

Professional high-speed optical transceiver

**OPN-S8F13-40SC2 / OPN-S8F13-40SC2I / OPN-S8F13-40SC2-EMG /
OPN-S8F13-40SC2I-EMG / OPN-S8F13-40ST2 / OPN-S8F13-40ST2I /
OPN-S8F13-40FC2 / OPN-S8F13-40FC2I / OPN-S8F13T-40SC2 /
OPN-S8F13T-40SC2I / OPN-S8F13T-40SC2-EMG /
OPN-S8F13T-40SC2I-EMG / OPN-S8F13T-40ST2 / OPN-S8F13T-40ST2I /
OPN-S8F13T-40FC2 / OPN-S8F13T-40FC2I
3.3V / 1310 nm / 622 Mbps RoHS Compliant Optical Single-Mode Transceiver**

PRODUCT FEATURES

- Duplex SC Single Mode Transceiver: OPN-S8F13-40SC2
- Duplex ST Single Mode Transceiver: OPN-S8F13-40ST2
- Duplex FC Single Mode Transceiver: OPN-S8F13-40FC2
 - Industry Standard 1 x 9 Footprint
 - Single +3.3 V Power Supply
 - RoHS Compliant
- PECL Signal Detect Output: OPN-S8F13-40FC2I
- TTL Signal Detect Output: OPN-S8F13T-40FC2I
 - 0 to 70°C Operating: OPN-S8F13T-40FC2
 - -50 to 85°C Operating: OPN-S8F13T-40FC2I
- LED Multisourced 1 x 9 Transceiver Interchangeable
 - Wave Solderable
- Class 1 Laser International Safety Standard IEC 60825Compliant

APPLICATIONS

- ATM 622 Mbps Links
- SONET / SDH Equipment Interconnect
- Fibre Channel 532 Mbps Links

PRODUCT DESCRIPTION

The OPN-S8F13T-40FC2I series single mode transceiver is a low power, high performance module for bi-directional serial optical data communications such as SONET OC-12 / SDH STM-4. This module is designed for single mode fiber and operates at a nominal wavelength of 1310 nm. The transmitter 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)	SONET SDH	Distance (km)	Wavelength (nm)	Voltage (V)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-S8F13T-40FC2	622		40	1310	3.3	1X9 SC/ST/FC	0 to 70	0 to -5	-28	Y
OPN-S8F13T-40FC2I	622		40	1310	3.3	1X9 SC/ST/FC	-50 to 85	0 to -5	-28	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-S8F13T-40FC2 OPN-S8F13T-40FC2I
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	

Professional high-speed optical transceiver

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-S8F13T-40FC2 °C / OPN-S8F13T-40FC2I
Data Rate		50	622		Mb/s
Power Supply Current	I _{CC}			240	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	1280	1310	1350	nm	
Output Spectrum Width	Δλ	---	---	3	nm	RMS(σ)
Extinction Ratio	E _R	10	---	---	dB	
Output Eye	Compliant with Bellcore TR-NWT-000253 and ITU recommendation G.957					
Optical Rise Time	t _r			1.2	ns	10% to 90% Values
Optical Fall Time	t _f			1.2	ns	10% to 90% Values
Relative Intensity Noise	RIN			-116	dB/Hz	
Total Jitter	TJ			0.55	ns	2
Electrical						
Data Input Current – Low	I _{IL}	-350			μA	
Data Input Current – High	I _{IH}			350	μA	
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 μm single mode fiber.

2. Measured with a 2²³-1 PRBS with 72 ones and 72 zeros.

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	---	---	---	-28	dBm	1
Maximum Input Power	P _{in}	-5		---	dBm	
Signal Detect -- Asserted	P _a	---	---	-28	dBm	Transition: low to high
Signal Detect -- Deasserted	P _d	-40	---	---	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-S8F13-40FC2I
Signal Detect Output Voltage -- High	V _{OH} - V _{CC}	-1.1		-0.74	V	
Signal Detect Output Voltage -- Low	V _{SDL}			0.8	V	OPN-S8F13T-40FC2I
Signal Detect Output Voltage -- High	V _{SDH}	2.0			V	

Notes: 1. Minimum sensitivity and saturation levels at BER=1E-10 for a 2²³-1 PRBS with 72 ones and 72 zeros.

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

Professional high-speed optical transceiver

Receiver Signal Ground
Receiver Data Out
Receiver Data Out Bar
Signal Detect
Receiver Power Supply
Transmitter Power Supply
Transmitter Data In Bar
Transmitter Data In
Transmitter Signal Ground

1 (Rx GND)
2 (RD+)
3 (RD-)
4 (SD)
5 (Rx Vcc)
6 (Tx Vcc)
7 (TD-)
8 (TD+)
9 (Tx GND)

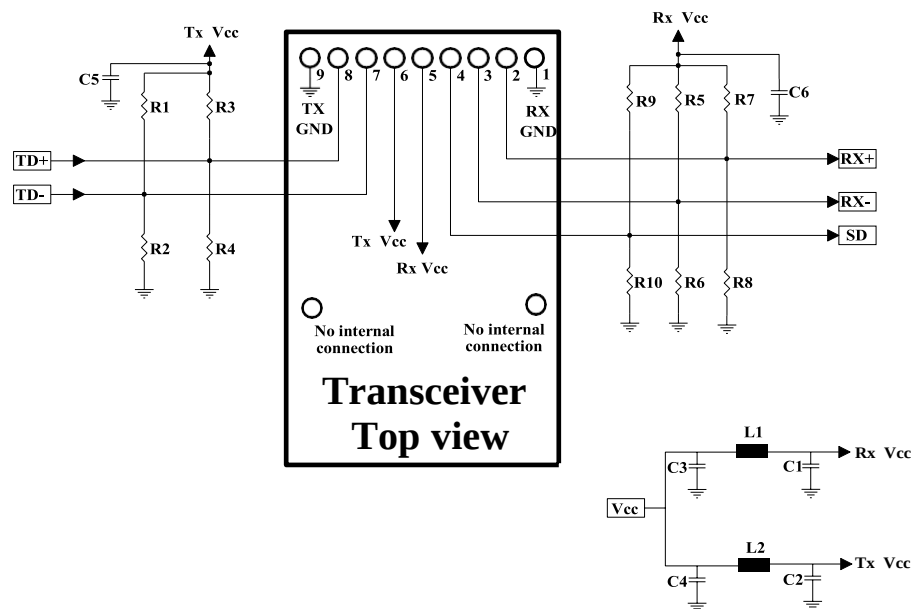
TOP VIEW

○
N/C

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	+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



R1=R3=R5=R7=R9=130 ohm
R2=R4=R6=R8=R10=82 ohm
C1=C2=C3=C5=C6=0.1 Uf
C4=10uF L1=L2=1uH

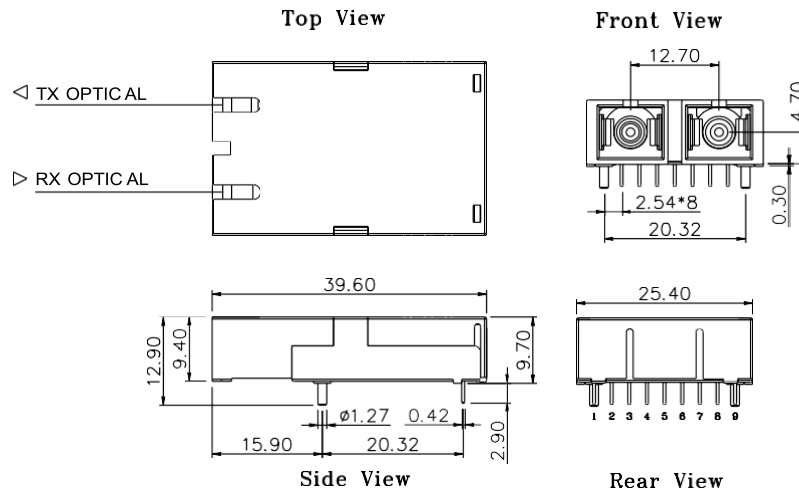
The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good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

Professional high-speed optical transceiver

PACKAGE DIAGRAM

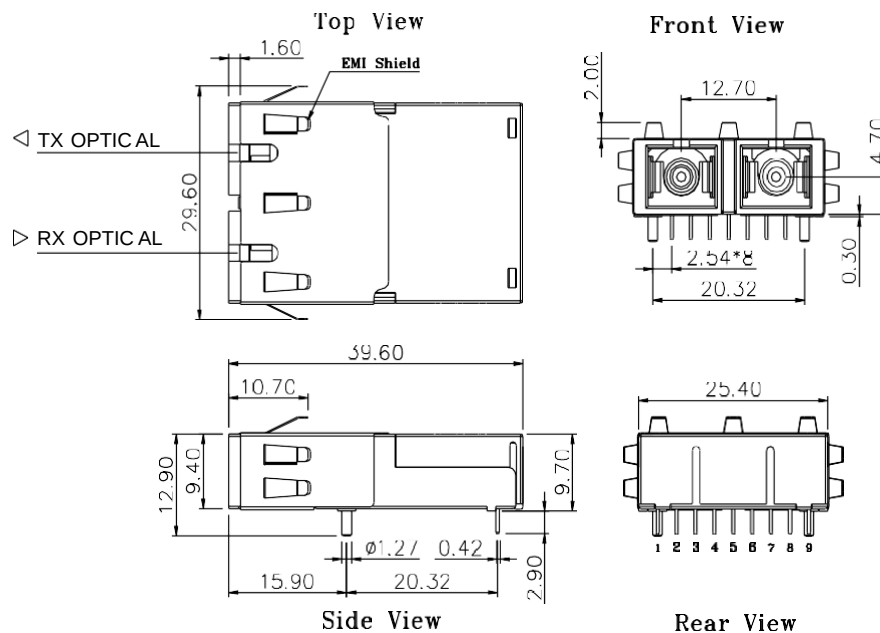
Units in mm

1) SC Type



OPN-S8F13-40SC2 / OPN-S8F13T-40SC2 / OPN-S8F13-40SC2I / OPN-S8F13T-40SC2I

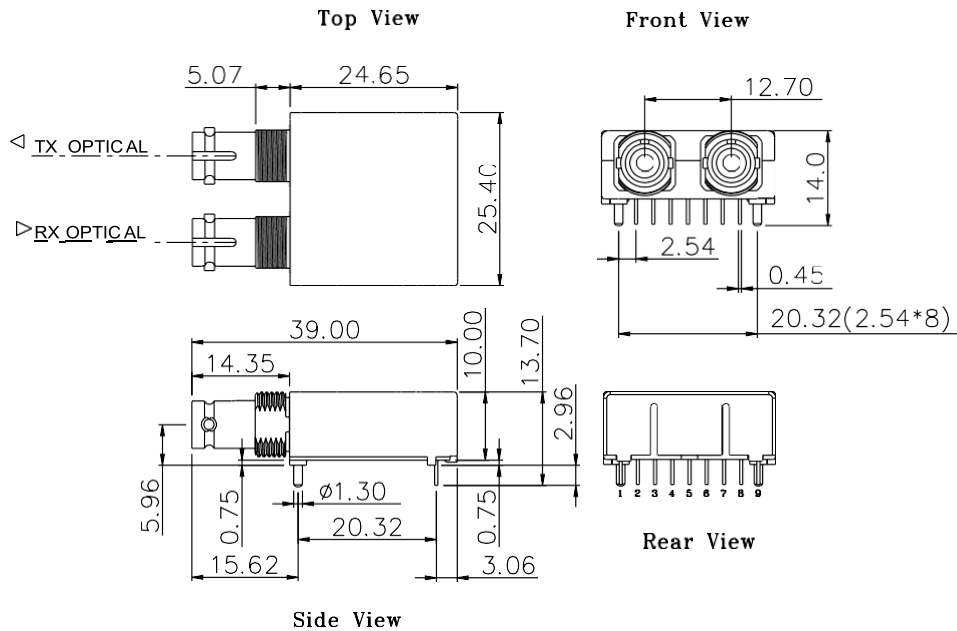
2) SC Type With Extended Shielding



OPN-S8F13-40SC2-EMG / OPN-S8F13T-40SC2-EMG / OPN-S8F13-40SC2I-EMG / OPN-S8F13T-40SC2I-EMG

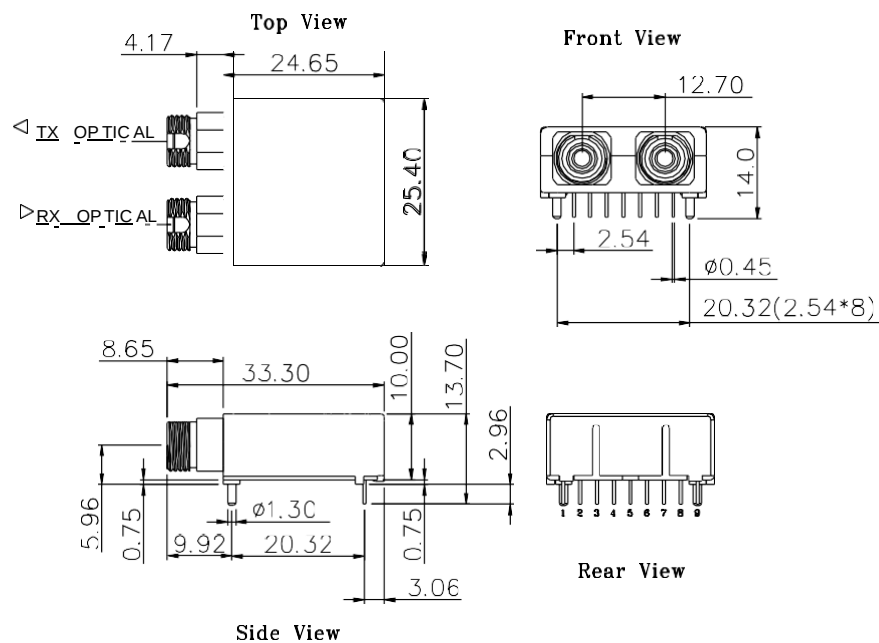
Professional high-speed optical transceiver

3) ST Type



OPN-S8F13-40ST2 / OPN-S8F13T-40ST2 / OPN-S8F13-40ST2I / OPN-S8F13T-40ST2I

4) FC Type



OPN-S8F13-40FC2 / OPN-S8F13T-40FC2 / OPN-S8F13-40FC2I / OPN-S8F13T-40FC2I

Note: Specifications subject to change without notice.