

Professional high-speed optical transceiver

OPN-SG13-2LC2I-HM

3.3V / 1310 nm / 125 Mbps LC SFP MULTI-MODE TRANSCEIVER

PRODUCT FEATURES

- Hot-Pluggable SFP Footprint LC Optical Transceiver
- Small Form-Factor Pluggable (SFP) MSA compatible
 - 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
- -50 to 85°C Operation: OPN-SG13-2LC2I-HM
- Class 1 Laser International Safety Standard IEC 60825Compliant
 - Link Budget at 1310 nm: 0-12 dB

APPLICATIONS

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

PRODUCT DESCRIPTION

The OPN-SG13-2LC2I-HM series is 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. The transmitter section uses a multiple quantum well 1310 nm laser and is a 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 limitingpost-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	Distance(m)	Wavelength h(nm)	Package	Temp.(°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SG13-2LC2I-HM	125	0 to 2000	1310	LC SFP	-50 to 85	-12 to -19	-30	Yes

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Temperature	Topr	-50	85	°C	OPN-SG13-2LC2I-HM
Power Supply Voltage	Vcc	0	3.6	V	
Input Voltage	---	GND	Vcc	V	
Output Current	Iout	0	30	mA	

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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
Power Supply Current	I _{CC (TX+RX)}		150	250	mA
Operating Temperature	T _{opr}	-50		85	°C / OPN-SG13-2LC2I-HM
Data Rate			125	200	Mb/s
Link Budget @ 1310 nm		0		12	dB
Attenuation	A		1.0		dB/km
Modal Bandwidth	BLP		500		MHz·km

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	1260	1310	1360	nm	
Output Spectrum Width	Δλ	---	---	10	nm	RMS (σ)
Extinction Ratio	E _R	8.2	---	---	dB	
Optical Rise Time	t _r			2	ns	10% to 90% Values
Optical Fall Time	t _f			2	ns	10% to 90% Values
Relative Intensity Noise	RIN			-116	dB/Hz	
Total Jitter	TJ			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).

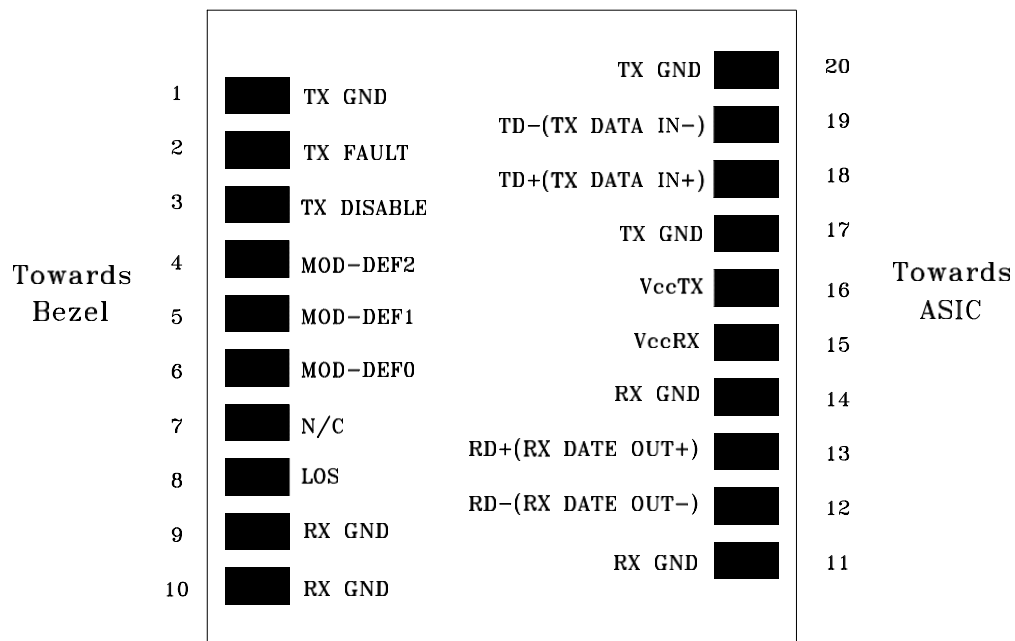
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Receiver Specifications (0°C < Topr < 70°C, 3.1 V < Vcc < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity	---	---	---	-30	dBm	5
Maximum Input Power	Pin	-8	---	---	dBm	
Signal Detect -- Asserted	Pa	---	---	-30	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-43	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Optical Return Loss	ORL	14			dB	
Wavelength of Operation		1260		1600	nm	
Electrical						
Differential Output Voltage	$V_{OH} - V_{OL}$	0.6		2.0	V	
Output LOS Voltage -- Low	V_{OL}	0		0.5	V	6
Output LOS Voltage -- High	V_{OH}	2.0		$V_{CC}+0.3$	V	6
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



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

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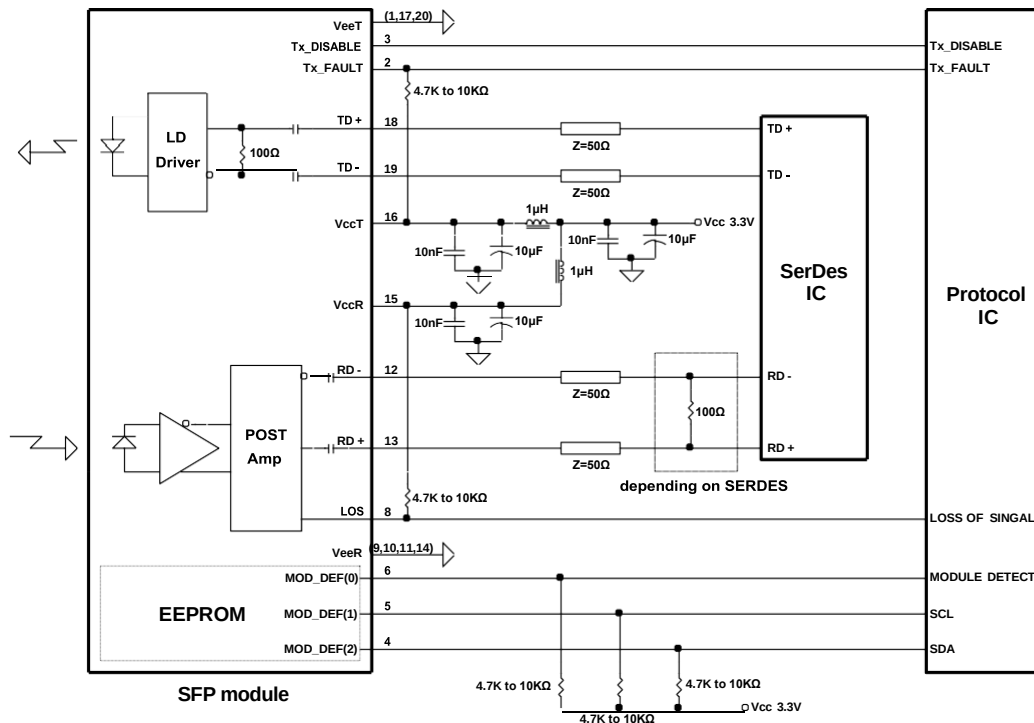
4	MOD-DFE2	Modulation Definition 2 – Two wires serial ID Interface	14	RX GND	Receiver Ground
5	MOD-DEF1	Modulation Definition 1 – Two wires serial ID Interface	15	Vcc RX	Receiver Power – 3.3V±5%
6	MOD-DEF0	Modulation Definition 0 – Ground in Module	16	Vcc TX	Transmitter Power – 3.3V±5%
7	N/C	Not Connected	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.

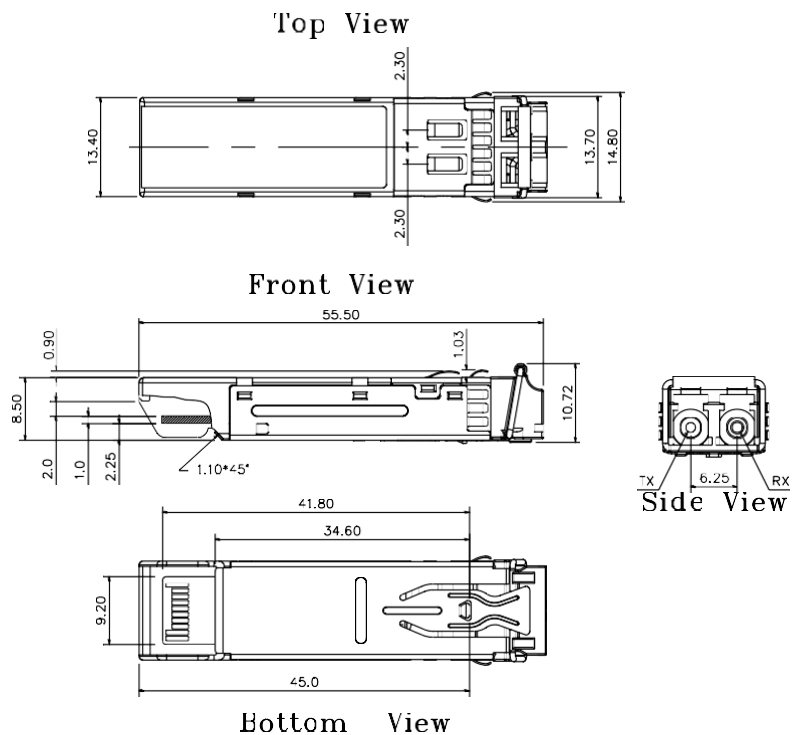
RECOMMENDED CIRCUIT SCHEMATIC



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PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.