



### Features

- SFP Multi-Source Agreement compliance
- Compliant with 4.25G Fiber Channel 400-M5-SN-I and 400-M6-SN-I standard
- Compliant with 2.125G Fiber Channel 200-M5-SN-I and 200-M6-SN-I standard
- Compliant with 1.0625G Fiber Channel 100-M5-SN-I and 100-M6-SN-I Standard
- Compliant with IEEE802.3z Gigabit Ethernet standard
- Compliant with SFF8472 diagnostic monitoring interface Duplex LC connector
- Differential LVPECL inputs and CML 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	$T_C$	-10	70	°C	OP6F-MX1-85-CM
		-40	85	°C	OP6F-MX1-85-IM
Supply Voltage	$V_{CC}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	200	mA	

## Transmitter Electro-optical Characteristics

Vcc = 3.1 V to 3.5 V, T<sub>c</sub> = -10 °C to 70 °C ( -40 °C to 85 °C )

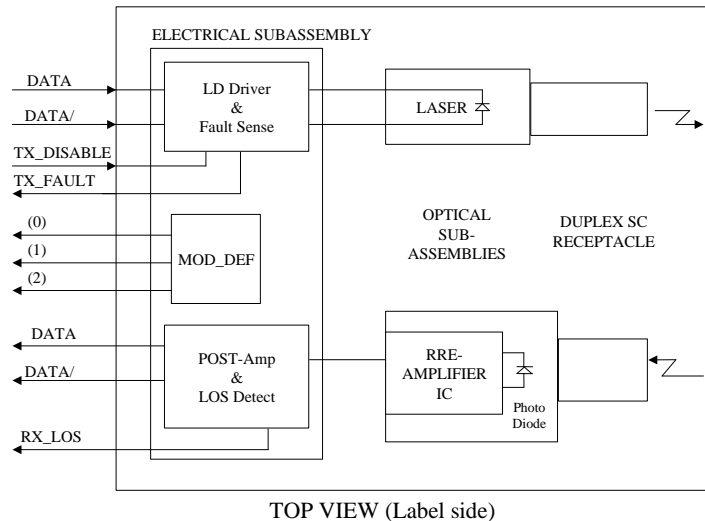
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Output Optical Power (50/125 μm fiber, NA=0.20) (62.5/125 μm fiber, NA=0.275)	<i>P<sub>out</sub></i>	-9	---	-3	dBm	
Extinction Ratio	<i>ER</i>	6	---	---	dB	
Optical Modulation Amplitude @4.25Gb/s	<i>OMA</i>	247			uW	
Optical Modulation Amplitude @2.125Gb/s	<i>OMA</i>	196			uW	
Optical Modulation Amplitude @1.0625Gb/s	<i>OMA</i>	156			uW	
Center Wavelength	<i>λ<sub>C</sub></i>	830	850	860	nm	
Spectral Width (RMS)	<i>Δλ</i>	---	---	0.85	nm	
Relative Intensity Noise	<i>RIN</i>	---	---	-118	dB/Hz	
Output Eye	Compliant with IEEE802.3z and fiber channel 4x					
Max. <i>P<sub>out</sub></i> TX-DISABLE Asserted	<i>P<sub>OFF</sub></i>	---	---	-35	dBm	
Differential Input Voltage	<i>V<sub>DIFF</sub></i>	0.35	---	2.0	V	
Transmit Fault Output-Low	<i>TX_FAULT<sub>L</sub></i>	0	---	0.5	V	
Transmit Fault Output-High	<i>TX_FAULT<sub>H</sub></i>	2.4	---	Vcc	V	
TX_DISABLE Assert Time	<i>t<sub>off</sub></i>	---	---	10	μs	
TX_DISABLE Negate Time	<i>t<sub>on</sub></i>	---	---	1	ms	
Time to initialize include reset of TX_FAULT	<i>t<sub>init</sub></i>	---	---	300	ms	
TX_FAULT from fault to assertion	<i>t<sub>fault</sub></i>	---	---	100	μs	
TX_DISABLE time to start reset	<i>t<sub>reset</sub></i>	10	---	---	μs	

## Receiver Electro-optical Characteristics

V<sub>CC</sub> = 3.1 V to 3.5 V, T<sub>C</sub> = -10 °C to 70 °C (-40 °C to 85 °C)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Optical Input Power-maximum	$P_{IN}$	0	---	---	dBm	BER < 10 <sup>-12</sup>
Receiver Sensitivity (@4.25Gbps)	$P_{IN}$	---	---	-15	dBm	BER < 10 <sup>-12</sup>
Receiver Sensitivity (@2.1.25Gbps)	$P_{IN}$	---	---	-18	dBm	BER < 10 <sup>-12</sup>
Receiver Sensitivity (@1.25Gbps)	$P_{IN}$	---	---	-20	dBm	BER < 10 <sup>-12</sup>
Receiver Sensitivity (@1.0625Gbps)	$P_{IN}$	---	---	-20	dBm	BER < 10 <sup>-12</sup>
Operating Center Wavelength	$\lambda_C$	770	---	860	nm	
Optical Return Loss	ORL	12	---	---	dB	
Signal Detect-Asserted	$P_A$	-20	---	---	dBm	
Signal Detect-Deasserted	$P_D$	---	---	-30	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	
Receiver Loss of Signal Assert Time (off to on)	$t_{A,RX\_LOS}$	---	---	100	μs	
Receiver Loss of Signal Assert Time (on to off)	$t_{D,RX\_LOS}$	---	---	100	μs	

## Block Diagram of Transceiver



### Transmitter Section

The transmitter section consists of a 850 nm VCSEL 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\_FAULT

When sensing an improper power level in the laser driver, the SFP set this signal high and turns off the Laser. TX\_FAULT can be reset with the TX\_DISABLE line. The signal is in TTL level.

#### TX\_DISABLE

The TX\_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on within 1ms when TX\_DISABLE is low (TTL logic "0").

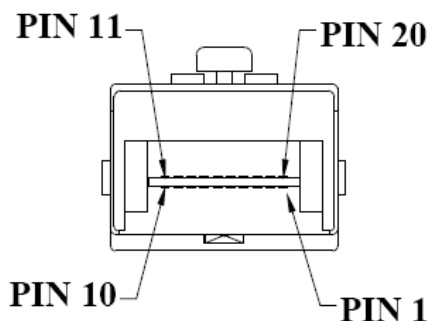
### Receiver Section

The receiver utilizes a MSM detector integrated with a trans-impedance preamplifier 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.

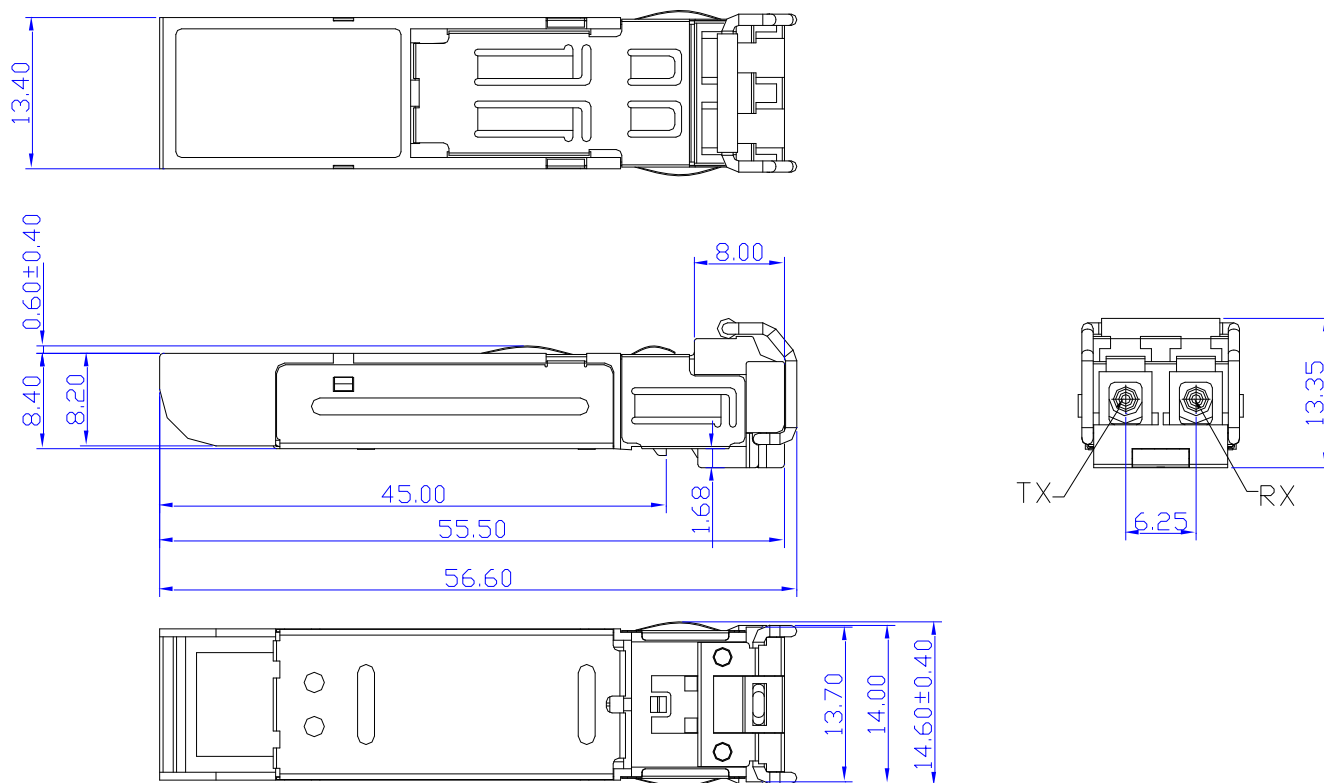
## Pin Assignment



## 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

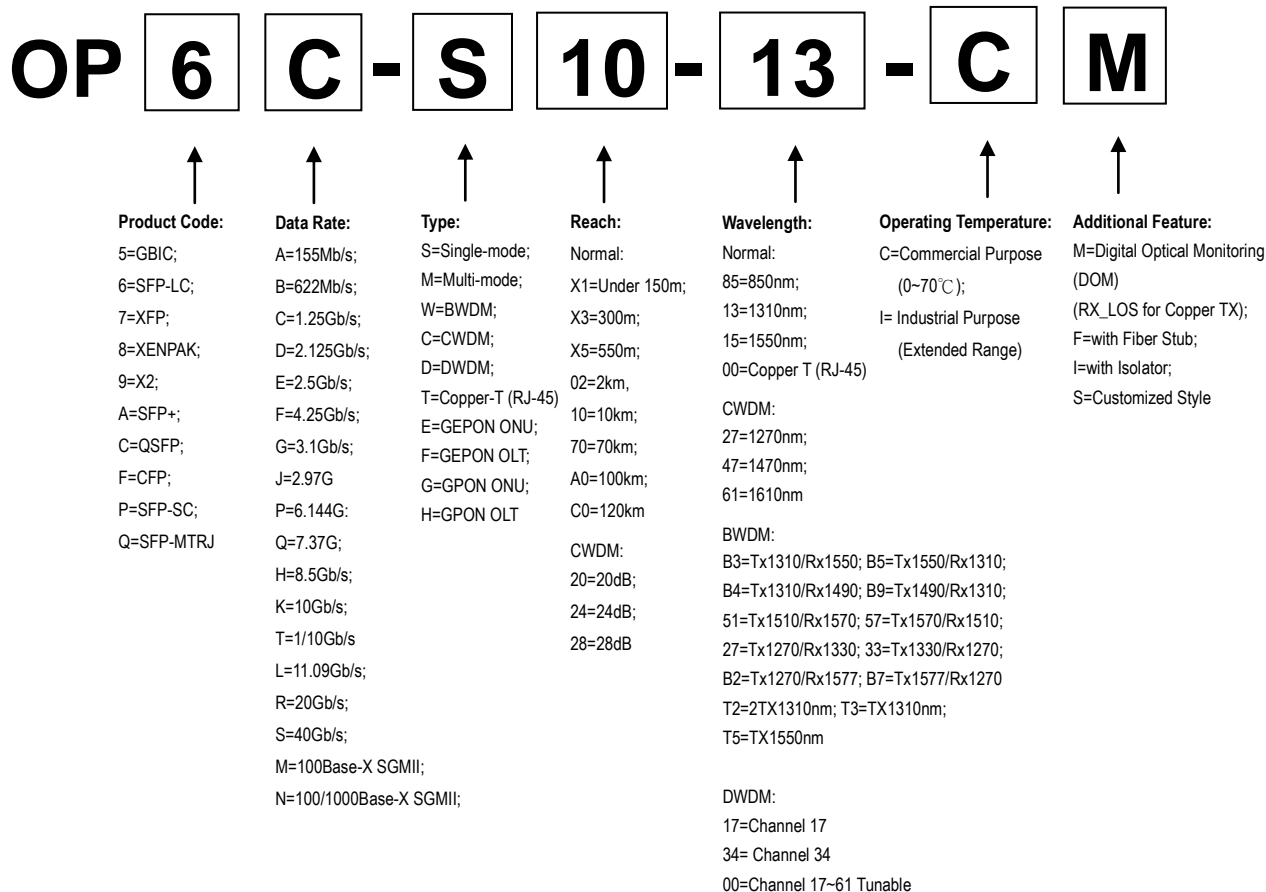
**Dimensions**



**DIMENSIONS ARE IN MILLIMETERS**

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

Ordering Information



Model Number	Part Number	Reach	Input/Out	Signal Detect	Voltage	Temperature
SFP-4xFC-SW	OP6F-MX1-85-CM	150 m	AC/AC	TTL	3.3V	-10°C to 70 °C
SFP-4xFC-SW -I	OP6F-MX1-85-IM	150 m	AC/AC	TTL	3.3V	-40°C to 85 °C

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