



Features

- Compliant with XFP MSA
- Wavelength selectable to C-band ITU-T grid wavelengths
- Suitable for use in 100GHz channel spacing DWDM systems
- No Reference Clock required
- Cold Start up Wavelength Compliance
- DWDM-rated EML transmitter and PIN receiver
- Low Power Dissipation 3.5W Maximum
- RoHS Compliant

Applications

- SONET OC-192&SDH STM 64
- 10G Ethernet
- 80km 10G Fiber Channel
- DWDM Networks

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Remarks
Storage Temperature	T_{st}	-40	85	°C	
Supply Voltage	$V_{cc1.8}$	-0.5	+2.0	V	
	$V_{cc3.3}$	-0.5	+4.0	V	
	$V_{cc5.0}$	-0.5	+6.0	V	
Optical Input Received Power	P_{IN}	---	+4	dBm	

Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
Operating Case temperature	T_{ca}	-5	-	70	°C	
Supply Voltage	$V_{cc1.8}$	1.71	1.8	1.89	V	
	$V_{cc3.3}$	3.13	3.3	3.47	V	
	$V_{cc5.0}$	4.75	5.0	5.25	V	
Supply Current	$I_{cc1.8}$	-	-	350	mA	
	$I_{cc3.3}$	-	-	450	mA	
	$I_{cc5.0}$	-	-	100	mA	
Module Power Dissipation	P_m	-	-	3.5	W	

Transmitter Electro-optical Characteristics

V_{cc} = 3.13 V to 3.47 V, T_c = -5 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate Multirate	Mra	9.95	---	11.1	Gbps	
Optical Transmit Power	Po	-1		+2	dBm	
Optical Transmit Power (disabled)	PTX_DIS	---	---	-40	dBm	
Extinction Ratio	ER	8.2	---	---	dB	
Center Wavelength-Start of Life	λ_C	λ_C-25	λ_C	λ_C+25	pm	
Center Wavelength-End of Life	λ_C	λ_C-100	λ_C	λ_C+100	pm	
Side-mode Supression Ratio	SMSR	30	---	---	dB	
Channel Spacing	Δf	---	100	---	GHz	
Jitter Generation	TJP-P	---	---	0.1	UI	
Spectral Width (-20dB)	DI20	---	0.1	0.3	nm	
Dispersion Penalty with 800 ps/nm	DP	---	---	2.0	dB	
Optical Output Eye	Compliant with ITU-T G.691 STM-64 eye mask					
Input Differential impedance	Rim	---	100		Ω	
Differential data Input	VtxDIFF	120		1000	mV	
Transmit Disable Voltage	VD	2.0		V _{cc} +0.3	V	
Transmit Enable Voltage	Ven	0		+0.8	V	
Transmit Disable Assert Time	Vn	---	---	10	us	

Receiver Electro-optical Characteristics

V_{cc} = 3.13 V to 3.47 V, T_c = -5 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate Multirate	<i>Mra</i>	9.95	---	11.3	Gbps	
Receiver Sensitivity	<i>Rsens</i>	---	---	-15	dBm	
Receiver Sensitivity (OSNR=20dB)	<i>Rsens-2</i>	---	---	-24	dBm	
Maximum Input Power	<i>RX-overload</i>	---	---	-1	dBm	
Input Operating Wavelength	λ	1528	---	1564	nm	
Reflectance	<i>Rrx</i>	---	---	-27	dB	
Loss of Signal Asserted	<i>LOS_A</i>	-28	---	---	dBm	
LOS De-Asserted	<i>LOS_D</i>	---	---	-22	dBm	
LOS Hysteresis	<i>LOS_H</i>	0.5	---	---	dB	
Differential Output Swing	<i>Vout P-P</i>	400	---	800	mV	
Rise/Fall Time	<i>Tr/Tf</i>	24	---	---	ps	
Loss of Signal-Asserted	<i>VOH</i>	2	---	V _{cc3} +0.3-	V	
Loss of Signal-Negated	<i>VOL</i>	0	---	0.8	V	

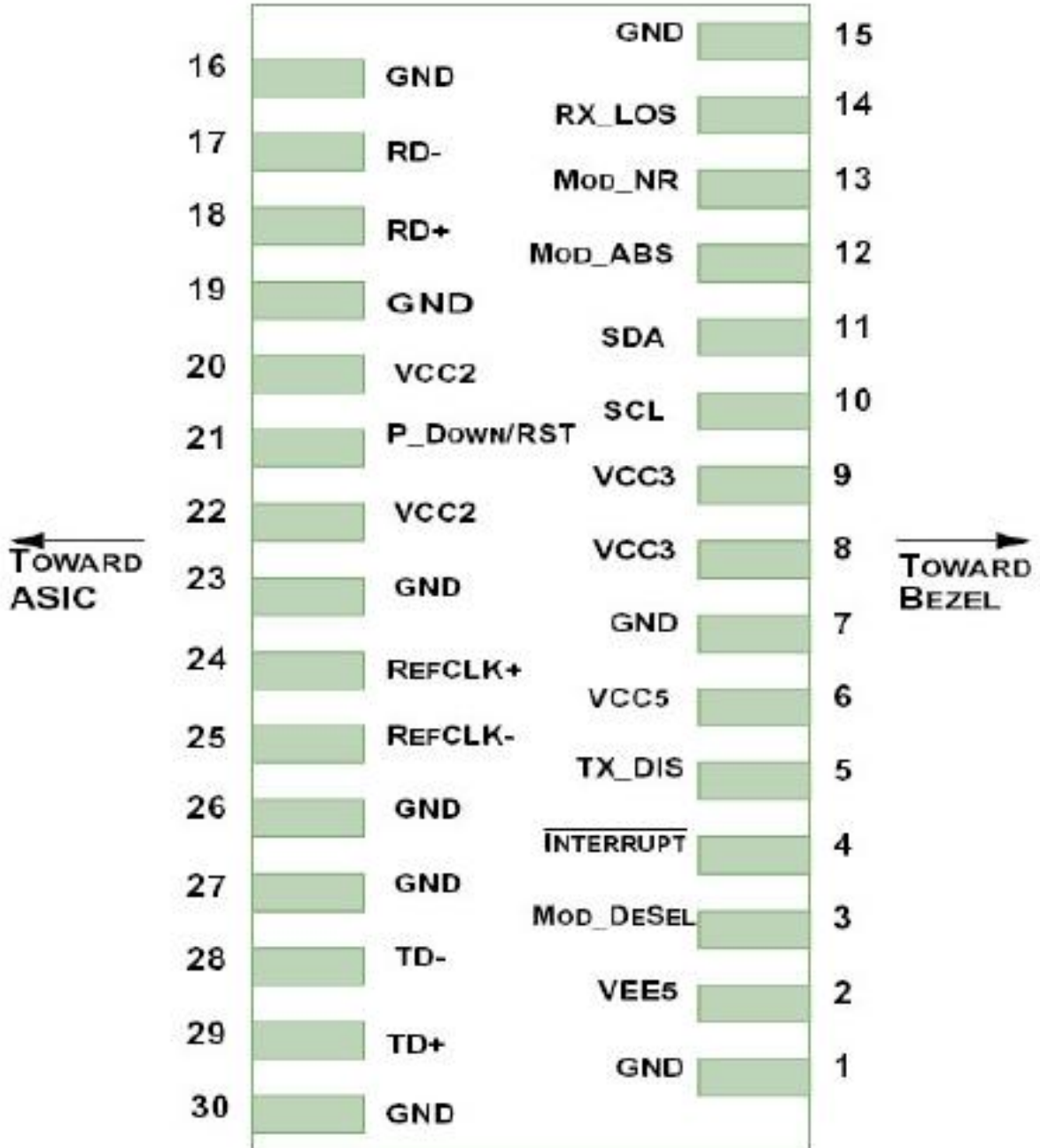
Low Speed Electrical Signal Timings

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
TX Disable, Power_Down/RST	<i>VIH</i>	2.0		V _{cc3} +0.3	V	
	<i>VIL</i>	-0.3		0.8	V	
Interrupt, Mod_NR, Rx_Los	<i>VOH</i>	V _{dd3} -0.5		V _{cc3} +0.3	V	
	<i>VOL</i>	0		0.4	V	
SCL, SDA (IN)	<i>VIH</i>	V _{dd3} *0.7		V _{cc3} +0.5	V	
	<i>VIL</i>	-0.3		V _{cc3} *0.3	V	
SCL, SDA(OUT)	<i>VOH</i>	V _{dd3} -0.5		V _{cc3} +0.3	V	
	<i>VOL</i>	0		0.4	V	

C-band λ c Wavelength Guide

<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>	<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>	<i>Channels</i>	<i>Frequency</i>	<i>Wavelength</i>
17	191.7	1563.86	32	193.2	1551.72	47	194.7	1539.77
18	191.8	1563.05	33	193.3	1550.92	48	194.8	1538.98
19	191.9	1562.23	34	193.4	1550.12	49	194.9	1538.19
20	192.0	1561.42	35	193.5	1549.32	50	195.0	1537.40
21	192.1	1560.61	36	193.6	1548.51	51	195.1	1536.61
22	192.2	1559.79	37	193.7	1547.72	52	195.2	1535.82
23	192.3	1558.98	38	193.8	1546.92	53	195.3	1535.04
24	192.4	1558.17	39	193.9	1546.12	54	195.4	1534.25
25	192.5	1557.36	40	194.0	1545.32	55	195.5	1533.47
26	192.6	1556.55	41	194.1	1544.53	56	195.6	1532.68
27	192.7	1555.75	42	194.2	1543.73	57	195.7	1531.9
28	192.8	1554.94	43	194.3	1542.94	58	195.8	1531.12
29	192.9	1554.13	44	194.4	1542.14	59	195.9	1530.33
30	193.0	1553.33	45	194.5	1541.35	60	196.0	1529.55
31	193.1	1552.52	46	194.6	1540.56	61	196.1	1528.77

Pin Assignment



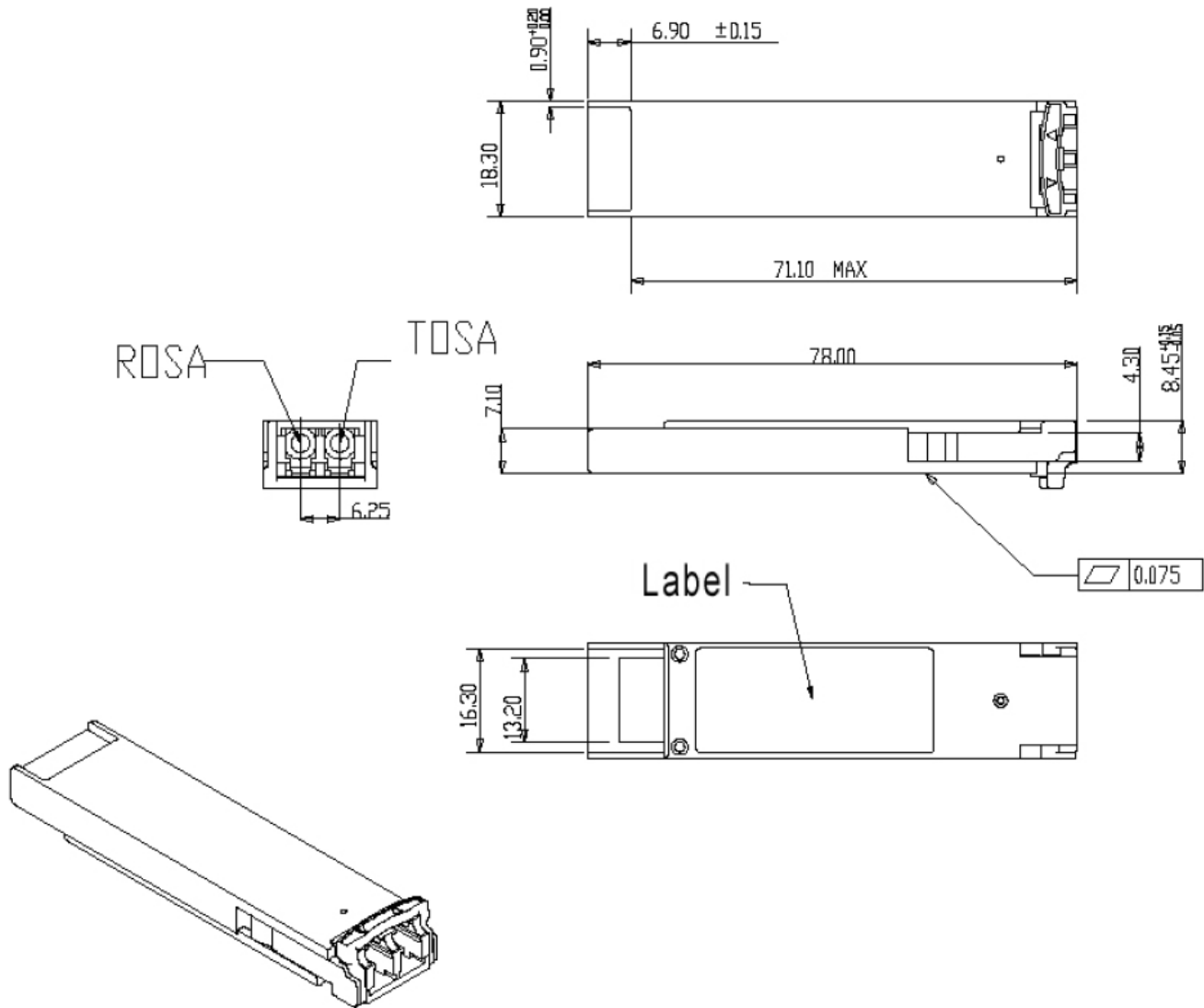
Pin Description

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply – Not required	
3	LVTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial interface commands.	
4	LVTTL-O	<u>Interrupt</u>	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	Module Absent; Indicates Module is not present. Grounded in the Module	2
13	LVTTL-O	Mod_NR	Module Not Ready	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	
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	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board-Not required.	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board- Not required	3
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

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required.

Dimensions



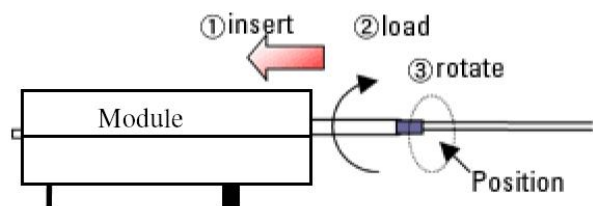
Optical Receptacle Cleaning Recommendations :

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

OP **6** **C** - **S** **10** - **13** - **C** **M**

↑	↑	↑	↑	↑	↑	↑
Product Code:	Data Rate:	Type:	Reach:	Wavelength:	Operating Temperature:	Additional Feature:
5=GBIC; 6=SFP-LC; 7=XFP; 8=XENPAK; 9=X2; A=SFP+; C=QSFP; F=CFP; P=SFP-SC; Q=SFP-MTRJ	A=155Mb/s; B=622Mb/s; C=1.25Gb/s; D=2.125Gb/s; E=2.5Gb/s; F=4.25Gb/s; G=3.1Gb/s; J=2.97G; P=6.144G; Q=7.37G; H=8.5Gb/s; K=10Gb/s; T=1/10Gb/s; L=11.09Gb/s; R=20Gb/s; S=40Gb/s; M=100Base-X SGMII; N=100/1000Base-X SGMII;	S=Single-mode; M=Multi-mode; W=BWDM; C=CWDM; D=DWDM; T=Copper-T (RJ-45) E=GEPON ONU; F=GEPON OLT; G=GPON ONU; H=GPON OLT	Normal: X1=Under 150m; X3=300m; X5=550m; O2=2km, 10=10km; 70=70km; A0=100km; C0=120km CWDM: 20=20dB; 24=24dB; 28=28dB	Normal: 85=850nm; 13=1310nm; 15=1550nm; 00=Copper T (RJ-45) CWDM: 27=1270nm; 47=1470nm; 61=1610nm BWDM: B3=Tx1310/Rx1550; B5=Tx1550/Rx1310; B4=Tx1310/Rx1490; B9=Tx1490/Rx1310; 51=Tx1510/Rx1570; 57=Tx1570/Rx1510; 27=Tx1270/Rx1330; 33=Tx1330/Rx1270; B2=Tx1270/Rx1577; B7=Tx1577/Rx1270 T2=2TX1310nm; T3=TX1310nm; T5=TX1550nm DWDM: 17=Channel 17 34= Channel 34 00=Channel 17~61 Tunable	C=Commercial Purpose (0~70°C); I= Industrial Purpose (Extended Range)	M=Digital Optical Monitoring (DOM) (RX_LOS for Copper TX); F=with Fiber Stub; I=with Isolator; S=Customized Style

Model Number	Part Number	Input/Output	Signal Detect	Voltage	Temperature
XFP-DWDM-40	OP7K-D40-xx-CF	AC/AC	TTL	3.3/5V	-5°C to 70 °C

Note: xx = channels

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