

# 10Gbps XFP Optical Transceiver RTXM226-408



The RTXM226-408 is a hot pluggable 10Gbps small-form-factor transceiver module integrated with the high performance un-cooled 1310nm DFB laser and high sensitivity PIN receiver. It is compliant to INF-8077i XFP Multi-source Agreement(MSA). The module is a multirate optical transceiver, intended to support Telecom and Datacom applications.

## Features

- Data rate from 9.95 Gbps to 11.3Gbps
- 1310nm DFB TOSA and PIN ROSA
- Industry-standard, protocol-independent, XFI interface
- LC duplex receptacle package
- Single +3.3V power supply
- Hot pluggable
- Built in digital diagnostic functions
- Operating case temperature range:-5°C~70°C
- RoHS compliant

## Applications

- SONET OC-192 SR-1&SDH STM I-64.1
- 10GBASE-LR/LW 10G Ethernet
- 1200-SM-LL-L 10G Fiber Channel
- 10GBASE-LR/LW with FEC
- 1200-SM-LL-L 10G Fiber Channel with FEC

## Standards

- XFP MSA (INF-8077i)
- IEEE802.3ae
- ITU-T G.691

## Specifications

(Tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Value		
			Min	Typ	Max
Optical Transmitter Characteristics					
Data Rate	-	Gbps	9.95	-	11.3
Transmission Distance <sup>1</sup>	L	km	-	-	10
Optical Power	P <sub>0</sub>	dBm	-6	-	-1
Center Wavelength Range	λ <sub>c</sub>	nm	1290	-	1330
Extinction Ratio	ER	dB	6	-	-
Spectral Width (-20dB)	Δλ	nm	-	-	1
TX Jitter Generation(p-p) <sup>2</sup>	-	mUI	-	-	100
TX Jitter Generation(RMS) <sup>3</sup>	-	mUI	-	-	10
Relative Intensity Noise	RIN	dB/Hz	-	-	-128
Eye Diagram	Compliant with IEEE802.3ae and ITU-T G.691				
Dispersion Penalty <sup>4</sup>	-	dB	-	-	1
Optical Receiver Characteristics					
Data Rate	-	Gbps	9.95	-	11.3
Center Wavelength Range	λ <sub>c</sub>	nm	1260	-	1600
Receiver Sensitivity <sup>5</sup>	S	dBm	-	-	-14.4
Stressed Receiver Sensitivity in OMA <sup>6</sup>	SRS	dBm	-	-	-10.3
Overload Input Optical Power	-	dBm	0.5	-	-
Receiver Reflectance	-	dB	-	-	-14
LOS	Optical De-assert	-	-	-	-16
	Optical Assert	-	-30	-	-
LOS Hysteresis	-	dB	0.5	-	6
Note1: Over single mode fiber					
Note2,3: Measured 50KHz~80MHz					
Note4: With 10km G.652 SMF					
Note5: Ber<10 <sup>-12</sup> , 2 <sup>31</sup> -1 PRBS NRZ, 1310nm, ER=6dB					
Note6: 10GFC 1200-SM-LL-L/IEEE 802.3ae 10GBASE-LR compliant					

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## Ordering Information

Part No.	Specifications								
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Top	Reach	Others
RTXM226-408	XFP	10G	1310nm DFB	-6 ~ -1dBm	PIN	<-14.4dBm	-5~70°C	10km	DDM,RoHS

## Block Diagram

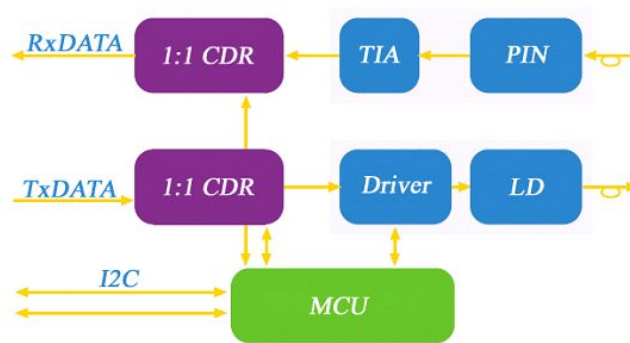


Figure 1. Transceiver functional diagram

## Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Supply Voltage	$V_{CC3}$	V	-0.5	4.0
Storage Temperature	$T_s$	°C	-40	85
Operating Case Temperature	$T_c$	°C	-5	70
Relative Humidity (Non condensation)	-	%	5	90

## Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature	$T_c$	°C	-5	-	70
Supply Voltage	$V_{CC3}$	V	3.13	3.3	3.47
Supply Current	$I_{CC3}$	mA	-	-	650
Power Dissipation	-	W	-	1.7	-

## Electrical Characteristics

(Tested under recommended operating conditions, unless otherwise noted)

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Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Transmitter</b>						
Input Differential Impedance	Rin	$\Omega$	-	100	-	
Differential Data Input Swing	Vin,pp	mV	120	-	1000	
Transmit Disable Voltage	VD	V	2.0	-	V <sub>cc3</sub>	
Transmit Enable Voltage	VEN	V	0	-	+0.8	
Transmit Disable Assert Time	-	$\mu$ s	-	-	10	
<b>Receiver</b>						
Differential Data Output Swing	Vout,pp	mV	400	-	800	
Data Output Rise Time	Tr	ps	24	-	-	
Data Output Fall Time	Tf	ps	24	-	-	
LOS Fault	-	V	V <sub>dd3</sub> -0.5	-	V <sub>dd3</sub>	
LOS Normal	-	V	0	-	+0.5	1
Power Noise Output	-			-		2
Note1: V <sub>dd3</sub> is host +3.3V power supply.						
Note2: Compliant with INF 8077i XFP MSA section 2.7.1.						

## Low Speed Electrical Interface

Parameter	Symbol	Unit	Min	Max	Note
XFP Tx_Dis,P_Down/RST	V <sub>IH</sub>	V	2.0	V <sub>cc3</sub> +0.3	
	V <sub>IL</sub>	V	-0.3	0.8	
XFP Interrupt,Mod_NR,Rx_Los	V <sub>OH</sub>	V	V <sub>dd3</sub> -0.5	V <sub>dd3</sub> +0.3	1
	V <sub>OL</sub>	V	0.0	0.4	
XFP SCL and SDA Input	V <sub>IH</sub>	V	V <sub>dd3</sub> *0.7	V <sub>dd3</sub> +0.5	1
	V <sub>IL</sub>	V	-0.3	V <sub>dd3</sub> *0.3	
XFP SCL and SDA Output	V <sub>OH</sub>	V	V <sub>dd3</sub> -0.5	V <sub>dd3</sub> +0.3	
	V <sub>OL</sub>	V	0.0	0.4	
Leakage Current	I <sub>L</sub>	$\mu$ A	-10	10	
I <sup>2</sup> C Clock Rate	-	KHz	-	400	
Note1: V <sub>dd3</sub> is host +3.3V power supply.					

## Pin Description

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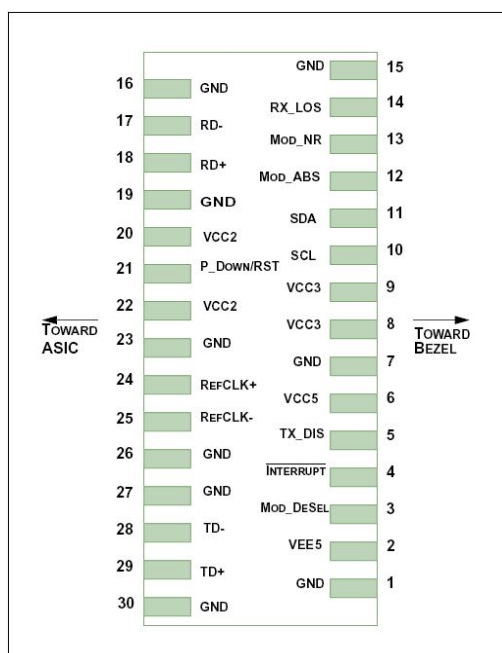


Figure 2.Pin function definitions

Table 1: Transceiver pin descriptions

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply (Not Required)	
3	LVTTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial interface	
4	LVTTTL-O	Interrupt	Interrupt; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply (Not Required)	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	I/O	SCL	2-Wire Serial Interface Clock	2
11	I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the Module	2
13	LVTTTL-O	Mod_NR	Module Not Ready; Indicating Module Operational Fault	2
14	LVTTTL-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)	

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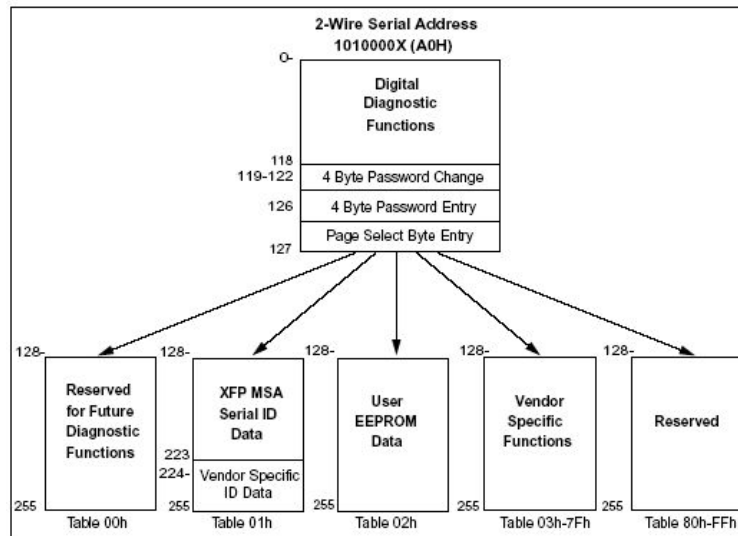
21	LVTTTL-I	P_Down/RST	Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode. Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power 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)	
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board (Not Required)	
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

Note1: Module ground pins GND are isolated from the module case and chassis ground within the module.  
Note2: Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

## Digital Diagnostic Functions

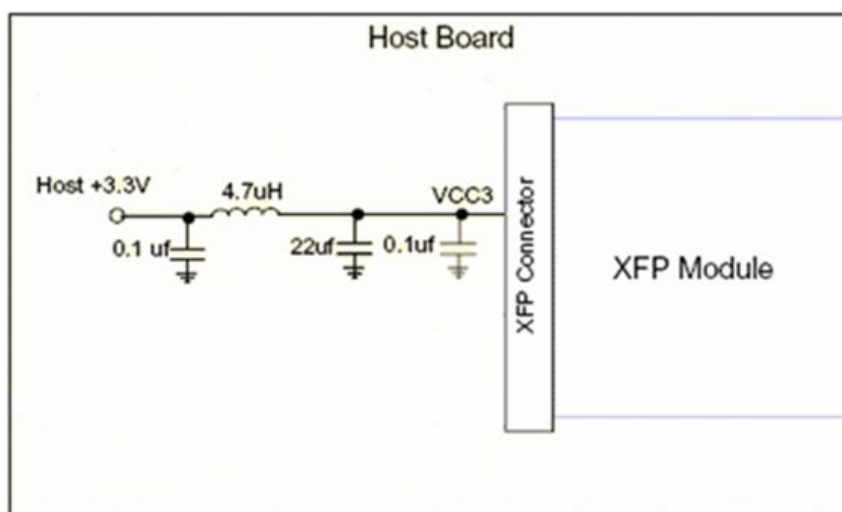
As defined by the XFP MSA, digital diagnostic functions are provided via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver Temperature
- Tx Bias Current
- Tx Optical Power
- RX Received Optical Power
- Transceiver +3.3V Supply Voltage

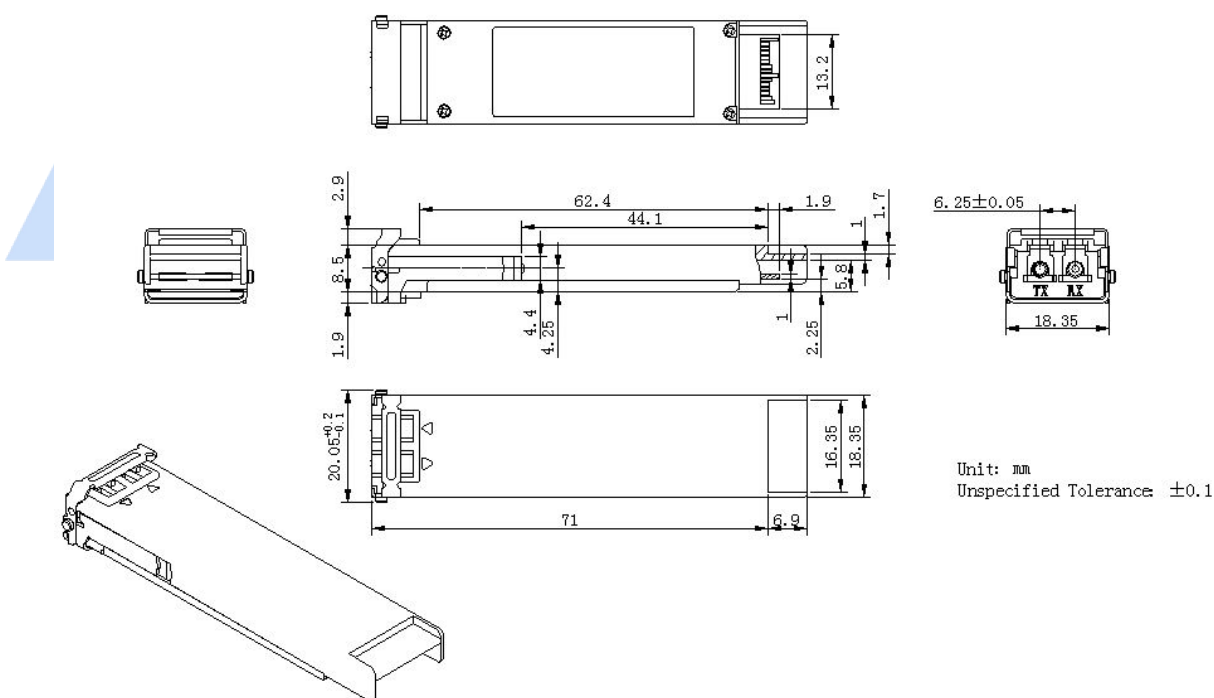


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## Typical Application Circuit for Power Supply



## Package Outline



## Regulatory Compliance

Feature	Test Method	Performance
Laser Eye Safety	FDA 21 CFR 1040.10 and 1040.11 IEC 60825-1: 1994+ A11: 1996+ A2: 2001 IEC 60825-2: 2004 + A1: 2006 EN 60825-1:1994+A1:2002+A2:2001	Compliant with Class 1 laser product

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	EN 60825-2: 2004	
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7 Human Body Model	Class 1 (>1.5kV)
Electrostatic Discharge (ESD) Immunity	IEC 61000-4-2: 2001	Class 2 (>4.0kV)
Electromagnetic Interference (EMI)	FCC Part 15 Subpart J Class B CISPR22:1997+A1:2000+A2:2002, Class B EN55022:1998+A1:2000+A2:2003, Class B	Compliant with standards

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