

# 10GBASE-ER SFP+ 1310nm 40km DOM Transceiver

330-2404-40-LL



## Application

- 10GBASE-LR/LW 10G
- Ethernet
- 10GFC
- 8GFC

## Features

- Link lengths at 10G 40Km with DFB 1310nm
- 0°C to 70°C operating temperature range
- Digital Monitoring
- LC duplex connector
- Single +3.3V  $\pm$  5% power supply
- SFF-8472 compliant
- Low power consumption < 1.3W

## Description

The 10Gigabit 1310nm DFB Transceiver is designed to transmit and receive serial optical data links up from 6.1 Gb/s to 10.52 Gb/s data rate over 30km singlemode fiber. The Transceiver is compliant with SFF-8432, 10GFC, FC-PI-4, IEEE802.3ae and applicable portions of SFF-8431. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Product Specifications

### I. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
<b>Storage Temperature Range</b>	T <sub>s</sub>	°C	0	70
<b>Relative Humidity</b>	RH	%	0	95
<b>Supply Voltage</b>	VCC	V	-0.3	4.0

### II. Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
<b>Operating Case Temperature Range</b>	T <sub>c</sub>	°C	0		70
<b>Power Supply Voltage</b>	V <sub>cc</sub>	V	3.14	3.3	3.46
<b>Bit Rate</b>	BR	Gb/s	6.1		10.52
<b>Bit Error Ratio</b>	BER				10 <sup>-12</sup>
<b>Max Supported Link Length</b>	L	km			30

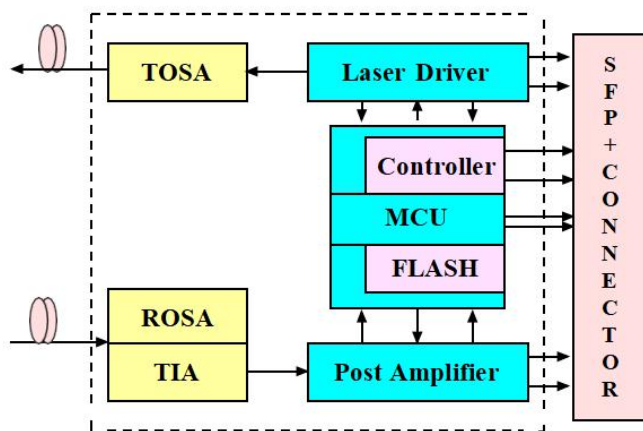
### III. Electric Ports Definition

Parameter	Symbol	Unit	Min	Typ	Max	Note
<b>Supply Voltage</b>	$V_{CC}$	V	3.14	3.3	3.46	
<b>Supply Current</b>	$I_{CC}$	mA			390	
<b>Transmitter</b>						
<b>Input Differential Impedance</b>	RIN	$\Omega$	80	100	120	1
<b>Differential Data Input Swing</b>	VIN	mVp-p	180		700	
<b>Transmit Disable Voltage</b>	VDIS	V	2		VCCHOST	
<b>Transmit Enable Voltage</b>	VEN	V	VEE		VEE+0.8	
<b>Transmit Fault Assert Voltage</b>	VFA	V	2.2		VCCHOST	
<b>Transmit Fault De-Assert Voltage</b>	VFDA	V	VEE		VEE+0.4	
<b>Receiver</b>						
<b>Differential Data Output Swing</b>	VOD	mVp-p	450	600	850	
<b>Output Rise Time</b>	tRISE	ps	25			
<b>Output Fall Time</b>	tFALL	ps	25			
<b>LOS Fault</b>	VLOSFT	V	2		VCCHOST	
<b>LOS Normal</b>	VLOSNR	V	VEE		VEE+0.8	

**Note:**

1. Differential between TD+ / TD-

### IV. Principle diagram



### V. Optical Characteristics

Parameter	Symbol	Unit	Min	Typ	Max	Note
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#### Transmitter

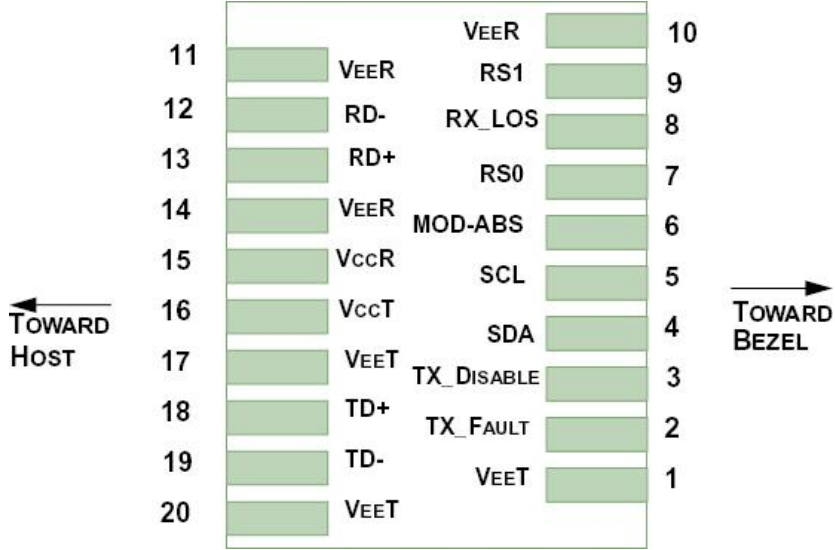
<b>Nominal Wavelength</b>	$\lambda$	nm	1260	1310	1355	
<b>Side Mode Suppression Ratio</b>	SMSR	dB	30			
<b>Spectral width</b>	$\Delta\lambda$	nm			1	
<b>Optical Output Power</b>	$P_{av}$	dBm			1	20km
					3	30km
<b>Optical Modulation Amplitude<sup>1</sup></b>	$P_{OMA}$	dBm	-5			20km
			-1			30km
<b>Extinction Ratio</b>	ER	dB	3.5			
<b>Average launch power of OFF transmitter</b>	$P_{OFF}$	dBm			-35	
<b>Relative Intensity Noise</b>	$R_{IN}$	dB/Hz			-128	

<b>Optical Return Loss Tolerance</b>	ORLT	dB	-15			
<b>Receiver</b>						
<b>Center Wavelength</b>	$\lambda$	nm	1260		1610	
<b>Average Receiver Power</b>	$P_{AVG}$	dBm			+1	
<b>Receiver Sensitivity<sup>2</sup> (OMA)</b>	$R_{SENSE1}$	dBm			-15	PRBS7
<b>Receiver Reflectance</b>	$R_{REFL}$	dB			-15	
<b>Assert LOS</b>	$LOS_A$	dBm	-30			
<b>De-Assert LOS</b>	$LOS_D$	dBm			-17	
<b>LOS Hysteresis</b>		dB	0.5			

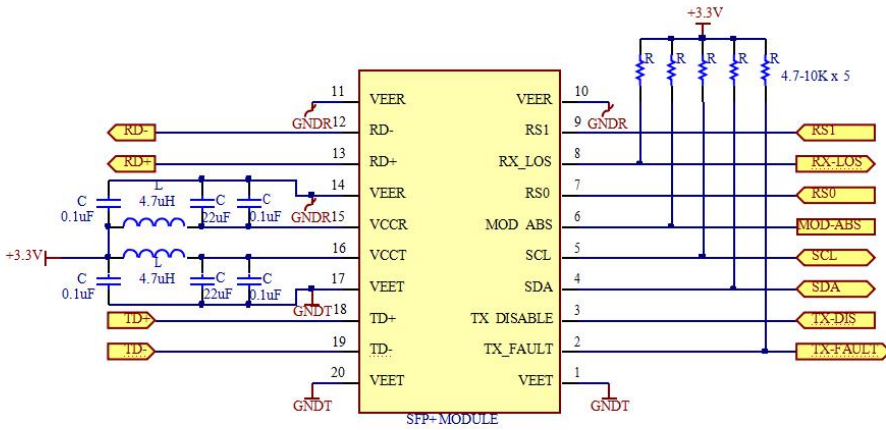
**Note:**

1. OMA = OMAmin – TDP, sum of all penalties incorporated, incl. aging and interoperability margin
2. achieved with worst case jitter stress at  $\delta t$ , and maximum reflection at  $\gamma t$ , Jitter total @ $\delta t$ , BER<10<sup>-12</sup> = 0.28UI (informative)

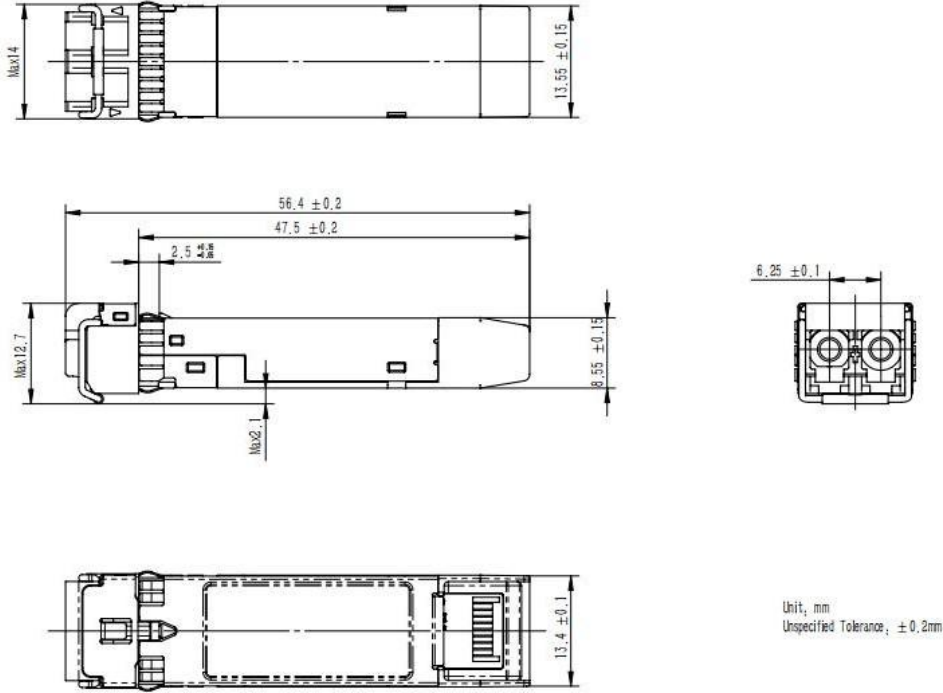
## VI. Pin function definitions



## VII. Typical Application Circuit



### VIII. Package Outline



### IX. Regulatory Compliance

Feature	Test Method	Performance
<b>Electrostatic Discharge (ESD) to the Electrical Pins</b>	MIL-STD-883C Method 3015.7	Class 1 (> 1500 Volts)
<b>Electrostatic Discharge (ESD) Immunity</b>	Variation of IEC 61000-4-2	LV 4 (Air discharge :15KV; Contact discharge: 8 KV) Performance criterion:B
<b>Electromagnetic Interference (EMI)</b>	CISPR22 ITE Class B EN55022 Class B FCC Class B	Compliant with standards
<b>Immunity</b>	6100IEC61000-4-3 Class 2 EN55024	Typically show no measurable effect from a 3V/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure.