Professional high-speed optical transceiver

OPN-SG13-10LC2-MO

3.3V / 1310 nm / 1.25 Gbps Digital Diagnostic LC SFP SINGLE-MODE TRANSCEIVER

PRODUCT FEATURES

- Hot-Pluggable SFP Footprint LC Optical Transceiver
- Small Form-Factor Pluggable (SFP) MSA compatible
- Compliant with IEEE 802.3z 1000BASE-LX
- Compliant with Fibre Channel 1x SM-LC-L FC-PI
- SFF-8472 Digital Diagnostic Function
- AC/AC Coupling according to MSA
- Distance up to 10 km
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70ºC Operation
- Class 1 Laser International Safety Standard IEC-60825Compliant

APPLICATIONS

- Gigabit Ethernet Switches and Routers
- Fibre Channel Switch Infrastructure
- XDSL Applications
- Metro Edge Switching

PRODUCT DESCRIPTION

The OPN-SG13-10LC2-MO series single mode transceivers are smallform factor pluggable module for bi-directional serial optical data communications such as Gigabit Ethernet 1000BASE-LX and Fibre Channel 1x SM-LC-L FC-PI. It iswith the SFP 20-pin connector to allow hot plug capability.Digital diagnostic functions are available via an I^2C. 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 is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAsdetector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Gb/s)	1000 BASE	Distance (km)	Wavelength (nm)	Package	Temp. (ºC)	TX Power (dBm)	RX Sens. (dBm)	Link Budget (dB)	RoHS Compliant
OPN-SG13-10LC2-MO	1.25	LX / LH	10	1310	LC SFP with DMI	0 to 70	-3 to -9.5	-3 to -21	12	Yes

Absolute Maximum Ratings					
Parameter	**Symbol**	**Min**	**Max**	**Units**	**Notes**
Storage Temperature	Tstg	-50	85	ºC	
Operating Case Temperature	Topr	0	70	ºC	
Power Supply Voltage	Vcc	-0.5	3.6	V	

Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units / Notes**
Power Supply Voltage	Vcc	3.1	3.3	3.5	V
Operating Case Temperature	Topr	0		70	ºC
Power Supply Current	$I_{CC\ (TX+RX)}$		200	300	mA
Data Rate		100	1250		Mb/s

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Transmitter Specifications (0ºC < Topr < 70ºC, 3.1V < Vcc < 3.5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Optical Transmit Power	Po	-9	—	-3	dBm	1
Output Center Wavelength	λ	1280	1310	1355	nm	
Output Spectrum Width	Δλ	—	—	2.5	nm	RMS (σ)
Extinction Ratio	ER	9	—	—	dB	
Optical Rise Time	tr	—	—	260	ps	20% to 80% Values
Optical Fall Time	tf	—	—	260	ps	20% to 80% Values
Relative Intensity Noise	RIN	—	—	-120	dB/Hz	
Electrical						
Data Input Current – Low	IIL	-350	—	—	μA	
Data Input Current – High	IIH	—	—	350	μA	
Differential Input Voltage	VIH - VIL	0.5	—	2.4	V	Peak-to-Peak
TX Disable Input Voltage – Low	TDIS, L	0	—	0.5	V	2
TX Disable Input Voltage – High	TDIS, H	2.0	—	Vcc	V	2
TX Disable Assert Time	TASSERT	—	—	10	μs	
TX Disable Deassert Time	TDEASSERT	—	—	1	ms	
TX Fault Output Voltage – Low	TFaultL	0	—	0.5	V	3
TX Fault Output Voltage – High	TFaultH	2.0	—	Vcc+0.3	V	3

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

Receiver Specifications (0ºC < Topr < 70ºC, 3.1V < Vcc < 3.5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Sensitivity	Sens	—	—	-21	dBm	4,
Maximum Input Power	Pin	-3	—	—	dBm	4
Signal Detect – Asserted	Pa	—	—	-20	dBm	Transition: low to high
Signal Detect – Deasserted	Pd	-31	—	—	dBm	Transition: high to low
Signal Detect – Hysteresis	—	1.0	—	—	dB	
Wavelength of Operation	—	1260	—	1610	nm	
Electrical						
Differential Output Voltage	VOH – VOL	0.6	—	2.0	V	
Output LOS Voltage – Low	VOL	0	—	0.5	V	5
Output LOS Voltage – High	VOH	2.0	—	Vcc+0.3	V	5

4. Measured at 2^7-1 PRBS at BER 1E-12 @ 1300 nm.
5. Open collector compatible, 4.7K to 10K ohm pull-up to Vcc (Host Supply Voltage).

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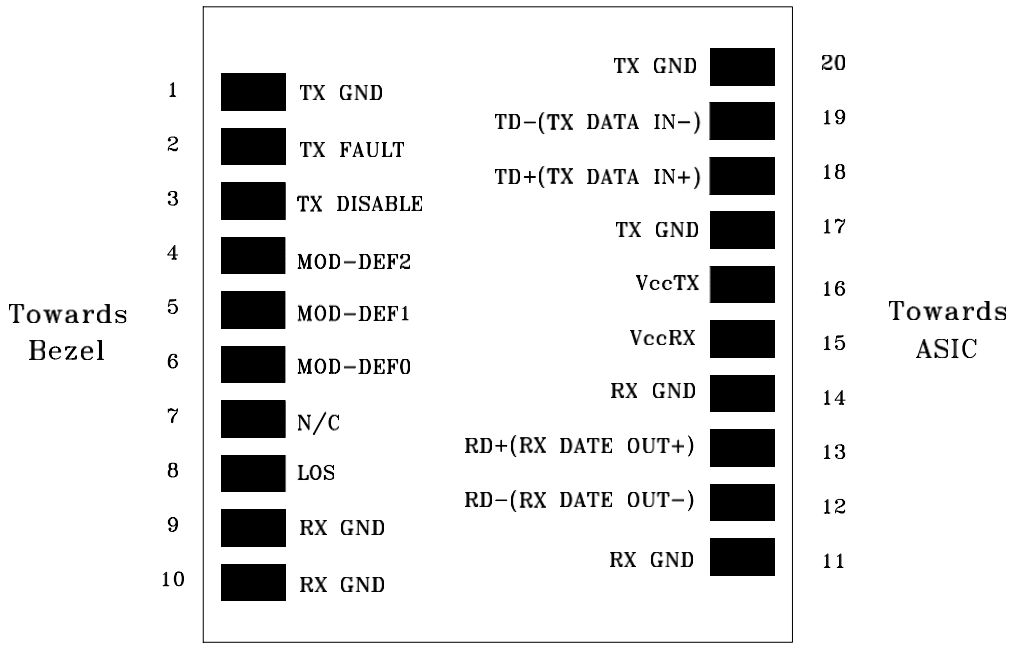
CONNECTION DIAGRAM



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.

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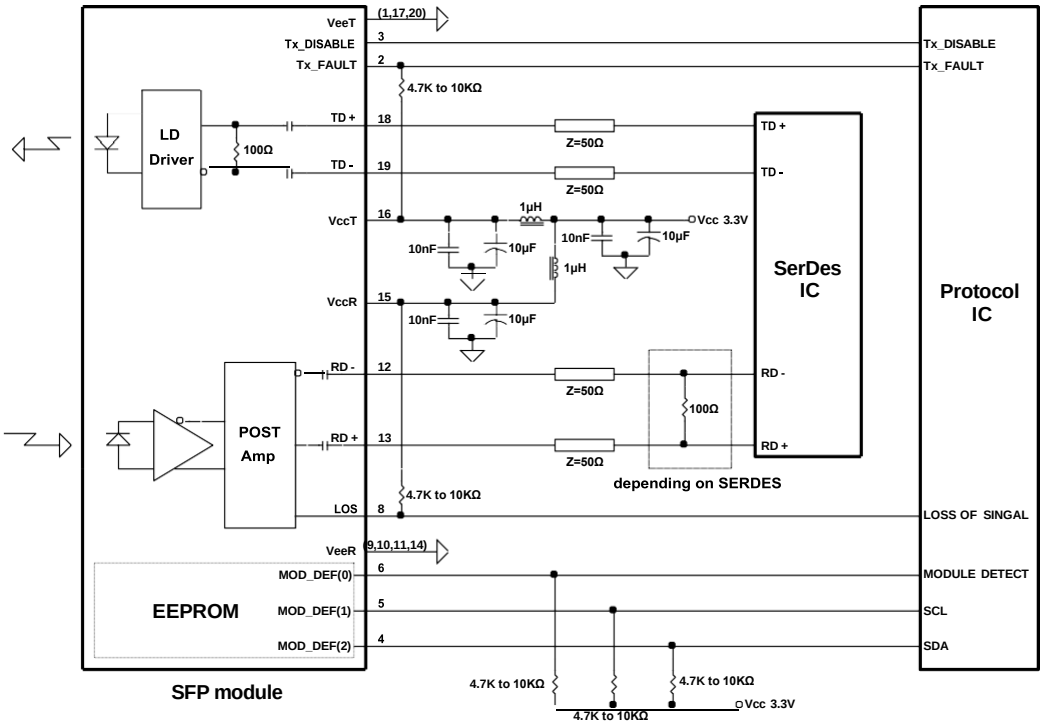
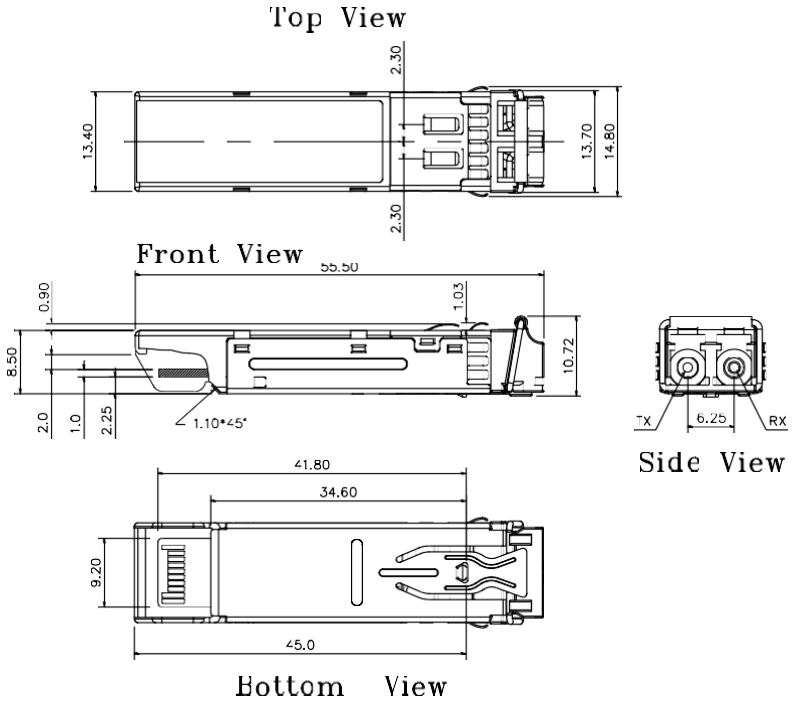
RECOMMENDED CIRCUIT SCHEMATIC



PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.