Professional high-speed optical transceiver

OPN-SG15-200LC2 / OPN-SG15-200LC2I

3.3V / 1550 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 Gigabit Ethernet
- Compliant with Fiber Channel 1X SM-LC-L FC-PI
- SFF-8472 Digital Diagnostic Function
- 1550 nm DFB LD Transmitter
- APD High Sensitivity Receiver
- 41 dB Power Budget at Least
- Distance up to 200 km
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- RoHS Compliant
- 0 to 70ºC Operation: OPN-SG15-200LC2
- -50 to 85ºC Operation: OPN-SG15-200LC2I
- Class 1 Laser International Safety Standard IEC-60825Compliant

APPLICATIONS

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

PRODUCT DESCRIPTION

The OPN-SG15-200LC2I series single mode transceivers aresmall form factor pluggable module for bi-directional serial optical data communications such as Gigabit Ethernet 1000BASE-ZX and Fiber 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 1550 nm. A guaranteed minimum optical link budget of 41 dB is offered which can correspond to a link distance of over 200 km (assuming worst case fiber loss of 0.2 dB/km). The transmitter sectionuses a multiple quantum well 1550 nm DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs Avalanche photodetector preamplifier 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)	RoHS Compliant
OPN-SG15-200LC2	1.25		200	1550 DFB	LC SFP with DMI	0 to 70	8 to 5	-36	Yes
OPN-SG15-200LC2I	1.25		200	1550 DFB	LC SFP with DMI	-50 to 85	8 to 5	-36	Yes

Absolute Maximum Ratings					
Parameter	**Symbol**	**Min**	**Max**	**Units**	**Notes**
Storage Temperature	Tstg	-50	85	ºC	
Operating Case Temperature	Topr	0 -50	70 85	ºC	OPN-SG15-200LC2 OPN-SG15-200LC2I
Power Supply Voltage	Vcc	-0.5	3.6	V	

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Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units / Notes**
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0 -50		70 85	°C / OPN-SG15-200LC2 °C / OPN-SG15-200LC2I
Power Supply Current	$I_{CC\ (TX+RX)}$		230	280	mA
Data Rate			1250		Mb/s

Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Optical Transmit Power	Po	5	---	8	dBm	1
Output Center Wavelength	λ	1520	1550	1580	nm	
Output Spectrum Width	Δλ	---	0.2	1	nm	-20 dB Width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	E_R	9	---	---	dB	
Optical Rise Time	t_r			260	ps	20 % to 80% Values.
Optical Fall Time	t_f			260	ps	20 % to 80% Values.
Relative Intensity Noise	RIN			-120	dB/Hz	
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	2
TX Disable Input Voltage – High	$T_{DIS,\ H}$	2.0		Vcc	V	2
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	3
TX Fault Output Voltage -- High	T_{FaultH}	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 (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Optical						
Sensitivity	Sens			-36	dBm	4
Maximum Input Power	Pin	-10			dBm	4
Signal Detect -- Asserted	Pa	---		-36	dBm	Transition: low to high
Signal Detect -- Deasserted	Pd	-50	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1100	---	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	5
Output LOS Voltage – High	V_{OH}	2.0		Vcc+0.3	V	5

4. Measured at 2^7-1 PRBS at BER 1E-12. Receiver sensitivity is better than -36dBm at1.25 Gbps. However, due to the resolution limitation of Digital Diagnostic Monitoring, the effect readout range for the RX received power at EEPROM A2 is from -10 to -34 dBm.
5. Open collector compatible, 4.7K to 10K ohm pull-up to Vcc (Host Supply Voltage).

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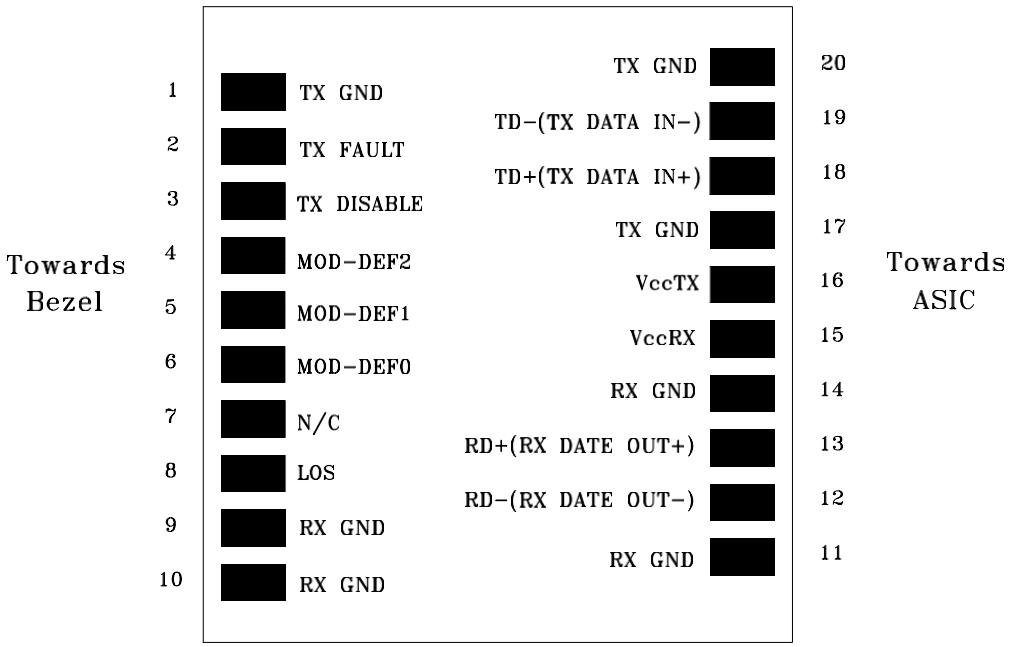
CONNECTION DIAGRAM



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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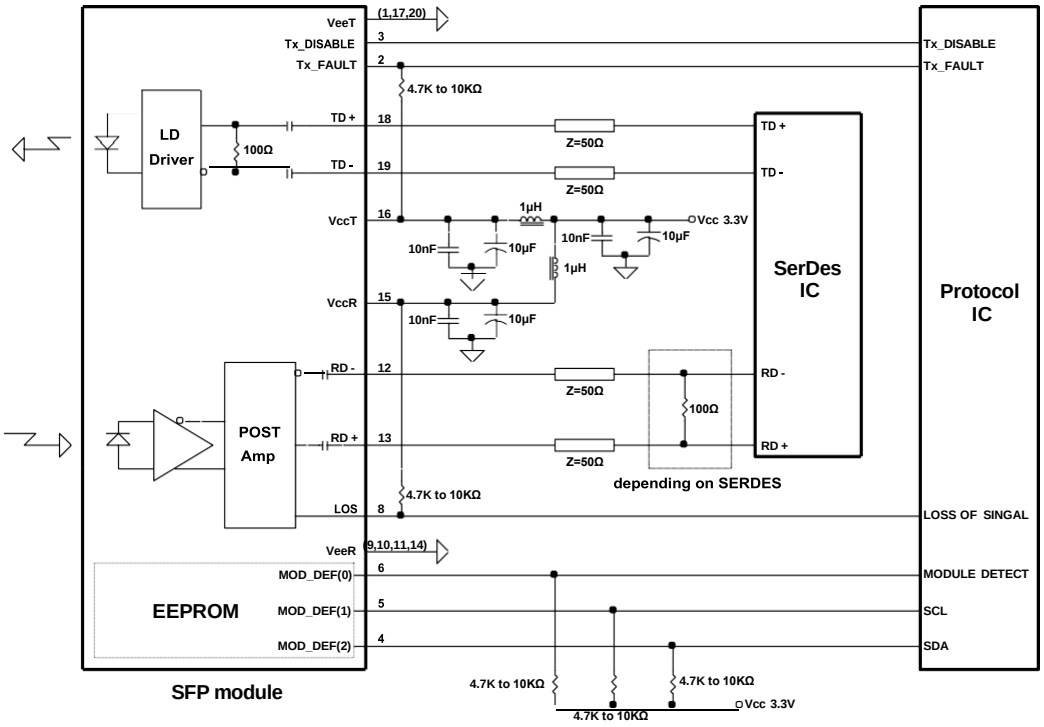
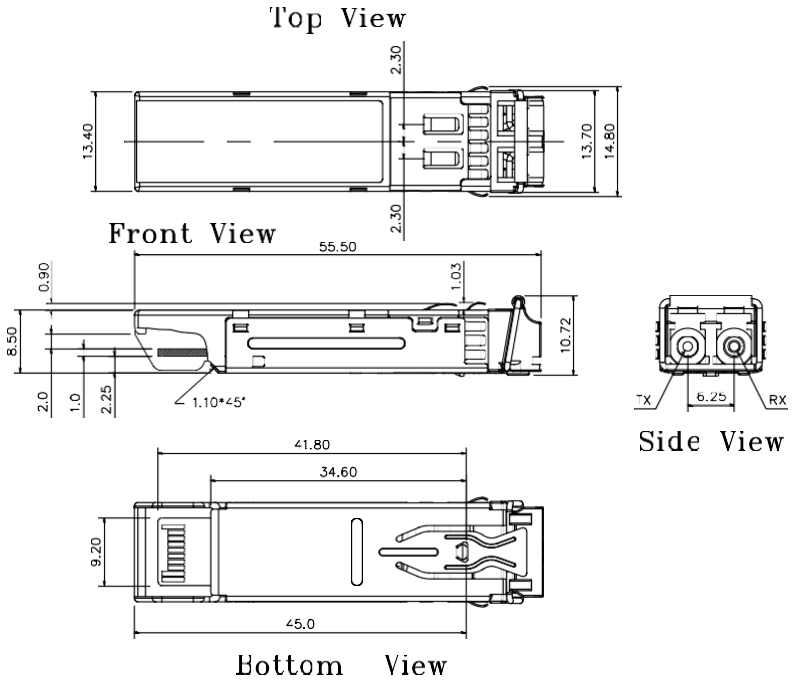
RECOMMENDED CIRCUIT SCHEMATIC



PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.