Gigabit Singlemode	C-13-1250-SFP-SLC C-13-1250-SFP-SLC2 C-13-1250-SFPD-SLC2 C-15-1250-SFPD-SLC2	*1.25 Gbps Single Mode SFP LC Transceiver*

Description

OIC-Luminent Small Form Factor Pluggable Transceiver is fully compliant with the SFP Multi-Source Agreement Specification. The C-1X-1250-SFPX-SLCX transceiver family also meets the requirements of the IEEE 802.3 Gigabit Ethernet Standard. These modules are designed for short and long-reach applications (1000 BASE-LX). OIC-Luminent's transceivers incorporate highly reliable Fabry-Perot (FP) and Distributed Feedback (DFB) lasers at 1310 nm and 1550 nm.

Each optical transceiver has a novel push-to-pull release feature that allows for a simple and easy one motion product release. The new SFP includes built-in serial ID recognition, which allows the user to interface with the I^2C EEPROM that displays information on manufacturer, part number, link, distance, and other parameters. This is yet another solution from OIC-Luminent's broad portfolio supporting metro and access optical connectivity.

Features

- Small Form Pluggable MSA Compliant
- For Single Mode Applications
- 1310nm / 1550nm Wavelength, FP / DFB Laser
- 1.25 Gigabit Ethernet
- Low power consumption
- Standard LC Duplex Connector
- Serial ID through I^2C Interface
- Temperature Range: 0 to 70^oC
- Class 1 Laser International Safety Standard IEC 825 Compliant
- Flammability to UL94V0
- Humidity RH 5-85% (5-95% short term) to IEC 68-2-3
- Complies with Bell core TA-NWT-000983
- Uncooled laser diode with MQW structure

Applications

- Small Form Pluggable MSA Compliant
- 1.25 Gigabit Ethernet

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	Vcc		4.0	V	
Output Correct (Surge)	Ios		70	nA	
Output Current (Continuous)	lo		50	mA	
Stotage Temperature	Tstg	-40	85	°C	
Operating Temperature	T_{opr}	0	70	°C	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	Vcc	3.1	3.3	3.5	V
Operating Temperature	T_{opr}	0		70	°C
Data Rate			1250		Mbit/s

Transmitter Specifications (0°C<T_{opr}<70°C,3.1V<Vcc<3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Optical						
Optical Transmit Power	P_o	-10	---	-3	dBm	C-13-1250-SFP-SLC
Optical Transmit Power	P_o	-5	---	0	dBm	C-1X-1250-SFPX-SLC2
Output Center Wavelength	λp	1270	1310	1355	nm	C-13-1250-SFP-SLC
Output Center Wavelength	λp	1275	1310	1350	nm	C-13-1250-SFP-SLC2
Output Center Wavelength	λp	1280	1310	1340	nm	C-13-1250-SFPD-SLC2
Output Center Wavelength	λp	1520	1550	1580	nm	C-15-1250-SFPD-SLC2
Output Spectrum Width	$\Delta\lambda_{rms}$	---	---	4	nm	RMS (σ), C-13-1250-SFP-SLC
Output Spectrum Width	$\Delta\lambda_{rms}$	---	---	2.5	nm	RMS (σ), C-13-1250-SFP-SLC2
Output Spectrum Width	$\Delta\lambda_{rms}$			1	nm	-20 dB width , C-1X-1250-SFPD-SLC2
Side Mode Suppression	Sr	30	35	---	dB	CW, Po=5 mW , C-1X-1250-SFPD-SLC2
Extinction Ratio	E_R	9	---	---	dB	
Output Eye	Compliant with IEEE 802.3					
Optical Rise Time	t_r			260	ps	20%-80% Values
Optical Fall Time	t_f			260	ps	20%-80% Values
Duty Cycle Distortion				100	ps(p-p)	
Total Jitter				100	ps(p-p)	
Electrical						
Power Supply Current	Icc			160	mA	Maximum current is specified at Vcc=Maximum & maximum temperature.
TX_DISABLE Input Voltage-Low	V_{IL}	0		0.8	V	Transmitter on
TX_DISABLE Input Voltage-High	V_{IH}	2		3.465	V	Transmitter Disabled
TX_Fault Output Voltage-Low	V_{TOL}	0		0.8	V	Laser in normal operation
TX_Fault Input Voltage-High	V_{TOH}	2		V_{cc}+0.3	V	Laser fault
Data Input Voltage-Low	V_{IL}-V_{CC}	-1.82		-1.48	V	Terminated by 50Ω to V_{cc} –2V
Data Input Voltage-High	V_{IH}-V_{CC}	-1.16		-0.89	V	Terminated by 50Ω to V_{cc} –2V
Data Input Voltage-Differential	VI	400		1600	mAp-p	AC coupled inputs
Data Input Voltage-Single Ended	VI	200		800	mAp-p	AC coupled inputs

Receiver Specifications (0°C<T_{opr}<70°C,3.1V<Vcc<3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Optical						
Sensitivity	---	---		-20	dBm	C-13-1250-SFP-SLC/2, Measured with 2^7-1 PRBS, BER=10^{-10}
Sensitivity	---	---		-24	dBm	C-1X-1250-SFPD-SLC2, Measured with 2^7-1 PRBS, BER=10^{-10}
Maximum Input Power	Pin			-3	dBm	
RX_LOS – Asserted	Pa	---		-20	dBm	Measured on transition: low to high
RX_LOS –Deasserted	Pd	-38		---	dBm	Measured on transition: high to low
RX_LOS –Hysteresis	Pa-Pd	1			dB	
Wavelength of Operation		1100		1600	nm	
Electrical						
Power Supply Current	Icc	---		130	mA	The current excludes the output load current
Data output Voltage—Low	V_{OL}-V_{CC}	-1.82		-1.63	V	Terminated by 50Ω to V_{cc} –2V
Data output Voltage—High	V_{OH}-V_{CC}	-1.03		-0.89	V	Terminated by 50Ω to V_{cc} –2V
Data output Voltage-Single Ended		250		500	mAp-p	AC coupled outputs
Data output Voltage-Differential		500		1000	mAp-p	AC coupled outputs
RX_LOS Output Voltage - Low	V_{rol}	0		0.8	V	Rx in normal operation
RX_LOS Output Voltage - High	V_{roh}	2		V_{cc}+0.3	V	Rx input power is below the threshold level
Rise Time	t_r			260	ps	20%～80% Values
Fall Times	t_f			260	ps	20%～80% Values
Data dependent Jitter		2.0			dB	
Duty Cycle Distortion				0.1	ns(p-p)	
Signal Detect Timing-Assertion				100	μs	
Signal Detect Timing-Deassertion				100	μs	

CONNECTION DIAGRAM

PIN	Function	Notes
1	VeeT	TX GND
2	TX Fault	Open Collector
3	TX Disable	Internally Pulled High
4	MOD_DEF2	I^2C Data Input
5	MOD_DEF1	I^2C Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	VeeR	RX Ground
10	VeeR	RX Ground
11	VeeR	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	VeeR	RX GND
15	VccR	RX Power
16	VccT	TX Power
17	VeeT	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	VeeT	TX GND

Removal of the transceiver

The latching mechanism for this Small Form Pluggable transceiver is a push to release type. By pushing in the lever, located under the LC duplex connector, the latch that secures the transceiver onto the cage disengages. Once disengaged, pull upon the optical connector to remove the transceiver.

RECOMMENDED CIRCUIT SCHEMATICS

Inputs to the C-1X-1250-SFPX-SLCX transmitter are AC coupled and internally terminated through 50 ohms to AC ground. The input signal must have at least a 200 mV peak to (single ended) signal swing. Output from the receiver section of the module is also AC coupled and is expected to drive into 50 ohm load. Different termination strategies may be required depending on the particular Serializer / Deserializer chip set used.
The C-1X-1250-SFPX-SLCX product family is designed with AC coupled data inputs and outputs to provide the following advantages:

- Close positioning of SERDES with respect to transceiver; allows for shorter line lengths and at gigabit speeds reduces EMI.
- Minimum number of external components.
- Internal termination reduces the potential for unterminated stubs which would otherwise increase jitter and reduce transmission margin.

Figure 1 & 2 illustrates the recommended host board power supply and data line interface terminations for SERDES Inputs / Outputs respectively.

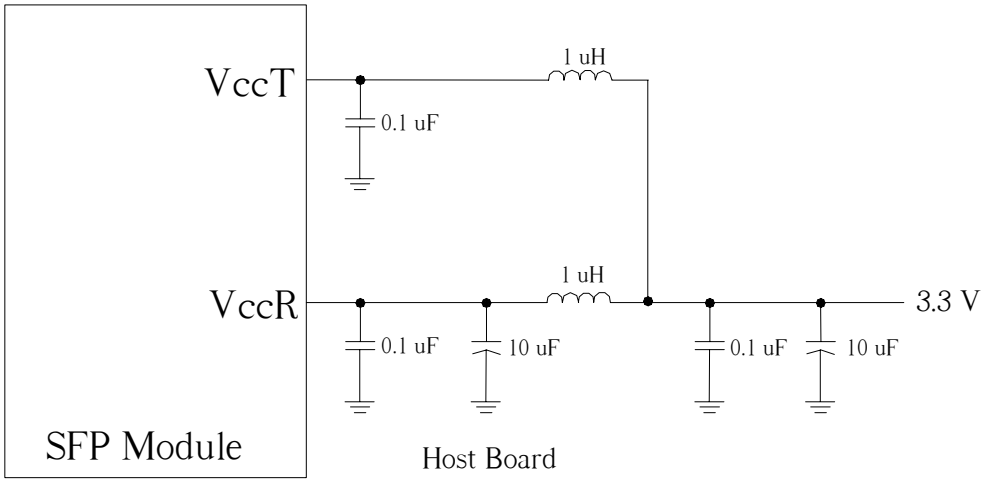


Figure 1. Recommended Host Board Supply Filtering Network

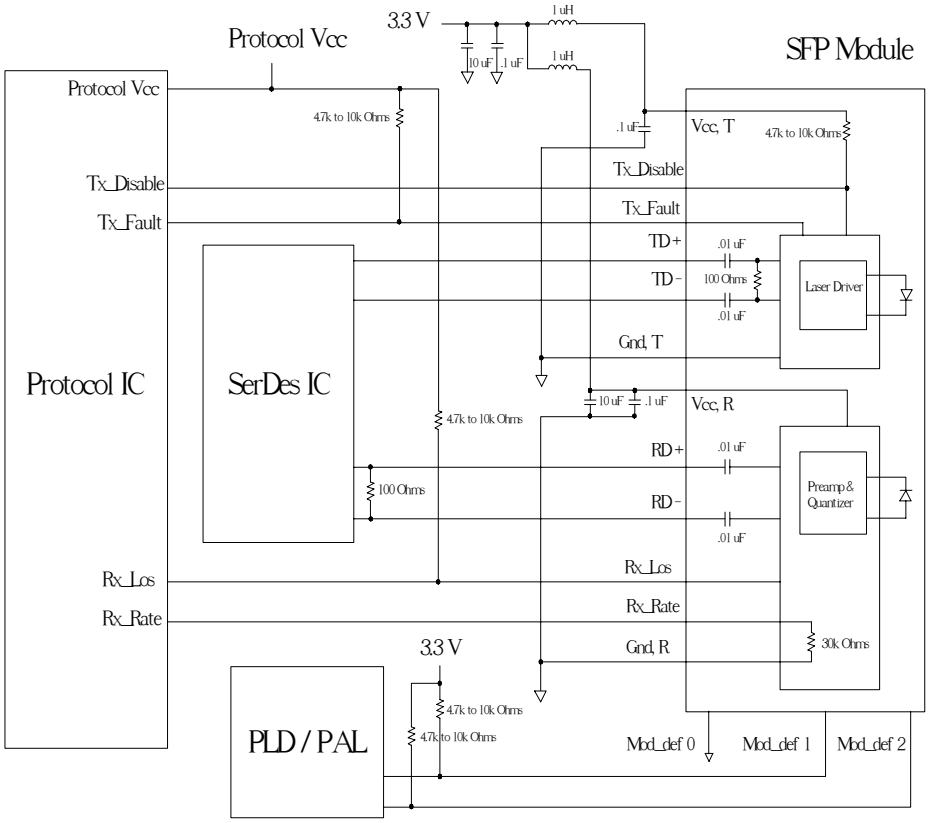


Figure 2. Example SFP Host Board Schematic

Printed Circuit Board Layout Considerations

A fiber-optic receiver employs a very high gain, wide bandwidth transimpedance amplifier. This amplifier detects and amplifies signals that are only tens of nA in amplitude when the receiver is operating near its limit. Any unwanted signal currents that couple into the receiver circuitry causes a decrease in the receiver's sensitivity and can also degrades the of the receiver's signal detect (SD) circuit. To minimize the coupling of unwanted noise into the receiver, careful attention must be given to the printed circuit board.

At a minimum, a double-sided printed circuit board (PCB) with a large component side ground plane beneath the transceiver must be used. In applications that include many other high speed devices, a multi-layer PCB is highly recommended. This permits the placement of power and ground on separate layers, which all them to be isolated from the signal lines. Multilayer construction also permits the routing of signal traces away from high level, high speed signal lines. To minimize the possibility of coupling noise into the receiver section, high level, high speed signals such as transmitter inputs and clock lines should be routed as far away as possible from the receiver pins.

Noise that couples into the receiver through the power supply pins can also degrade performance. It is recommended that a pi filter in both the transmitter and receiver power supplies.

EMI and ESD Considerations

OIC transceivers offer a metalized plastic case and a special chassis grounding clip. As shown in the drawing, this clip connects the module case to chassis ground then installed flush through the panel cutout. The grounding clip in this way brushes the edge of the cutout in order to make a proper contact. The use of a grounding clip also provides increased electrostatic protection and helps reduce radiated emissions from the module or the host circuit board through the chassis faceplate. The attaching posts are at case potential and may be connected to chassis ground. They should not be connected to circuit ground.

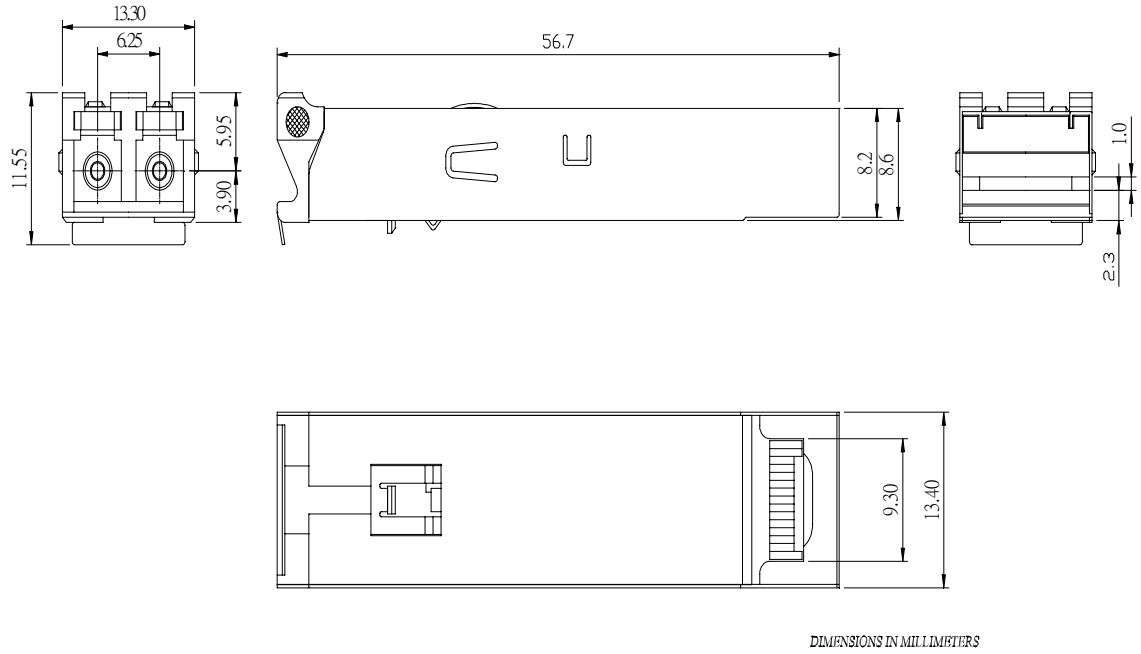
Plastic optical subassemblies are used to further reduce the possibility of radiated emissions by eliminating the metal from the transmitter and receiver diode housings, which extend into connector space. By providing a non-metal receptacle for the optical cable ferrule, the gigabit speed RF electrical signal is isolated form the connector area thus preventing radiated energy leakage from these surfaces to the outside of the panel.

LASER Safety

This single mode transceiver is a Class1 laser product. It complies with IEC 825 and FDA 21 CFR 1040.10 and 1040.11.The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall determinate with an optical connector or with a dust plug.

PACKAGE DIAGRAM

Units in mm (inch)



Case with EMI Shielding Finger