ETU-LINK

Optical Communication System

XFP Series

XFP

EXTDxxX-3LCD80

10Gbps Tunable DWDM 80KM XFP Transceiver Module

➢ Supports 9.95Gb/s to 11.3Gb/s bit rates
➢ Monolithically integrated full C-band tunable transmitter and APD receiver
➢ 50 GHz ITU channel spacing with integrated wavelength locker
➢ Up to 80km on 9/125μm SMF
➢ Support Digital Diagnostic Monitoring interface
➢ Hot-pluggable XFP footprint
➢ No Reference Clock required
➢ Metal enclosure, for lower EMI
➢ RoHS-10 compliant and lead-free
➢ Supports Line-side and XFI loopback
➢ Standard bail release mechanism
➢ Single +3.3V power supply
➢ Power dissipation <3.5W
➢ Case operating temperature:
  Commercial: 0 ~ +70ºC

Applications

➢ DWDM 10GBASE-ZR/ZW & 10G Ethernet
➢ DWDM SONET OC-192&SDH STM-64
➢ 10G Fiber Channel

Description

The ETU-Link tunable transceiver is an integrated fiber optic transceiver that provides a high-speed serial link at signaling rates from 9.95 Gb/s to 11.35 Gb/s. The module complies with the 10 Gigabit small form factor pluggable (XFP) multisource agreement-MSA (INF-8077i) and Tunable XFP for ITU Frequency Grid Applications (SFF-8477).

It complies with the ITU-T G.698.1 standard with 50 GHz channel spacing for SONET/SDH, IEEE DWDM 10GBASE-ZR for 80 km reach (Ethernet), and DWDM 10GFC for 80 km reach (Fiber Channel) applications.

The transceiver integrates the receiver and transmit path on one module. On the transmit side, the 10 Gbps serial data stream is recovered, retimed, and passed to a modulator driver. The modulator driver biases and modulates a C-band-tunable integrated laser Mach-Zehnder (ILMZ), enabling data transmission over single-mode fiber through an industry-standard LC connector. On the receiver side, the 10 Gbps data stream is recovered from an APD/ trans-impedance amplifier, retimed, and passed to an output driver. This module features a hot-pluggable XFI-compliant electrical interface.

Part Number Ordering Information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(m)	Temperature (°C) (Operating Case)
EXTDxxX-3LCD80	10.3125	Refer to wavelength selection	80km SMF	0~70 commercial

Wavelength Selection: C-band λ c Wavelength Guide Pin Descriptions

Channel	Wavelength (nm)	Frequency (THZ)	Channel	Wavelength (nm)	Frequency (THZ)
C17	1563.86	191.70	C39	1546.12	193.90
H17	1563.45	191.75	H39	1545.72	193.95
C18	1563.05	191.80	C40	1545.32	194.00
H18	1562.64	191.85	H40	1544.92	194.05
C19	1562.23	191.90	C41	1544.53	194.10
H19	1561.83	191.95	H41	1544.13	194.15
C20	1561.42	192.00	C42	1543.73	194.20

H20	1561.01	192.05	H42	1543.33	194.25
C21	1560.61	192.10	C43	1542.94	194.30
H21	1560.20	192.15	H43	1542.54	194.35
C22	1559.79	192.20	C44	1542.14	194.40
H22	1559.39	192.25	H44	1541.75	194.45
C23	1558.98	192.30	C45	1541.35	194.50
H23	1558.58	192.35	H45	1540.95	194.55
C24	1558.17	192.40	C46	1540.56	194.60
H24	1557.77	192.45	H46	1540.16	194.65
C25	1557.36	192.50	C47	1539.77	194.70
H25	1556.96	192.55	H47	1539.37	194.75
C26	1556.55	192.60	C48	1538.98	194.80
H26	1556.15	192.65	H48	1538.58	194.85
C27	1555.75	192.70	C49	1538.19	194.90
H27	1555.34	192.75	H49	1537.79	194.95
C28	1554.94	192.80	C50	1537.40	195.00
H28	1554.54	192.85	H50	1537.00	195.05
C29	1554.13	192.90	C51	1536.61	195.10
H29	1553.73	192.95	H51	1536.22	195.15
C30	1553.33	193.00	C52	1535.82	195.20
H30	1552.93	193.05	H52	1535.43	195.25
C31	1552.52	193.10	C53	1535.04	195.30
H31	1552.12	193.15	H53	1534.64	195.35
C32	1551.72	193.20	C54	1534.25	195.40
H32	1551.32	193.25	H54	1533.86	195.45
C33	1550.92	193.30	C55	1533.47	195.50
H33	1550.52	193.35	H55	1533.07	195.55
C34	1550.12	193.40	C56	1532.68	195.60
H34	1549.72	193.45	H56	1532.29	195.65
C35	1549.32	193.50	C57	1531.90	195.70
H35	1548.91	193.55	H57	1531.51	195.75
C36	1548.51	193.60	C58	1531.12	195.80
H36	1548.11	193.65	H58	1530.72	195.85
C37	1547.72	193.70	C59	1530.33	195.90
H37	1547.32	193.75	H59	1529.94	196.95
C38	1546.92	193.80	C60	1529.55	196.00

H38	1546.52	193.85	H60	1529.16	196.05
Non-ITU	Peak wavelength between 1528.77nm-1563.86		C61	1528.77	196.10

Notes：

1. When a tunable module is plugged in for the first time, it will go to a default channel, or Tx_DIS asserted it will go to a standby condition. ETU-ALT81C default channel is 1568.36nm, compatible with channel range from 1 to 99

2. When the module is power cycled it will automatically go to the last channel selected, or Tx_DIS asserted it will go to a standby condition. If Tx_DIS asserted, the last channel selected will be cleared, and a valid new channel command will be required to set a channel.

3. If the Tx disabled and then re-enabled, the module rrns to the last channel selected.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T_S	-40	85	℃	
Power Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH_d	0		dBm	

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T_{OP}	0		70	℃	commercial
Supply Voltage	V_{CC}	3.135		3.465	V	
Main Supply Voltage	Vcc5	4.75		5.25	V	
Data Rate			10.3125		Gb/s	

Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			80	km	9/125um

Pin Assignment and Pin Description
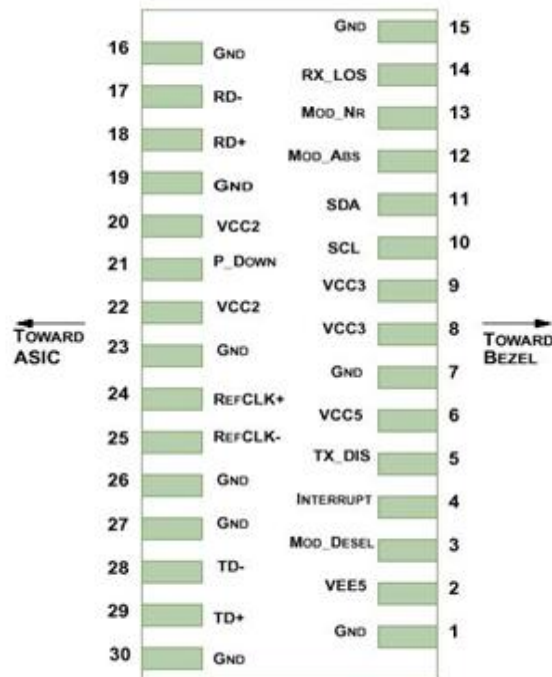
Figure1. Diagram of host board connector block pin numbers and names

Pin	Symbol	Name/Description	Notes
1	GND	Module Ground	1
2	VEE5	Optional –5.2 Power Supply – Not required	
3	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6	VCC5	+5 Power Supply – Not required	
7	GND	Module Ground	1
8	VCC3	+3.3V Power Supply	
9	VCC3	+3.3V Power Supply	
10	SCL	Serial 2-wire interface clock	
11	SDA	Serial 2-wire interface data line	2

12	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	Mod_NR	Module Not Ready; 's defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	2
14	RX_LOS	Receiver Loss of Signal indicator	2
15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver inverted data output	
18	RD+	Receiver non-inverted data output	
19	GND	Module Ground	1
20	VCC2	+1.8V Power Supply – Not required	
21	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset	
		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 – Not required	
23	GND	Module Ground	1
24	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	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	TD-	Transmitter inverted data input	
29	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. 2 Open collector; should be pulled up with 4.7k – 10kohms on host board to a voltage between 3.15V and 3.6V.

3. A Reference Clock input is not required by the XFP 80km tunable. If present, it will be ignored.

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Power Consumption	P			3.5	W	
Supply Current – Vcc3 supply	Icc3			450	mA	
Supply Current – Vcc5 supply	Icc5			350	mA	
Transmitter						
Differential Input Voltage Swing	Vin,pp	120		820	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time	Toff			100	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee+0.8	V	
Transmit Disable Assert Time				10	us	
Receiver						
Differential Output Voltage Swing	Vout,pp	340		850	mVpp	
Differential Output Impedance	Zout	80	100	120	Ohm	
Data output rise/fall time	Tr/Tf	30			ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vee		Vee+0.8	V	

Notes:

1. Loss of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Optical Wavelength	λc	λc -0.05		λc +0.05	nm	1
Center Wavelength Spacing			50		GHz	
Optical Spectral Width	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	-1		4	dBm	2
Optical Extinction Ratio	ER	9			dB	
Transmitter and Dispersion Penalty	TDP			3	dB	
Transmitter OFF Output Power	POff			-30	dBm	
Frequency stability (BOL)		-1.5		1.5	GHz	
Frequency stability (EOL)		-2.5		2.5	GHz	
Transmitter Eye Mask		Compliant with IEEE802.3ae				
Receiver						
Center Wavelength	$λ_C$	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-24	dBm	3
Input Saturation Power (overload)	Psat	-7			dBm	
LOS Assert	LOSA	-37			dB	
LOS De-assert	LOSD			-27	dBm	
LOS Hysteresis	LOSH	0.5			dBm	

Notes:

1. λc refer to wavelength selection, and corresponds to approximately 0.4 nm

2. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.

3. Measured with Light source 1528.77~1563.86nm, ER=6.0dB; BER =<10^{-12} @10.3125Gbps, PRBS=2^{31}-1 NRZ.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-2	2	dB	
Bias current monitor	DMI_ bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-2	2	dB	

Precautions

a. This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

b. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Compatibility Test

In order to ensure the product compatibility, our products will be tested on the switch before shipment. Our modules can compatible with many mainstream brand switches, such as Cisco, Juniper, Extreme, Brocade, IBM, H3C, HP, Huawei, D-Link, Mikrotik, ZTE, TP-Link...

Our test equipment: VOLKTEK MEN-4110, HP 2530-8G, CRS226-24G-25+RM, Catalyst 2960G Series, Catalyst 3850 XS 10G SFP+, Catalyst 3750-E Series, HUAWEI S5700Series, H3C S3100V2 Series, Juniper-EX4200, etc.

Cisco Catalyst 3850

HUAWEI S5700

H3C S3100V2

HP J9264AR

Juniper EX 4200

Alcatal 6850E-U24X

Mikrotik CR5226-24G-25+RM

Cisco Catalyst 2960G

Volktek MEN-4110

Product Production Process

Quality Assurance

Continuous introduction of new equipment, produced by strict standards, strict quality inspection, to guarantee the high quality standard of each product.
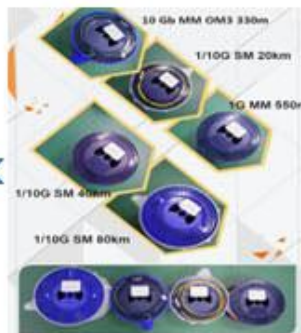
Standardized Production Line → **Professional Welding** → **Assembling**

Aging Testing ← **Distance Testing** ← **Cleaning end face**

Product Initial Test → **Switch Testing** → **Product Final Test**

Packaging

ETU-Link provides two kinds of packaging, 10pcs/Tray and individual package.

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Addresses and phone number also have been listed at www.etulinktechnology.com.
Please e-mail us at sales@etulinktechnology.com or call us for assistance.