



Features

- SFP Multi-Source Agreement compliance
- Compliant with 4.25G Fiber Channel 400-SM-LC-M standard
- Compliant with 2.125G Fiber Channel 200-SM-LC-M standard
- Compliant with 1.0625G Fiber Channel 100-SM-LC-M 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	
Supply Voltage	V_{CC}	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	300	mA	

Transmitter Electro-optical Characteristics

V_{cc} = 3.1 V to 3.5 V, T_c = -10 °C to 70 °C (-40 °C to 85 °C)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Output Optical Power 9/125 μm fiber	P_{out}	-9.5	---	-3	dBm	
Optical Modulation Amplitude @4.25Gb/s	OMA	290			uW	
Optical Modulation Amplitude @2.125Gb/s	OMA	290			uW	
Optical Modulation Amplitude @1.0625Gb/s	OMA	290			uW	
Center Wavelength	λ_c	1285	1310	1345	nm	See FC-PI-2 clause 6.3.5
Spectral Width (RMS)	$\Delta\lambda$	---	---	---	nm	Fig.18.19.21 for detail
Relative Intensity Noise	RIN	---	---	-118	dB/Hz	
Output Eye	Compliant with IEEE802.3z and fiber channel 4x					
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	---	---	-35	dBm	
Differential Input Voltage	V_{DIFF}	0.35	---	2.0	V	
Transmit Fault Output-Low	TX_FAULT_L	0	---	0.5	V	
Transmit Fault Output-High	TX_FAULT_H	2.4	---	V _{cc}	V	
TX_DISABLE Assert Time	t_{off}	---	---	10	μs	
TX_DISABLE Negate Time	t_{on}	---	---	1	ms	
Time to initialize include reset of TX_FAULT	t_{init}	---	---	300	ms	
TX_FAULT from fault to assertion	t_{fault}	---	---	100	μs	
TX_DISABLE time to start reset	t_{reset}	10	---	---	μs	

Receiver Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}$, $T_C = -10^\circ \text{ C to } 70^\circ \text{ C}$ (-40°C to 85°C)

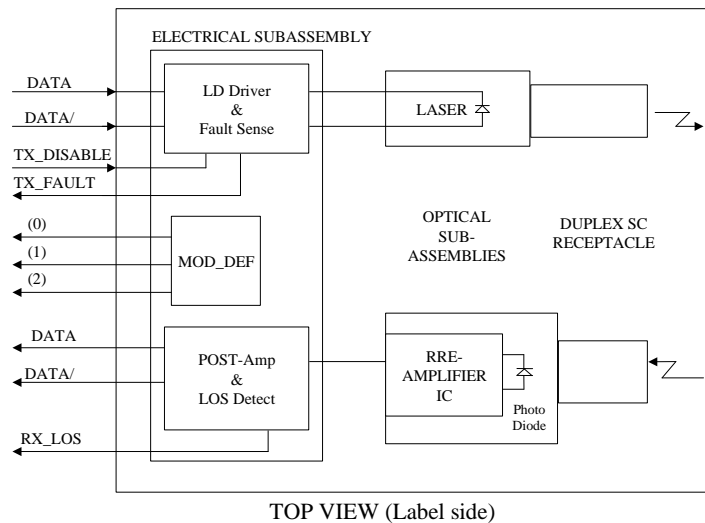
Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Optical Input Power-maximum	P_{IN}	0	---	---	dBm	
Receiver Sensitivity (@4.25GBps)	P_{IN}	---	---	-18	dBm	Note 2
	P_{IN}			0.029	dBm	Note 1
Receiver Sensitivity (@2.1.25GBps/1.25/1.0625GBps)	P_{IN}	---	---	-21	dBm	Note 3
	P_{IN}			0.015	dBm	Note 1
Operating Center Wavelength	λ_C	1260	---	1600	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_{CC}	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	

Note1: Value in OMA. Measured with PRBS 2^7-1 at $\text{BER}=10^{-12}$

Note2: Represents sensitivity based on OMA spec, as corrected to incoming Extinction Ratio of 13 dB (for example, at 6.0dB incoming extinction ratio, an OMA of 0.029 mW corresponds to -16.1 dBm sensitivity). Measured with PRBS 2^7-1 at $\text{BER}=10^{-12}$

Note3: Represents sensitivity based on OMA spec, as corrected to incoming Extinction Ratio of 13 dB (for example, at 6dB incoming extinction ratio, an OMA of 0.015 mW corresponds to -19 dBm sensitivity). Measured with PRBS 2^7-1 at $\text{BER}=10^{-12}$

Block Diagram of Transceiver



Transmitter Section

The transmitter section consists of a 1310 nm FP 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”).

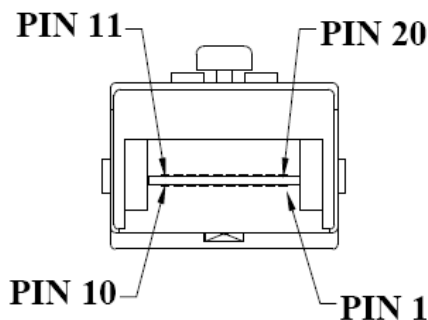
Receiver Section

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.

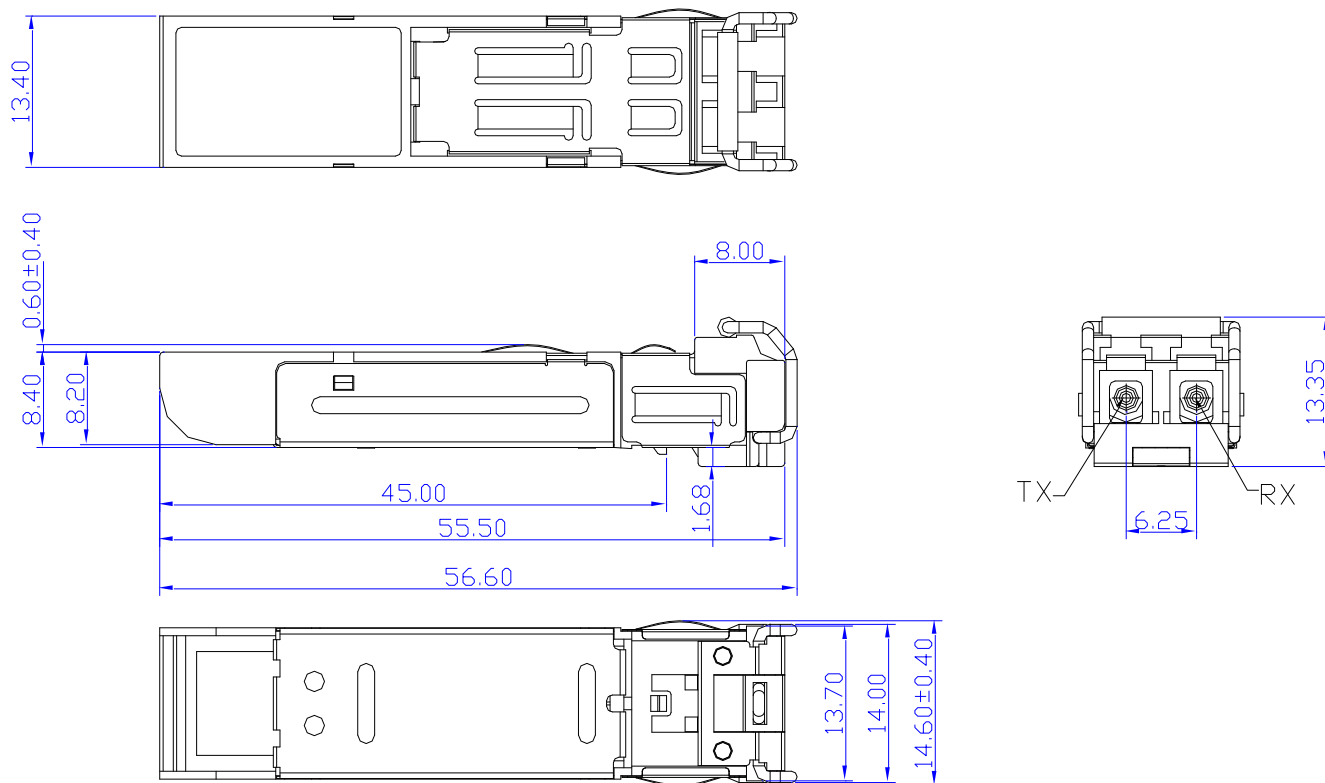
Pin Assignment



Pin Descriptions

Pin	Signal Name	Description
1	T _{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

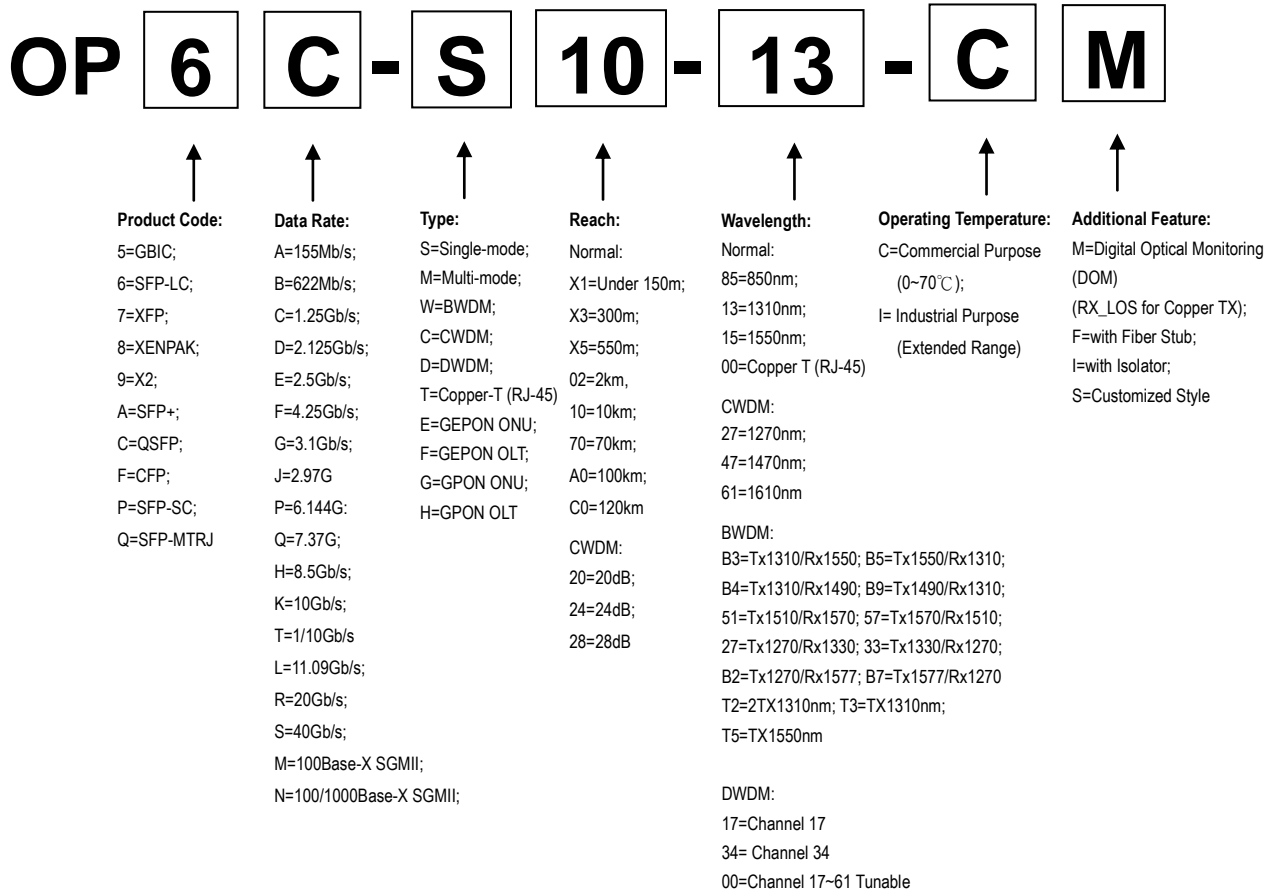
Dimensions



DIMENSIONS ARE IN MILLIMETERS

ALL DIMENSIONS ARE ± 0.2mm UNLESS OTHERWISE SPECIFIED

Ordering Information



Ordering Information

Model Number	Part Number	Reach	Input/Out	Signal Detect	Voltage	Temperature
SFP-4xFC-LW-4	OP6F-S04-13-CM	4km	AC/AC	TTL	3.3V	-10°C to 70 °C
SFP-4xFC-LW-4-I	OP6F-S04-13-IM	4km	AC/AC	TTL	3.3V	-40°C to 85 °C

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