Features:

- Supports 9.95 Gb/s to 11.1 Gb/s bit rates
- Power dissipation <3.5W
- Up to Distance 40km
- Hot-Pluggable XFP footprint
- Duplex LC/PC connector
- Built-in digital diagnostic functions
- Core size: G.652 (Micron)
- Pay as you Populate model lowers initial costs

Applications:

- 10GBASE-ER/EW 10G Ethernet
- 1200-SM-LL-L 10G Fibre Channel
- SONET OC-192 IR-2/3
- SDH STM S-64.2b/3b
- ITU-T G.709

Standards:

- IEEE 802.3ae
- GR-253, ITU-T G.691, and G.693
- GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
- GR-326-CORE: Generic Requirements for Single mode Optical Connectors and Jumpers Assemblies
- GR-1435-CORE: Generic Requirements for Multi-Fiber Optical Connectors

Physicals:

- Dimensions (L x W x H): 71 x 18.5 x 8.5 mm
- Laser Class 1 21CFR-1040 LN#50 7/2001
- Laser Class 1 IEC60825-1

Specification:

a) Electrical and Optical Characteristics: (T_{OP} = -5 to 70˚C, VCC5 = 4.75 to 5.25 V)

Parameter	Symbol	Min	Typical	Max	Unit
Main Supply Voltage	Vcc5	4.75	-	5.25	V
Supply Voltage #2	Vcc3	3.13		3.45	V
Supply Current – Vcc5	I_{CC5}	-		300	mA
Supply Current – Vcc5	I_{CC3}	-		750	mA
Module total power	P	-	-	3.5	W

b) Transmitter

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Input differential impedance	Rin		100		Ω	1
Differential data input swing	Vin, pp	120	-	820	mV	
Transmit Disable Voltage	VD	2.0	-	Vcc	V	
Transmit Enable Voltage	VEN	GND	-	GND+ 0.8	V	
Transmit Disable Assert Time			-	10	us	
Optical Modulation Amplitude (OMA)	POMA	-2.1	-		dBm	
Output Opt. Pwr: 9/125 v SMF	Pout	0		+4	dBm	
Optical Wavelength	λ	1530		1565	nm	
Optical Extinction Ratio	ER	8.2	-	-	dB	
Transmitter and Dispersion Penalty	TDP			2	dB	
Average Launch power of OFF transmitter	POFF	-30			dBm	
Tx Jitter Generation (peak-to-peak)	Txj			0.1	UI	
Tx Jitter Generation (RMS)	TxjRMS			0.01	UI	

Notes:

1. After internal AC Coupling.

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c) Receiver

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Differential data output swing	Vout, pp	340	650	850	mV	
Data output rise time	tr		-	38	ps	2
Data output fall time	tr	-	-	39	ps	2
LOS Fault	VLOS fault	Vcc – 0.5	-	VccHOST	V	3
LOS Normal	VLOS Norm PSR	GND		GND+0.5	V	3
Power Supply Rejection	PSR	See Note 4 below				4
Receiver Sensitivity (OMA) @ 10.5Gb/s	RSENS			-23	dBm	
Maximum Input Power	PMAX	-7	-	-	dBm	
Optical Center Wavelength	λC	1270	1550	1600	Nm	
Receiver Reflectance	Rrx		-	-27	dB	
LOS De-Assert	LOSD		-	-24	dBm	
LOS Assert	LOSA	-37			dBm	
LOS Hysteresis		1			dB	

Notes:

2. 20 – 80%.
3. 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.
4. Per Section 2.7.1. in the XFP MSA Specification.

d) Absolute Maximum Ratings: (T_C=25˚C)

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	˚C
Operating Temperature	T_{IP}	-5	+70	˚C
Maximum Supply Voltage 1	Vcc3	-0.5	4.0	V
Maximum Supply Voltage 2	Vcc5	-0.5	6.0	V

e) Recommended Operating Environment:

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage 1	V_{CC3}	+3.13	+3.3	+3.45	V
Supply Voltage 2	V_{CC5}	+4.75	+5	+5.25	V
Operating Temperature	T_{OP}	-5	-	+70	C

f) Digital Diagnostic Monitor Characteristics:

As defined by the XFP MSA, Spectrum XFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

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g) General Specifications:

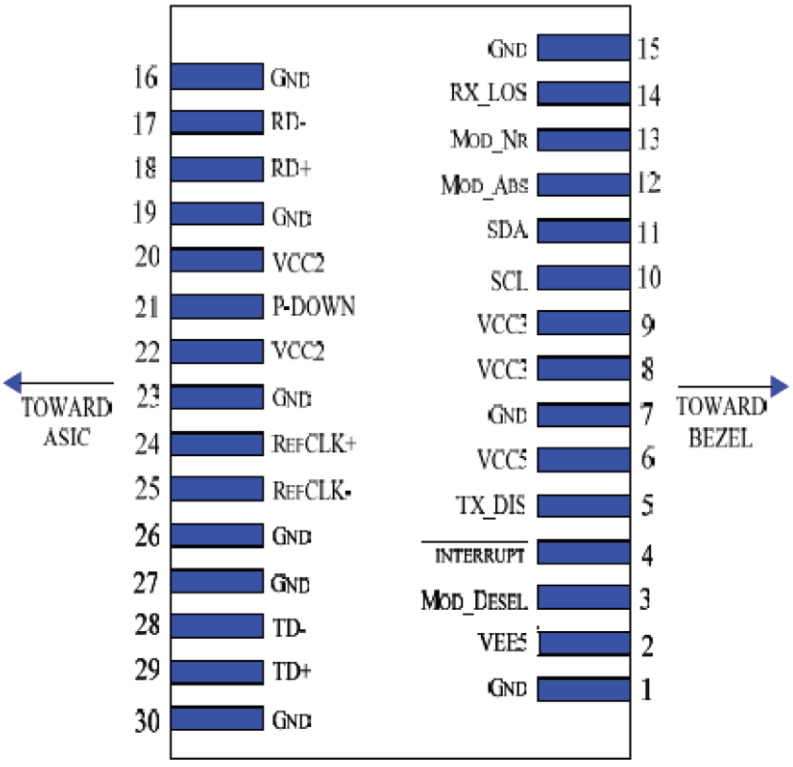
Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Bit Rate	BR	9.95		11.1	Gb/s	1
Bit Error Ratio	BER			10^{-12}		2
Max. Supported Link Length	LMAX		80		km	1

Notes:

1. SONET OC-192 IR-2, OC-192 IR-3, ITU-T G.709, 10GBASE-ER/EW + FEC, 10G Fibre Channel
2. Tested with a $2^{31} - 1$ PRBS

h) Block Diagram of Transceiver:

Pin Assignment:



Pin out of Connector Block on Host Board

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i) Pin Description:

Pin	Logic	Symbol	Name/Description	Ref
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to , respond to 2-wire serial interface commands	
4	LVTTLO	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTLI/O	SDA	Serial 2-wire interface data line	2
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTL- O	Mod_NR	Module Not Ready;	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply – Not required	
21	LVTTL-I	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	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	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	CML-I	TD-	Transmitter inverted data input	
29	CML-I	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. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15Vand 3.6V.
3. A Reference Clock input is not required.

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