



## **10GBASE-LR/LW 1310nm SMF 10km SFP+ Optical Transceiver with Duplex LC Connector**

### **10GLRSFPx**



#### **DESCRIPTION**

The 10GLRSFPx Enhanced Small Form Factor Pluggable SFP+ optical transceivers are RoHS compliant and designed for use in serial optical data communications application specified for a data rate of 10 Gb/s. The SFP+ transceiver module provides up to 10km transmission distance over single-mode fiber at nominal wavelength of 1310nm. They are compliant with SFP+ MSA SFF-8431, SFF 8472 diagnostic monitoring interface, and EN60825-1.

#### **FEATURES**

- Compliant with SFP+ MSA SFF-8431
- Compliant with SFF8472 diagnostic monitoring interface
- Duplex LC connector
- Hot pluggable SFP+ package
- Class 1 laser product compliant with EN 60825-1
- Support CPRI line bit rate option 7: 9830.4 Mbit/s
- Single power supply 3.3V
- Input/Output: AC/AC
- Up to 10km over single mode fiber

#### **APPLICATIONS**

- 10GBASE-LR/LW
- Fiber Channel 10G
- SONET OC-192 SR-1 SDH STM I-64.1

#### **PRODUCT OVERVIEW**

<b>PART NUMBER</b>	<b>OPERATING TEMPERATURE</b>
10GLRSFPC	0°C to 70°C
10GLRSFPI	-40°C to 85°C

**DIAGNOSTICS**

PARAMETER	RANGE	ACCURACY	UNIT	CALIBRATION
Internal Transceiver Temperature	-40 to 95	±3	°C	Internal
Internal Transceiver Voltage	3.1 to 3.5	±0.1	V	
Bias Current	0 to 120	±10%	mA	
TX Power	-9 to +2	±3	dB	
RX Average Power	-16 to 0	±3	dB	

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	MIN	MAX	UNIT
Storage Temperature	T <sub>S</sub>	-40	85	°C
Supply Voltage	V <sub>CC</sub>	-0.5	4.0	V
Input Voltage	V <sub>IN</sub>	-0.5	V <sub>CC</sub>	V
Overload	P <sub>IN</sub>	-	5	dBm

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTES
Case Operating Temperature	T <sub>C</sub>	-10	70	°C	10GLRSFPC
		-40	85		10GLRSFPI
Supply Voltage	V <sub>CC</sub>	3.14	3.46	V	
Supply Current	I <sub>TX</sub> + I <sub>RX</sub>		300	mA	
Power Consumption	P	-	1.0	W	

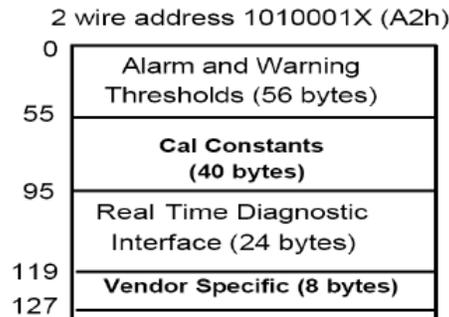
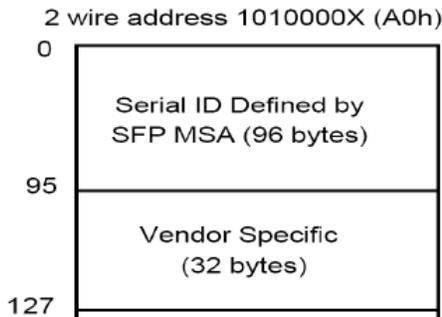
**TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS (V<sub>CC</sub> = 3.14V to 3.46V, T<sub>C</sub> = -10°C to 70°C, -40°C to 85°C)**

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT
Data Rate	B		10.3125		Gbps
Output Optical Power	P <sub>out</sub>	-6	-	0.5	dBm
Optical Modulation Amplitude	OMA	-5.2			dBm
Extinction Ratio	ER	3.5			dB
Center Wavelength	λ <sub>C</sub>	1290	1310	1330	nm
Spectral Width (RMS)	Δλ	-	-	1	nm
Side Mode Suppression Ratio	SSR <sub>min</sub>	30			dB
Transmitter and Dispersion Penalty	TDP			3.2	dB
Relative Intensity Noise	RIN	-	-	-128	dB/Hz
Output Eye		Compliant with IEEE802.3ae			
Max. P <sub>out</sub> TX-DISABLE Asserted	P <sub>OFF</sub>	-	-	-35	dBm
Differential Input Impedance	Z <sub>d</sub>	75	100	125	Ω
Differential Input Voltage Swing	V <sub>DIFF</sub>	200		800	mV
Transmit Fault Output-Low	TX_FAULT <sub>L</sub>	0.0	-	0.5	V
Transmit Fault Output-High	TX_FAULT <sub>H</sub>	2.4	-	V <sub>CC</sub>	V
TX_DISABLE Assert Time	t <sub>off</sub>	-	-	100	μs
TX_DISABLE Negate Time	t <sub>on</sub>	-	-	2	ms
Time to Initialize, include reset of TX_FAULT	t <sub>init</sub>	-	-	300	ms
TX_FAULT from fault to assertion	t <sub>fault</sub>	-	-	1	ms
TX_DISABLE Time to start reset	t <sub>reset</sub>	10	-	-	μs

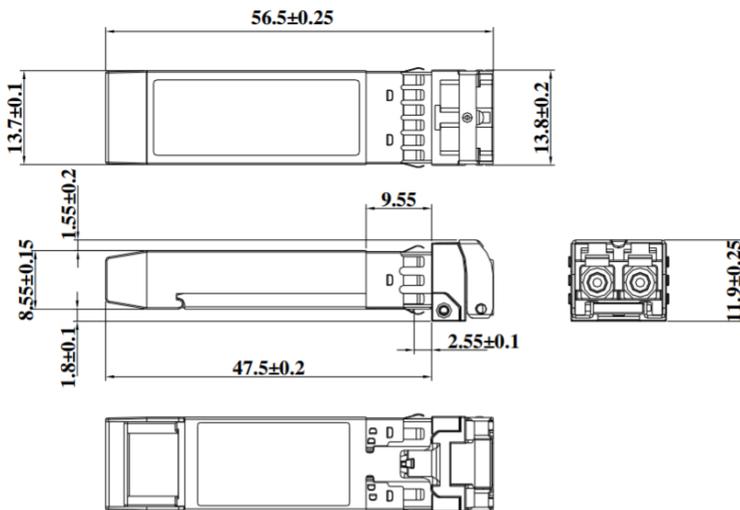
**RECEIVER ELECTRO-OPTICAL CHARACTERISTICS ( $V_{CC} = 3.14V$  to  $3.46V$ ,  $T_C = -10^{\circ}C$  to  $70^{\circ}C$ ,  $-40^{\circ}C$  to  $85^{\circ}C$ )**

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTES
Data Rate	B		10.3125		Gbps	
Optical Input Power – maximum	$P_{IN}$	0.5	-	-	dBm	BER<10 <sup>-12</sup>
Receiver Sensitivity	$P_{IN}$	-	-	-14.4	dBm	BER<10 <sup>-12</sup>
Receiver Sensitivity (OMA)	$P_{IN}$	-	-	-12.6	dBm	BER<10 <sup>-12</sup>
Stressed Receiver Sensitivity (OMA)	$P_{IN}$	-	-	-10.3	dBm	BER<10 <sup>-12</sup>
Operating Center Wavelength	$\lambda_C$	1260	-	1355	nm	
Optical Return Loss	ORL	12	-	-	dB	
Loss of Signal-Asserted	$P_A$	-30	-	-	dBm	
Loss of Signal-Deasserted	$P_D$	-	-	-15	dBm	
Differential Output Impedance	$Z_d$	75	100	125	$\Omega$	
Differential Output Voltage	$V_{DIFF}$	300	-	800	mV	
Receiver Loss of Signal Output Voltage-Low	RX_LOS <sub>L</sub>	0	-	0.5	V	
Receiver Loss of Signal Output-High	RX_LOS <sub>H</sub>	2.4	-	$V_{CC}$	V	
Receiver Loss of Signal Assert Time (off to on)	$t_{A,RX\_LOS}$	-	-	100	$\mu s$	
Receiver Loss of Signal Assert Time (on to off)	$t_{D,RX\_LOS}$	-	-	100	$\mu s$	

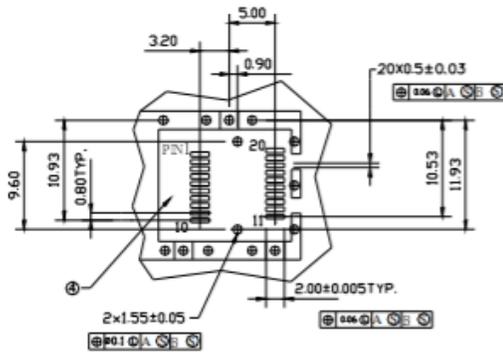
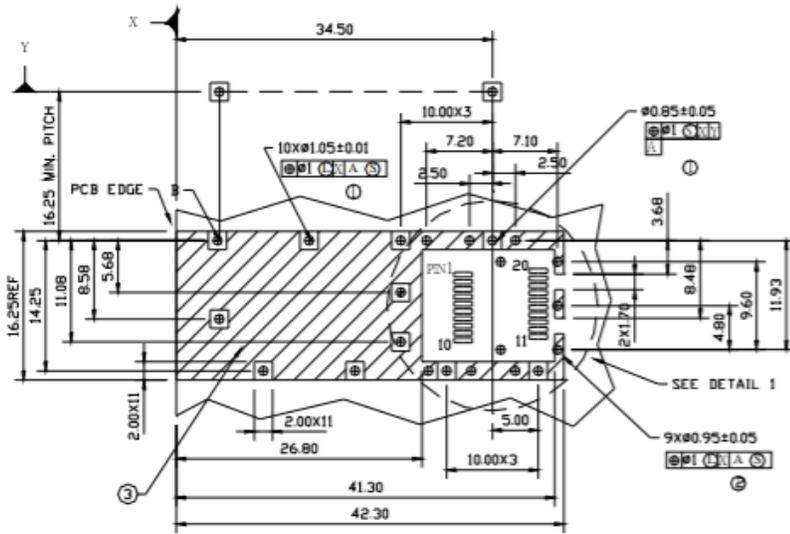
**DIGITAL DIAGNOSTIC MEMORY MAP**



**DIMENSIONS (unit: mm)**



SFP HOST BOARD MECHANICAL LAYOUT

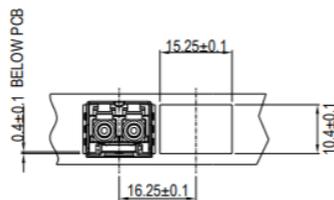
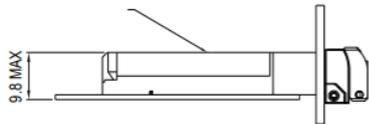
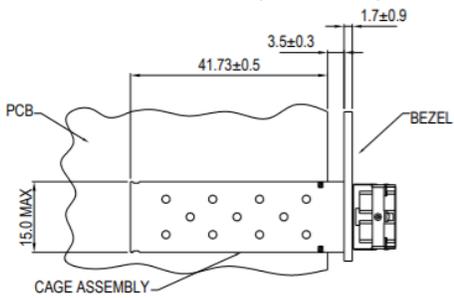


LEGEND

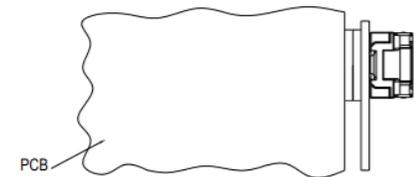
- 1. PADS AND VIAS ARE CHASSIS GROUND
- 2. THROUGH HOLES, PLATING OPTIONAL
- 3. HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT (EXCEPT CHASSIS GROUND)
- 4. AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

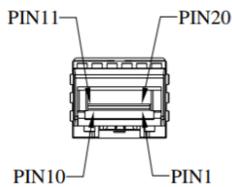
DIMENSIONS ARE IN MILLIMETERS

ASSEMBLY DRAWING (unit: mm)



MSA-SPECIFIED BEZEL



**PIN ASSIGNMENT**

PIN	SIGNAL NAME	DESCRIPTION	PIN	SIGNAL NAME	DESCRIPTION
1	T <sub>GND</sub>	Transmit Ground	11	R <sub>GND</sub>	Receiver Ground
2	TX_FAULT	Transmit Fault	12	RX-	Receive Data out Bar, ac coupled
3	TX_DISABLE	Transmit Disable	13	RX+	Receive Data out, ac coupled
4	MOD_DEF (2)	SDA Serial Data Signal	14	R <sub>GND</sub>	Receiver Ground
5	MOD_DEF (1)	SCL Serial Clock Signal	15	V <sub>CCR</sub>	Receiver Power Supply
6	MOD_DEF (0)	TTL Low	16	V <sub>CCT</sub>	Transmitter Power Supply
7	RS0	RX Rate Select, No used	17	T <sub>GND</sub>	Transmitter Ground
8	RX_LOS	Receiver Loss of Signal, TTL High, open collector	18	TX+	Transmit Data in, ac coupled
9	RS1	TX Rate Select, No used	19	TX-	Transmit Data in Bar, ac coupled
10	R <sub>GND</sub>	Receiver Ground	20	T <sub>GND</sub>	Transmitter Ground

**ADDITIONAL NOTES**

- Avoid eye or skin exposure to laser radiations.
- The device is sensitive to electro-static discharge (ESD). The device should be handled with ESD proof tools. To assemble the device on PCB, proper grounding is required to prevent ESD.
- Specifications are subject to change without notice.



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