TELEDYNE RELAYS
Everywhereyoulook™

Series RF121/RF121R

SPDT Magnetic-Latching
DC-12GHz, 20Gbps RF Relay

HIGH REPEATABILITY SPDT, BROADBAND 12 GHZ, 20 Gbps MAGNETIC-LATCHING RF RELAY

SERIES	RELAY TYPE
RF121	RF Magnetic-Latching, SPDT, Common Coil Negative, Through-Hole Relay
RF121R	RF Magnetic-Latching, SPDT, Common Coil Positive, Through-Hole Relay

DESCRIPTION

The ultraminiature Series RF121/RF121R is built on Teledyne Relays' heritage of miniature RF relays, and is designed to provide a compact electromechanical switching solution with broadband RF performance from DC to 12GHz in a leaded, hand solderable package. The RF121/RF121R relay incorporates a precision 50Ω transmission line in the contact system which provides for optimum RF transmission characteristics.

The RF121/RF121R is designed for use in switchable RF attenuators, RF switch matrices, high frequency spread spectrum radios, ATE, and other applications that require dependable high frequency signal fidelity and performance.

The magnetic-latching RF121/RF121R is suitable for applications where power budget is restricted. The relays can be operated with a short duration pulse. After the contacts have transferred, no external holding power is required.

The RF121/RF121R features:

- High Repeatability
- Wide Bandwidth Performance
- Higher Isolation Between Each Signal Path
- Metal Enclosure for EMI Shielding
- High Isolation Between Control and Signal Paths
- High Resistance to ESD

The unique construction features and manufacturing techniques provide excellent robustness for environmental extremes and overall reliability:

- Minimum mass components and welded construction provide maximum resistance to shock and vibration
- Advanced cleaning techniques provide maximum assurance of internal cleanliness
- Gold-plated precious metal alloy contacts ensure reliable switching
- Hermetic Seal
- RoHS Compliant

ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

Temperature (Ambient)	Storage	–55°C to +125°C
	Operating	–55°C to +85°C
Vibration (General Note 3)		10 g's 10 to 3,000 Hz
Shock (General Note 3)		30 g's, 6ms half sine
Enclosure		Hermetically sealed

Teledyne Part Numbering System for RF121/RF121R

RF121 - 12 / Q

Relay Series
RF121
RF121R

Coil Voltage
5 = 5Vdc
12 = 12Vdc

Lead Finish
Q = Solder-Dipped Leads[4]
G = Gold-Plated Leads[5]
R = RoHS Compliant Solder-Dipped Leads[6]

SERIES RF121/RF121R
GENERAL ELECTRICAL SPECIFICATIONS (@ 25°C)

Contact Arrangement	1 Form C (SPDT) with open contact grounded to case
Rated Duty	Continuous
Contact Load Rating	Resistive: .25A @ 28Vdc
Contact Life Rating	3,000,000 cycles typical at low level
Coil Operating Power	RF121-5/RF121R-5: 410mW typical @ nominal rated voltage RF121-12/RF121R-12: 290mW typical @ nominal rated voltage
Switching Time (inluding bounce time)	7.0 msec. max. (2ms Operate time, 5ms contact bounce time)
Minimum Operate Pulse	6.0 msec width at rated voltage
Insulation Resistance	1,000MΩ min. between mutually isolated terminals
Dielectric Strength	350 Vrms (60Hz) @ Atmospheric Pressure
Propagation Delay	54-60 ps (typical)

DETAILED ELECTRICAL SPECIFICATIONS (@25°C)

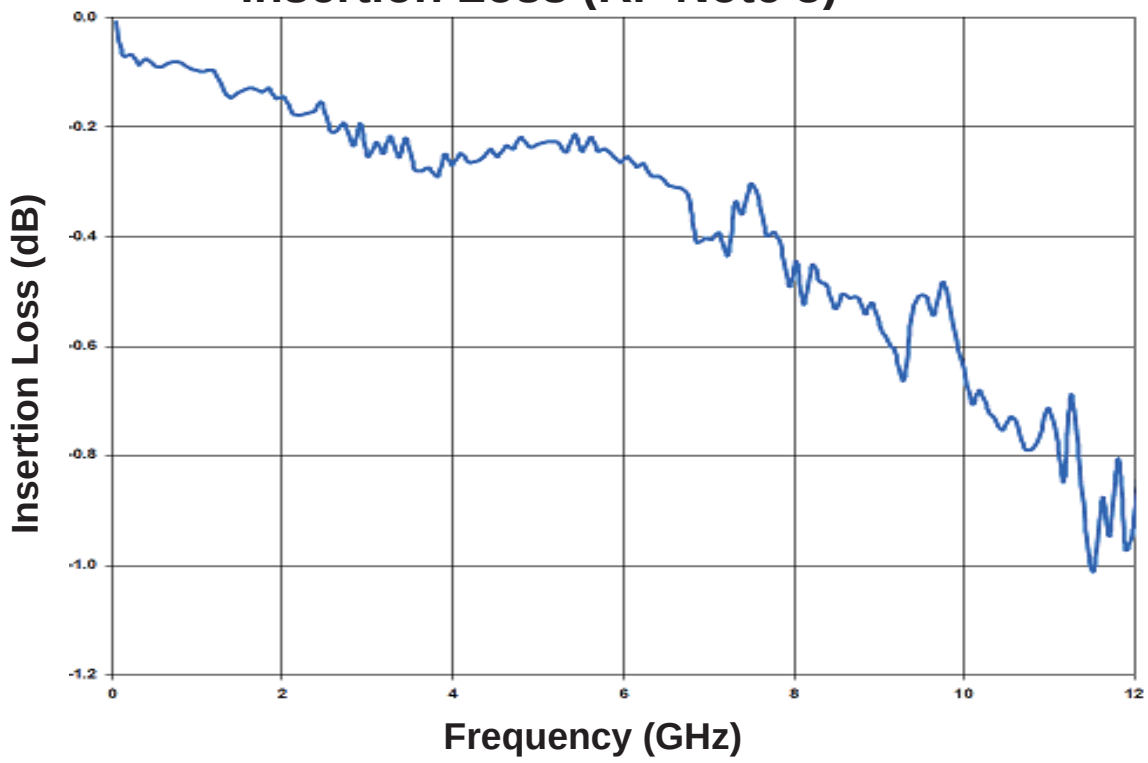
BASE PART NUMBERS	RF121-5/RF121R-5	RF121-12/RF121R-12
Coil Voltage, Nominal (Vdc)	5.0	12.0
Coil Resistance (Ohms ±20%, 25°C)	61	500
Pick-up Voltage, Max (Vdc) (General Note 7)	4.3	10.4

GENERAL NOTES

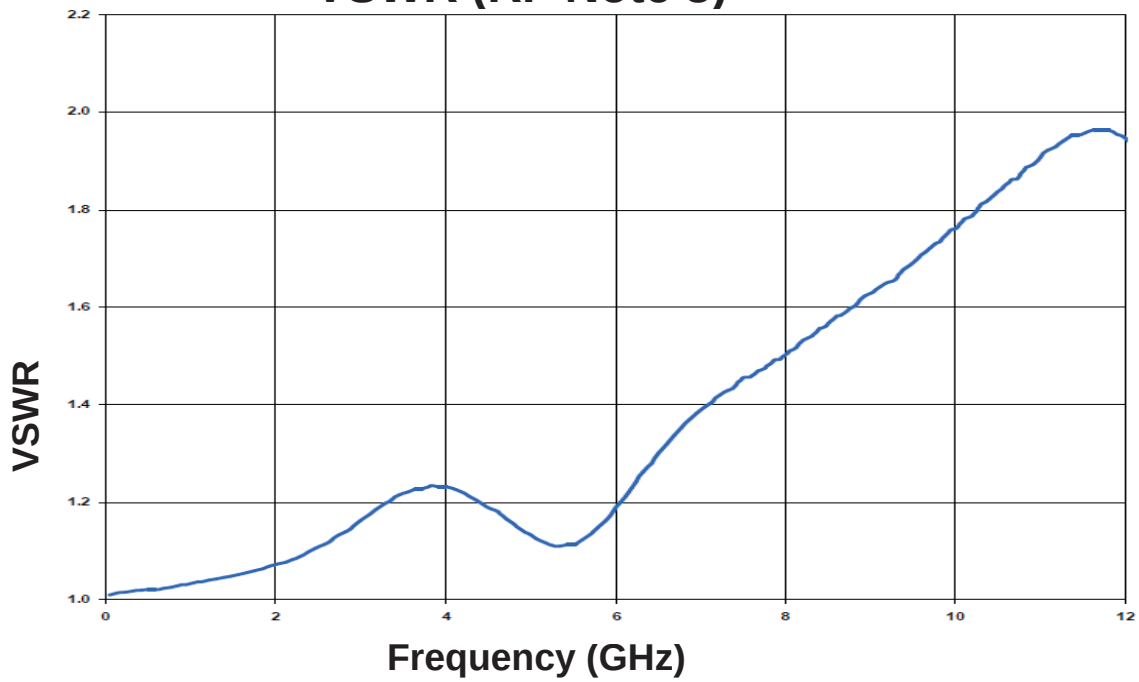
1. Characteristics shown as “typical” are based on available data and are best estimates. No ongoing verification tests are performed.
2. Unless otherwise specified, parameters are initial values.
3. Relay contacts will exhibit no chatter in excess of 10 µsec or transfer in excess of 1 µsec.
4. Parts ordered with Solder-Coated leads will have Sn60/Pb40 solder.
5. Parts ordered with Gold-Plated leads will have a typical plating thickness of 25-40 µin.
6. Parts ordered with RoHS Solder-Coated leads will have Sn99.3/Cu0.7 solder.
7. Using an operate voltage less than the specified minimum may result in unreliable operation.
8. Relay temperature during soldering shall not exceed 250°C, and reflow temperature shall not exceed 250°C, 3 passes, 1 minute each.

SERIES RF121/RF121R
TYPICAL RF CHARACTERISTICS (See RF Notes)

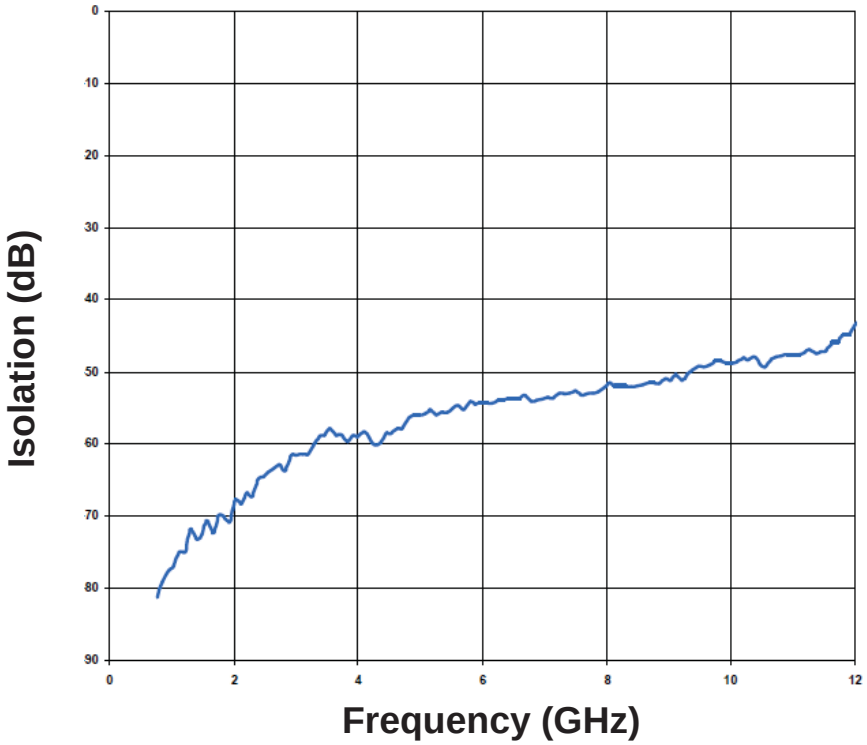
Insertion Loss (RF Note 3)

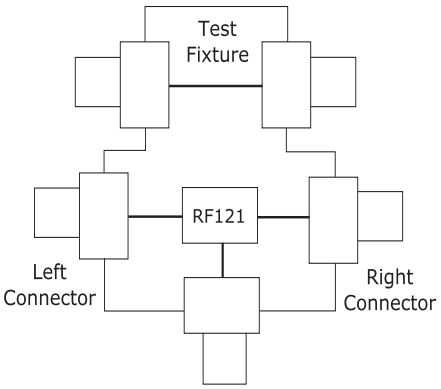


VSWR (RF Note 3)



Isolation (RF Note 4)



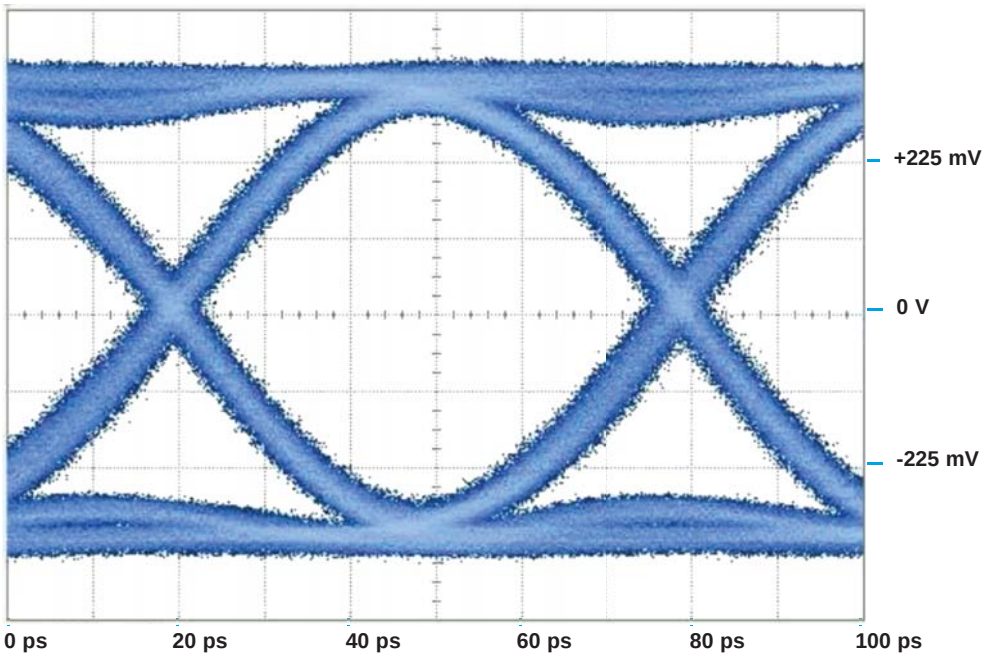


RF121/RF121R Test Evaluation Board

RF NOTES

1. Test conditions:
   - *a.* Fixture: .031” copper clad, gold plated, reinforced Rogers Corporation 4350B High Frequency Laminate with 26.5 GHz SMA connectors. Header body is soldered to PCB ground plane.
   - *b.* Room ambient temperature.
   - *c.* Unused Terminals were terminated with 50-ohm load.
   - *d.* Contact signal level: –10 dBm.
   - *e.* No. of test samples: 2.
2. Data presented herein represents typical characteristics and is not intended for use as specification limits.
3. Data is the average from readings taken on all closed contacts.
4. Data is the average from readings taken on all open contacts.
5. Test fixture effect de-embedded from frequency response data.

SERIES RF121/RF121R
TYPICAL SIGNAL INTEGRITY CHARACTERISTICS

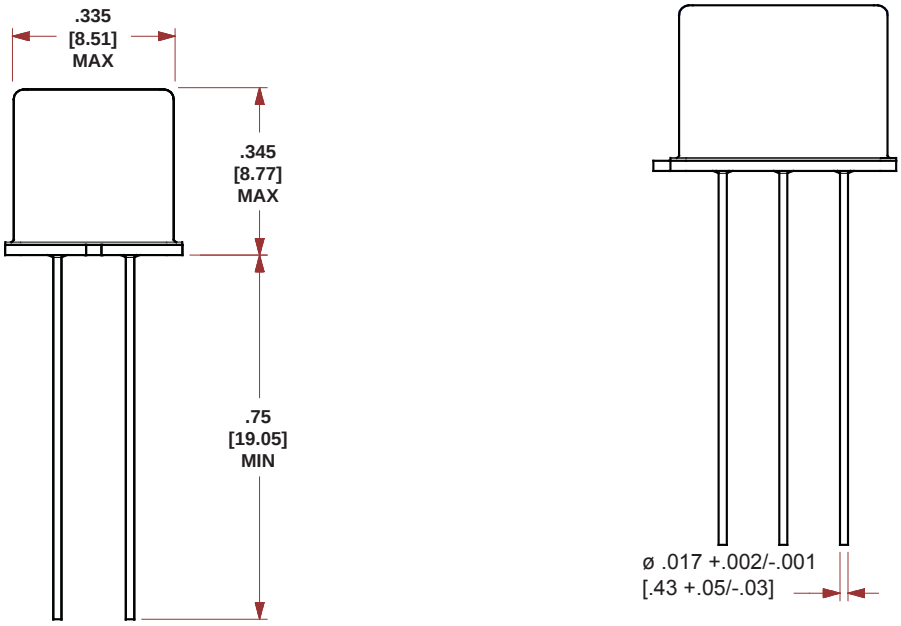


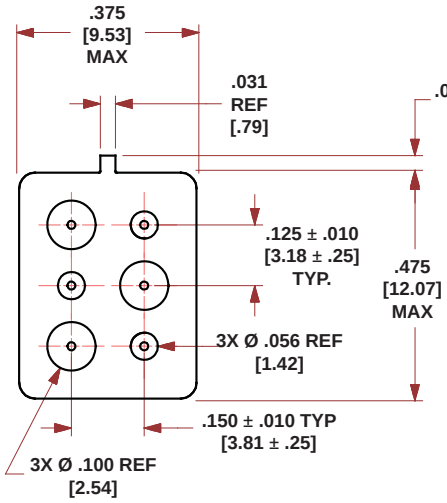
Bit Rate	Eye Height	Eye Width	$Jitter_{P-P}$
20 Gbps	360 mV	40.3 ps	6.93 ps

PATTERN GENERATOR SETTINGS

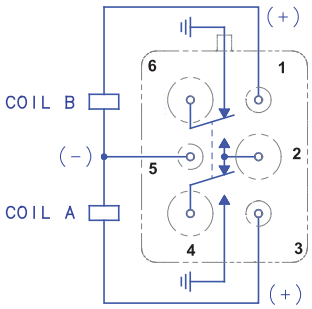
- 20 Gbps Random Pulse Pattern Generator
- 2^{31} - 1 PRBS signal pattern
- PRBS output of 500 mV_{P-P} (nominal)
- RF PCB effect (negligible) not removed from measurement
- Data shown is typical of both contacts

SERIES RF121/RF121R
OUTLINE DIMENSIONS



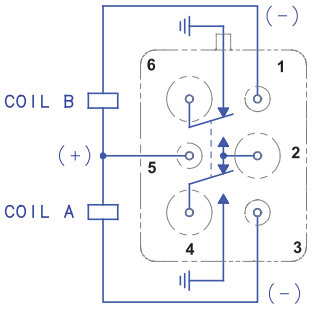


RF121
Schematic - Terminal View



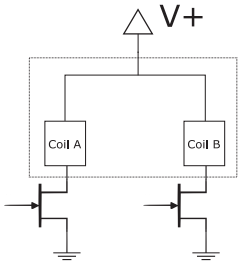
CONTACTS SHOWN IN POSITION RESULTING WHEN COIL A LAST ENERGIZED

RF121R
Schematic - Terminal View



CONTACTS SHOWN IN POSITION RESULTING WHEN COIL A LAST ENERGIZED

For applications where transistors are used to pull-down the magnetic coils to ground (see image on right) the RF121R provides a common positive terminal and two independent negative terminals, alowing each coil to be independently sinked to ground.



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