

10G DWDM 40km SFP+ Transceiver

ET5402-ER-DW-Cxy

ET5402-ER-DW-Cxy-I



Edgecore's ET5402-ER-DW transceiver module is designed for C-band DWDM 10G Ethernet links over 40km single mode fiber. The module incorporates a DWDM Electro-absorption Modulated Laser (EML) transmitter in the C-band channel (Cxy) and a PIN receiver. The electrical interface of the module is compliant with the SFP+ MSA. Digital diagnostic functions are available via a 2-wire serial interface, as specified in SFF-8472.

Product Features

- Up to 11.3 Gbps data links
- DWDM EML transmitter and PIN receiver
- Metal enclosure, for lower EMI
- Single +3.3 V power supply
- Hot-pluggable
- Compliant with SFP+ MSA with LC connector
- Operating temperature range:
 - Commercial: 0°C~+70°C
 - Industrial: -40°C~+85°C
- RoHS compliant
- 2-wire interface with integrated Digital Diagnostic Monitoring (DDM)
- Up to 40 km transmission distance over Single Mode Fiber (SMF)
- Low Power Dissipation: 1.5 W power dissipation with CDR

Applications

- 10GBASE-ER/EW
- 10G Ethernet
- SDH STM64

Standard

- Compliant with SFP+ MSA specification (SFF-8431)
- Compliant with SFF-8472
- Compliant with IEEE 802.3ae

Ordering Information

Part Number	Specifications									
	Pack	Rate (Gbps)	Tx (nm)	Po (dBm)	RX	Sen (dBm)	Temp (°C)	Reach (km)	DDM	CDR
ET5402-ER-DW-Cxy (xy: CH no.= 17-61)	SFP+	10.3125	DWDM Ch. Cxy	-1~3	PIN	<-16	0~70	40	Y	Y
ET5402-ER-DW-Cxy-I (xy: CH no.= 17-61)	SFP+	10.3125	DWDM Ch. Cxy	-1~3	PIN	<-16	-40~85	40	Y	Y

Wavelength Selection

Channel	Wavelength (nm)	Frequency (THz)	Channel	Wavelength (nm)	Frequency (THz)
C17	1563.86	191.70	C39	1546.12	193.90
C18	1563.05	191.80	C40	1545.32	194.00
C19	1562.23	191.90	C41	1544.53	194.10
C20	1561.42	192.00	C42	1543.73	194.20
C21	1560.61	192.10	C43	1542.94	194.30
C22	1559.79	192.20	C44	1542.14	194.40
C23	1558.98	192.30	C45	1541.35	194.50
C24	1558.17	192.40	C46	1540.56	194.60
C25	1557.36	192.50	C47	1539.77	194.70
C26	1556.55	192.60	C48	1538.98	194.80
C27	1555.75	192.70	C49	1538.19	194.90
C28	1554.94	192.80	C50	1537.40	195.00
C29	1554.13	192.90	C51	1536.61	195.10
C30	1553.33	193.00	C52	1535.82	195.20
C31	1552.52	193.10	C53	1535.04	195.30
C32	1551.72	193.20	C54	1534.25	195.40
C33	1550.92	193.30	C55	1533.47	195.50
C34	1550.12	193.40	C56	1532.68	195.60
C35	1549.32	193.50	C57	1531.90	195.70
C36	1548.51	193.60	C58	1531.12	195.80
C37	1547.72	193.70	C59	1530.33	195.90
C38	1546.92	193.80	C60	1529.55	196.00
			C61	1528.77	196.10

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	85	°C
Power Supply Voltage	Vcc3	-0.3	+4	V
Relative Humidity	RH	5	95	%
Signal Input Voltage		Vcc-0.3	Vcc+0.3	V

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature (Commercial)	Tc	0		70	°C
Operating Case Temperature (Industrial)	Tc	-40		85	°C
Power Supply Voltage	Vcc3	3.13	3.3	3.47	V
Supply Current	Icc3	400		430	mA
Data Rate			10.3125		Gbps
Fiber Length 9/125µm Core SMF		-	40	-	km

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter Differential Input Voltage	Vin,pp	180		700	mV	
Receiver Differential Output Voltage	Vout,pp	400		800	mV	
Input Differential Impedance	Rin		100		Ω	1
LOS Fault	VLOS fault	2.0		Vcc _{Host}	V	2
LOS Normal	VLOS norm	Vee		Vee+0.8	V	2
Transmit Disable Voltage	VIH	2.0		Vcc	V	
Transmit Enable Voltage	VIL	Vee		Vee+0.8	V	
Data Output Rise Time	Tr	28			ps	
Data Output Fall Time	Tf	28			ps	
Transmit Disable Assert Time			10	us		
Power Supply Rejection	PSR	100			mVpp	3

*Notes 1: Connected directly to TX data input pins. AC coupled thereafter.

*Notes 2: Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

*Notes 3: Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

Transmitter Optical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Launched Power (Avg.)	P _{out}	-1		3	dBm	1
Operating Wavelength Range	λ_c	$\lambda-0.1$		$\lambda+0.1$	nm	2
Center Wavelength Spacing			100		GHZ	
Spectral Width (-20 dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter OFF Output Power	P _{off}			-30	dB	
Extinction Ratio	ER	8.2			dB	
Transmitter and Dispersion Penalty	TDP			2	dB	

Output Eye Diagram Compliant with ITU-T G.691 eye mask and IEEE802.3ae eye mask

Receiver Optical Characteristics

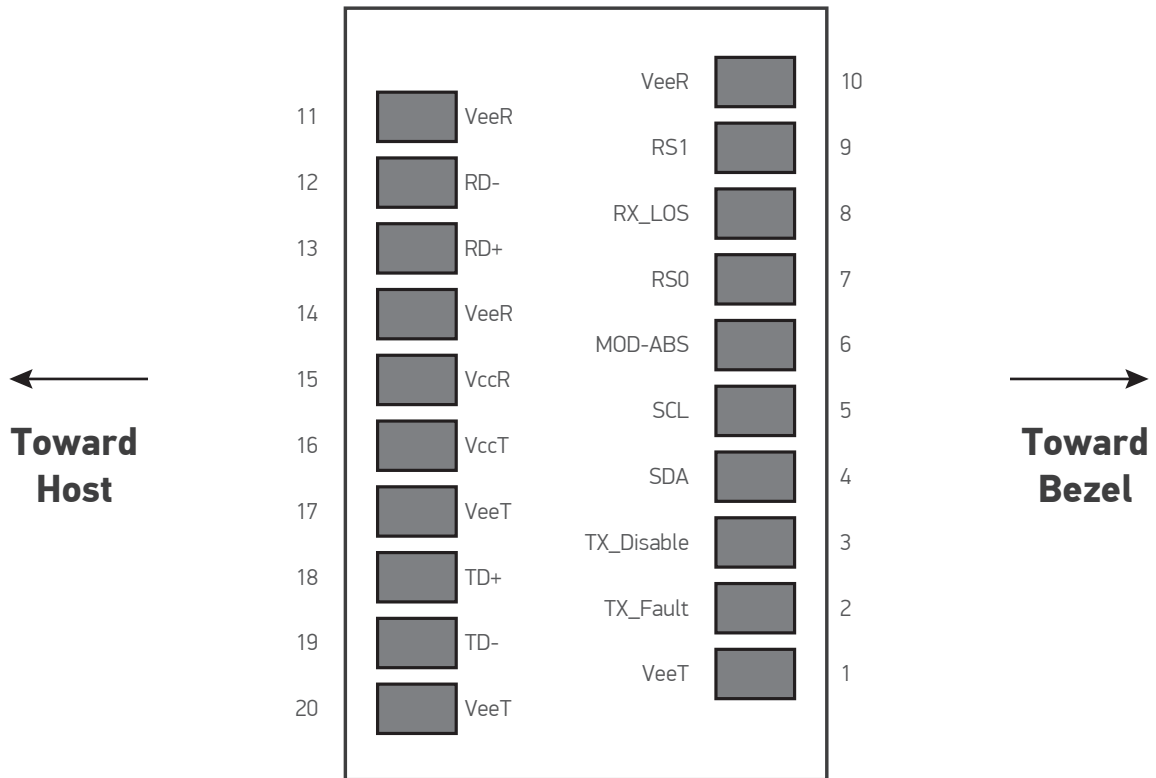
Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Receiver Sensitivity	S			-16	dBm	3
Wavelength Range	λ_c	1270		1610	nm	
Optical Power Input Overload	P _{in-max}	0			dBm	
LOS Optical De-assert	P _d			-17	dBm	
LOS Optical Assert	P _a	-30			dBm	
LOS hysteresis		0.5			dB	

*Note 1: Launched power (avg.) is power coupled into a single mode fiber with master connector. Before of Life.

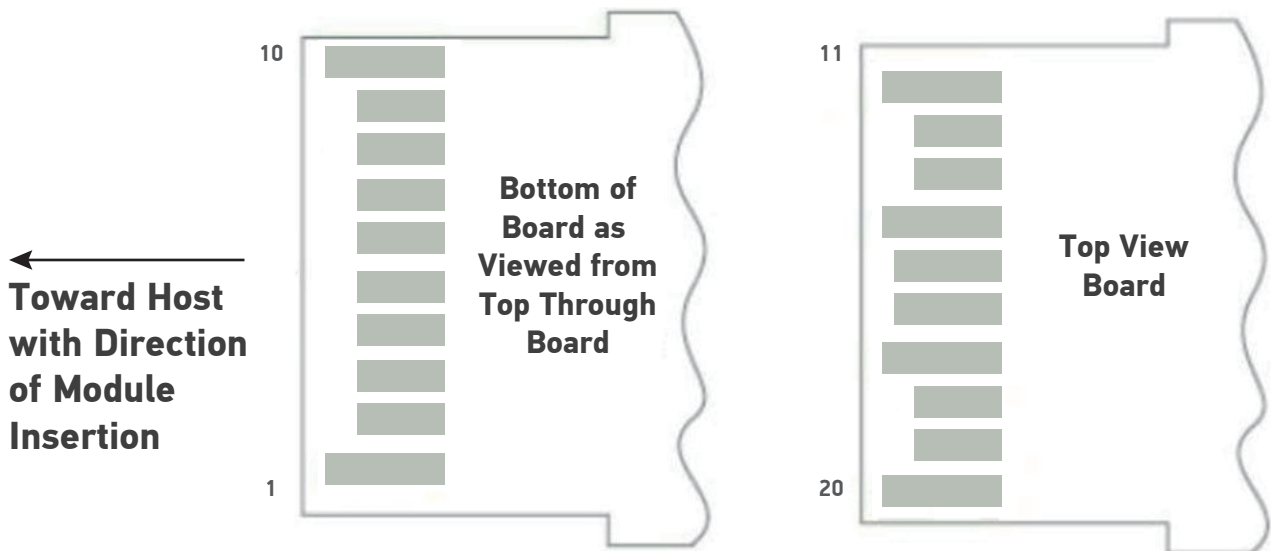
*Note 2: λ_c refers to wavelength selection, and corresponds to approximately 0.8 nm.

*Note 3: Receiver Reflectance Measured with a PRBS 2³¹-1 test pattern, @10.3125Gbps, ER=8.2dB, BER<10⁻¹².

Pin Description



SFP+ Pad Assignment Top View

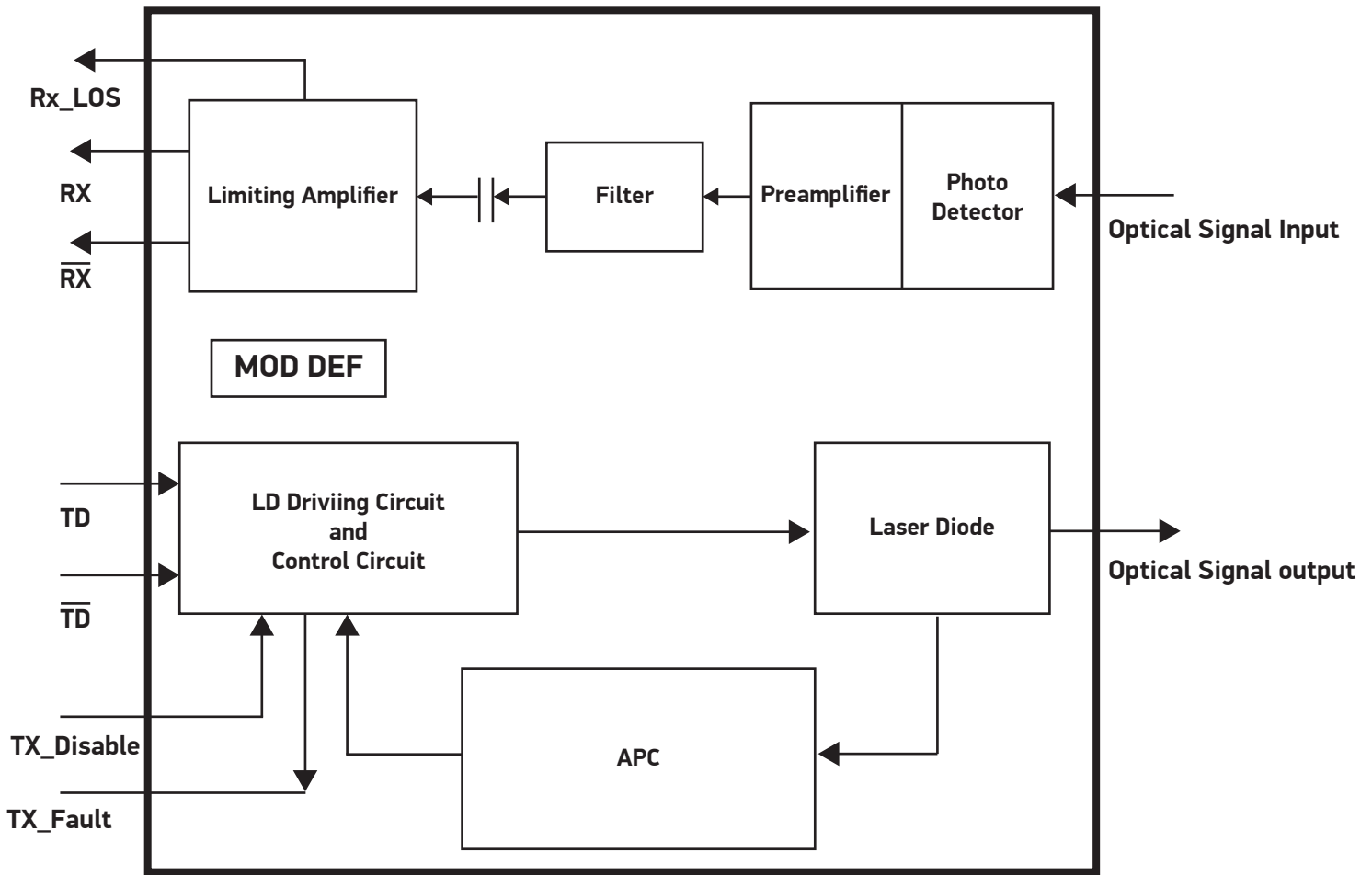


SFP+ Module Contact Assignments

Pin Assignment

Pin	Symbol	Description	Notes
1	VeeT	Module Ground(Common with Receiver Ground)	1
2	TX_Fault	Transmitter Fault, Low: normal; High: abnormal	2
3	TX_Disable	Transmitter Disable High: Transmitter off Low: Transmitter on	3
4	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	4
5	SCL	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	4
6	Mod_ABS	Module Absent, Connect to VeeT or VeeR in Module	4
7	RS0	no connection	
8	RX_LOS	Receiver Loss of Signal indication High: loss of signal Low: signal detected	5
9	RS1	No connection required	1
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled. CML-O	
13	RD+	Receiver Non-inverted DATA out. AC Coupled. CML-O	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled. CML-I	
19	TD-	Transmitter Inverted DATA in. AC Coupled. CML-I	
20	SDA	Transmitter Ground	1
*Notes 1: Circuit ground is internally isolated from chassis ground.			
*Notes 2: TFAULT is an open collector/drain output, which should be pulled up with a 4.7 k – 10 k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0 V to Vcc + 0.3 V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8 V.			
*Notes 3: Laser output disabled on TDIS >2.0 V or open, enabled on TDIS <0.8 V.			
*Notes 4: Should be pulled up with 4.7 kΩ- 10 kΩ host board to a voltage between 2.0 V and 3.6 V. MOD_ABS pulls line low to indicate module is plugged in.			
*Notes 5: LOS is open collector output. It should be pulled up with 4.7 kΩ – 10 kΩ on host board to a voltage between 2.0 V and 3.6 V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.			

Block Diagram



Digital Diagnostic Memory Map

2 wire address 1010000X (A0h)

0	Serial ID Defined by SFP MSA (96 bytes)
95	
127	
127	Vendor Specific (32 bytes)
255	Reserved (128 bytes)

2 wire address 1010001X (A2h)

0	Alarm and Warning Thresholds (56 bytes)
55	
95	Cal Constants (40 bytes)
119	Real Time Diagnostic Interface (24 bytes)
127	Vendor Specific (8 bytes)
247	User Writable EEPROM (120 bytes)
255	Vendor Specific (8 bytes)

Warranty

Please check www.edge-core.com for the warranty terms in your country.

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