ESTxxX-80D(I) Tunable

10Gb/s Tunable DWDM 80km XFP Transceiver

PRODUCT FEATURES

- 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
- Temperature Range:
  Commercial:0°C ~70°C
  Industrial: -40°C ~85°C

APPLICATIONS

- WDM SONET OC-192&SDH STM-64
- 10G Fiber Channel

DESCRIPTIONS

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 10G FC 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.

Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EXTDxxX-80D	10.3125Gbps	EML	SMF	80km	LC	0~70℃	Y	Green
EXTDxxX-80DI	10.3125Gbps	EML	SMF	80km	LC	-40~85℃	Y	Green

Wavelength Selection: C-band λc Wavelength Guide Pin Descriptions

Channel	Wavelength (nm)	Frequency (THZ)	Channel	Wavelength (nm)	Frequency (THZ)
1	1566.72	191.35	50	1546.92	193.8
2	1566.31	191.4	51	1546.52	193.85
3	1565.9	191.45	52	1546.12	193.9
4	1565.5	191.5	53	1545.72	193.95
5	1565.09	191.55	54	1545.32	194
6	1564.68	191.6	55	1544.92	194.05
7	1564.27	191.65	56	1544.53	194.1
8	1563.86	191.7	57	1544.13	194.15
9	1563.45	191.75	58	1543.73	194.2
10	1563.05	191.8	59	1543.33	194.25
11	1562.64	191.85	60	1542.94	194.3
12	1562.23	191.9	61	1542.54	194.35
13	1561.83	191.95	62	1542.14	194.4
14	1561.42	192	63	1541.75	194.45
15	1561.01	192.05	64	1541.35	194.5
16	1560.61	192.1	65	1540.95	194.55

17	1560.2	192.15	66	1540.56	194.6
18	1559.79	192.2	67	1540.16	194.65
19	1559.39	192.25	68	1539.77	194.7
20	1558.98	192.3	69	1539.37	194.75
21	1558.58	192.35	70	1538.98	194.8
22	1558.17	192.4	71	1538.58	194.85
23	1557.77	192.45	72	1538.19	194.9
24	1557.36	192.5	73	1537.79	194.95
25	1556.96	192.55	74	1537.4	195
26	1556.55	192.6	75	1537	195.05
27	1556.15	192.65	76	1536.61	195.1
28	1555.75	192.7	77	1536.22	195.15
29	1555.34	192.75	78	1535.82	195.2
30	1554.94	192.8	79	1535.43	195.25
31	1554.54	192.85	80	1535.04	195.3
32	1554.13	192.9	81	1534.64	195.35
33	1553.73	192.95	82	1534.25	195.4
34	1553.33	193	83	1533.86	195.45
35	1552.93	193.05	84	1533.47	195.5
36	1552.52	193.1	85	1533.07	195.55
37	1552.12	193.15	86	1532.68	195.6
38	1551.72	193.2	87	1532.29	195.65
39	1551.32	193.25	88	1531.9	195.7
40	1550.92	193.3	89	1531.51	195.75
41	1550.52	193.35	90	1531.12	195.8
42	1550.12	193.4	91	1530.72	195.85
43	1549.72	193.45	92	1530.33	195.9
44	1549.32	193.5	93	1529.94	195.95
45	1548.91	193.55	94	1529.55	196.00
46	1548.51	193.6	95	1529.16	196.05
47	1548.11	193.65	96	1528.77	196.10
48	1547.72	193.7			
49	1547.32	193.75			

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 96

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

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T_S	-40		85	ºC	
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

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Case Operating Temperature	Top	0	-	70	℃	Commercial
		-40		85		Industrial
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

Electrical Characteristics

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 (Module Input)						
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 (Module Output)						
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 and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λc_BOL	z-1.5	z	Z+1.5	GHz	
Center Wavelength	λc_EOL	z-2.5	z	Z+2.5	GHz	
Center Wavelength Spacing			50		GHz	
Optical Spectral Width	Δλ			1	nm	1
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:

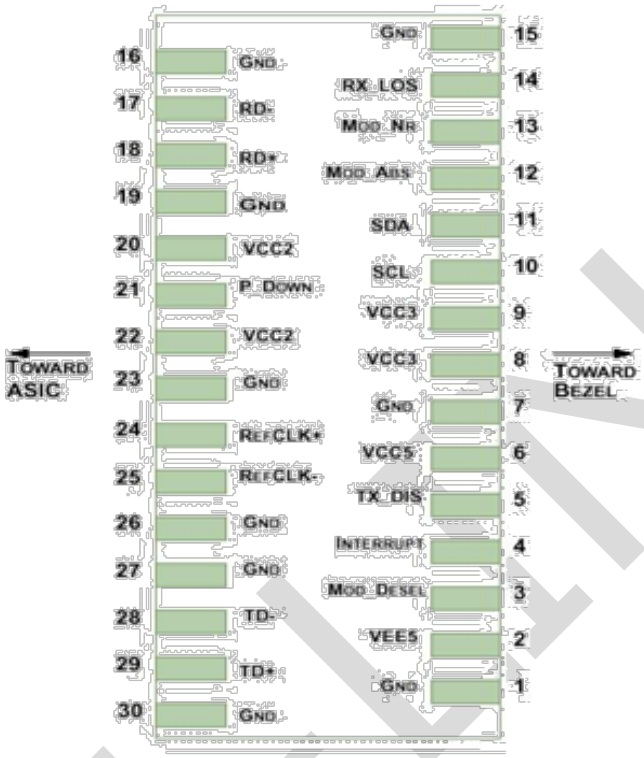
1. λc refer to wavelength selection, and corresponds to approximately 0.4 nm
2. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
3. Measured with Light source 1528.77~1563.86nm, ER=6.0dB; BER =<10^-12 @10.3125Gbps, PRBS=2^31-1 NRZ.

Digital Diagnostics

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	-0.1	0.1	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	

Bias current monitor	DMI_ bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Diagram



Pin Definitions

PIN #	Name	Function	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	2

		Lock in TX/RX.	
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

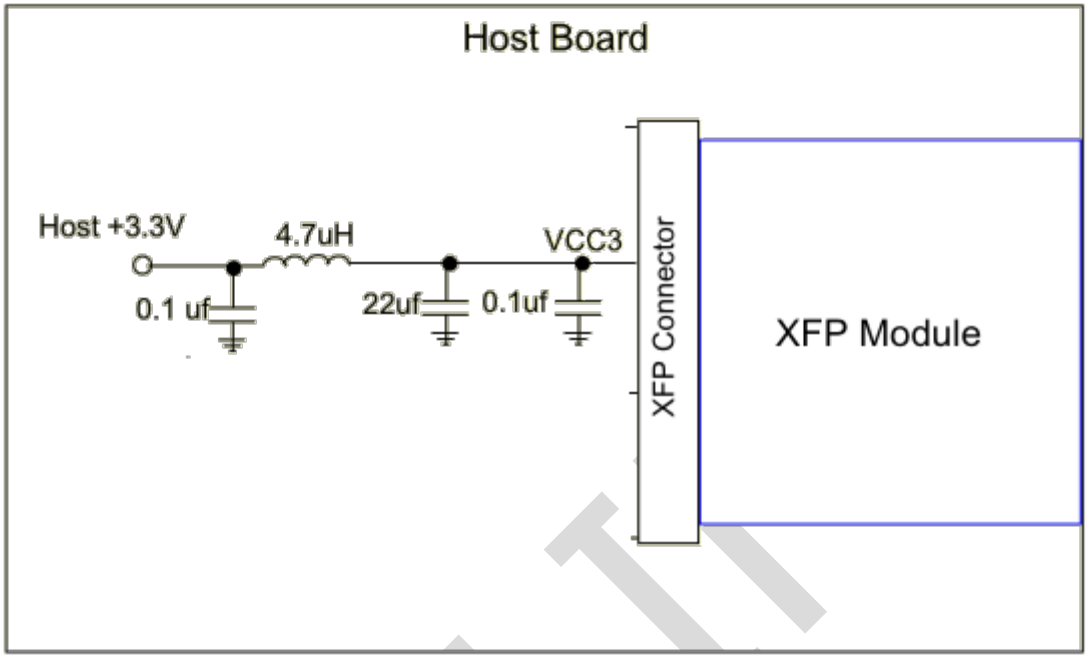
Notes:

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.

Recommended Interface Circuit



Revision History

Version No.	Date	Description
1.0	February 8, 2016	Preliminary datasheet
2.0	September 27, 2024	Format change

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