RoHS compliant
2X TX-1310/RX-1490 nm or 2X TX-1490/RX-1310nm
Single-mode Bi-directional /Compact Small Form Pluggable (SFP), 3.3V
1.0625Gbd Fiber Channel/1.25 Gigabit Ethernet

Features

- 1250Mbps Typical Data Rate and compliant to 1000Base BX20 IEEE802.3ah
- PIN photo-detector
- Up to 20km on 9/125μm SMF
- Hot-pluggable CSFP footprint
- LC/UPC type pluggable optical interface
- Achieve operational compatibility with conventional SFP
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Support Digital Diagnostic Monitoring interface
- Compliant with SFF-8472
- Case operating temperature 0°C to +70°C

Ordering Information

PART NUMBER	INPUT/OUTPUT	MONITOR	VOLTAGE	TEMPERATURE
CL-CSFP-WDM-20-31 DD	AC/AC	Yes	3.3V	0°C to 70°C
CL-CSFP-WDM-20-49 DD	AC/AC	Yes	3.3V	0°C to 70°C

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I. Pin Descriptions

Pin#	Name	Function	Notes
1	VEE	Transceiver Ground	VEE may be internally connected within the SFP module
2	TX FAULT	Transmitter Fault Indication	TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10K resistor on the host board. Note 1 for more information
3	TX1_ Disable	Transmitter Disable of Ch A	Module channel A disables function
4	MOD-DEF2	Two-wires interface Data	2 wire serial ID interface, SDA
5	MOD-DEF1	Two-wires interface Clock	2 wire serial ID interface, SCL
6	TD2-	Inverted Transmit Data Input of Ch B	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
7	TD2+	Transmit Data Input of Ch B	
8	LOS1	Loss of Signal of Ch A	Loss of Signal detected function. Note 2 for more information.
9	RD2+	Received Data Output of Ch B	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
10	RD2-	Inverted Received Data Output of Ch B	
11	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.

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Pin#	Name	Function	Notes
12	RD1-	Inverted Received Data Output of Ch A	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100(differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
13	RD1+	Received Data Output of Ch A	
14	LOS2	Loss of Signal of CH B	Loss of Signal detected function. Note 2 for more information.
15	VCCR	Receiver Power	3.3V± 5%. Note 3 for more information
16	VCCT	Transmitter Power	3.3V± 5%. Note 3 for more information
17	TX2_ Disable	Transmitter Disable of Ch B	Module channel B disables function
18	TD1+	Transmit Data Input of Ch A	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
19	TD1-	Inverted Transmit Data Input of Ch A	
20	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.

Note 1: When high, output indicates a laser fault of some kind either in Channel A or Channel B. The Host shall read Channel A/B for details: TX Fault from channel A if bit 2 is set in [A2H:110]; TX Fault from channel B if bit 2 is set in [B2H: 110]. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

Note 2: When high, this output indicates the received optical power is below the worst-case

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receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

Note 3: VccT VccR are the power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 400Ma@3.3V. Vcc may be internally connected within the SFP transceiver module.
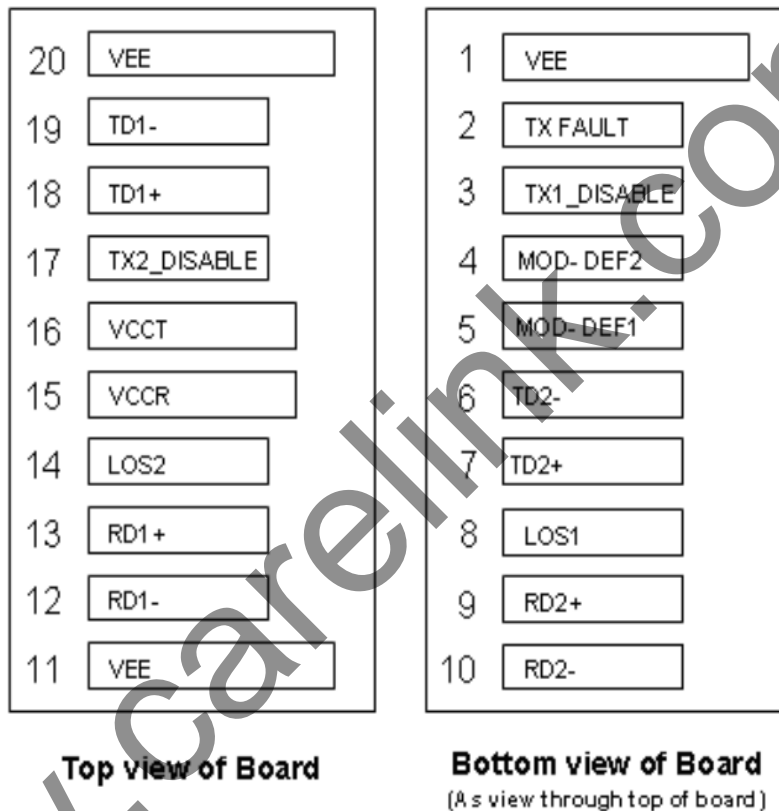
20	VEE		1	VEE
19	TD1-		2	TX FAULT
18	TD1+		3	TX1_DISABLE
17	TX2_DISABLE		4	MOD- DEF2
16	VCCT		5	MOD- DEF1
15	VCCR		6	TD2-
14	LOS2		7	TD2+
13	RD1+		8	LOS1
12	RD1-		9	RD2+
11	VEE		10	RD2-

Top view of Board

Bottom view of Board
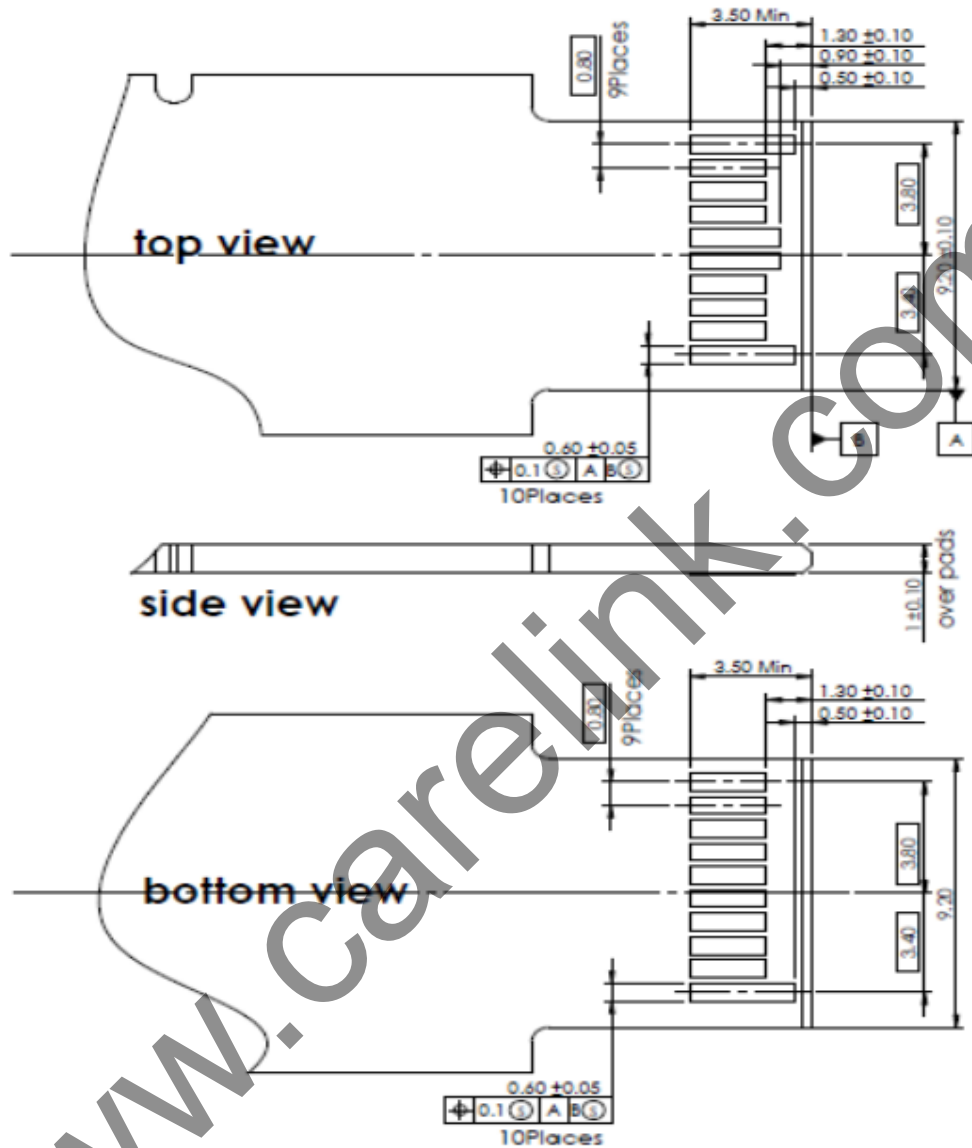(A s view through top of board)

Figure 2: Pin out of Connector Block on Host Board

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top view

side view

bottom view

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II. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	ºC	
Storage Ambient Humidity	HA	5		95	%	
Power Supply Voltage	Vcc	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		3			dBm	

III. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0		70	ºC	
Ambient Humidity	HA	5		70	%	Non-condensing
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			450	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz
Data Rate			1.25/1.25		Gbps	TX Rate/RX Rate
Transmission Distance				20	KM	
Coupled Fiber	Single mode fiber					9/125um SMF

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IV. Specification of Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P$_{OUT}$	-9		-3	dBm	
Extinction Ratio	ER	8			dB	
Center Wavelength	λ$_C$	1270	1310	1360	nm	3149
		1470	1490	1510		4931
Spectrum Width (RMS)	σ			3.5	nm	FP Laser (TX:1310nm)
Side Mode Suppression Ratio	SMSR	30			dB	DFB Laser
Spectrum Bandwidth(-20dB)	σ			1	nm	(TX:1490nm)
Transmitter OFF Output Power	P$_{Off}$			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Jitter P-P	t$_J$			128	ps	Note (1)
Output Eye Mask	Compliant with IEEE802.3 ah (class 1 laser safety)					Note (2)

Note (1): Measure at 2^7-1 NRZ PRBS pattern

Note (2): Transmitter eye mask definition, and eye mask diagram with at least 10% margin.

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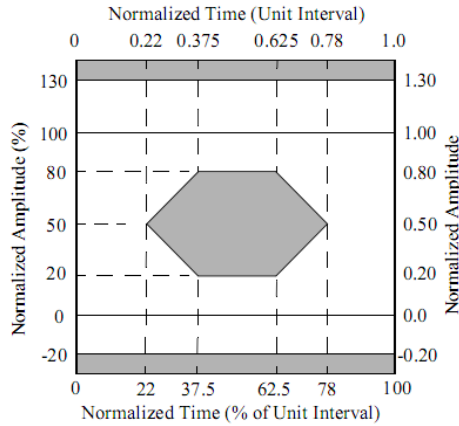
V. Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1470	1490	1510	nm	
		1270	1310	1360		
Receiver Sensitivity	P_{IN}			-19	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	-3			dBm	
Los Of Signal Assert	P_A	-38			dBm	
Los Of Signal De-assert	P_D			-22	dBm	Note (2)
LOS Hysteresis	P_A-P_D	0.5	2	6	dB	

Note (1): Measured with Light source 1490nm(1310nm), ER=8dB; BER =<10^-12 @PRBS=2^7-1 NRZ

Note (2): When LOS de-asserted, the RX data+/- output is High-level (fixed)

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VI. Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I_{CC}			A	mA	Note (1)
Transmitter Disable Input-High	V_{DISH}	2		Vcc+0.3	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Input-High	V_{DISL}	2		Vcc+0.3	V	
Transmitter Fault Input-Low	V_{TxFH}	0		0.8	V	
Receiver						
Total Supply Current	I_{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V_{LOSH}	2		Vcc+0.3	V	LVTTL
LOSS Output Voltage-Low	V_{LOSL}	0		0.8	V	

Note (1): A (TX) + B (RX) = 450mA   (Not include termination circuit)

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VII. Digital Diagnostic Functions
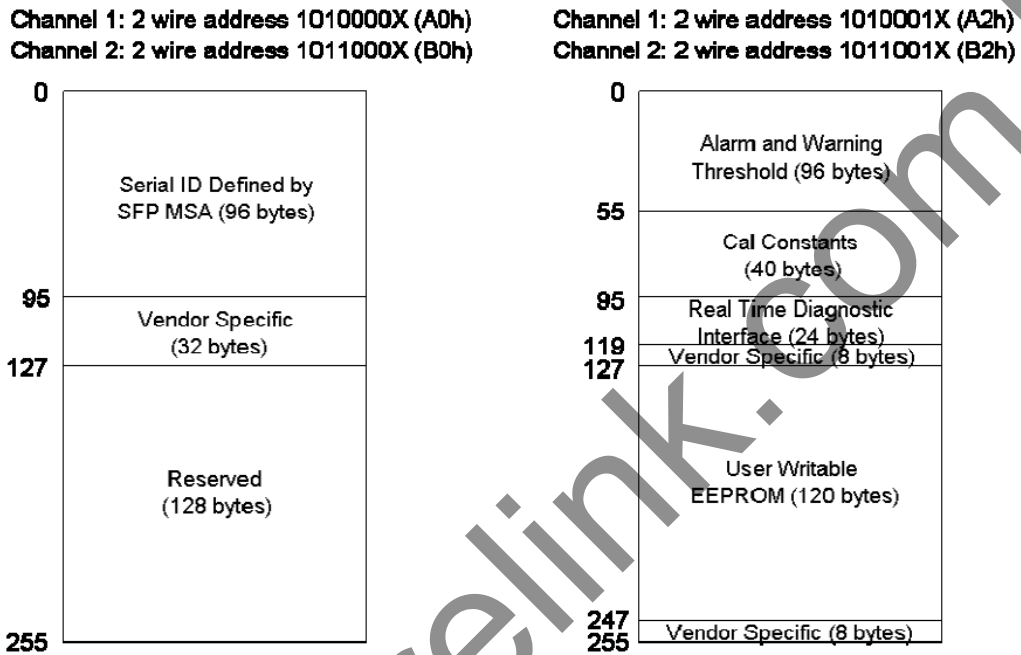
The digital diagnostic memory is defined as follow:

Channel 1: 2 wire address 1010000X (A0h)
Channel 2: 2 wire address 1011000X (B0h)

0	
	Serial ID Defined by SFP MSA (96 bytes)
95	
	Vendor Specific (32 bytes)
127	
	Reserved (128 bytes)
255	

Channel 1: 2 wire address 1010001X (A2h)
Channel 2: 2 wire address 1011001X (B2h)

0	
	Alarm and Warning Threshold (96 bytes)
55	
	Cal Constants (40 bytes)
95	Real Time Diagnostic
119	Interface (24 bytes)
127	Vendor Specific (8 bytes)
	User Writable EEPROM (120 bytes)
247	
255	Vendor Specific (8 bytes)

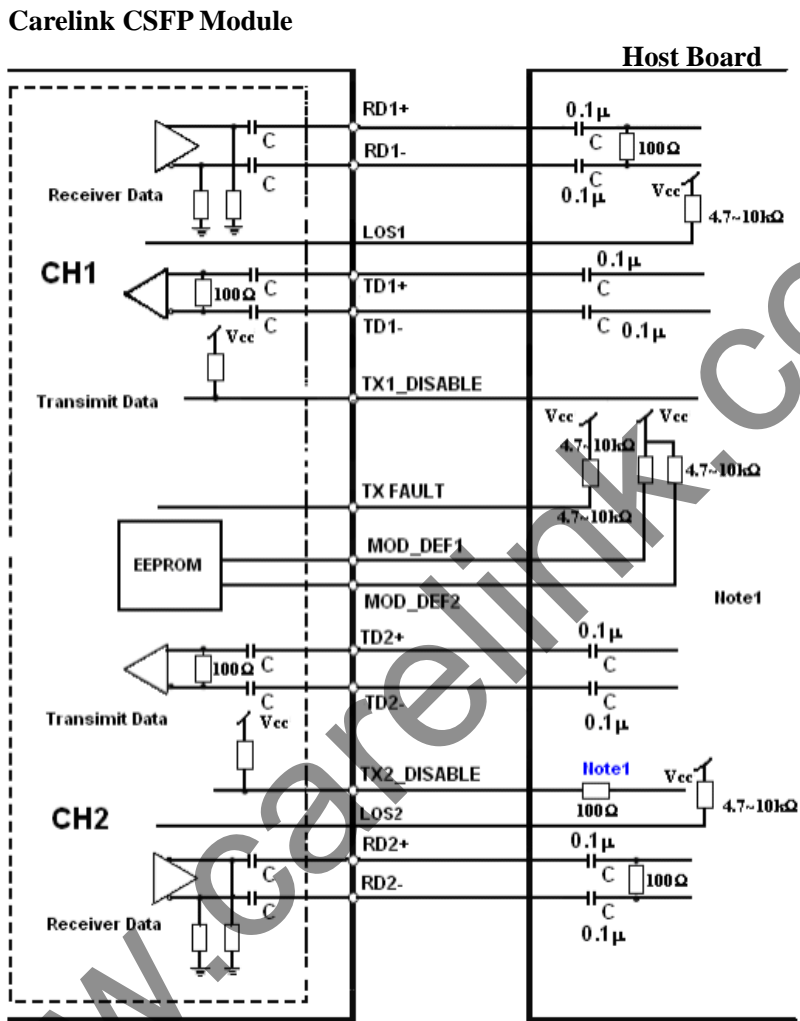**Figure 29 Memory map of 2ch Compact SFP (option 2)**

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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.

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VIII. Recommend Circuit Diagram

Carelink CSFP Module

Note1 : Recommendation 100Ω series resistance on host board.

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IX. Mechanical Specifications (Unit: mm)
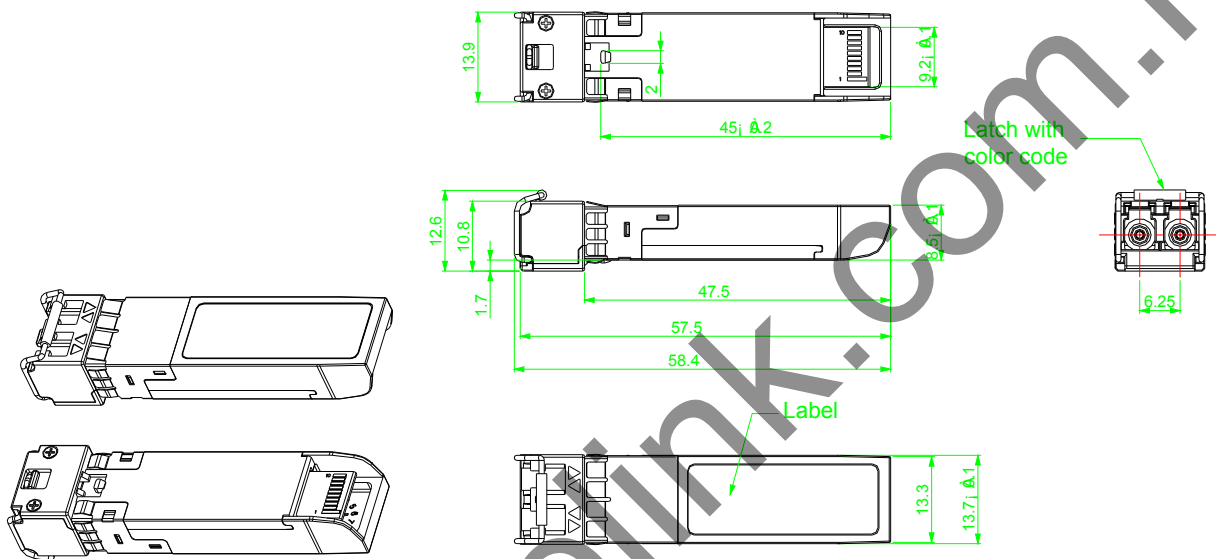
X. Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge（ESD）	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

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Eye Safety Mark

The SFP 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.

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