



### Features

- Duplex LC Single Mode Transceiver
- Small Form Factor Multi-sourced 2 x 5 Pin Package
- Long reach SONET OC-3 / SDH STM-1 LR1 Compliant
- Single +3.3V Power Supply
- LVPECL Differential Inputs and Outputs
- Class 1 Laser International Safety Standard IEC 825 Compliant
- Solderability to MIL-STD-883, Method 2003
- Flammability to UL94V0
- Humidity RH 5-85% (5-95% short term) to IEC 68-2-3
- Complies with Bellcore GR-468-CORE
- Uncooled laser diode with MQW structure
- ATM 155Mb/s Links
- RoHS compliance available

**Table 1 – Absolute Maximum Rating**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	V <sub>cc</sub>	0	-	3.6	V	
Output Current	I <sub>out</sub>	-	-	30	mA	
Soldering Temperature	-	-	-	260	°C	1
Storage Temperature	T <sub>stg</sub>	-40	-	85	°C	

Note 1: 10 seconds on leads only

**Table 2 – Recommended Operating Condition**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	V <sub>cc</sub>	3.1	3.3	3.5	V	
Operating Temperature (Case)	T <sub>opr</sub>	-40	-	85	°C	
Data Rate	DR	-	155	-	Mbps	

**Table 3 – Transmitter Specifications (Optical)**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Optical Transmit Power	$P_o$	-4.5	-	0	dBm	2
Output Center Wavelength	$\lambda_c$	1280	1310	1335	nm	
Output Spectrum Width	$\Delta \lambda$	-	-	1	nm	3
Side Mode Suppression Ratio	Sr	30	35	-	dBm	
Extinction Ratio	ER	10	-	-	dB	
Output Eye		Compliant with Bellcore GR-253-CORE and ITU Recommendation				
Optical Rise/Fall Time	$t_r / t_f$	-	-	2	ns	4
Relative Intensity Noise	RIN	-	-	-116	dB/Hz	
Total Jitter	$T_J$	-	-	1.2	ns	5

Note 2: Output power is coupled into a 9/125 $\mu$ m single mode fiber.

Note 3: -20 dB width

Note 4: 10% to 90% Values

Note 5: Measured with 223-1 PRBS with 72 ones and 72 zeros.

**Table 4 – Transmitter Specifications (Electrical)**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Current	$I_{CC}$	-	-	180	mA	6
Transmitter Enable Voltage	$V_{EN}$	0	-	0.8	V	
Transmitter Disable Voltage	$V_D$	2	-	$V_{CC}$	V	
Data Input Current-Low	$I_{IL}$	-200	-	-	$\mu$ A	
Data Input Current-High	$I_{IH}$	-	-	200	$\mu$ A	
Data Input Voltage-Low	$V_{IL}-V_{CC}$	-2.0	-	-1.58	V	7
Data Input Voltage-High	$V_{IH}-V_{CC}$	-1.1	-	-0.74	V	

Note 6: Maximum current is specified at  $V_{CC}$  = Maximum @ maximum temperature

Note 7: These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs

**Table 5 – Receiver Specifications (Optical)**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Sensitivity	-	-	-	-35	dBm	8
Maximum Input Power	$P_{in}$	0	-	-	dBm	
Signal Detect-Asserted	$P_a$	-	-	-35	dBm	
Signal Detect-Deasserted	$P_d$	-48	-	-	dBm	
Signal Detect-Hysteresis	-	0.5	-	4.0	dB	
Wavelength of Operation	-	1100	-	1600	nm	

Note 8: Measured with  $2^{23-1}$  PRBS/BER =  $10^{-10}$

**Table 6 – Receiver Specifications (Electrical)**

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Current	$I_{CC}$	-	-	100	mA	9
Data Output Voltage-Low	$V_{OL}-V_{CC}$	-1.98	-	-1.71	V	10
Data Output Voltage-High	$V_{OH}-V_{CC}$	-1.1	-	-0.91	V	
Signal Detect Output Voltage-Low	$V_{SDL}-V_{CC}$	-1.98	-	-1.71	V	11
Signal Detect Output Voltage-High	$V_{SDH}-V_{CC}$	-1.1	-	-0.91	V	
Signal Detect Output Voltage-Low	$V_{SDL}$	0	-	0.5	V	12
Signal Detect Output Voltage-High	$V_{SDH}$	2	-	$V_{CC}$	V	

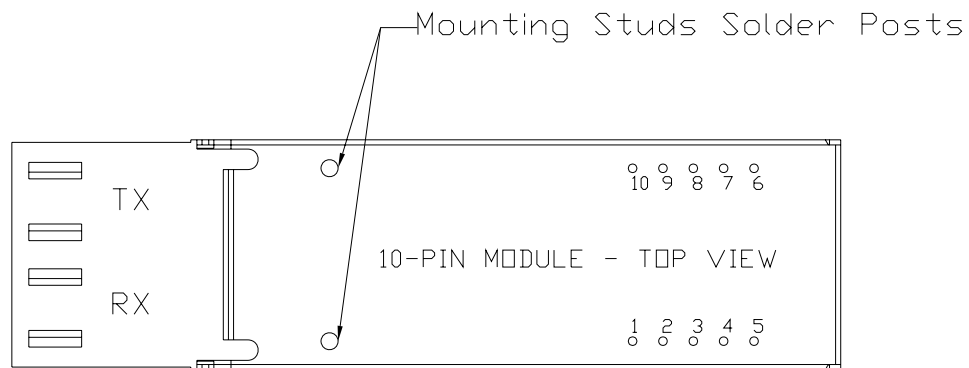
Note 9: The current excludes the output load current

Note 10: These outputs are compatible with 10K, 10KH and 100KECL and LVPECL outputs.

Note 11: C-13-155-FDFB-SLC8A-G5, LVPECL.

Note 12: C-13-155C-FDFB-SLC8A-G5, LVTTTL.

## Connection Diagram

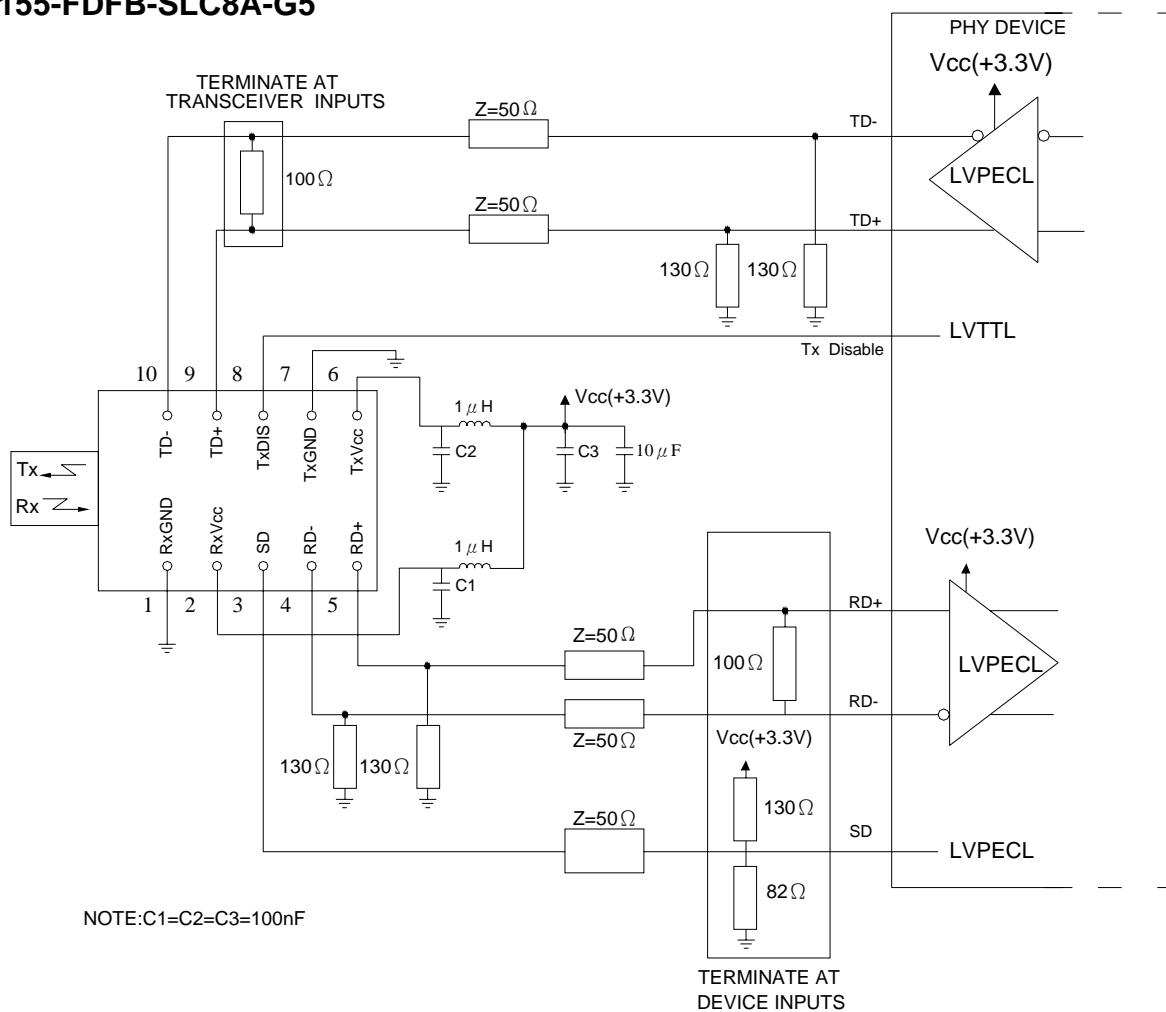


**Table 7 – Pin Definitions**

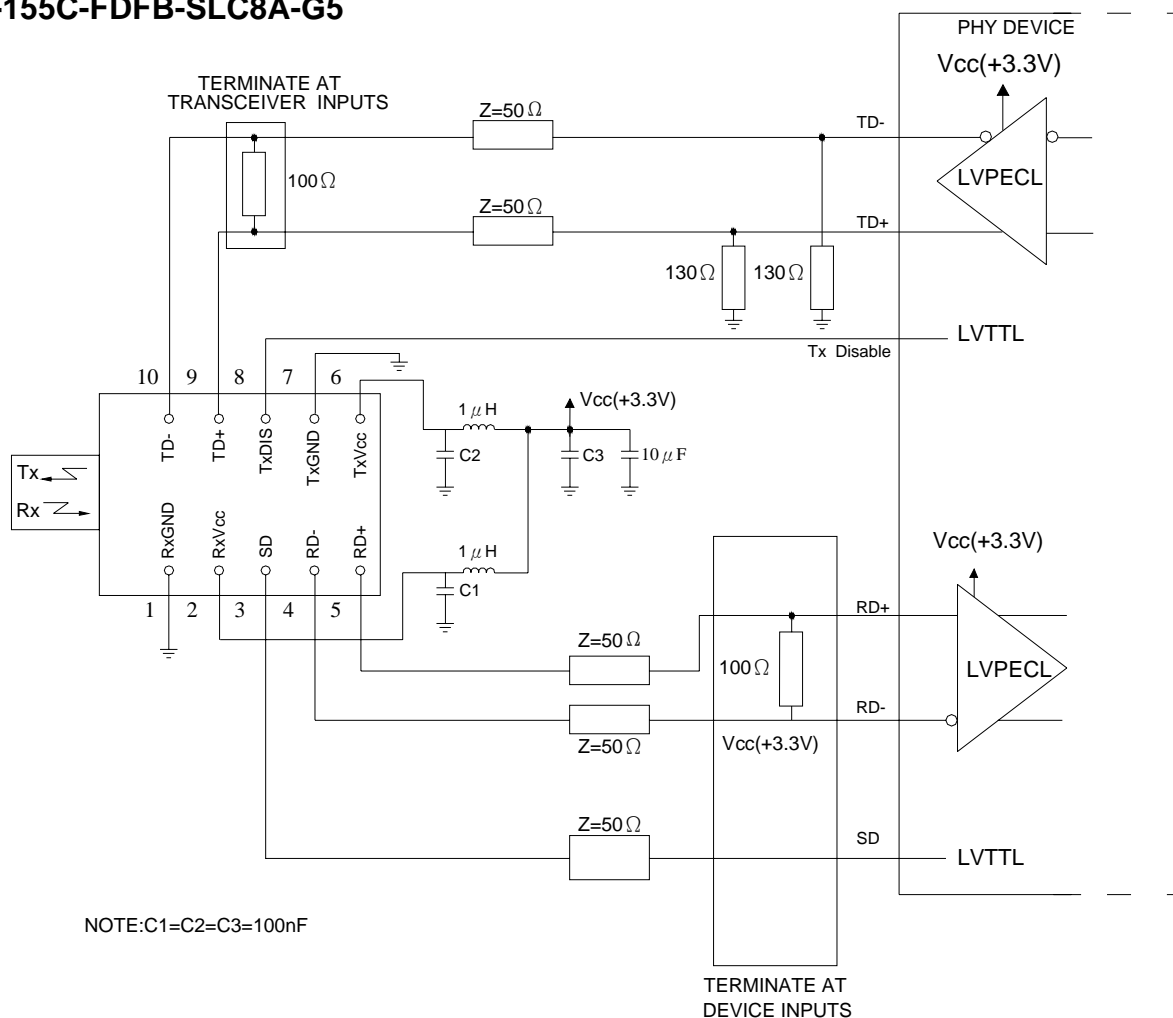
Pin	Unit	Notes
1	RxGND	Directly connect this pin to the receiver ground plane
2	RxVcc	+3.3V dc power for the receiver section
3	SD	Active high on this indicates a received optical signal (LVPECL/LVTTL)
4	RD-	Receiver Data Out Bar (LVPECL)
5	RD+	Receiver Data Out (LVPECL)
6	TxVcc	+3.3V dc power for the transmitter 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.

## Recommended Interface Circuit

### C-13-155-FDFB-SLC8A-G5



**C-13-155C-FDFB-SLC8A-G5**



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 its 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, which allows 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.

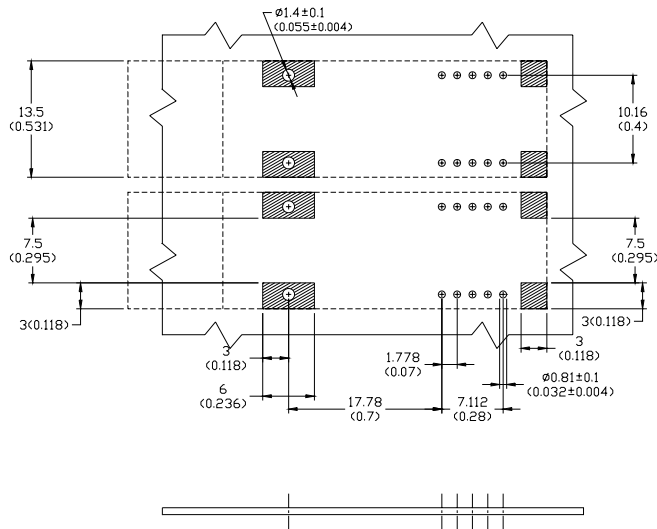
Noise that couples into the receiver through the power supply pins can also degrade performance. It is recommended that a pi filter be used in both transmitter and receiver power supplies.

## **EMI and ESD Consideration**

Source Photonics' 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

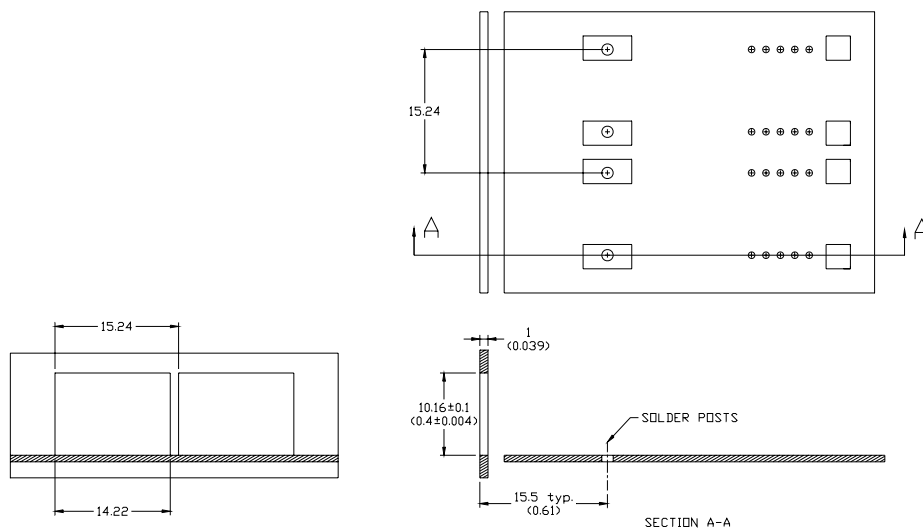


DIMENSION IN MILLIMETER (INCHES)

### 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 Board Layout Hole Pattern

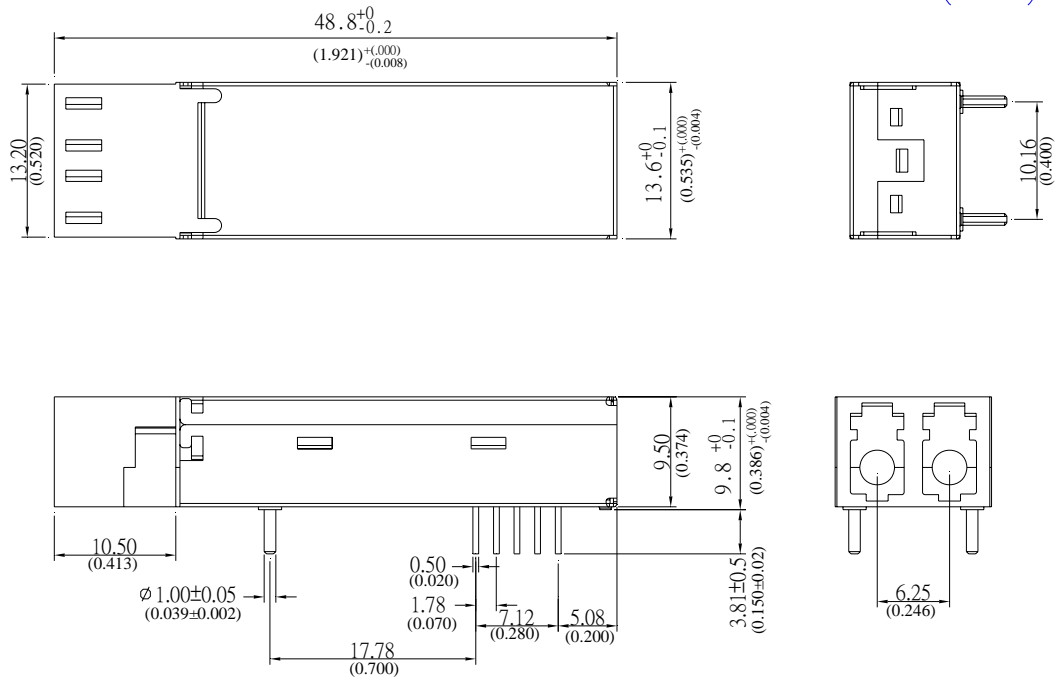


DIMENSION IN MILLIMETER (INCHES)



## Package Diagram

Units:mm(inch)

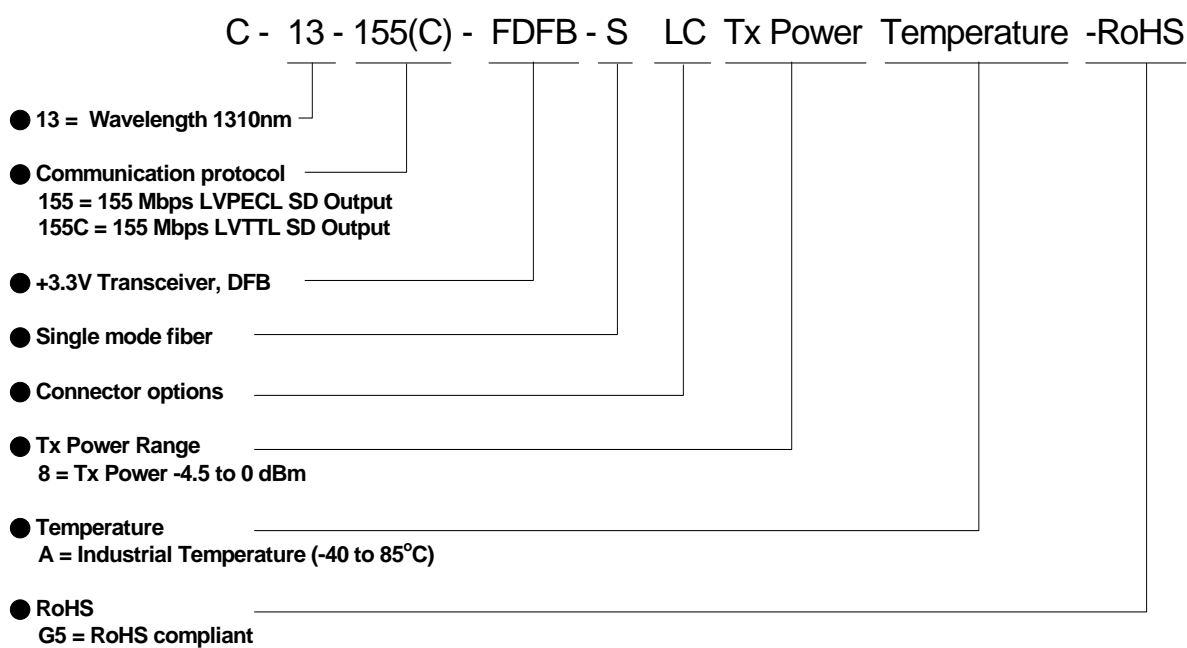


## Ordering Information

Table 8 – Order Information

Part No.
C-13-155-FDFB-SLC8A-G5
C-13-155C-FDFB-SLC8A-G5

### Part Numbering Definition:



## 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.

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