TS-XFP-ZR

10Gbps XFP Optical Transceiver, 80km Reach

Features

- Supports 9.95Gb/s to 11.3Gb/s Bit Rates
- Hot-pluggable XFP Footprint
- Maximum Link Length up to 80km
- Temperature-Stabilized EML transmitter
- Duplex LC Connector
- Built-in Digital Diagnostic Functions
- Dispersion Tolerance 800ps/nm
- Operating Case Temperature Standard : 0°C to +70°C
- No external clock required

Applications

- OC192/ STM 64
- 10GBASE-ZR/ZW 10G Ethernet
- 1200-SM-LL-L 10G Fiber Channel
- P1L1-2D2
- ITU-T G.709

Description

The TS-XFP-ZR series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-ZR/ZW defined by IEEE 802.3ae. It is with the XFP 30-pin connector to allow hot plug capability.

This module is designed for single mode fiber and operates at a nominal wavelength of 1550 nm. The transmitter section uses a 1550nm EML, which is class 1 laser compliant according to International Safety Standard IEC-60825.

The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings*Note

Parameter	Symbol	Min	Max	Unit
Supply Voltage Range @ 3.3V	Vcc3	-0.5	4.0	V
Supply Voltage Range @ 5V	Vcc5	-0.5	6.0	V
Operating Relative Humidity	RH		80	%
Storage Temperature	Ts	-40	+85	°C

Note: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage @ 3.3V	Vcc3	3.15	3.3	3.45	V
Power Supply Voltage @ 5V	Vcc5	4.75	5	5.25	V

Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Main Supply Voltage	Vcc5	4.75		5.25	V	
Supply Voltage #2	Vcc3	3.13		3.45	V	
Supply Current – Vcc5 supply	Icc5			370	mA	
Supply Current – Vcc3 supply	Icc3			500	mA	
Module Total Power	P			3.5	W	
Transmitter						
Input Differential Impedance	Rin		100		Ω	1
Differential Data Input Swing	Vin,pp	120		820	mV	
Transmit Disable Voltage	V_D	2.0		Vcc	V	
Transmit Enable Voltage	V_{EN}	GND		GND+ 0.8	V	
Transmit Disable Assert Time				10	us	
Receiver						
Differential Data Output Swing	Vout,pp	340	650	850	mV	1
Rise Time (20– 80%)	tr			38	ps	
Fall Time (20– 80%)	tf			38	ps	
LOS Fault	$V_{LOS\ fault}$	Vcc -0.5		VccHOST	V	2
LOS Normal	$V_{LOS\ norm}$	GND		GND+0.5	V	2

Note1: After internal AC coupling

Note2: Loss of signal is open collector. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
Transmitter					
Centre Wavelength	λc	1530	1550	1565	nm
Spectral Width (-20dB)	Δλ			1	nm
Average Output Power	Pout	-2		5	dBm
Extinction Ratio@10.3Gb/s	ER	9			dB
Average Launch Power of OFF Transmitter	P_{OFF}			-30	dBm
TX Jitter Generation (Peak-to-Peak)	T_{Xj}			0.1	UI
TX Jitter Generation (RMS)	T_{XjRMS}			0.01	UI
Relative Intensity Noise	RIN			-130	dB/Hz
Eye Mask		Compliant with ITU-T G.691			
Receiver					
Centre Wavelength	λc	1270		1600	nm
Receiver Sensitivity@ 9.95Gb/s *Note	P_{min}			-23	dBm
Receiver Sensitivity @ 10.3Gb/s *Note	P_{min}			-23	dBm
Receiver Overload	P_{MAX}	-7			dBm
Receiver Reflectance	Rf			-27	dB
LOS De-Assert	LOS_D			-26	dBm
LOS Assert	LOS_A	-38			dBm
LOS Hysteresis		0.5			dB

Note: Back to back, measured with a PRBS 2^{31}-1 test pattern and ER=9dB, BER $1X10^{-12}$.

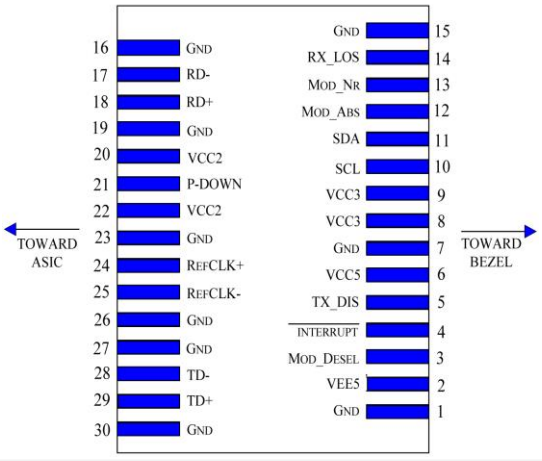
Pin Descriptions

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V 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	
4	LVTTL-O	INTb	Interrupt; Indicates presence of an important condition which can be read via the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V 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	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	RDN	Receiver Inverted Data Output	
18	CML-O	RDP	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply (Not required).	3
21	LVTTL-I	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. Reset; The falling edge initiates a complete reset of the module including the2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply (Not required)	3
23		GND	Module Ground	1
24	PECL-I	REFCLKP	Not used, internally terminated to 50ohm (100ohm diff).	4
25	PECL-I	REFCLKN	Not used, internally terminated to 50ohm (100ohm diff).	4
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TDN	Transmitter Inverted Data Input	
29	CML-I	TDP	Transmitter Non-Inverted Data Input	
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; shall 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.
4. Reference Clock is not required.

Host board Connector Pin out

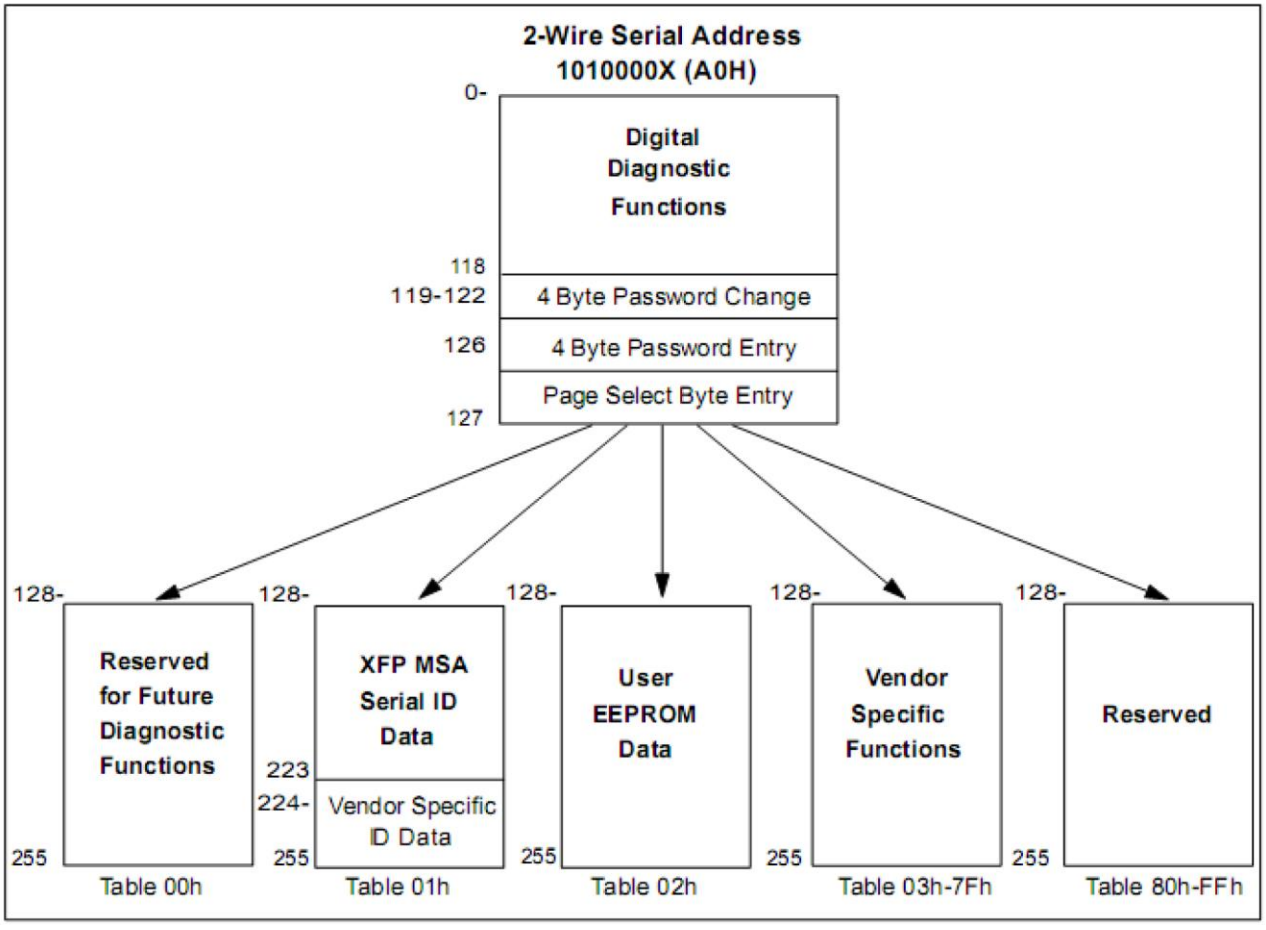


Management Interface

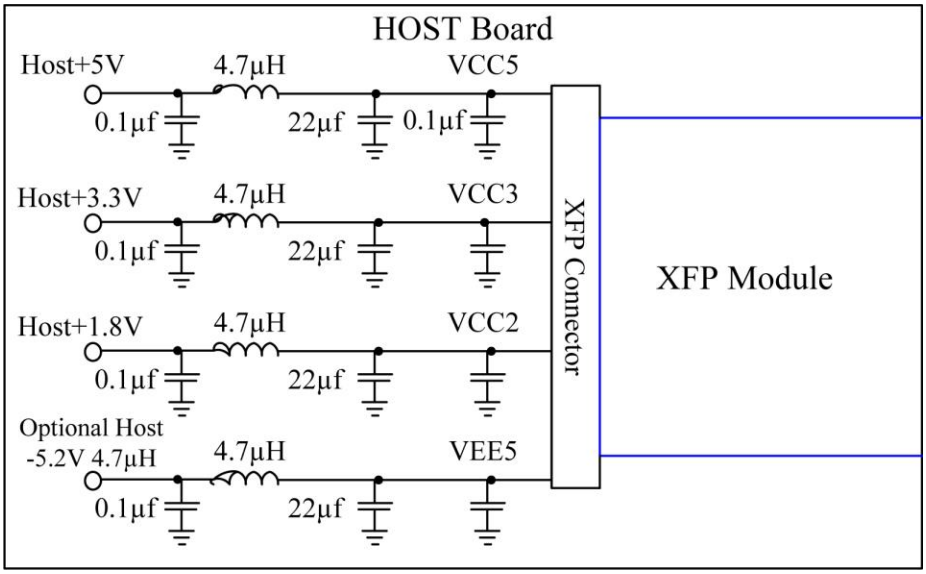
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented.

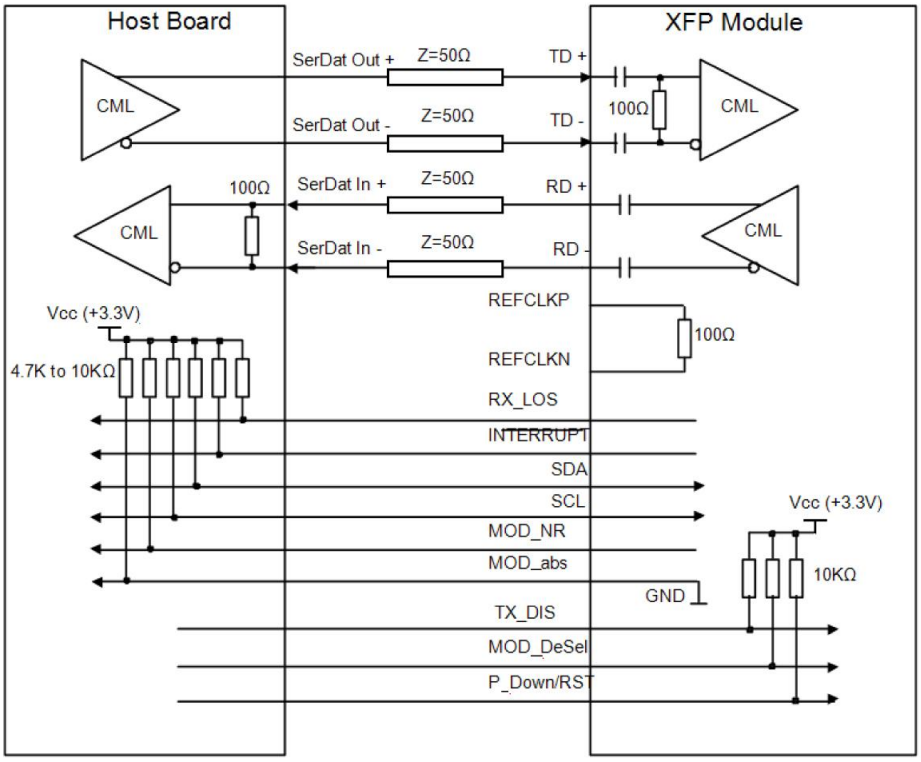
The digital diagnostic memory map specific data field defines as following.



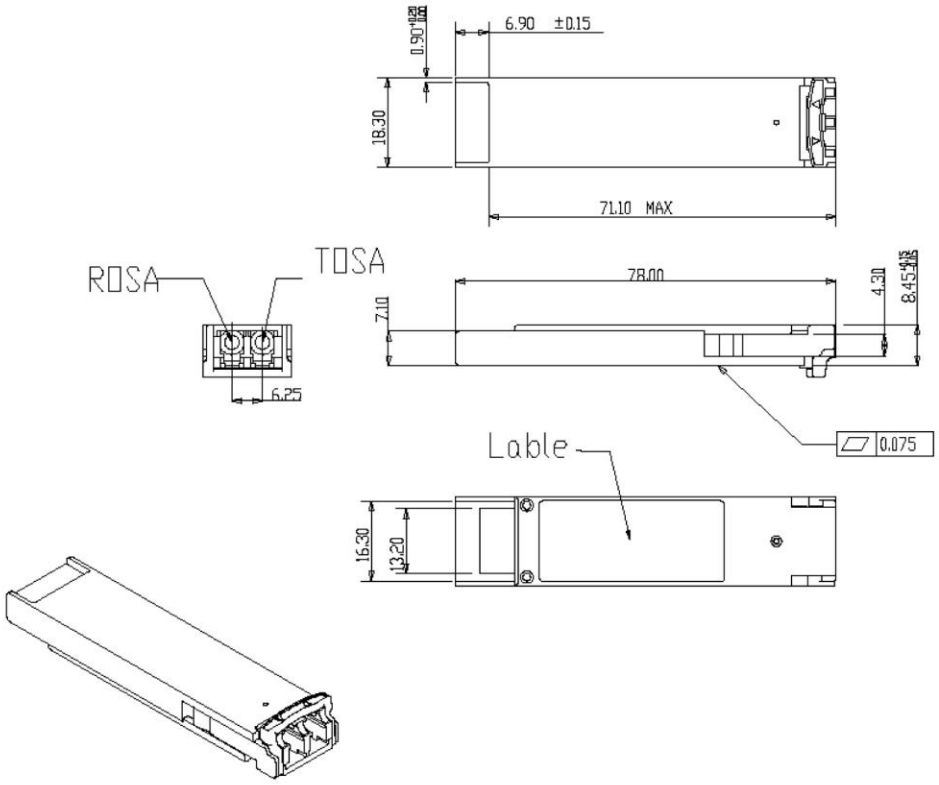
Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit



Package Dimensions



Eye Safety

This single-mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits.

The optical ports of the module shall be terminated with an optical connector or with a dust plug.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compliant with standards Noise frequency range: 30 MHz to 6 GHz. Good system EMI design practice required to achieve Class B margins. System margins depend on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compliant with standards. 1kHz sine-wave, 80% AM, from 80 MHz to 1 GHz. No effect on transmitter/receiver performance is detectable between these limits.
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1:2007 EN (IEC) 60825-2:2004+A1	CDRH compliant and Class I laser product. TüV Certificate No. 50135086
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards *note

Note:

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item 13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for TONGSION's transceivers, because TONGSION's transceivers use glass, which may contain Pb, for components such as lenses, isolators, and other electronic components.

Ordering information

Part Number	Product Description
TS-XFP-ZR	1550nm, 10Gbps, LC, 80km, 0°C~+70°C, With DDM

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by TONGSION before they become applicable to any particular order or contract. In accordance with the TONGSION policy of continuous improvement specifications may change without notice.

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