Features:

- Supports 9.95Gb/s to 11.1Gb/s bit rates
- Hot-pluggable XFP footprint
- Uncooled 1310nm EML/DFB laser
- Up to Distance 10km
- Power dissipation <2.5W
- Duplex LC connector
- Built-in digital diagnostic functions

Applications:

- SONET OC-192 SR-1, SDH STM I-64.1 at 9.953Gbps
- 10GBASE-LR/LW 10G Ethernet
- 1200-SM-LL-L 10G Fibre Channel
- 10GE over G.709 at 11.09Gbps
- OC192 over FEC at 10.709Gbps

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}	-		250	mA
Supply Current – Vcc5	I_{CC3}	-		500	mA
Module total power	P	-	-	2.5	W

a) 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 output Power	P	-6		0	dBm	
Optical Wavelength	λ	1290		1330	nm	
Optical Extinction Ratio	ER	6	-	-	dB	
Sidemode Supression ratio	SSRmin			30	dB	
Average Launch power of OFF transmitter	POFF	-30			dBm	
Tx Jitter Generation (peak-to-peak)	Txj	Compliant with each standard requirements				

Notes:

1. After internal AC Coupling.

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b) 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	-	-	38	ps	2
LOS Fault	VLOS fault	Vcc – 0.5	-	VccHOST	V	3
LOS Normal	VLOS norm	GND		GND+0.5	V	3
Power Supply Rejection	PSR					4
Receiver Sensitivity (OMA) @ 10.7Gb/s	RSENS			-14.5	dBm	
Maximum Input Power	PMAX	+0.5	-	-	dBm	
Optical Center Wavelength	λC	1270		1600	nm	
Receiver Reflectance	Rrx		-	-14	dB	
LOS De-Assert	LOSD		-	-18	dBm	
LOS Assert	LOSA	-32			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.

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

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	℃
Operating Temperature	T_{IP}	-5	+70	℃
Maximum Supply Voltage 1	V_{cc3}	-0.5	4.0	V
Maximum Supply Voltage 2	V_{cc5}	-0.5	6.0	V

d) 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

e) 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

f) 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		10		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

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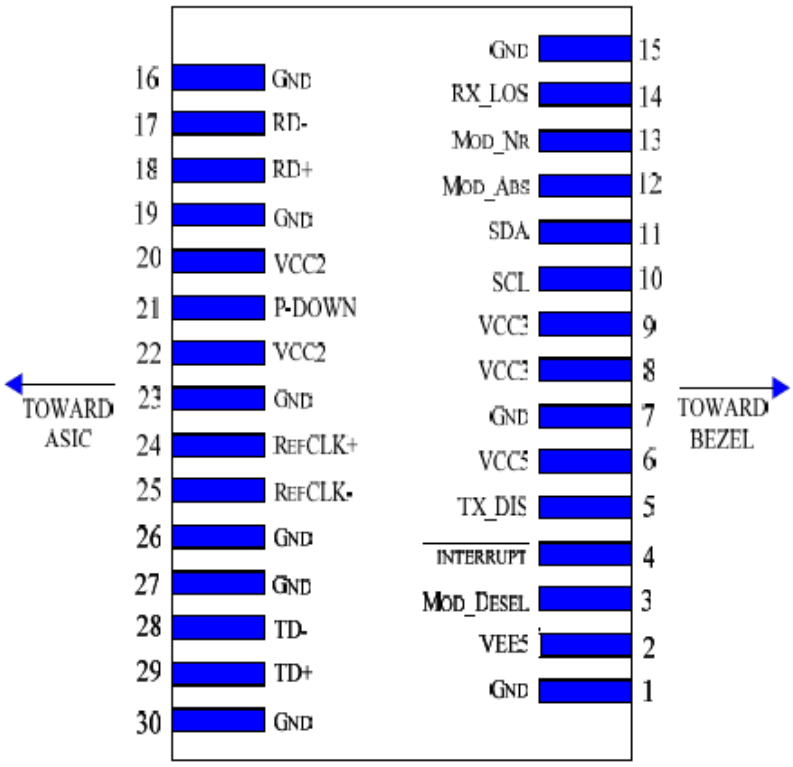
g) Block Diagram of Transceiver:

Pin Assignment:



Pin out of Connector Block on Host Board

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h) 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	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTL-I	TX_DS	Transmitter Disable; turned off Transmitter laser output	
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/O	SCL	2-wire Serial interface clock	2
11	LVTTL-I/O	SDA	2-wire Serial 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; Indicating module operational fault	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	
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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