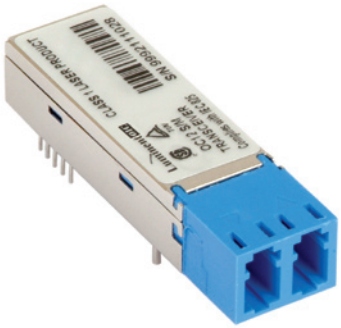
1.25 Gbps Single Mode SFF LC Transceiver

C-1x-1250(C)-F(DFB)-SLCx



Features

- Duplex LC Single Mode Transceiver
- Small Form Factor Multi-sourced 2x5 Pin Package
- Complies with IEEE 802.3 Gigabit Ethernet
- 1310 nm/ 1550 nm wavelength, FP/DFB Laser
- Single +3.3V Power Supply
- LVPECL Differential Inputs and Outputs
- LVTTL Signal Detection Output(C-1x-1250C-Fx-SLCx)
- LVPECL Signal Detection Output(C-1x-1250-Fx-SLCx)
- Temperature Range: 0 to 70°C
- Class 1 Laser International Safety Standard IEC 825 Compliant
- Solder ability to MIL-STD-883, Method 2003
- Pin coating is Sn/Pb with minimum 2% Pb content
- Flammability to UL94V0
- Humidity RH-5-85% (5-95% short term) to IEC 68-2-3
- Complies with Telcordia(Bellcore) GR-468-CORE
- Uncooled laser diode with MQW structure
- 1.25 Gbps Ethernet Links
- 1.06 Gbps Fiber Channel

Absolute Maximum Rating

Parameter	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{cc}	0	3.6	V	
Output Current	I_{out}	0	30	mA	
Soldering Temperature	-	-	260	°C	10 seconds on leads only
Operating temerature	T_{opr}	0	70	°C	
Storage Temperature	T_{stg}	-40	85	°C	

Recommended Operating Condition

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{cc}	3.1	3.3	3.5	V
Operating Temperature	T_{opr}	0	-	70	°C
Data Rate	-	-	1250	-	Mbps

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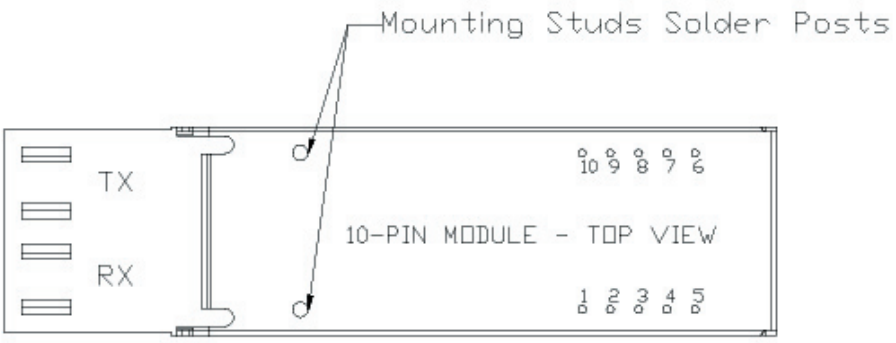
Transmitter Specifications, ($0°C<T_{opr}<70°C$, $3.1V < V_{CC} < 3.5V$)						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Optical						
Optical Transmit Power	P_o	-9.5	-	-3	dBm	C-13-1250(C)-F-SLC
Optical Transmit Power	P_o	-5	-	0	dBm	C-1x-1250(C)-Fx-SLC2
Output center Wavelength	λ	1270	1310	1355	nm	C-13-1250(C)-F-SLC
Output center Wavelength	λ	1275	1310	1350	nm	C-13-1250(C)-F-SLC2
Output center Wavelength	λ	1280	1310	1340	nm	C-13-1250(C)-FDFB-SLC2
Output center Wavelength	λ	1520	1550	1580	nm	C-15-1250(C)-FDFB-SLC2
Output Spectrum Width	$\Delta\lambda_{rms}$	-	-	3	nm	RMS(σ), C-13-1250(C)-F-SLC
Output Spectrum Width	$\Delta\lambda_{rms}$	-	-	2.5	nm	RMS(σ), C-13-1250(C)-F-SLC2
Output Spectrum Width	$\Delta\lambda_{rms}$	-	-	1	nm	-20 dB width, C-1x-1250(C)-FDFB-SLC2
Side Mode Suppression Ratio	Sr	30	35	-	dB	CW, Po=5mW
Extinction Ratio	ER	9	-	-	dB	
Output Eye		Compliant with IEEE 802.3				
Optical Rise Time	t_r	-	-	0.26	ns	20% to 80% Values
Optical Fall Time	t_f	-	-	0.26	ns	20% to 80% Values
Relative Intensity Noise	RIN	-	-	-120	dB/Hz	
Total Jitter	TJ	-	-	0.27	ns	Measured with 2^{23}-1 PRBS with 72 ones and 72 zeros.

Transmitter Specifications, ($0°C<T_{opr}<70°C$, $3.1V < V_{CC} < 3.5V$)						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Electrical						
Power Supply Current	I_{CC}	-	-	160	mA	Maximum current is specified at Vcc= Maximum @ maximum temperature
Transmitter Enable Voltage	V_{EN}	0	-	0.8	V	
Transmitter Disable Voltage	V_D	2	-	Vcc	V	
Data Input Current-Low	I_{IL}	-200	-	-	μA	
Data Input Current-High	I_{IH}	-	-	200	μA	
Data Input Voltage-Low	V_{IL}-V_{CC}	-2.0	-	-1.58	V	These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs
Data Input Voltage-High	V_{IH}-V_{CC}	-1.1	-	-0.74	V	

Receiver Specifications, (0°C<T_{opr}<70°C, 3.1V < V_{CC} < 3.5V)						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Optical						
Sensitivity	-	-	-	-20	dBm	C-13-1250(C)-F-SLC2, Measured with 2^7-1 PRBS, BER = 10^{-10}
Sensitivity	-	-	-	-24	dBm	C-1x-1250(C)-FDFB-SLC2, Measured with 2^7-1 PRBS, BER = 10^{-10}
Maximum Input Power	P_{in}	-	-	-3	dBm	
Signal Detect-Asserted	Pa	-	-	-20	dBm	Measured on transition: low to high
Signal Detect-Deasserted	Pd	-38	-	-	dBm	Measured on transition: high to low
Signal Detect-Hysteresis		1.0	-	4.0	dB	
Wavelength of Operation		1100	-	1600	nm	

Receiver Specifications, (0°C<T_{opr}<70°C, 3.1V < V_{CC} < 3.5V)						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Note**
Electrical						
Power Supply Current	I_{CC}	-	-	120	mA	The current excludes the output load current
Data Output Voltage-Low	V_{OL} -V_{cc}	-2.0	-	-1.58	V	These outputs are compatible with 10K, 10KH and 100KECL and LVPECL outputs
Data Output Voltage-High	V_{OH}- V_{cc}	-1.1	-	-0.74	V	
Signal Detect output Voltge-Low	V_{SDL}-V_{cc}	-2.0	-	-1.58	V	C-1x-1250-Fx-SLCx
Signal Detect Output Voltage-High	V_{SDH}- V_{cc}	-1.1	-	-0.74	V	
Signal Detect Output Voltage-Low	V_{SDL}-V_{cc}	-	-	0.5	V	C-1x-1250C-Fx-SLCx
Signal Detect Output Voltage-High	V_{SDH}- V_{cc}	2.0	-	-	V	

Connection Diagram



PIN	Symbol	Notes
1	RxGND	Directly connect this pin to the receiver ground plane
2	RxVcc	+3.3V dc power for the receiver section
3	SD	Active high on this indicates a received optical signal(LVPECL/LVTTL)
4	RD-	Receiver Data Out Bar (LVPECL)
5	RD+	Receiver Data Out (LVPECL)
6	TxVcc	+3.3V dc power for the trasmitter section
7	TxGND	Directly connect this pin to the transmitter ground plane
8	TxDIS	Transmitter disable (LVTTL)
9	TD+	Transmitter Data In (LVPECL)
10	TD-	Transmitter Data In Bar (LVPECL)
Attaching Posts		The attaching posts are at case potential and may be connected to chassis ground. They are isolated from circuit ground.

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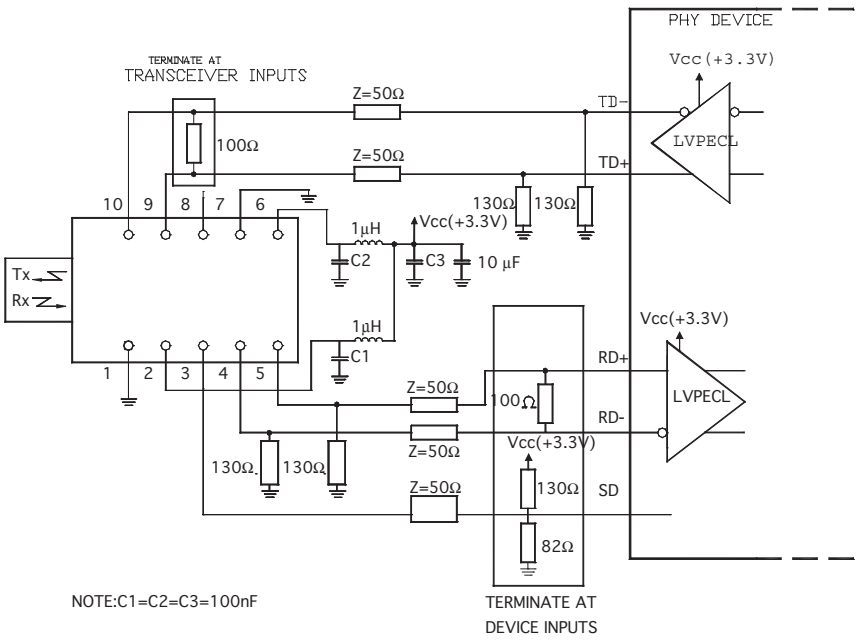
Recommended Circuit Schematic



The split-loaded terminations for ECL signals need to be located at the input of devices receiving those ECL signals.
The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc.
A GND plane under the module is required for good EMI and sensitivity performance.

Printed Circuit Board Layout Consideration

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 it's limit. Any unwanted signal current that couples into the receiver circuitry causes a decrease in the receiver's sensitivity and can also degrade the performance 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, wich allows them to be isolated from the signal lines. Multilayer construction also permits the routing of signal traces away from high level, high speed sinal 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.

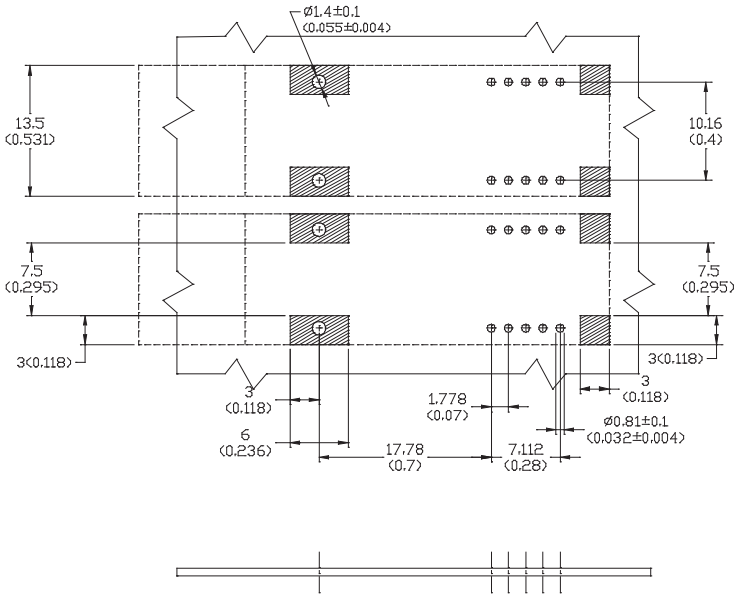
Noise that couples into the receiver through the power supply pins can also degrade performance. It is recommended that a pi filter be used in both transmitter and receiver power supplies.

EMI and ESC Consideration

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 installs flush through the panel cutout. This way, the grounding clip 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 emission 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 emission 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 from the connector area thus preventing radiated energy leakage from these surfaces to the outside of the panel.

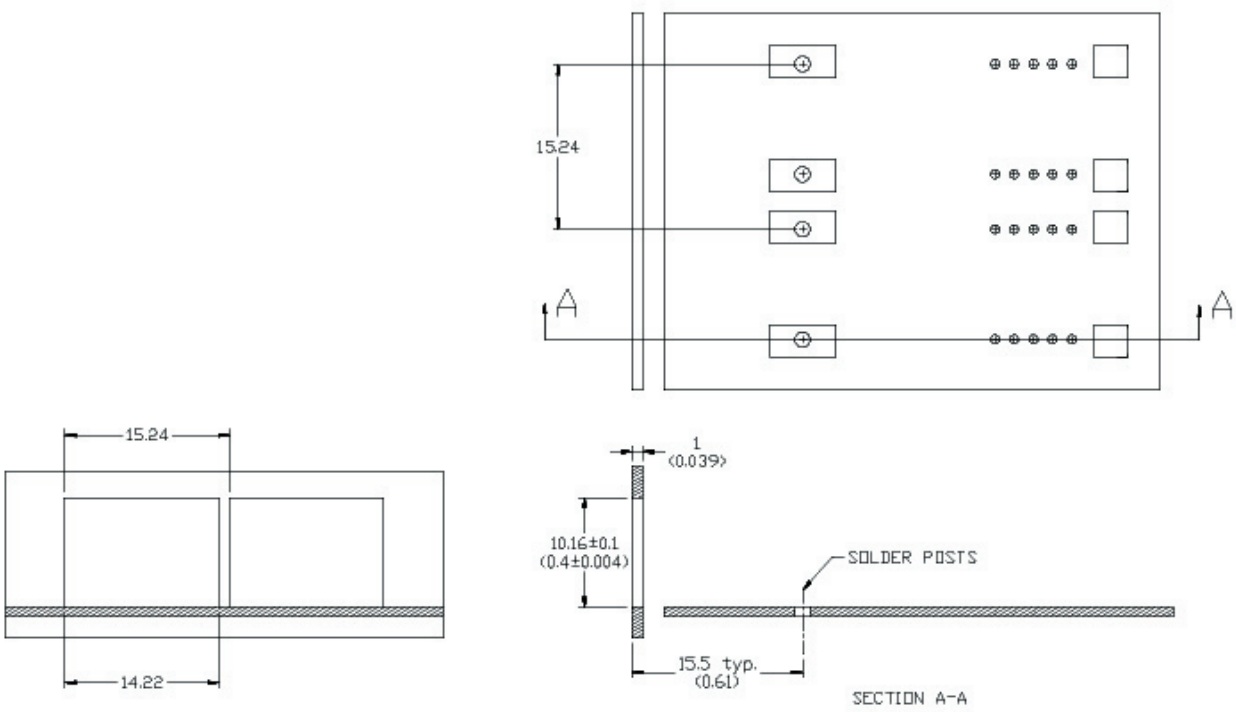
Recommended Board Layout Hole Pattern



DIMENSION IN MILLIMETER (INCHES)

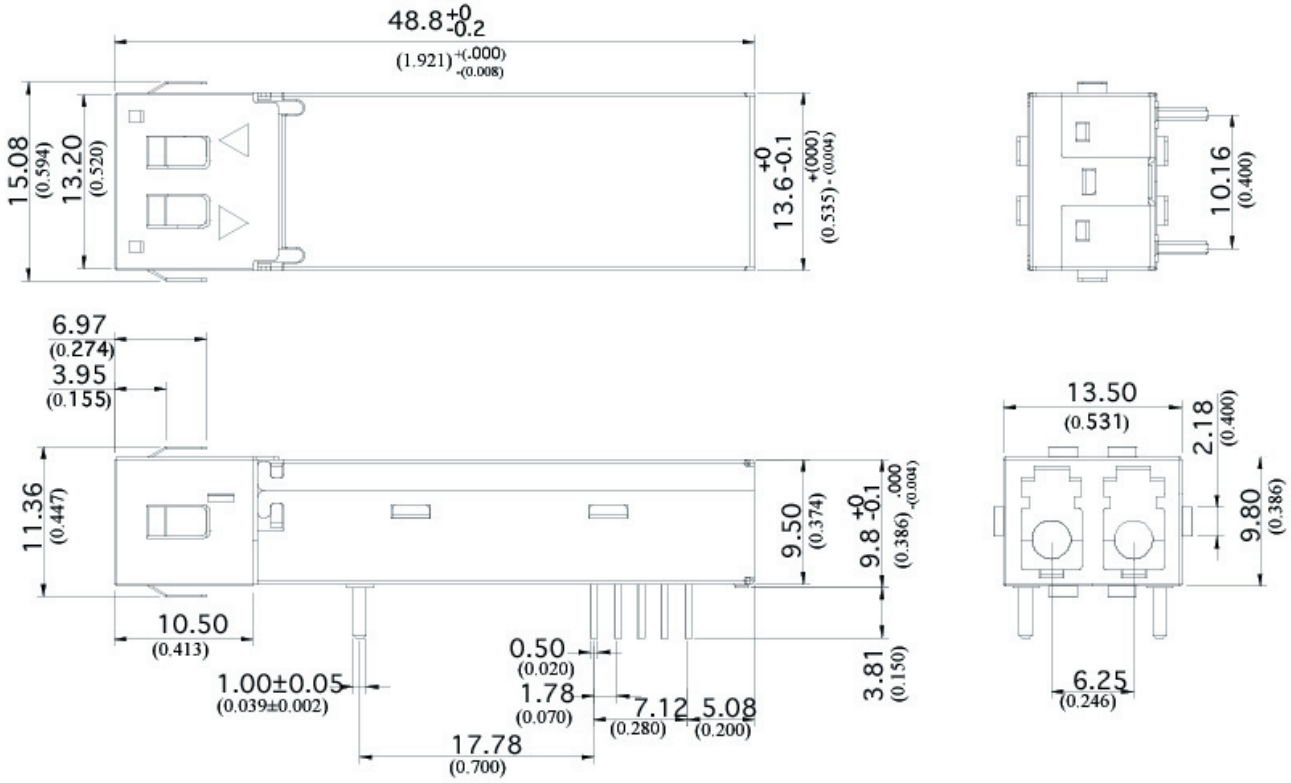
NOTES:
1.THIS FIGURE DESCRIBE THE RECOMMAND CIRCUIT BOARD LAYOUT FOR THE SFF TRANSCEIVER.
2.THE HATCHED AREAS ARE KEEP-OUT AREAS RESERVED FOR HOUSING STANDOFF. NO METAL TRACES OR GROUND CONNECTION IN KEEP-OUT AREAS.
3.THE MOUNTING STUDS SHOULD BE SOLDERED TO CHASSIS GROUND FOR MECHANICAL INTEGRITY.

Recommended Panel mounting



DIMENSION IN MILLIMETER (INCHES)

Package Diagram



Warnings:

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Legal Notes:

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