



Features

- Compliant with XFP MSA INF-8077i
- Compliant with IEEE802.3ae 10GBASE-EW/ER Ethernet
- Compliant with 40km 10G Fiber Channel
- Compliant with SONET OC-192 IR-2/SONET OC-192 IR-3
- Compliant with SDH STM S-64.2b/SDH STM S-64.3b
- Compliant with SONET OC-192/SDH STM-64 with ITU-T G.709
- Compliant with 40km 10G Ethernet with ITU-T G.709 FEC
- Differential LVPECL inputs and CML outputs
- TTL signal detect indicator
- Hot Pluggable
- Power consumption < 3.5W
- Class 1 laser product complies with EN 60825-1
- RoHS Compliant

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_s	-40	85	°C	
Supply Voltage	V_{cc3}	-0.5	4.0	V	
Input Voltage	V_{cc5}	-0.5	6.0	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_C	-5	70	°C	
Supply Voltage	V_{cc3}	3.1	3.5	V	
Supply Current	I_{cc3}	---	500	mA	
Supply Voltage	V_{cc5}	4.5	5.5	V	
Supply Current	I_{cc5}	---	350	mA	

Diagnostics

Data Address	Parameter	Range	Accuracy
96-97	Temperature	-40 °C to 85 °C	±3°C
100-101	Bias Current	0 to 120mA	±10%
102-103	TX Power	-2 to +3dBm	±2dB
104-105	RX Power	-17 to +0dBm	±2dB
106-107	Vcc3 Voltage	2.9~3.7 Volts	±3%
108-109	Vcc5 Voltage	4.5~5.5 Volts	±3%

Transmitter Electro-optical Characteristics

Vcc3 = 3.1 V to 3.5 V, Vcc5 = 4.5 V to 5.5 V, T_c = -5 °C to 70 °C (-40 °C to 85 °C)

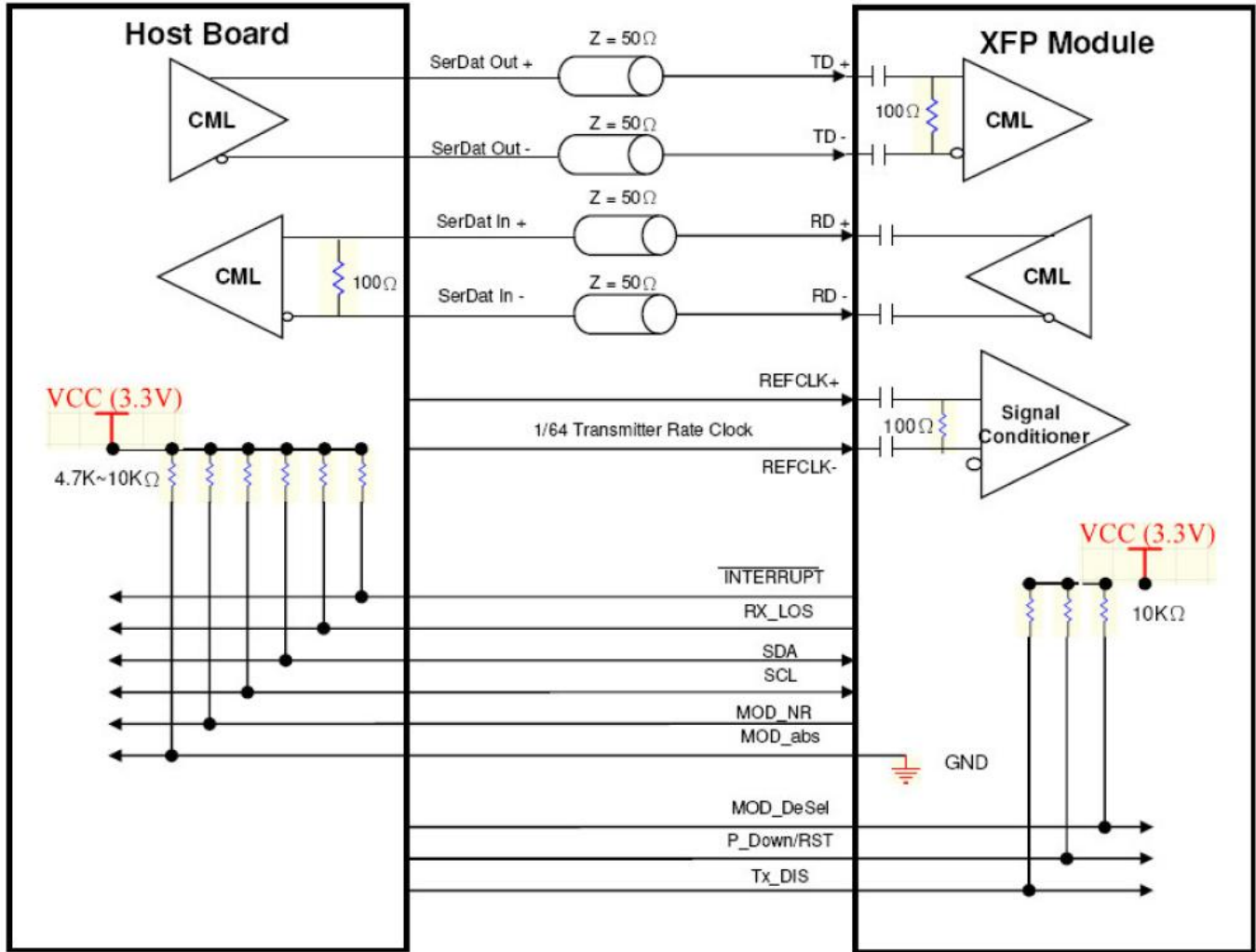
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Data Rate		9.95		11.3	Gbps	
Input Reference Clock Rate			Not Required			
Output Optical Power	P _{out}	-1	---	+2	dBm	
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ _c	1530		1565	nm	
Tx jitter (20kHz-80MHz)	T _{xj1}			0.3	UI	
Tx jitter (4MHz-80MHz)	T _{xj2}			0.1	UI	
Sidemode Supression ratio	SSR _{min}	30				dB
Relative Intensity Noise	RIN	---	---	-130	dB/Hz	
Output Eye		Compliant with IEEE802.3ae				
Differential Input Voltage	V _{DIFF}	0.12	---	1.0	V	
Transmit Fault Output-Low	TX_FAULTL	0.0	---	0.5	V	
Transmit Fault Output-High	TX_FAULTH	2.4	---	Vcc	V	
TX_DISABLE Assert Time	t _{off}	---	---	10	μs	
TX_DISABLE Negate Time	t _{on}	---	---	2	ms	
Time to initialize	t _{init}	---	---	300	ms	
Interrupt assert delay	Interrupt _{on}	---	---	200	ms	
Interrupt negate delay	Interrupt _{off}	---	---	500	ms	
P_Down/RST assert delay	P_Down/RST _{on}			100	ms	
Mod_NR assert delay	Mod_nr _{on}			1	ms	
Mod_NR negate delay	Mod_nr _{off}			1	ms	
P-Down reset time		10			μs	
RX_LOS assert delay	t _{loss_on}			100	μs	
RX_LOS negate delay	t _{loss_off}			100	μs	

Receiver Electro-optical Characteristics

$V_{cc3} = 3.1\text{ V to }3.5\text{ V}$, $V_{cc5} = 4.5\text{ V to }5.5\text{ V}$, $T_C = -5\text{ }^\circ\text{C to }70\text{ }^\circ\text{C}$ (-40 °C to 85 °C)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Optical Input Power-maximum	P_{IN}	-1	---	---	dBm	BER < 10^{-12}
Receiver Sensitivity	P_{IN}	---	---	-16	dBm	BER < 10^{-12}
Receiver Sensitivity (OMA)	P_{IN}	---	---	-14.1	dBm	BER < 10^{-12}
Stress Receiver Sensitivity (OMA)	P_{IN}	---	---	-11.3	dBm	BER < 10^{-12}
Operating Center Wavelength	λ_C	1270	---	1600	nm	
Receiver Reflectance	R_{rx}	27	---	---	dB	
Dispersion Penalty				2	dB	40 km
Loss of Signal-Asserted	P_A	---	---	-30	dBm	
Loss of Signal-Deasserted	P_D	-22	---	---	dBm	
Differential Output Voltage	V_{DIFF}	0.6		0.8	V	
TTL Input High Voltage		2		V_{cc}	V	
TTL Input Low Voltage		0		0.8	V	
TTL output High Voltage		2.4	---	V_{cc}	V	
TTL output Low Voltage		0	---	0.4	V	
Receiver Loss of Signal Assert Time (off to on)	t_{A,RX_LOS}	---	---	100	μs	
Recover Loss of Signal Assert Time (on to off)	t_{D,RX_LOS}	---	---	100	μs	

Block Diagram of Transceiver



MOD_NR

The Mod_NR is an output pin that when High, indicates that the module has detected a condition that renders transmitter and or receiver data invalid, shall consist of logical OR of the following signals:

- Transmit Signal Conditioner Loss of Lock
- Transmitter Laser Fault
- Receiver Signal Conditioner Loss of Lock

MOD_DESEL

The Mod_DeSel is an input pin. When held Low by the host, the module responds to 2-wire serial communication commands. The Mod_DeSel allows the use of multiple XFP modules on a single 2-wire interface bus. When the Mod_DeSel pin is "High", the module shall not respond to or acknowledge any 2-wire interface communication from the host.

INTERRUPT

Interrupt is an output pin. When "Low", indicates possible module operational fault or a status critical to the host system.

TX_DIS

TX_DIS is an input pin. When TX_DIS is asserted High, the XFP module transmitter output must be turned off.

MOD_ABS

Mod_ABS is pulled up to Host_Vcc on the host board and grounded in the XFP module. Mod_ABS is then asserted "High" when the XFP module is physically absent from a host slot.

RX_LOS

The RX_LOS when High indicates insufficient optical power for reliable signal reception.

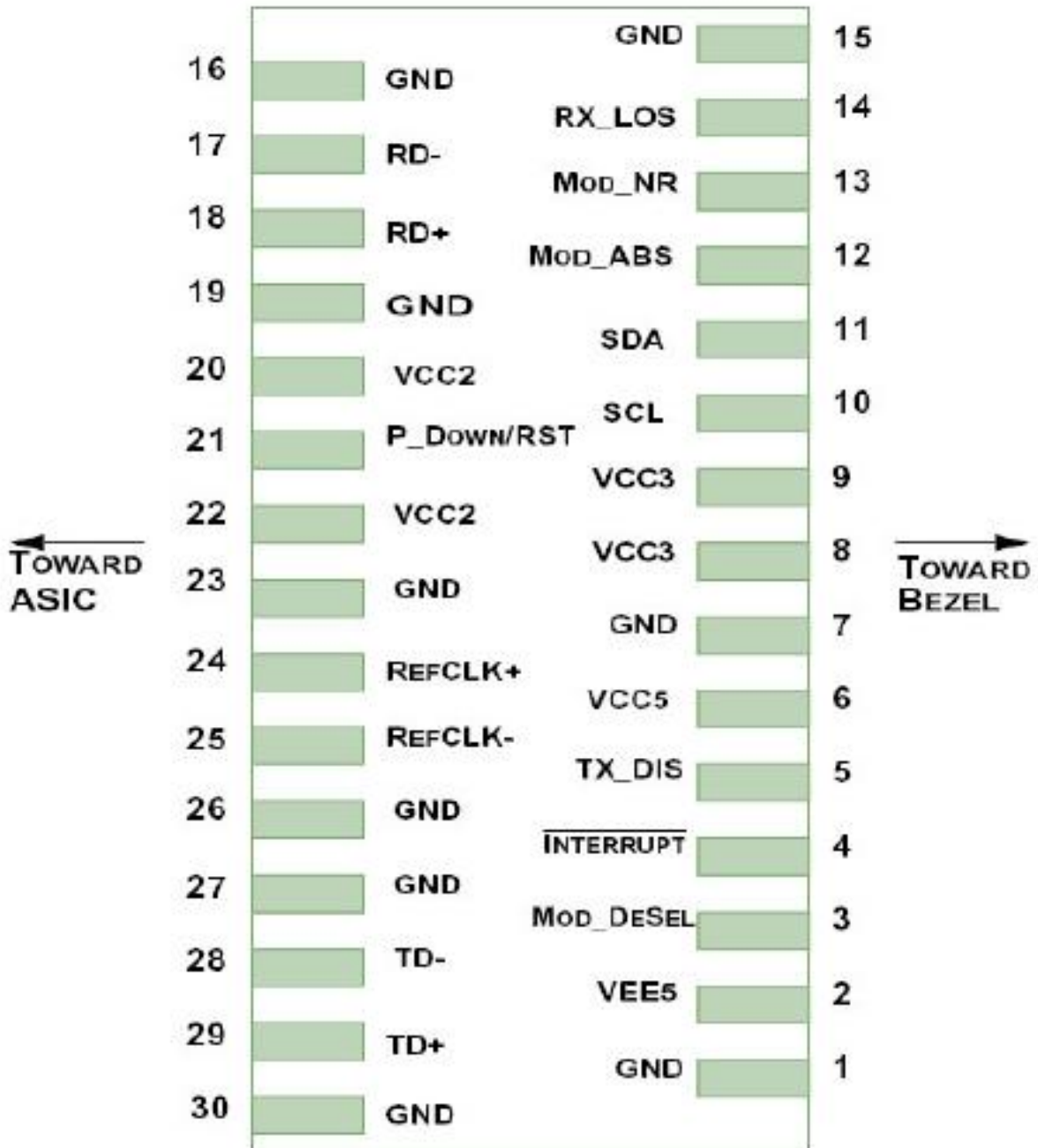
P_DOWN/RST

This is a multifunction pin for module Power Down and Reset. The P_Down/RST pin must be pulled up to VCC3 in the XFP module.

POWER DOWN FUNCTION

The P_Down pin, when held high by the host, places the module in the standby (Low Power) mode with a maximum power dissipation of 1.5W. This protects hosts which are not capable of cooling higher power modules which may be accidentally inserted.

Pin Assignment

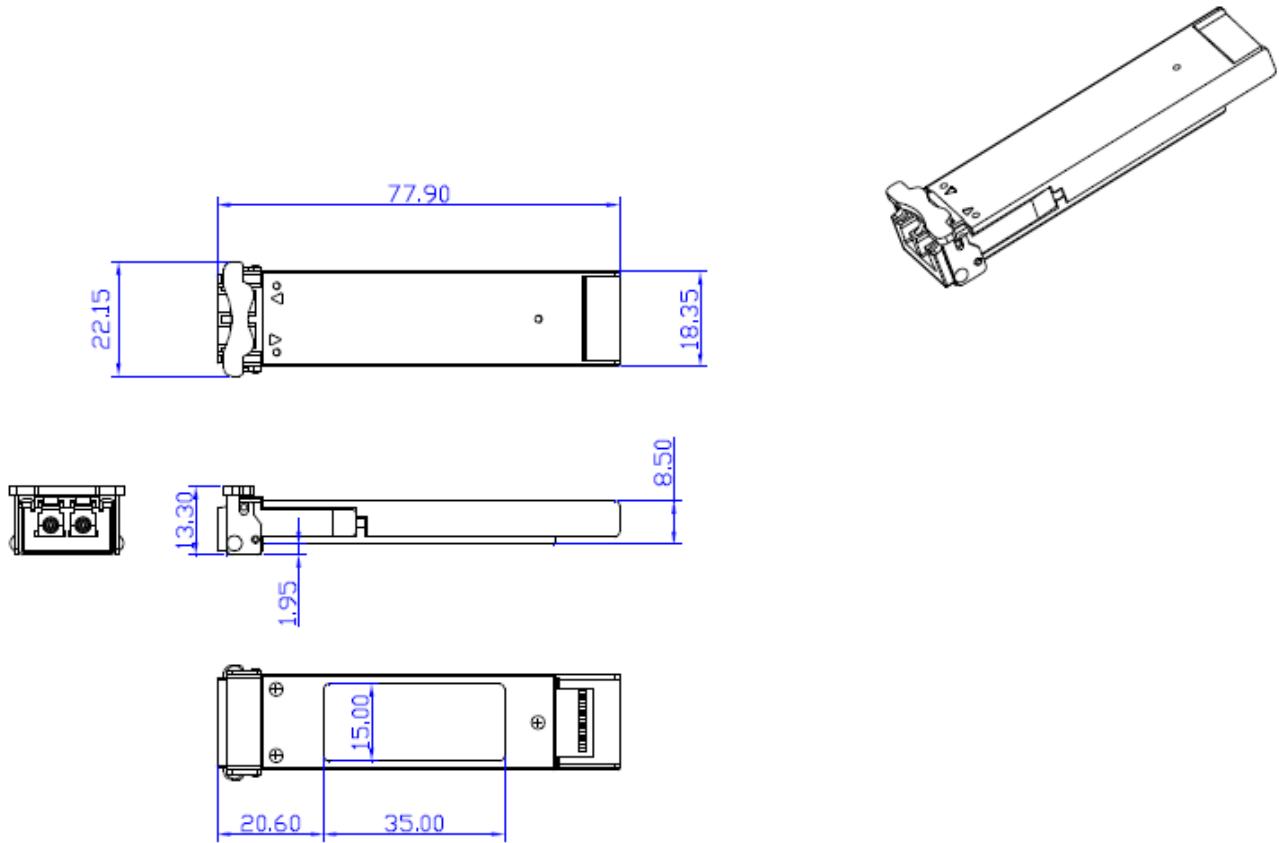


Pin Descriptions

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply	
3	LVTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial interface	
4	LVTTL-O	Interrupt	Interrupt; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the Module	2
13	LVTTL-O	Mod_NR	Module Not Ready; Indicating Module Operational Fault	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal Indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver Inverted Data Output	
18	CML-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	3
21	LVTTL-I	P_Down/RST	Power down; When high, requires the module to limit power consumption to 1.5W or below, 2-Wire serial interface must be functional in the low power mode. Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply	3
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Not Required	
25	PECL-I	RefCLK-		
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter Inverted Data Input	
29	CML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

1. Module ground pins Gnd are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.
3. The 1.8V power supply can be optionally programmed to voltages lower than 1.8V in modules supporting the variable power supply.

Dimensions



DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE $\pm 0.2\text{mm}$ UNLESS OTHERWISE SPECIFIED

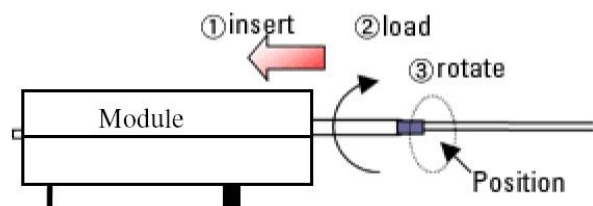
Optical Receptacle Cleaning Recommendations :

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

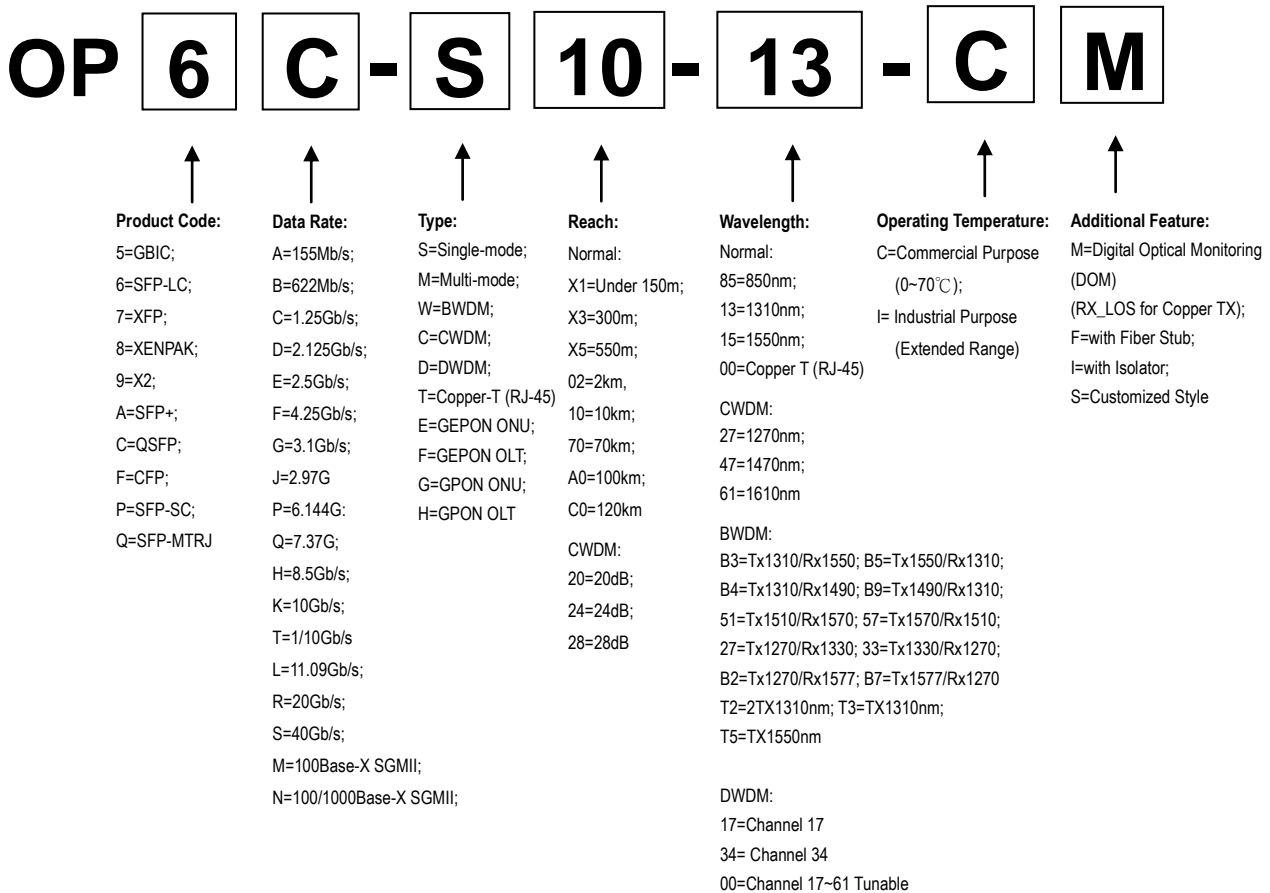


1. Insert
Ensure that stick is held straight when inserting into sleeve.
2. Load
Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

*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	Input/Output	Signal Detect	Voltage	Temperature
XFP-ER	OP7K-S40-15-C	40 km	AC/AC	TTL	3.3V/5V	-5°C to 70 °C
XFP-ER-I	OP7K-S40-15-I	40 km	AC/AC	TTL	3.3V/5V	-40°C to 85 °C

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