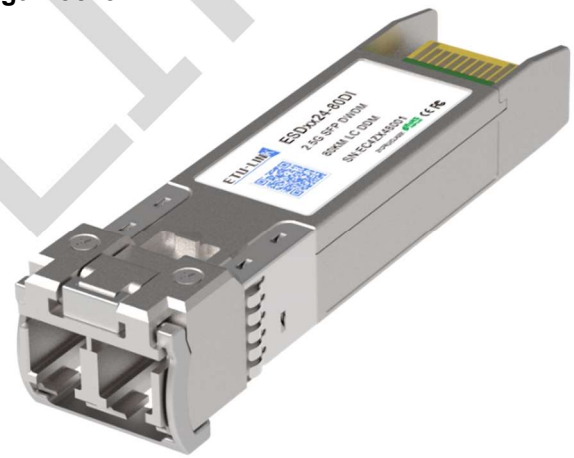
ESDxx24-80D(I)

2.5Gb/s DWDM 80KM SFP Transceiver

PRODUCT FEATURES



- Up to 2.5Gb/s data links
- DWDM EML laser transmitter and PIN photo-detector
- 100 GHz ITU channel spacing with integrated wavelength locker
- Up to 80km on 9/125μm SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Operating case temperature:

  Commercial: 0 to +70°C

  Extended: -10 ~ +80°C

  Industrial: -40 ~ +85°C

APPLICATIONS

- SONET/SDH networks
- Gigabit Ethernet

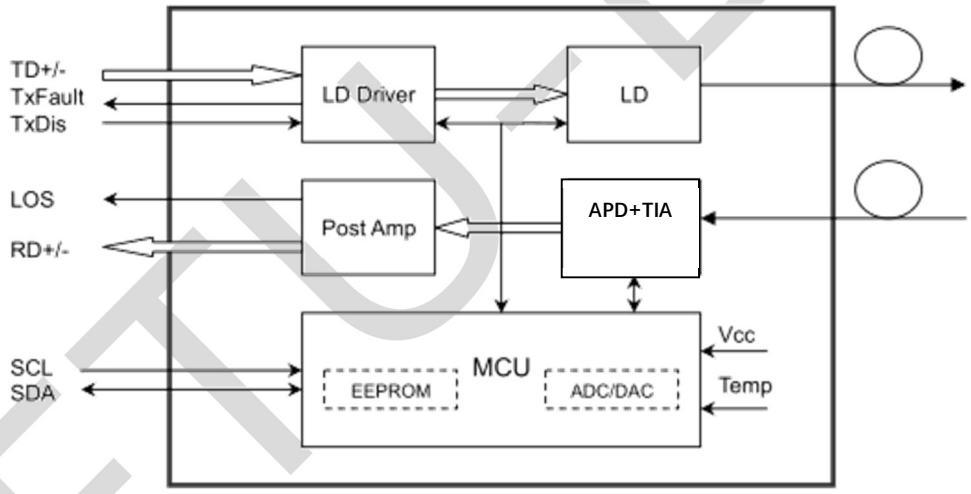
- **C Band DWDM networks**

DESCRIPTIONS

The transceivers include an PIN photo-detector diode and temperature stabilized DWDM EML transmitter. Digital diagnostic functions are available via an I2C.This module is designed for single mode fiber and operates at a nominal wavelength of 100GHz ITU Grid, C Band DWDM wavelength. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF8472.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
ESDxx24-80D	2.5Gb/s	EML	SM	80km SMF	LC	0~70 commercial	Y
ESDxx24-80DE	2.5Gb/s	EML	SM	80km SMF	LC	-10~80 Extended	Y
ESDxx24-80DI	2.5Gb/s	EML	SM	80km SMF	LC	-40~85 Industrial	Y

Wavelength Selection: C-band λc Wavelength Guide Pin Descriptions

Channel	Wavelength (nm)	Frequency(THZ)	Channel	Wavelength (nm)	Frequency(THZ)
C12	1567.95	191.20	C42	1543.73	194.20
C13	1567.13	191.30	C43	1542.94	194.30
C14	1566.31	191.40	C44	1542.14	194.40
C15	1565.50	191.50	C45	1541.35	194.50
C16	1564.68	191.60	C46	1540.56	194.60
C17	1563.86	191.70	C47	1539.77	194.70
C18	1563.05	191.80	C48	1538.98	194.80
C19	1562.23	191.90	C49	1538.19	194.90
C20	1561.42	192.00	C50	1537.40	195.00
C21	1560.61	192.10	C51	1536.61	195.10
C22	1559.79	192.20	C52	1535.82	195.20
C23	1558.98	192.30	C53	1535.04	195.30
C24	1558.17	192.40	C54	1534.25	195.40
C25	1557.36	192.50	C55	1533.47	195.50
C26	1556.55	192.60	C56	1532.68	195.60
C27	1555.75	192.70	C57	1531.90	195.70
C28	1554.94	192.80	C58	1531.12	195.80
C29	1554.13	192.90	C59	1530.33	195.90
C30	1553.33	193.00	C60	1529.55	196.00
C31	1552.52	193.10	C61	1528.77	196.10
C32	1551.72	193.20	C62	1527.99	196.20
C33	1550.92	193.30	C63	1527.22	196.30
C34	1550.12	193.40	C64	1526.44	196.40
C35	1549.32	193.50	C65	1525.66	196.50
C36	1548.51	193.60	C66	1524.89	196.60
C37	1547.72	193.70	C67	1524.11	196.70
C38	1546.92	193.80	C68	1523.34	196.80
C39	1546.12	193.90	C69	1522.56	196.90
C40	1545.32	194.00	C70	1521.79	197.00
C41	1544.53	194.10			

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T_S	-40	-	85	°C	
Operating Case Temperature	T_{case}	See order Information			°C	
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
Operating Case Temperature	T_{OP}	0		70	°C	commercial
		-10		80		extended
		-40		85		industrial
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate			2.5		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				1.5	W	commercial
				1.8		Industrial
Supply Current	Icc			450	mA	commercial
				545		Industrial
Transmitter (Module Input)						
Single-ended Input Voltage Tolerance		-0.3		4.0	V	
Differential Input Voltage Swing	Vin,pp	200		2400	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee-0.3		0.8	V	
Receiver (Module Output)						

Differential Output Voltage Swing	Vout,pp	500		900	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vee-0.3		0.8	V	

Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Optical Wavelength	λ_C	λc -0.1		λc +0.1	nm	1
Center Wavelength Spacing			100		GHz	
Spectrum Bandwidth(RMS)	σ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	0		4	dBm	2
Optical Extinction Ratio	ER	8.2			dB	
Transmitter OFF Output Power	POff			-45	dBm	
Transmitter Eye Mask		Compliant with G.957(class 1 laser safety)				
Receiver						
Center Wavelength	λ_C	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-28	dBm	3
Input Saturation Power (overload)	Psat	-6			dBm	
LOS Assert	LOSA	-41			dB	4
LOS De-assert	LOSD			-29	dBm	4
LOS Hysteresis	LOSH	0.5	2	6	dBm	

Notes:

1. λc refer to wavelength selection, and corresponds to approximately 0.8 nm

2. Measure at 2^23-1 NRZ PRBS pattern

3. Measured with Light source 1563.86~1528.77nm, ER=8.2dB; BER =<10^-12 @PRBS=2^23-1 NRZ

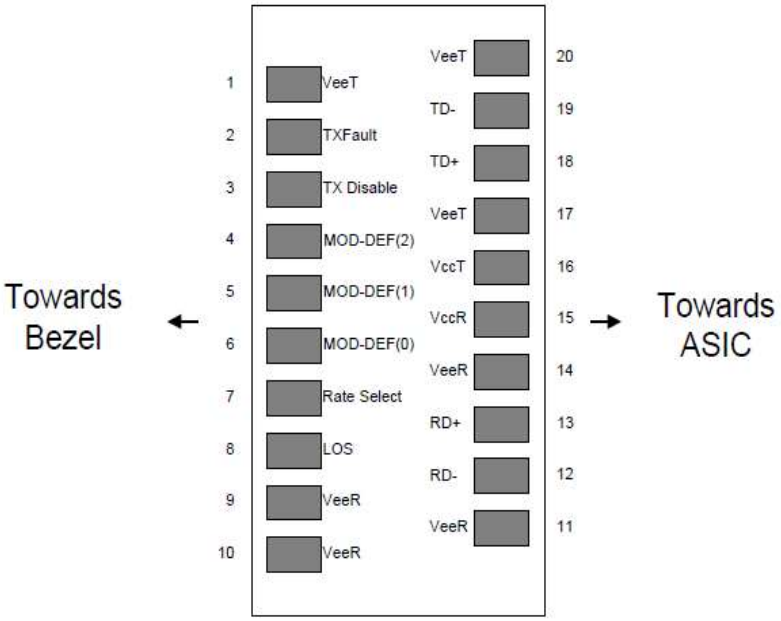
4. When LOS de-asserted, the RX data+/- output is High-level (fixed).

Digital Diagnostics

Parameter	Symbol	Min.	Max.	Unit	Notes
Temperature monitor	DMI _ Temp	-3	3	degC	Over operating temp
Supply voltage monitor	DMI _ VCC	-0.15	0.15	V	Full operating range
RX power monitor	DMI _ RX	-3	3	dB	

Bias current monitor	DMI _ bias	-10%	10%	mA	
TX power monitor	DMI _ TX	-3	3	dB	

Pin Diagram



Pin Definitions

PIN #	Name	Function	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TXFAULT	Transmitter Fault.	
3	TXDIS	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1

11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.

2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

3. Should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF (0) pulls line low to indicate module is plugged in.

4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates).If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:

1) Low (0 – 0.8V): Reduced Bandwidth

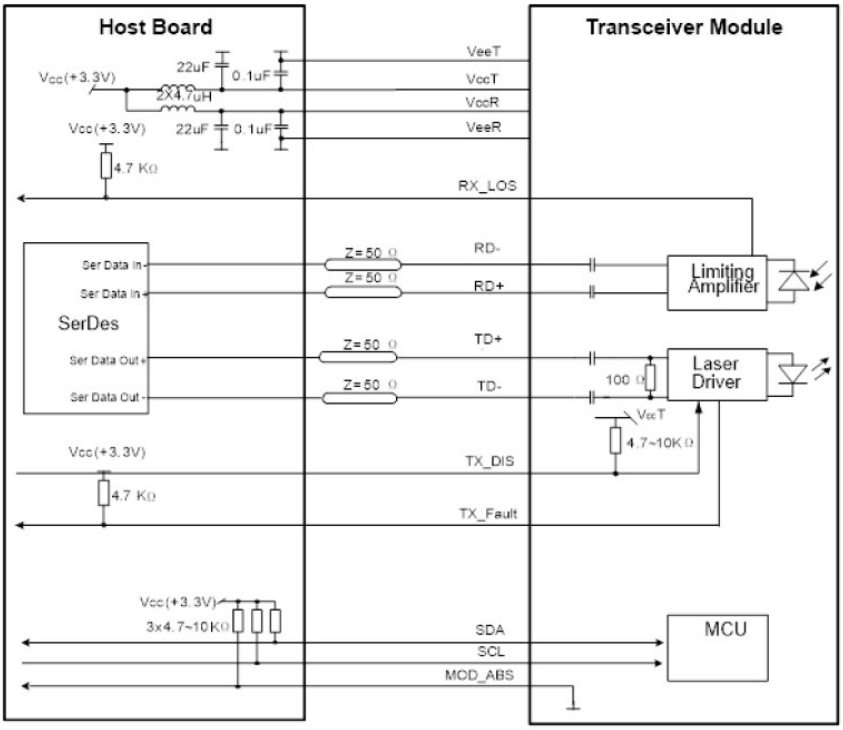
2) (>0.8, < 2.0V): Undefined

3) High (2.0 – 3.465V): Full Bandwidth

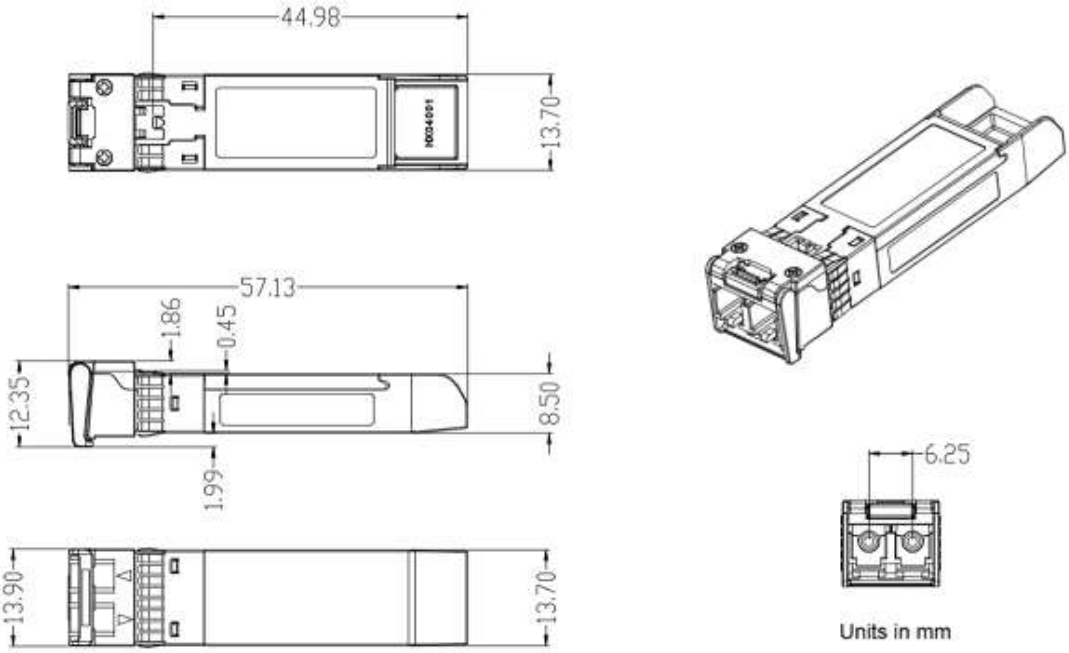
4) Open: Reduced Bandwidth

5. LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 8, 2016	Preliminary datasheet
2.0	October 11,2023	Product upgrades
2.1	July 27, 2024	Format change

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