



### Features

- SFP Multi-Source Agreement compliant
- Compliant with Fiber Channel 100-SM-LC-L standard
- Compliant with IEEE802.3z Gigabit Ethernet standard
- Industry standard small form pluggable (SFP) package
- 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	$I_{TX} + I_{RX}$	---	300	mA	

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### Transmitter Electro-optical Characteristics

V<sub>cc</sub> = 3.1 V to 3.5 V, T<sub>c</sub> = 0 °C to 70 °C

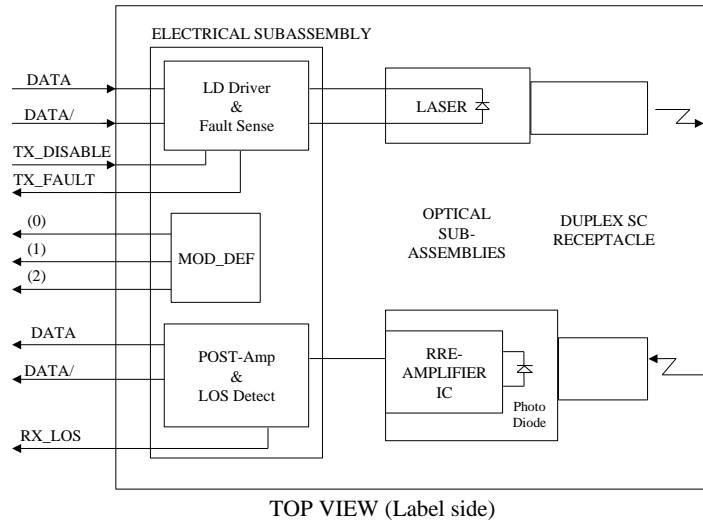
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Output Optical Power 9/125 μm fiber	$P_{out}$	-4	-1	+1	dBm	Average
Extinction Ratio	$ER$	7	---	---	dB	
Center Wavelength (OP6C-C20-47-C)	$\lambda_C$	1464.5	---	1477.5	nm	
Center Wavelength (OP6C-C20-49-C)	$\lambda_C$	1484.5	---	1497.5	nm	
Center Wavelength (OP6C-C20-51-C)	$\lambda_C$	1504.5	---	1517.5	nm	
Center Wavelength (OP6C-C20-53-C)	$\lambda_C$	1524.5	---	1537.5	nm	
Center Wavelength (OP6C-C20-55-C)	$\lambda_C$	1544.5	---	1557.5	nm	
Center Wavelength (OP6C-C20-57-C)	$\lambda_C$	1564.5	---	1577.5	nm	
Center Wavelength (OP6C-C20-59-C)	$\lambda_C$	1584.5	---	1597.5	nm	
Center Wavelength (OP6C-C20-61-C)	$\lambda_C$	1604.5	---	1617.5	nm	
Spectral Width (-20dB)	$\Delta\lambda$	---	---	1	nm	
Side Mode suppression Ratio	SMSR	30	--	--	dB	
Rise/Fall Time (20–80%)	$T_{r,f}$	---	---	260	ps	
Relative Intensity noise	$RIN$	---	---	-120	dB/Hz	
Total Jitter	$TJ$	---	---	227	ps	
Max $P_{out}$ TX-DISABLE Asserted	$P_{OFF}$	---	---	-45	dBm	
Output Eye	Compliant with IEEE802.3z					
Differential Input Voltage	$V_{DIFF}$	0.4	---	2.0	V	

### Receiver Electro-optical Characteristics

V<sub>CC</sub> = 3.1 V to 3.5 V, T<sub>C</sub> = 0 °C to 70 °C

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Optical Input Power-maximum	$P_{IN}$	+1	---	---	dBm	BER < 10 <sup>-12</sup>
Optical Input Power-minimum (Sensitivity)	$P_{IN}$	---	-27	-24	dBm	BER < 10 <sup>-12</sup>
Operating Center Wavelength	$\lambda_C$	1260	---	1620	nm	
Optical Return Loss	ORL	12	---	---	dB	
Data Output Rise, Fall Time (20%~80%)	$T_{r,f}$	---	---	0.35	ns	
Loss of Signal-Asserted	$P_A$	---	---	-24	dBm	
Loss of Signal-Deasserted	$P_D$	-35	---	---	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 <sub>CC</sub>	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”).

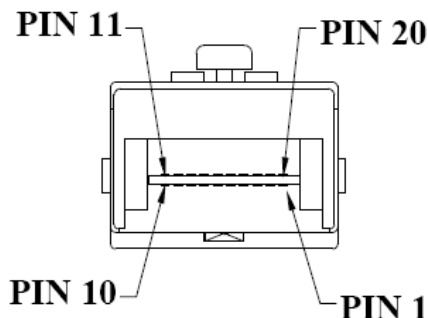
#### Receiver Section

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.

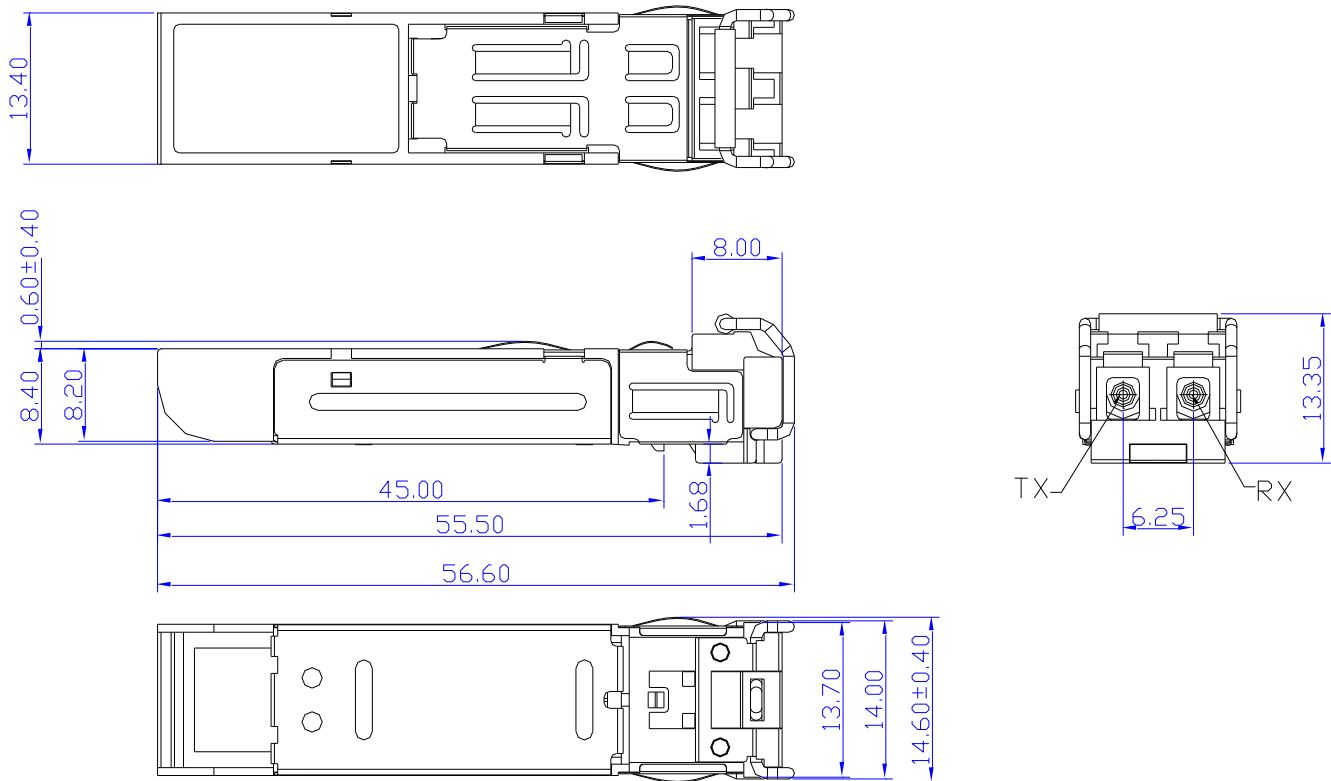
### Pin Assignment



### Pin Descriptions

Pin	Signal Name	Description
1	T <sub>GND</sub>	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 <sub>GND</sub>	Receiver Ground
10	R <sub>GND</sub>	Receiver Ground
11	R <sub>GND</sub>	Receiver Ground
12	RX-	Receive Data Bar, Differential PECL, ac coupled
13	RX+	Receive Data, Differential PECL, ac coupled
14	R <sub>GND</sub>	Receiver Ground
15	V <sub>CCR</sub>	Receiver Power Supply
16	V <sub>CCT</sub>	Transmitter Power Supply
17	T <sub>GND</sub>	Transmitter Ground
18	TX+	Transmit Data, Differential PCEL, ac coupled
19	TX-	Transmit Data Bar, Differential PCEL, ac coupled
20	T <sub>GND</sub>	Transmitter Ground

**Dimensions**



**DIMENSIONS ARE IN MILLIMETERS**

**ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED**

**Ordering Information**

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

Model Number	Part Number	Input/Output	Signal Detect	Voltage	Temperature
SFP-CWDM-20-yy	OP6C-C20-yy-C	AC/AC	TTL	3.3V	0°C to 70°C

Note: yy=47, Center Wavelength=1470nm ,yy=49, Center Wavelength=1490nm  
yy=51, Center Wavelength=1510nm ,yy=33, Center Wavelength=1530nm  
yy=55, Center Wavelength=1550nm ,yy=37, Center Wavelength=1570nm  
yy=59, Center Wavelength=1590nm ,yy=41, Center Wavelength=1610nm

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

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