Video 1310nm SFP Optical Transceiver

TRPV3GELRx000E2G

Product Description

The TRPV3GELRx000E2G is an optical transceiver module designed to transmit and receive electrical and optical serial digital signals as defined in SMPTE 297-2006. The TRPV3GELRx000E2G is specifically designed for robust performance in the presence of SDI pathological patterns for SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M serial rates.

The TRPV3GELRx000E2G contains a PIN photodiode receiver and a 1310nm Fabry-Perot laser transmitter designed to provide error-free transmission of signals from 50Mbps to 3Gbps over single mode fiber (9/125). It is also hot-pluggable.

The TRPV3GELRx000E2G provides extensive operational status monitoring through an I²C interface. Input optical power is monitored in the receiver; output optical power and bias current are monitored in the transmitter. Other operating conditions, such as power supply and operating temperature, are also monitored. If a monitored parameter falls outside the pre-defined range, an alarm flag for the parameter is raised.

Features

☑ Excellent optical receive sensitivity over supported video rates with pathological data

☑ Features standard video pin-out

☑ Robust error-free transmission of signals from 50Mbps to 3Gbps for up to 30km (single-mode fiber)

☑ Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI

☑ Digital Diagnostics and control via I²C interface

☑ Low power consumption

☑ RoHS compliant

☑ Industrial temperature option (- 40°C to +85°C)

☑ SMPTE 297-2006 compatible

Absolute Maximum Ratings

Parameter		Symbol	Minimum	Maximum	Units
Storage Temperature Range		T_{ST}	- 40	+ 85	°C
Case Operating Temperature [1]	"Commercial"	T_{OP}	- 5	+ 70	°C
	"Industrial"		- 40	+ 85	°C
Operating Relative Humidity [2]		RH	5	95	%
Supply Voltage Range		V_{CC}	- 0.5	+ 4	V

[1] Measured on top side of SFP module at the front center vent hole of the cage.
[2] Non condensing

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Transmitter Performance Characteristics (Over Operating Case Temperature. V_{CC} = 3.13 to 3.47V)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	0.05	-	3	Gb/s
Center Wavelength [1]		λ_C	1280	1310	1340	nm
Spectral Width [1]		$\Delta\lambda_{MS}$	-	1.5	3	nm
Average Optical Output Power		P_{Avg}	- 5	- 2	0	dBm
Extinction Ratio		ER	7	-	-	dB
Optical Signal Intrinsic Jitter [2]	2.97Gb/s, 1.485Gb/s, 270Mb/s, PRBS 2^{23}-1	-	-	30	60	ps
	2.97Gb/s SMPTE 424M Pathological		-	45	70	
	1.485Gb/s SMPTE 292M Pathological		-	60	100	
	270Mb/s, SMPTE 259M Pathological		-	110	180	
Optical Signal Rise Time (20% to 80%) [3]	SMPTE 424M 2.97Gb/s	tr	-	-	165	ps
	SMPTE 292M 1.485Gb/s		-	-	270	
	SMPTE 259M 270Mb/s		400	-	1500	
Optical Signal Fall Time (20% to 80%) [3]	SMPTE 424M 2.97Gb/s	tf	-	-	135	ps
	SMPTE 292M 1.485Gb/s		-	-	270	
	SMPTE 259M 270Mb/s		400	-	1500	
Laser Power Monitoring Accuracy		-	- 2	-	+ 2	dB

[1] Measured at 25℃
[2] As specified in SMPTE 259M, SMPTE 344M, SMPTE 292, or SMPTE 424M for the corresponding electrical signal. Test method shall conform to SMPTE RP 184
[3] Rise/fall times are measured following a fourth-order Bessel-Thompson filter with a 3dB point at 0.75 x data rate in MHz

Receiver Performance Characteristics (Over Operating Case Temperature. V_{CC} = 3.13 to 3.47V)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	0.05	-	3	Gb/s
Center Wavelength		λ_C	1260	-	1620	nm
Sensitivity [1]	SMPTE 259M, SMPTE 344M, SMPTE 292M Pathological, SMPTE 424M Pathological and PRBS 2^{23}-1	P_{min}	-	- 24	- 21	dBm
Overload		P_{max}	0	-	-	dBm
LOS Thresholds [1]	Increasing Light Input	$Plos+$	-	-	- 23	dBm
	Decreasing Light Input	$Plos-$	- 31	-	-	dBm
LOS Hysteresis		-	0.5	-	6	dB
Maximum Back Reflection		-	-	-	- 27	dB
Input Power Monitoring Accuracy		-	- 2	-	+ 2	dB

[1] Specified at a BER of 10^{-12}
[2] Specified with PRBS 2.97Gb/s signal, ER= 7dB

Application Notes

Electrical Interface: Signal interfaces are compatible with the SFP MSA specification. The high speed DATA interface is differential AC-coupled internally and can be directly connected to a 3.3V SERDES IC. All low speed control and sense output signals are open collector TTL compatible and should be pulled up with a 4.7 - 10kΩ resistor on the host board.

Loss of Signal (LOS): The Loss of Signal circuit monitors the level of the incoming optical signal and generates logic HIGH when an insufficient photocurrent is produced.

Serial Identification and Monitoring: The module definition of SFP is indicated by the MOD_ABS pin and the 2-wrie serial interface. Upon power up, the 2-wrie interface appears as NC (no connection), and MOD_ABS is TTL LOW. When the host system detects this condition, it activates the serial protocol (standard two-wire I²C serial interface) and generates the serial clock signal (SCL). The positive edge clocks data into the EEPROM segments of the device that are not write protected, and the negative edge clocks data from the device. The serial data signal (SDA) is for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The supported monitoring functions are temperature, voltage, average receiver signal, all alarms and warnings, and software monitoring of LOS. The device is internally calibrated.

The data transfer protocol and the details of the mandatory and vendor specific data structures are defined in the SFP MSA, and SFF-8472, Rev. 9.4.

Power Supply and Grounding: The power supply line should be well-filtered. All power supply bypass capacitors should be as close to the transceiver module as possible.

## Interfacing the Transceivers

Communication is via a serial 2-wire serial interface. As described in the document SFF-8472 (REV. 9.4) there are two distinct address spaces:

Base Address A0(hex)	
Byte Address	**Content**
0 – 95	Serial Transceiver ID as defined in SFP MSA
96 – 127	OPLINK Specific
128 – 255	Reserved

Base Address A2(hex)	
Byte Address	**Content**
0 - 55	Alarm & Warnings thresholds & limits
56 - 95	External calibration constants (not used)
96 – 119	Values from real time diagnostic monitoring
120 – 127	Not used
128 – 247	Customer specific, writable area
248 - 255	Not used

Application Schematics

R: 4.7 to 10kΩ
CAP Values in µF

No Connection: 3, 9, 10
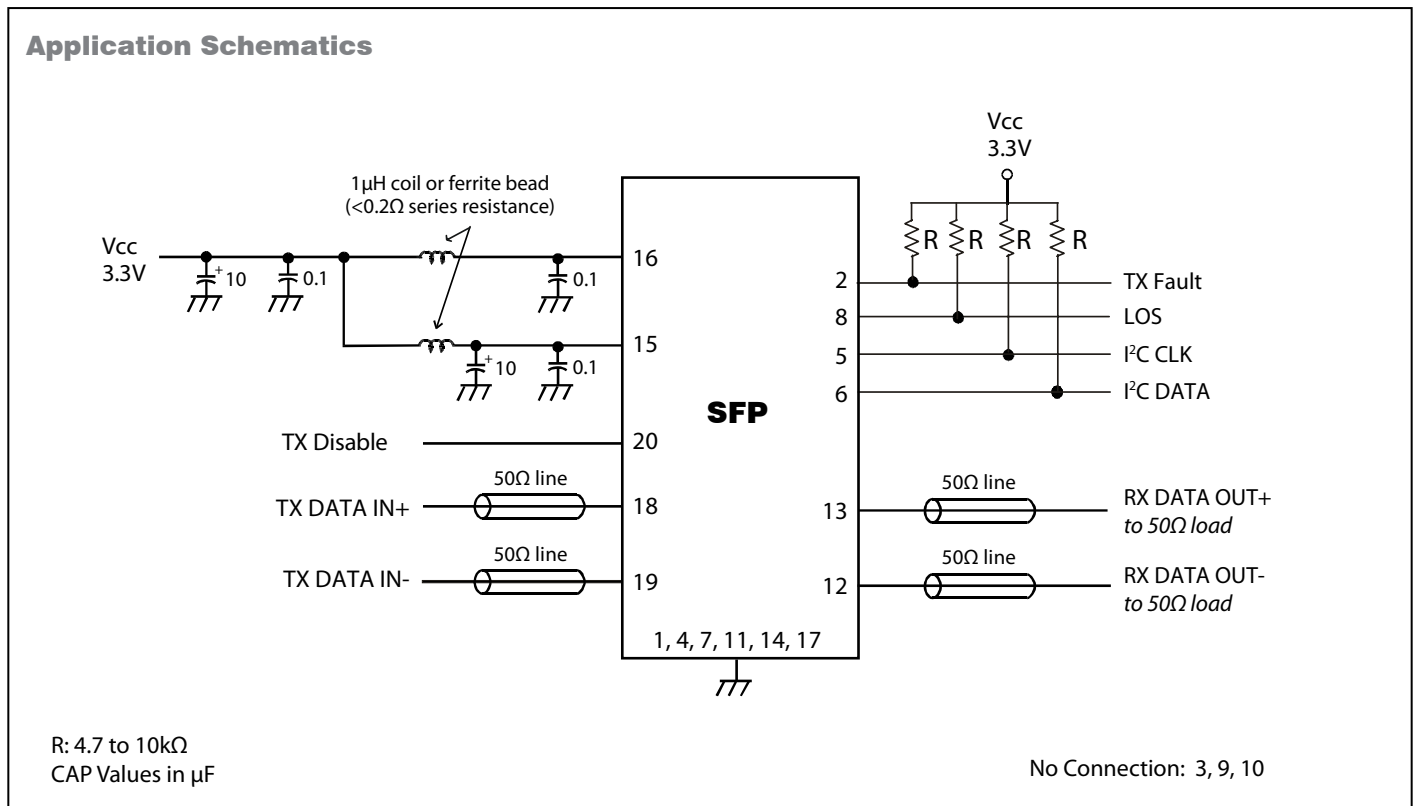
Package Outline
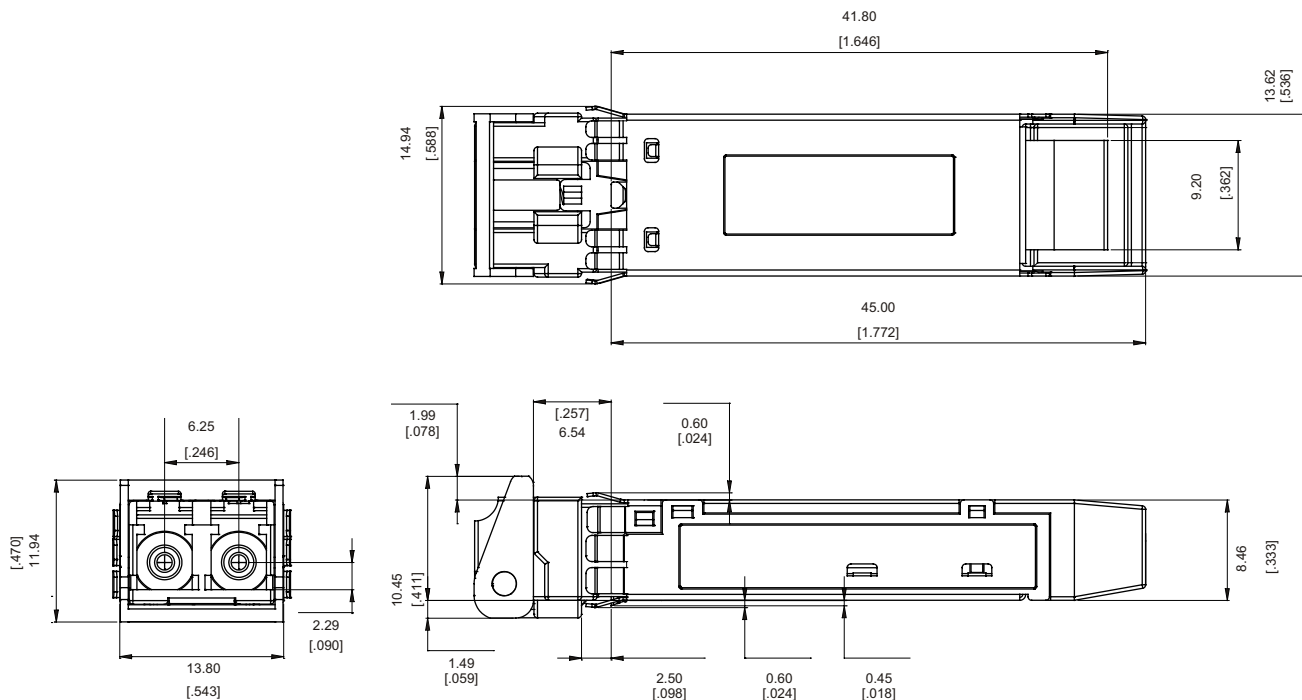
All dimensions shown are in [inches] and Millimeters. Millimeters are the primary units.
Tolerances are in accordance with SFF-8432 Rev.5.

Ordering Information

Model Name	Operating Temperature		Nominal Wavelength	Latch Color	Reach
TRPV3GELRx000E2G	- 5°C to +70°C	Commercial	1310nm	Blue	10km
TRPV3GELRI000E2G	- 40°C to +85°C	Industrial			

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