

10.3 Gb/s XFP Transceiver

10G-DXxx-ER

■ Product Features

- ✓ Supports 9.95 to 11.3Gb/s
- ✓ Duplex LC connector
- ✓ Hot-pluggable XFP footprint
- ✓ Cooled 1550nm EML laser
- ✓ RoHS compliant and Lead Free
- ✓ 40Km link length
- ✓ Metal enclosure for lower EMI
- ✓ 100GHz channel spacing
- ✓ Built-in dual CDR
- ✓ +5.0V and +3.3V power supply and power dissipation <2.5W
- ✓ XFP MSA INF-8077I Compliant
- ✓ XFI loop-back Support



■ Applications

- ✓ SONET OC-192 IR-2/IR-3
- SDH STM S-64.2b/S-64.3b
- ITU-T G.709
- ✓ IEEE 802.3ae 10GBASE-ER/
- EW 40km 10G Ethernet
- ✓ Supports OTN/1TU-T G.709
- ✓ DWDM point-to-point link

■ General

Fiberend's 10G-DXxx-ER Small Form Factor 10Gb/s XFP transceivers are compatible with XFP MSA Specification. They comply with SONET OC-192 IR-2,OC-192 IR-3,SDH STM S-64.2b,STM S-64.3b as well as with 10G Ethernet 10G BASE-ER/EW per IEEE802.3ae and 40km 10G Fibre Channel applications.

■ Product Selection

Part Number	Operating Case temperature	DDMI
10G-DXxx-ER	Commercial(0~70℃)	Yes
10G-DXxx-ERE	Extend(0~85℃)	Yes
10G-DXxx-ERI	Industrial(-40~85℃)	Yes

■ Product Channel Selection

Product Code	ITU channel	Frequency	Center Wavelength(nm)
10G-DX61-ER	61	196.1	1528.77
10G-DX60-ER	60	196.0	1529.55
10G-DX59-ER	59	195.9	1530.33
10G-DX58-ER	58	195.8	1531.12
10G-DX57-ER	57	195.7	1531.90
10G-DX56-ER	56	195.6	1532.68
10G-DX55-ER	55	195.5	1533.47
10G-DX54-ER	54	195.4	1534.25
10G-DX53-ER	53	195.3	1535.04
10G-DX52-ER	52	195.2	1535.82
10G-DX51-ER	51	195.1	1536.61
10G-DX50-ER	50	195.0	1537.40
10G-DX49-ER	49	194.9	1538.19
10G-DX48-ER	48	194.8	1538.98
10G-DX47-ER	47	194.7	1539.77
10G-DX46-ER	46	194.6	1540.56
10G-DX45-ER	45	194.5	1541.35
10G-DX44-ER	44	194.4	1542.14
10G-DX43-ER	43	194.3	1542.94
10G-DX42-ER	42	194.2	1543.73
10G-DX41-ER	41	194.1	1544.53
10G-DX40-ER	40	194.0	1545.32
10G-DX39-ER	39	193.9	1546.12
10G-DX38-ER	38	193.8	1546.92
10G-DX37-ER	37	193.7	1547.72
10G-DX36-ER	36	193.6	1548.51
10G-DX35-ER	35	193.5	1549.32
10G-DX34-ER	34	193.4	1550.12

10G-DX33-ER	33	193.3	1550.92
10G-DX32-ER	32	193.2	1551.72
10G-DX31-ER	31	193.1	1552.52
10G-DX30-ER	30	193.0	1553.33
10G-DX29-ER	29	192.9	1554.13
10G-DX28-ER	28	192.8	1554.94
10G-DX27-ER	27	192.7	1555.75
10G-DX26-ER	26	192.6	1556.55
10G-DX25-ER	25	192.5	1557.36
10G-DX24-ER	24	192.4	1558.17
10G-DX23-ER	23	192.3	1558.98
10G-DX22-ER	22	192.2	1559.79
10G-DX21-ER	21	192.1	1560.61
10G-DX20-ER	20	192.0	1561.42
10G-DX19-ER	19	191.9	1562.23
10G-DX18-ER	18	191.8	1563.05
10G-DX17-ER	17	191.7	1563.86

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- ROHS compliant with ROHS 2 (2011/65/EU)

Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	GND	Module Ground	
2	VEE5	Optional -5.2 Power Supply – Not required	

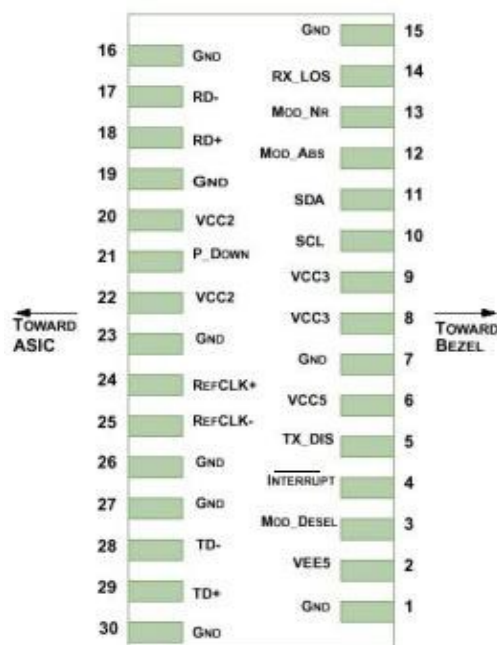
3	MOD_DESEL	Module De-select; When held low allows the module to respond to 2-wire serial interface. LVTTL-I	
4	/INTERRUPT	Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface. LVTTL-O	2
5	TX_DIS	Transmitter Disable. Logic1 indicates laser output disabled, LVTTL-I	
6	VCC5	+5V Power Supply	
7	GND	Module Ground	1
8	VCC3	+3.3V Power Supply	
9	VCC3	+3.3V Power Supply	
10	SCL	2-Wire Serial Interface Clock. LVTTL-I	2
11	SDA	2-Wire Serial Interface Data Line. LVTTL-I/O	2
12	MOD_Abs	Indicates Module is not present. Grounded in the Module. LVTTL-O	2
13	MOD_NR	Module Not Ready; Indicating Module Operational Fault. Open-collector. LVTTL-O	2
14	RX_LOS	Loss of Signal indication. Logic 1 indicates loss of Signal. Open-collector. LVTTL-O	2
15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver Inverted Data Output. CML-O	
18	RD+	Receiver Non-Inverted Data Output. CML-O	
19	GND	Module Ground	1
20	VCC2	+1.8V Power Supply (Not required).	3
21	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. LVTTL-I	
		Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle. LVTTL-I	

22	VCC2	+1.8V Power Supply (Not required)	3
23	GND	Module Ground	1
24	REFCLK+	Reference Clock (Not required)	
25	REFCLK-	Reference Clock (Not required)	
26	GND	Module Ground	1
27	GND	Module Ground	1
28	TD-	Transmitter Inverted Data Input. CML-I	
29	TD+	Transmitter Non-Inverted Data Input. CML-I	
30	GND	Module Ground	1

Notes:

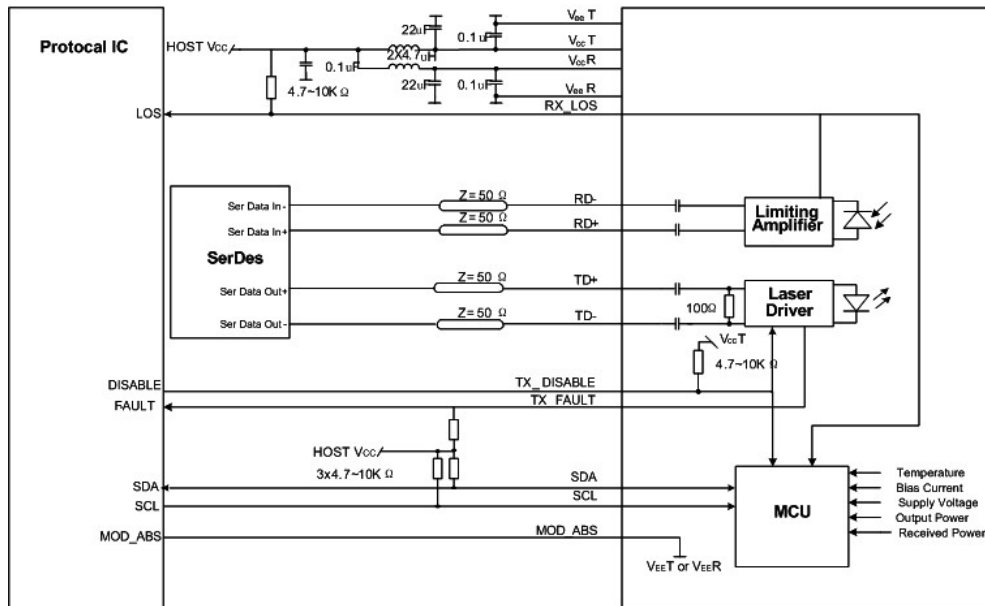
1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Open collector; Should be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.6V on the host board.
3. The pins are open within module.

■ Pin-out Connector Block on Host Board



Pin-out of Connector Block on Host Board

Recommend Circuit Schematic



Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc3	-0.5		+4.0	V	
	Vcc5	-0.5		+6.0	V	
Storage Temperature	TS	-40		+85	°C	
Operating Humidity	RH	0		85	%	

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	Vcc3	3.13	3.30	3.47	V	
	Vcc5	4.75	5.0	5.25	V	
Power Supply Current	Icc3			600	mA	
	Icc5			100	mA	
Case Operating Temperature	Tc	0		+70	°C	Commercial
	Te	0		+85		Extend
	Tl	-40		+85		Industrial
Bit Rate	Br	9.95		11.3	Gbps	
9/125um G.652 SMF	Lmax			40	km	

■ Electrical Characteristics (TOP=25°C, Vcc 3=3.3Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Input differential impedance	Rin	80	100	120	Ω	1
Differential data input swing	Vin, pp	120		850	mV	
TX Disable-High		Vcc – 0.8		Vcc	V	
TX Disable-Low		Vee		Vee+ 0.8	V	
TX Fault-High		Vcc-0.8		Vcc	V	
TX Fault-Low		Vee		Vee+0.8	V	
Receiver						
Single ended data output swing	Vout, pp	300		850	mV	2
Data output rise time	Tr	30			ps	3
Data output fall time	Tf	30			ps	3
LOS-High		Vcc – 0.8		Vcc	V	
LOS-Low		Vee		Vee+0.8	V	

Notes:

1. AC coupled.
2. Into 100 ohm differential termination.
3. 20 – 80 %

■ Optical Characteristics (TOP=25°C, Vcc 3=3.3 Volts)

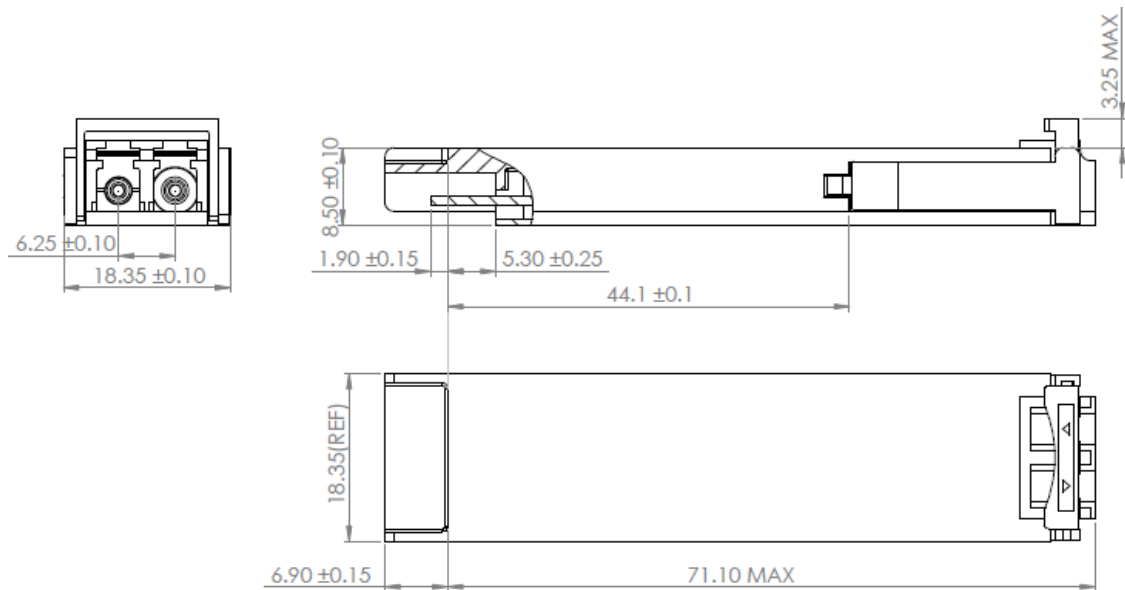
Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Power	PO	-1		4	dBm	
Optical Wavelength	λ	As per ITU-T 694.1			nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS Spectral Width(-20dB)	σ			1	nm	
Optical Extinction Ratio	ER	8.2			dB	
Tx Jitter(SONET)20KHZ-80MHZ	Txj1			0.3	UI	3
Tx Jitter(SONET)4MHZ-80MHZ	TXj2			0.1	UI	3
Path penalty at 800ps/nm@9.95Gb/s				2	dB	

Relative Intensity Noise	RIN			-128	dB/Hz	
Center Wavelength	λ_c EOL	z-100	z	Z+100	pm	
Receiver						
RX Sensitivity @10.3 Gb/s	SENS			-16	dBm	1,2
Receiver Overload		-1			dBm	
Optical Center Wavelength	λ_C	1260		1600	nm	
LOS De-Assert	LOSD			-20	dBm	
LOS Assert	LOSA	-34			dBm	
LOS Hysteresis		0.5			dB	
Rx Noise-Limited Performance(OSNR)						
Bit Rate(Gb/s)	Max CD (ps/nm)	BER-		Max OSNR (dB)	REF	
8.5,9.95-10.3	0	1E-12	OSNR1	26	4	
	800		OSNR2	26	4	
10.7-11.3	0	1E-04	OSNR5	21	4	
	800		OSNR6	21	4	

Notes:

1. Measured with conformance signals defined in FC-PI-2 Rev. 10.0 specifications.
2. Measured with PRBS 2³¹-1 at 10⁻¹² BER.
3. GR-253-CORE Issue 4.
4. With optical input power at the receiver between -1 ~ -11dBm.

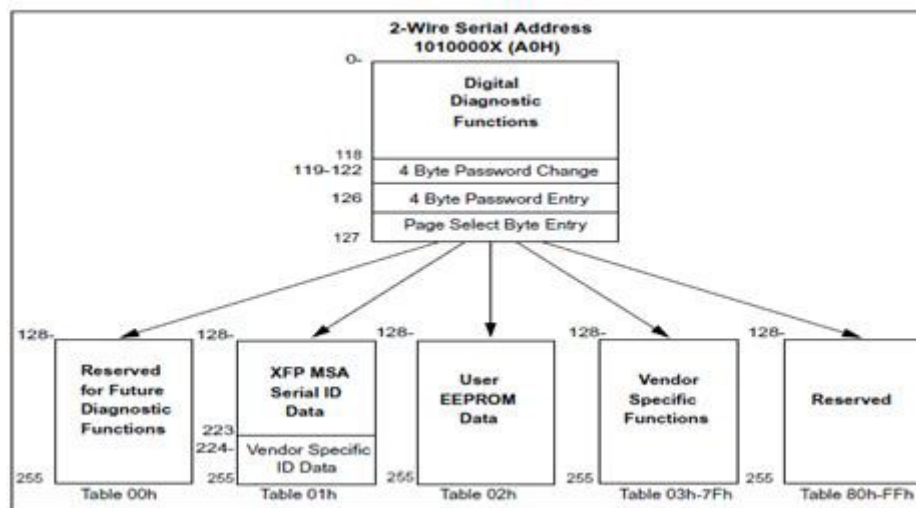
■ Mechanical Specifications



10G-DXxx-ER

■ EEPROM Information

EEPROM memory map specific data field description is as below:



■ Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C (C)	±3°C	Internal
	0 to +85°C (E)		
	-40 to +85°C (I)		
Voltage	2.97 to 3.63V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	-1 to 4dBm	±3dB	Internal
RX Power	-16 to -1dBm	±3dB	Internal