



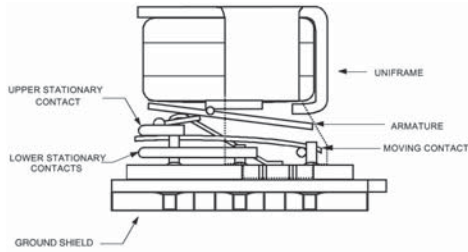
A Unit of Teledyne Electronics and Communications

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

## SERIES GRF100 GRF103

| SERIES DESIGNATION | RELAY TYPE                                |
|--------------------|---|
| GRF100             | Repeatable, RF Centigrd® relay            |
| GRF103             | Sensitive, repeatable, RF Centigrd® relay |

### INTERNAL CONSTRUCTION



### DESCRIPTION

The ultraminiature GRF100 and GRF103 relays are designed to provide a practical surface-mount solution with improved RF signal repeatability over the frequency range. GRF100 and GRF103 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 GRF100 and GRF103 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 GRF100 and GRF103 feature:

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

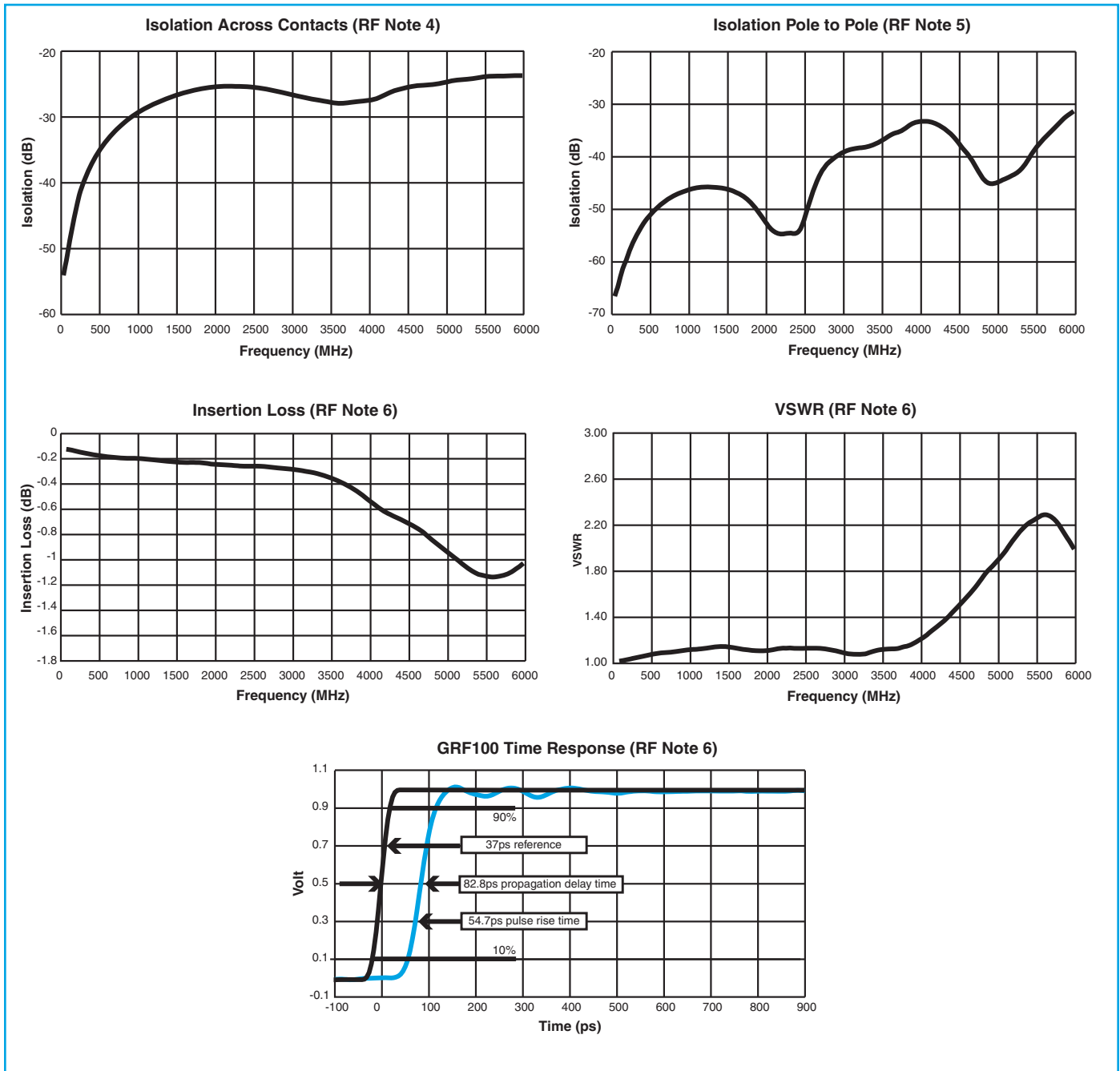
The following unique construction features and manufacturing techniques provide excellent robustness to environmental extremes and overall high reliability:

- 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><br>(Ambient)      | <b>Storage</b>   | -65°C to +125°C              |
|                                      | <b>Operating</b> | -55°C to +85°C               |
| <b>Vibration</b><br>(General Note 1) |                  | 10 g's to 500 Hz             |
| <b>Shock</b><br>(General Note 1)     |                  | 30 g's,<br>6 msec, half-sine |
| <b>Enclosure</b>                     |                  | Hermetically sealed          |
| <b>Weight</b>                        | GRF100           | 0.09 oz. (2.55g) max.        |
|                                      | GRF103           | 0.16 oz. (4.5g) max.         |

**SERIES GRF100 AND GRF103  
TYPICAL RF CHARACTERISTICS (See RF Notes)**

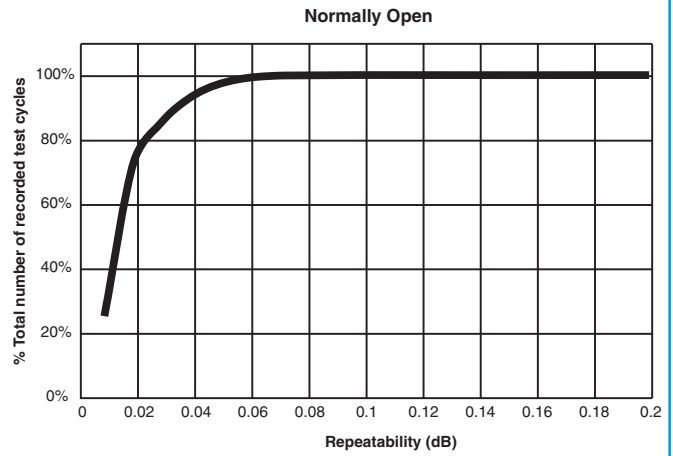
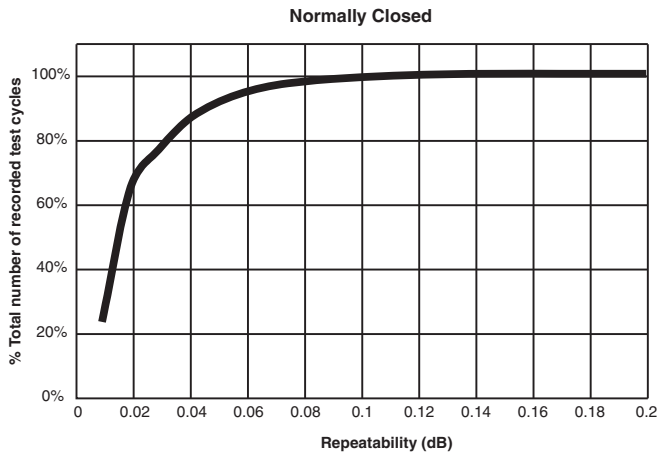


**RF NOTES**

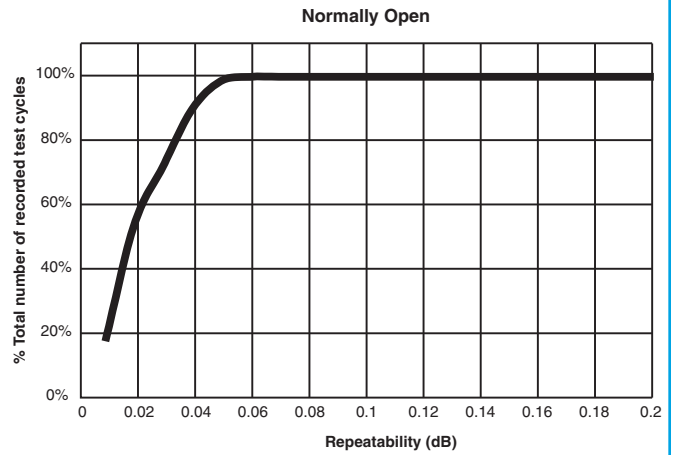
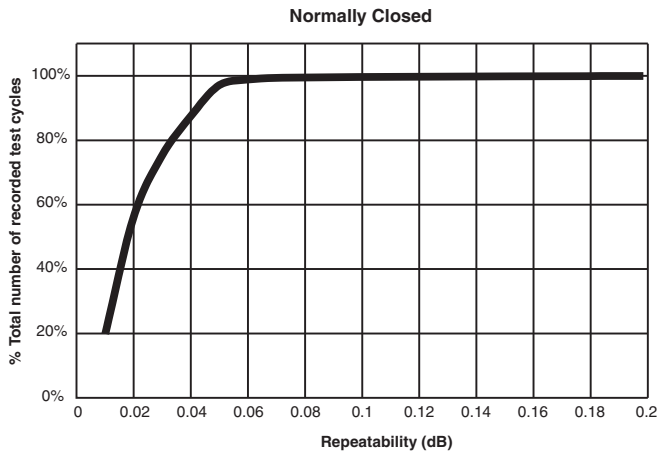
1. Test conditions:
  - a. Fixture: .031" copper clad, reinforced PTFE, RT/duroid® 6002 with SMA connectors. (RT/duroid® is a registered trademark of Rogers Corporation.)
  - b. RF ground shield is soldered to PCB RF ground plane.
  - c. Room ambient temperature.
  - d. Terminals not tested were terminated with 50-ohm load.
  - e. Contact signal level: -10 dBm.
  - f. No. of test samples: 4.
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 GRF100 AND GRF103**  
**TYPICAL RF INSERTION LOSS REPEATABILITY CHARACTERISTICS (See RF Insertion Loss Repeatability Notes)**

**REPEATABILITY CHARACTERISTICS GRF100 RELAYS**



**REPEATABILITY CHARACTERISTICS GRF103 RELAYS**



**RF INSERTION LOSS REPEATABILITY NOTES**

- Test conditions:
  - Fixture: .031" copper clad, reinforced PTFE, RT/duroid® 6002 with SMA connectors. (RT/duroid® is a registered trademark of Rogers Corporation.)
  - Test performed at room ambient temperature.
  - Contact signal level: -10 dBm.
- Data presented herein represents typical characteristics and is not intended for use as specification limits.
- Insertion loss repeatability measured over frequency range from 50 MHz to 4 GHz.

**SERIES GRF100 GRF103  
GENERAL ELECTRICAL SPECIFICATIONS (@25°C)**

|                                 |  |   |
|---------------------------------|--|---|
| <b>Contact Arrangement</b>      | DPDT   |   |
| <b>Rated Duty</b>               | Continuous   |   |
| <b>Contact Resistance</b>       | 0.100 ohm max.   |   |
| <b>Contact Load Rating</b>      | Low Level: 10 to 50 $\mu$ A/10 to 50mV                 |   |
| <b>Contact Life Rating</b>      | 10,000,000 cycles (typical) at low level               |   |
| <b>Coil Operating Power</b>     | GRF100-5: 500 mW typical @ nominal rated voltage       | GRF100-12: 369 mW typical @ nominal rated voltage |
|                                 | GRF103-5: 250 mW typical @ nominal rated voltage       | GRF103-12: 180 mW typical @ nominal rated voltage |
| <b>Operate Time</b>             | <b>GRF100</b>  | 4.0 msec max.                                     |
|                                 | <b>GRF103</b>  | 6.0 msec max.                                     |
| <b>Release Time</b>             | <b>GRF100</b>  | 3.0 msec max.                                     |
|                                 | <b>GRF103</b>  | 3.0 msec max.                                     |
| <b>Intercontact Capacitance</b> | 0.4 pf typical   |   |
| <b>Insulation Resistance</b>    | 1,000 megohms min. between mutually isolated terminals |   |
| <b>Dielectric Strength</b>      | 350 Vrms/60Hz @ atmospheric pressure                   |   |

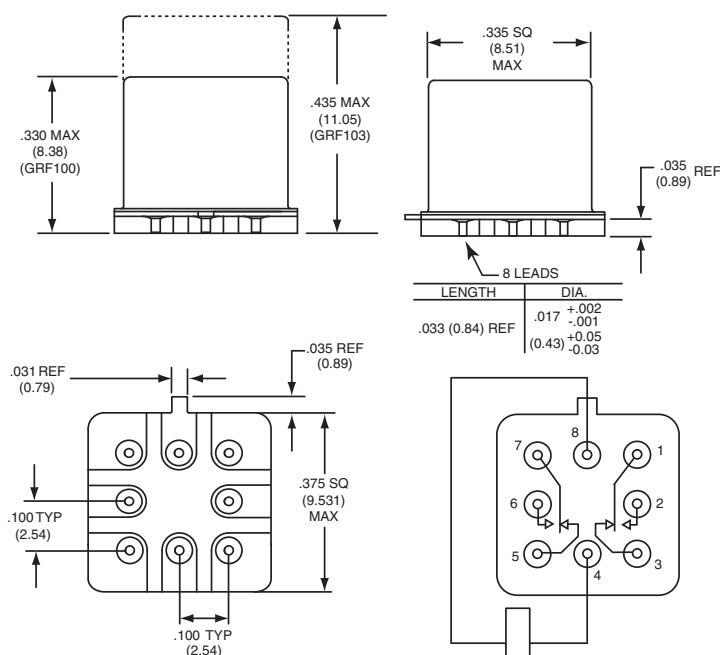
**DETAILED ELECTRICAL SPECIFICATIONS (@25°C)**

| BASE PART NUMBERS                                 | ➔      |        | GRF100-5 | GRF100-12 |
|---|--------|--------|----------|-----------|
|   | GRF100 | GRF103 | GRF103-5 | GRF103-12 |
| <b>Coil Voltage, Nominal (Vdc)</b>                |        |        | 5.0      | 12.0      |
| <b>Coil Resistance (Ohms <math>\pm</math>20%)</b> | GRF100 |        | 50       | 390       |
|   | GRF103 |        | 100      | 800       |
| <b>Pick-up Voltage (Vdc, Max.)</b>                |        |        | 3.6      | 9.0       |

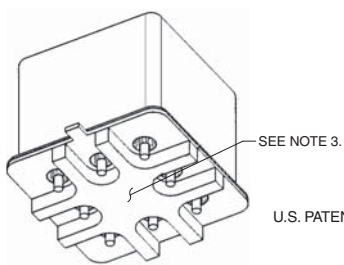
**GENERAL NOTES**

1. Relays will exhibit no contact chatter in excess of 10  $\mu$ sec or transfer in excess of 1  $\mu$ sec.
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.

**OUTLINE DIMENSIONS**

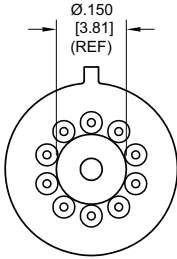
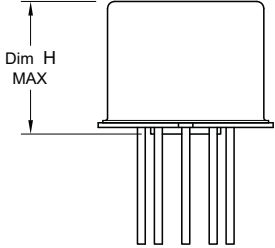
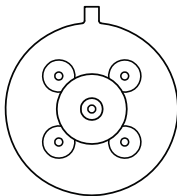
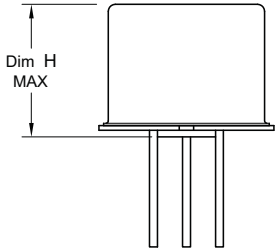
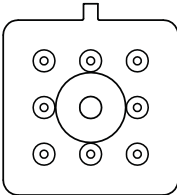
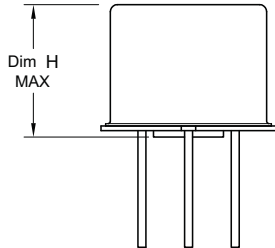
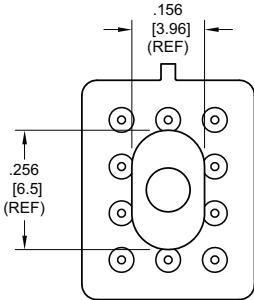
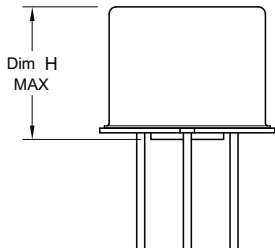


**SCHEMATIC-TERMINAL VIEW**  
PIN NUMBERS ARE FOR REFERENCE ONLY, NOT MARKED ON RELAY



NOTES:  
1. DIMENSIONS ARE IN INCHES, METRIC EQUIVALENTS IN MILLIMETERS ARE SHOWN IN ( ).  
2. UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE .010 INCH (0.025 mm).  
3. FOR OPTIMAL RF PERFORMANCE, SOLDER BOTTOM OF GROUND SHIELD TO PCB RF GROUND PLANE.

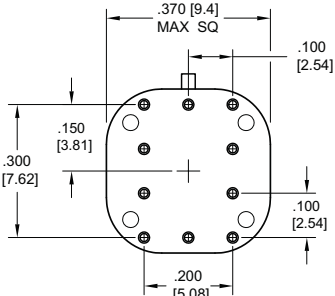
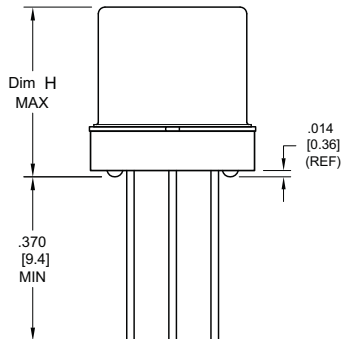
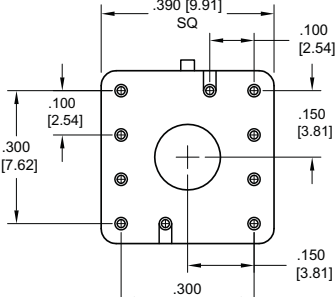
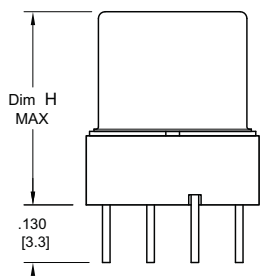
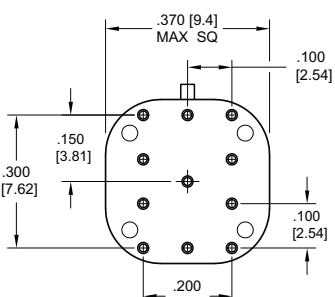
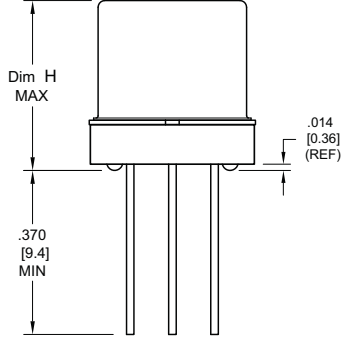
# Appendix A: Spacer Pads

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

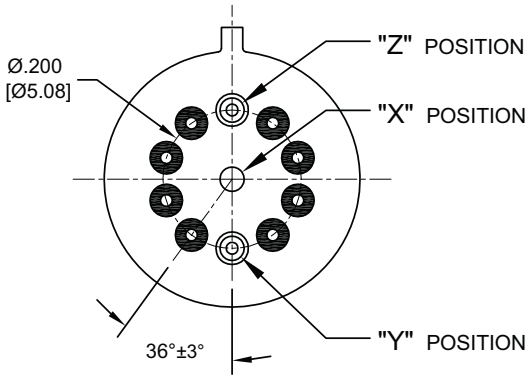
# Appendix A: Spreader Pads

| Pad designation and bottom view dimensions  | Height  | For use with the following:   | Dim. H Max.  |
|---|---|---|--------------|
|  <p>“M” Pad <u>5/</u> <u>6/</u> <u>9/</u></p>    |    | ER411T, J411T, ER412, ER412D<br>ER412DD, J412, J412D, J412DD<br>ER412T, J412T                                       | .388 (9.86)  |
|   |   | 712, 712D, 712TN  | .393 (9.99)  |
|   |   | ER431T, J431T, ER432, ER432D<br>ER432DD, J432, J432D, J432DD<br>ER432T, J432T                                       | .493 (12.52) |
|   |   | 732, 732D, 732TN  | .503 (12.78) |
|   |   | ER420, J420, ER420D, J420D<br>ER420DD, J420DD, ER421, J421<br>ER421D, J421D, ER421DD<br>J422D, ER422DD, J422DD, 722 | .398 (10.11) |
|  <p>“M2” Pad <u>7/</u> <u>8/</u></p>            |   | ER411T<br>ER412, ER412D, ER412DD<br>J412, J412D, J412DD   | .441 (11.20) |
|   |   | 712, 712D   | .451 (11.46) |
|   |   | ER421, ER421D, ER421DD<br>722, 732D   | .451 (11.46) |
|   |   | ER431T<br>ER432, ER432D, ER432DD  | .546 (13.87) |
|   |   | 732, 732D   | .556 (14.12) |
|  <p>“M3” Pad <u>5/</u> <u>6/</u> <u>9/</u></p> |  | ER411, ER411D, ER411DD<br>ER411TX<br>ER412X, ER412DX, ER412DDX<br>ER412TX   | .388 (9.86)  |
|   |   | 712X, 712DX, 712TNX   | .393 (9.99)  |
|   |   | ER420X, ER420DX, ER420DDX<br>ER421X, ER421DX, ER421DDX<br>ER422X, ER422DX<br>ER422DDX, 722X, 722DDX                 | .398 (10.11) |
|   |   | ER431, ER431D, ER431DD<br>ER431TX<br>ER432X, ER432DX, ER432DDX<br>ER432TX   | .493 (12.52) |
|   |   | 732X, 732DX, 732TNX   | .503 (12.78) |

## Notes:

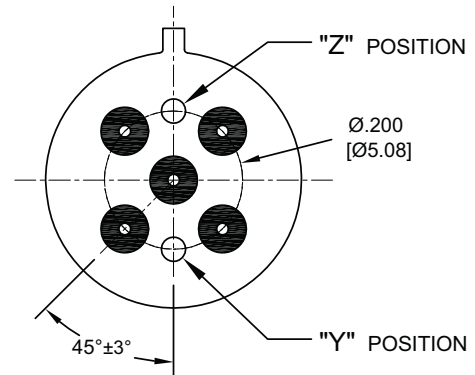
1. Spreader pad material: Diallyl Phthalate.
2. To specify an “M”, “M2” or “M3” spreader pad, refer to the mounting variants portion of the part number example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is  $\pm .010$ ” (0.25).
- 5/. Add 25 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



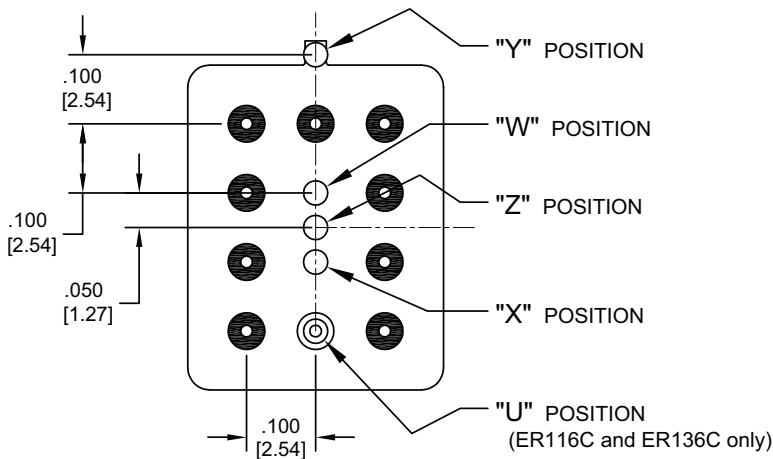
### TO-5 Relays:

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



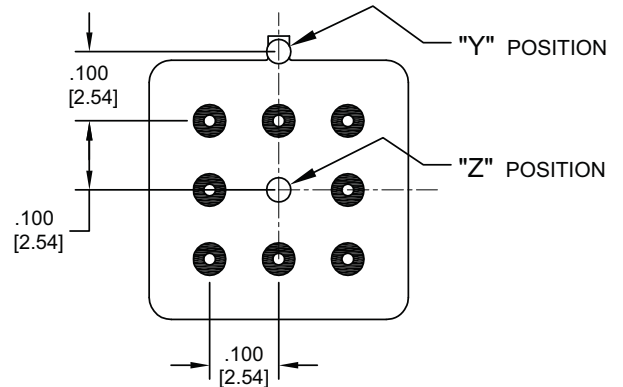
### TO-5 Relays:

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.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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