



Professional high-speed optical transceiver

OPN-SL15-240LC2 / OPN-SL15-240LC2I

3.3V / 1550 nm / 155 Mbps 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 SONET OC-3 / SDH STM-1
 - SFF-8472 Digital Diagnostic Function
 - 1550 nm DFB LD Transmitter
 - 50 dB Power Budget at Least
 - Distance up to 240 km
 - AC/AC Coupling according to MSA
 - Single +3.3 V Power Supply
 - RoHS Compliant
 - 0 to 70°C Operation: OPN-SL15-240LC2
 - -50 to 85°C Operation: OPN-SL15-240LC2I
- Class 1 Laser International Safety Standard IEC-60825Compliant

APPLICATIONS

- ATM Switches and Routers
- SONET / SDH Switch Infrastructure
 - Fast Ethernet Applications

PRODUCT DESCRIPTION

The OPN-SL15-240LC2 series single mode transceiver is smallform factor pluggable module for bi-directional serial optical data communications such as SONET OC-3 / SDH STM-1 and Fast Ethernet. It is with the SFP 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I²C. A guaranteed minimum optical link budget of 50 dB is offered which can correspond to a link distance of over 240 km (assuming worst case fiber loss of 0.2 dB/km).

This module is designed for single mode fiber and operates at a nominal wavelength of 1550 nm. The transmitter section uses a 1550 nm multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAsdetector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

ORDER INFORMATION

P/No.	Bit Rate (Mb/s)	SONET /SDH	Distance (km)	Wavelength (nm)	Package	Temp. (°C)	TX Power (dBm)	RX Sens. (dBm)	RoHS Compliant
OPN-SL15-240LC2	125 / 155		240	1550 DFB	LC SFP with DMI	0 to 70	8 to 5	-45	Yes
OPN-SL15-240LC2I	125 / 155		240	1550 DFB	LC SFP with DMI	-50 to 85	8 to 5	-45	Yes

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-50	85	°C	
Operating Case Temperature	Topr	0	70	°C	OPN-SL15-240LC2 OPN-SL15-240LC2I
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	V _{CC}	3.13	3.3	3.47	V
Operating Case Temperature	T _{opr}	0 -50		70 85	°C / OPN-SL15-240LC2 °C / OPN-SL15-240LC2I
Power Supply Current	I _{CC} (TX+RX)		200	300	mA
Data Rate			125/155	200	Mb/s

Transmitter Specifications (0°C < T _{opr} < 70°C, 3.13V < V _{CC} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Optical Transmit Power	P _o	5	---	8	dBm	1
Output Center Wavelength	λ	1500		1580	nm	
Output Spectrum Width	Δλ	---	---	1	nm	-20 dB Width
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	E _R	10	---	---	dB	
Output Eye	Compliant with Bellcore TR-NWT-000253 and ITU recommendation G.957					
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			-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		V _{CC}	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		0.8	V	3
TX Fault Output Voltage -- High	T _{FaultH}	2.0		V _{CC} +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 V_{CC}TX.
3. Open collector compatible, 4.7K to 10K ohm pull-up to V_{CC} (Host Supply Voltage).

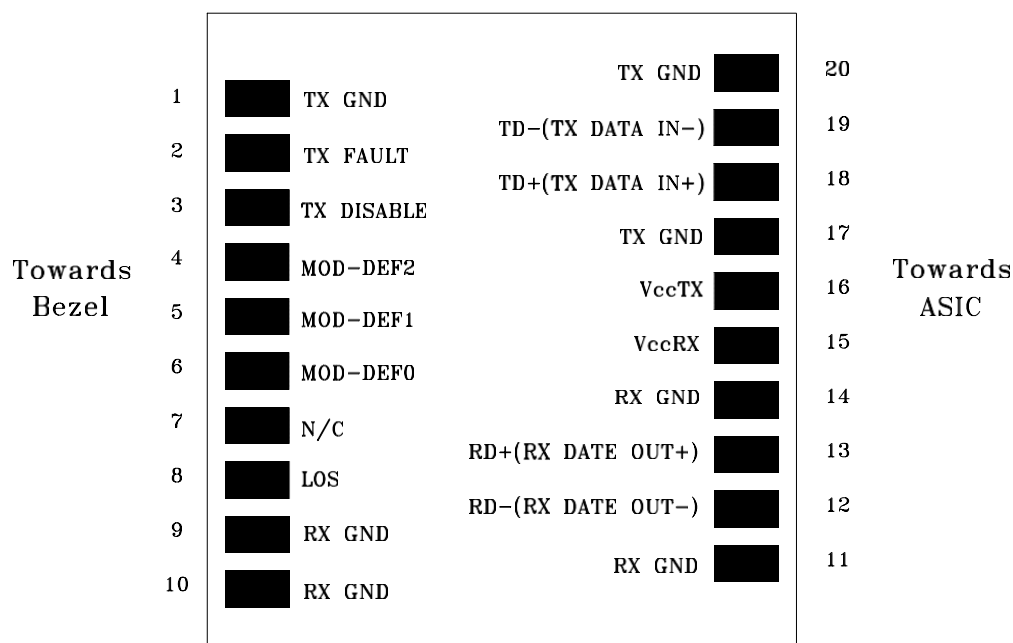
Receiver Specifications (0°C < T _{opr} < 70°C, 3.13V < V _{CC} < 3.47V)						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical						
Sensitivity	Sens			-45	dBm	4
Maximum Input Power	P _{in}	-10			dBm	4
Signal Detect -- Asserted	P _a	---		-45	dBm	Transition: low to high
Signal Detect -- Deasserted	P _d	-55	---	---	dBm	Transition: high to low
Signal detect -- Hysteresis		1.0	---		dB	
Wavelength of Operation		1200	---	1600	nm	
Electrical						
Differential Output Voltage	V _{OH} - V _{OL}	0.6		2.0	V	
Output LOS Voltage -- Low	V _{OL}	0		0.8	V	5
Output LOS Voltage -- High	V _{OH}	2.0		V _{CC} +0.3	V	5

4. Measured at 2²³-1 PRBS at BER 1E-10. Receiver sensitivity is better than -45dBm at 155 Mbps and 125 Mbps. 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 V_{CC} (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

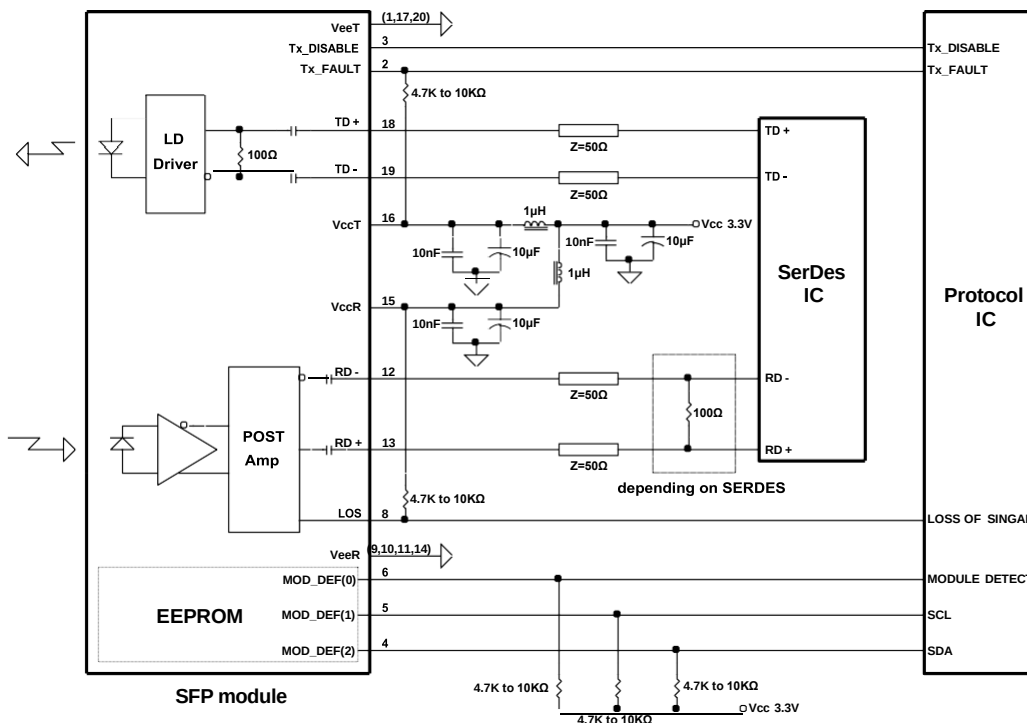
Module Definition

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 E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

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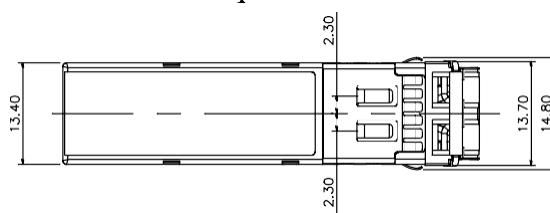
RECOMMENDED CIRCUIT SCHEMATIC



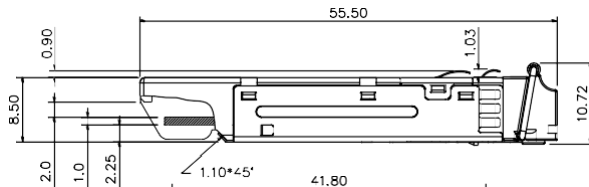
PACKAGE DIAGRAM

Units in mm

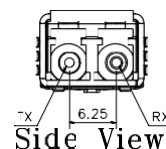
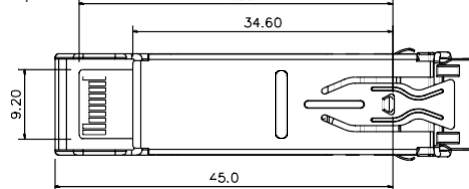
Top View



Front View



Bottom View



Note: Specifications subject to change without notice.