

# 10 GB/s 10Km CWDM SFP+ Transceivers



The RTX228-5XX 10Gigabit DFB laser with CWDM transceiver is designed to transmit and receive serial optical data links up from 8.5 Gb/s to 10.52 Gb/s data rate over 10km singlemode fiber. The Transceiver is compliant with SFF-8432, 10GFC, FC-PI-4, IEEE802.3ae and applicable portions of SFF-8431. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Specifications

(tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min	Typ	Max	Note
Transmitter						
Nominal Wavelength	$\lambda$	nm	1271,1291,1311,1331, The confirmation of the else wavelength is according to the future study.			CWDM
Wavelength Drift	$\Delta \lambda$	nm	-6.5		+6.5	
Side Mode Suppression Ratio	SMSR	dB	30			
Optical Output Power	P <sub>av</sub>	dBm	-2.4		+5	1
Extinction Ratio	ER	dB	3.5			
Average launch power of OFF transmitter	P <sub>OFF</sub>	dBm			-35	
Relative Intensity Noise	RIN	dB/Hz			-128	
Optical Return Loss Tolerance	ORLT	dB			12	
Receiver						
Center Wavelength	$\lambda$	nm	1260		1610	
Average Receiver Power	P <sub>AVG</sub>	dBm	-14.4		+0.5	2
Receiver Sensitivity (OMA)	R <sub>SENSE1</sub>	dBm			-12.6	2
Stressed Receiver Sensitivity (OMA)	R <sub>SENSE2</sub>	dBm			-10.3	3
Receiver Reflectance	R <sub>REFL</sub>	dB			-12	
Assert LOS	LOS <sub>A</sub>	dBm	-30			
De-Assert LOS	LOS <sub>D</sub>	dBm			-15	
LOS Hysteresis		dB	0.5			

**Note 1:** Demand of customer

**Note 2:** Sensitivity for 10G PRBS 2<sup>31</sup>-1 and BER better than or equal to 10E-12

**Note 3:** The stressed sensitivity value in the table are for system level BER measurements which include the effects of CDR circuit.

## Features

- Link lengths at 10G 10Km
- LC duplex connector
- Low power consumption <1.0W
- 0°C to 70°C operating temperature range
- Single +3.3V±5% power supply
- Digital Monitoring SFF-8472 compliant
- High sensitivity PIN photodiode and TIA
- Uncooled directly modulated DFB Laser with CWDM wavelengths

## Applications

- 10GBASE-LR/LW 10G Ethernet
- 10GFC
- 8GFC

## Standards

- IEEE 802.3ae
- SFF-8431 Rev 3.0
- SFF-8472 Rev 10.2
- 10GFC Rev 4.0
- FC-PI-4 Rev 7.0

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## Ordering Information

Part No.	Specifications									Application
	Package	Data rate(Gb/s)	Laser	Optical Power (dBm)	Detector	Sensitivity (OMA) dBm	Top	Reach (km)	Other	
RTXM228-5XX	SFP+	8.5 ~10.52	CWDM DFB	-2.4 ~+5	PIN	< -12.6	0~70 °C	10km	DDM	10GBASE-LR/LW 8G/10GFC

Part NO.	Wavelength(nm)		
	min	type	max
RTXM228-501	1263.5	1271	1278.5
RTXM228-502	1283.5	1291	1298.5
RTXM228-503	1303.5	1311	1318.5
RTXM228-504	1323.5	1331	1338.5

## Absolute Maximum Ratings

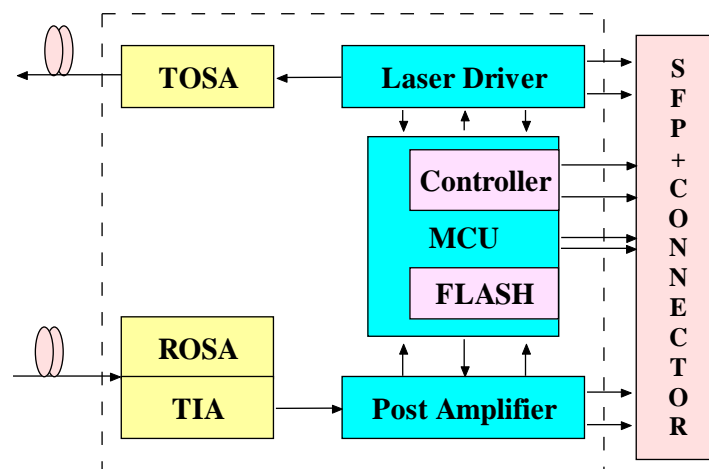
Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	85
Relative Humidity	RH	%	0	95
Supply Voltage	V <sub>CC</sub>	V	-0.3	4.0

## Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	°C	0		70
Power Supply Voltage	V <sub>CC</sub>	V	3.14	3.3	3.46
Bit Rate	BR	Gb/s	8.5		10.52
Bit Error Ratio	BER				10 <sup>-12</sup>
Max Supported Link Length	L	km			10

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## Principle diagram



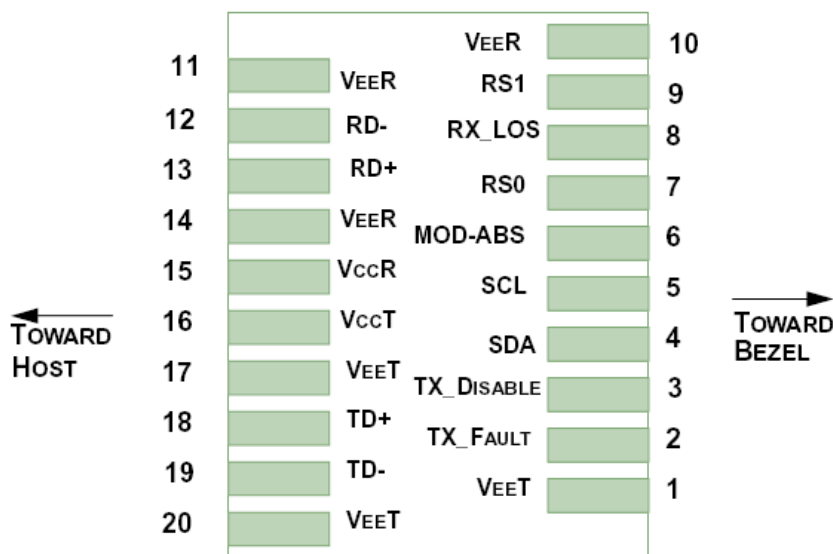
## Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
Supply Voltage	V <sub>CC</sub>	V	3.14	3.3	3.46	
Supply Current	I <sub>CC</sub>	mA			300	
<b>Transmitter</b>						
Input Differential Impedance	R <sub>IN</sub>	Ω	80	100	120	1
Differential Data Input Swing	V <sub>IN</sub>	mVp-p	180		700	
Transmit Disable Voltage	V <sub>DIS</sub>	V	2		V <sub>CCHOST</sub>	
Transmit Enable Voltage	V <sub>EN</sub>	V	V <sub>EE</sub>		V <sub>EE</sub> +0.8	
Transmit Fault Assert Voltage	V <sub>FA</sub>	V	2.2		V <sub>CCHOST</sub>	
Transmit Fault De-Assert Voltage	V <sub>FDA</sub>	V	V <sub>EE</sub>		V <sub>EE</sub> +0.4	
<b>Receiver</b>						
Differential Data Output Swing	V <sub>OD</sub>	mVp-p	450	600	850	
Output Rise Time	t <sub>RISE</sub>	ps	25			
Output Fall Time	t <sub>FALL</sub>	ps	25			
LOS Fault	V <sub>LOSFT</sub>	V	2		V <sub>CCHOST</sub>	
LOS Normal	V <sub>LOSNR</sub>	V	V <sub>EE</sub>		V <sub>EE</sub> +0.8	

**NOTE 1:** Differential between TD+ / TD-

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## Pin function definitions

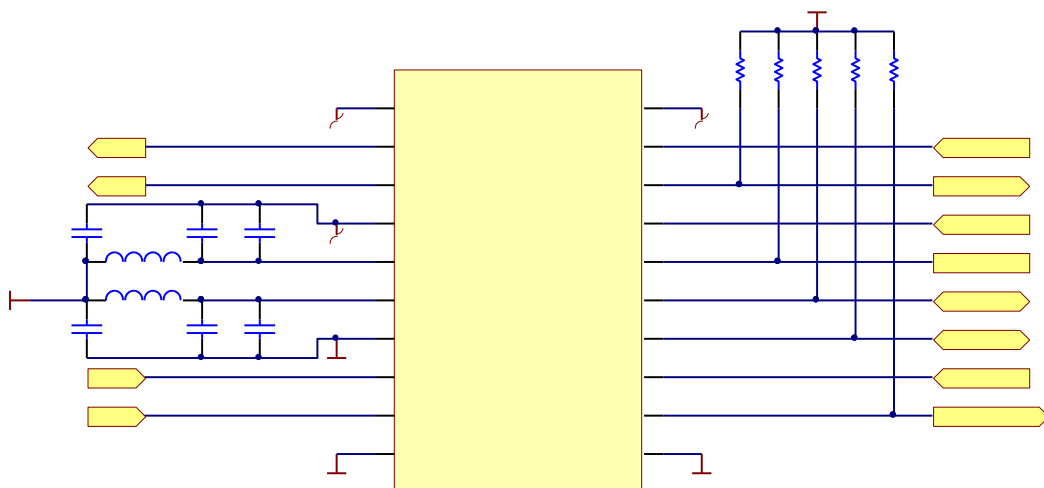


Pin Number	Symbol	Name	Description
1,17,20	VeeT	Transmitter Signal Ground	These pins should be connected to signal ground on the host board.
2	TX Fault	Transmitter Fault Out (OC)	Logic "1" Output = Laser Fault (Laser off before t_fault) Logic "0" Output = Normal Operation This pin is open collector compatible, and should be pulled up to Host Vcc with a 10kΩ resistor.
3	TX Disable	Transmitter Disable In (LVTTL)	Logic "1" Input (or no connection) = Laser off Logic "0" Input = Laser on This pin is internally pulled up to VccT with a 10 kΩ resistor.
4	SDA	Module Definition Identifiers	Serial ID with SFF 8472 Diagnostics Module Definition pins should be pulled up to Host Vcc with 10 kΩ resistors.
5	SCL		
6	MOD-ABS		
7	RS0	Receiver Rate Select (LVTTL)	These pins have an internal 33kΩ pull-down to ground. A signal on either of these pins will not affect module performance.
9	RS1	Transmitter Rate Select (LVTTL)	
8	LOS	Loss of Signal Out (OC)	Sufficient optical signal for potential BER < 1x10 <sup>-12</sup> = Logic "0" Insufficient optical signal for potential BER < 1x10 <sup>-12</sup> = Logic "1" This pin is open collector compatible, and should be pulled up to Host Vcc with a 10kΩ resistor.
10,11,14	VeeR	Receiver Signal Ground	These pins should be connected to signal ground on the host board.
12	RD-	Receiver Negative DATA Out (CML)	Light on = Logic "0" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.
13	RD+	Receiver Positive DATA Out (CML)	Light on = Logic "1" Output Receiver DATA output is internally AC coupled and series terminated with a 50Ω resistor.

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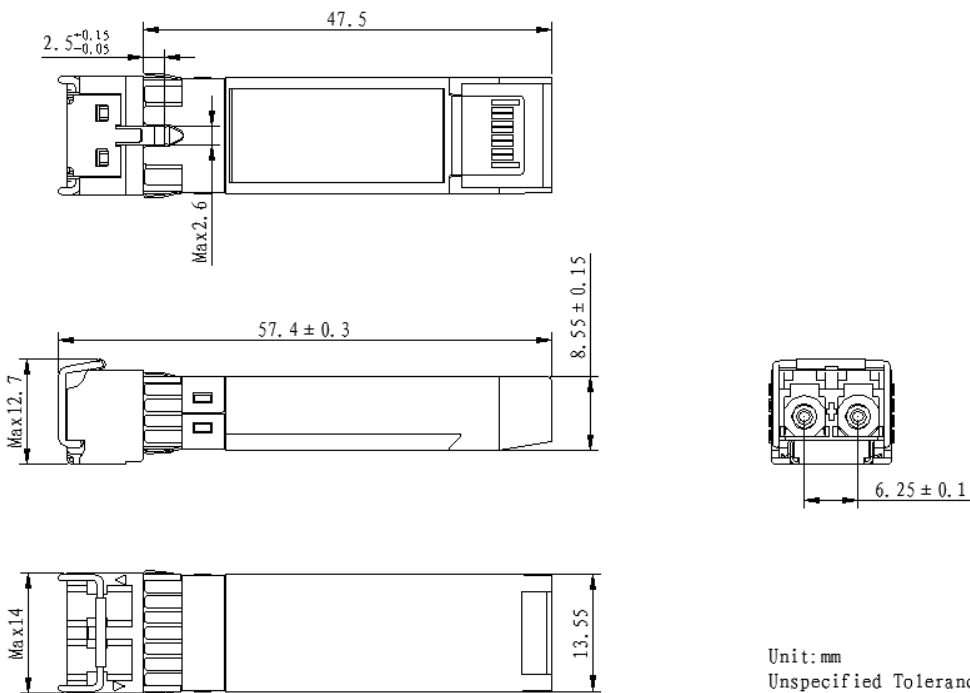
15	VccR	Receiver Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. See Figure 3. Recommended power supply filter
16	VccT	Transmitter Power Supply	This pin should be connected to a filtered +3.3V power supply on the host board. See Figure 3. Recommended power supply filter
18	TD+	Transmitter Positive DATA In (CML)	Logic “1” Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.
19	TD-	Transmitter Negative DATA In (CML)	Logic “0” Input = Light on Transmitter DATA inputs are internally AC coupled and terminated with a differential 100Ω resistor.

## Typical Application Circuit



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## Package Outline



## Regulatory Compliance

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.7	Class 1 (> 1500 Volts)
Electrostatic Discharge (ESD) Immunity	Variation of IEC 61000-4-2	LV 4(Air discharge :15KV;Contact discharge:8 KV) Performance criterion:B
Electromagnetic Interference (EMI)	CISPR22 ITE Class B EN55022 Class B FCC Class B	Compliant with standards
Immunity	IEC61000-4-3 Class 2 EN55024	Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure.