Professional high-speed optical transceiver

OPN-S1H15-40LC2 / OPN-S1H15-40LC2I

10.3 Gb/s / 40 km / 1550 nm Digital Diagnostic SFP+ LC SINGLE-MODE TRANSCEIVER

PRODUCT FEATURES

- Support 9.95 Gbps to 10. 5 Gbps
- Complaint with SFP+ MSA
- Compliant to IEEE 802.3ae 10GBASE-ER
- SFF-8472 Digital Diagnostic Function
- Temperature-stabilized 1550 nm EML Transmitter
- Distance up to 40 km at SM Fiber
- AC/AC Coupling according to MSA
- Single +3.3 V Power Supply
- Low Power consumption
- RoHS Compliant
- 0 to 70°C Operating: OPN-S1H15-40LC2
- -50 to 85°C Operating: OPN-S1H15-40LC2I
- Class 1 Laser International Safety Standard IEC-60825Compliant

APPLICATIONS

- 10GBASE-ER/EW
- 40 km 10G Fibre Channel

PRODUCT FDESCRIPTION

The OPN-S1H15-40LC2I series single mode transceiver is smallform factor pluggable module for bi-directional serial optical data communications such as IEEE 802.3ae 10GBASE-ER/EW and 10G FC. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I^2C. This module is designedfor single mode fiber and operates at a nominal wavelengthof 1550 nm. The transmitter section uses a temperature-stabilized 1550 nm electrical-modulated laser(EML) 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 limiting post-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Gb/s)	10GBASE	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	RoHS Compliant
OPN-S1H15-40LC2	10.3	ER / EW	40	1550 EML	SFP+ with DMI	0 to 70	Yes
OPN-S1H15-40LC2I	10.3	ER / EW	40	1550 EML	SFP+ with DMI	-50 to 85	Yes

Absolute Maximum Ratings					
Parameter	**Symbol**	**Min**	**Max**	**Units**	**Notes**
Storage Temperature	Tstg	-50	85	°C	
Relative Humidity	RH	5	85	%	Non-condensing
Operating Case Temperature	Topr	0 -50	70 85	°C	OPN-S1H15-40LC2 OPN-S1H15-40LC2I
Power Supply Voltage	Vcc	-0.5	3.6	V	
Receiver Input Optical Power	Mip		3	dBm	Average power

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Recommended Operating Conditions					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units / Notes**
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Operating Case Temperature	Topr	0 -50		70 85	ºC / OPN-S1H15-40LC2 ºC / OPN-S1H15-40LC2I
Relative Humidity	RH	5	85	%	Non-condensing
Power Supply Current	$I_{CC\ (TX+RX)}$		320	500	mA / OPN-S1H15-40LC2
			320	650	mA / OPN-S1H15-40LC2I
Data Rate			10.3	10.5	Gb/s

Transmitter Optical Specifications (0ºC < Topr < 70ºC, 3.13V < Vcc < 3.47V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Average Launch Power	$Po_{,\ Avg}$	-4.7		+4.0	dBm	2
Optical Modulation Amplitude	$Po_{,\ OMA}$	-1.7				
Output Center Wavelength	λc	1530		1565	nm	
Output Spectrum Width	σ_λ			1	nm	-20 dB width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.0				
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter and Dispersion Penalty	TDP			3	dB	
Average Launch Power of OFF Transmitter				-30	dBm	

2. Output power is power coupled into a 9/125 μm single-mode fiber.

Receiver Optical Specifications (0ºC < Topr < 70ºC, 3.13V < Vcc < 3.47V)						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
Sensitivity in Average Power	Sen1			-15.8	dBm	3
Receiver Sensitivity in OMA	Sen2			-14.1	dBm	
Stressed Receiver Sensitivty in OMA				-11.3	dBm	
Receiver Overload	P_{MAX}	-1	---		dBm	
LOS -- Deasserted	LOS_D	---	---	-18	dBm	Transition: low to high
LOS -- Asserted	LOS_A	-28	---	---	dBm	Transition: high to low
Wavelength of Operation	λc	1530		1565	nm	

3. BER < 10^{-12} and PRBS 2^{31}-1 at 10.3125 Gb/s..

Electrical Characteristics						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes**
High-Speed Signal (CML) Interface Specification						
Input Data Rate			10.3		Gb/s	
Differential Input Impedance	Rin		100		Ω	
Differential Data Input Amplitude		120		820	mVpp	Internally AC coupled
Output Data Rate			10.3125		Gb/s	
Differential Output Impedance	Rout		100		Ω	
Differential Data Output Amplitude		340		850	mVpp	Internally AC coupled
Low-Speed Signal (LVTTL) Interface Specification						
Input High Voltage		2.0		Vcc+0.3	V	
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		Vcc	V	
Output Low Voltage		GND		0.5	V	

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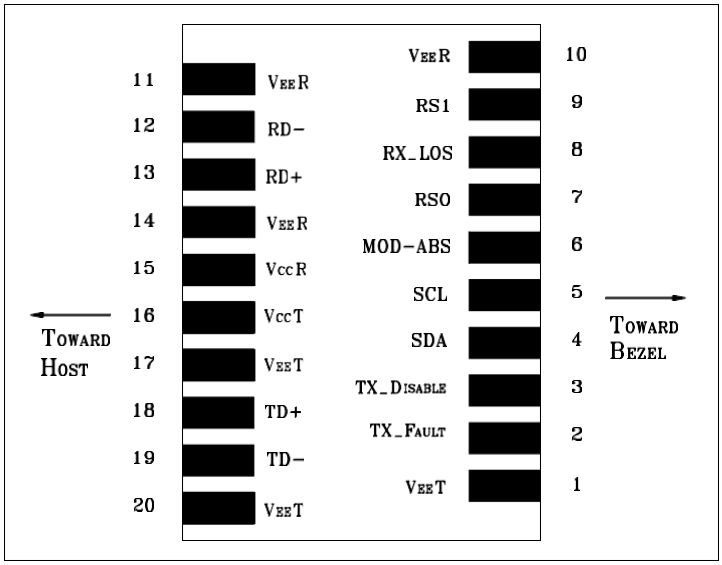
CONNECTION DIAGRAM



PIN	Signal Name	Description	PIN	Signal Name	Description
1	$V_{EE}T$	Transmitter Signal Ground	11	$V_{EE}R$	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic "1" Output = Laser Fault. Logic "0" Output = Normal Operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic "1" Input (or no connection) = Laser off, Logic "0" = Laser on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	$V_{EE}R$	Receiver Signal Ground
5	SCL	Modulation Definition 1 – Two wires serial ID Interface	15	$V_{CC}R$	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	$V_{CC}T$	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	$V_{EE}T$	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	$V_{EE}R$	Receiver Signal Ground	20	$V_{EE}T$	Transmitter Signal Ground

MODULE DEFINITION

Module Definition	PIN 4	PIN 5	PIN 6	Interpretation by Host
4	SDA	SCL	MOD-ABS	Serial module definition protocol

Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SDA and SCL appear as no connection (NC) and MOD-ABS 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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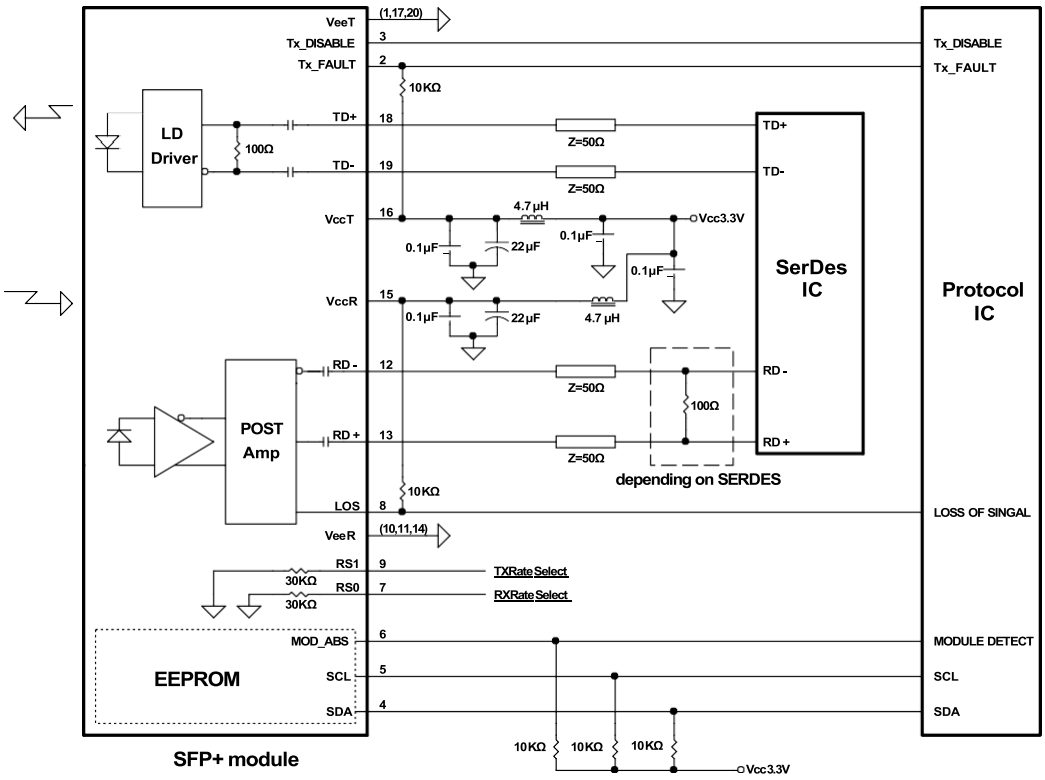
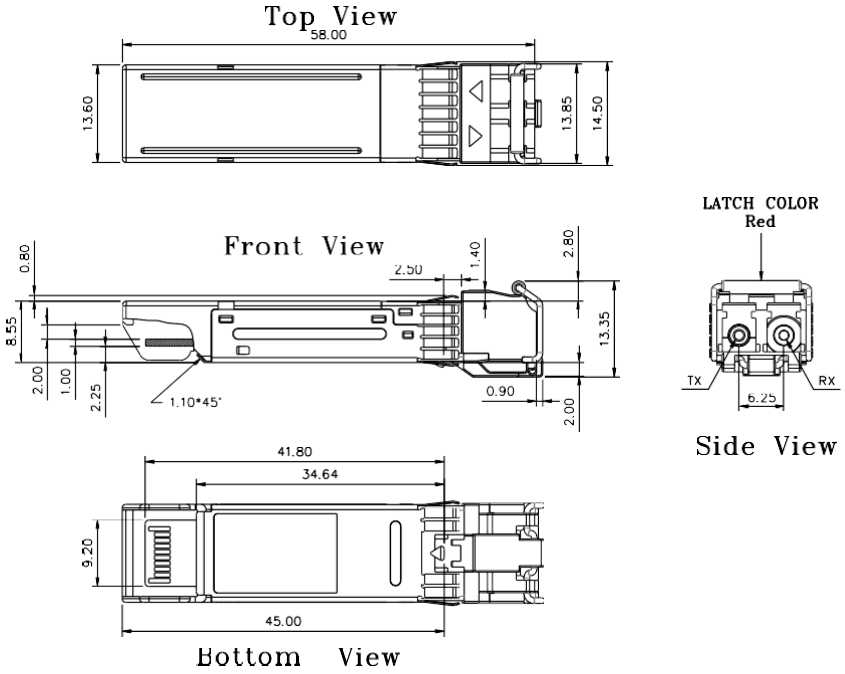
RECOMMENDED CIRCUIT SCHEMATIC



PACKAGE DIAGRAM

Units in mm



Note: Specifications subject to change without notice.