



# 10Gbps 80km DWDM XFP Optical Transceiver

## ***RTXM226-6XX***

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### Features

- *Compliant with XFP MSA Rev.4.0*
- *Data Rate from 9.95 Gbps to 11.3Gbps*
- *100GHz ITU Grid, C Band*
- *DWDM-rated EML transmitter*
- *APD receiver*
- *10G XFI interface*
- *Transmission distance up to 80km*
- *LC duplex receptacle package*
- *Low power dissipation (Max 3.5W)*
- *Hot Pluggable*
- *Built in digital diagnostic Functions*
- *Operating case temperature range:-5°C~70°C*
- *RoHS compliant*

### Applications

- *DWDM Networks*
- *SONET OC-192&SDH STM 64*
- *10Gigabit Ethernet*
- *10Gigabit Fiber Channel*

## Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Supply Voltage 1	V <sub>cc3</sub>	V	-0.5	4.0
Supply Voltage 2	V <sub>cc5</sub>	V	-0.5	6.0
Storage Temperature	T <sub>s</sub>	°C	-40	85
Operating Case Temperature	T <sub>c</sub>	°C	-5	70
Relative humidity (Non condensation)	-	%	5	90

## Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature	T <sub>c</sub>	°C	-5	-	70
Supply Voltage 1	V <sub>CC3</sub>	V	3.13	3.3	3.47
Supply Current 1	I <sub>CC3</sub>	mA	-	-	750
Supply Voltage 2	V <sub>CC5</sub>	V	4.75	5.0	5.25
Supply Current 2	I <sub>CC5</sub>	mA	-	-	500
Power Dissipation	-	W	-	-	3.5

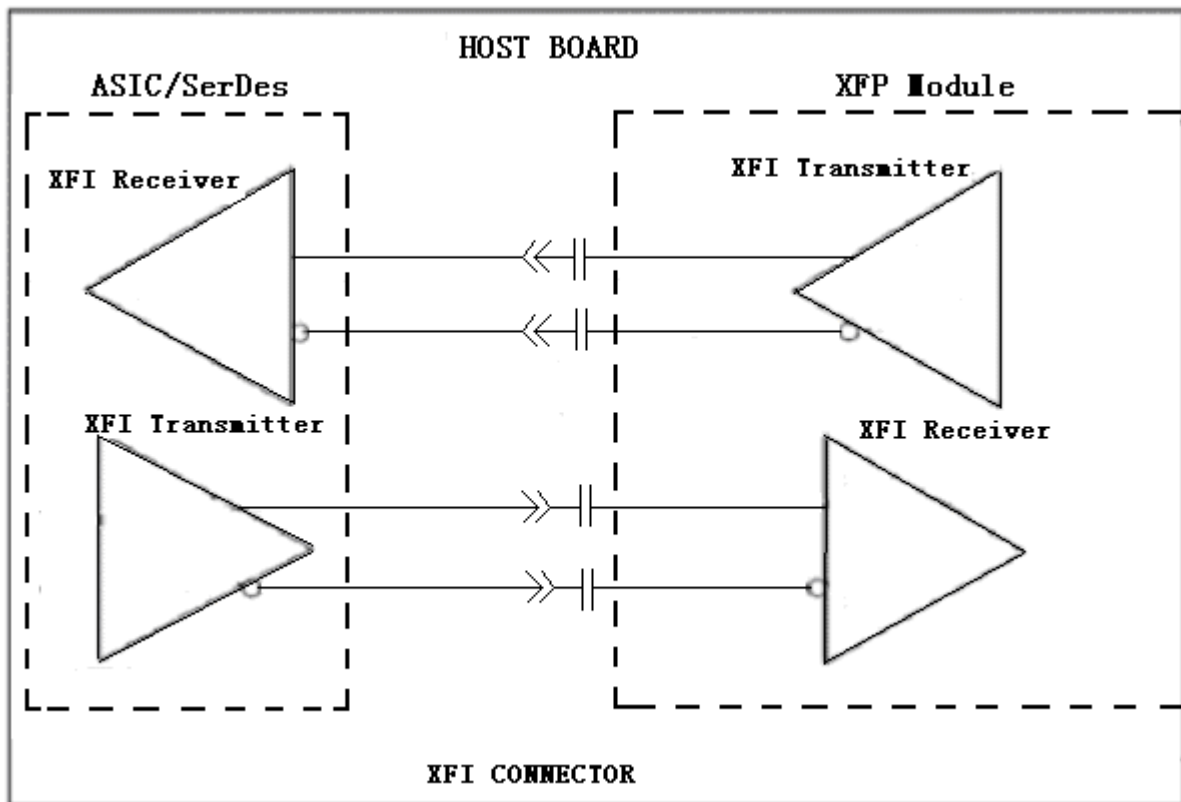
## Electrical Characteristics

*(Tested under recommended operating conditions, unless otherwise noted)*

### High Speed Electrical Interface

Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Transmitter</b>						
Input differential impedance	R <sub>in</sub>	Ω	-	100	-	
Differential data input swing	V <sub>in,pp</sub>	mV	120	-	1000	
Transmit Disable Voltage	VD	V	2.0	-	V <sub>cc3</sub> +0.3	
Transmit Enable Voltage	VEN	V	0	-	+0.8	
Transmit Disable Assert Time	-	us	-	-	10	
<b>Receiver</b>						
Differential data output swing	V <sub>out,pp</sub>	mV	400	650	800	
Data output rise time	T <sub>r</sub>	ps	24	-	-	
Data output fall time	T <sub>f</sub>	ps	24	-	-	
LOS Fault	-	V	2	-	V <sub>dd3</sub> +0.3	1
LOS Normal	-	V	0	-	+0.8	

**Note1:** V<sub>dd3</sub> is host +3.3V power supply.



**Figure 1.** High Speed Electrical Interface

### Low Speed Electrical Interface

Parameter	Symbol	Unit	Min	Max	Note
LVTTL-I (Tx_Dis,P_Down/RST)	$V_{IH}$	V	2.0	$V_{cc3}+0.3$	
	$V_{IL}$	V	-0.3	0.8	
LVTTL-O (Interrupt,Mod_NR,Rx_Los)	$V_{OH}$	V	$V_{dd3}-0.5$	$V_{dd3}+0.3$	1
	$V_{OL}$	V	0.0	0.4	
LVTTL-I (SCL,SDA)	$V_{IH}$	V	$V_{dd3}*0.7$	$V_{dd3}+0.5$	1
	$V_{IL}$	V	-0.3	$V_{dd3}*0.3$	
LVTTL-O (SCL,SDA)	$V_{OH}$	V	$V_{dd3}-0.5$	$V_{dd3}+0.3$	
	$V_{OL}$	V	0.0	0.4	
Leakage Current	$I_L$	$\mu A$	-10	10	
I <sup>2</sup> C Clock Rate		KHz		400	

**Note 1:** Vdd3 is host +3.3V power supply.

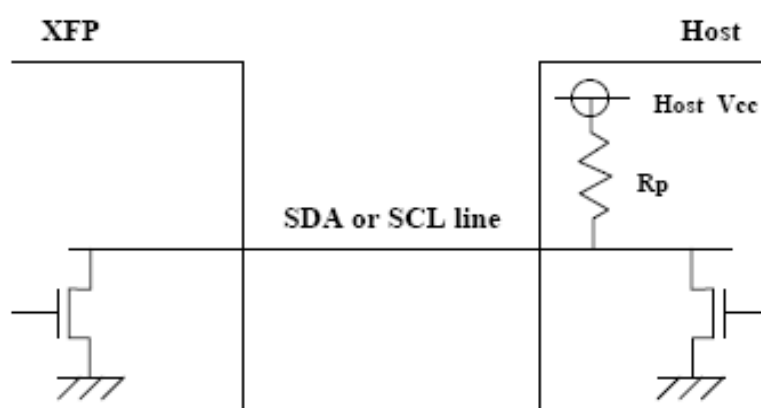


Figure 2. Open Drain Type Connection for I<sup>2</sup>C

## Optical Characteristics

(Tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Optical transmitter Characteristics</b>						
Data rate	-	Gbps	9.95	-	11.3	
Optical Power	P <sub>o</sub>	dBm	0.0	-	4.0	ITU-T G.691
Wavelength		nm	1528.77		1563.05	
Center Wavelength Spacing		GHz		100		
Wavelength Tolerance		pm	-50		+50	
Extinction Ratio	ER	dB	9	-	-	ITU-T G.691
SMSR	-	dB	30	-	-	
Eye diagram	Compliant with ITU-T G.691 STM-64 eye mask					
<b>Optical receive Characteristics</b>						
Data rate	-	Gbps	9.95	-	11.3	
Receiver Sensitivity@0ps/nm	-	dBm	-	-	-24	10.709Gbps
Receiver Sensitivity@1600ps/nm	-	dBm	-	-	-22	10.709Gbps
Receiver Sensitivity@0ps/nm	-	dBm	-	-	-23	11.3Gbps
Receiver Sensitivity@1600ps/nm	-	dBm	-	-	-21	11.3Gbps
Overload	-	dBm	-9	-	-	
Optical Return Loss	-	dB	27	-	-	
LOS De-Assert	-	dBm	-	-	-27	
LOS Assert	-	dBm	-34	-	-	
LOS Hysteresis	-	dB	0.5	-	6	

## Block Diagram

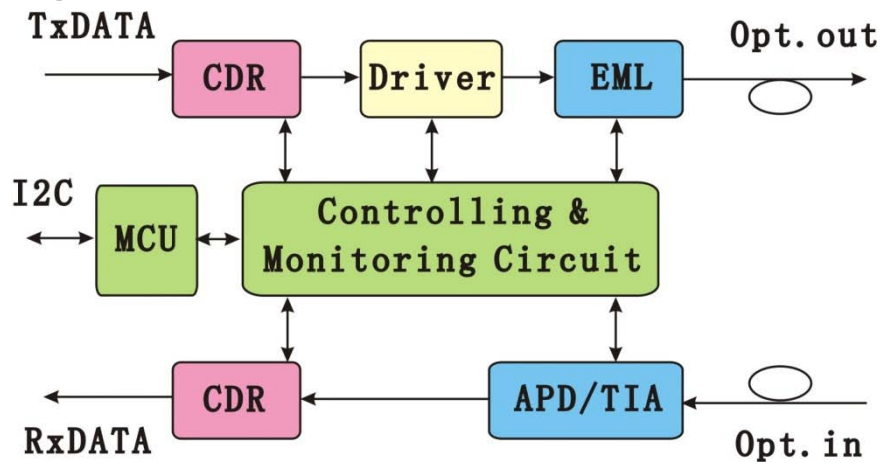


Figure 3. Block Diagram for RTX226-6XX

## Pin Description

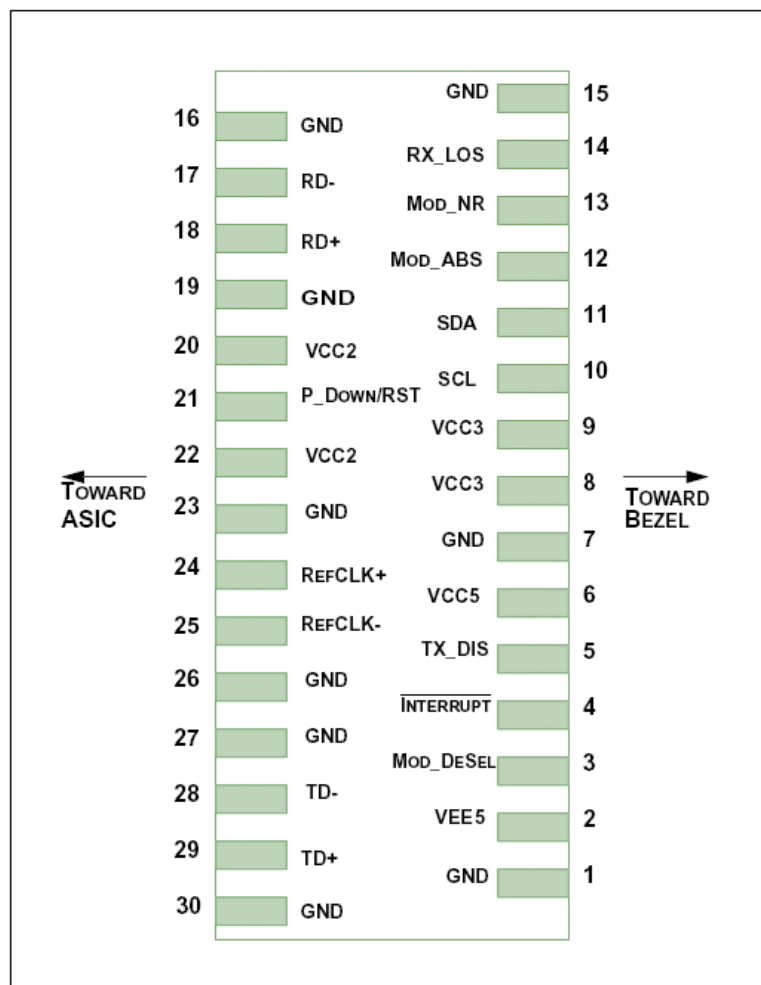


Figure 4. Host PCB XFP Pinout Top View

### Module Electrical Pin Definition

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply ( <b>Not Required</b> )	
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	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTTL-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 ( <b>Not Required</b> )	
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 ( <b>Not Required</b> )	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input, AC coupled on the host board <b>(Not Required)</b>	
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board <b>(Not Required)</b>	
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.

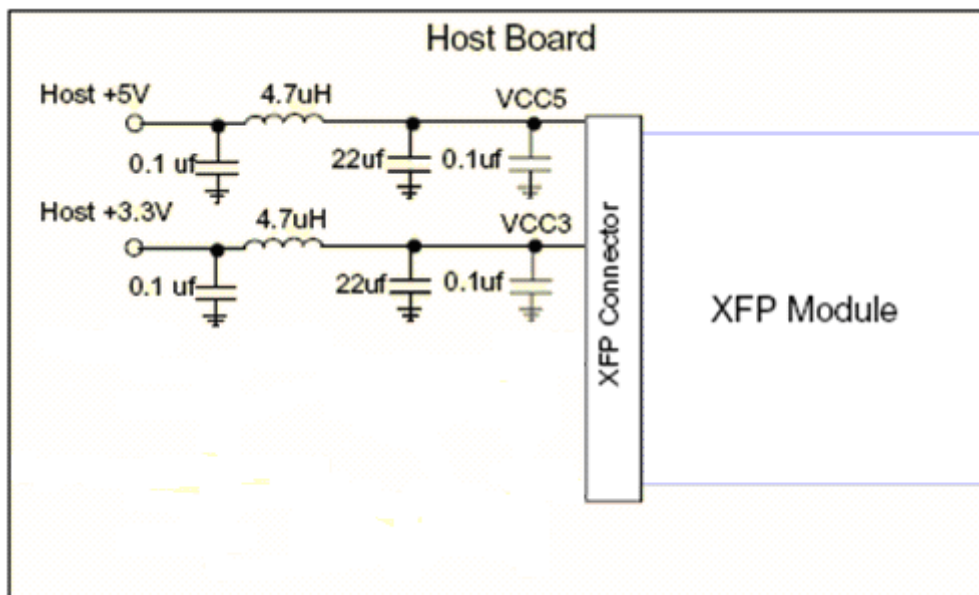
**Note2:** Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

## 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&+5.0V Supply Voltage

## Typical Application Circuit For Power Supply



**Figure 5.** Example of Host Board Supply Filtering Network

## Package Outline

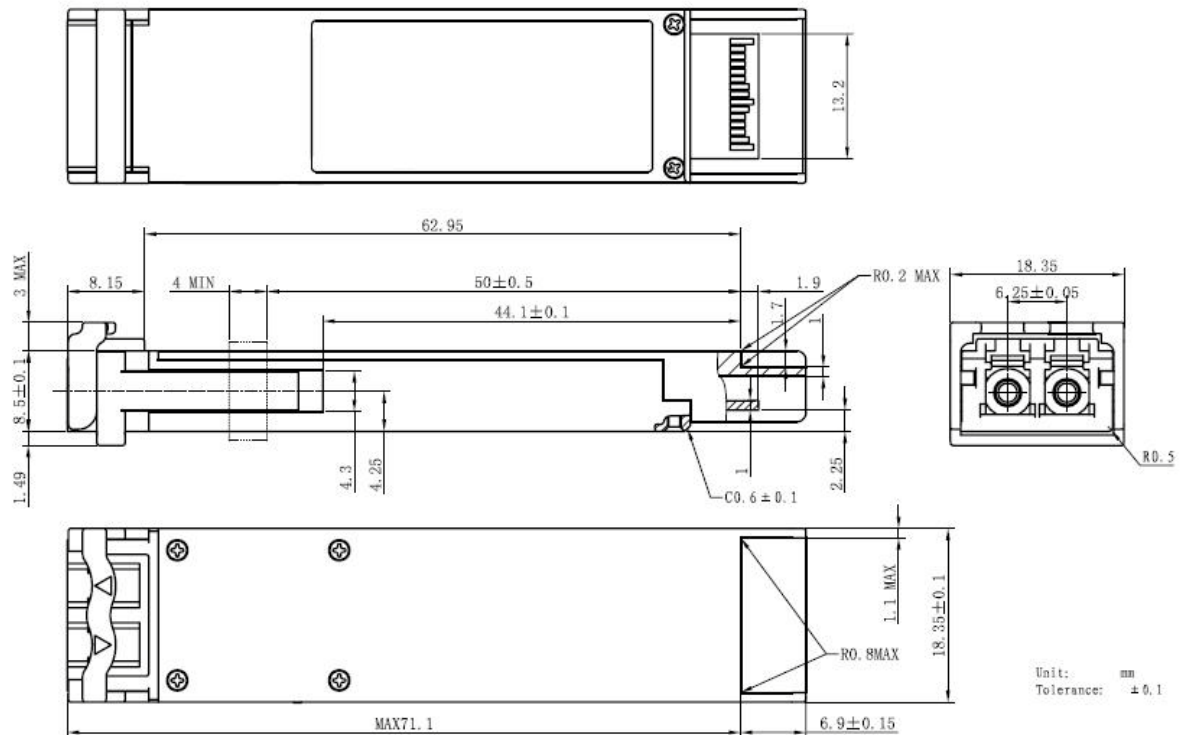


Figure 6. Package Outline

## 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 EN 60825-2: 2004	Compliant with Class 1 laser product
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



## Ordering Information

Part No.	Specifications							Application	
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp		Reach
RTXM226-6XX	XFP	9.95G ~ 11.3G	DWDM-rated EML transmitter	0 ~ 4dBm	APD	< -23dBm	-5~70°C	80km	SONET OC-192 LR-2 SDH STM L-64.2, 10GBASE-ZR 10G Fiber Channel

Product Code	Frequency (THz)	Center Wavelength (nm)
RTXM226-618	191.8	1563.05
RTXM226-619	191.9	1562.23
RTXM226-620	192.0	1561.42
RTXM226-621	192.1	1560.61
RTXM226-622	192.2	1559.79
RTXM226-623	192.3	1558.98
RTXM226-624	192.4	1558.17
RTXM226-625	192.5	1557.36
RTXM226-626	192.6	1556.55
RTXM226-627	192.7	1555.75
RTXM226-628	192.8	1554.94
RTXM226-629	192.9	1554.13
RTXM226-630	193.0	1553.33
RTXM226-631	193.1	1552.52
RTXM226-632	193.2	1551.72
RTXM226-633	193.3	1550.92
RTXM226-634	193.4	1550.12
RTXM226-635	193.5	1549.32
RTXM226-636	193.6	1548.51
RTXM226-637	193.7	1547.72
RTXM226-638	193.8	1546.92
RTXM226-639	193.9	1546.12
RTXM226-640	194.0	1545.32
RTXM226-641	194.1	1544.53
RTXM226-642	194.2	1543.73
RTXM226-643	194.3	1542.94
RTXM226-644	194.4	1542.14
RTXM226-645	194.5	1541.35

RTXM226-646	194.6	1540.56
RTXM226-647	194.7	1539.77
RTXM226-648	194.8	1538.98
RTXM226-649	194.9	1538.19
RTXM226-650	195.0	1537.40
RTXM226-651	195.1	1536.61
RTXM226-652	195.2	1535.82
RTXM226-653	195.3	1535.04
RTXM226-654	195.4	1534.25
RTXM226-655	195.5	1533.47
RTXM226-656	195.6	1532.68
RTXM226-657	195.7	1531.90
RTXM226-658	195.8	1531.12
RTXM226-659	195.9	1530.33
RTXM226-660	196.0	1529.55
RTXM226-661	196.1	1528.77

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