

Professional high-speed optical transceiver

OPN-SB13-2LC2I-SGMII

3.3V / 1310 nm / 125 Mbps Digital Diagnostic LC SFP MULTI-MODE TRANSCEIVER WITH SGMII INTERFACE

PRODUCT FEATURES

- Operating Data Rate up to 125Mbps
- Built-in PHY supporting SGMII Interface
- Built-in high performance MCU supporting easier configuration
 - 1310nm FP Laser and PIN Photo-Detector
 - Link Length up to 2km on OM1 MMF
 - Single 3.3V Power Supply
- Supports extended link status monitoring, such as CRC and packet counters
 - With Spring-Latch for high density application
 - Hot-Pluggable SFP Footprint
 - Duplex LC Connector Interface
 - Power Dissipation < 1.2W
- Operating Case Temperature: -50°C ~ +85°C

APPLICATIONS

- 100BASE-FX Fast Ethernet Links via SGMII Host Interface
- Gigabit Ethernet SFP Ports Requiring 100BASE-FX Conversion
 - Switch / Router Fast Ethernet Fiber Links

PRODUCT DESCRIPTION

OPN-SB13-2LC2I-SGMII is a 100BASE-FX Small Form-Factor Pluggable (SFP) transceiver. It is a hot-swappable input/output device that plugs into Gigabit Ethernet ports of switch or router, linking the port with the fiber cabling network. The receiver uses a PIN-TIA and the transmitter uses a 1310nm FP laser, with at least 11.5dB link budget to ensure this module works in Fast Ethernet 2km MMF applications. Built-in PHY supporting SGMII Interface makes it support Fast Ethernet in Gigabit Ethernet ports.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SB13-2LC2I-SGMII	125	0 to 2	1310	LC SFP with DDM	-50 to 85	-20 to -14	-31.5	Yes

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Ts	-50	85	°C	
Maximum Supply Voltage	V _{CC}	-0.5	3.6	V	OPN-SB13-2LC2I-SGMII
Operating Relative Humidity (non-condensing)	RH	5	85	%	

Note: Exceeding any one of these values may destroy the device permanently.

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units / Notes
Operating Case Temperature	T _C	-50		85	°C
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V
Power Supply Current	I _{CC}			360	mA
Data Rate			125		Mbps

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Transmitter Specifications (-50°C < Topr < 85°C, 3.1V < Vcc < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Center Wavelength	λ_C	1260	1310	1360	nm	
Spectral Width (RMS)	$\Delta\lambda$			7.7	nm	
Average Output Power	Pout	-20		-14	dBm	1
Extinction Ratio	ER	9			dB	
Rise/Fall Time (20% ~ 80%)	tr/tf			3	ns	2
Output Optical Eye	Compliant with IEEE 802.3-2002					3
Pout@TX Disable Asserted	Pout			-45	dBm	1
Electrical						
Inputs Amplitude (Differential)	Vin	200		2000	mVpp	AC Coupled Inputs
Input Impedance (Differential)	Zin	80	100	120	ohms	Rin > 100 kohms @ DC
TX_Disable	Disable	2		Vcc	V	
	Enable	0		0.8		
TX_FAULT	Fault	2		Vcc+0.3	V	
	Normal	0		0.8		

1. The optical power is launched into 62.5/125um MMF.
2. Unfiltered, measured with 4B/5B code for 125Mbps
3. Measured with 4B/5B code for 125Mbps.

Receiver Specifications (-50°C < Topr < 85°C, 3.1V < Vcc < 3.5V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Center Wavelength	λ_C	1260	1310	1570	nm	
Receiver Sensitivity	Pmin			-31.5	dBm	4
Receiver Overload	Pmax	-8			dBm	4
LOS De-Assert	LOSD			-32.5	dBm	
LOS Assert	LOSA	-45			dBm	
LOS Hysteresis	Phys	0.5		4.5	dB	
Return Loss		12			dB	
Total Jitter (SGMII Series Interface)	TJ			0.43	UI	
Electrical						
Outputs Amplitude (Differential)	Vout	370		2000	mVpp	AC Coupled Outputs
Output Impedance (Differential)	Zout	85	100	115	ohms	
TX_Disable Assert Time	t_off			10	us	
RX_LOS	LOS	2		Vcc+0.3	V	
	Normal	0		0.8		

4. Measured with 4B/5B code for 125Mbps, worst-case extinction ratio, and BER $\leq 1 \times 10^{-10}$.

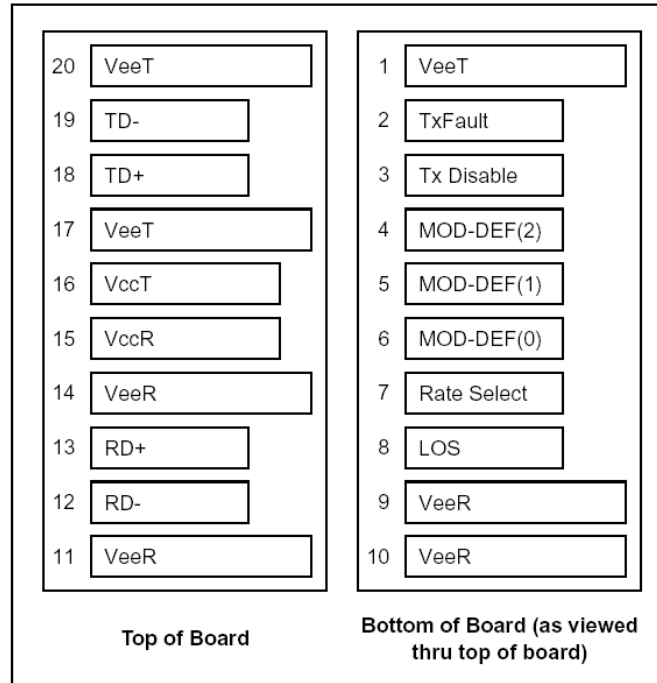
DIGITAL DIAGNOSTIC FUNCTIONS

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to 70	°C	±3°C	Internal
Voltage	3.13 to 3.47	V	±3%	Internal
Bias Current	15 to 75	mA	±10%	Internal
TX Power	-20 to -14	dBm	±3dB	Internal
RX Power	-31.5 to -8	dBm	±3dB	Internal

Note: The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA). The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

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CONNECTION DIAGRAM



PIN	Signal Name	Description	PIN	Signal Name	Description
1	VeeT	Transmitter Ground	11	VeeR	Receiver Ground
2	TX Fault	Transmitter Fault Indication	12	RD-	Received Data Out –
3	TX Disable	Transmitter Disable	13	RD+	Received Data Out +
4	MOD-DEF2	Serial Data Line (SDA)	14	VeeR	Receiver Ground
5	MOD-DEF1	Serial Clock Line (SCL)	15	VccR	Receiver Power, +3.3 V ±5%
6	MOD-DEF0	Module Present (Grounded in Module)	16	VccT	Transmitter Power, +3.3 V ±5%
7	Rate Select	Not Connect	17	VeeT	Transmitter Ground
8	LOS	Loss of Signal	18	TD+	Transmit Data In +
9	VeeR	Receiver Ground	19	TD-	Transmit Data In –
10	VeeR	Receiver Ground	20	VeeT	Transmitter Ground

Module Definition

Module Definition	MOD-DEF2PIN 4	MOD-DEF1PIN 5	MOD-DEF0PIN 6	Interpretation by Host
4	SDA	SCL	Grounded in Module	Serial ID / Digital Diagnostic Interface

Module Definition 4 specifies the two-wire serial interface. MOD-DEF2 (Pin 4) is the serial data line (SDA), MOD-DEF1 (Pin 5) is the serial clock line (SCL), and MOD-DEF0 (Pin 6) is grounded within the module to indicate module presence. The two-wire serial interface provides access to Serial ID and Digital Diagnostic information.

