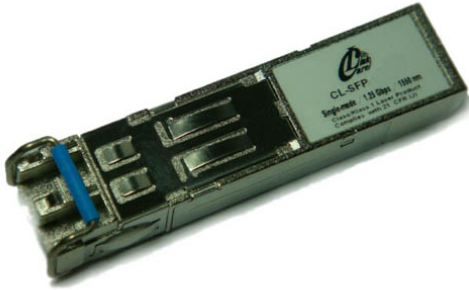




RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet



Features

- Compliant with IEEE802.3z Gigabit Ethernet Standard
- Compliant with Fiber Channel 100-SM-LC-L standard
- Industry standard small form pluggable (SFP) package
- Simplex LC/SC connector
- Differential LVPECL inputs and outputs
- Single power supply 3.3V
- TTL signal detect indicator
- Support Digital Diagnostic Monitoring interface
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1

Ordering Information

PART NUMBER	TX/RX	INPUT/OUTPUT	SIGNAL DETECT	TEMPERATURE	LD Type	Distance
CL-SFP-WDM-10-31DD	1310/1550	AC/AC	TTL	-5°C to 70 °C	1310 DFB	10km
CL-SFP-WDM-10-31DDe	1310/1550	AC/AC	TTL	-30°C to 70 °C	1310 DFB	10km
CL-SFP-WDM-10-31DDi	1310/1550	AC/AC	TTL	-40°C to 85 °C	1310 DFB	10km
CL-SFP-WDM-10-31SC DD	1310/1550	AC/AC	TTL	-5°C to 70 °C	1310 DFB	10km
CL-SFP-WDM-10-31SC DDe	1310/1550	AC/AC	TTL	-30°C to 70 °C	1310 DFB	10km
CL-SFP-WDM-10-31SC DDi	1310/1550	AC/AC	TTL	-40°C to 85 °C	1310 DFB	10km



RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

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	-5	70	°C	CL-SFP-WDM-10-31DDxx
		-30	70	°C	CL-SFP-WDM-10-31DDxxe
		-40	85	°C	CL-SFP-WDM-10-31DDxxi
Supply Voltage	V_{CC}	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	250	mA	



RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Transmitter Electro-optical Characteristics

$V_{CC} = 3.1\text{ V to }3.5\text{ V}$, $T_C = -5^\circ\text{C to }70^\circ\text{C}$ ($-40^\circ\text{C to }85^\circ\text{C}$)

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 9/125 μm fiber	P_{out}	-9	---	-3	dBm	Average
Extinction Ratio	ER	9	---	---	dB	
Center Wavelength	λ_c	1270	1310	1355	nm	
Spectral Width (RMS)	$\Delta\lambda$	---	---	2.5	nm	
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	



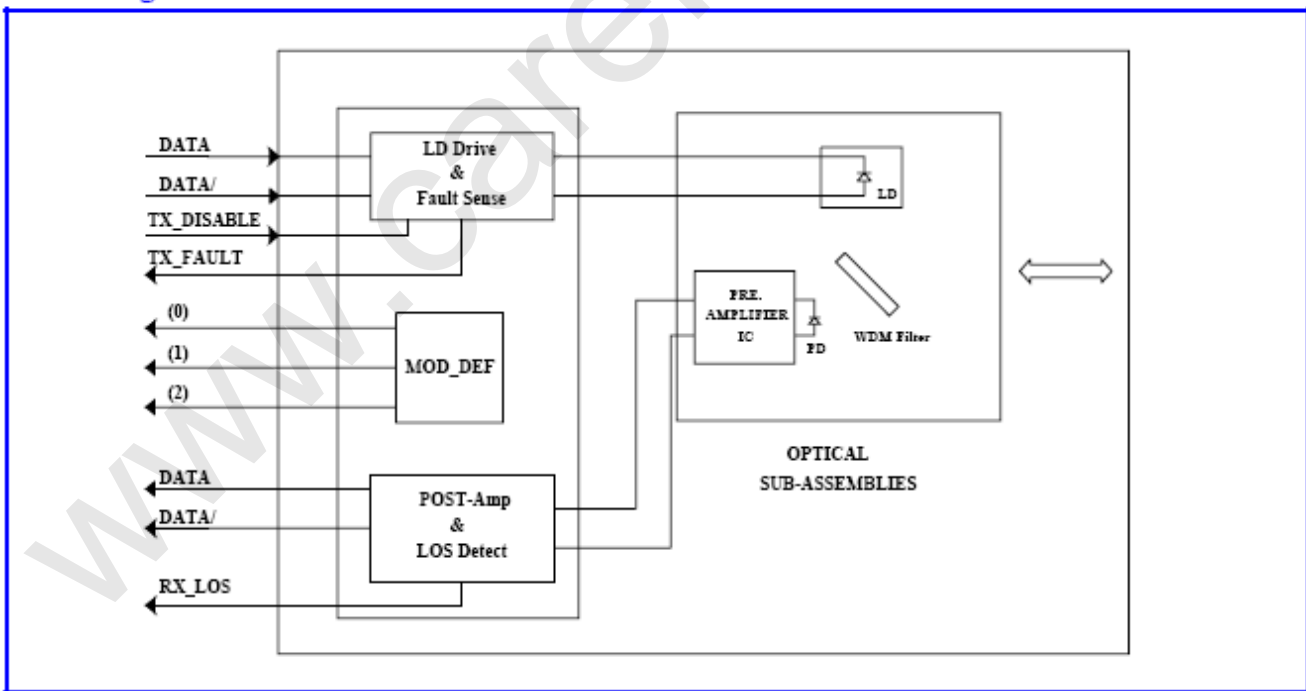
RoHS compliant
 TX-1310/RX-1550 nm Single-mode Bi-directional
 SFP LC/SC Simplex Connector (12dB margin) DDM
 1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Receiver Electro-optical Characteristics

$V_{CC} = 3.1\text{ V to } 3.5\text{ V}$, $T_C = -5^\circ\text{C to } 70^\circ\text{C}$

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}	---	---	-21	dBm	BER < 10^{-12}
Operating Center Wavelength	λ_C	1480	---	1580	nm	
Optical Return Loss	ORL	14	---	---	dB	$\lambda=1480\sim 1580\text{nm}$
Optical isolation	ISO	---	---	-40	dB	$\lambda=1480\sim 1580\text{nm}$
Signal Detect-Asserted	P_A	---	---	-21	dBm	
Signal Detect-Deasserted	P_D	-35	---	---	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 and Receiver Optical Sub-assembly Section

A 1310 nm InGaAsP laser and an InGaAs PIN photodiode integrate with an WDM filter to form a bi-directional single fiber optical subassembly (OSA). The laser of OSA is driven by a LD driver IC which converts differential input LVPECL logic



RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

signals into an analog laser driving current. And, The photodiode of OSA is connected to a circuit providing post-amplification quantization, and optical signal detection.

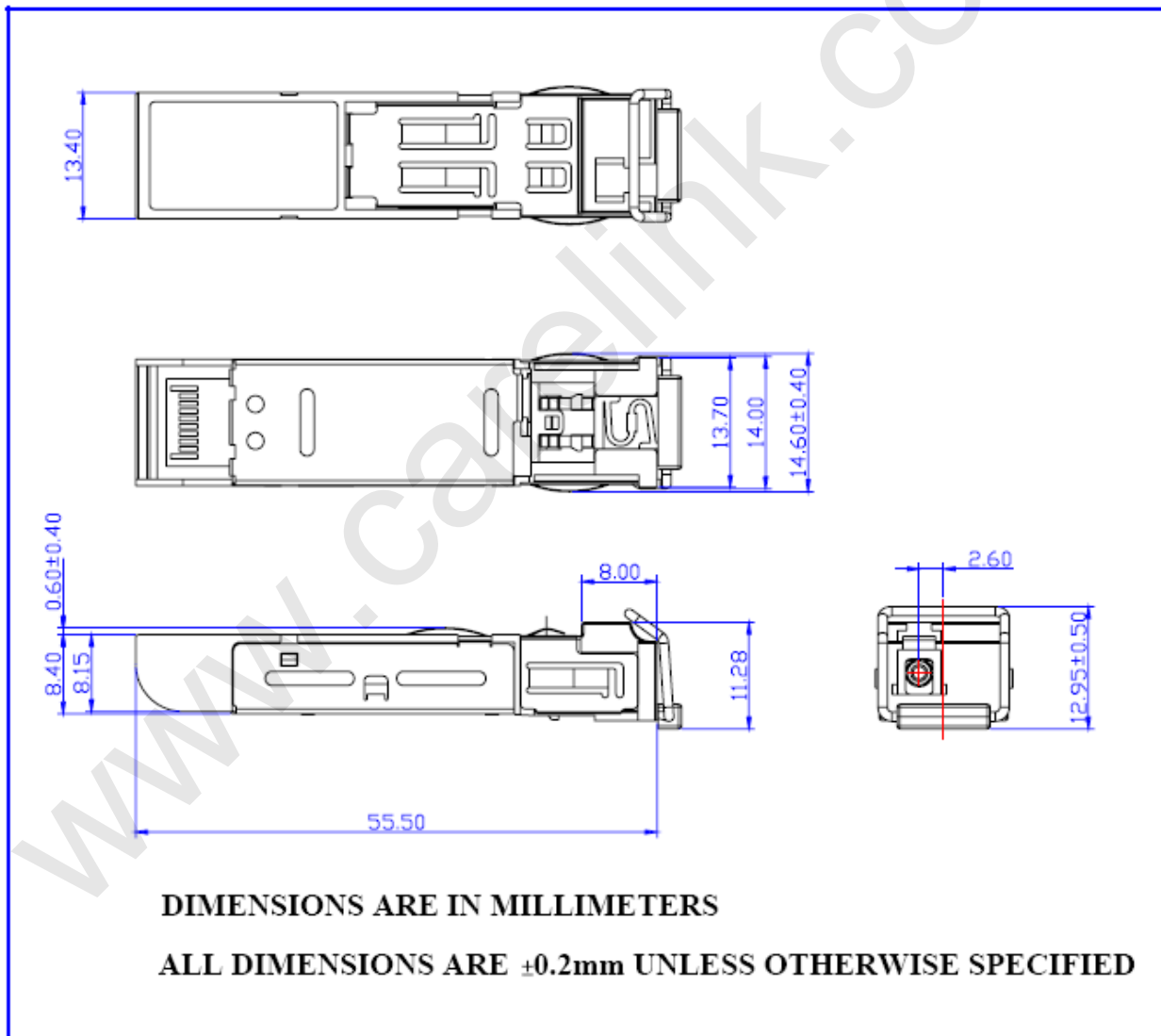
TX_DISABLE

The TX_DISABLE signal is high (TTL logic “1”) to turn off the laser output.

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.

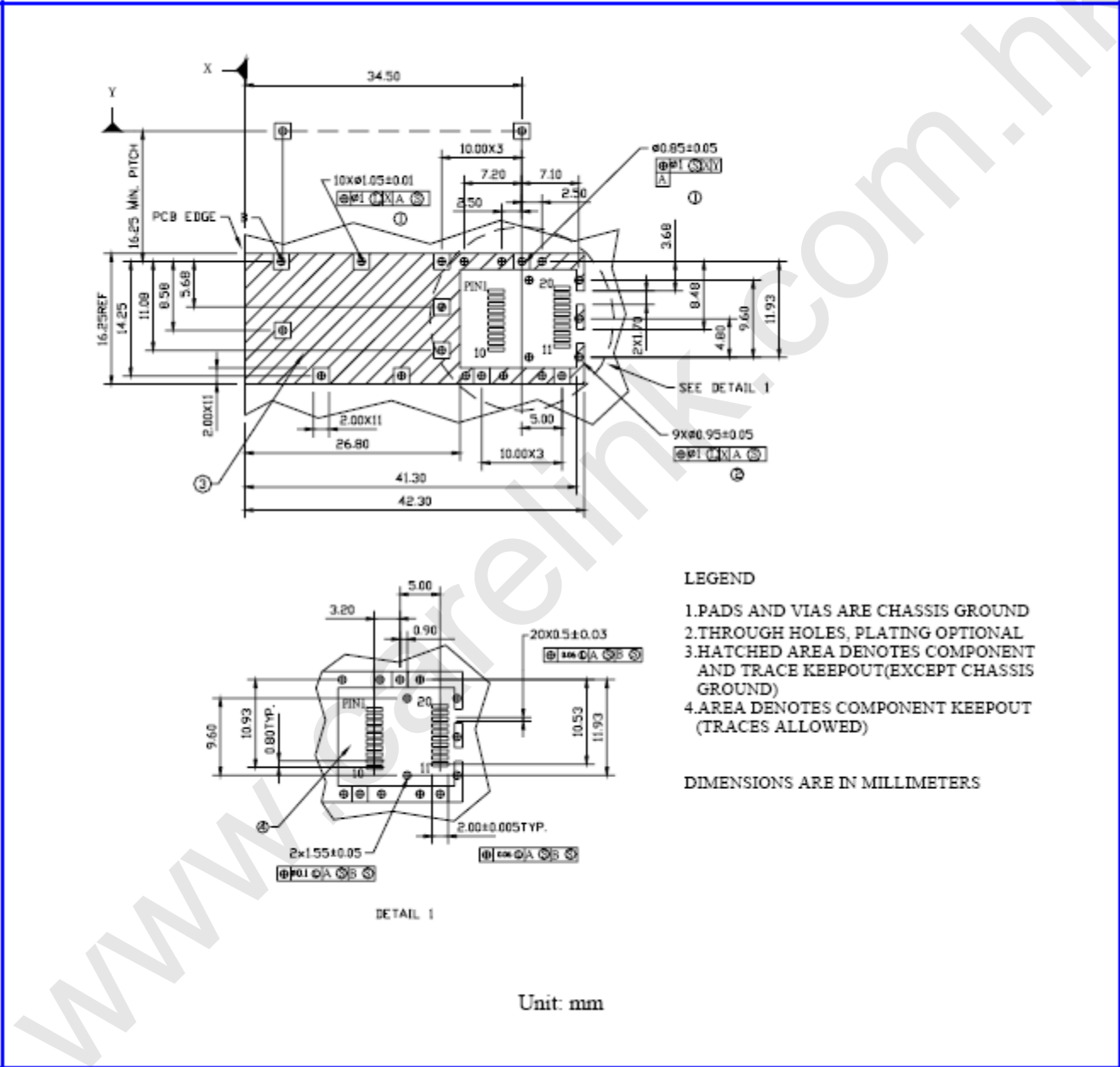
Dimensions





RoHS compliant
 TX-1310/RX-1550 nm Single-mode Bi-directional
 SFP LC/SC Simplex Connector (12dB margin) DDM
 1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

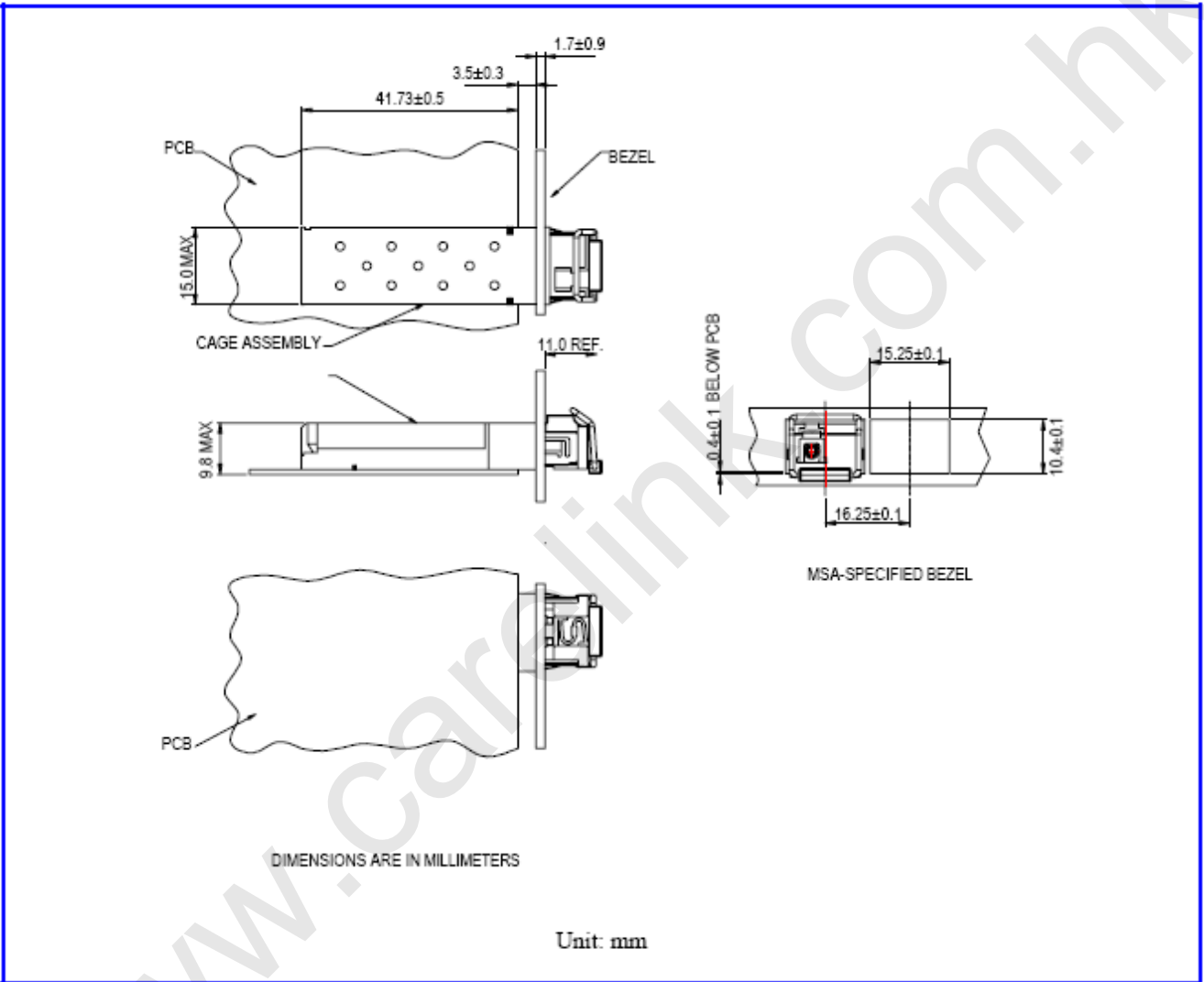
SFP host board mechanical layout





RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Assembly drawing

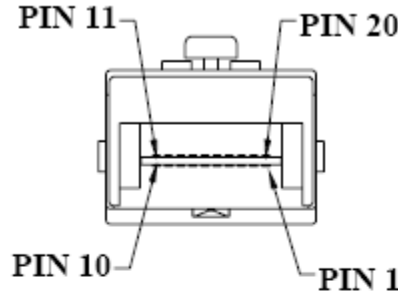




RoHS compliant
 TX-1310/RX-1550 nm Single-mode Bi-directional
 SFP LC/SC Simplex Connector (12dB margin) DDM
 1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Pin Assignment

Pin-Out



Pin	Signal Name	Description
1	T_{GND}	Transmit 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 PECL, ac coupled
19	$TX-$	Transmit Data Bar, Differential PECL, ac coupled
20	T_{GND}	Transmitter Ground



RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Digital Diagnostic Functions

Carelink CL-SFP-WDM-10-55DDxxy transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications. The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. Additionally, Carelink SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range. The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement. The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. Digital diagnostics for the CL-SFP-WDM-10-55DDxxy are internally calibrated by default.



RoHS compliant
TX-1310/RX-1550 nm Single-mode Bi-directional
SFP LC/SC Simplex Connector (12dB margin) DDM
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Eye Safety Mark

The LS3 series singlemode transceiver is a class 1 laser product. It complies with EN 60825-1 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

Caution

All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.

Required Mark

Class 1 Laser Product
Complies with
21 CFR 1040.10 and 1040.11

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