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SMI OPTICAL INTERCONNECTS

106108 Transceiver
501266 Adapter
88531 Cable Assemblies
85994 Tooling Kit

Plastic optical fiber SMI interconnects provide high-speed data signals for end-user applications

Molex's SMI Interconnects provide high-speed and effective data connections for industrial, consumer and end-user applications. This plastic optical system ensures many benefits over traditional copper lines.

Designed to provide an end-to-end solution, Molex offers the **complete solution** with the optoelectronic transmitter and receiver module integrated with transceiver, adapter, cable assemblies and complementary tooling. Electro Magnetic Interference (EMI), Radio Frequency Interference (RFI) and ground loops are no longer a concern with the non-metallic Plastic Optical Fiber (POF) cabling. Having implemented complete solution, it is easier to be compliant with EMC standards. In addition, the plastic optical fiber connectors and transceivers are light weight and more cost effective than the glass or copper cabling counterparts.

SMI is a POF interface standardized to IEC-671754-21. SMI is accepted as an industry standard POF interconnect for applications ranging from wind turbines, medical equipment and internal equipment data links to set-top box interfaces and Internet Protocol Television (IPTV) applications. SMI plastic optical interconnects complement Molex's existing line of optical products. For more information on our extensive optical offering, visit: www.molex.com/fiber.

Small Multimedia Interface (SMI) Optical Interconnects

Transceiver, Adapter and Cable Assemblies

Dielectric material of POF (PMMA) cabling interconnects is immune to EMI and RFI, lightweight and easy to handle

Push-pull positive latching with safe-release mechanism for industrial and consumer applications offers secure, safe and easy mate de-mate

Easy connector termination process

Designed to IEC-671754-21 SMI interface standard

Data speeds up to 250 Mbps over 50 meters Step Index POF cable (0.5 NA) to provide high-speed signals for Ethernet and Industrial Datalink (proprietary protocol) applications

SMI transceiver with digital integrated fiber optic transmit (Tx) and receive (Rx) modules, and integrated digital signaling reduces board layout requirements, minimizing design requirements

Logic interfaces: LVDS and LVPECL

Available in Ethernet 10 to 100 Mbps versions which provides increased versatility and market applications

RoHS Compliant

Medical Diagnostic Equipment

Rolling stock/Railway infrastructure

Applications

Industrial:

- -Wind industry
- -Frequency Inverters/Converters/ Drives
- -Controller board
- -Networking
- -Power Transmission & Distribution
- -Transportation/Traction
- -Factory automation

Optical sensors

Consumer

- -HDTV
- -Set Top Boxes

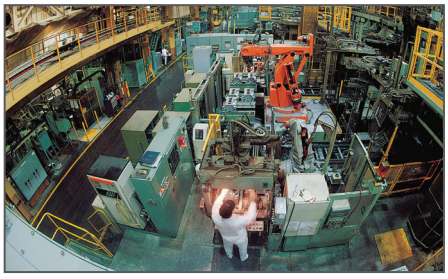
Medical

- -Data and video transmission
- -Medical diagnostic equipment
- -Optical sensors

Networking

- -Data communication centers

Wind Industry



Factory Automation

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SMI OPTICAL INTERCONNECTS

Transceiver Specifications

REFERENCE INFORMATION
Transceiver Packaging:
Tray (50 per tray)

PHYSICAL
Housing: High-temperature Thermo Plastic
Plating:
Solder Tail Area – Tin (Sn)
Underplating – Nickel (Ni)
Operating Temperature:
-20 to +85˚C (Industrial Datalink)
-40 to +85˚C (Ethernet)
Shelf Life: 12 months in sealed, un-opened bag with desiccant

MECHANICAL
Mating Force SMI connector-to-transceiver at 25°C:
SMI connector Long Body: 29,69N
SMI connector Short Body: 29,69N

Unmating Force SMI connector-to-transceiver at 25°C:
SMI connector Long Body: 23,73N
SMI connector Short Body: 100N

Retention Force Cable-to-SMI connector (straight pull) at 25°C for 10 seconds, average increase loss 1.68dB:
SMI connector Long Body: 22,24N
SMI connector Short Body: 22,24N

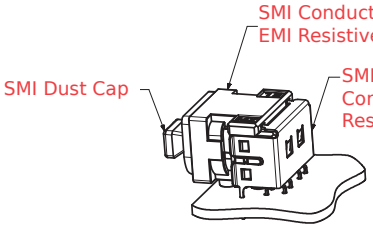
OPTICAL
Insertion loss: 2.0 dB max.
Plastic Optical Fiber Compatibility:
standard 980µm core POF, Step Index 0.3 and 0.5NA

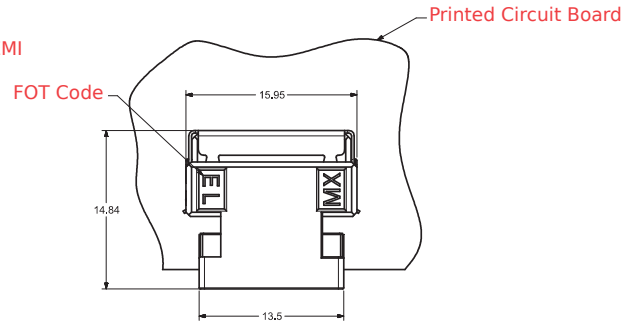
ELECTRICAL
Data Rate:
10/100 Ethernet (100 Mbps)
Industrial Datalink (min 10 Mbps up to 250 Mbps)
Distance: 50.00m (1968.5’’)
Step Index POF

Ordering Information

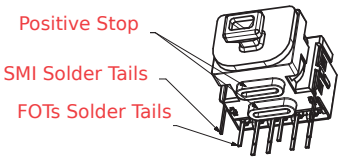
TRANSCEIVER

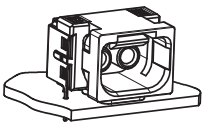
Order No.	PCB Mounting Style	Signaling Type	Data Rate	Baud Rate	Logic Interface	Operating Temperature Range	Storage Temperature Range
106108-3100	Through Hole	Ethernet	100 Mbps	125 Mbd	LVPECL	-40 to +85˚C	-40 to +85˚C
106108-3200	Surface Mount						
106108-4100	Through Hole	Industrial Datalink	250 Mbps		LVDS	-20 to +85˚C	
106108-4200	Surface Mount						





Dust Cap is Not Shown





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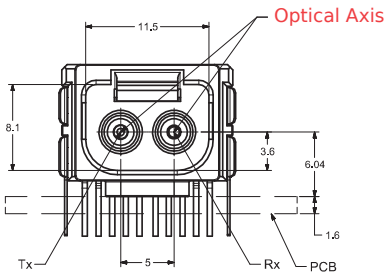
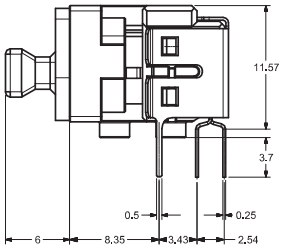
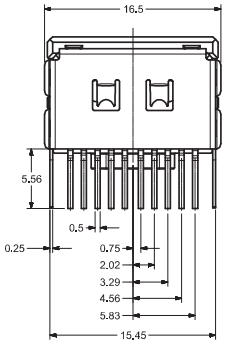
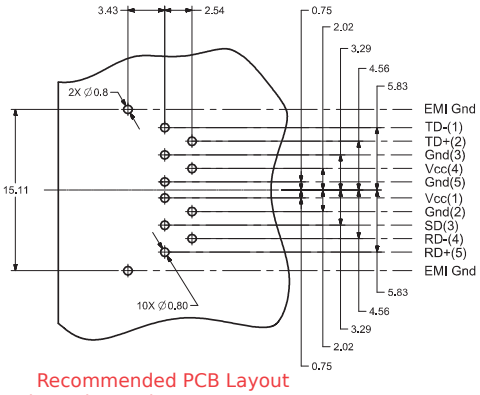


SMI Transceiver Assembly mounted on the PCB Dust Cap is not Shown

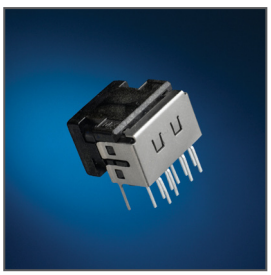


SMI Transceiver Through Hole

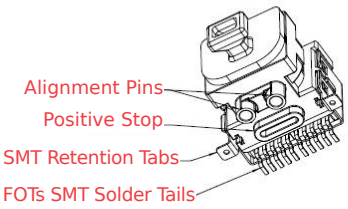


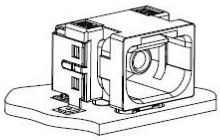


Recommended PCB Layout
Dimensions Tolerance: ±0.1mm



SMI Transceiver Through Hole





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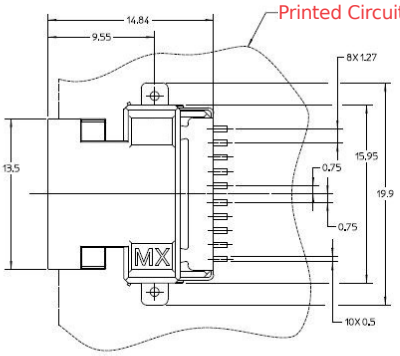

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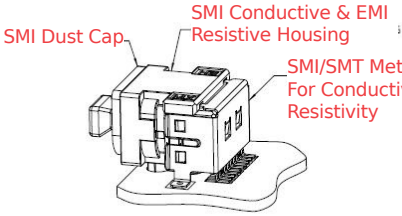
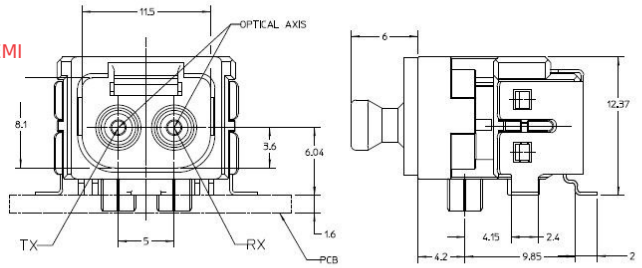
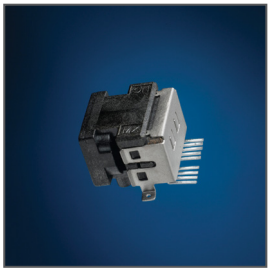


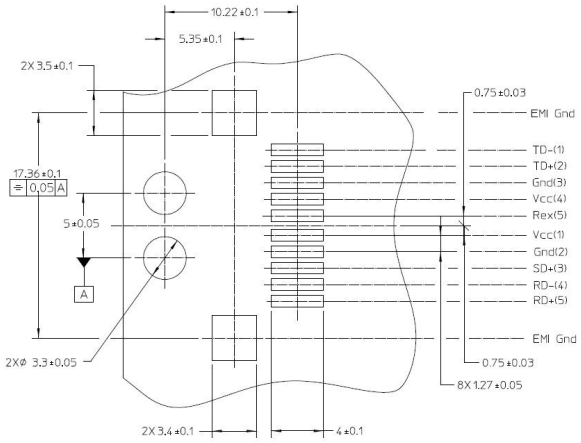


SMI Transceiver Assembly Mounted on the PCB Dust Cap Not Shown



SMI Transceiver Surface Mount

SMI Transceiver Surface Mount



Recommended PCB Layout for SMI Transceiver Surface Mount

106108-3100, 106108-3200, 106108-4100 AND 106108-4200 TECHNICAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min.	Max.	Units
Supply Voltage		V_{cc}	-0.5	4.5	V
Storage Temperature		T_{STG}	-40	+85	˚C
Lead Soldering Temperature[1]		T_{sold}	/	260	˚C
Receiver Optical Overload		P_{OL}	/	0	dBm
Storage Compliance		MSL	/	2a	J-STD-020D
Operating Temperature[1]	106108-3100 106108-3200	T_{OP}	-40	+85	˚C
	106108-4100 106108-4200		-20		

Notes:
1. 260˚C for 10sec, 1 time only, at least 2.2mm away from lead root.
   These are absolute maximum ratings at or beyond which the FOT can be expected to be damaged.

TRANSMITTER ELECTRICAL AND OPTICAL CHARACTERISTICS

Parameter		Symbol	Min.	Typ.	Max.	Units
DC Supply Voltage		V_{cc}	3.0	3.3	3.6	V
Operating Current Consumption	106108-3100 106108-3200	I_{cc}	30	37	52	mA
	106108-4100 106108-4200			37	52	
Sleep State Current Consumption	106108-4100 106108-4200	I_{SLEEP}		20	40	µA
Data Rate	106108-3100 106108-3200	DR	10		100	Mbps
	106108-4100 106108-4200		10		250	
Input Capacitance		C_{IN}			5	pF
Input Resistance (Single-Ended)		R_{IN}		5		kΩ
Input Common-Mode Range		$V_{IN-BIAS}$	GND+0.8		V_{cc}-0.8	V
Input Voltage Swing (pk-pk)		$V_{IN-SWING}$	100		1200	mV
Minimum Differential Voltage Swing to Ensure Wake-Up		Wake-up Input	50			mV
Wake-Up Time Delay				5	80	µs
Optical Power OFF Delay			0.02		20	µs
Peak Wavelength		λ_{peak}	640	660	670	nm
Spectral Bandwidth (FWHM)	106108-3100 106108-3200	Δλ	18	24	27	nm
	106108-4100 106108-4200			23	30	
Average optical power[3]	106108-3100 106108-3200	P	-10	-5.5	-1.5	dBm
	106108-4100 106108-4200				-2.0	
Optical Rise Time (20%-80%)	106108-3100 106108-3200	T_R	0.5	1.3	3.1	ns
	106108-4100 106108-4200			2.0	2.8	
Optical Fall Time (80%-20%)	106108-3100 106108-3200	T_F	0.4	0.5	0.75	ns
	106108-4100 106108-4200		0.3		0.6	
Optical Modulation Amplitude (OMA)		OMA	160	590	1250	µW
Open Eye Width	106108-3100 106108-3200	T_{EYE}	6.5	7.4	7.9	ns
Total Jitter	106108-4100 106108-4200				1.6	ns

Notes:
Test Conditions:
1. Test data was validated over the full temperature range of -20/-40 to +85˚C and over the supply range of 3V to 3.6V
2. Test data represents operation at the maximum data rate of 100Mbps/250Mbps using a PRBS7 test pattern (8B/10B encoding)
3. Optical power is measured when coupled into 0.5m of a 1mm diameter 0.5NA plastic fiber

RECEIVER CHARACTERISTICS

Parameter		Symbol	Min.	Typ.	Max.	Units
DC Supply Voltage		V_{cc}	3.0	3.3	3.6	V
Operating Current Consumption	106108-3100 106108-3200	I_{cc}	35	43	50	mA
	106108-4100 106108-4200		34	36	40	
Sleep State Current Consumption	106108-4100 106108-4200	I_{SLEEP}	2	20	25	µA
Output Impedance (differential)		R_{Diff}		100		Ohm
Offset Common Mode Voltage	106108-3100 106108-3200	V_{ocm}		1.41		V
	106108-4100 106108-4200			1.2		
Output Differential Voltage Swing	106108-3100 106108-3200		800	1150	1400	mV
	106108-4100 106108-4200		300	350	400	
Receivable Optical Power Sensitivity	106108-3100 106108-3200			-26	-24	dBm
	106108-4100 106108-4200			-24	-22	
Maximum Allowed Optical Power					0	dBm
Rise Time (10%-90%)	106108-3100 106108-3200			1.6	3.4	ns
	106108-4100 106108-4200			1.0	2.5	
Fall Time (10%-90%)	106108-3100 106108-3200			1.6	3.4	ns
	106108-4100 106108-4200			1.0	2.0	
Wake Up Time from Sleep State	106108-4100 106108-4200			10	100	µs
Signal Detect Assert/ De-Assert time	106108-3100 106108-3200	T_{SD}	0.1	0.3	0.6	µs
Signal Detect Optical Assert Level	106108-3100 106108-3200	P_{SD-AS}	-32	-27	-24	dBm
Signal Detect Optical De-Assert Level	106108-3100 106108-3200	P_{SD-DAS}	-32	-28	-25	dBm
Signal Detect Voltage High	106108-3100 106108-3200	V_{SDH}	2.4	3.0	3.6	V
Signal Detect Voltage Low	106108-3100 106108-3200	V_{SDL}	0.0	0.05	0.1	V
Open Eye Width	106108-3100 106108-3200	EW	5.7	7.4	7.9	ns

Test conditions:

1. Test data was validated over the full temperature range -20/-40˚C to +85˚C, and over the supply range of 3V to 3.6V.
2. Test data represents operation at maximum data rate of 100/250 Mbps using a PRBS7 test pattern (8B/10B encoding) unless otherwise stated.
3. Optical power was coupled from a minimum 0.5m length of 1mm diameter core and 0.5NA step index plastic optical fiber.

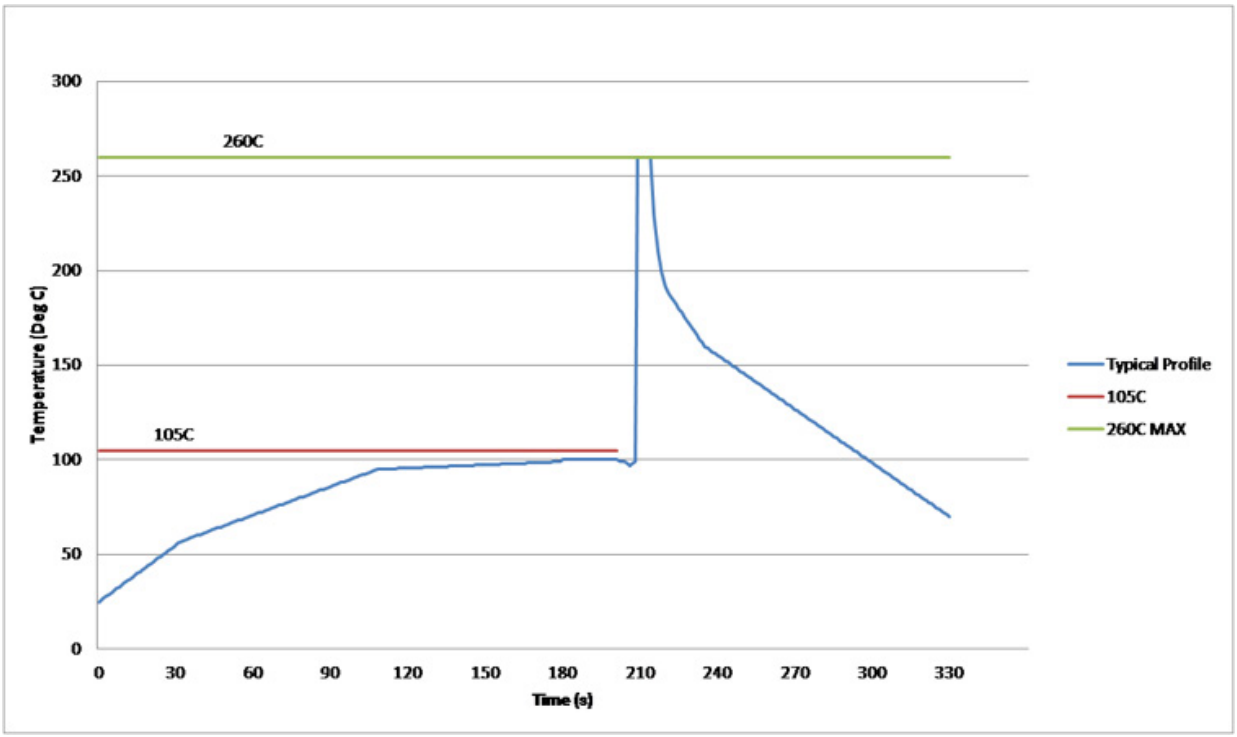
REGULATORY COMPLIANCE:

Parameter	Symbol	Standard	Level
Electrostatic Discharge, Human Body Model (contact ESD)	HBM	Mil-STD-883	Level 2 (2 kV)
Storage Compliance	MSL	J-STD-020D	2a (4-week floor life)
Eye Safety[1]		IEC 60825-1	LED Class 1

Note:
1. WARNING: The LED Class 1 Accessible Emission Limit (AEL) may be exceeded in some circumstances if the maximum IFAVG exceeds 20 mA.

SOLDER PROFILE:

The SMI transceiver may be soldered to a maximum 260°C, maximum 10 seconds, one time only, at least 2.20mm away from lead root. Parts are suitable for wave soldering. They are not suitable for reflow soldering. Hand soldering is not recommended for production due to the uncontrolled nature of this process.



Typical solder profile
(maximum peak temperature 260°C)

SPECIFICATIONS, HANDLING:

SMI transceivers are tested for handling in static controlled assembly processes (HBM). Cleaning, degreasing and post-solder washing should be carried out using standard solutions compatible with both plastics and the environment. For example, recommended solutions for degreasing are alcohols, (methyl, isopropyl and isobutyl). In the soldering process, non-halogenated water-soluble fluxes are recommended. SMI transceivers are not suitable for use in reflow solder processes (infrared/vapor-phase reflow). The dust plug should be kept in place during soldering, washing and drying processes to avoid contamination of the active optical area.

STORAGE CONDITIONS:

1. Moisture sensitivity: parts must be stored in a sealed moisture barrier bag (MBB) at <40°C and <90% R.H.
2. Once removed from MBB, parts must be either used within 672 hours (4 weeks) of factory conditions <30°C, <60% R.H. Stored at <10% R.H.

SMI CONNECTOR

Features and Benefits

Suitable for 2.20mm zipcord POF cable with 980/1000µm fiber
New connector suitable for 200/230µm available soon

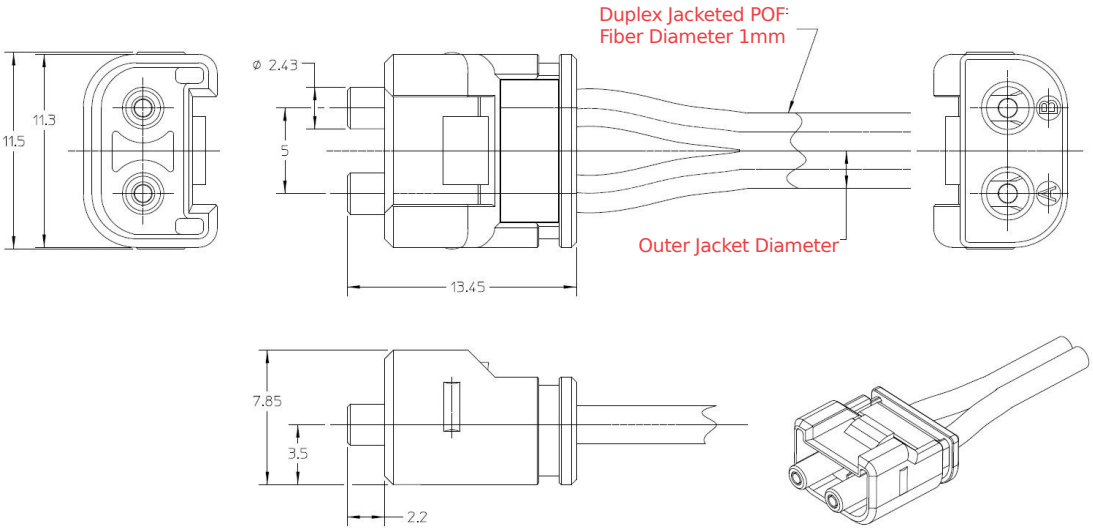
Order No.	Description
106108-6004	SMI Long Body Connector Bulk Pack (50 pcs)
106108-6301	SMI Short Body Connector Bulk Pack (50 pcs)

SMI Short and Long Body Connector

ABSOLUTE MAXIMUM RATINGS

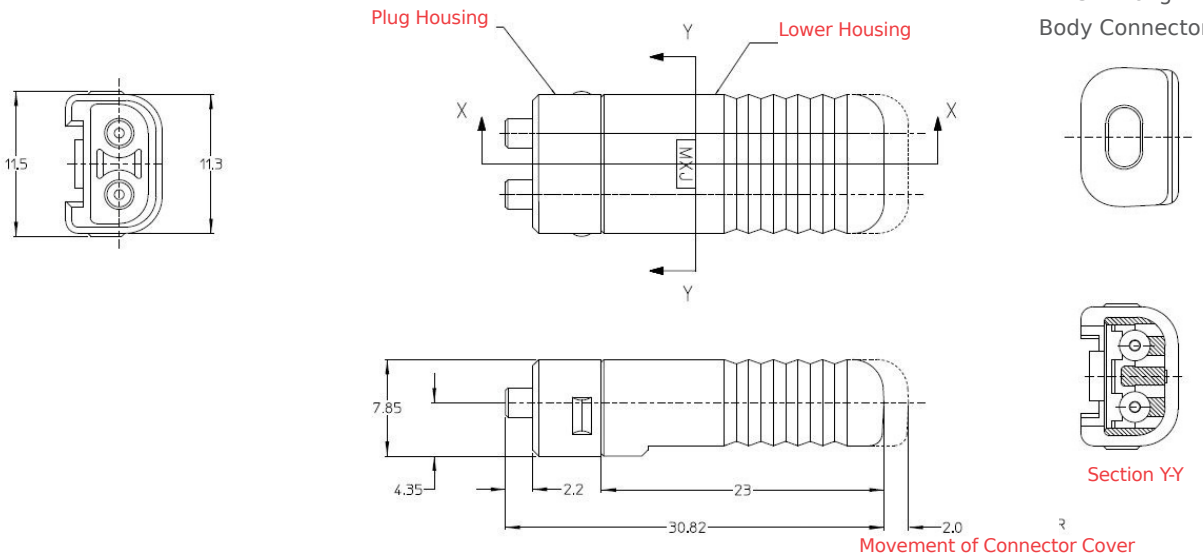
Parameter	Min	Max	Unit
Storage and operating temperature	-40	+85	°C
Recommended operation temperature			

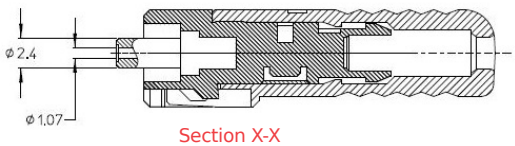
SMI Short Body Connector



SMI Short Body Connector

SMI Long Body Connector





SMI Long Body Connector

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SMI OPTICAL INTERCONNECTS

STANDARD LENGTH CABLE ASSEMBLIES

Order No.	Cable Type	Length
88531-9808	2.20mm diameter zipcord	0.20m
88531-9810		0.30m
88531-9800		1.00m
88531-9801		2.00m
88531-9802		3.00m
88531-9803		5.00m
88531-9804		10.00m
88531-9809		15.00m
88531-9805		20.00m
88531-9806		30.00m
88531-9807		50.00m

Cable Assemblies/ Adapters

CUSTOMIZED CABLE ASSEMBLIES, HYBRID CABLES AND HARNESSES

Molex meets customer's request by manufacturing customized cable assemblies, hybrid cables and harnesses.
www.molex.com/link/pof.html

ADAPTER

Order No.	End-to-End
501266-0000	SMI-to-SMI

TOOLING

Order No.	Component	Content
85994-0212	Field Termination Kit	50 SMI connectors, termination tooling
85994-0214	Replacement Cutter	Replacement cutting head for hand-termination tool

Tooling

FIELD TERMINATION TOOLING KIT

Features and Benefits

Designed to terminate both duplex fibers (standard as one cable assembly) simultaneously provides consistent termination results with average attenuation loss 1.0 to 1.5 dB

Strips the fiber jacketing to the proper length and installs the connector holding tab to provide quick, simple, easy field terminations for installers

Designed for small quantity applications, Molex offers fully tested factory-manufactured cable assemblies, hybrid cable assemblies and harnesses for large and mid-sized quantities.

www.molex.com/link/optoelectronics.html
www.molex.com/link/pof.html
www.molex.com/fiber