



125M / 155M 1X9-100BASE-FX Transceiver
Duplex SC, 1310nm FP, MMF 2KM, I-Temp
LVPECL Signal Detection

Part Number: F1X9-A1-M13-02Pi



Overview

F1X9-A1-M13-02Pi 1X9 SIP package style transceivers are compliant with the industrial standard specification. The high performance uncooled 1310nm FP transmitter and high sensitivity PIN receiver provide superior performance for Fast Ethernet 100BASE-FX and SONET OC-3 / SDH STM-1 applications up to MMF 2km optical links in Industrial Temperature range.

Applications

- Fast Ethernet 100BASE-FX @125M
- SDH STM-1 / SONET OC-3 @155M

Features

- Compliant with IEEE802.3u 100BASE-FX
- Industry Standard 1X9 Footprint
- 1310nm FP transmitter & PIN receiver
- Duplex SC connector
- Single 3.3V Power Supply
- DC-coupled Differential LVPECL inputs and outputs
- LVPECL Signal Detection Output
- Wave Solderable and Aqueous Washable
- Link distance 2km over MM fiber
- Operating Temperature -40~+85°C
- RoHS Compliant

Laser Safety

- This is a Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution: Use of control or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.



Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage	V _{CC}	0	+4.5	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature	T _{OP}	-40		+85	°C
Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Supply Current	I _{CC}			240	mA
Power Consumption	P			0.8	W
Lead Soldering Limits	T _{sold}			260/10	°C/Sec

Transmitter Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to 85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		125/155		Mb/s	
Optical Launch Power	P _o	-20		-14	dBm	1
Optical Center Wavelength	λ _c	1270	1310	1350	nm	
Spectral Width (RMS)	Δλ			3	nm	
Optical Extinction Ratio	ER	9			dB	
Optical Eye Mask		IEEE802.3u and ITU-T G.957				
Rise / Fall Time (20%~80%)	T _r / T _f			2	ns	
Differential Data Input Swing	V _{IN}	400	800	1800	mV	

Note1: The optical power is launched into a 62.5/125μm multi-mode fiber.



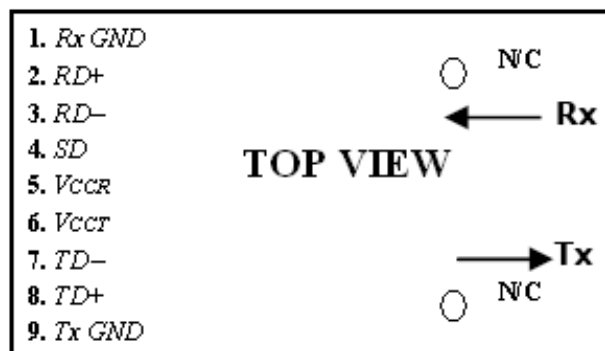
Receiver Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to 85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		125/155		Mb/s	
Receiver Sensitivity	SEN			-30	dBm	1
Maximum Receive Power	P _{RX-MAX}	-3			dBm	1
Optical Center Wavelength	λ_c	1260		1620	nm	
Signal Detect Assert	SD _A			-30	dBm	
Signal Detect De-Assert	SD _D	-40			dBm	
Signal Detect Hysteresis	SD _{HY}	0.5		5	dB	
Differential Data Output Swing	V _{OUT}	500		1200	mV	
Signal Detect O/P Voltage Low	V _{SDL-VCC}	-2.0		-1.58	V	
Signal Detect O/P Voltage High	V _{SDH-VCC}	-1.1		-0.74	V	

Note1: Measured with a PRBS 2²³-1 test pattern @155Mbps BER<10⁻¹².

Pin Assignment



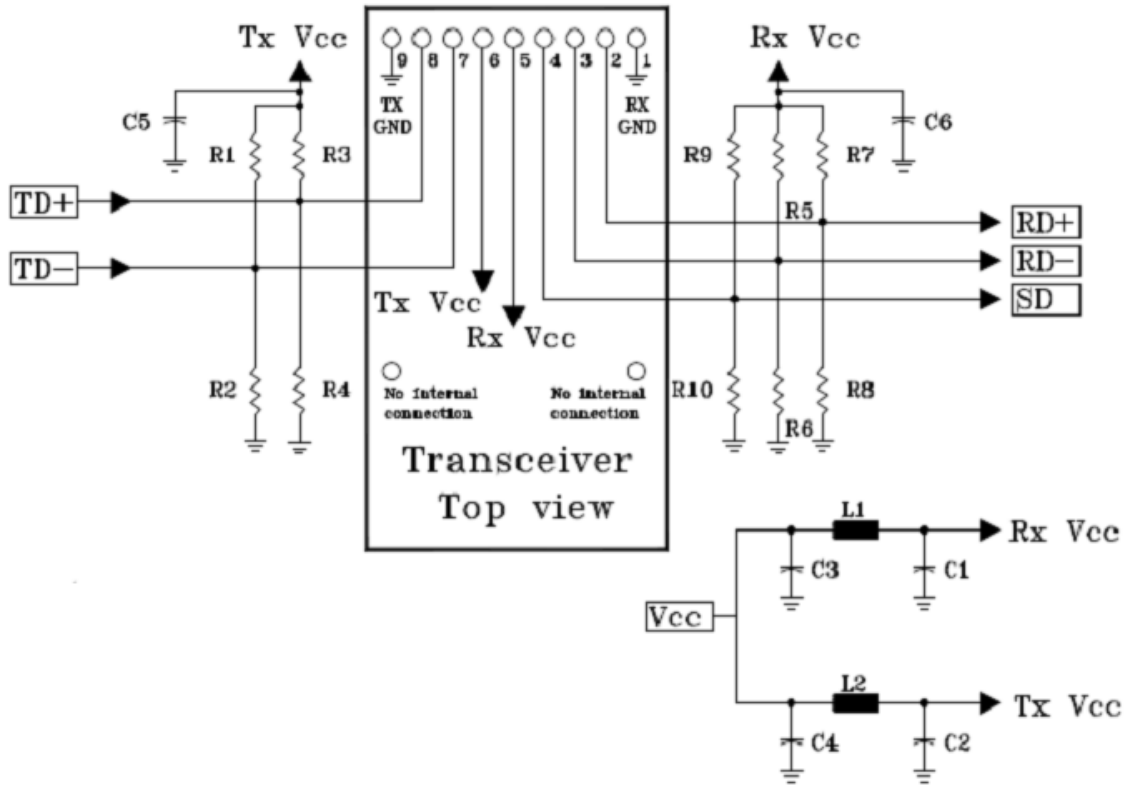
Pin Description

Pin	Name	Function / Description
1	Rx GND	Receiver Signal Ground
2	RD+	Receiver Data Out
3	RD-	Receiver Data Out Bar
4	SD	Signal Detect (1)
5	VccR	Receiver Power Supply
6	VccT	Transmitter Power Supply
7	TD-	Transmitter Data In Bar
8	TD+	Transmitter Data In
9	Tx GND	Transmitter Signal Ground

Note1: Signal Detect is a basic fiber failure indicator. This is a single-ended LVPECL output. As the input optical power is decreased, Signal Detect will switch from high to low (de-assert point) somewhere between sensitivity and the no light input level. As the input optical power is increased from very low levels, Signal Detect will switch back from low to high (assert point).



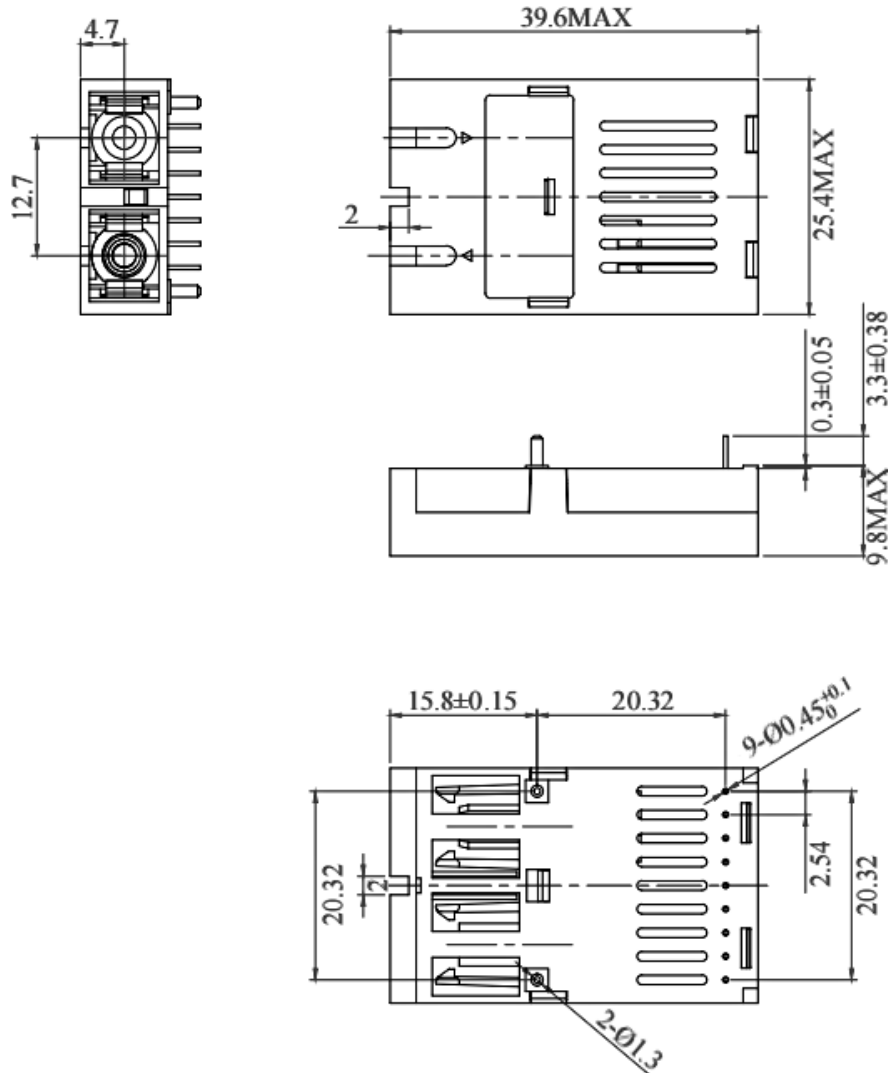
Recommended Circuit



$R1=R3=R5=R7=R9=130\Omega$
 $R2=R4=R6=R8=R10=82\Omega$
 $C1=C2=C3=C5=C6=0.1\mu F$
 $C4=10\mu F$ $L1=L2=1\mu H$



Mechanical Dimensions



(All Dimensions are $\pm 0.20\text{mm}$ Unless Otherwise Specified, Unit: mm)

Ordering Information

Part No.	Tx	Rx	Conn.	I/O	SD	Link	Voltage	Temp.
F1X9-A1-M13-02Pi	1310nm	1260nm ~ 1620nm	Duplex SC	DC/DC	LVPECL	MMF 2km	3.3V	-40~85°C

Note: Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.