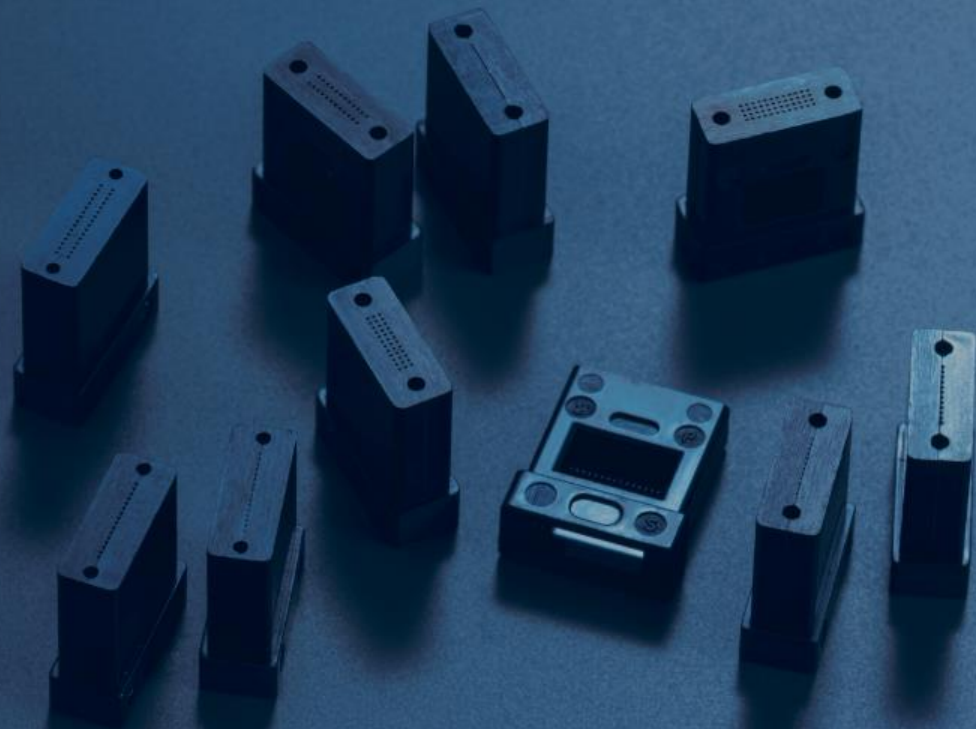


Swifter, and Surer.
Connecting the world,
HAKUSAN Technology.

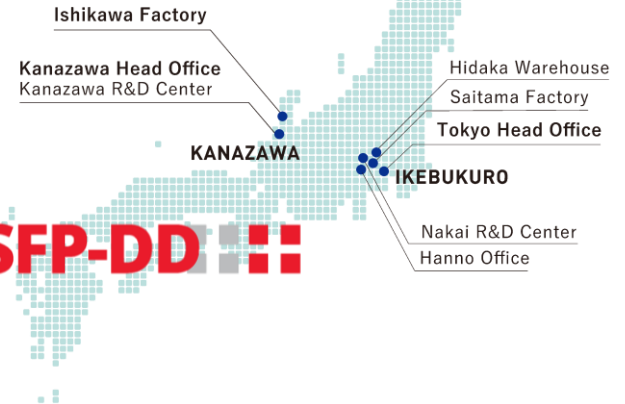
We realize "connection" and "safety and security"
with our world-class proprietary technologies.





Hakusan Inc.

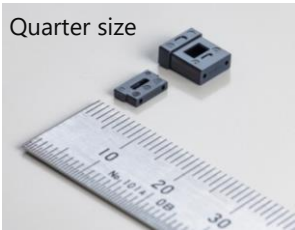
Foundation	October 15, 1947
No. of Employees	134 (as of October, 2023)
HQ	Kanazawa
CEO & President	Tatsuya Yonekawa



Flexible development to the optical market-direction

MTCOMPACT® (MTCT®) Series

✓ Compatibility + Downsizing both achievable



Slim (Half thickness)



Short (Half length)

High-Density Series

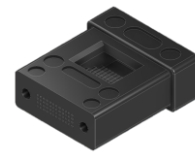
✓ High-density connecting, incl. 80µm cladding fibers



32MT
(16x2rows)



36MT
(12x3rows)



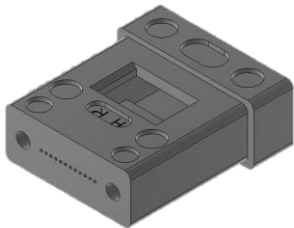
80MT
(12x4rows)



MTDS®
(24x1row)

For Reflowable Interconnecting

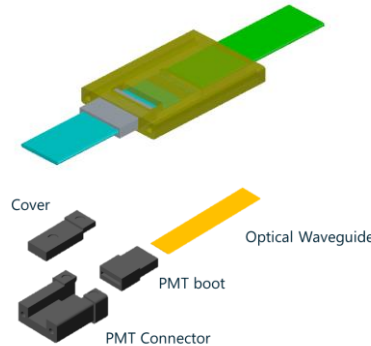
Reflowable
MT ferrule (MTHR®)



Ceramic
Multifiber Ferrule (CMF®)

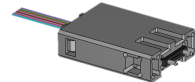


Custom Designing

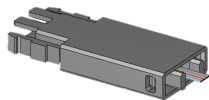


Special Connector

✓ MTCT Connector



✓ Immersion-cooling
Connector (GrinEB)



Standard MT ferrule

Mode	Grade	Fiber	IL 97% (dB) ^{*IEC 61755-1}			
			≤0.25	≤0.35	≤0.5	≤0.7
SM	Standard	12				●
		16				●
		24				●
	Super Low Loss	12		●		
		16		●		
		24*		●		
	Master Loss	12	●			
16*		●				
MM	Standard	12			●	
		16			●	
		24			●	
		32			●	
		48			●	
	Super Low Loss	12		●		
		16		●		
		24		●		
		32		●		



12MT



16MT



24MT



32MT



36MT



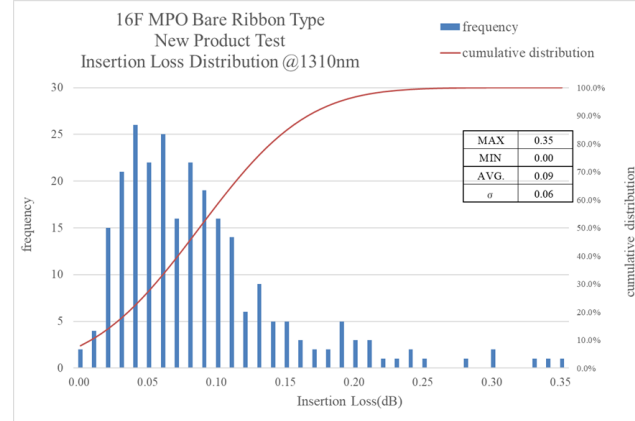
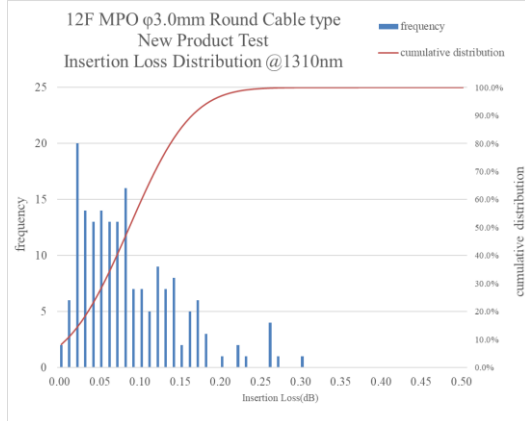
48MT

Hakusan MPO Connector

Hakusan has launched their brand MPO Connectors, and the samples are available.

Fiber Counts 12F/16F/24F
 Grade Standard: Beige(MM)/Green(SM)
 Low Loss: Aqua, Magenta(MM)/Yellow(SM)
 Boots Type Round Cable / Bare Ribbon / Oval

*Telcordia GR-1435-CORE 2 compliant



MPO Master Cord

For Precise Insertion Loss Measurement



Single-Mode 12/16 Master Cord

VS.master IL MAX ≤ 0.20 dB

Random Mating IL 100% ≤ 0.25 dB

Single-Mode 24 Master Cord

VS.master IL MAX ≤ 0.25 dB

Random Mating IL 100% ≤ 0.35 dB

Accessories for Optical Connection

Standard Metal Pin Clamp(Box/Flat) and other accessories (adapters, clips) can be provided.

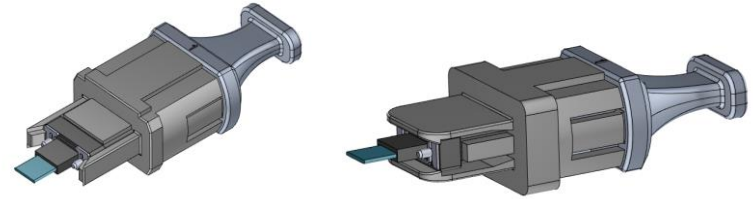
Fiber Optic Connector Accessories

Flat Bend-Type
Pin Keeper

Box-Type Pin Keeper



A wide variety of pins and pin keepers are available.



Standard Metal Pin Clamp

Flat Type



Box Type

Metal Pin Clamp Product Line

*Straight pin w/o pin keeper is available (for standard and MTCOMPACT length)

2024.06

Type	Application	Applicable MT ferrules	Product Name	P/N	Grade
Box	MPO Connectors	12/24 MT	Metal Pin Clamp CMM	90A11517	Standard Multimode
			Metal Pin Clamp CSM	90A11518	Low Loss Multimode Standard Loss Single-mode
			Metal Pin Clamp CE	90A11532	Low Loss Single-mode
		16/32 MT	Metal Pin Clamp 0.55 CMM	90A11547	Standard Multimode
			Metal Pin Clamp 0.55 CSM	90A11548	Low Loss Multimode Standard Loss Single-mode
			Metal Pin Clamp 0.55 CE	90A11549	Low Loss Single-mode
Flat	MT-Jumper (for Transceiver)	12/24 MT	Metal Pin Clamp FLAT CMM	90A11560	Standard Multimode
			Metal Pin Clamp FLAT CSM	90A11561	Low Loss Multimode Standard Loss Single-mode
			Metal Pin Clamp FLAT CE	90A11562	Low Loss Single-mode
		16/32 MT	Metal Pin Clamp FLAT 0.55 CMM	90A11557	Standard Multimode
			Metal Pin Clamp FLAT 0.55 CSM	90A11558	Low Loss Multimode Standard Loss Single-mode
			Metal Pin Clamp FLAT 0.55 CE	90A11559	Low Loss Single-mode
		MTCOMPACT Short	Metal Pin Clamp Short FLAT	ORD2021-009-2	Standard/Low Loss for SM/MM
			Metal Pin Clamp Short FLAT 0.55	ORD2023-043	Standard/Low Loss for SM/MM

New Downsized Product

MTCOMPACT® (MTCT®) Series

That's our Very Small Form Factor (VSFF)!

These Compact MT ferrules are available even in small areas.

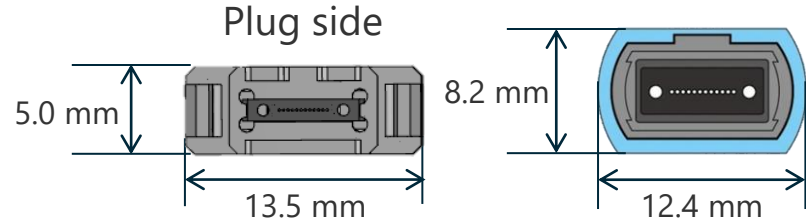
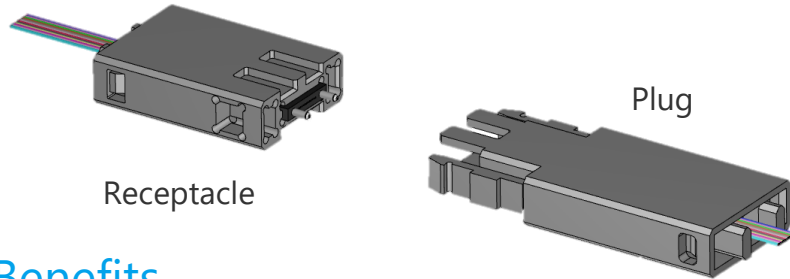
The single-mode ferrule is under development, but samples are available.

Product	Fiber count	Expected polishing	Features
MTCT Slim	12(MM)	Flat (MM)	Thickness 1.25 mm (Half of standard)
MTCT Short	12(MM/SM) 16(MM/SM)	Flat (MM) 8 deg. Angle (SM)	Length 4 mm (Half of standard)
MTCT Slim & Short	12(MM/SM) 16(MM/SM)	Flat (MM) 8 deg. Angle (SM)	Thickness 1.25 mm Length 4 mm



MTCT[®] Connector

(under development)

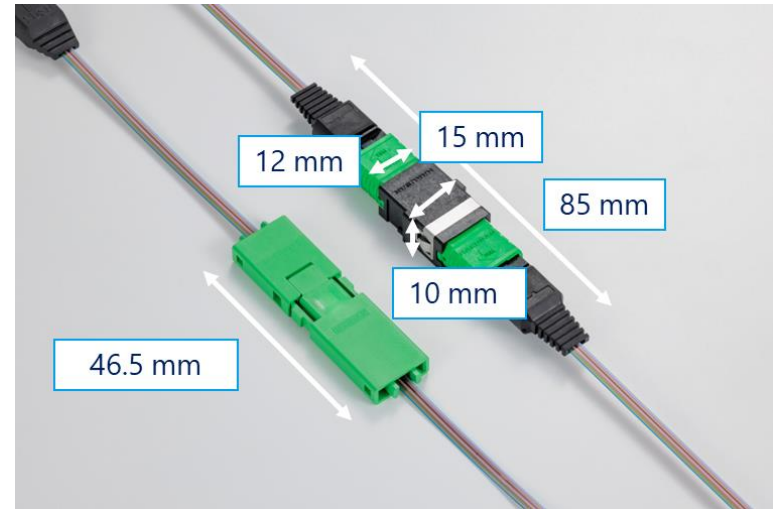


Benefits

- Easy to assemble and disassemble in fields.
- Suitable for mid-board connectors
(Device-inside interconnecting)
- Compatible with 250 μ m fiber pitch

Features

- No connecting adapter (Less parts)
- Stable connection by 2 springs
- Each side available for Male / Female



High-Density Development

High-Density Series

That's our High-Density MT ferrule series.

High density brings the reduction of connectors to your field engineers.

The single-mode ferrule is under development, but samples are available.

Mode	Product	Fiber count	Expected polishing
Single-mode	32MT-PA-S	32 (16 x 2)	8 deg. angle
	32MT-PA-SLS	32 (12 x 3)	8 deg. angle
	36MT-PA-S	36 (12 x 3)	8 deg. angle
	36MT-PA-SLS	36 (12 x 3)	8 deg. angle
	48MT-PA-S	48 (12 x 4)	8 deg. angle

High-Density Development

Φ80μm Cladding Fiber Series

Another High-Density Approach with the φ80μm cladding fibers

The Ferrules are under development, watching the market deployment trend of φ80μm cladding fibers, but samples are [available](#).

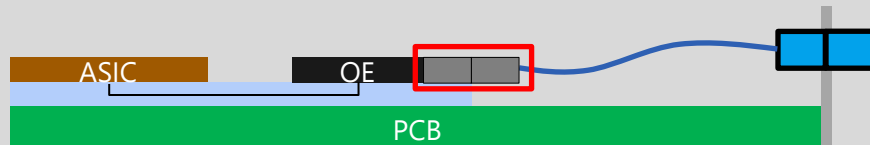
Mode	Product	Fiber count	Fiber pitch	Expected polishing
Single-mode	12MT-PA-SLS-φ80μm	12 (12 x 1)	250 μm	8 deg. angle
	16MT-PA-SLS-φ80μm	16 (16 x 1)	250 μm	8 deg. angle
Multimode	24MTDS®	24 (24 x 1)	125 μm	Flat

Background: Requirement for simultaneous board mounting of optical connectors

- Needs for the interconnectivity from an optical engine on PCB to the optical connector
 - > Solder reflowing is required to avoid damage to the optical engine
- Board mounting (Solder reflowing) for the optical connector aside from the OE required
- Temperature profile of solder reflowing (260 deg.C)
 - > Thermoplastic resin (PPS) material applies only to temperatures up to 125 deg.C

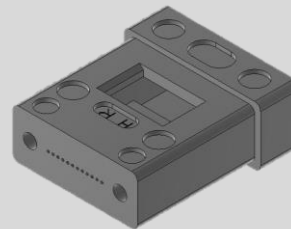
Challenges

- I. Limited applicable temperature of the resin
- II. Dimensional deformation after solder reflowing
 - Increase of the fiber eccentricity
 - Deviations in the fiber positioning
- Deterioration of the insertion loss



Development of connectivity products ongoing for electrics to optics convergence technology

Reflowable
MT ferrule (MTHR[®])



Ceramic
Multifiber Ferrule (CMF[®])



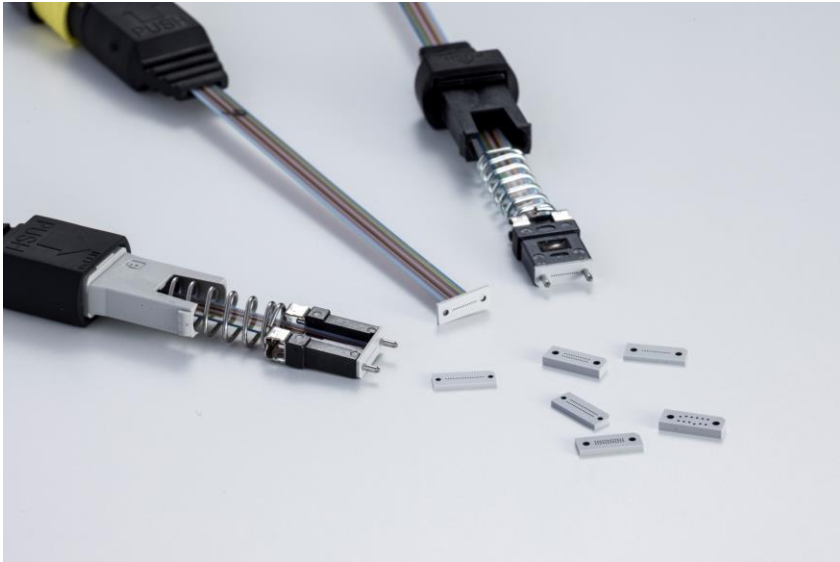
Reflowable MT Ferrule



- ✓ Short-time Heat Resistant - 260 deg.C (10 min.)
- ✓ MT-shaped product
- ✓ Conventional MT technology viable
- 12/16/24MT interface for SMF Low Loss available
- Fiber-hole accuracy confirmed before/after Heat apply
- Sample available

8.0 x 6.4 x 2.5 (mm)

Ceramic Multifiber Ferrule



*Under development

- ✓ Thermal resistant
- ✓ Flexible to hole layout
- ✓ Versatile optical connection
- ✓ Short-time delivery for initial samples
- Width and height customizable
- Super high fiber count possible from 36 fibers

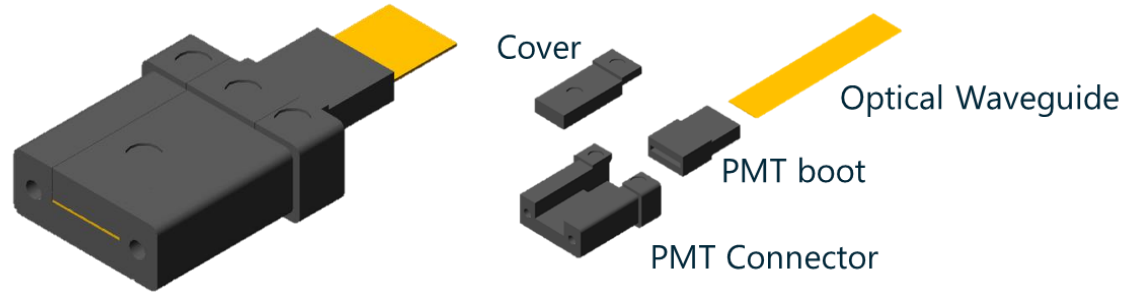
0.5 (t) x 6.4 x 2.5 (mm)

Hakusan Expanded Beam Connector



- ✓ Non-Physical Contact
- ✓ Less Spring force and longer Lifetime
- ✓ Available for Immersed environment
- ✓ Single-mode / Multimode application
- Initial Target: Single-mode Application
- Sample Deployment Start: by the end of 2024

PMT Connector for Polymer Waveguide



Features

- **Capability to mate an optical waveguide with optical fibers**
- **Good for waveguide application at a board edge connection**
- Compatible with a standard MT ferrule
- Mass production available for Multimode
- Single-mode application under investigation



HAKUSAN

Connect to the Future Society

with passion to the top ferrule supplier

Ryu (Tatsuki) Kimbara, Manager of Global Marketing and Business Development

t.Kimbara@hakusan-mfg.co.jp

<https://www.linkedin.com/in/ryu-tatsuki-kimbara/>

<https://hakusan-mfg.co.jp/en/>



More updates on LinkedIn!