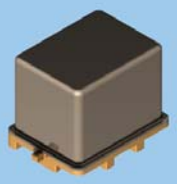
TELEDYNE RELAYS
Everywhereyoulook™

Series GRF121

SPDT Magnetic-Latching
DC-16GHz RF Relay
40Gbps

SURFACE MOUNT HIGH REPEATABILITY SPDT, BROADBAND 16 GHZ 40GBPS MAGNETIC-LATCHING RF RELAY



SERIES	RELAY TYPE
GRF121	RF Magnetic-Latching, SPDT, Surface Mount Relay

DESCRIPTION

The ultraminiature GRF121 relay is designed to provide a practical surface-mount switching solution with RF performance and repeatability to 16GHz. The GRF121 improves on Teledyne Relays' heritage of miniature RF relays by incorporating a precision trasmission line structure in the internal construction of the contact system. GRF121 relays feature a unique ground shield to facilitate surface mounting and to extend the frequency range when compared to through-hole solutions.

These relays are designed for use in 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 GRF121 is suitable for applications where power dissipation must be minimized. The relays can be operated with a short duration pulse. After the contacts have transferred, no external holding power is required.

The GRF121 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 2)		10 g's 10 to 3000 Hz
Shock (General Note 2)		100 g's, 5ms half sine
Enclosure		Hermetically sealed

Teledyne Part Numbering System for GRF121

GRF121 - 12

Relay Series

Coil Voltage
5 = 5Vdc
12 = 12Vdc

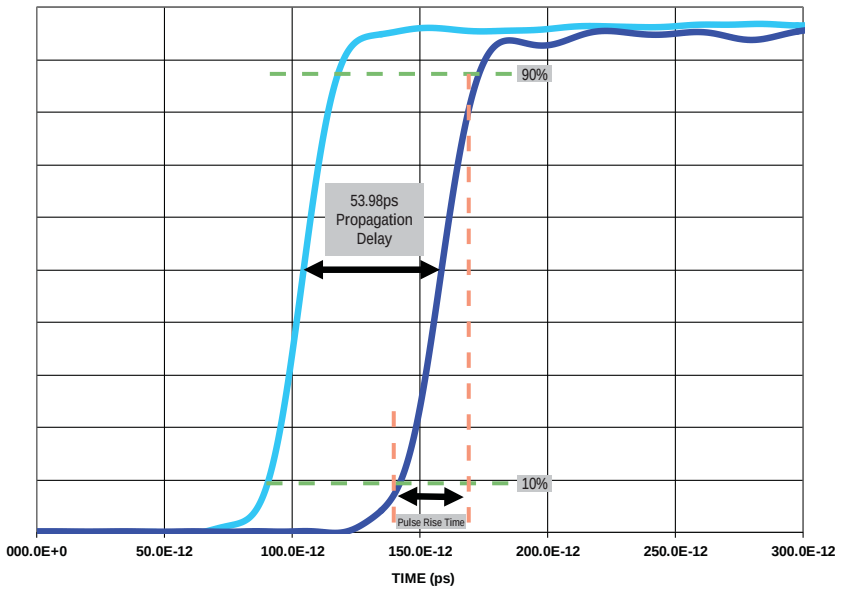
SERIES GRF121
GENERAL ELECTRICAL SPECIFICATIONS (@ 25°C)

Contact Arrangement	1 Form C (SPDT), with open contact grounded to case
Rated Duty	Continuous
Contact Load Rating	Resistive: 0.25A @ 28Vdc
Contact Life Rating	3,000,000 cycles typical at low level
Coil Operating Power	GRF121-5: 410mW typical @ nominal rated voltage GRF121-12: 290mW typical @ nominal rated voltage
Switching Time	7.0 msec. max. (2 msec operate time, 5 msec 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

DETAILED ELECTRICAL SPECIFICATIONS (@25°C)

BASE PART NUMBERS	GRF121-5	GRF121-12
Coil Voltage, Nominal (Vdc)	5.0	12.0
Coil Resistance (Ohms ±20%)	61	500
Operate Voltage (Vdc) (General Note 1)	4.5 - 5.5	10.8 - 13.2

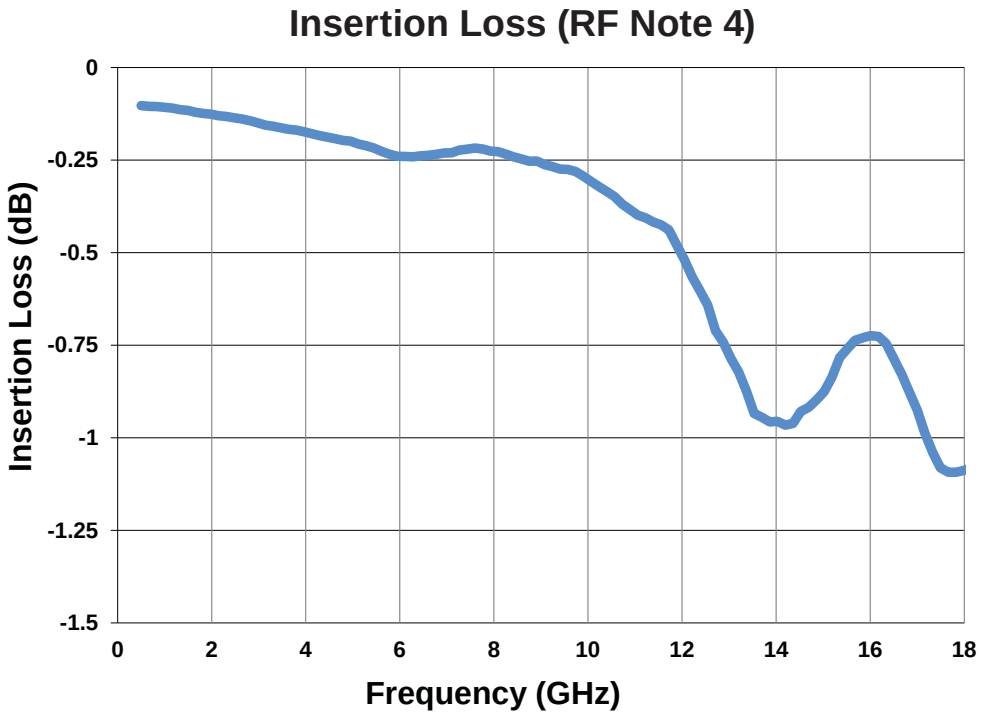
RF121 Time Response (RF NOTE 4)

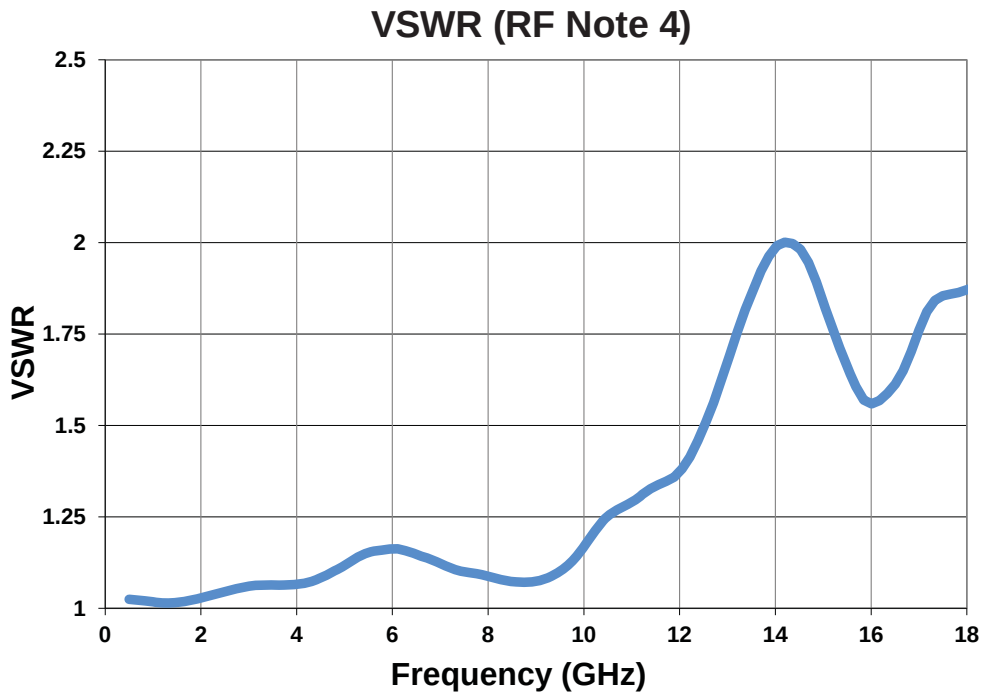


GENERAL NOTES

1. Operate voltage at less than specified minimum may result in unreliable operation
2. Parts ordered with Solder-Coated leads will have (Sn60/Pb40)
3. Parts ordered with Gold-Plated leads will have a typical plating thickness of 25-40µ-in
4. Parts ordered with RoHS Solder-Coated leads will have (Sn99.3/Cu0.7)
5. Relay contacts will exhibit no chatter in excess of 10 µsec or transfer in excess of 1 µsec

SERIES GRF121
TYPICAL RF CHARACTERISTICS (See RF Notes)





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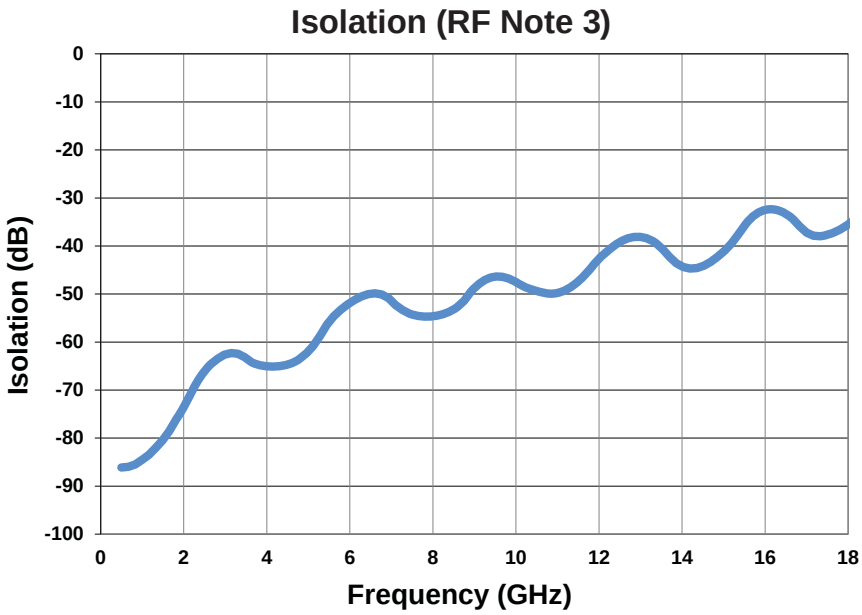
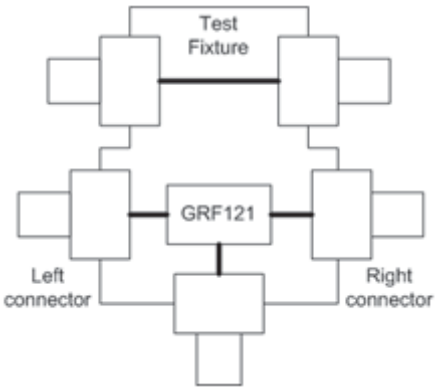


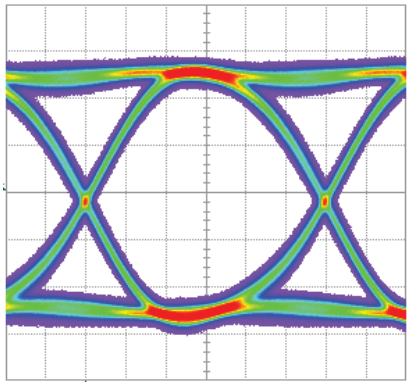


GRF121 Test Evaluation Board

RF NOTES

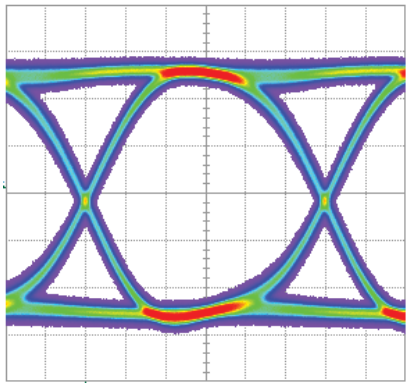
1. Test conditions:
   - *a.* Fixture: .031" copper clad, Rogers Corporation 4350B High Frequency Laminate with SMA connectors.
   - *b.* Room ambient temperature.
   - *c.* Unused Terminals were terminated with 50-ohm load.
   - *d.* Contact signal level: –10 dBm.
   - *e.* No. of test samples: 4.
2. 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 open contacts.
4. Data is the average from readings taken on all closed contacts.
5. Test fixture effect de-embedded from frequency response data.

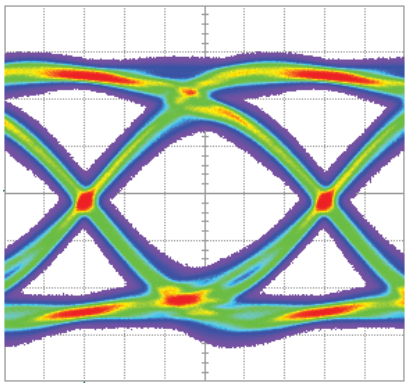
GRF121 @ 16Gbps



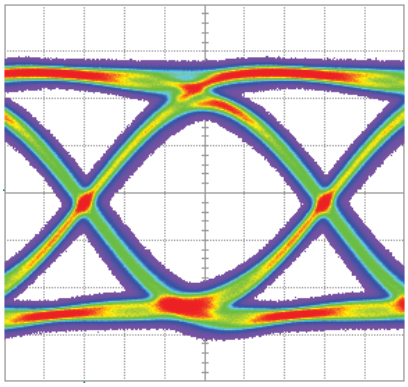
Bit Rate	Eye Height	Eye Width	Jitter$_{P-P}$
16 Gbps	203 mV	49.92 ps	4.99 ps

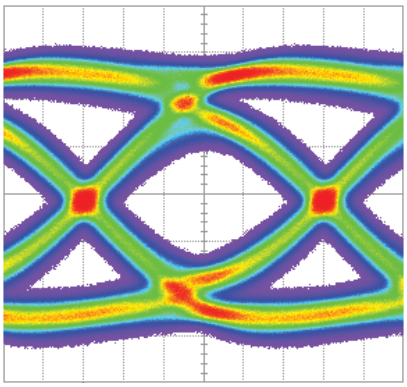
Reference @ 16Gbps



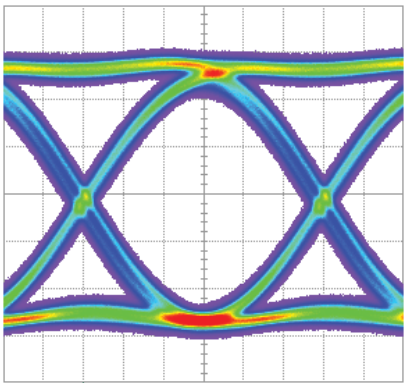


Bit Rate	Eye Height	Eye Width	Jitter$_{P-P}$
28 Gbps	139.2 mV	21.6 ps	5.89 ps



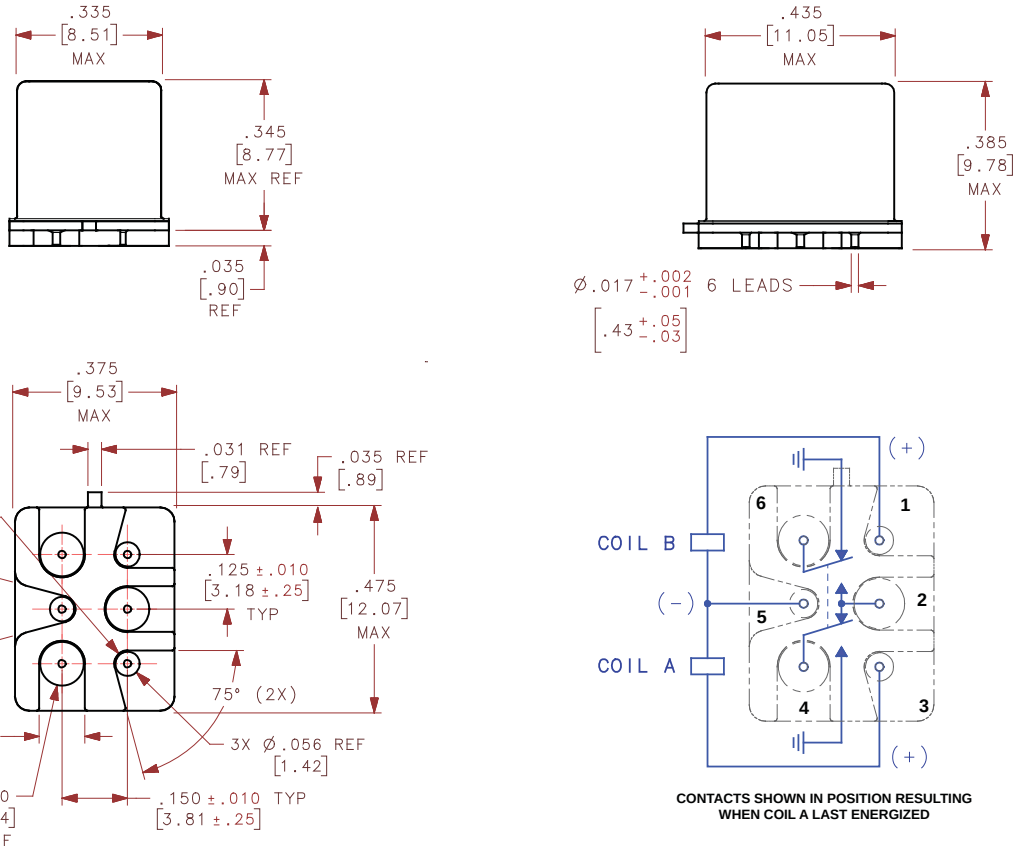


Bit Rate	Eye Height	Eye Width	Jitter$_{P-P}$
40 Gbps	95 mV	13.34 ps	8.73 ps



- **Pattern Generator Seetings**
- 40 Gbps Random Pulse Pattern Generator
- 2^{31} - 1 PRBS signal
- PRBS output of 500 mV$_{P-P}$ (nominal)
- RF PCB effect (negligible) not removed from measurement
- Data shown is typical of both poles

SERIES GRF121
OUTLINE DIMENSIONS



CONTACTS SHOWN IN POSITION RESULTING WHEN COIL A LAST ENERGIZED

RECOMMENDED SOLDER STENCIL