

Professional high-speed optical transceiver

OPN-SL13-2LC2-MO / OPN-SL13-2LC2I-MO

3.3V / 1310 nm / 155 Mbps Digital Diagnostic LC SFP MULTI-MODE TRANSCEIVER

PRODUCT FEATURES

- Hot-Pluggable SFP Footprint LC Optical Transceiver
- Small Form-Factor Pluggable (SFP) MSA compatible
 - SFF-8472 Digital Diagnostic Function
 - 1310 nm Transmitter
 - 0 to 2000 m Transmission
 - AC/AC Coupling according to MSA
 - LV-TTL TX Disable Input Signal
 - LV-TTL RX Loss of Signal Output
 - Single +3.3 V Power Supply
 - RoHS Compliant
- 0 to 70°C Operating : OPN-SL13-2LC2-MO
- -50 to 85°C Operating : OPN-SL13-2LC2I-MO
- Class 1 Laser International Safety Standard IEC 60825Compliant

APPLICATIONS

- Fast Ethernet Links
- SONET / SDH Equipment Interconnect
- Fiber Channel Links

PRODUCT DESCRIPTION

The OPN-SL13-2LC2I-MO series is a small form factor pluggable module for multi-mode fiber Fast Ethernet and OC-3 / STM-1 SONET / SDH fiber communications. It is with the SFP 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C series bus specified in the SFP MSA SFF-8472. The transmitter section uses a multiple quantum well 1310 nm laser and is aclass 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integratedInGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	Distance (m)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SL13-2LC2-MO	155	0 to 2000	1310	LC SFP with DMI	0 to 70	-12 to -19	-30	Yes
OPN-SL13-2LC2I-MO	155	0 to 2000	1310	LC SFP with DMI	-50 to 85	-12 to -19	-30	Yes

Absolute Maximum Ratings					
Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Case Temperature	Topr	0 / -50	70 / 85	°C	OPN-SL13-2LC2-MO / OPN-SL13-2LC2I-MO
Relative Humidity	RH	5	95	%	Non-condensing
Power Supply Voltage	Vcc	-0.5	3.6	V	
Receiver Input Optical Power	Pin(max)	-	+3	dBm	Average power

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Recommended Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	V _{cc}	3.1	3.3	3.5	V
Operating Case Temperature	T _{opr}	0 / -50	25	70 / 85	°C (LC2 / LC2I)
Relative Humidity	RH	5	-	95	% Non-condensing
Power Supply Current	I _{cc} (TX+RX)	-	150	250	mA
Power Consumption	P _d	-	0.8	1.0	W
Data Rate	-		155	200	Mb/s

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	-19	-	-12	dBm	1
Output Center Wavelength	λ _c	1280	1310	1340	nm	
Output Spectrum Width (RMS)	Δλ	-	-	10	nm	σ
Extinction Ratio	ER	8.2	-	-	dB	
Output Eye	Compliant with ITU-T G.957					
Optical Rise Time (10-90%)	t _r	-	-	2	ns	
Optical Fall Time (10-90%)	t _f	-	-	2	ns	
Relative Intensity Noise	RIN	-	-	-116	dB/Hz	
Total Jitter	T _J	-	-	1.0	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		V _{cc}	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		V _{cc} +0.3	V	4

Notes: 1. Output power is power coupled into a 62.5/125 μm multi-mode fiber.
 2. Measured with a 2⁷-1 PRBS.
 3. There is an internal 4.7K to 10K ohm pull-up resistor to V_{cc}TX.
 4. Open collector compatible, 4.7K to 10K ohm pull-up to V_{cc} (Host Supply Voltage).

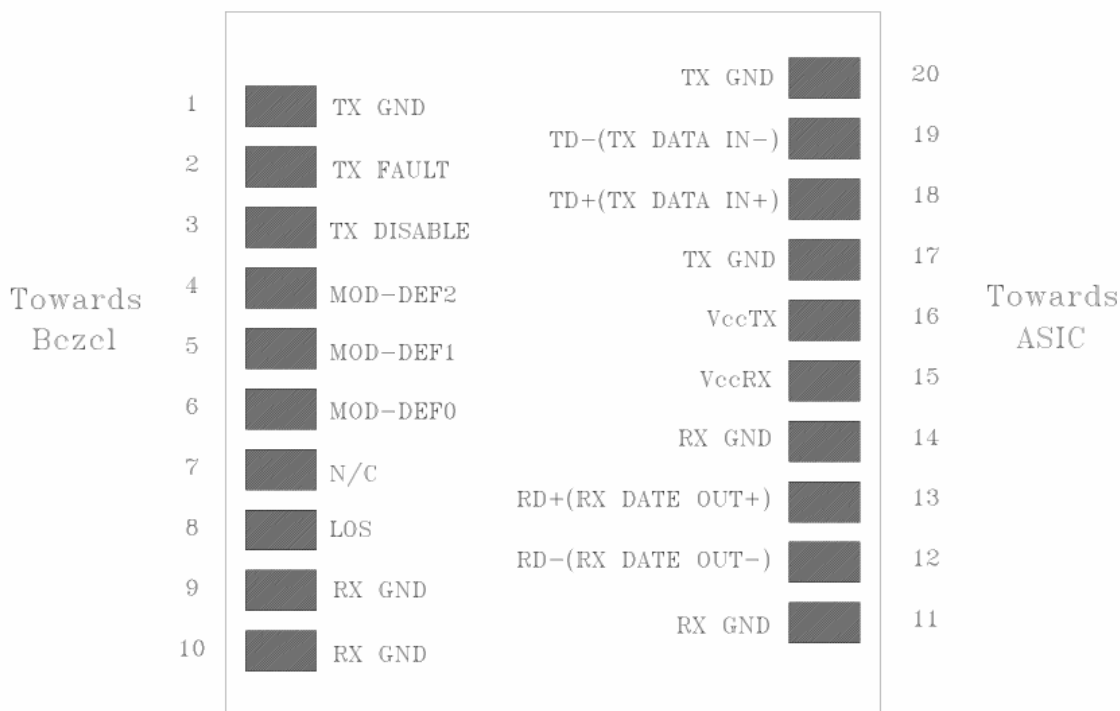
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Receiver Specifications (0°C < Topr < 70°C, 3.1 V < Vcc < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity (Average Power)	Sens	-	-	-30	dBm	BER < 1E-10
Maximum Input Power	Pin(max)	-3	-	-	dBm	
Signal Detect – Asserted	Pa	-	-	-30	dBm	Transition: low → high
Signal Detect – Deasserted	Pd	-43	-	-	dBm	Transition: high → low
Signal Detect Hysteresis	-	1.0	-	-	dB	
Wavelength of Operation	λ	1100	-	1650	nm	
Link Budget	LB	-	14	-	dB	2 km / 4 km, 1310 nm
Dispersion Penalty	DP	-	2~3	-	dB	2 km / 4 km, 1310 nm
Optical Return Loss Tolerance	ORL	14	-	-	dB	
Electrical						
Input High Voltage	-	2.0	-	Vcc+0.3	V	
Input Low Voltage	-	GND	-	0.8	V	6
Output High Voltage	-	2.4	-	Vcc	V	6
Output Low Voltage	-	GND	-	0.5	V	
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 2⁷-1 PRBS.

6. Open collector compatible, 4.7K to 10K ohm pull-up to Vcc (Host Supply Voltage).

CONNECTION DIAGRAM



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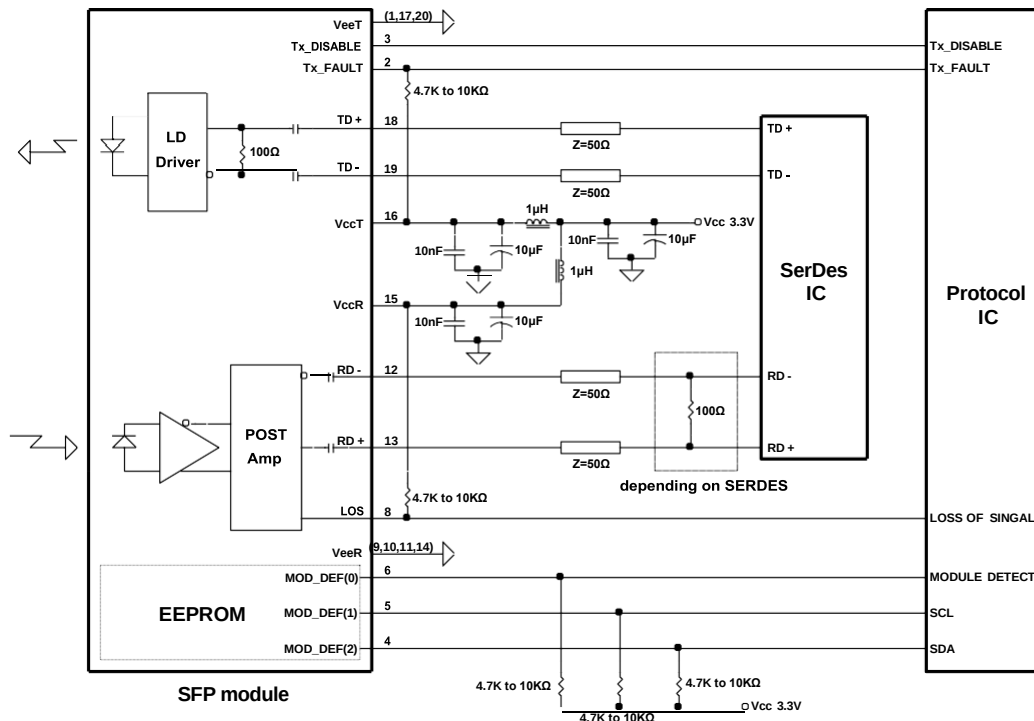
PIN	Signal Name	Description	PIN	Signal Name	Description
1	TX GND	Transmitter Ground	11	RX GND	Receiver Ground
2	TX Fault	Transmitter Fault Indication	12	RX DATA OUT-	Inverse Receiver Data Out
3	TX Disable	Transmitter Disable (Module disables on high or open)	13	RX DATA OUT+	Receiver Data Out
4	MOD-DFE2	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 E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

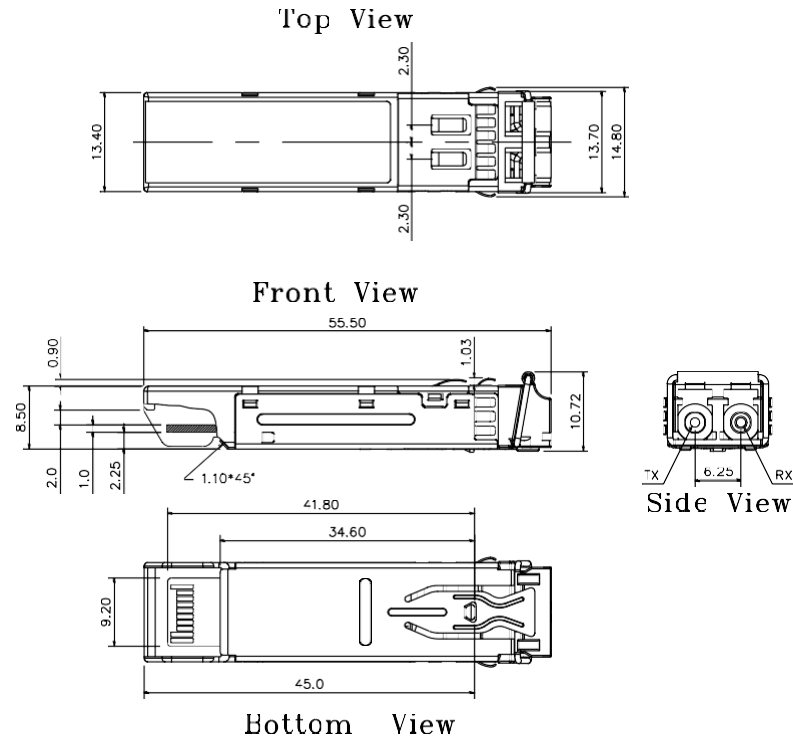
RECOMMENDED CIRCUIT SCHEMATIC



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PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.