

Professional high-speed optical transceiver

**OPN-S8G13-30SC / OPN-S8G13-30SCI / OPN-S8G13T-30SC /
OPN-S8G13T-30SCI / OPN-S8G13-30SC-EMG / OPN-S8G13T-30SC-EMG /
OPN-S8G13-30SCI-EMG / OPN-S8G13T-30SCI-EMG / OPN-S8G13-30ST /
OPN-S8G13T-30ST / OPN-S8G13-30STI / OPN-S8G13T-30STI /
OPN-S8G13-30FC / OPN-S8G13T-30FC / OPN-S8G13-30FCI /
OPN-S8G13T-30FCI**

3.3V / 1310 nm / 1.25 Gbps RoHS Compliant Optical Single-Mode Transceiver

PRODUCT FEATURES

- Duplex SC Single Mode Transceiver: OPN-S8G13-30SC
- Duplex ST Single Mode Transceiver: OPN-S8G13-30ST
- Duplex FC Single Mode Transceiver: OPN-S8G13-30FC
 - Compliant with IEEE 802.3z Gigabit Ethernet
 - Link Distance up to 30 km
 - Link Power Budget at Least 19 dB
 - Industry Standard 1 x 9 Footprint
 - Single +3.3 V Power Supply
 - RoHS Compliant
 - 0 to 70°C Operating: OPN-S8G13-30FC
 - -50 to 85°C Operating: OPN-S8G13-30FCI
- LVPECL Signal Detect Output: OPN-S8G13-30FCI
- LVTTTL Signal Detect Output: OPN-S8G13T-30FCI
 - Wave Solderable
- Class 1 Laser International Safety Standard IEC 60825Compliant

APPLICATIONS

- Switch to Switch Interface
- High Speed Interface for File Servers
- High Performance Desktops

PRODUCT DESCRIPTION

The OPN-S8G13-30FCI series single mode transceiver is a low power, high performance module for bi-directional serial optical data communications such Gigabit Ethernet and Fibre Channel. This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. Thetransmitter section uses a multiple quantum well laser and isa class 1 laser compliant according to International SafetyStandard IEC 60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted inan optical header and a limiting post-amplifier IC. A PECLlogic interface simplifies interface to external circuitry.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	1000 BASE	Distance (km)	Wavelength (nm)	Voltage (V)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-S8G13-30FC	1250		30	1310	3.3	1X9 SC/ST/FC	0 to 70	0 to -5	-24	Y
OPN-S8G13-30FCI	1250		30	1310 DFB	3.3	1X9 SC/ST/FC	-50 to 85	0 to -5	-24	Y

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Temperature	Topr	0 -50	70 85	°C	OPN-S8G13-30FC OPN-S8G13-30FCI
Soldering Temperature	---		260	°C	10 seconds on leads only
Power Supply Voltage	Vcc	0	3.6	V	
Input Voltage	---	GND	Vcc	V	
Output Current	Iout	0	30	mA	

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Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units
Power Supply Voltage	V _{CC}	3.1	3.3	3.5	V
Operating Temperature	T _{opr}	0 -50		70 85	°C / OPN-S8G13-30FC °C / OPN-S8G13-30FCI
Data Rate			1250	1300	Mb/s
Power Supply Current	I _{CC}		180	260	mA

Transmitter Specifications (0°C < T _{opr} < 70°C, 3.1V < V _{CC} < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	P _O	-5	---	0	dBm	1
Output Center Wavelength	λ	1285	1310	1340	nm	OPN-S8G13-30FC
		1261		1360	nm	OPN-S8G13-30FCI
Output Spectrum Width	$\Delta\lambda$	---	1.8		nm	RMS(σ) / OPN-S8G13-30FC
				1	nm	-20 dB width / OPN-S8G13-30FCI
Extinction Ratio	E _R	9		---	dB	
Output Eye	Compliant with IEEE 802.3z					
Optical Rise Time	t _r			0.26	ns	20% to 80% Values
Optical Fall Time	t _f			0.26	ns	20% to 80% Values
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Jitter	TJ			0.227	ns	2
Electrical						
Data Input Current – Low	I _{IL}	-350			μ A	
Data Input Current – High	I _{IH}			350	μ A	
Differential Input Voltage	V _{IH} - V _{IL}	300			mV	
Data Input Voltage – Low	V _{IL} - V _{CC}	-2.0		-1.58	V	3
Data Input Voltage -- High	V _{IH} - V _{CC}	-1.1		-0.74	V	3

- Notes: 1. Output power is power coupled into a 9/125 μ m single mode fiber.
2. Measured with a 2⁷-1 PRBS.
3. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL inputs.

Receiver Specifications (0°C < T _{opr} < 70°C, 3.1V < V _{CC} < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity	---	---	---	-24	dBm	1
Maximum Input Power	P _{in}	-3		---	dBm	
Signal Detect -- Asserted	P _a	---	---	-24	dBm	Transition: low to high
Signal Detect -- Deasserted	P _d	-36	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	1600	nm	
Electrical						
Data Output Voltage – Low	V _{OL} - V _{CC}	-2.0		-1.58	V	2
Data Output Voltage – High	V _{OH} - V _{CC}	-1.1		-0.74	V	2
Signal Detect Output Voltage -- Low	V _{OL} - V _{CC}	-2.0		-1.58	V	OPN-S8G13-30FCI
Signal Detect Output Voltage -- High	V _{OH} - V _{CC}	-1.1		-0.74	V	
Signal Detect Output Voltage -- Low	V _{SDL}			0.5	V	OPN-S8G13T-30FCI
Signal Detect Output Voltage -- High	V _{SDH}	2.0			V	

- Notes: 1. Minimum sensitivity and saturation levels at BER=1E-12 for a 2⁷-1 PRBS at ER=9 dB.
2. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

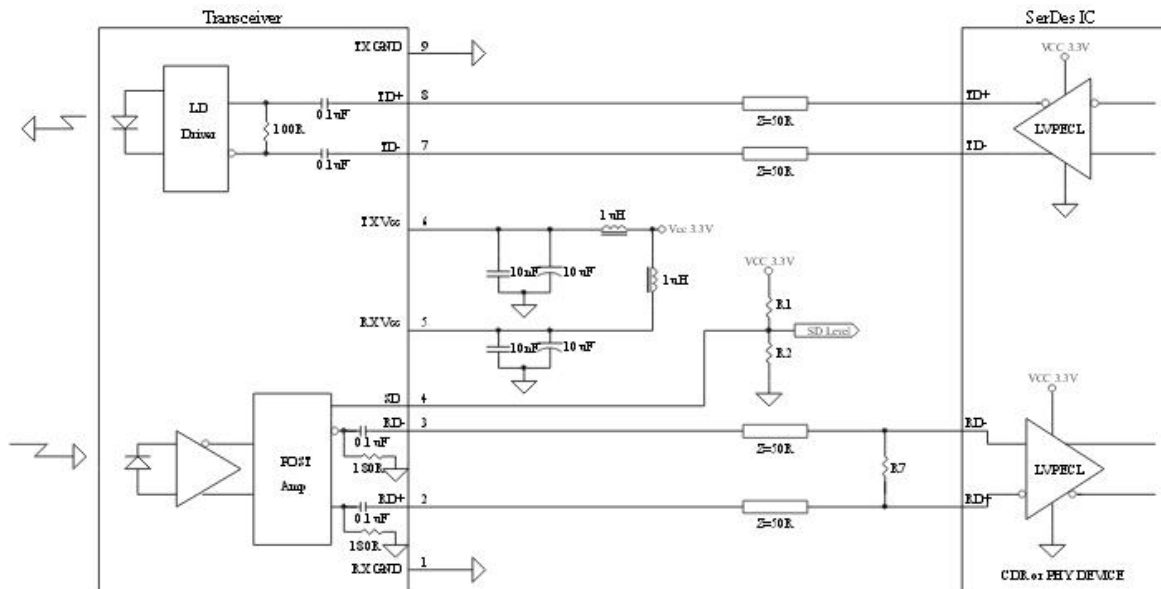
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CONNECTION DIAGRAM

Receiver Signal Ground	1 (Rx GND)	○
Receiver Data Out	2 (RD+)	N/C
Receiver Data Out Bar	3 (RD-)	
Signal Detect	4 (SD)	
Receiver Power Supply	5 (Rx Vcc)	TOP VIEW
Transmitter Power Supply	6 (Tx Vcc)	
Transmitter Data In Bar	7 (TD-)	
Transmitter Data In	8 (TD+)	N/C
Transmitter Signal Ground	9 (Tx GND)	○

PIN	Symbol	Notes
1	Rx GND	Directly connect this pin to the receiver ground plane
2	RD+	See recommended circuit schematic
3	RD-	See recommended circuit schematic
4	SD	Active high on this indicates a received optical signal
5	Rx Vcc	+3.3V dc power for the receiver section
6	Tx Vcc	+3.3V dc power for the transmitter section
7	TD-	See recommended circuit schematic
8	TD+	See recommended circuit schematic
9	Tx GND	Directly connect this pin to the transmitter ground plane

RECOMMENDED CIRCUIT SCHEMATIC



For TTL SD Level, R1=R2=N.C., R7=100 ohm

For PECL SD Level, R1=130 ohm, R2=82 ohm, R7=100 ohm

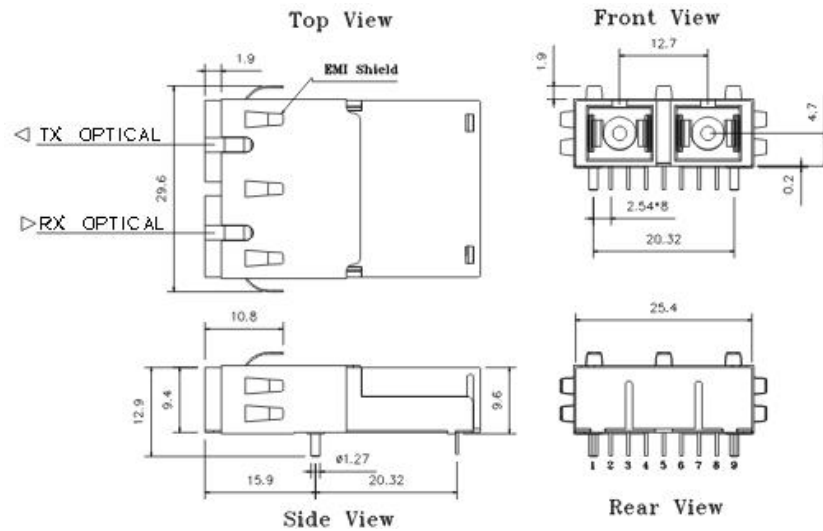
The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good EMI and sensitivity performance.

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PACKAGE DIAGRAM

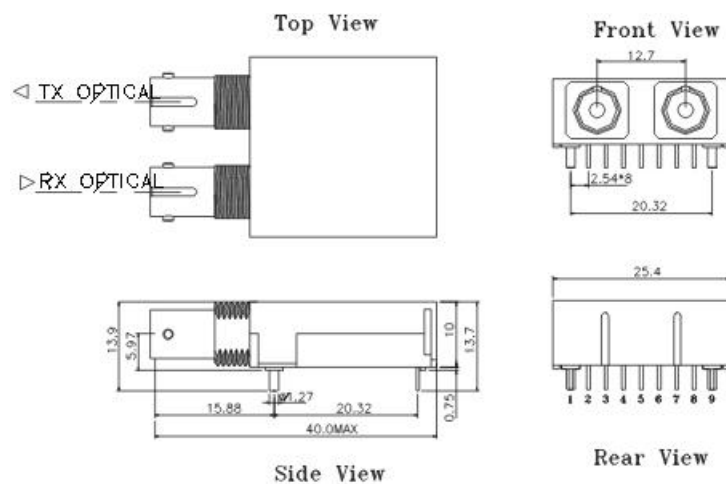
Units in mm

1) SC Type With Extended Shielding



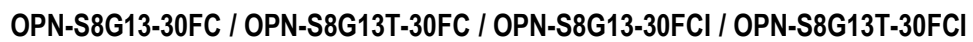
OPN-S8G13-30SC-EMG / OPN-S8G13T-30SC-EMG / OPN-S8G13-30SCI-EMG / OPN-S8G13T-30SCI-EMG

2) ST Type



OPN-S8G13-30ST / OPN-S8G13T-30ST / OPN-S8G13-30STI / OPN-S8G13T-30STI

3) FC Type



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