



Features

- Duplex LC Single Mode Transceiver
- Small Form Factor Multi-sourced 2x5 Pin Package
- Ultra Long reach SONET OC-3/SDH STM-1 Compliant
- Single +3.3V Power Supply
- LVPECL Differential Inputs and Outputs
- LVTTTL Signal Detection Output (C-13-155C-F-SLCx)
- LVPECL Signal Detection Output (C-13-155-F-SLCx)
- Temperature Range: 0 to 70 °C [C-13-155(C)-F-SLCx]
- Temperature Range: -40 to 85 °C [C-13-155(C)-F-SLCxA]
- 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
- EMI Shielding Finger Optional
- ATM 155 Mbps links
- RoHS compliance available

Table 1 – Absolute Maximum Rating

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	Vcc	0	-	3.6	V	
Output Current	I _{out}	-	-	30	mA	
Soldering Temperature	-	-	-	260	°C	1
Storage Temperature	T _{stg}	0	-	70	°C	
Storage Temperature	T _{stg}	-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	Vcc	3.1	3.3	3.5	V	
Operating Temperature (Case)	T _{opr}	0	-	70	°C	
Operating Temperature (Case)	T _{opr}	-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	-19	-	-12	dBm	2
Optical Transmit Power	P_o	-15	-	-8	dBm	3
Optical Transmit Power	P_o	-5	-	0	dBm	4
Optical Transmit Power	P_o	-3	-	+2	dBm	5
Optical Transmit Power	P_o	0	-	+5	dBm	6
Output Center Wavelength	λ_c	1261	1310	1360	nm	7
Output Center Wavelength	λ_c	1263	1310	1360	nm	8
Output Center Wavelength	λ_c	1270	1310	1350	nm	9
Output Center Wavelength	λ_c	1275	1310	1345	nm	10
Output Spectrum Width	$\Delta \lambda$	-	-	7.7	nm	11
Output Spectrum Width	$\Delta \lambda$	-	-	3	nm	12
Output Spectrum Width	$\Delta \lambda$	-	-	2.5	nm	13
Extinction Ratio	ER	8.2	-	-	dB	14
Extinction Ratio	ER	10	-	-	dB	15
Output Eye		Compliant with Bellcore GR-253-CORE and ITU Recommendation				
Optical Rise/Fall Time	t_r / t_f	-	-	2	ns	16
Relative Intensity Noise	RIN	-	-	-116	dB/Hz	
Total Jitter	T_j	-	-	1.2	ns	17

Note 2: C-13-155(C)-F-SLC

Note 3: C-13-155(C)-F-SLC3

Note 4: C-13-155(C)-F-SLC5

Note 5: C-13-155(C)-F-SLC7

Note 6: C-13-155(C)-F-SLC9

Note 7: C-13-155(C)-F-SLC(3)

Note 8: C-13-155(C)-F-SLC5

Note 9: C-13-155(C)-F-SLC7

Note 10: C-13-155(C)-F-SLC9

Note 11: C-13-155(C)-F-SLC(3)

Note 12: C-13-155(C)-F-SLC5

Note 13: C-13-155(C)-F-SLC7(9)

Note 14: C-13-155(C)-F-SLC(3)

Note 15: C-13-155(C)-F-SLC5(7/9)

Note 16: 10% to 90% Values

Note 17: Measured with $2^{23}-1$ 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	18
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	-	-	μA	
Data Input Current-High	I_{IH}	-	-	200	μA	
Data Input Voltage-Low	$V_{IL}-V_{CC}$	-2.0	-	-1.58	V	19
Data Input Voltage-High	$V_{IH}-V_{CC}$	-1.1	-	-0.74	V	

Note 18: Maximum current is specified at V_{CC} = Maximum @ maximum temperature

Note 19: 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	-	-	-	-30	dBm	20
Sensitivity	-	-	-	-34	dBm	21
Sensitivity	-	-	-	-35	dBm	22
Sensitivity	-	-	-	-36	dBm	23
Sensitivity	-	-	-	-37	dBm	24
Maximum Input Power	P_{in}	-7	-	-	dBm	25
Maximum Input Power	P_{in}	-3	-	-	dBm	26
Maximum Input Power	P_{in}	0	-	-	dBm	27
Signal Detect-Asserted	P_a	-	-	-30	dBm	28
Signal Detect-Asserted	P_a	-	-	-34	dBm	29
Signal Detect-Asserted	P_a	-	-	-35	dBm	30
Signal Detect-Asserted	P_a	-	-	-36	dBm	31
Signal Detect-Asserted	P_a	-	-	-37	dBm	32
Signal Detect-Deasserted	P_d	-48	-	-	dBm	
Signal Detect-Hysteresis	-	1	-	4	dB	
Wavelength of Operation	-	1100	-	1600	nm	

Note 20, 28: C-13-155(C)-F-SLC

Note 21, 29: C-13-155(C)-F-SLC3

Note 22, 30: C-13-155(C)-F-SLC5

Note 23, 31: C-13-155(C)-F-SLC7

Note 24, 32: C-13-155(C)-F-SLC9

Note 25: C-13-155(C)-F-SLC(3)

Note 26: C-13-155(C)-F-SLC5(7)

Note 27: C-13-155(C)-F-SLC9

Note 33: Measured on transition: high to low

Table 6 – Receiver Specifications (Electrical)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Current	I_{CC}	-	-	100	mA	34
Data Output Voltage-Low	$V_{OL}-V_{CC}$	-2	-	-1.58	V	35
Data Output Voltage-High	$V_{OH}-V_{CC}$	-1.1	-	-0.74	V	
Signal Detect Output Voltage-Low	$V_{SDL}-V_{CC}$	-2	-	-1.58	V	36
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	37
Signal Detect Output Voltage-High	$V_{SDH}-V_{CC}$	2.0	-	-	V	

Note 34: The current excludes the output load current

Note 35: These outputs are compatible with 10K, 10KH and 100KECL and LVPECL outputs.

Note 36: LVPECL, C-13-155-F-SLCX

Note 37: LVTTTL, C-13-155C-F-SLCX

Connection Diagram

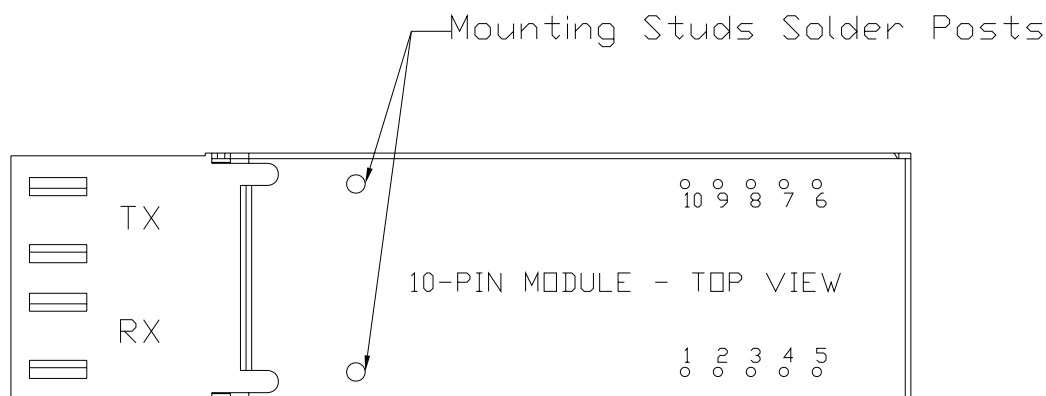
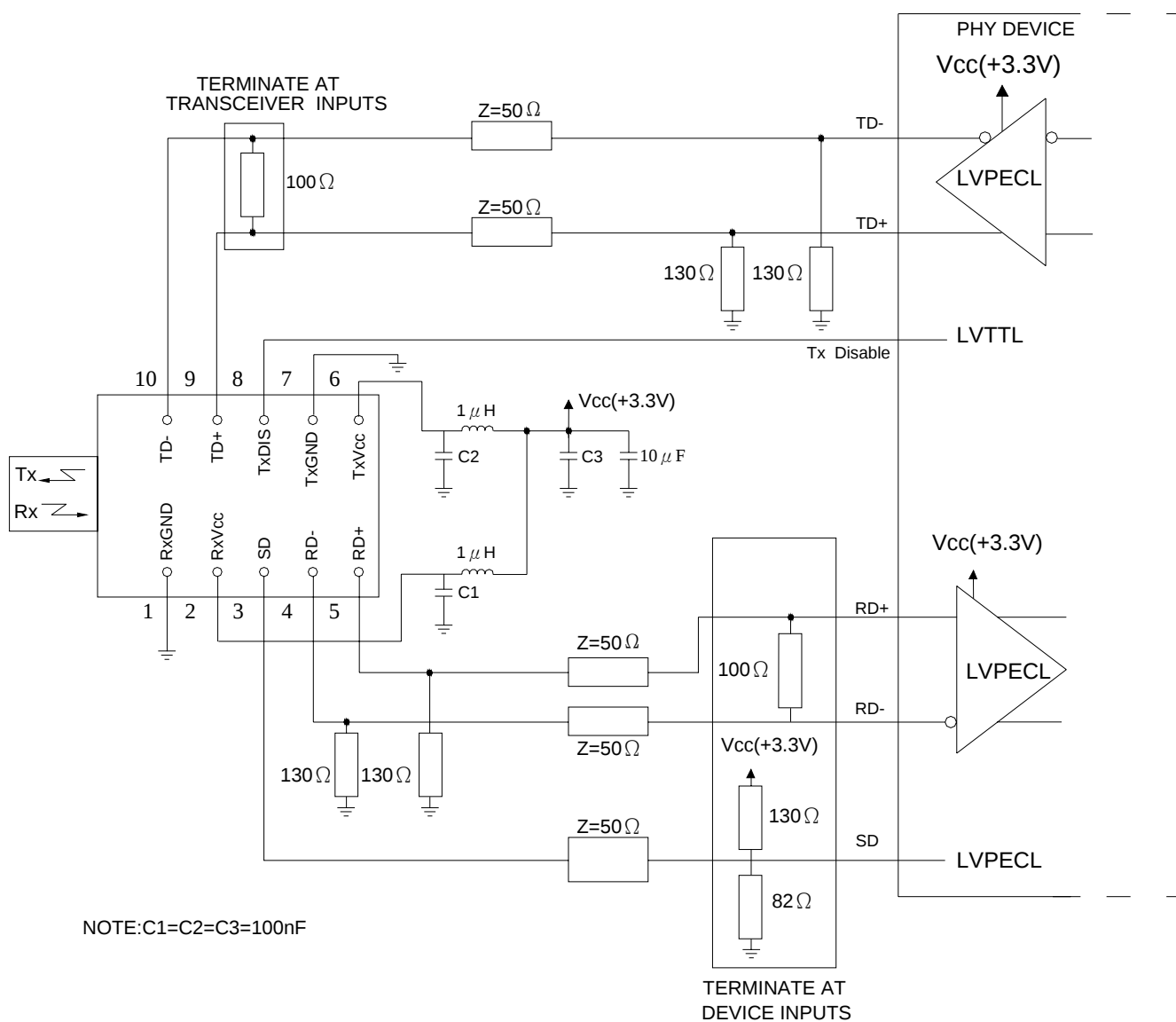


Table 7 – Pin Definitions

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.

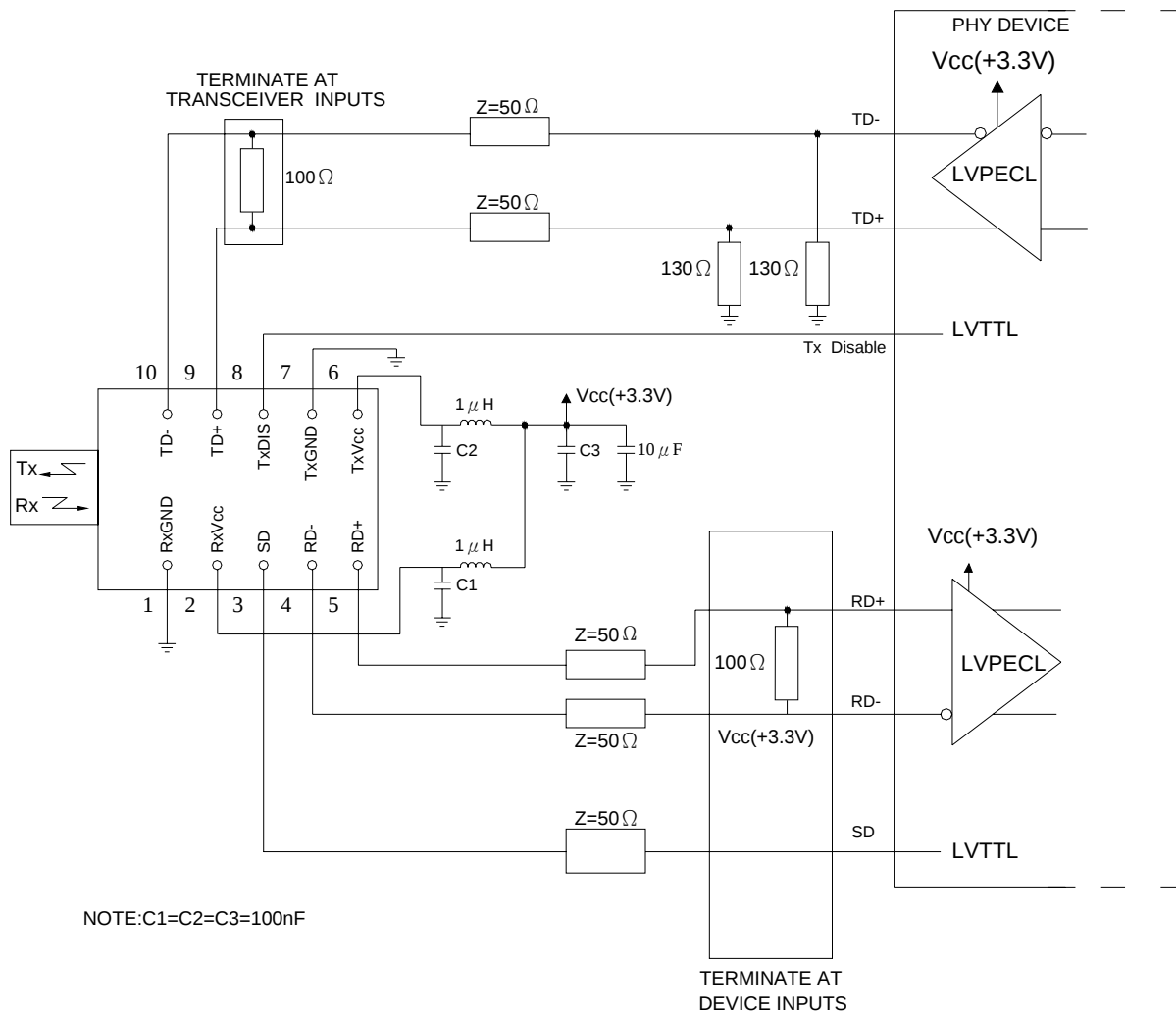
Recommended Circuit Schematic

C-13-155-F-SLCx(-G5)



Recommended Circuit Schematic

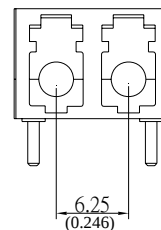
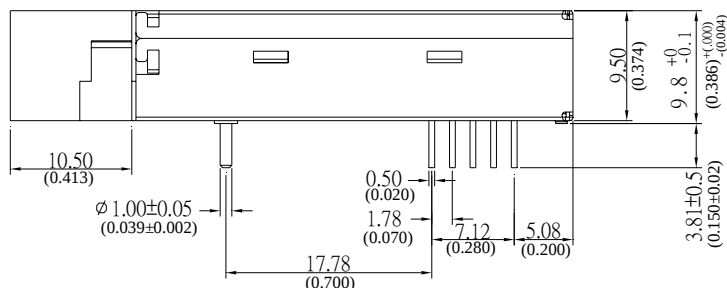
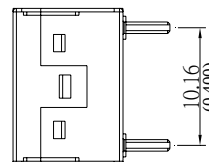
C-13-155C-F-SLCx(-G5)



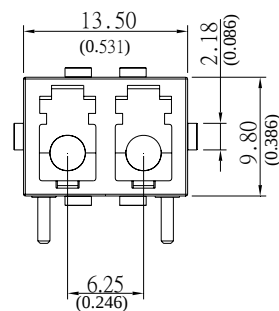
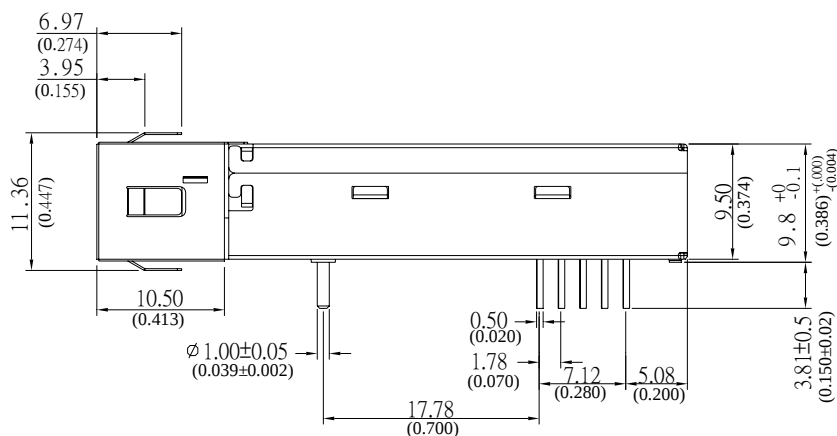
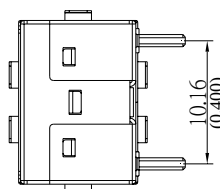
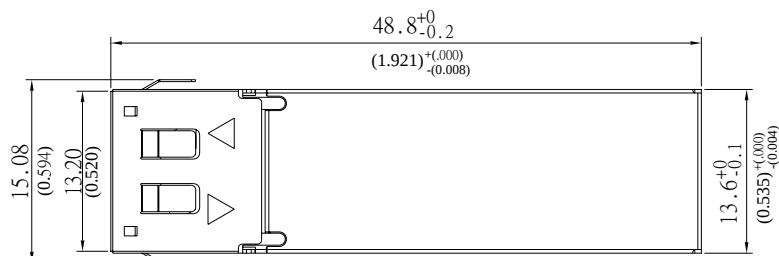
The split-loaded terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc.

A GND plane under the module is required for good EMI and sensitivity performance.

C-13-155(C)-F-SLCx(-G5)

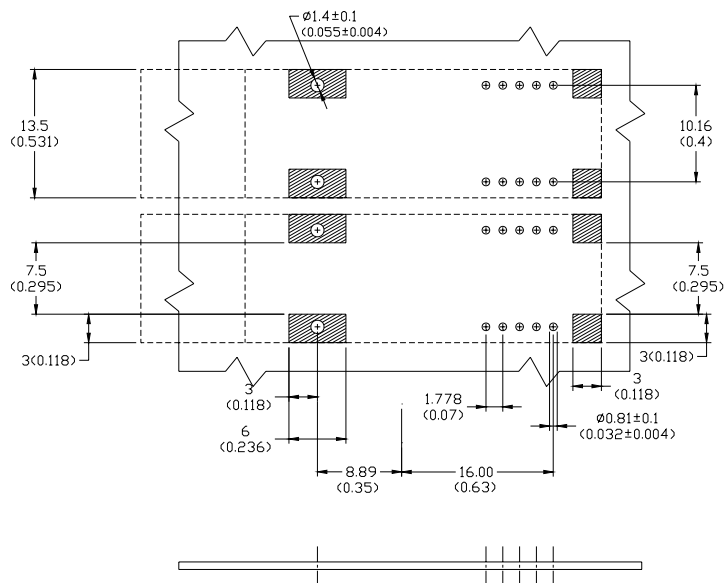


Units:mm(inch)



Case with metal shielding finger

Recommended Board Layout Hole Pattern

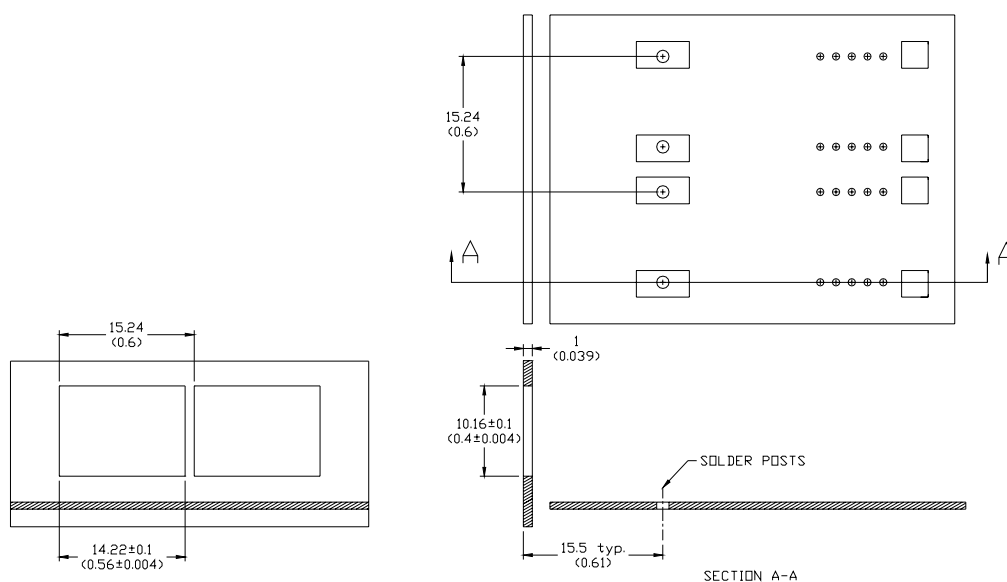


DIMENSION IN MILLIMETER (INCHES)

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



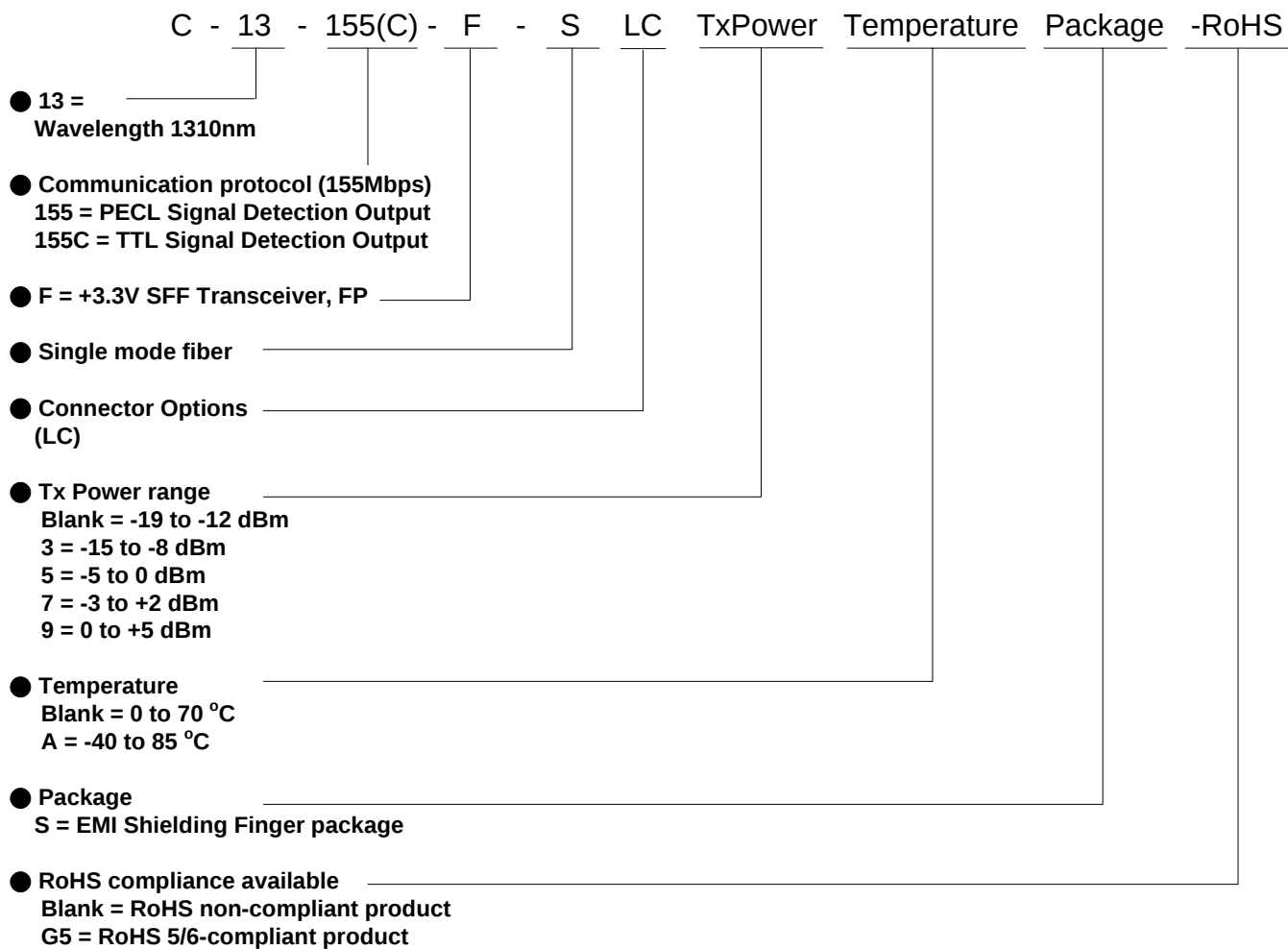
DIMENSION IN MILLIMETER (INCHES)

Order Information

Table 8 – Order Information

Part No.	Part No.	Part No.	Part No.
C-13-155-F-SLC	C-13-155-F-SLC-G5	C-13-155-F-SLCS	C-13-155-F-SLCS-G5
C-13-155C-F-SLC	C-13-155C-F-SLC-G5	C-13-155C-F-SLCS	C-13-155C-F-SLCS-G5
C-13-155-F-SLC3	C-13-155-F-SLC3-G5	C-13-155-F-SLC3S	C-13-155-F-SLC3S-G5
C-13-155C-F-SLC3	C-13-155C-F-SLC3-G5	C-13-155C-F-SLC3S	C-13-155C-F-SLC3S-G5
C-13-155-F-SLC5	C-13-155-F-SLC5-G5	C-13-155-F-SLC5S	C-13-155-F-SLC5S-G5
C-13-155C-F-SLC5	C-13-155C-F-SLC5-G5	C-13-155C-F-SLC5S	C-13-155C-F-SLC5S-G5
C-13-155-F-SLC7	C-13-155-F-SLC7-G5	C-13-155-F-SLC7S	C-13-155-F-SLC7S-G5
C-13-155C-F-SLC7	C-13-155C-F-SLC7-G5	C-13-155C-F-SLC7S	C-13-155C-F-SLC7S-G5
C-13-155-F-SLC9	C-13-155-F-SLC9-G5	C-13-155-F-SLC9S	C-13-155-F-SLC9S-G5
C-13-155C-F-SLC9	C-13-155C-F-SLC9-G5	C-13-155C-F-SLC9S	C-13-155C-F-SLC9S-G5
C-13-155-F-SLCA	C-13-155-F-SLCA-G5	C-13-155-F-SLCAS	C-13-155-F-SLCAS-G5
C-13-155C-F-SLCA	C-13-155C-F-SLCA-G5	C-13-155C-F-SLCAS	C-13-155C-F-SLCAS-G5
C-13-155-F-SLC3A	C-13-155-F-SLC3A-G5	C-13-155-F-SLC3AS	C-13-155-F-SLC3AS-G5
C-13-155C-F-SLC3A	C-13-155C-F-SLC3A-G5	C-13-155C-F-SLC3AS	C-13-155C-F-SLC3AS-G5
C-13-155-F-SLC5A	C-13-155-F-SLC5A-G5	C-13-155-F-SLC5AS	C-13-155-F-SLC5AS-G5
C-13-155C-F-SLC5A	C-13-155C-F-SLC5A-G5	C-13-155C-F-SLC5AS	C-13-155C-F-SLC5AS-G5
C-13-155-F-SLC7A	C-13-155-F-SLC7A-G5	C-13-155-F-SLC7AS	C-13-155-F-SLC7AS-G5
C-13-155C-F-SLC7A	C-13-155C-F-SLC7A-G5	C-13-155C-F-SLC7AS	C-13-155C-F-SLC7AS-G5
C-13-155-F-SLC9A	C-13-155-F-SLC9A-G5	C-13-155-F-SLC9AS	C-13-155-F-SLC9AS-G5
C-13-155C-F-SLC9A	C-13-155C-F-SLC9A-G5	C-13-155C-F-SLC9AS	C-13-155C-F-SLC9AS-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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