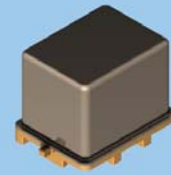


**SURFACE MOUNT  
HIGH REPEATABILITY  
SPDT, BROADBAND 16 GHZ  
40GBPS  
MAGNETIC-LATCHING RF RELAY**



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 transmission 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		
<b>Temperature</b> (Ambient)	Storage	-55°C to +125°C
	Operating	-55°C to +85°C
<b>Vibration</b> (General Note 2)	10 g's 10 to 3000 Hz	
<b>Shock</b> (General Note 2)	100 g's, 5ms half sine	
<b>Enclosure</b>	Hermetically sealed	

Teledyne Part Numbering System for GRF121

GRF121 - 12

Relay Series

**Coil Voltage**  
5 = 5Vdc  
12 = 12Vdc

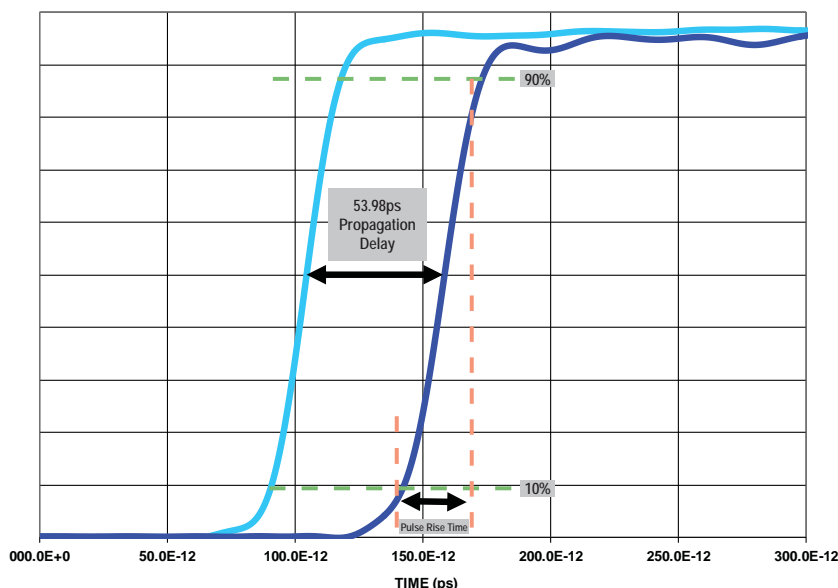
**SERIES GRF121**  
**GENERAL ELECTRICAL SPECIFICATIONS (@ 25°C)**

<b>Contact Arrangement</b>	1 Form C (SPDT), with open contact grounded to case
<b>Rated Duty</b>	Continuous
<b>Contact Load Rating</b>	Resistive: 0.25A @ 28Vdc
<b>Contact Life Rating</b>	3,000,000 cycles typical at low level
<b>Coil Operating Power</b>	GRF121-5: 410mW typical @ nominal rated voltage GRF121-12: 290mW typical @ nominal rated voltage
<b>Switching Time</b>	7.0 msec. max. (2 msec operate time, 5 msec bounce time)
<b>Minimum Operate Pulse</b>	6.0 msec width at rated voltage
<b>Insulation Resistance</b>	1,000MΩ min. between mutually isolated terminals
<b>Dielectric Strength</b>	350 Vrms (60Hz) @ Atmospheric Pressure

**DETAILED ELECTRICAL SPECIFICATIONS (@25°C)**

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

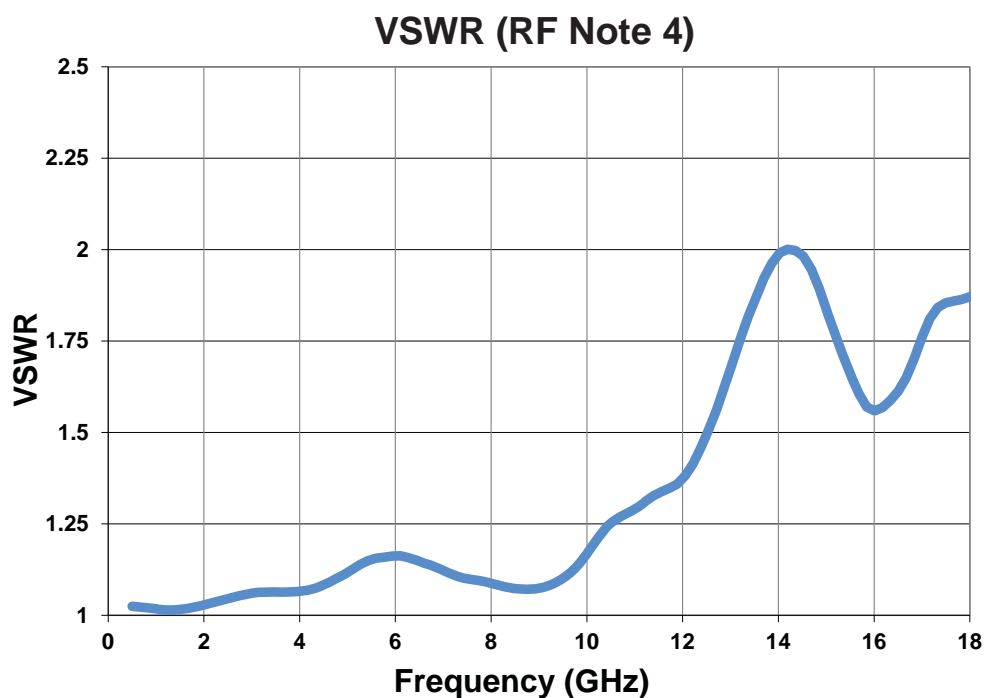
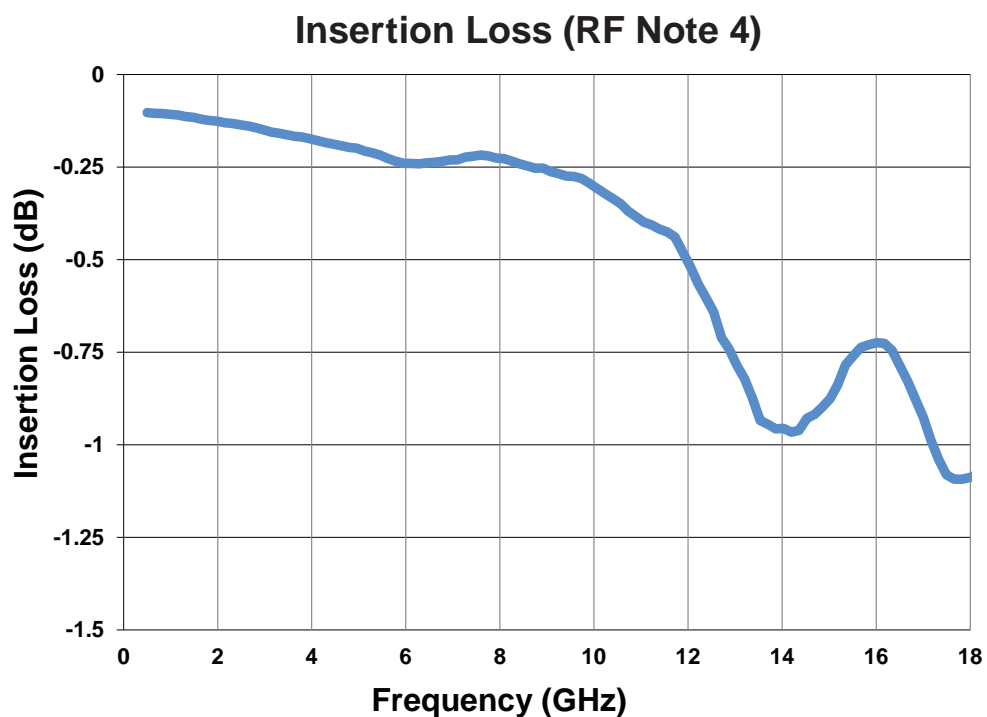
**RF121 Time Response (RF NOTE 4)**



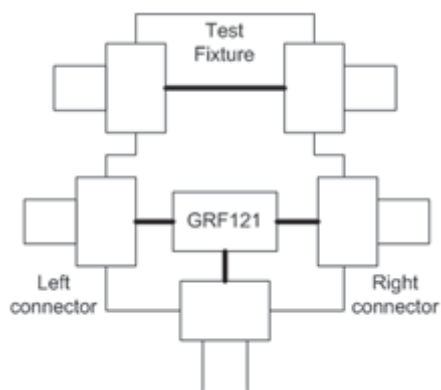
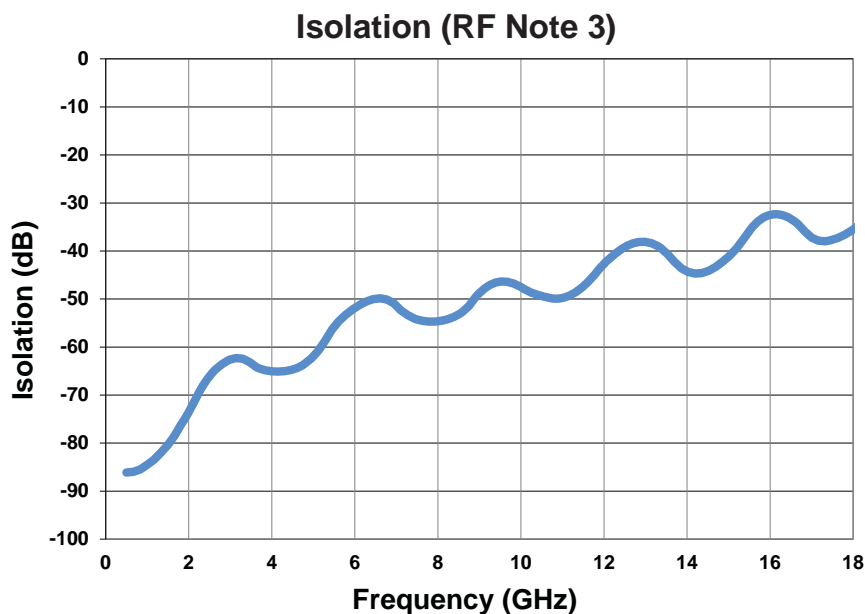
**GENERAL NOTES**

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)**



**SERIES GRF121**  
**TYPICAL RF CHARACTERISTICS (See RF Notes)**

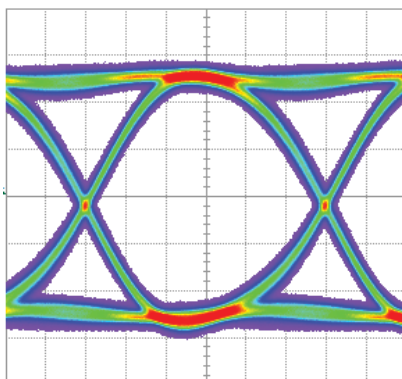


**GRF121 Test Evaluation Board**

**RF NOTES**

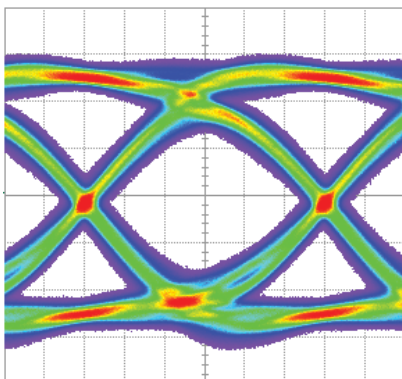
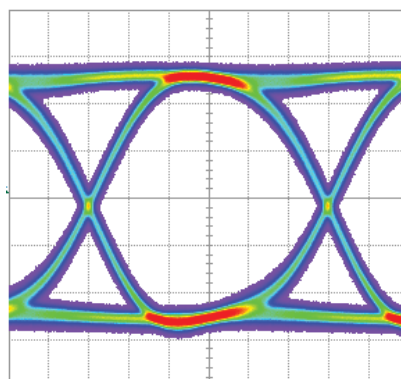
1. Test conditions:
  - a. Fixture: .031" copper clad, Rogers Corporation 4350B High Frequency Laminate with SMA connectors.
  - b. Room ambient temperature.
  - c. Unused Terminals were terminated with 50-ohm load.
  - d. Contact signal level: -10 dBm.
  - e. No. of test samples: 4.
2. Data presented 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**

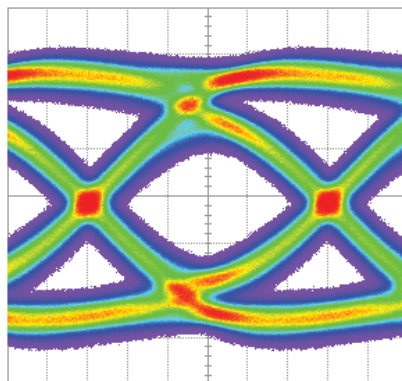
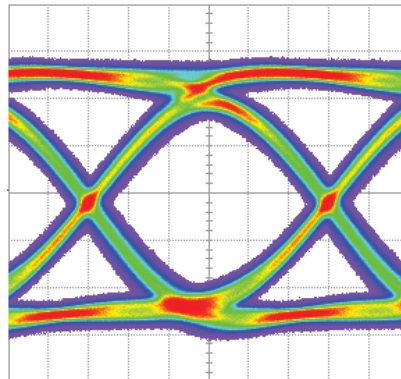


Bit Rate	Eye Height	Eye Width	Jitter <sub>P,P</sub>
16 Gbps	203 mV	49.92 ps	4.99 ps

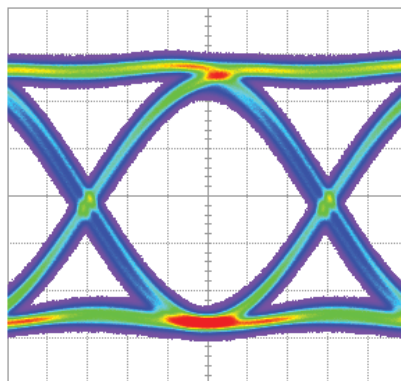
**Reference @ 16Gbps**



Bit Rate	Eye Height	Eye Width	Jitter <sub>P,P</sub>
28 Gbps	139.2 mV	21.6 ps	5.89 ps



Bit Rate	Eye Height	Eye Width	Jitter <sub>P,P</sub>
40 Gbps	95 mV	13.34 ps	8.73 ps



- **Pattern Generator Settings**
- 40 Gbps Random Pulse Pattern Generator
- 2<sup>31</sup> - 1 PRBS signal
- PRBS output of 500 mV<sub>P,P</sub> (nominal)
- RF PCB effect (negligible) not removed from measurement
- Data shown is typical of both poles

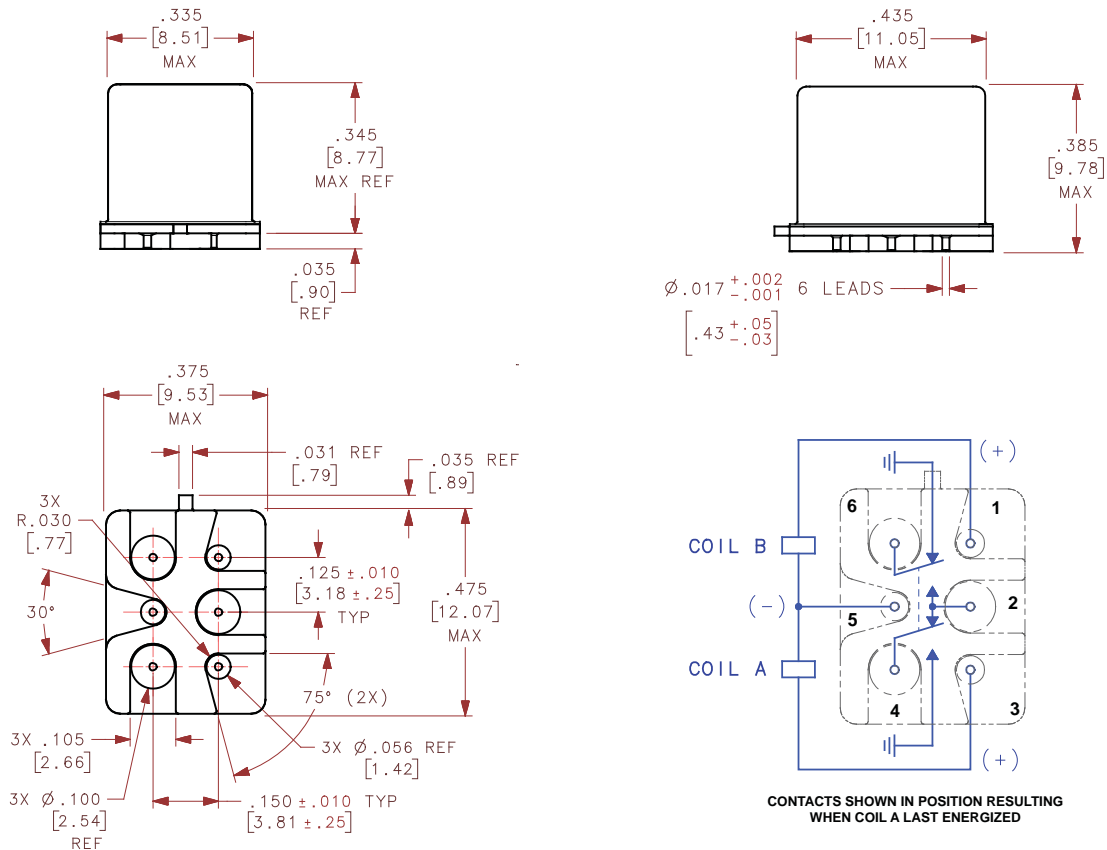
## SPDT Magnetic-Latching DC-16GHz RF Relay 40Gbps



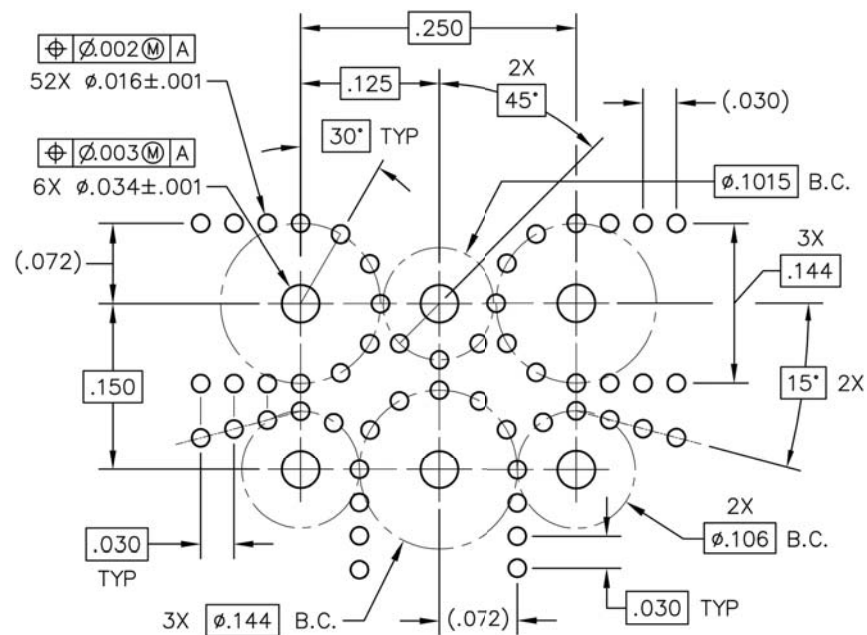
**TELEDYNE**  
RELAYS

Everywhere**you**look™

## SERIES GRF121 OUTLINE DIMENSIONS



## RECOMMENDED SOLDER STENCIL



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