

Features



- SFP Multi-Source Agreement compliant
- Compliant with SFF8472 diagnostic monitoring interface
- Industry standard small form pluggable (SFP) package
- Multi-rate
- With APD
- Duplex LC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1
- RoHS Compliant

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_S	-40	85	°C	
Supply Voltage	V_{CC}	-0.5	4.0	V	
Input Voltage	V_{IN}	-0.5	V_{CC}	V	
Output Current	I_o	---	50	mA	
Operating Current	I_{OP}	---	400	mA	

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_c	0	70	°C	
Supply Voltage	V_{CC}	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	320	mA	

Diagnostics Monitoring

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-20 to 95	± 3	°C	External
Voltage	0 to V_{CC}	± 0.1	V	
Bias Current	0 to 120	± 5	mA	
TX Power	-3 to +7	± 3 dB	dBm	
RX Power	-28 to -10	± 3 dB	dBm	

Transmitter Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}$, $T_C = 0^\circ\text{C to } 70^\circ\text{C}$

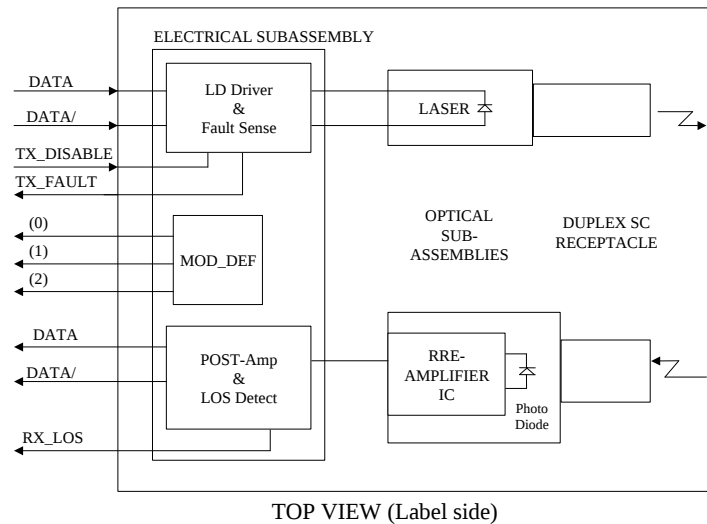
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Output Optical Power 9/125 μm fiber	P_{out}	+0	---	+5	dBm	Average
Extinction Ratio	ER	8.2	---	---	dB	
Center Wavelength	λ_C	1520	1550	1580	nm	
Spectral Width (-20dB)	$\Delta\lambda$	---	---	0.7	nm	
Side Mode Suppression Ratio	$SMSR$	30	---	---	dB	
Output Eye	Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957					
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	---	---	-45	dBm	
Differential Input Voltage	V_{DIFF}	0.4	---	2.0	V	
Optical Path Penalty				2	dB	
Maximum dispersion				1680	ps/nm	

Receiver Electro-optical Characteristics

V_{CC} = 3.1 V to 3.5 V, T_C = 0 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Optical Input Power-maximum	P_{IN}	-8	---	---	dBm	BER < 10 ⁻¹⁰
RX Sensitivity @2.67 Gb/s	P_{IN}	---	---	-28	dBm	PRBS23, BER < 10 ⁻¹⁰
RX Sensitivity @OC-48	P_{IN}	---	---	-28	dBm	PRBS23, BER < 10 ⁻¹⁰
RX Sensitivity @2xFC	P_{IN}	---	---	-28	dBm	PRBS7, BER < 10 ⁻¹²
RX Sensitivity @GbE	P_{IN}	---	---	-28	dBm	PRBS7, BER < 10 ⁻¹²
RX Sensitivity @OC-12	P_{IN}	---	---	-28	dBm	PRBS23, BER < 10 ⁻¹⁰
RX Sensitivity @OC-3	P_{IN}	---	---	-28	dBm	PRBS23, BER < 10 ⁻¹⁰
RX Sensitivity @Fast ethernet	P_{IN}	---	---	-28	dBm	PRBS7, BER < 10 ⁻¹⁰
Operating Center Wavelength	λ_C	1260	---	1620	nm	
Optical Return Loss	ORL	-27	---	---	dB	
Signal Detect-Asserted	P_A	---	---	-28	dBm	
Signal Detect-Deasserted	P_D	-45	---	--	dBm	
Differential Output Voltage	V_{DIFF}	0.5	---	1.2	V	
Receiver Loss of Signal Output Voltage-Low	RX_LOS_L	0	---	0.5	V	
Receiver Loss of Signal Output Voltage-High	RX_LOS_H	2.4	---	V _{CC}	V	

Block Diagram of Transceiver



Transmitter Section

The transmitter section consists of a 1550 nm InGaAsP laser in an eye safe optical subassembly (OSA) which mates to the fiber cable. The laser OSA is driven by a LD driver IC which converts differential input LVPECL logic signals into an analog laser driving current.

TX_DISABLE

The TX_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on when TX_DISABLE is low (TTL logic "0").

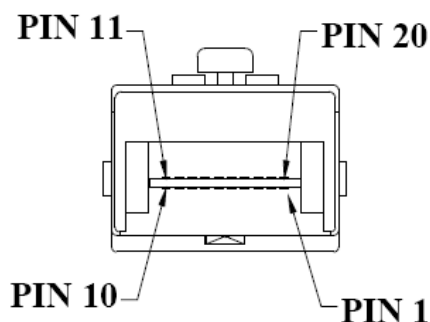
Receiver Section

The receiver utilizes an InGaAs PIN photodiode mounted together with a trans-impedance preamplifier IC in an OSA. This OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

Receive Loss (RX_LOS)

The RX_LOS is high (logic "1") when there is no incoming light from the companion transceiver. This signal is normally used by the system for the diagnostic purpose. The signal is operated in TTL level.

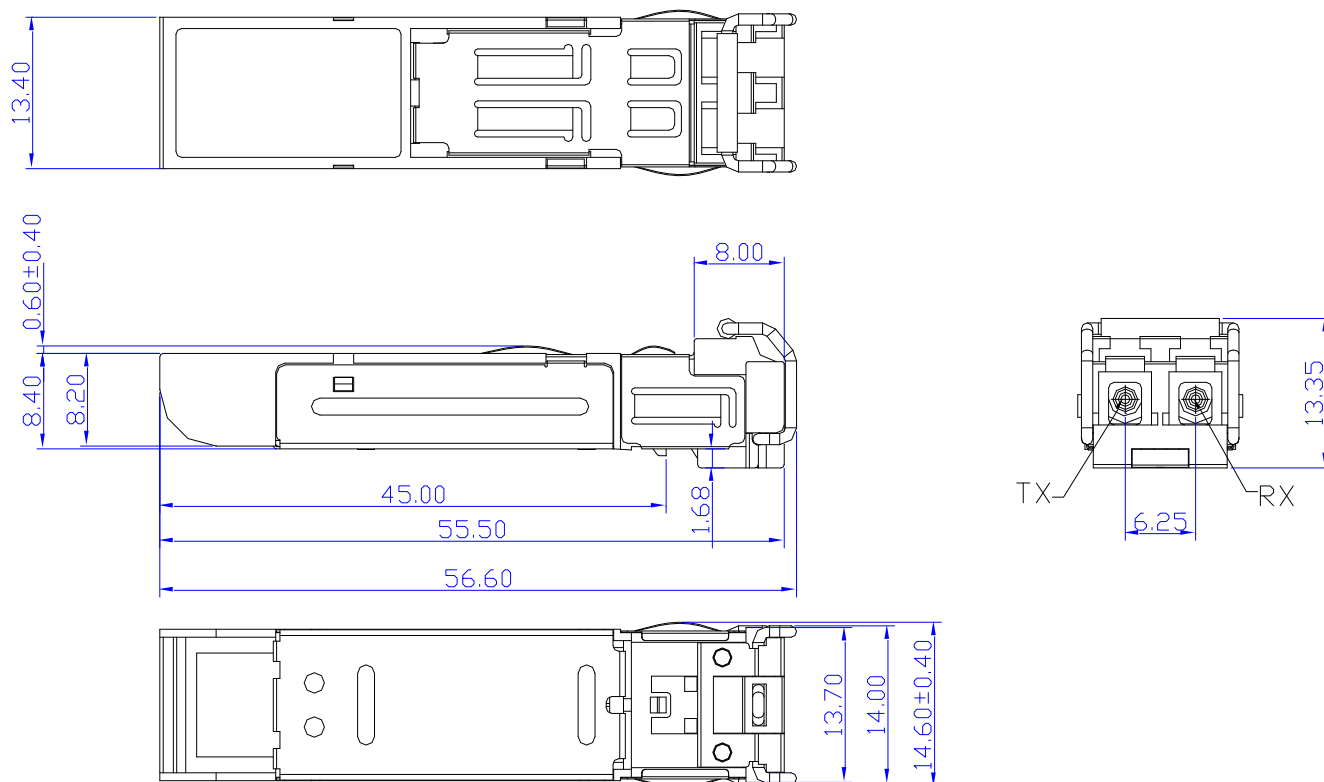
Pin Assignment



Pin Descriptions

Pin	Signal Name	Description
1	T _{GND}	Transmitter Ground
2	TX_FAULT	Transmit Fault
3	TX_DISABLE	Transmit Disable
4	MOD_DEF(2)	SDA Serial Data Signal
5	MOD_DEF(1)	SCL Serial Clock Signal
6	MOD_DEF(0)	TTL Low
7	RATE SELECT	Open Circuit
8	RX_LOS	Receiver Loss of Signal, TTL High, Open collector
9	R _{GND}	Receiver Ground
10	R _{GND}	Receiver Ground
11	R _{GND}	Receiver Ground
12	RX-	Receive Data Bar, Differential PECL, ac coupled
13	RX+	Receive Data, Differential PECL, ac coupled
14	R _{GND}	Receiver Ground
15	V _{CCR}	Receiver Power Supply
16	V _{CCT}	Transmitter Power Supply
17	T _{GND}	Transmitter Ground
18	TX+	Transmit Data, Differential PCEL, ac coupled
19	TX-	Transmit Data Bar, Differential PCEL, ac coupled
20	T _{GND}	Transmitter Ground

Dimensions



DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED

Ordering Information

OP	6	C	-	S	10	-	13	-	C	M
	↑	↑		↑	↑		↑		↑	↑
Product Code:	Data Rate:	Type:		Reach:	Wavelength:		Operating Temperature:		Additional Feature:	
5=GBIC;	A=155Mb/s;	S=Single-mode;		Normal:	Normal:		C=Commercial Purpose		M=Digital Optical Monitoring	
6=SFP-LC;	B=622Mb/s;	M=Multi-mode;		X1=Under 150m;	85=850nm;		(0~70℃);		(DOM)	
7=XFP;	C=1.25Gb/s;	W=BWDM;		X3=300m;	13=1310nm;		I= Industrial Purpose		(RX_LOS for Copper TX);	
8=XENPAK;	D=2.125Gb/s;	C=CWDM;		X5=550m;	15=1550nm;		(Extended Range)		F=with Fiber Stub;	
9=X2;	E=2.5Gb/s;	D=DWDM;		02=2km;	00=Copper T (RJ-45)				I=with Isolator;	
A=SFP+;	F=4.25Gb/s;	T=Copper-T (RJ-45)		10=10km;	CWDM:				S=Customized Style	
C=QSFP;	G=3.1Gb/s;	E=GEPON ONU;		70=70km;	27=1270nm;					
F=CFP;	J=2.97G	F=GEPON OLT;		A0=100km;	47=1470nm;					
P=SFP-SC;	P=6.144G;	G=GPON ONU;		C0=120km	61=1610nm					
Q=SFP-MTRJ	Q=7.37G;	H=GPON OLT			BWDM:					
	H=8.5Gb/s;			CWDM:	B3=Tx1310/Rx1550; B5=Tx1550/Rx1310;					
	K=10Gb/s;			20=20dB;	B4=Tx1310/Rx1490; B9=Tx1490/Rx1310;					
	T=1/10Gb/s			24=24dB;	51=Tx1510/Rx1570; 57=Tx1570/Rx1510;					
	L=11.09Gb/s;			28=28dB	27=Tx1270/Rx1330; 33=Tx1330/Rx1270;					
	R=20Gb/s;				B2=Tx1270/Rx1577; B7=Tx1577/Rx1270					
	S=40Gb/s;				T2=2TX1310nm; T3=TX1310nm;					
	M=100Base-X SGMII;				T5=TX1550nm					
	N=100/1000Base-X SGMII;				DWDM:					
					17=Channel 17					
					34= Channel 34					
					00=Channel 17~61 Tunable					

Model Number	Part Number	Reach	Input/Output	Signal Detect	Voltage	Temperature
SFP-2.5G-90-55-DM	OP6E-S90-15-CM	90km	AC/AC	TTL	3.3V	0℃ to 70℃

Note: All information contained in this document is subject to change without notice.