Professional high-speed optical transceiver

OPN-SF1590-80SC / OPN-SF1590-80SCI / OPN-SF1590-80LC / OPN-SF1590-80LCI

1590 nm TX / 1510 nm RX , 3.3V / 622 Mbps Digital Diagnostic Single-Fiber SFP Transceiver

PRODUCT FEATURES

- 1-Fiber Bi-Directional SFP Optical Transceiver
- Simplex SC Connector: OPN-SF1590-80SC
- Simplex LC Connector: OPN-SF1590-80LC
- SFF-8472 Digital Diagnostic Function
- 1590 nm DFB LD Transmitter
- 1510 nm Receiver
- Distance Up to 80 km
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70°C Operation: OPN-SF1590-80SC
- -50 to 85°C Operation: OPN-SF1590-80SCI
- Class 1 Laser International Safety Standard IEC 60825Compliant

APPLICATIONS

- SONET/SDH Equipment Interconnect
- Fibre Channel Links

PRODUCT DESCRIPTION

The OPN-SF1590-80SC series is a small form factor pluggable modules for OC-12/STM-4 SONET/SDH and Fibre Channel single fiber communications by using 1590 nm transmitter and 1510 nm receiver. It is with the SFP 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I^2C. The transmitter section uses a multiple quantum well 1590 nm laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated 1510 nm detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	Distance (km)	TX (nm)	RX (nm)	Package	Temp (ºC)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SF1590-80SC	622	80	1590 DFB	1510	SC SFP with DMI	0 to 70	2 to -3	-28	Yes
OPN-SF1590-80SCI	622	80	1590 DFB	1510	SC SFP with DMI	-50 to 85	2 to -3	-28	Yes
OPN-SF1590-80LC	622	80	1590 DFB	1510	LC SFP with DMI	0 to 70	2 to -3	-28	Yes
OPN-SF1590-80LCI	622	80	1590 DFB	1510	LC SFP with DMI	-50 to 85	2 to -3	-28	Yes

Absolute Maximum Ratings					
Parameter	**Symbol**	**Min**	**Max**	**Units**	**Notes**
Storage Temperature	Tstg	-50	85	ºC	
Operating Case Temperature	Topr	0 -50	70 85	ºC	OPN-SF1590-80SC OPN-SF1590-80SCI
Power Supply Voltage	Vcc	0	3.6	V	
Input Voltage	---	GND	Vcc	V	
Output Current	Iout	0	30	mA	

Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units / Notes**
Power Supply Voltage	Vcc	3.1	3.3	3.5	V
Power Supply Current	$I_{CC\ (TX+RX)}$		200	300	mA
Operating Case Temperature	Topr	0 -50		70 85	ºC / OPN-SF1590-80SC ºC / OPN-SF1590-80SCI
Data Rate			622	700	Mb/s

Professional high-speed optical transceiver

Transmitter Specifications (0ºC < Topr < 70ºC, 3.1V < Vcc < 3.5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Optical Transmit Power	Po	-3	---	2	dBm	1
Output Center Wavelength	λ	1580		1620	nm	
Output Spectrum Width	Δλ		---	1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	E_R	10	---	---	dB	
Output Eye	Compliant with Bellcore GR-253-CORE 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}	0.5		2.4	V	Peak-to-Peak
TX Disable Input Voltage – Low	$T_{DIS,\,L}$	0		0.5	V	3
TX Disable Input Voltage – High	$T_{DIS,\,H}$	2.0		Vcc	V	3
TX Disable Assert Time	T_{ASSERT}			10	μs	
TX Disable Deassert Time	$T_{DEASSERT}$			1	ms	
TX Fault Output Voltage -- Low	T_{FaultL}	0		0.5	V	4
TX Fault Output Voltage -- High	T_{FaultH}	2.0		Vcc+0.3	V	4

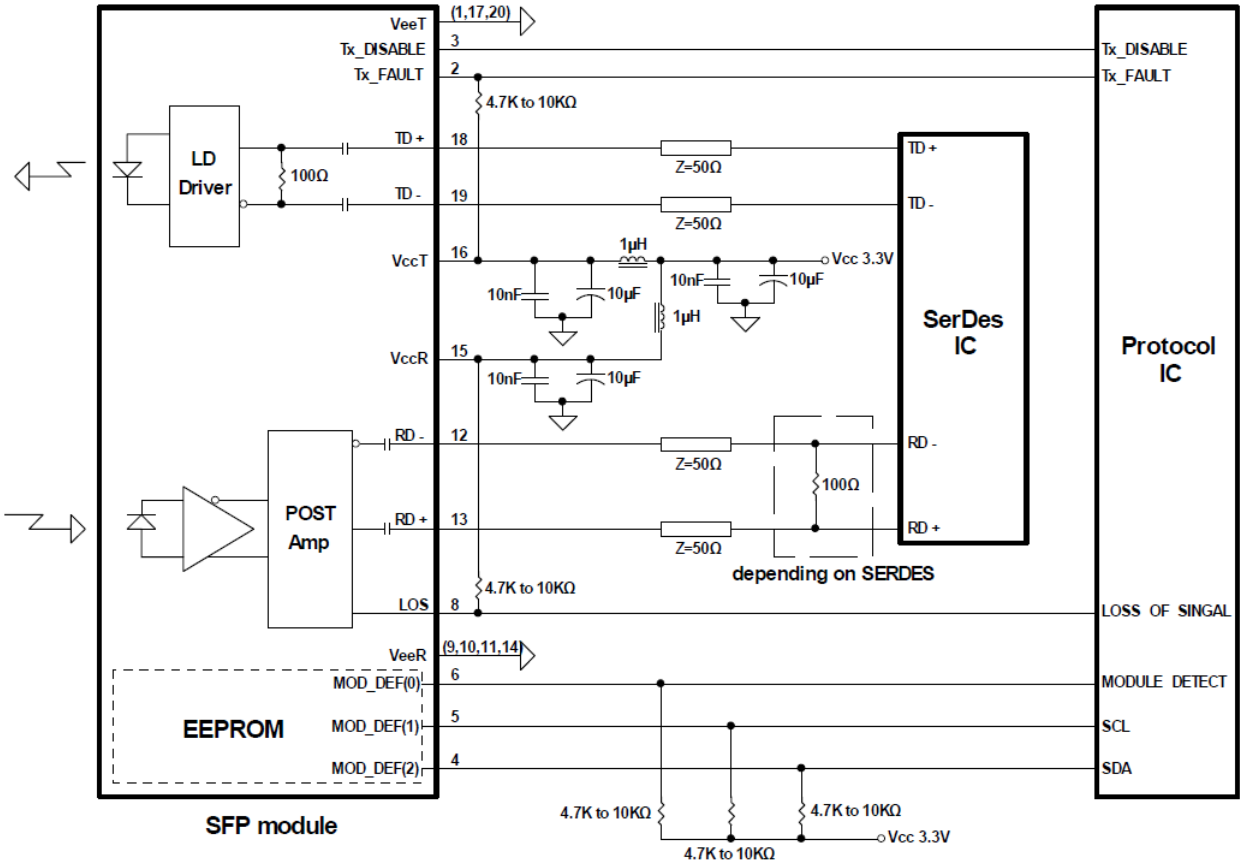
Notes: 1. Output power is power coupled into a 9/125 μm single mode fiber.
2. Measured with a 2^{23}-1 PRBS
3. There is an internal 4.7K to 10K ohm pull-up resistor to VccTX.
4. Open collector compatible, 4.7K to 10K ohm pull-up to Vcc (Host Supply Voltage).

Receiver Specifications (0ºC < Topr < 70ºC, 3.1 V < Vcc < 3.5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Sensitivity	---	---	---	-28	dBm	5
Maximum Input Power	Pin	-8	---	---	dBm	
Signal Detect – Asserted	Pa	---	---	-28	dBm	Transition: low to high
Signal Detect – Deasserted	Pd	-40	---	---	dBm	Transition: high to low
Signal detect – Hysteresis		1.0	---		dB	
Wavelength of Operation		1480		1520	nm	6
Optical Return Loss	ORL	14			dB	
Electrical						
Differential Output Voltage	V_{OH} – V_{OL}	0.6		2.0	V	
Output LOS Voltage -- Low	V_{OL}	0		0.5	V	7
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	7
Signal Detect Assert Time	AS_{MAX}			100	μs	OFF to ON
Signal Detect Deassert Time	ANS_{MAX}			300	μs	ON to OFF

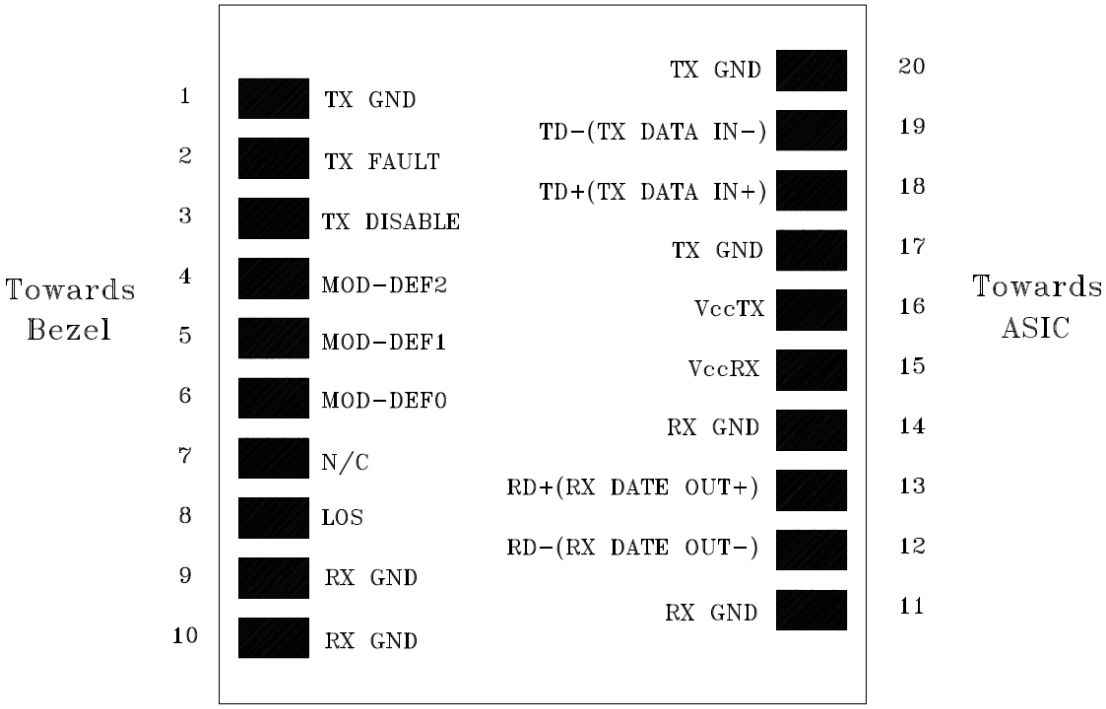
Notes: 5. Minimum sensitivity and saturation levels at BER 1E-10 for a 2^{23}-1 PRBS.
6. At least 30 dB optical isolation for the wavelength 1580 to 1620 nm.
7. Open collector compatible, 4.7K to 10K ohm pull-up to Vcc (Host Supply Voltage).

Professional high-speed optical transceiver

RECOMMENDED CIRCUIT SCHEMATIC



CONNECTION DIAGRAM



Professional high-speed optical transceiver

PIN	Signal Name	Description	PIN	Signal Name	Description
1	TX GND	Transmitter Ground	11	RX GND	Receiver Ground
2	TX Fault	Transmitter Fault Indication	12	RX DATA OUT-	Inverse Receiver Data Out
3	TX Disable	Transmitter Disable (Module disables on high or open)	13	RX DATA OUT+	Receiver Data Out
4	MOD-DFE2	Modulation Definition 2 – Two wires serial ID Interface	14	RX GND	Receiver Ground
5	MOD-DEF1	Modulation Definition 1 – Two wires serial ID Interface	15	Vcc RX	Receiver Power – 3.3V±5%
6	MOD-DEF0	Modulation Definition 0 – Ground in Module	16	Vcc TX	Transmitter Power – 3.3V±5%
7	N/C	Not Connected	17	TX GND	Transmitter Ground
8	LOS	Loss of Signal	18	TX DATA IN+	Transmitter Data In
9	RX GND	Receiver Ground	19	TX DATA IN-	Inverse Transmitter Data In
10	RX GND	Receiver Ground	20	TX GND	Transmitter Ground

Module Definition

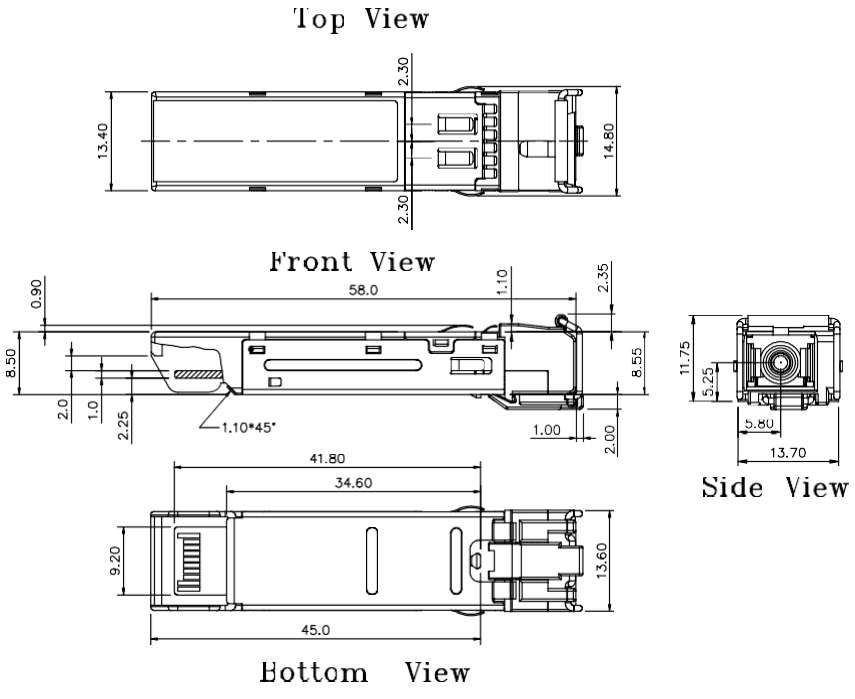
Module Definition	MOD-DEF2 PIN 4	MOD-DEF1 PIN 5	MOD-DEF0 PIN 6	Interpretation by Host
4	SDA	SCL	LV-TTL Low	Serial module definition protocol

Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, MOD-DEF(1:2) appear as no connector (NC) and MOD-DEF(0) is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E^2PROM protocol of the ATMEL AT24C01A/02/04 family of components.

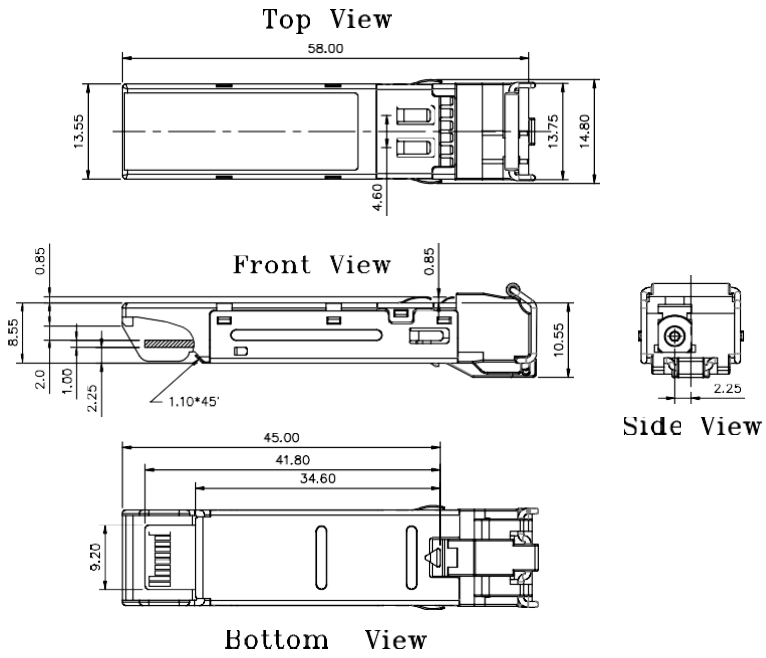
PACKAGE DIAGRAM

Units in mm

A) SC SFP



B) LC SFP



Note: Specifications subject to change without notice.