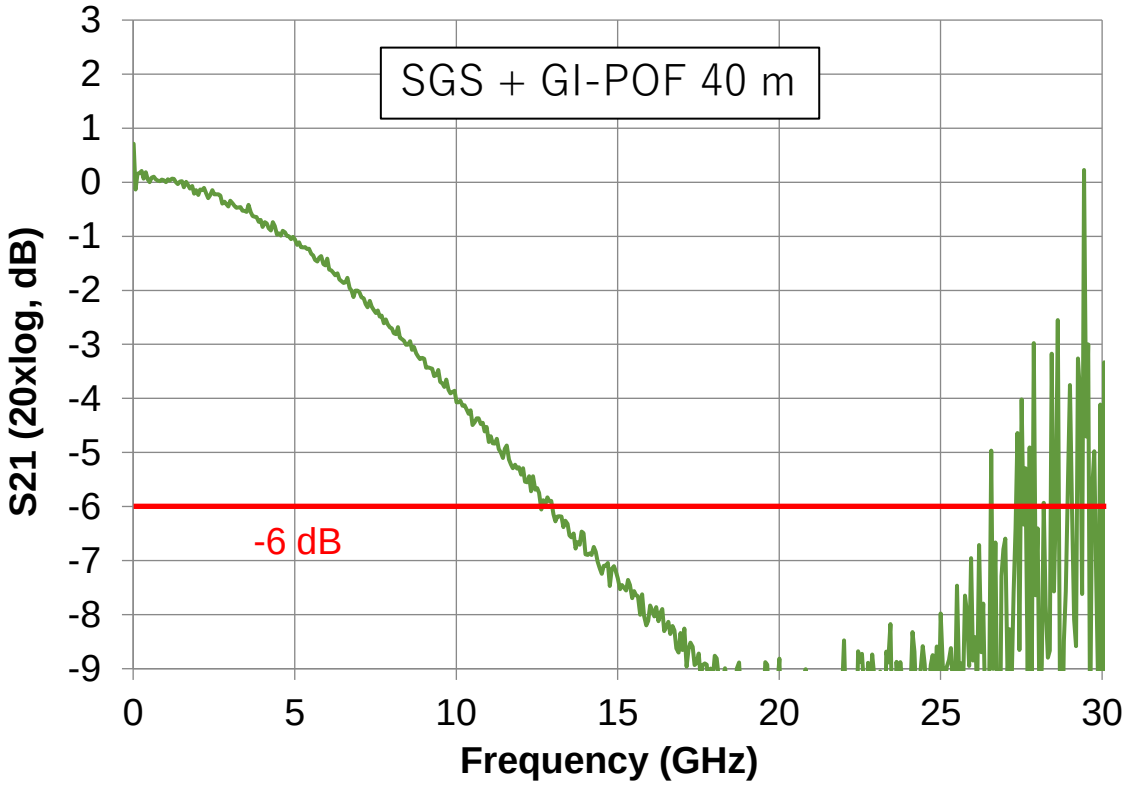


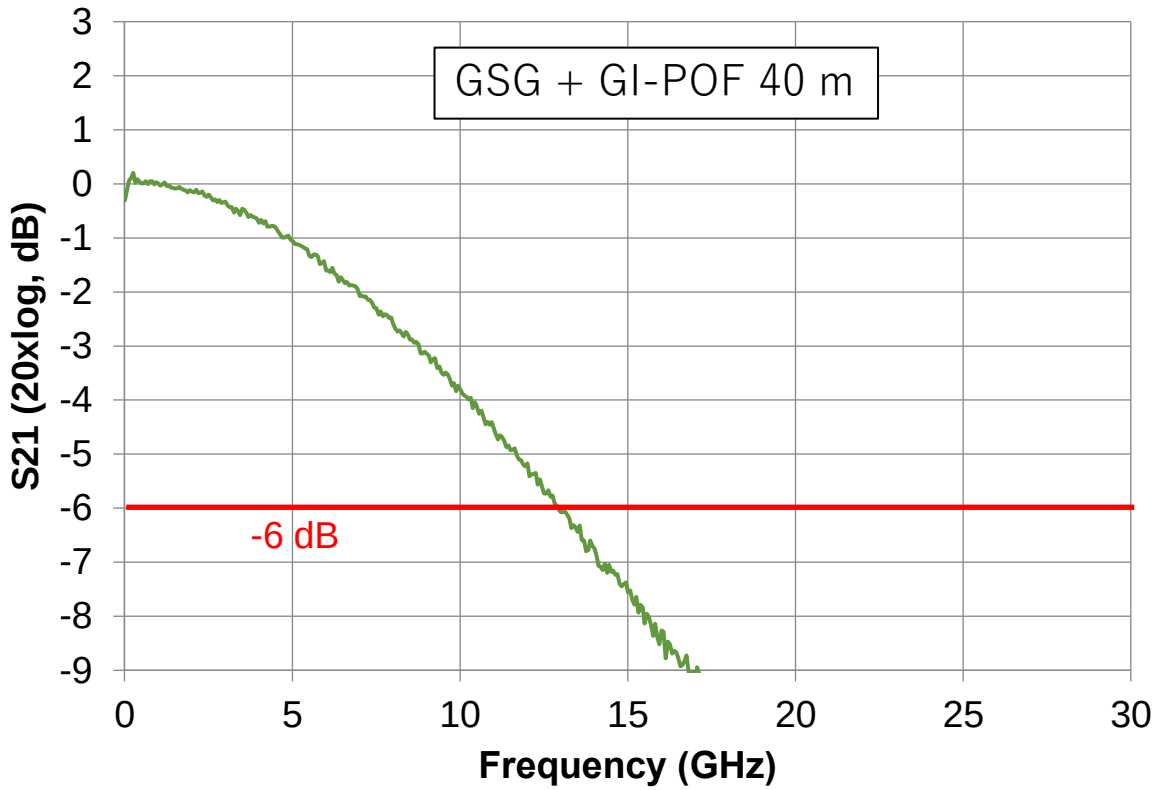
**850 nm (Newport 1784)
1060 nm (Furukawa Electric VCSEL 28 Gbps)

Newport 1414-50



Bandwidth of automotive grade GI-POF at 1060 nm





Support: Furukawa Electric Co., LTD.

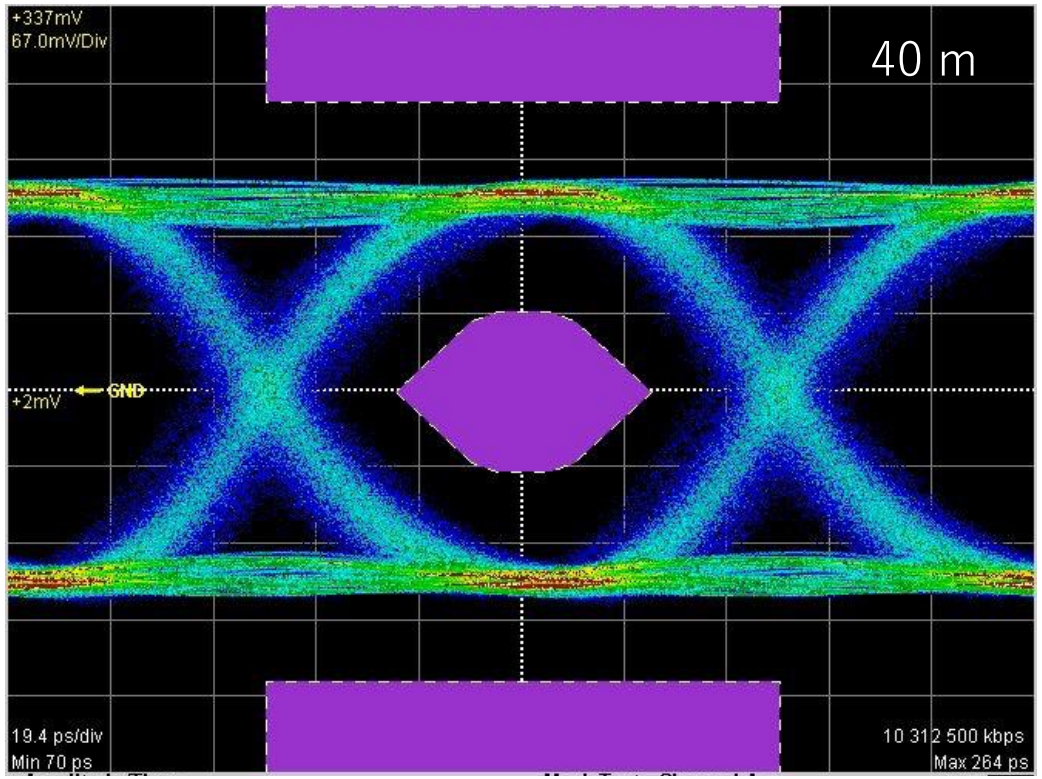
Bandwidth of GI-POF (40 m)

Summary: Bandwidth of GI-POF

		Bandwidth (GHz)	
		SGS	GSG
Wavelength (nm)	850	14.2	14.8
	1060	13.0	13.0

- Enough bandwidth over 10 GHz
- WDM operation (λ_1=0.85 μm & λ_2=1.0 μm) possible

10GbE eye pattern***

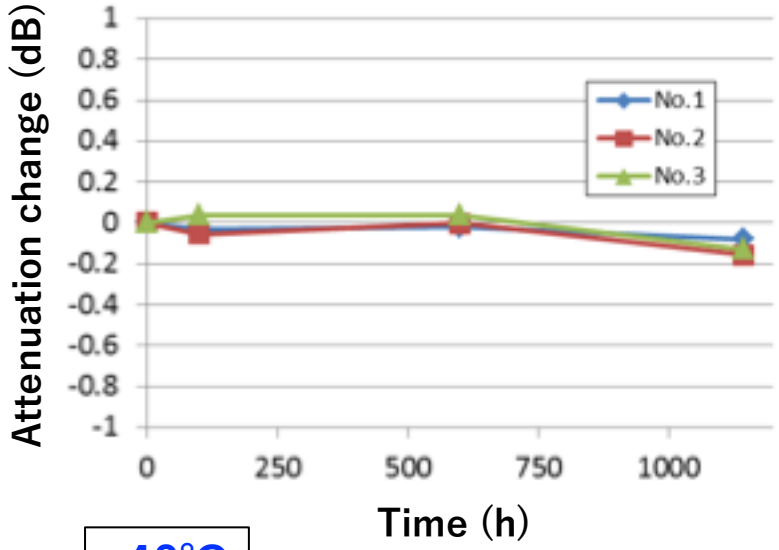


Enough eye opening sufficient to 10GbE operation

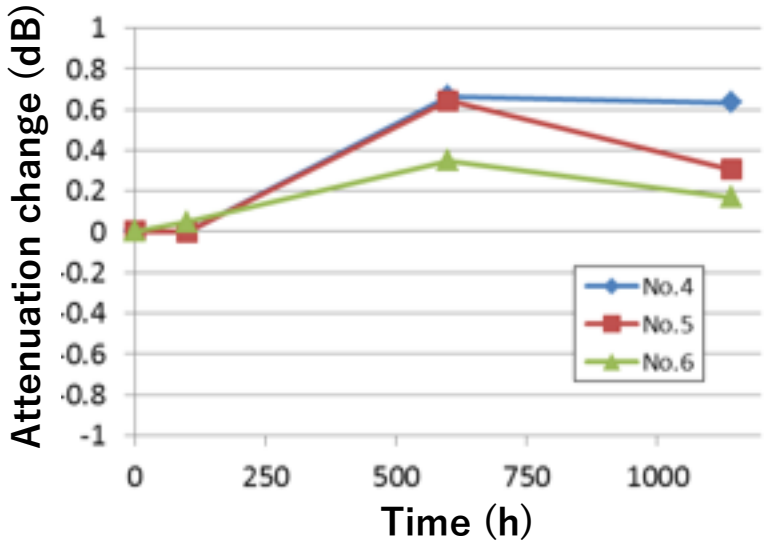
***BERTwave (Anritsu 2100B)

Reliability evaluation of automotive grade POF at 850 nm

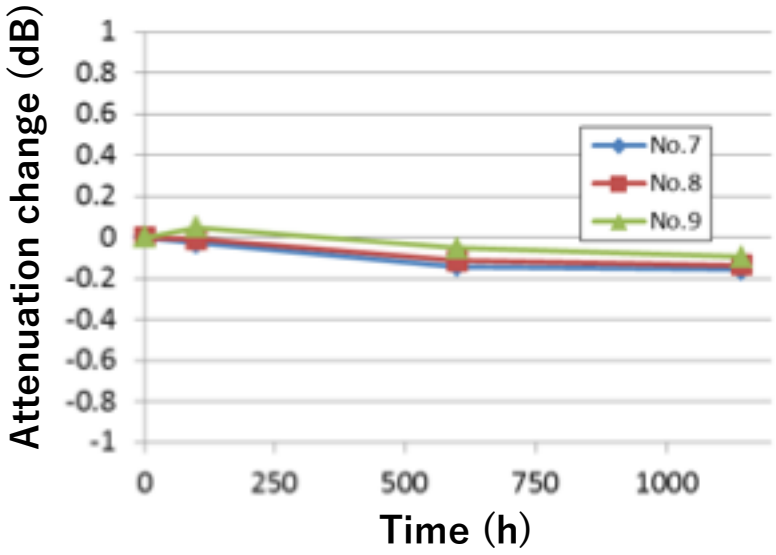
85℃/85%RH



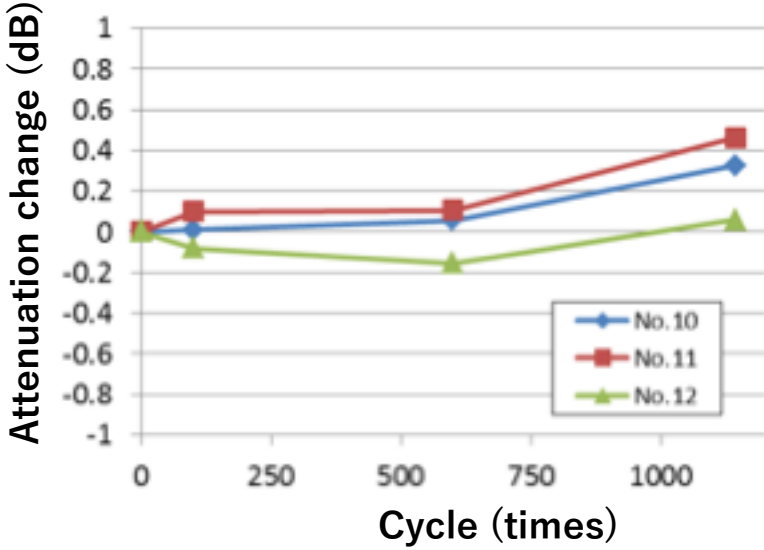
105℃



-40℃



-40℃↔105℃（1,000 cycles）



Support: Yazaki Corporation

Summary

We measured optical characteristics of automotive grade GI-POF.

- Loss: ~50 dB/km or less (850 nm & 1060 nm)
- Bandwidth: over 10 GHz (850 nm & 1060 nm)
- 10GbE operation
- Enough reliability in moist & heat tests

Thank you!