1310nm Dual Channel Optical Transmitter

TRPV3GET2C000E2G

Product Description

The TRPV3GET2C000E2G is a dual channel optical transmitter module designed to transmit optical serial digital signals as defined in SMPTE 297-2006. The module 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 SFP transmitter provides an excellent solution for transmission at 1310nm to provide error-free transmission of signals from 50Mbps to 3Gbps over single mode fiber. The product is RoHS 6/6 compliant and is designed and tested in accordance with industry safety standards. The transceiver is Class I laser product per U.S. FDA/CDRH and international IEC-60825 standards.

The TRPV3GET2C000E2G connects to standard 20-pad SFP connector and supports hot-plug capability. This allows the system designer to make configuration changes or maintenance by simply plugging in different transceivers without removing the power supply from the host system.

The SFP transmitter also provides extensive operational status monitoring through an I^2C interface. Output optical power, bias current, supply voltage and operating temperature are monitored. If a parameter monitored is outside the pre-defined range, the alarm/warning flag associated with the parameter will be raised.

Features

- ☑ Features two transmitters in one SFP package
- ☑ Multirate from 50Mbps to 3Gbps for up to 30km single-mode fiber
- ☑ Maximum distance of 10km under worst case conditions and 3Gbps video pathological signals
- ☑ Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- ☑ Digital diagnostics and control via I^2C interface
- ☑ Low power consumption (Typically 600mW)
- ☑ RoHS compliant
- ☑ SMPTE 297-2006 compatible

Absolute Maximum Ratings

Parameter		Symbol	Minimum	Maximum	Units
Storage Temperature Range		T_{ST}	- 40	+ 100	°C
Case Operating Temperature [1]	"Commercial"	T_{OP}	- 5	+ 70	°C
Operating Relative Humidity [2]		RH	0	80	%
Supply Voltage Range		V_{CC}	- 0.5	+ 3.6	V

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

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	1270	1310	1350	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	-	-	135	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°C
[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

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

Parameter	Symbol	Minimum	Typical	Maximum	Units
Differential Input Voltage Swing	$V_{PP\text{-}DIFF}$	0.4	-	2.4	V
Input HIGH Voltage (TX Disable) [1]	V_{IH}	2	-	Vcc	V
Input LOW Voltage (TX Disable) [1]	V_{IL}	0	-	0.8	V
Output HIGH Voltage (TX Fault) [2]	V_{OH}	-	-	Vcc	V
Output LOW Voltage (TX Fault) [2]	V_{OL}	0	-	0.8	V

[1] There is an internal 4.7kΩ to 10kΩ pull-up resistor to VccT.
[2] Open collector compatible, 4.7kΩ to 10kΩ pull-up resistor to Vcc (Host Supply Voltage).

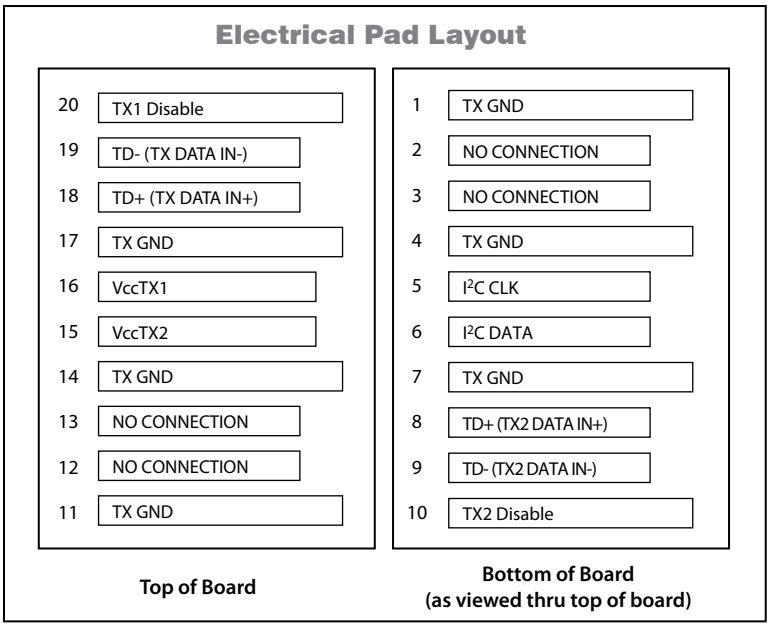
Electrical Power Supply Characteristics (Over Operating Case Temperature. V_{CC} = 3.13 to 3.47V)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Power Supply Voltage		V_{CC}	3.13	3.3	3.47	V
DC Common Mode Voltage		V_{CM}	0	-	3.6	V
Supply Current		I_{VCC}	-	-	370	mA
Power Consumption		P_W	-	-	1.22	W
Maximum Allowable Power Supply Noise	0.02-1000kHz	-	-	-	66	mV
	1000-10000kHz		-	-	99	

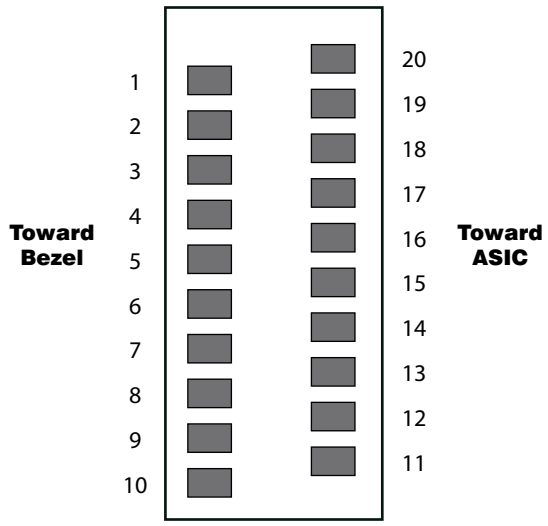
Timing Specifications

Parameter	Symbol	Minimum	Typical	Maximum	Units
Time to Initialize (from power on)	*t_init*	-	-	300	ms
Tx_Disable Assert Time	*t_off*	-	-	10	µs
Tx_Disable Negate Time	*t_on*	-	-	1	ms
I²C Clock Rate	-	-	-	400	kHz

Electrical Pad Layout



Host Board Connector Pad Layout



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.

TX_Fault: The output indicates LOW when the transmitter is operating normally and HIGH with a laser fault including laser end-of-life. TX Fault is an open collector/drain output and should be pulled up with a 4.7 - 10kΩ resistor on the host board.

TX_Disable: When the TX Disable pin is at logic HIGH, the transmitter optical output is disabled. The laser is also disabled if this line is left floating, as it is pulled high inside the transceiver.

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, bias current, transmitter power, all alarms and warnings, and software monitoring of TX Fault. 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.

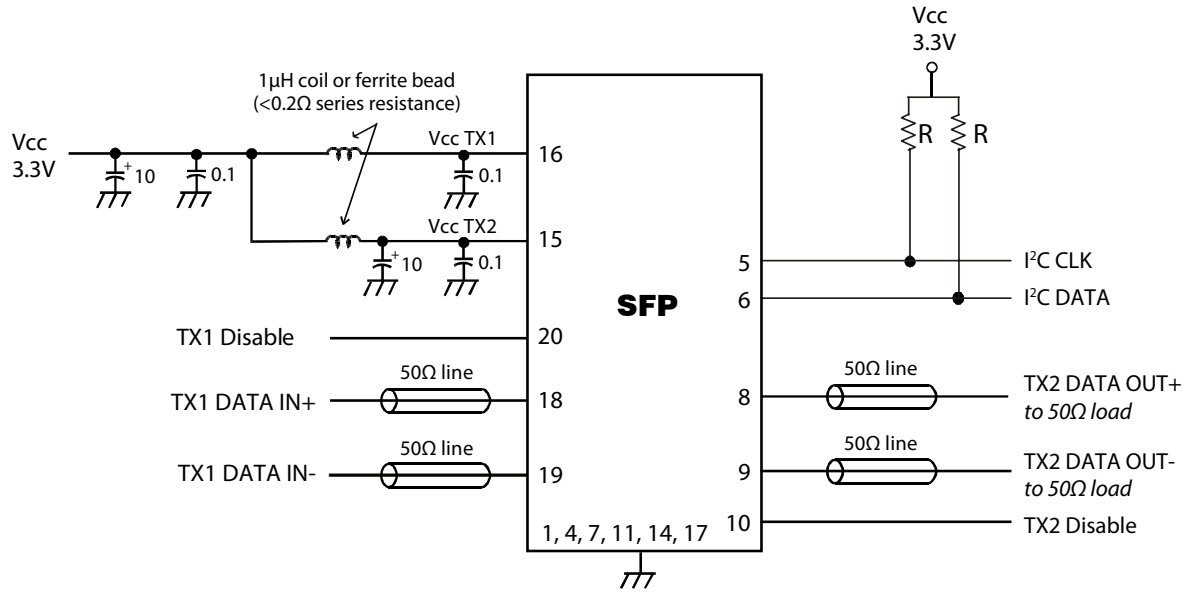
Interfacing the Transceivers

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

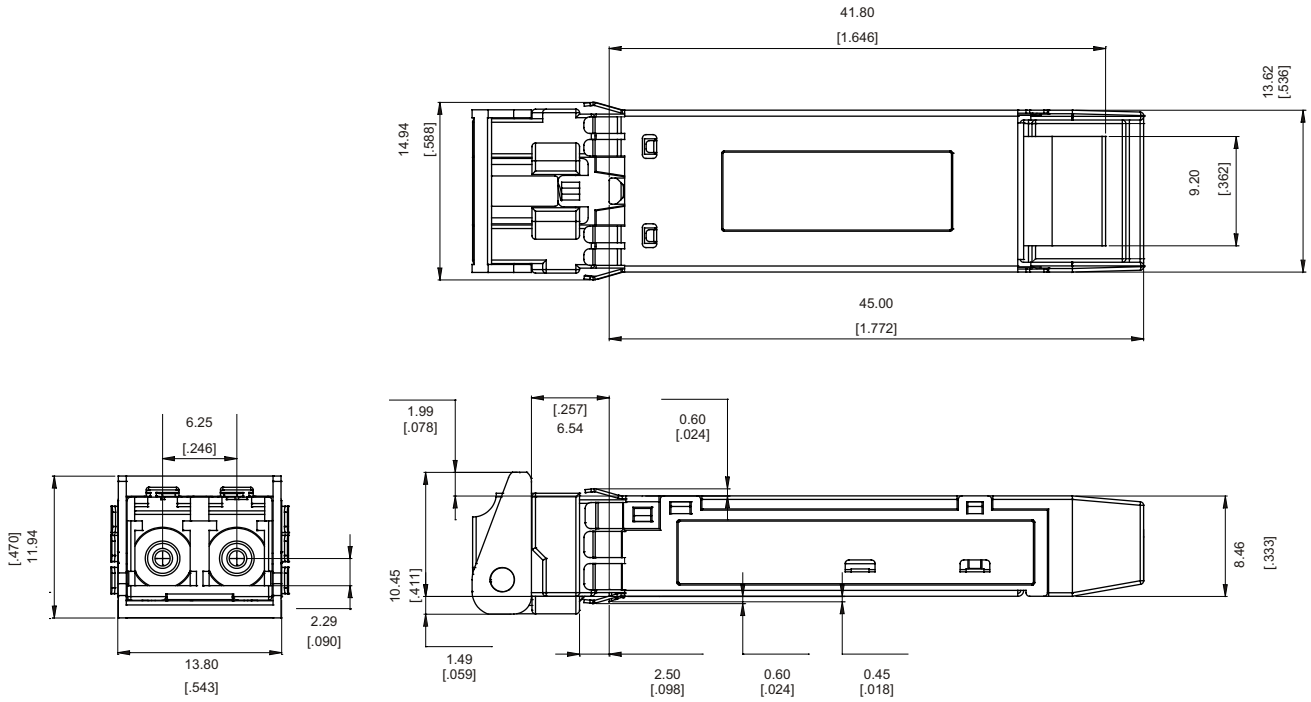
No Connection: 2, 3, 12, 13

Laser Safety:
All transceivers are Class I Laser products per FDA/CDRH and IEC-60825 standards. They must be operated under specified operating conditions.

Oplink Communications, Inc.
DATE OF MANUFACTURE:

This product complies with
21 CFR 1040.10 and 1040.11
Meets Class I Laser Safety Requirements

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	Distance
TRPV3GET2C000E2G	- 5°C to +70°C	Commercial	1310nm	10km

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