Professional high-speed optical transceiver

OPN-SB13-5LC2-HM / OPN-SB13-5LC2I-HM
3.3V / 1310 nm / 125 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 5000 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 70ºC Operating : OPN-SB13-5LC2-HM
- -50 to 85ºC Operating : OPN-SB13-5LC2I-HM
- Class 1 Laser International Safety Standard IEC 60825Compliant
- Link Budget @ 1310 nm: 0-8 dB (MMF 50/125 µm), 0-11 dB (MMF 62.5/125 µm)

APPLICATIONS

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

PRODUCT DESCRIPTION

The OPN-SB13-5LC2-HM 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 I^2C 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. (ºC)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SB13-5LC2-HM	125	0 to 5000	1310	LC SFP with DMI	0 to 70	-12 to -19	-30	Yes
OPN-SB13-5LC2I-HM	125	0 to 5000	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	ºC	
Operating Temperature	Topr	0 -50	70 85	ºC	OPN-SB13-5LC2-HM OPN-SB13-5LC2I-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	Vcc	3.1	3.3	3. 5	V
Power Supply Current	$I_{CC\ (TX+RX)}$		150	250	mA
Operating Temperature	Topr	0		70	°C / OPN-SB13-5LC2-HM
		-50		85	°C / OPN-SB13-5LC2I-HM
Data Rate			125	200	Mb/s
Link Budget @ 1310 nm		0		8/11	dB
Attenuation	A		1.0		dB/km
Modal Bandwidth (50/125 μm)	BLP		800		MHz·km
Modal Bandwidth (62.5/125 μm)	BLP		500		MHz·km

Transmitter Specifications (0°C < Topr < 70°C, 3.1V < Vcc < 3. 5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Optical Transmit Power	Po	-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		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 62.5/125 μm multi-mode fiber.

2. Measured with a 2^7-1 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).

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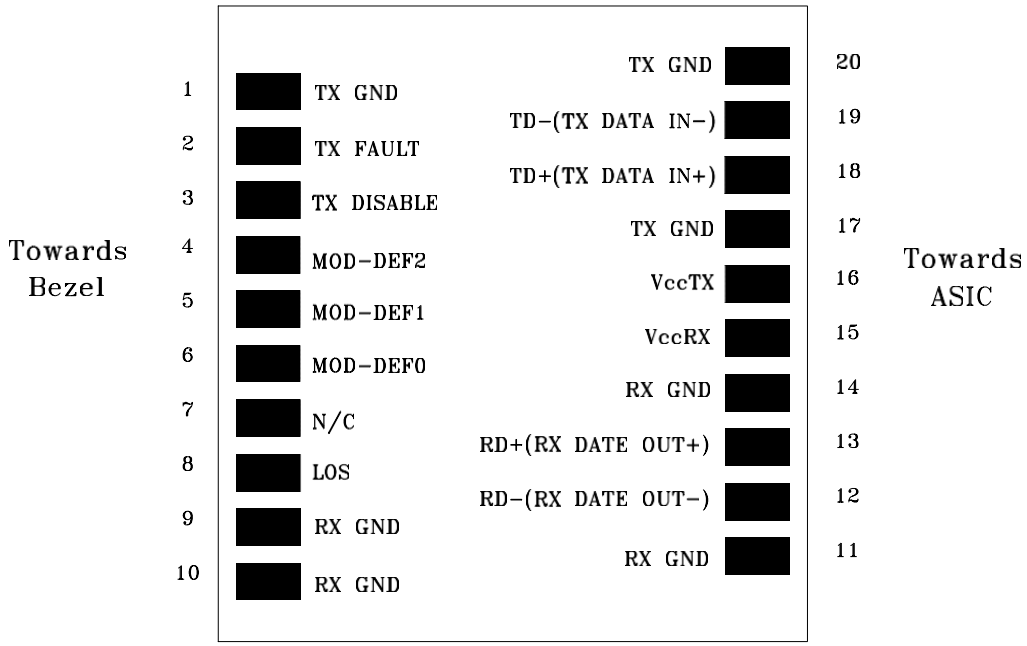
Receiver Specifications (0ºC < Topr < 70ºC, 3.1 V < Vcc < 3. 5V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Sensitivity	Sens	---	---	-30	dBm	5
Maximum Input Power	Pin	-8	---	---	dBm	
Signal Detect -- Asserted	Pa	---	---	-30	dBm	Transition: low to high
Signal 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		Vcc+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 2^7-1 PRBS.

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

CONNECTION DIAGRAM



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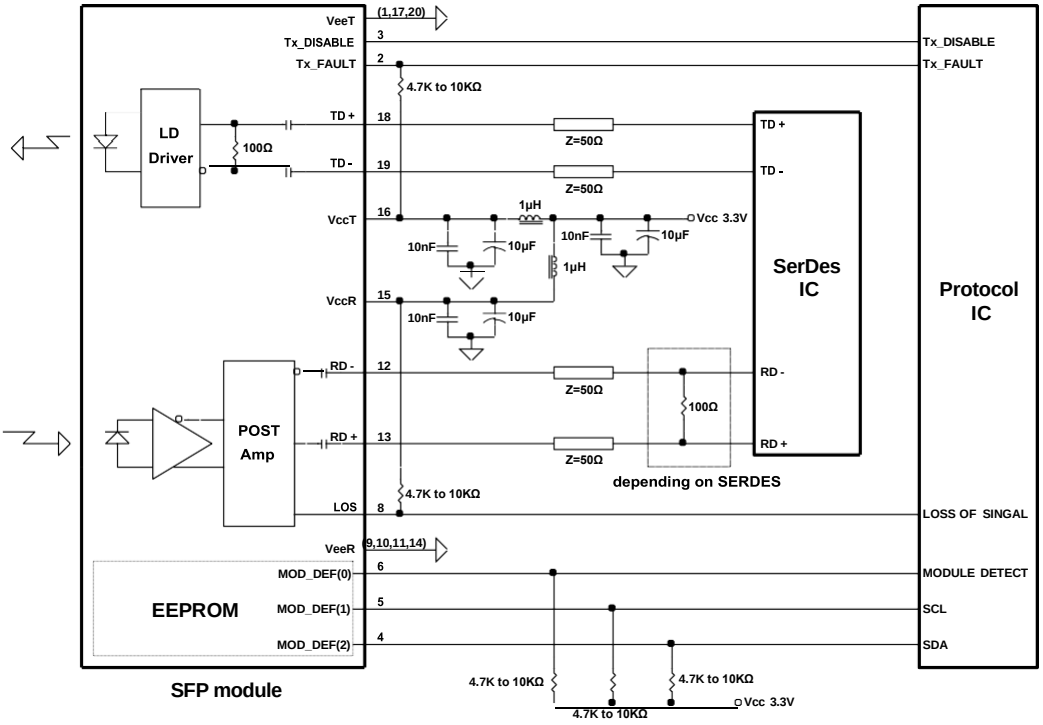
PIN	Signal Name	Description	PIN	Signal Name	Description
1	TX GND	Transmitter Ground	11	RX GND	Receiver Ground
2	TX Fault	Transmitter Fault Indication	12	RX DATA OUT-	Inverse Receiver Data Out
3	TX Disable	Transmitter Disable (Module disables on high or open)	13	RX DATA OUT+	Receiver Data Out
4	MOD-DFE2	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

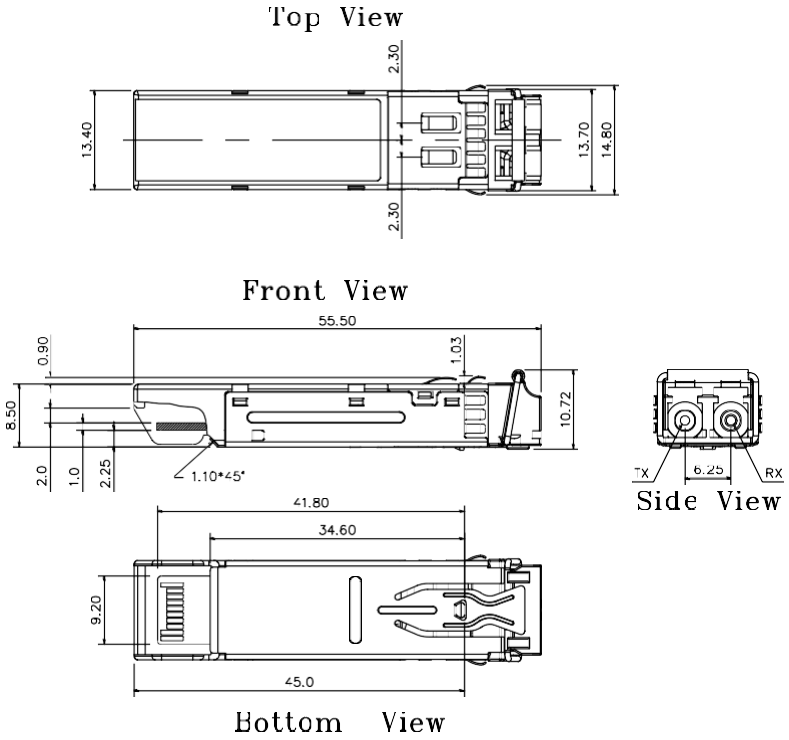
Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, MOD-DEF(1:2) appear as no connector (NC) and MOD-DEF(0) is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E^2PROM protocol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

RECOMMENDED CIRCUIT SCHEMATIC



PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.