Optical Connector Design Concept for GI-POF

Nov 13-16, 2023

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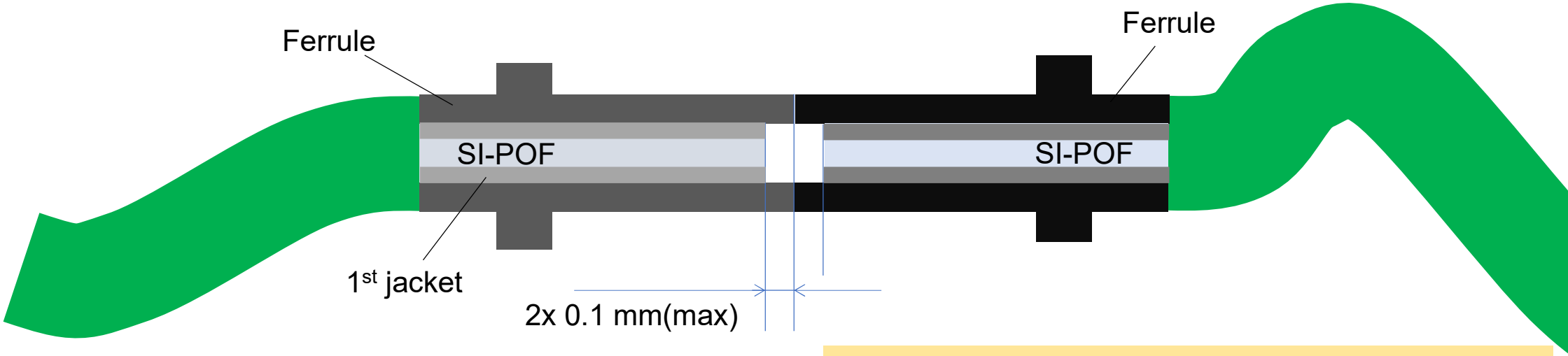
IEEE802.3dh Multi-Gigabit Automotive Ethernet over Plastic Optical Fiber Task Force
November 2023, Oahu, HI

Introduction

- Some concern was proposed on reliability of butt joint using GI-POF(A4i) in previous meeting

- Report vibration test results at the fiber to fiber connection system by using GI-POF (A4j)

Butt coupling for MOST Optical Components



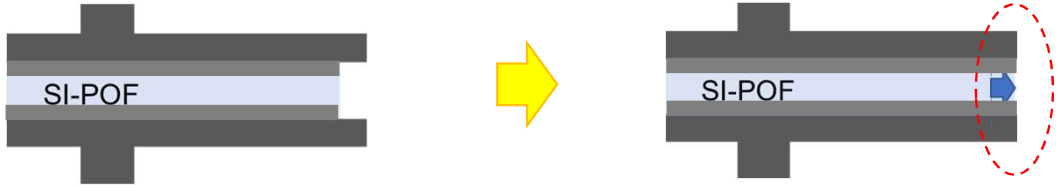
<General requirement>

- Coupling loss: 2.5dB/ connection
- Temperature range: -40 ~ 85 degC
- Automotive environments (Vibration, etc.)

<Countermeasure>

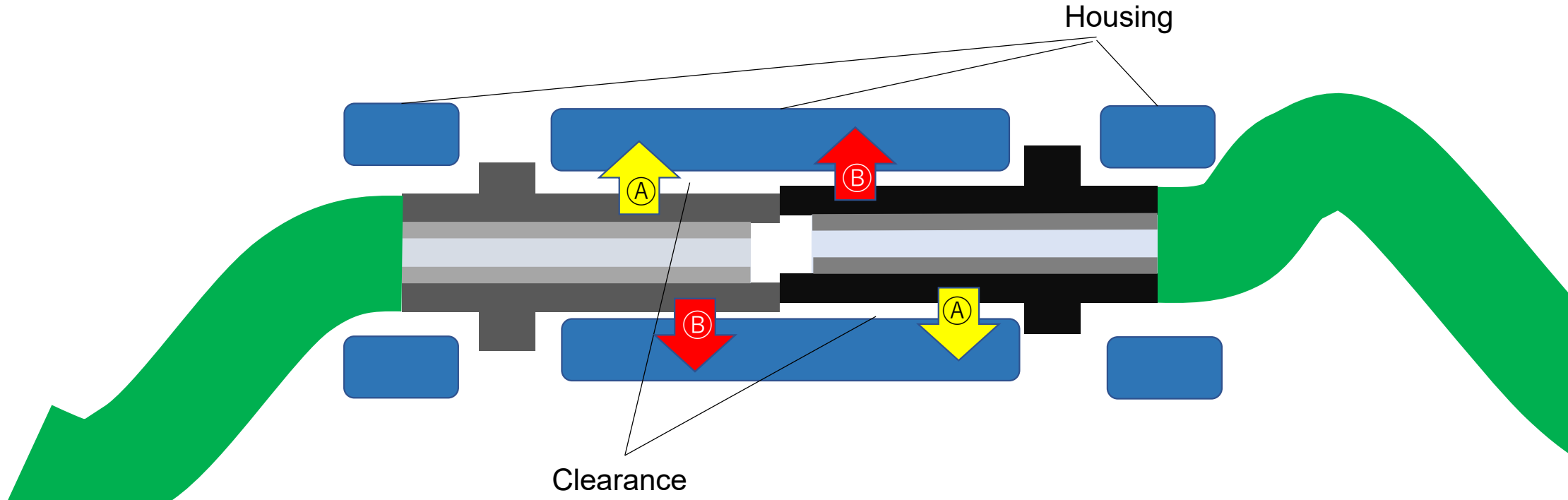
- Both ferrules to be contacted when connectors are mated
  -> Reduce coupling loss)
- Recessed SI-POF surface: ~0.1mm(max)
  -> Avoid scratching while driving (vibration)
  -> Consideration for pistoning*

* What is Pistoning



Once temperature is changed, an end face of SI-POF is moved to back and forth.
(Thermal expansion/ shrinkage)

Butt coupling for MOST Optical Components : Vibration protection

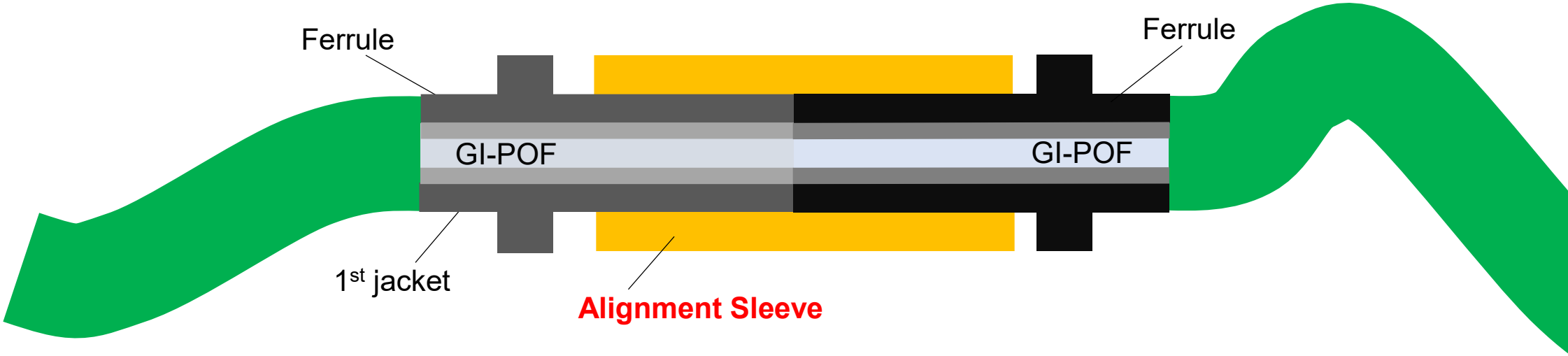


Vibration

- Ferrules inside housing are floating structure
- Both ferrules move randomly when vibrations are applied

The fiber end face is recessed relative to the ferrule surface to avoid possible friction of fiber connecting surface.

Butt coupling for GI-POF Optical Components - Concept

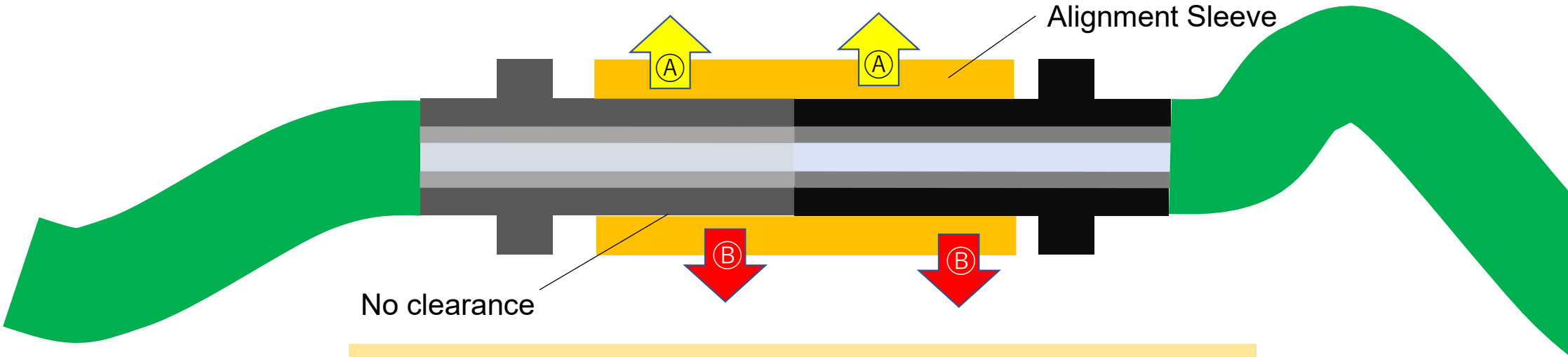


Concept

- Alignment Sleeve is used to reduce shaft misalignment and gaps
- Contact end face to reduce coupling loss

What's happen during vibration?

Butt coupling for GI-POF Optical Components - Mechanism



Vibration

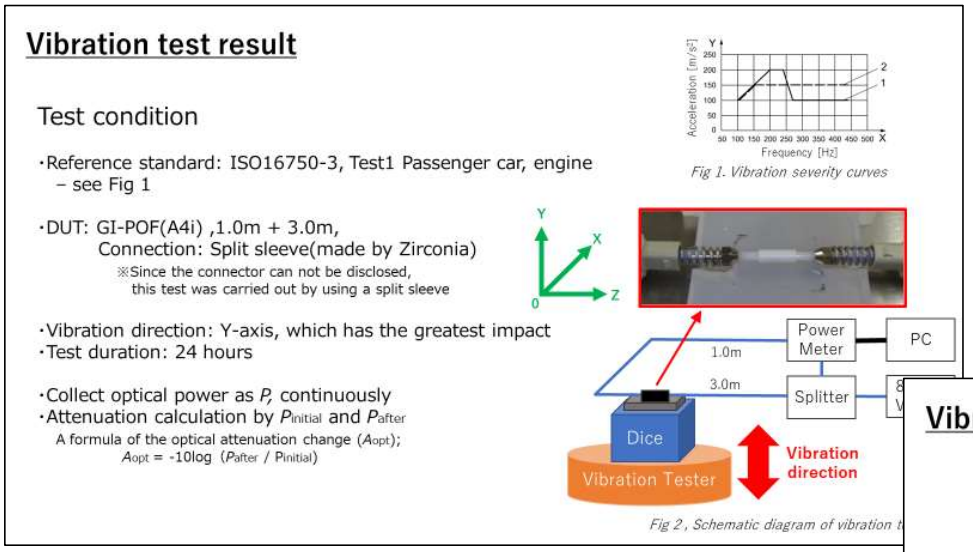
- Ferrules inside alignment sleeve is fixed and no clearance between ferrule and sleeve
- Both ferrules move synchronically when vibrations are applied

Butt coupling can be used because there is no possibility of friction on the fiber end faces

Note: Connector design is an implementation matter and is out of the scope on this standard

Vibration Test Result

Remind: Already reported in September Interim meeting



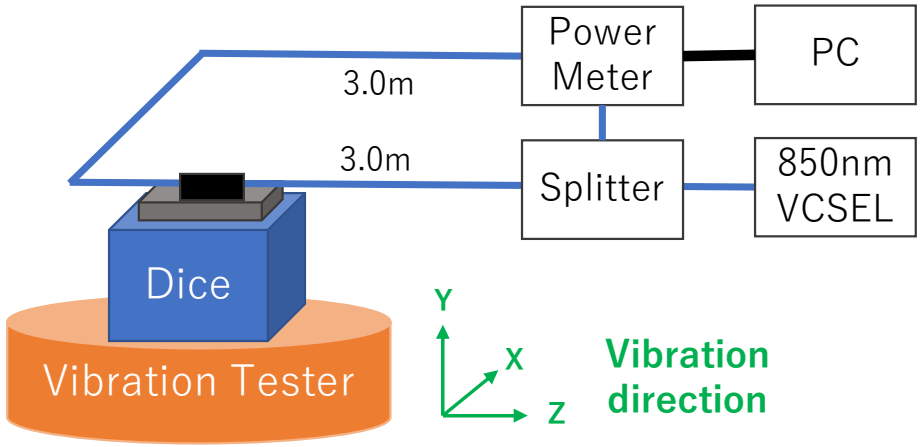
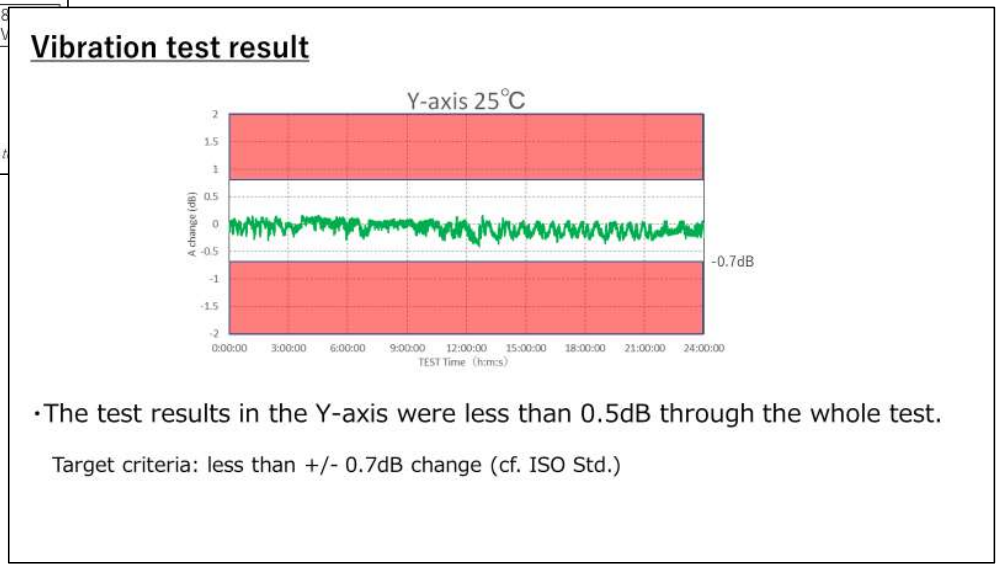
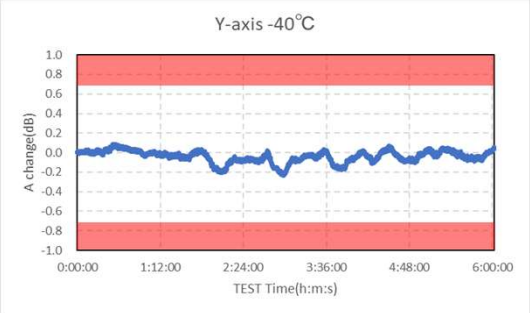
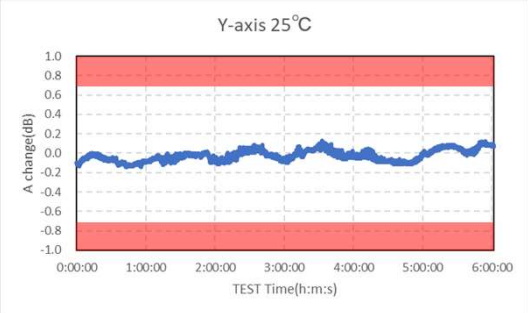
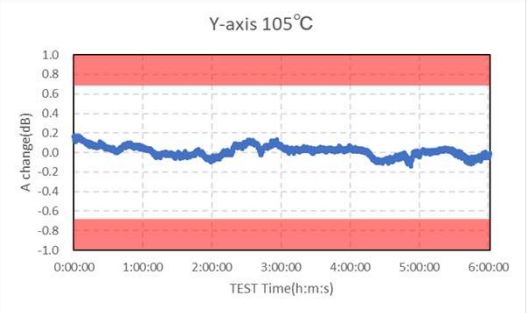
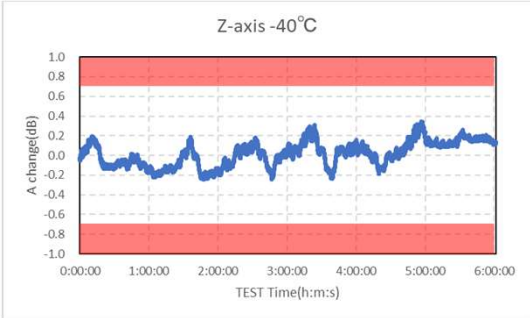
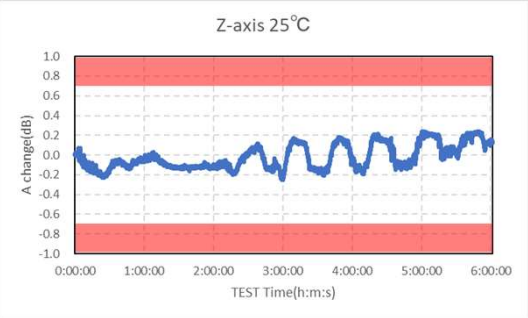
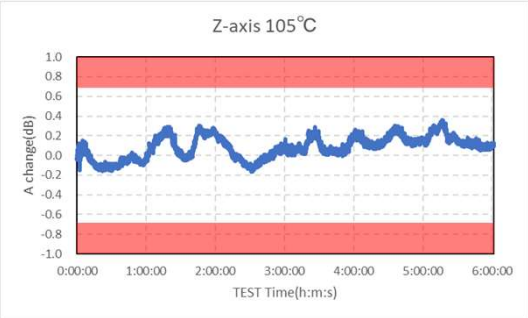


Fig 2 , Schematic diagram of vibration test



Vibration Test Result - Update

Vibration test – attenuation change at each temperature (-40, 25 and 105 ºC) by A4j(55/490)

	-40 ºC	25 ºC	105 ºC
Y-axis			
Z-axis			

Summary

- Connectors for SI-POF and GI-POF have different fiber to fiber connecting structures
- No significant attenuation changes are observed through the vibration test for A4j
- Therefore, this vibration test results prove tat the butt coupling concept can be applicable for GI-POF

Thank you for your attention