

Professional high-speed optical transceiver

OPN-S8G13-5D20SC / OPN-S8G13-5D20SCI
OPN-S8G13-5D20SC-EMG / OPN-S8G13-5D20SCI-EMG
OPN-S8G13-5D20ST / OPN-S8G13-5D20STI
OPN-S8G13-5D20FC / OPN-S8G13-5D20FCI
OPN-S8G13T-5D20SC / OPN-S8G13T-5D20SCI
OPN-S8G13T-5D20SC-EMG / OPN-S8G13T-5D20SCI-EMG
OPN-S8G13T-5D20ST / OPN-S8G13T-5D20STI
OPN-S8G13T-5D20FC / OPN-S8G13T-5D20FCI

5V / 1310 nm / 1.25 Gbps RoHS Compliant Optical Single-Mode Transceiver

PRODUCT FEATURES

- Duplex SC Single Mode Transceiver: OPN-S8G13-5D20SC
- Duplex ST Single Mode Transceiver: OPN-S8G13-5D20ST
- Duplex FC Single Mode Transceiver: OPN-S8G13-5D20FC
 - Compliant with IEEE 802.3z Gigabit Ethernet
 - Link Distance up to 20 km
 - Link Power Budget at Least 16 dB
 - Industry Standard 1 x 9 Footprint
 - 0 to 70°C Operating: OPN-S8G13T-5D20SC
 - -50 to 85°C Operating: OPN-S8G13T-5D20SCI
 - Single +5 V Power Supply
 - RoHS Compliant
 - PECL Signal Detect Output: OPN-S8G13-5D20SC
 - TTL Signal Detect Output: OPN-S8G13T-5D20SC
 - 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-S8G13T-5D20SC series single mode transceiver is a low power, high performance module for bi-directional serial optical data communications such Gigabit Ethernet andFibre 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 Safety Standard IEC 60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an 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	Distan ce(km)	Wavelength (nm)	Voltag e(V)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Complia nt
OPN-S8G13T-5D20SC	1250		20	1310	5	1X9 SC/ST/FC	0 to 70	-1 to -6	-22	Y
OPN-S8G13T-5D20SCI	1250		20	1310	5	1X9 SC/ST/FC	-50 to 85	-1 to -6	-22	Y

Professional high-speed optical transceiver

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Temperature	Topr	0 -50	70 85	°C	OPN-S8G13T-5D20SC OPN-S8G13T-5D20SCI
Soldering Temperature	---		260	°C	10 seconds on leads only
Power Supply Voltage	Vcc	0	6	V	
Input Voltage	---	GND	Vcc	V	
Output Current	Iout	0	30	mA	

Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units
Power Supply Voltage	Vcc	4.75	5	5.25	V
Operating Temperature	Topr	0 -50		70 85	°C / OPN-S8G13T-5D20SC °C / OPN-S8G13T-5D20SCI
Data Rate			1250	1300	Mb/s
Power Supply Current	Icc			240	mA

Transmitter Specifications (0°C < Topr < 70°C, 4.75V < Vcc < 5.25V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	Po	-6	---	-1	dBm	1
Output Center Wavelength	λ	1285	1310	1350	nm	
Output Spectrum Width	$\Delta\lambda$	---	---	2.0	nm	RMS(σ)
Extinction Ratio	ER	9	---	---	dB	
Output Eye	Compliant with IEEE 802.3z					
Optical Rise Time	tr			0.26	ns	20% to 80% Values
Optical Fall Time	tf			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	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 < Topr < 70°C, 4.75V < Vcc < 5.25V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity	---	---	---	-22	dBm	1
Maximum Input Power	Pin	-3		---	dBm	
Signal Detect -- Asserted	Pa	---	---	-22	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-31	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	1600	nm	

Professional high-speed optical transceiver

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-S8G13-5D20SC
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-5D20SC
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.

2. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

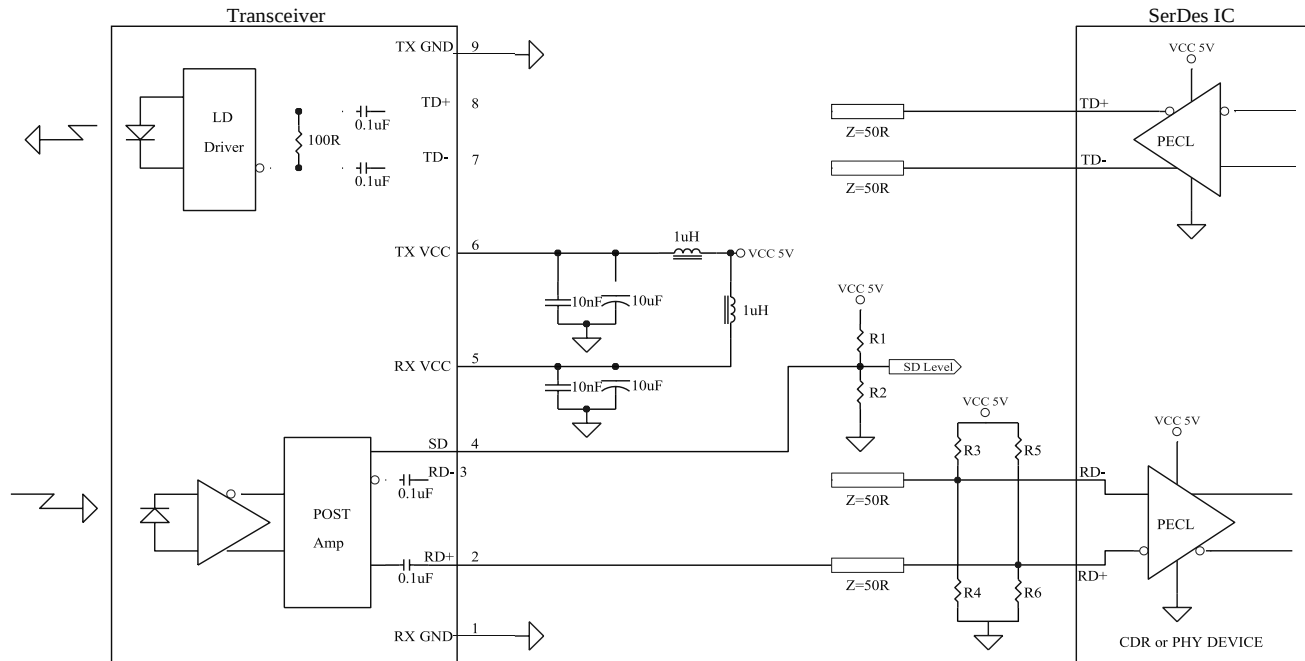
CONNECTION DIAGRAM

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

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	+5V dc power for the receiver section
6	Tx Vcc	+5V 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

Professional high-speed optical transceiver

RECOMMENDED CIRCUIT SCHEMATIC



For TTL SD Level, $R1=R2=N.C.$, $R3=R5=82R$, $R4=R6=130R$

For PECL SD Level, $R1=R3=R5=82R$, $R2=R4=R6=130R$

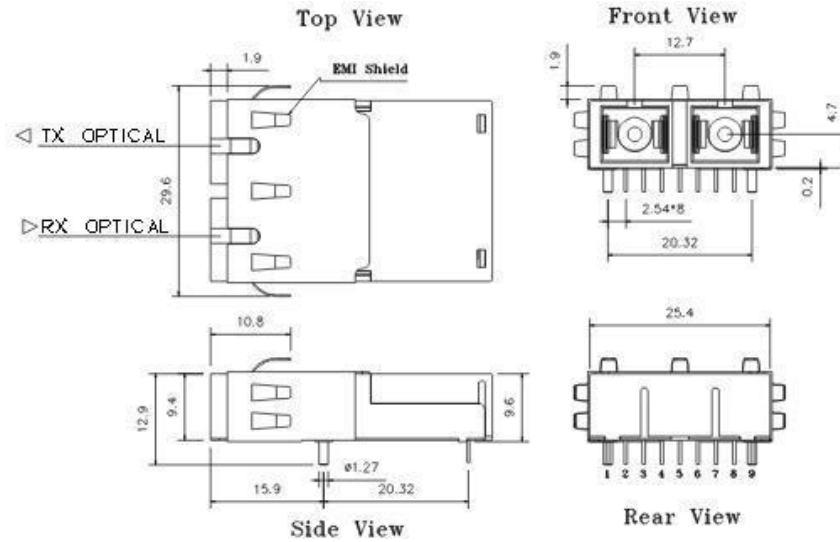
The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good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

Professional high-speed optical transceiver

PACKAGE DIAGRAM

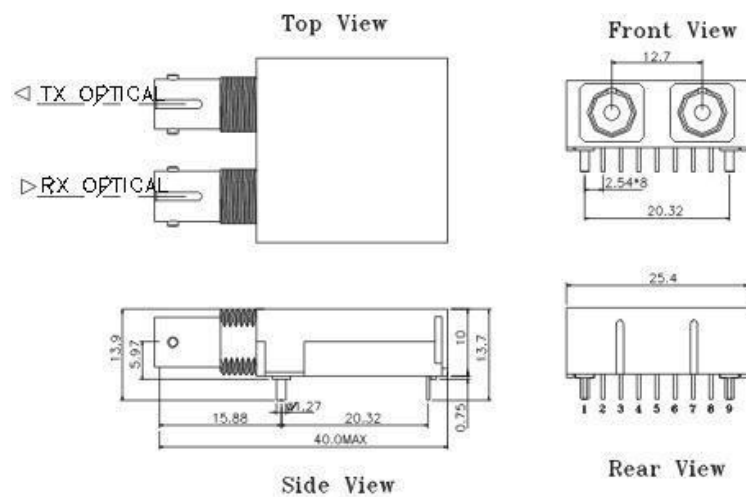
Units in mm

1) SC Type With Extended Shielding



OPN-S8G13-5D20SC-EMG / OPN-S8G13T-5D20SC-EMG

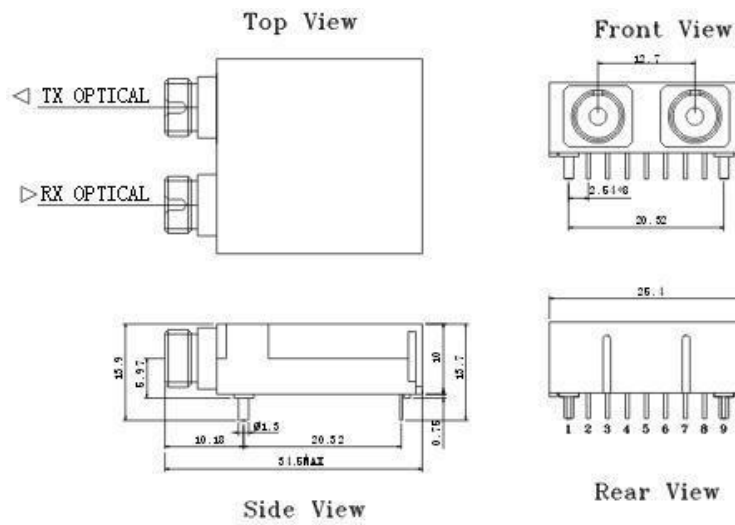
2) ST Type



OPN-S8G13-5D20ST / OPN-S8G13T-5D20ST

Professional high-speed optical transceiver

3) FC Type



OPN-S8G13-5D20FC / OPN-S8G13T-5D20FC

Note: Specifications subject to change without notice.