



**TELEDYNE  
RELAYS**  
A Teledyne Technologies Company

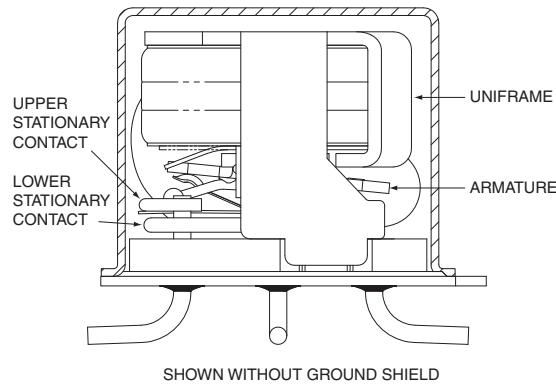
**NEW!**

**SURFACE MOUNT,  
HIGH REPEATABILITY,  
BROADBAND  
CENTIGRID® RELAYS  
DPDT**

## **SERIES SGRF100 SGRF103**

<b>SERIES DESIGNATION</b>	<b>RELAY TYPE</b>
SGRF100	Repeatable, RF Centigrid® relay
SGRF103	Sensitive, repeatable, RF Centigrid® relay

### **INTERNAL CONSTRUCTION**



### **DESCRIPTION**

The ultraminiature SGRF100 and SGRF103 relays are designed to provide a practical surface-mount solution with improved RF signal repeatability over the frequency range. SGRF100 and SGRF103 relays feature a unique ground shield that isolates and shields each lead to ensure excellent contact-to-contact and pole-to-pole isolation. This ground shield provides a ground interface that results in improved high-frequency performance as well as parametric repeatability. The SGRF100 and SGRF103 extend performance advantages over similar RF devices that simply offer formed leads for surface mounting.

These relays are engineered for use in RF attenuator, RF switch matrices, ATE and other applications that require dependable high frequency signal fidelity and performance.

The SGRF100 and SGRF103 feature:

- High repeatability
- Broader bandwidth
- Metal enclosure for EMI shielding
- High isolation between control and signal paths
- High resistance to ESD

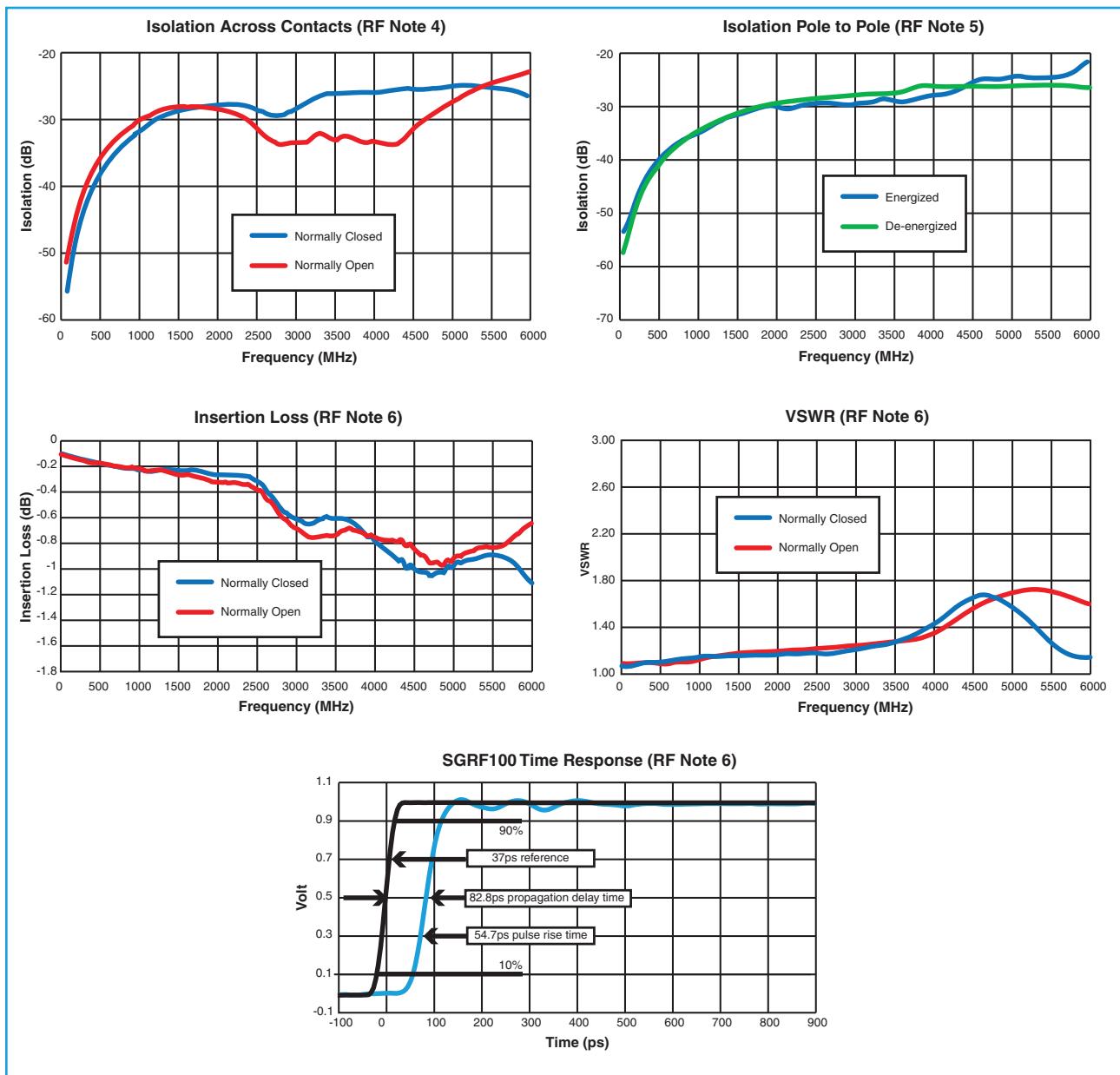
The following unique construction features and manufacturing techniques provide excellent robustness to environmental extremes and overall high reliability:

- Uniframe motor design provides high magnetic efficiency and mechanical rigidity
- 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
- Hermetically sealed

### **ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS**

<b>Temperature</b> (Ambient)	<b>Storage</b>	-65°C to +125°C
	<b>Operating</b>	-55°C to +85°C
<b>Vibration</b> (General Note 1)		10 g's to 500 Hz
<b>Shock</b> (General Note 1)		30 g's, 6ms half sine
<b>Enclosure</b>		Hermetically sealed
<b>Weight</b>	<b>SGRF100</b>	0.09 oz. (2.55g) max.
	<b>SGRF103</b>	0.16 oz. (4.5g) max.

**SERIES SGRF100 AND SGRF103**  
**TYPICAL RF CHARACTERISTICS (See RF Notes)**



**RF NOTES**

1. Test conditions:
  - a. Fixture: .031" copper clad, reinforced PTFE, RT/duroid® 6002 with SMA connectors. (RT/duroid® is a registered trademark of Rogers Corporation.)
  - b. RF ground shield is soldered to PCB RF ground plane.
  - c. Room ambient temperature.
  - d. Terminals not tested were terminated with 50-ohm load.
  - e. Contact signal level: -10 dBm.
  - f. No. of test samples: 2.
2. Data presented herein represents typical characteristics and is not intended for use as specification limits.
3. Data is per pole, except for pole-to-pole data.
4. Data is the average from readings taken on all open contacts.
5. Data is the average from readings taken on poles with coil energized and de-energized.
6. Data is the average from readings taken on all closed contacts.
7. Test fixture effect de-embedded from frequency and time response data.

**SERIES SGRF100 AND SGRF103**  
**GENERAL ELECTRICAL SPECIFICATIONS (@25°C unless otherwise noted) (Notes 2 & 3)**

Contact Arrangement	DPDT
Rated Duty	Continuous
Contact Resistance	0.100 Ω max. initial
Contact Load Rating	Low level: 10 to 50 μA @ 10 to 50 mV
Contact Life Ratings	10,000,000 cycles (typical) at low level
Coil Operating Power	SGRF100-5: 500 mW typical @ nominal rated voltage SGRF100-12: 369 mW typical @ nominal rated voltage SGRF103-5: 250 mW typical @ nominal rated voltage SGRF103-12: 180 mW typical @ nominal rated voltage
Operate Time	SGRF100: 4.0 mS max. SGRF103: 6.0 mS max.
Release Time	SGRF100: 3.0 mS max. SGRF103: 3.0 mS max.
Intercontact Capacitance	0.4 pf typical
Insulation Resistance	1,000 MΩ min. between mutually isolated terminals
Dielectric Strength	350 Vrms (60 Hz) @ atmospheric pressure

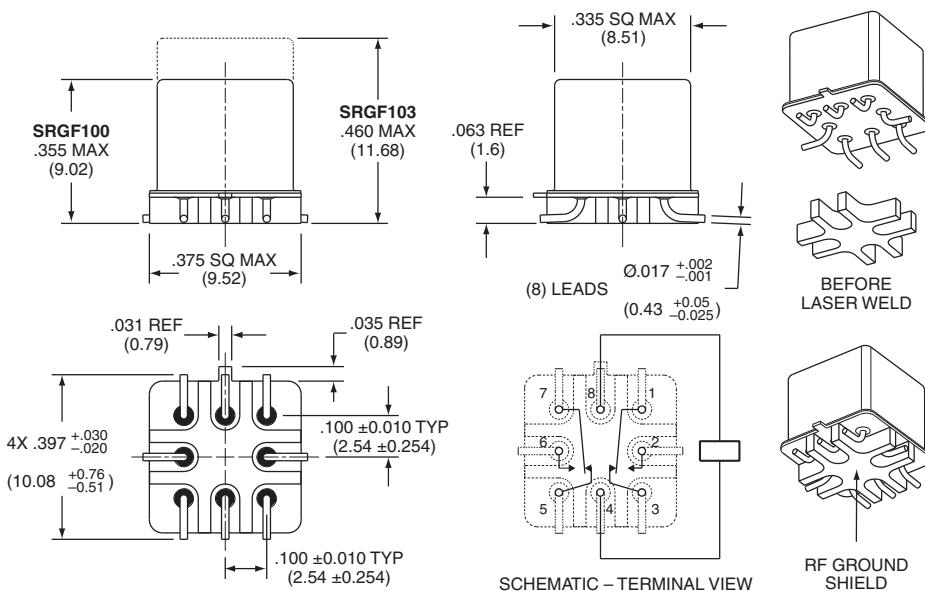
**DETAILED ELECTRICAL SPECIFICATIONS (@25°C)**

BASE PART NUMBERS	SGRF100-5/SGRF103-5	SGRF100-12/SGRF103-12
Coil Voltage, Nominal (Vdc)	5.0	12.0
Coil Resistance (Ohms ±20%)	SGRF100	50
	SGRF103	100
Pick-up Voltage (Vdc max.)	3.6	9.0

**GENERAL NOTES**

1. Relays will exhibit no contact chatter in excess of 10 μsec or transfer in excess of 1 μsec.
2. Unless otherwise specified, parameters are initial values.
3. Relays may be subjected to 260°C, peak solder reflow temperature, 1 minute, 3 passes.
4. Butt-lead ends are coplanar within .003" (0.08).
5. Application notes available for PCB layout and mounting information.
6. Add "/R" to end of part number for RoHS compliant solder coated pins (Sn99.3/Cu0.7).

**OUTLINE DIMENSIONS**



U.S. PATENT PENDING

## Appendix A: Spacer Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 “M4” Pad for TO-5		ER411T ER412, ER412D, ER412DD 712, 712D, 712TN, RF300, RF310, RF320 ER420, ER422D, ER420DD, 421, ER421D, ER421DD, ER422, ER422D, ER422DD, 722, 722D, RF341 ER431T, ER432T, ER432, ER432D, ER432DD 732, 732D, 732TN, RF303, RF313, RF323 RF312	.295 (7.49) .300 (7.62) .305 (7.75) .400 (10.16) .410 (10.41) .350 (8.89)
 “M4” Pad for TO-5		ER411, ER411D, ER411DD ER431, ER431D, ER431DD RF311 RF331	.295 (7.49) .400 (10.16) .300 (7.62) .410 (10.41)
 “M4” Pad for Centigrid®		172, 172D ER114, ER114D, ER114DD, J114, J114D, J114DD ER134, ER134D, ER134DD, J134, J134D, J134DD RF100 RF103	.305 (7.75) .300 (7.62) .400 (10.16) .315 (8.00) .420 (10.67)
 “M9” Pad for Centigrid®		122C, A152 ER116C, J116C ER136C, J136C RF180 A150	.320 (8.13) .300 (7.62) .400 (10.16) .325 (8.25) .305 (7.75)

Notes:

1. Spacer pad material: Polyester film.
2. To specify an “M4” or “M9” spacer pad, refer to the mounting variants portion of the part numbering example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is  $\pm .010$  (.25).
5. Add 10 mΩ to the contact resistance show in the datasheet.
6. Add 0.01 oz. (0.25 g) to the weight of the relay assembly shown in the datasheet.

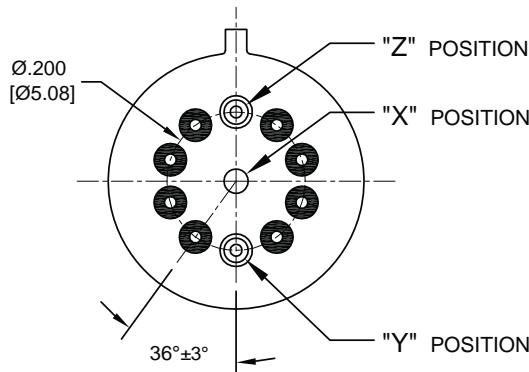
## Appendix A: Spreader Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 "M" Pad 5/6/		ER411T, J411T, ER412, ER412D ER412DD, J412, J412D, J412DD ER412T, J412T 712, 712D, 712TN	.388 (9.86) .393 (9.99)
 "M2" Pad 7/8/		ER411T ER412, ER412D, ER412DD J412, J412D, J412DD 712, 712D	.441 (11.20) .451 (11.46)
 "M3" Pad 5/6/9/		ER411, ER411D, ER411DD ER411TX ER412X, ER412DX, ER412DDX ER412TX 712X, 712DX, 712TNX	.388 (9.86) .393 (9.99)
		ER420X, ER420DX, ER420DDX ER421X, ER421DX, ER421DDX ER422X, ER422DX ER422DDX, 722X, 722DDX	.398 (10.11)
		ER431, ER431D, ER431DD ER431TX ER432X, ER432DX, ER432DDX ER432TX 732X, 732DX, 732TNX	.493 (12.52) .503 (12.78)

### Notes:

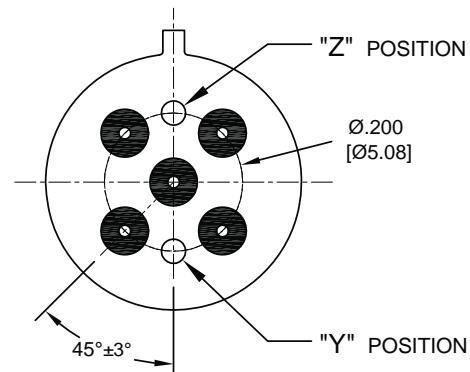
1. Spreader pad material: Diallyl Phthalate.
2. To specify an "M", "M2" or "M3" spreader pad, refer to the mounting variants portion of the part number example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is  $\pm .010"$  (0.25).
- 5/. Add 25 m $\Omega$  to the contact resistance shown in the datasheet.
- 6/. Add .01 oz. (0.25 g) to the weight of the relay assembly shown in the datasheet.
- 7/. Add 50 m $\Omega$  to the contact resistance shown in the datasheet.
- 8/. Add 0.025 oz (0.71 g) to the weight of the relay assembly shown in the datasheet.
- 9/. M3 pad to be used only when the relay has a center pin (e.g. ER411M3-12A, 722XM3-26.)

## Appendix A: Ground Pin Positions



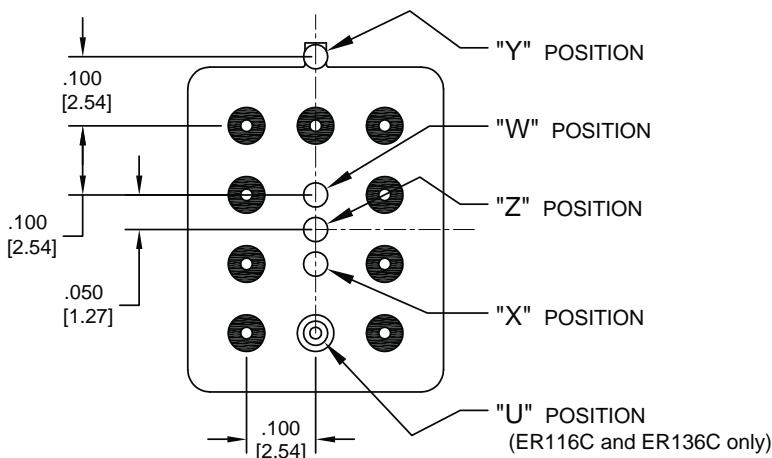
### TO-5 Relays:

ER411T, ER412, ER412T, ER420, ER421, ER422, ER431T, ER432, ER432T, 712, 712TN, 400H, 400K, 400V, RF300, RF303, RF341, RF312, RF310, RF313, RF320, RF323



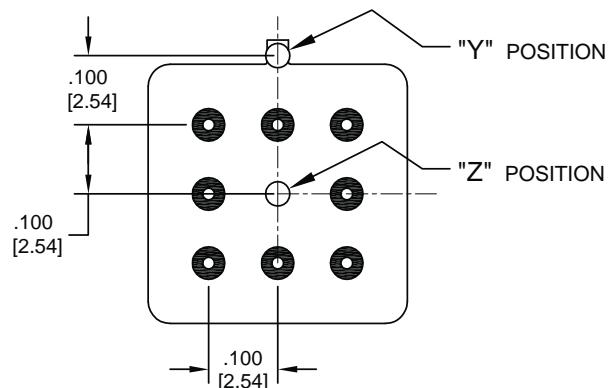
### TO-5 Relays:

ER411, ER431, RF311, RF331



### Centigrid® Relays:

RF180, ER116C, 122C, ER136C



### Centigrid® Relays:

RF100, RF103, ER114, ER134, 172

○ Indicates ground pin position

● Indicates glass insulated lead position

◎ Indicates ground pin or lead position depending on relay type

### NOTES

1. Terminal views shown
2. Dimensions are in inches (mm)
3. Tolerances:  $\pm .010$  ( $\pm .25$ ) unless otherwise specified
4. Ground pin positions are within  $.015$  (0.38) dia. of true position
5. Ground pin head dia.,  $0.035$  (0.89) ref: height  $0.010$  (0.25) ref.
6. Lead dia.  $0.017$  (0.43) nom.

# Mouser Electronics

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[SGRF100-12](#)