



RoHS Compliant
CWDM 1470~1610 nm Single-mode Transceiver, 20dB margin
Small Form Pluggable (SFP), with Diagnostic Monitoring
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet



Features

- IEEE802.3z Gigabit Ethernet application
- Fiber Channel 100-SM-LC-L application
- Compliant with SFF8472 diagnostic monitoring interface
- Industry standard small form pluggable (SFP) package
- Duplex LC connector
- Differential inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

Ordering Information

PART NUMBER	WAVELENGTH	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
LS48-C3L-TC-N47-DD	1470 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N49-DD	1490 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N51-DD	1510 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N53-DD	1530 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N55-DD	1550 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N57-DD	1570 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N59-DD	1590 nm	AC/AC	TTL	3.3V	0°C to 70°C
LS48-C3L-TC-N61-DD	1610 nm	AC/AC	TTL	3.3V	0°C to 70°C



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Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-10 to 80	± 3	$^{\circ}\text{C}$	External
Voltage	3.1 to 3.5	± 0.1	V	
Bias Current	0 to 90	± 5	mA	
TX Power	-4 to +1	± 3 dB	dBm	
RX Power	-24 to -1	± 3 dB	dBm	

Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	T_S	-40	85	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	-0.5	4.0	V	
Input Voltage	V_{IN}	-0.5	V_{CC}	V	

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Case Operating Temperature	T_C	0	70	$^{\circ}\text{C}$	
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

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

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 9/125 μm fiber	P_{out}	-4	-1	+1	dBm	Average
Extinction Ratio	ER	7	---	---	dB	
Central Wavelength (-N47)	λ_c	1464.5	---	1477.5	nm	
Central Wavelength (-N49)		1484.5	---	1497.5		
Central Wavelength (-N51)		1504.5	---	1517.5		
Central Wavelength (-N53)		1524.5	---	1537.5		
Central Wavelength (-N55)		1544.5	---	1557.5		
Central Wavelength (-N57)		1564.5	---	1577.5		
Central Wavelength (-N59)		1584.5	---	1597.5		
Central Wavelength (-N61)		1604.5	---	1617.5		
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	
Output Eye	Compliant with IEEE802.3z					
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	---	---	-45	dBm	
Differential Input Voltage	V_{DIFF}	0.4	---	2.0	V	



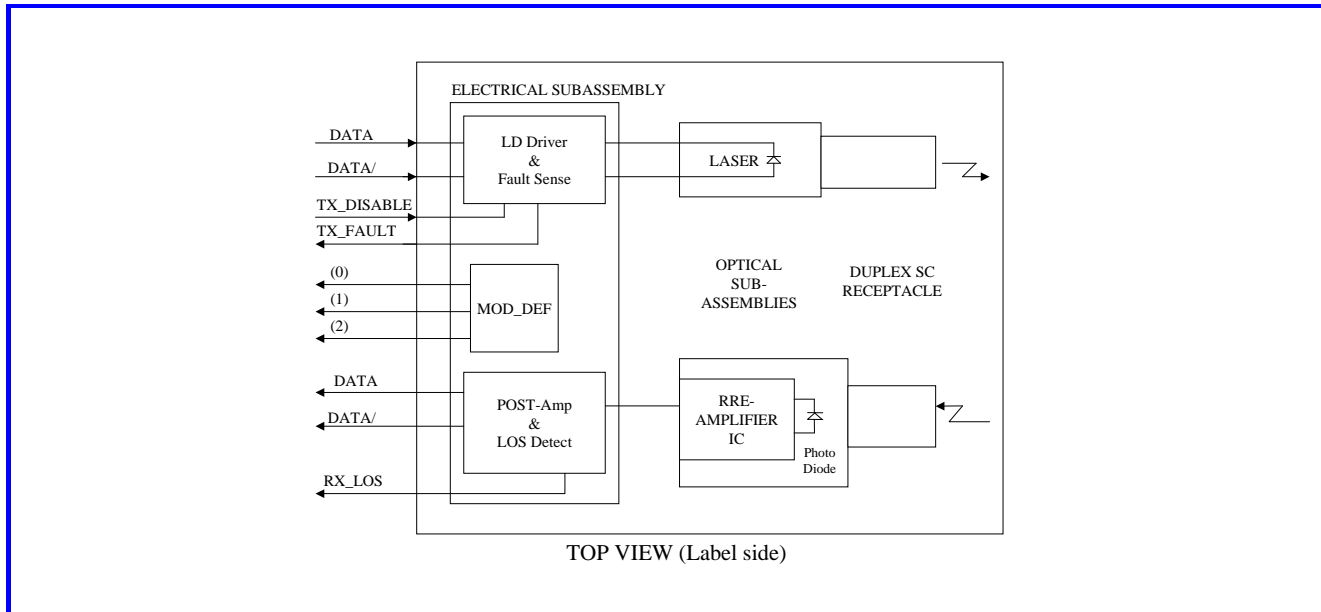
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Receiver Electro-optical Characteristics

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

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	P_{IN}	-1	---	---	dBm	BER < 10^{-12}
Optical Input Power-minimum (Sensitivity)	P_{IN}	---	-27	-24	dBm	BER < 10^{-12}
Operating Center Wavelength	λ_C	1260	---	1620	nm	
LOS-Deasserted	P_A	---	---	-24	dBm	
LOS-Asserted	P_D	-40	---	---	dBm	
Differential Output Voltage	V_{DIFF}	0.5	---	1.2	V	
Data Output Rise, Fall Time (20~80%)	$T_{r,f}$	---	---	0.35	ns	
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.

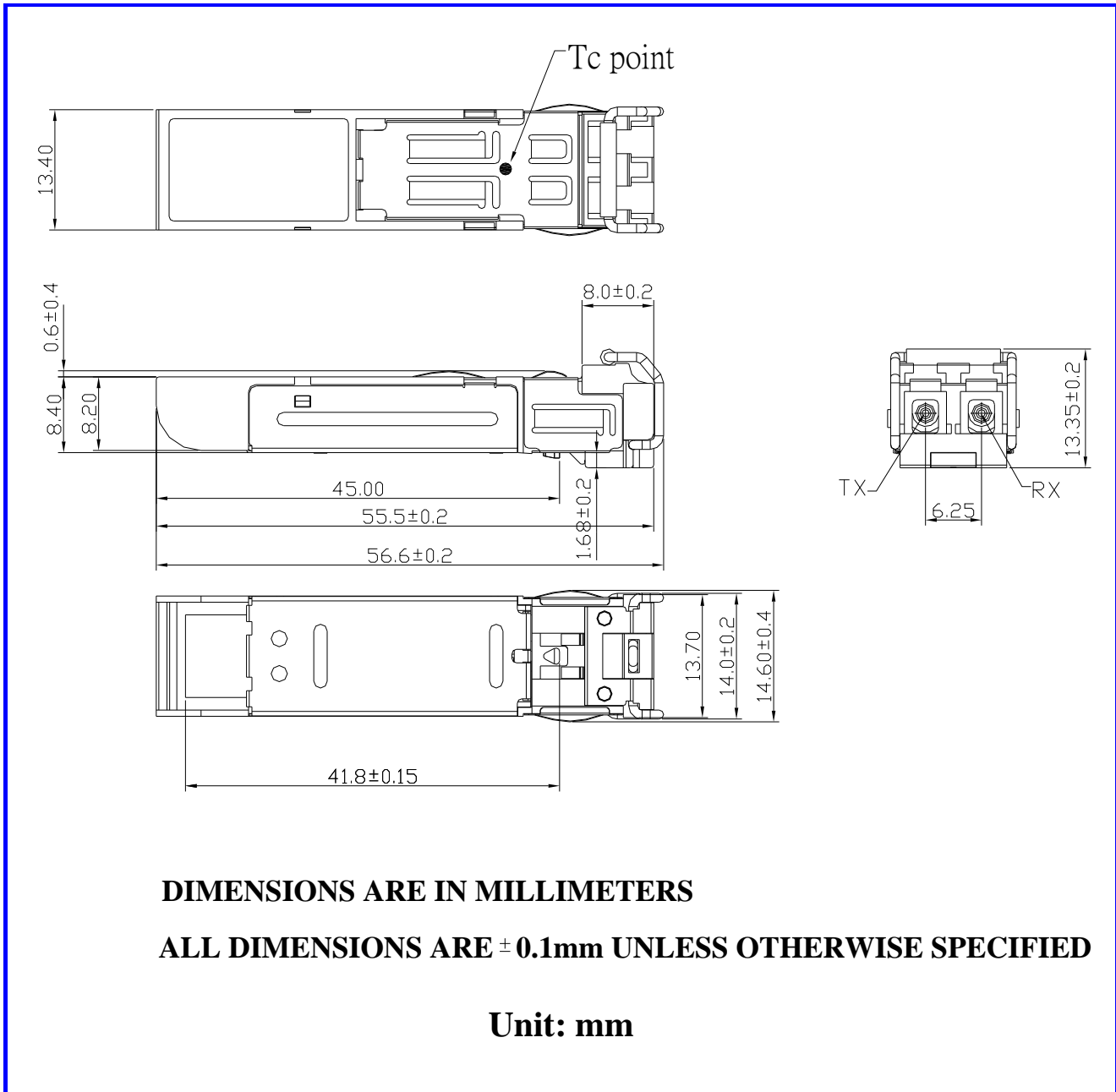
Receive Loss (RX_LOS)

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 LVTTTL level.

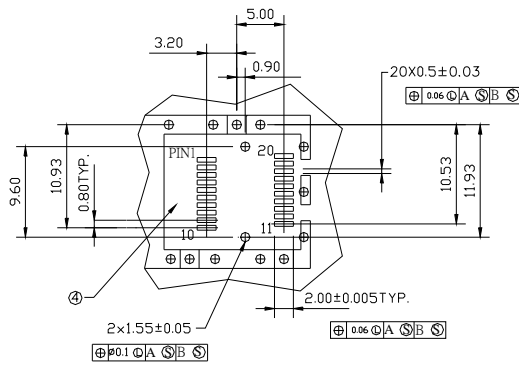
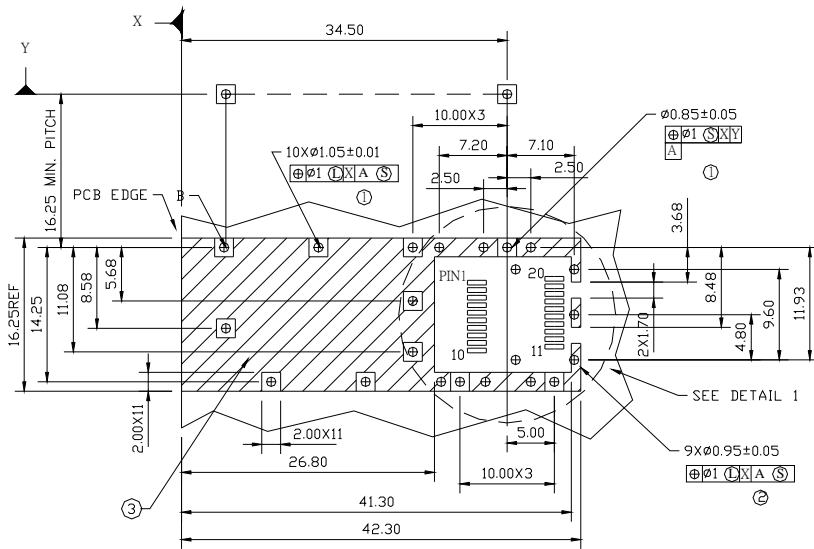


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Dimensions



SFP host board mechanical layout



DETAIL 1

LEGEND

- 1.PADS AND VIAS ARE CHASSIS GROUND
- 2.THROUGH HOLES, PLATING OPTIONAL
- 3.HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT(EXCEPT CHASSIS GROUND)
- 4.AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

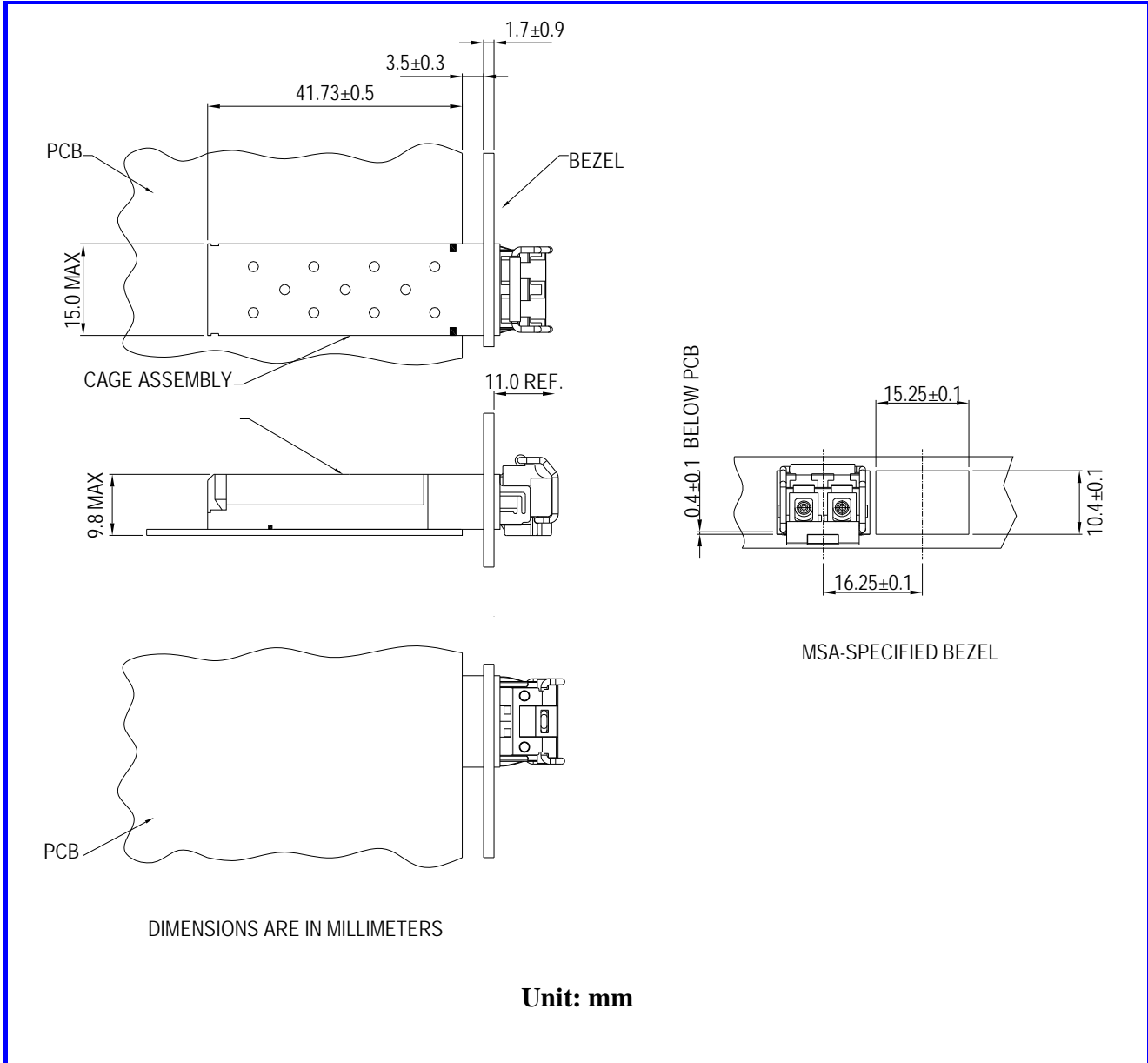
DIMENSIONS ARE IN MILLIMETERS

Unit: mm



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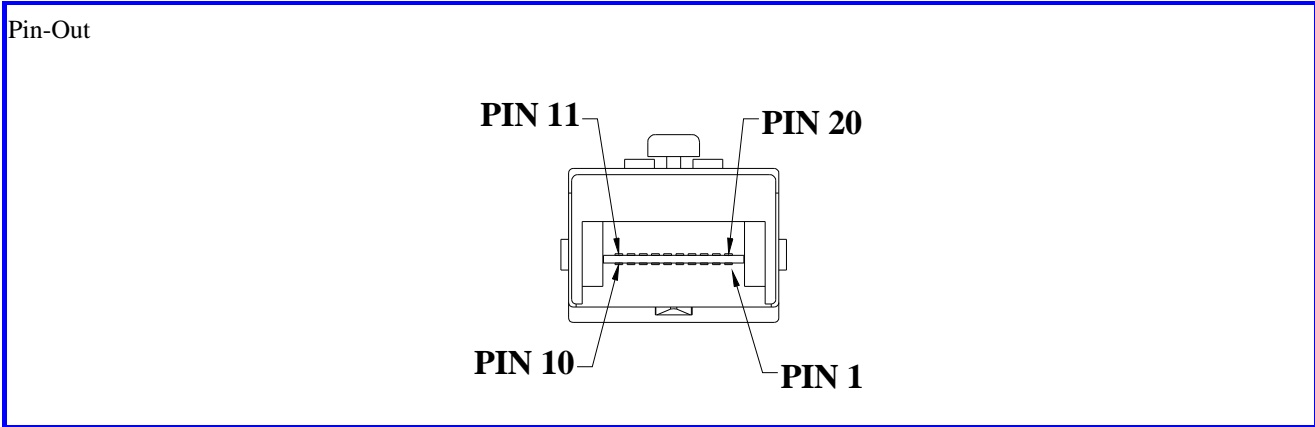
Assembly drawing





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Pin Assignment



Pin	Signal Name	Description
1	<i>T_{GND}</i>	Transmit Ground
2	<i>TX_FAULT</i>	Transmit Fault
3	<i>TX_DISABLE</i>	Transmit Disable
4	<i>MOD_DEF (2)</i>	SDA Serial Data Signal
5	<i>MOD_DEF (1)</i>	SCL Serial Clock Signal
6	<i>MOD_DEF (0)</i>	TTL Low
7	<i>RATE_SELECT</i>	Open Circuit
8	<i>RX_LOS</i>	Receiver Loss of Signal, TTL High, open collector
9	<i>R_{GND}</i>	Receiver Ground
10	<i>R_{GND}</i>	Receiver Ground
11	<i>R_{GND}</i>	Receiver Ground
12	<i>RX-</i>	Receive Data Bar, Differential , ac coupled
13	<i>RX+</i>	Receive Data, Differential , ac coupled
14	<i>R_{GND}</i>	Receiver Ground
15	<i>V_{CCR}</i>	Receiver Power Supply
16	<i>V_{CCT}</i>	Transmitter Power Supply
17	<i>T_{GND}</i>	Transmitter Ground
18	<i>TX+</i>	Transmit Data, Differential , ac coupled
19	<i>TX-</i>	Transmit Data Bar, Differential , ac coupled
20	<i>T_{GND}</i>	Transmitter Ground

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