

10Gb/s SFP+ 850nm 收发合一光模块

RTXM228-553



产品简介

RTXM228-550 采用 850nm 的 VCSEL 万兆收发器，设计用于在多模光纤中发送和接收从 8.5 到 10.51875 Gb/s 速率数据。该收发器符合 FC-P1-4、10G F、IEEE802.3ae、SFF-8432 和 SFF-8431 适用部分标准。发射机转换串行的 CML 电数据转换成串行光学数据。集电极开路兼容提供发送禁用 (Tx_Dis) 功能。当 TX_DIS 是告警高电平，发射机关闭。接收机串行光学数据转换为串行的 CML 电数据，提供信号的开路兼容的损失。RX_LOS 信号指示在接收机可靠接收信号光功率不足。在 SFF-8472 规定中数字诊断功能通过 2 路串行接口可用。

特征

- Compliant to SFP+ MSA
- Fully RoHS Compliant
- All metal housing for superior EMI performance
- IPF compliant mechanics SFF-8432
- Operating data rate 8.5-10.5Gb/s
- 850nm VCSEL Laser
- High sensitivity PIN photodiode and TIA
- LC duplex connector
- Hot pluggable 20pin connector
- Low power consumption <1.0W
- -40°C to 85°C operating wide temperature range
- Single +3.3V±5% power supply

- Digital Monitoring SFF-8472 Rev 11 compliant
- Real time monitoring of:
 - Transmitted optical power
 - Received optical power
 - Laser bias current
 - Temperature
 - Supply voltage

应用

- 10GBASE-SR
- 8.5/10.5 Gb/s Fiber Channel
- Wireless and cellular base station

标准

- FC-P1-4 Rev 7.00
- 10GFC Rev 4.0
- IEEE 802.3ae 10GBASE-SR
- SFF-8431 Rev 4
- SFF-8472 Rev 11

订购信息

产品型号	产品规格									应用
	封装	速率	激光器	光功率	探测器	灵敏度 (OMA)	温度	传输距离 (OM3)	其他	
RTXM228-553	SFP+	8.5~10.5 Gb/s	850nm VCSEL	-7.3~-1.0dBm	PIN	< -11.1dBm	-40~85℃	300m	DDM	10GBAS E-SR 8 GFC, 10 GFC

原理框图

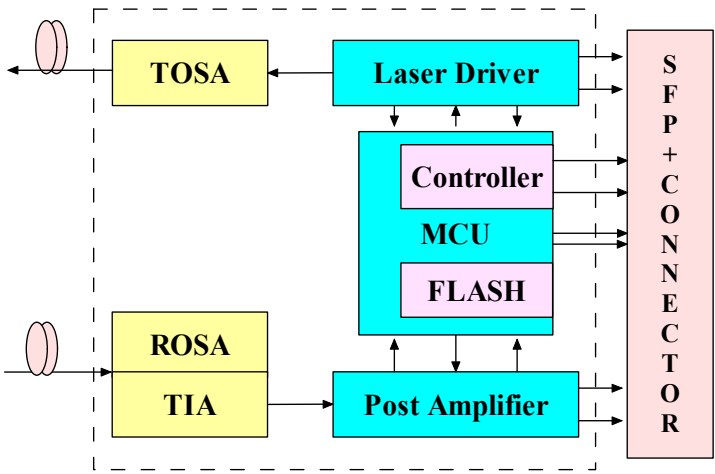


图 1 收发模块工作原理图

绝对最大额定值

参数	符号	单位	最小值	最大值
储存温度范围	Ts	°C	-40	85
相对湿度	RH	%	0	95
供电电压	V _{CC}	V	-0.3	4.0

推荐工作条件

参数	符号	单位	最小值	典型值	最大值
管壳工作温度范围	Tc	°C	-40		85
供电电压	V _{CC}	V	3.14	3.3	3.46
速率	BR	Gb/s	8.5	10.3125	10.51875
误码率	BER				10 ⁻¹²
在多模光纤 50um (OM3)(2000MHz.km) 传输距离	L	m			300

电学特性(Tc=-40 °C to 85 °C and Vcc= 3.14 to 3.46V)

参数	符号	单位	最小值	典型值	最大值	备注
供电电压	V _{CC}	V	3.14	3.3	3.46	
电流	I _{CC}	mA		180	285	
发送端						
输入差分阻抗	R _{IN}	Ω	80	100	120	1
差分数据输入摆幅	V _{IN}	mVp-p	180		700	
Transmit Disable 电压	V _{DIS}	V	2		V _{CCHOST}	
Transmit Enable 电压	V _{EN}	V	V _{EE}		V _{EE} +0.8	
发射故障告警电压	V _{FA}	V	2.2		V _{CCHOST}	
发射故障告警恢复电压	V _{FDA}	V	V _{EE}		V _{EE} +0.4	
接收端						
差分数据输出摆幅	V _{OD}	mVp-p	300		850	
输出上升时间	t _{RISE}	ps	28			
输出下降时间	t _{FALL}	ps	28			
LOS 告警	V _{LOSFT}	V	2		V _{CCHOST}	
LOS 恢复	V _{LOSNR}	V	V _{EE}		V _{EE} +0.8	

NOTE 1: Differential between TD+ / TD-

10GBASE-SR 光学特性(Tc=-40 °C to 85 °C, Vcc= 3.14 to 3.46V, Data rate: 10.3125Gb/s)

参数	符号	单位	最小值	典型值	最大值	备注
发射端						
标称波长	λ	nm	840	850	860	
光谱宽度 (RMS)			详见 图 2 和表 1			

输出光功率	P _{av}	dBm	-7.3	-1.0
平均放射光功率 (OFF Transmitter)	P _{OFF}			-30
发射光功率 (OMA)	详见 图 2 和表 1			
消光比	ER	dB	3.0	
相对强度噪声	R _{IN}	dB/Hz		-128
回波损耗容限	ORLT	dB		12
眼图模板 (X1,X2,X3,Y1,Y2,Y3)	(0.25, 0.40, 0.45, 0.25, 0.28, 0.40)			
发射机色散代价	TDP	dB	3.9	1
接收端				
中心波长	λ _c	nm	840	860
平均接收功率	P _{AVG}	dBm	-9.9	-1.0
接收灵敏度 (OMA)	R _{SENSE1}	dBm		-11.1 2
加压接收灵敏度(OMA)	R _{SENSE2}	dBm		-7.5 3
接收过载		dBm	-1.0	2
接收反射	R _{REFL}	dB		-12
Receive Electrical 3 dB Upper Cutoff Frequency	F _{CUT}	GHz		12.3
LOS 告警	LOS _A	dBm	-30	
LOS 恢复	LOS _D	dBm		-12
LOS 滞回		dB	0.5	

Note 1: Refer to Table1

Note 2: Sensitivity for 10G PRBS 2³¹-1 and BER better than or equal to 10E-12

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

Minimum 10GBASE-S optical modulation amplitude (dBm) as a function of center wavelength and spectral width

表 1 最低 10GBASE-S 光调制幅度 (dBm)

Center Wavelength (nm)	RMS Spectral Width (nm)								
	Up to 0.05	0.05 to 0.1	0.1 to 0.15	0.15 to 0.2	0.2 to 0.25	0.25 to 0.3	0.3 to 0.35	0.35 to 0.4	0.4 to 0.45
840 to 842	-4.2	-4.2	-4.1	-4.1	-3.9	-3.8	-3.5	-3.2	-2.8
842 to 844	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.6	-3.3	-2.9
844 to 846	-4.2	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-2.9
846 to 848	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-2.9
848 to 850	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-3.0
850 to 852	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.4	-3.0
852 to 854	-4.3	-4.2	-4.2	-4.1	-4.0	-3.9	-3.7	-3.4	-3.1
854 to 856	-4.3	-4.3	-4.2	-4.1	-4.0	-3.9	-3.7	-3.4	-3.1
856 to 858	-4.3	-4.3	-4.2	-4.1	-4.0	-3.9	-3.7	-3.5	-3.1
858 to 860	-4.3	-4.3	-4.2	-4.2	-4.1	-3.9	-3.7	-3.5	-3.2

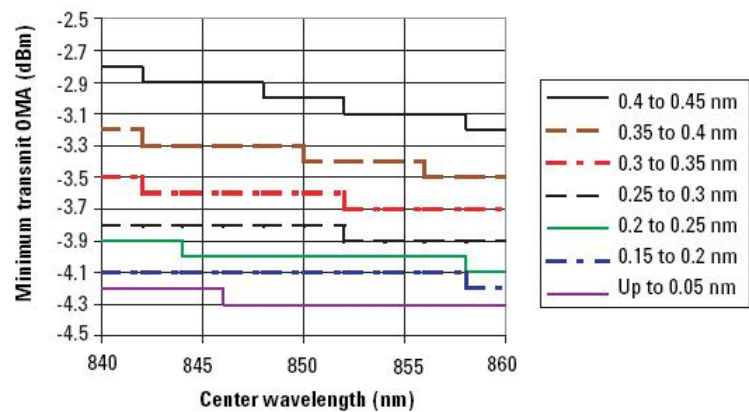


图 2 10GBASE-S 三重权衡曲线

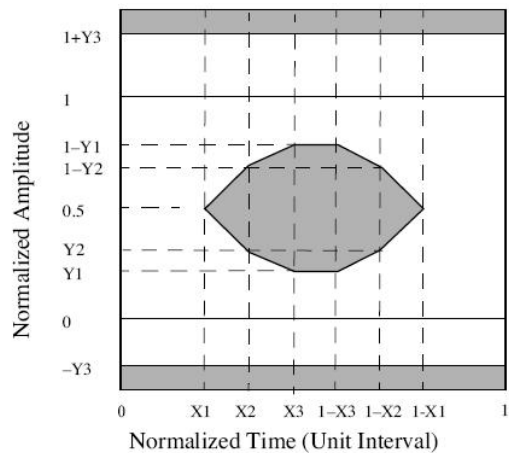


图 3 发射眼图模板定义

管脚功能定义

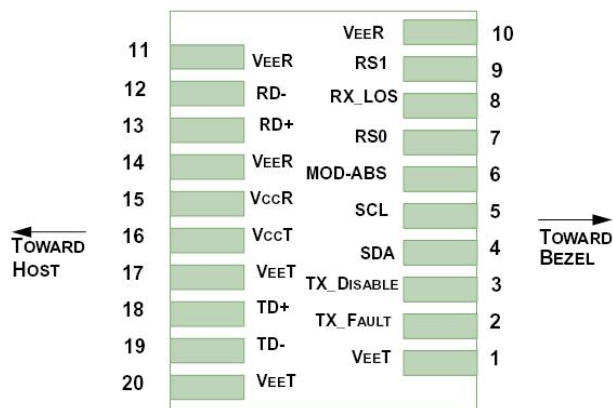


图 4 管脚功能定义

发射端管脚定义

管脚编号	符号	名称	说明
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	Logic “1” Input (or no connection) = Laser off

(LVTTL)			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 30kΩ 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 $BER < 1 \times 10^{-12} = \text{Logic "0"}$ Insufficient optical signal for potential $BER < 1 \times 10^{-12} = \text{Logic "1"}$ 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.
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.

典型应用电路

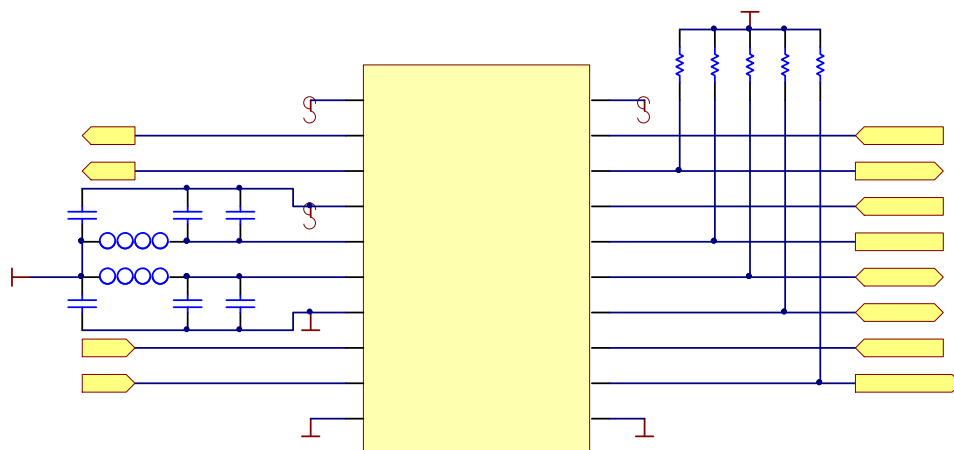


图 5 典型应用电路

静电放电

The RTX228 is compatible with ESD levels found in typical manufacturing and operating environments as described in Table Regulatory compliance. In the normal handling and operation of optical transceivers, ESD is of concern in two circumstances.

The first case is during handling of the transceiver prior to insertion into an SFP+ compliant cage. To protect the device, it's important to use normal ESD handling pre-cautions. These include use of

grounded wrist straps, work-benches and floor wherever a transceiver is handled.

The second case to consider is static discharges to the exterior of the host equipment chassis after installation. If the optical interface is exposed to the exterior of host equipment cabinet, the transceiver may be subject to system level ESD requirements.

电磁干扰

Equipment incorporating gigabit transceivers is typically subject to regulation by the FCC in the United States, CENELEC EN55022 (CISPR 22) in Europe. The RTX228 compliance to these standards is detailed in Table Regulatory compliance. The metal housing and shielded design of the RTX228 minimizes the EMI challenge facing the equipment designer.

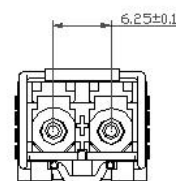
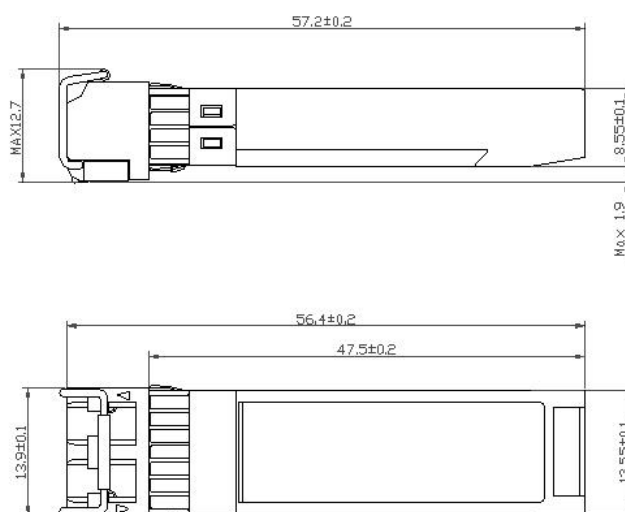
抗电磁干扰

Due to its shielded design, the EMI immunity of the RTX228 exceeds typical industry standards.

满足规范

特性	测试方法	参考
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.
RoHS Compliance		Less than 1000 ppm of cadmium, lead, mercury, hexavalent chromium, polybrominated biphenyls, and polybrominated biphenyl ethers.

封装外形



Unit: mm

