Features

- Data-rate of 1.25Gbps operation
- 1550nm DFB laser and PIN photo detector for 70km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring:
- Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
- Standard : 0 to +70°C
  Industrial : -40 to +85°C

Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 70km transmission distance with SMF.

The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Supply Voltage	*Vcc*	–0.5	4.0	V	
Storage Temperature	T_S	–40	85	°C	
Operating Humidity	-	5	85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Units
Case Operating Temperature	T_C	0		70	°C
		-40		85	°C
Supply Voltage	*Vcc*	3.13		3.47	V
Supply Current	*Icc*	---		300	mA
Data Rate			1.25		Gbps

Timing and Electrical

Parameter	Symbol	Min.	Typical	Max.	Units
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	µs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	µs
Tx Disable To Reset	t_reset	10			µs
LOS Assert Time	t_loss_on			100	µs
LOS De-assert Time	t_loss_off			100	µs
Serial ID Clock Rate	f_serial_clock			400	KHz
MOD_DEF (0:2)-High	V_H	2		Vcc	V
MOD_DEF (0:2)-Low	V_L			0.8	V

Diagnostics Monitoring

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70 -40 to 85	± 3	°C	Internal / External
Voltage	3.0 to 3.6	± 3%	V	
Bias Current	0 to 100	± 10%	mA	
TX Power	0 to 5	± 3 dB	dBm	
RX Power	-23 to -3	± 3 dB	dBm	

Transmitter Electro-optical Characteristics

***Vcc* = 3.13 V to 3.47 V, T_C = 0 °C to 70 °C (-40°C to 85°C)**

Parameter		Symbol	Min.	Typ.	Max.	Units	Note
Centre Wavelength		λc	1480	1550	1580	nm	
Spectral Width (-20dB)		Δλ			1	nm	
Side Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		Pout	0		5	dBm	1
Extinction Ratio		ER	9			dB	
Optical Rise/Fall Time (20%~80%)		t_r/t_f			0.26	ns	
Data Input Swing Differential		V_{IN}	400		1800	mV	2
Input Differential Impedance		Z_{IN}	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.

Receiver Electro-optical Characteristics

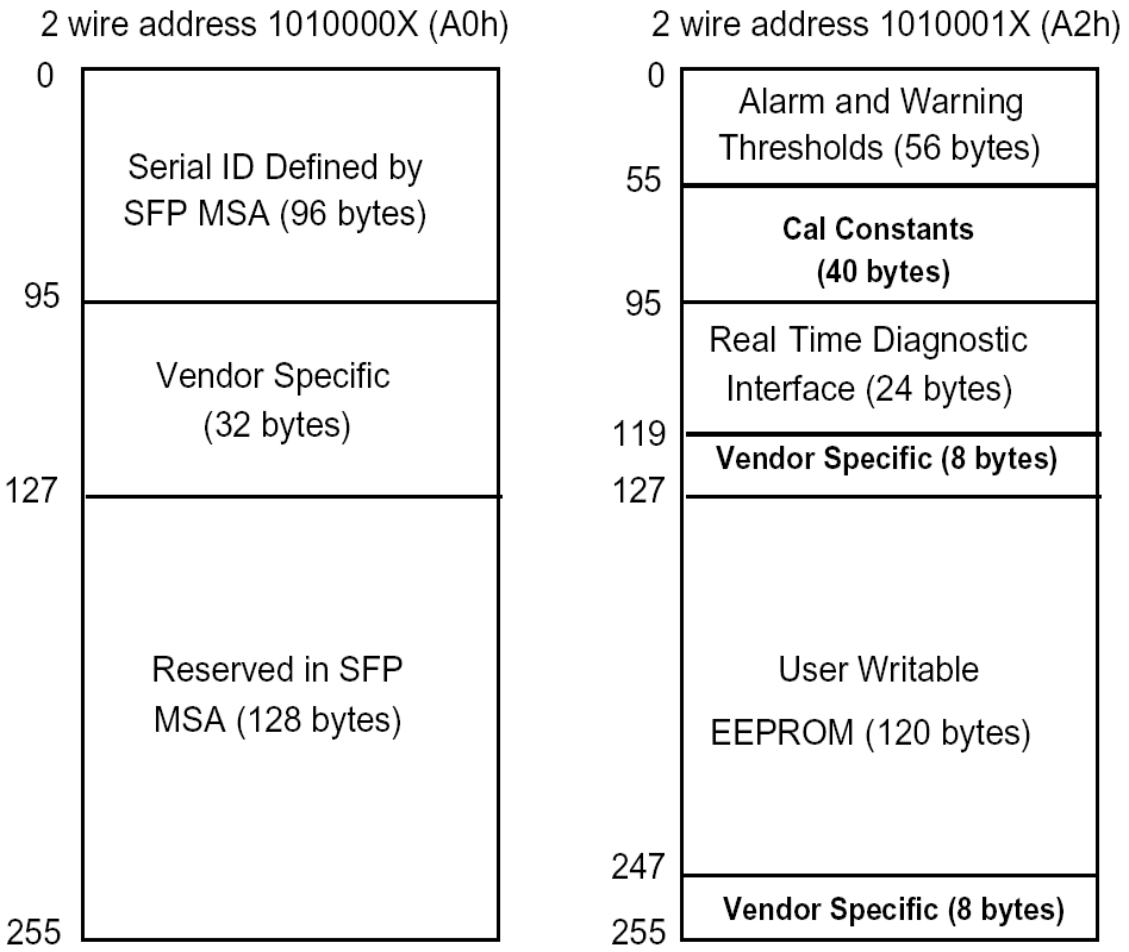
***Vcc* = 3.13 V to 3.47 V, T_C = 0 °C to 70 °C (-40°C to 85°C)**

Parameter	*Symbol*	*Min.*	*Typ.*	*Max.*	*Units*	*Note*
Centre Wavelength	λc	1260		1580	nm	
Receiver Sensitivity				-23	dBm	3
Receiver Overload		-3			dBm	3
LOS De-Assert	LOS_D			-24	dBm	
LOS Assert	LOS_A	-35			dBm	
LOS Hysteresis		1		4	dB	
Data Output Swing Differential	Vout	370		1800	mV	4
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

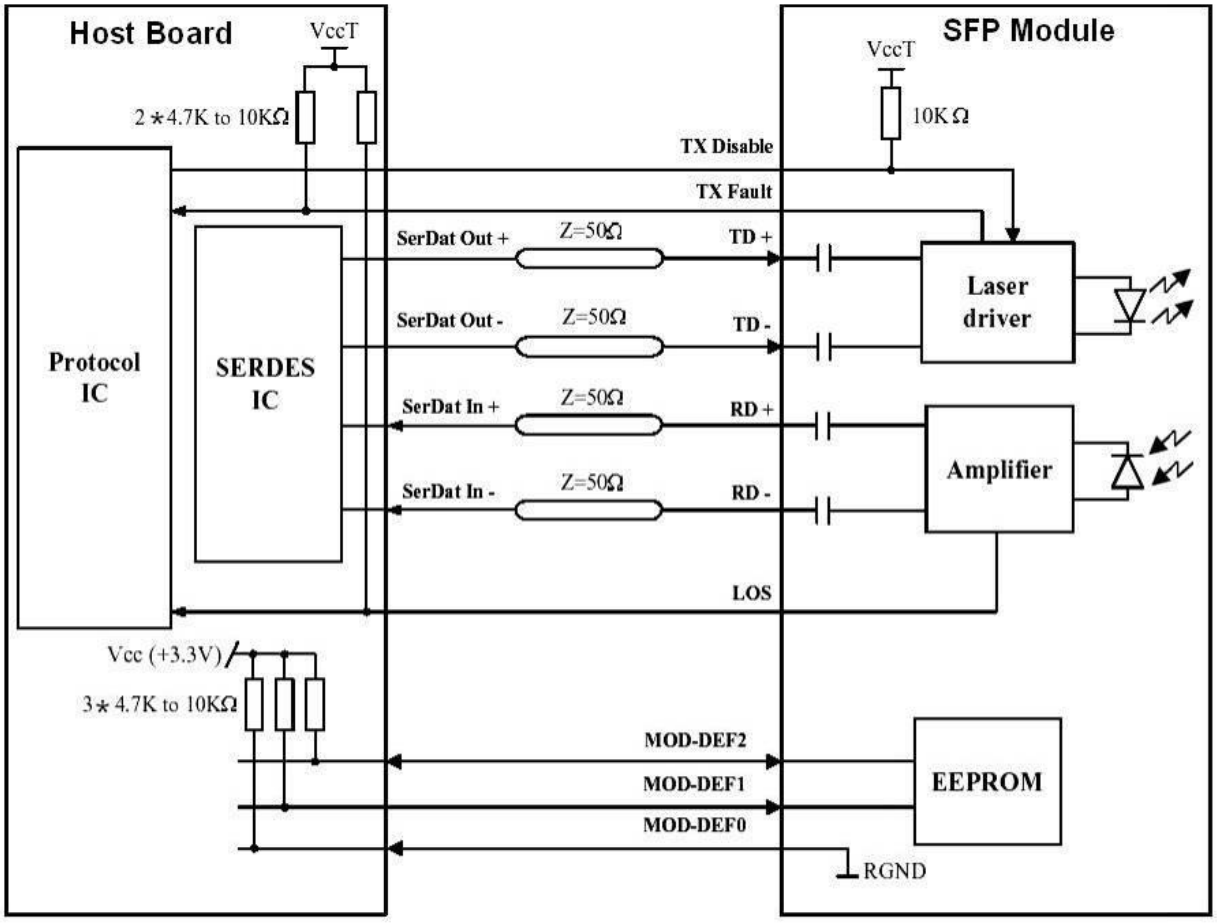
Notes:

1. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}.
2. Internally AC-coupled.

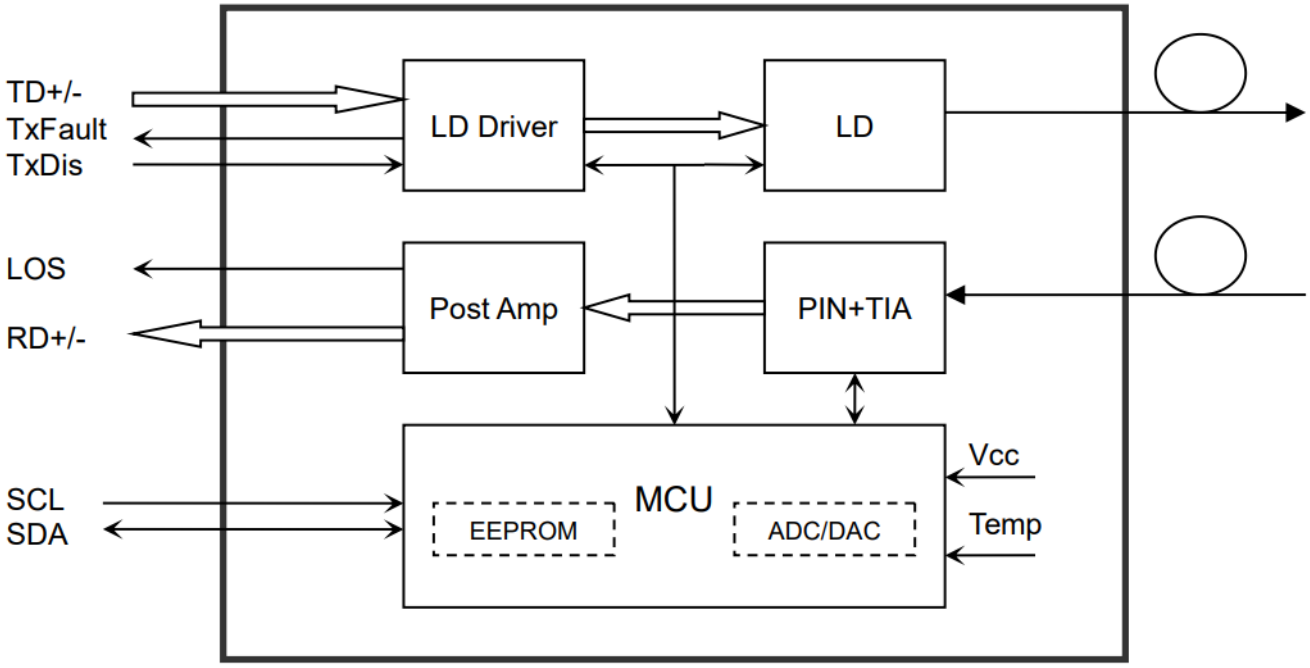
Digital Diagnostic Memory Map



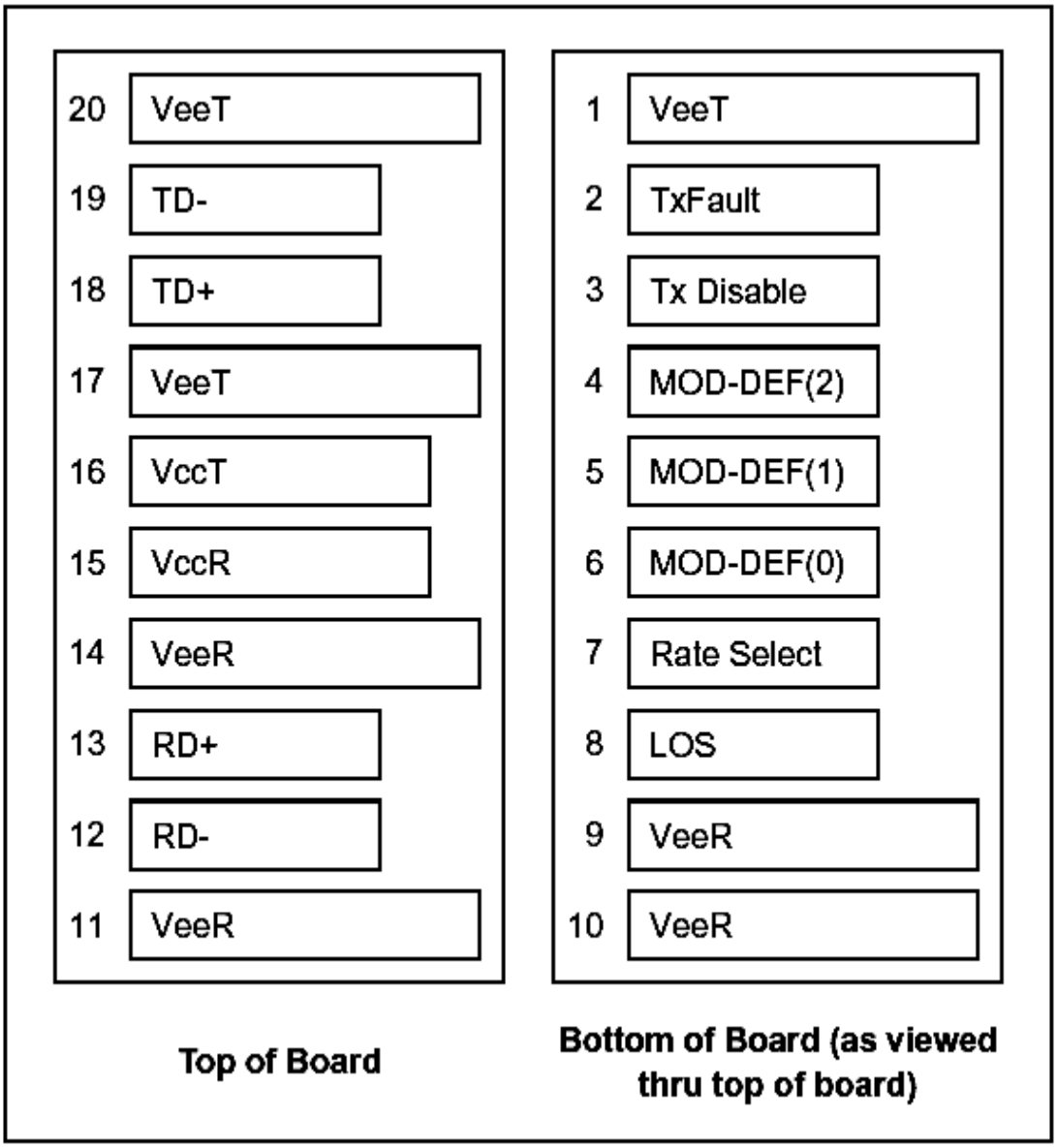
Recommended Interface Circuit



Block Diagram of Transceiver



Pin Assignment



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V_{EER}	Receiver ground	1	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V_{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:

   Low (0 to 0.8V): Transmitter on

   (>0.8V, < 2.0V): Undefined

   High (2.0 to 3.465V): Transmitter Disabled

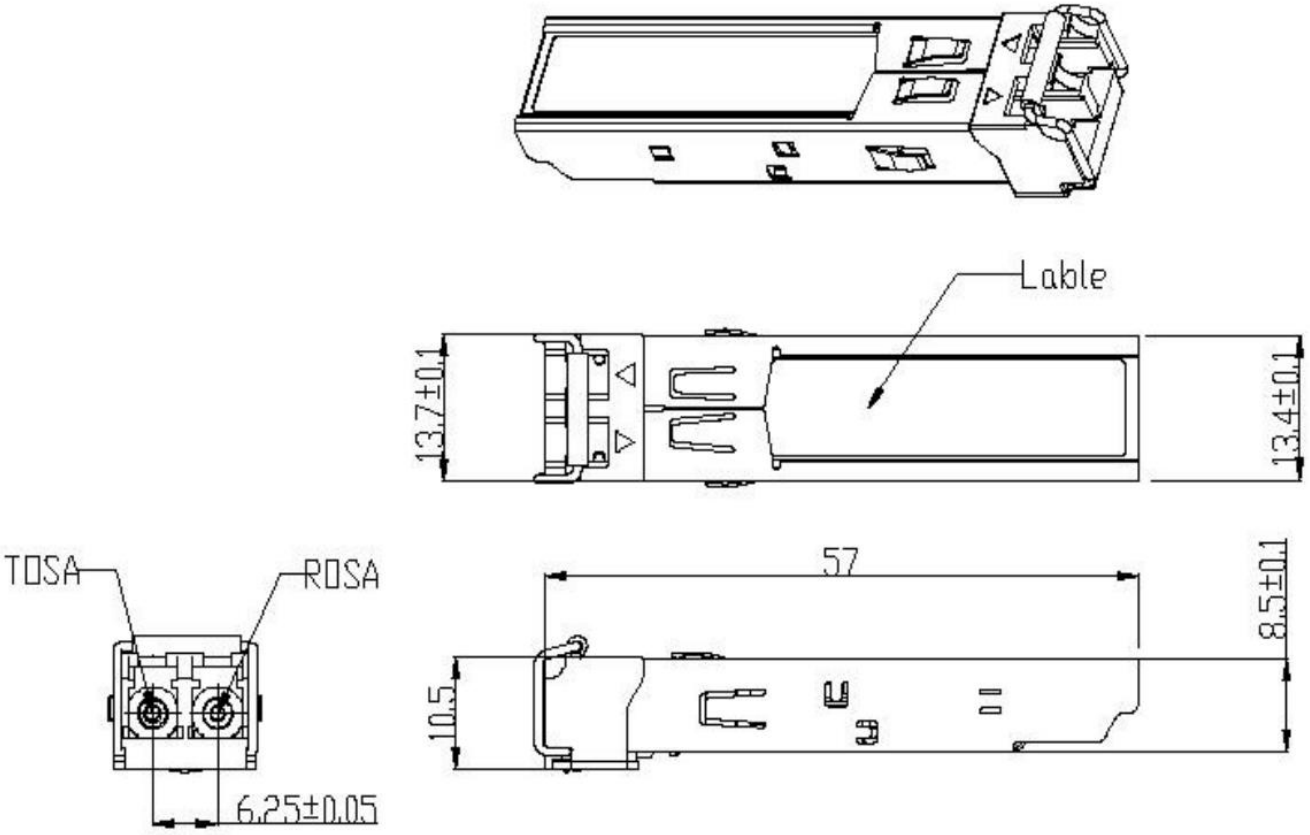
   Open: Transmitter Disabled
3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.

   Mod-Def 0 is grounded by the module to indicate that the module is present

   Mod-Def 1 is the clock line of two wire serial interface for serial ID

   Mod-Def 2 is the data line of two wire serial interface for serial ID
4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

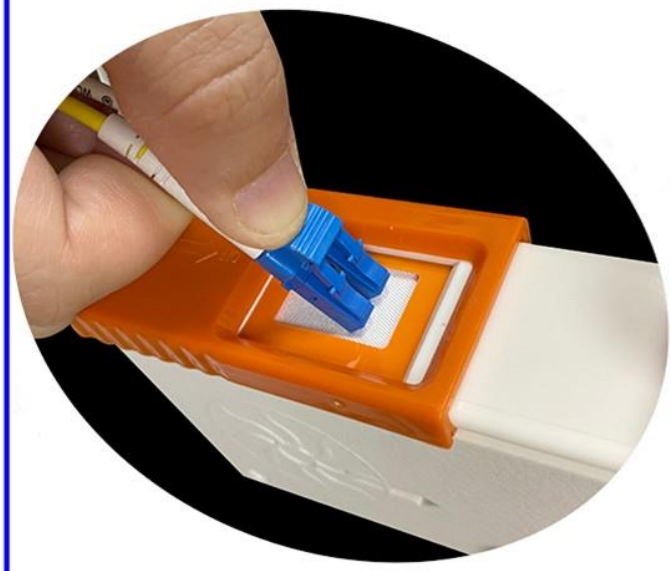
Dimensions



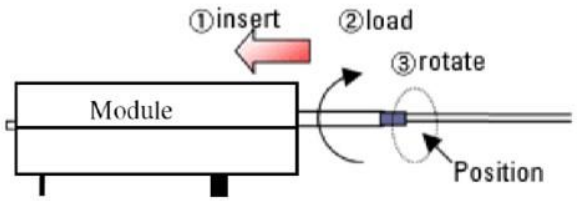
Optical Receptacle Cleaning Recommendations:

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Cleaning of patch-cord



Cleaning of fiber stub



1. Insert
   Ensure that stick is held straight when inserting into sleeve.
2. Load
   Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
   Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

Notice: Number of possible wipes:
Maintenance (repair) ~1 use / piece
Equipment construction: 4 uses / piece (max.)

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

Ordering Information

Model Number	Part Number	Reach	Voltage	Temperature
SFP-ZX-DM	OP6C-S70-15-CMF	70km	3.3V	0°C to 70 °C
SFP-ZX-I-DM	OP6C-S70-15-IMF	70km	3.3V	-40°C to 85 °C

Modification History

Revision	Date	Description
A1	Dec. 2023	Initial Release

Note: All information contained in this document is subject to change without notice.