



RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985



### Features

- RoHS compliant
- Compliant with SONET/SDH standard
- Compliant with Fast Ethernet standard
- Compliant with IEEE802.3ah 100Base-BX
- Compliant with ITU-T G.985 class S
- 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
- Hot Pluggable
- Class 1 laser product complies with EN 60825-1
- Digital Diagnostic Monitoring

### Ordering Information

PART NUMBER	TX/RX	INPUT/OUTPUT	TEMPERATURE	LD Type	Distance
CL-SFP-WDM-20-55/155SC DD	1550/1310	AC/AC	0°C to 70 °C	1550 FB	20km
CL-SFP-WDM-20-55/155SC DDi	1550/1310	AC/AC	-40°C to 85 °C	1550 FB	20km

### 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	



RoHS compliant  
 TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
 SFP LC/SC Simplex Connector / DDM  
 155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
 100Base-BX10-U/ITU-T G.985

### Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Case Operating Temperature	$T_C$	0	70	°C	CL-SFP-WDM-20-55-155
		-40	85	°C	CL-SFP-WDM-10-55-155i
Supply Voltage	$V_{CC}$	3.1	3.5	V	
Supply Current	$I_{TX} + I_{RX}$	---	200	mA	

### Transmitter Electro-optical Characteristics

$V_{CC} = 3.1 \text{ V to } 3.5 \text{ V}$ ,  $T_C = 0^\circ \text{C to } 70^\circ \text{C}$  ( $-40^\circ \text{C to } 85^\circ \text{C}$ )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Output Optical Power 9/125 $\mu\text{m}$ fiber	$P_{out}$	-14	---	-8	dBm	Average
Extinction Ratio	$ER$	8.2	---	---	dB	
Center Wavelength	$\lambda_C$	1480	1520	1580	nm	
Spectral Width (RMS)	$\Delta\lambda$	---	---	3	nm	
Rise/Fall Time (10–90%)	$T_{r,f}$	---	1	2	ns	
Output Eye	Compliant with Telcordia GR-253-CORE Issue 3 and ITU-T recommendation G-957					
Max. $P_{out}$ TX-DISABLE Asserted	$P_{OFF}$	---	---	-45	dBm	
Differential Input Voltage	$V_{DIFF}$	0.4	---	2.0	V	



RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985

### Receiver Electro-optical Characteristics

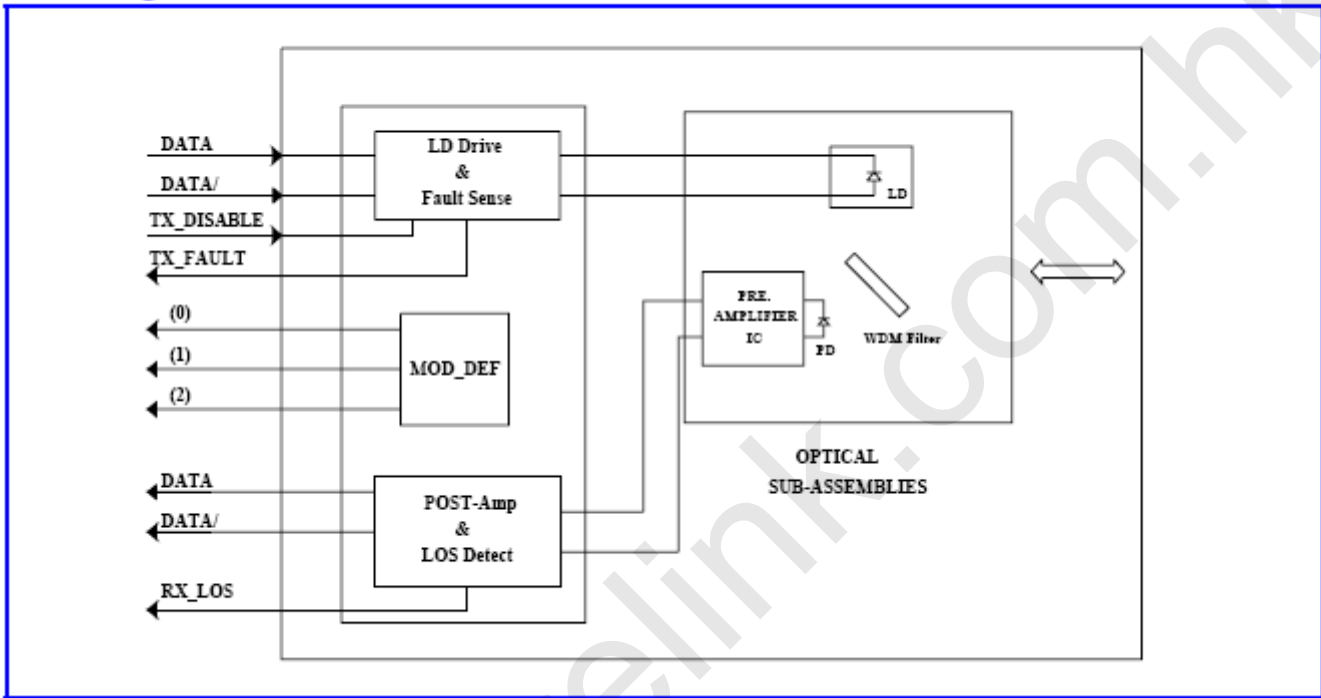
$V_{CC} = 3.1\text{ V to } 3.5\text{ V}$ ,  $T_C = 0^\circ\text{C to } 70^\circ\text{C}$  ( $-40^\circ\text{C to } 85^\circ\text{C}$ )

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Optical Input Power-maximum	$P_{IN}$	0	---	---	dBm	BER < $10^{-12}$
Optical Input Power-minimum (Sensitivity)	$P_{IN}$	---	---	-32	dBm	BER < $10^{-12}$
Operating Center Wavelength	$\lambda_c$	1260	---	1360	nm	
Optical Return Loss	ORL	14	---	---	dB	$\lambda=1260\sim 1360\text{nm}$
Optical isolation	ISO	---	---	-40	dB	$\lambda=1260\sim 1360\text{nm}$
Loss of signal-Asserted	$P_A$	---	---	-32	dBm	
Loss of signal-Deasserted	$P_D$	-45	---	---	dBm	
Differential Output Voltage	$V_{DIFF}$	0.5	---	1.6	V	
Data Output Rise, Fall Time (10%-90%)	$T_{r,f}$	---	1	2	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	



RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985

### Block Diagram of Transceiver



#### Transmitter and Receiver Optical Sub-assembly Section

A 1550 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 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.

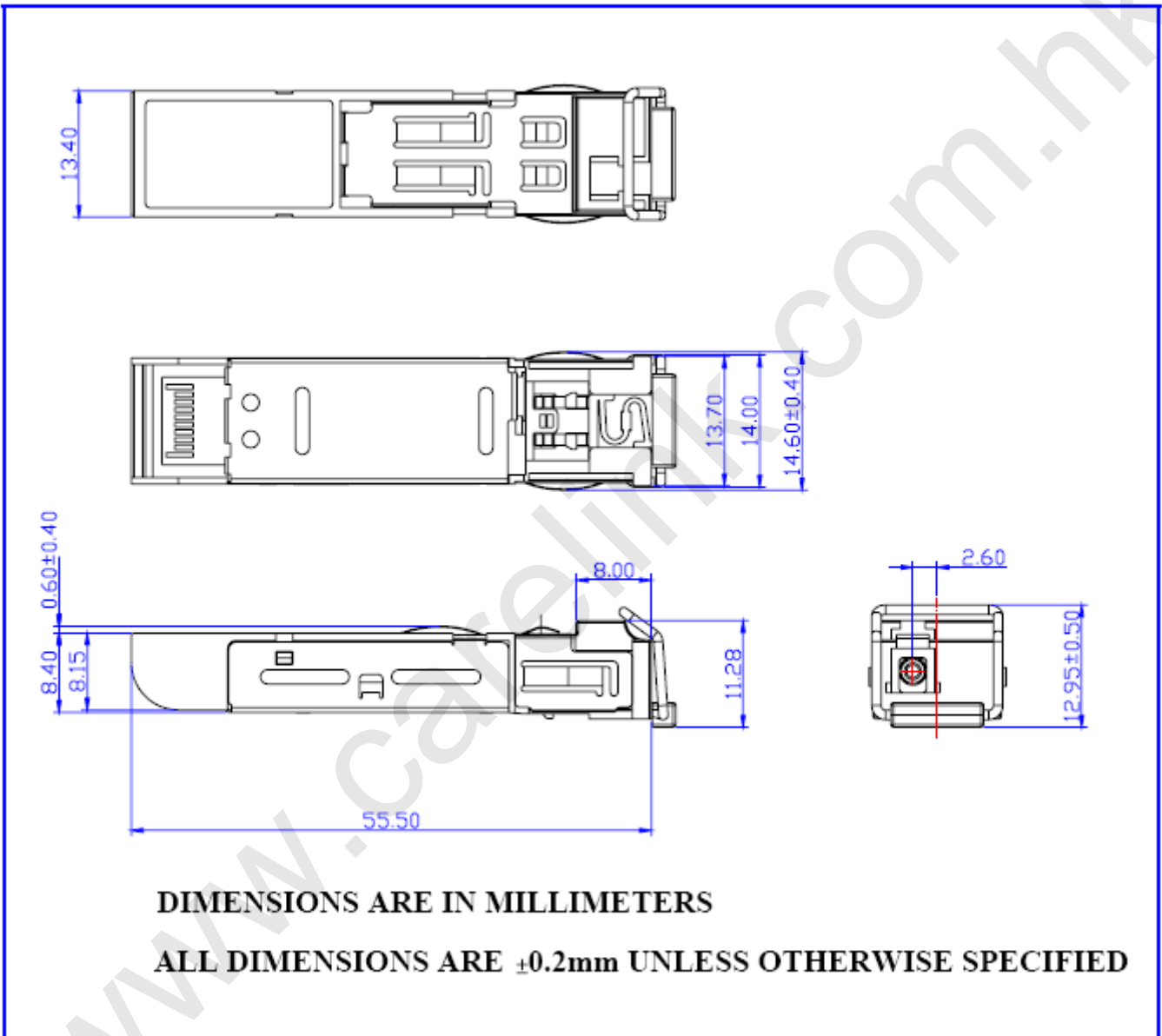
#### Receive Loss (RX\_LOS)

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.



RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985

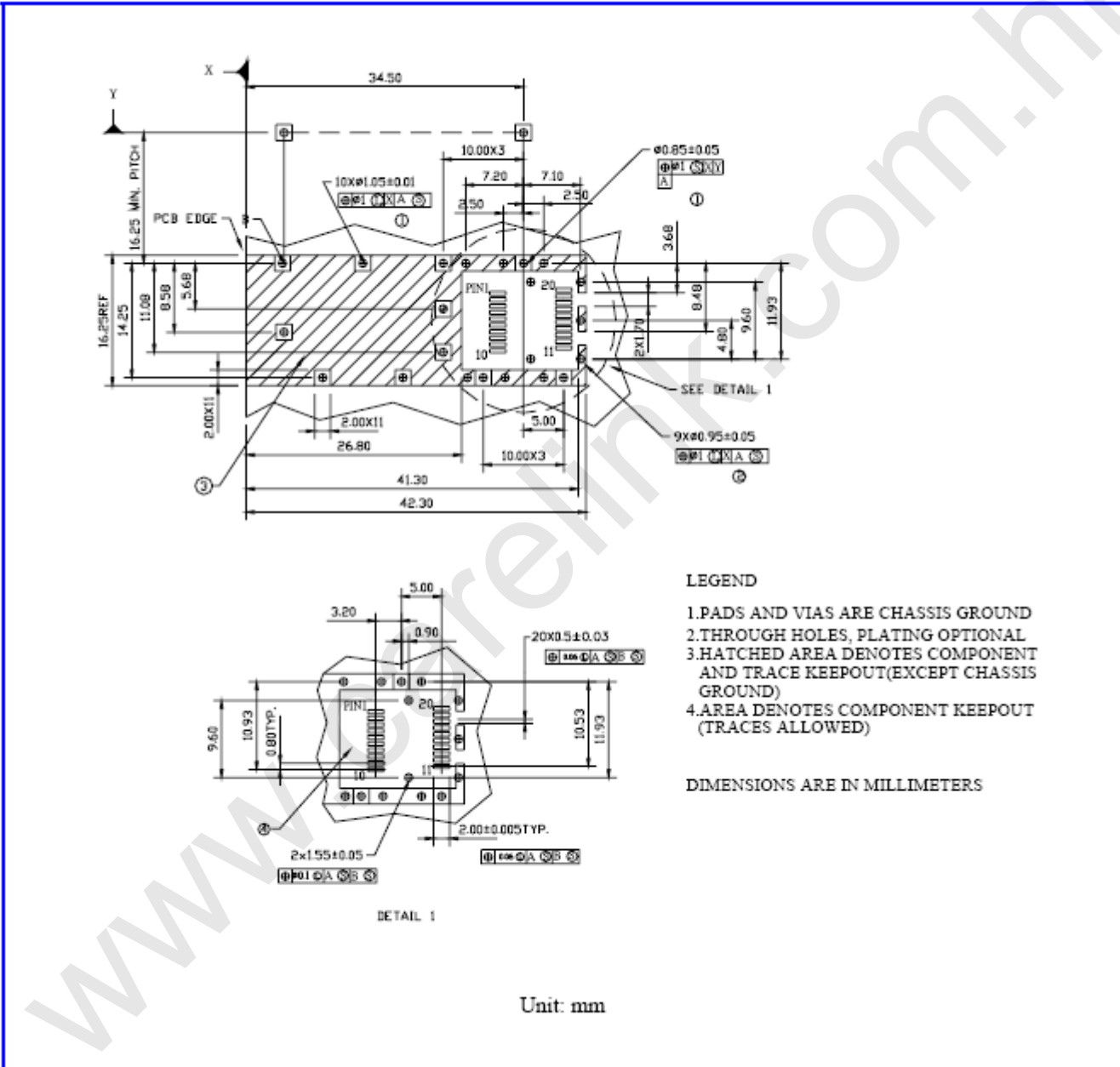
**Dimensions**





RoHS compliant  
 TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
 SFP LC/SC Simplex Connector / DDM  
 155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
 100Base-BX10-U/ITU-T G.985

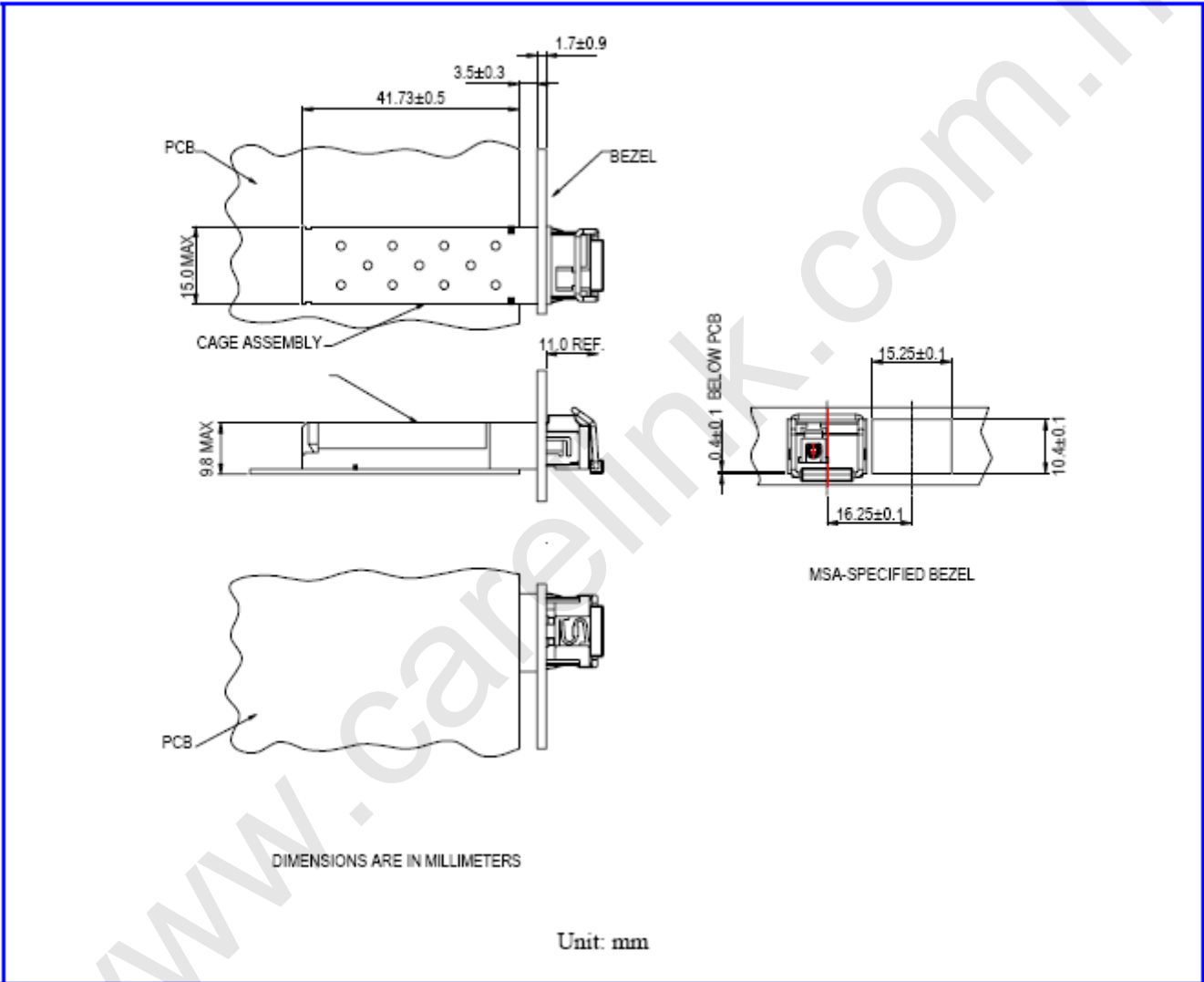
SFP host board mechanical layout





RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985

Assembly drawing

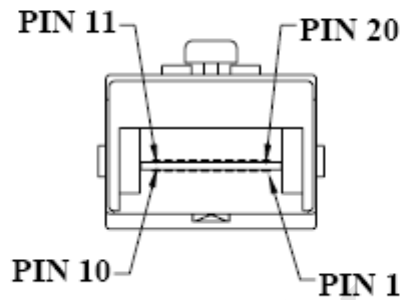




RoHS compliant  
 TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
 SFP LC/SC Simplex Connector / DDM  
 155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
 100Base-BX10-U/ITU-T G.985

### 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 PCEL, ac coupled
19	$TX-$	Transmit Data Bar, Differential PCEL, ac coupled
20	$T_{GND}$	Transmitter Ground

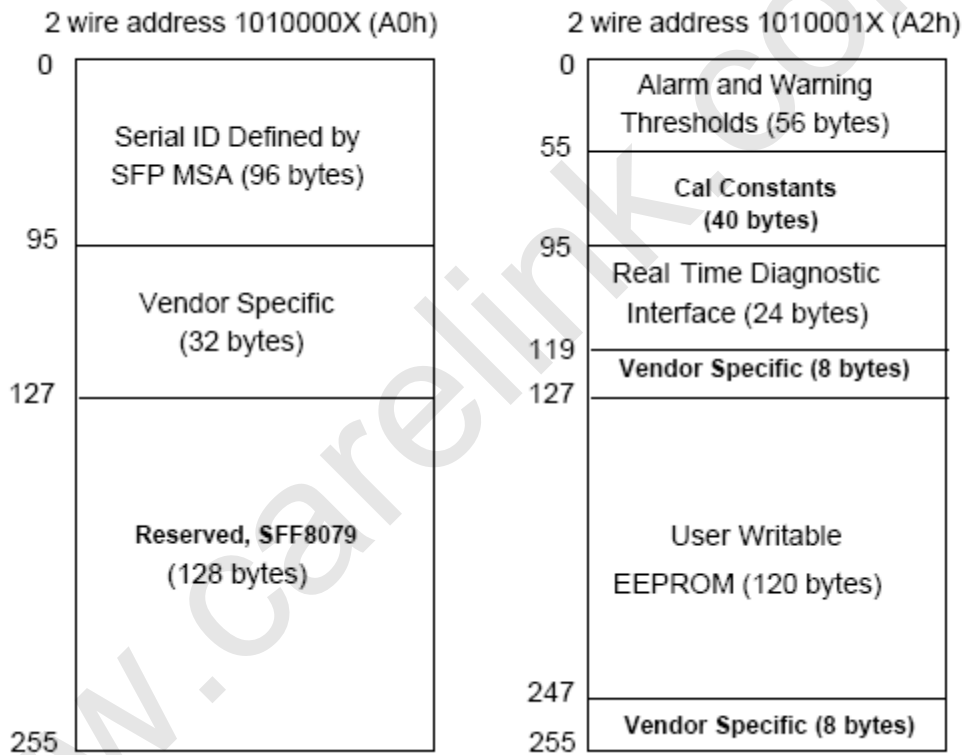




RoHS compliant  
TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)  
SFP LC/SC Simplex Connector / DDM  
155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /  
100Base-BX10-U/ITU-T G.985

## EEPROM Information

EEPROM memory map specific data field description is as below:



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class



**RoHS compliant**  
**TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)**  
**SFP LC/SC Simplex Connector / DDM**  
**155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /**  
**100Base-BX10-U/ITU-T G.985**

## Digital Diagnostic Functions

Carelink SFP transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. 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 EEPROM 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).

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 Carelink SFP Transceivers are externally calibrated by default.

### Eye Safety Mark

The LS3 series single mode 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.



**RoHS compliant**  
**TX-1550/RX-1310 nm Single-mode Bi-directional (Single-Fiber)**  
**SFP LC/SC Simplex Connector / DDM**  
**155 Mbps ATM/SONET OC-3/SDH STM-1/Fast Ethernet /**  
**100Base-BX10-U/ITU-T G.985**

---

[www.carelink.com.hk](http://www.carelink.com.hk)