

RF & MICROWAVE



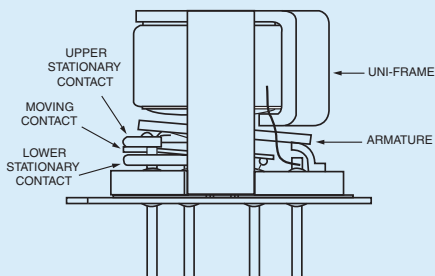
A Unit of Teledyne Electronics and Communications

HIGH REPEATABILITY BROADBAND TO-5 RELAYS DPDT

SERIES RF300 RF303

| SERIES DESIGNATION | RELAY TYPE |
|--------------------|--------------------------------|
| RF300 | Repeatable RF relay |
| RF303 | Sensitive, repeatable RF relay |

INTERNAL CONSTRUCTION



PERFORMANCE FEATURES

The ultraminiature RF300 and RF303 relays are designed to provide improved RF signal repeatability over the frequency range. These relays are highly suitable for use in attenuator and other RF circuits, the RF 300 and RF303 feature:

- High repeatability.
- Broader bandwidth.
- Metal enclosure for EMI shielding.
- Ground pin option to improve case grounding.
- High isolation between control and signal paths.
- Highly resistant to ESD.

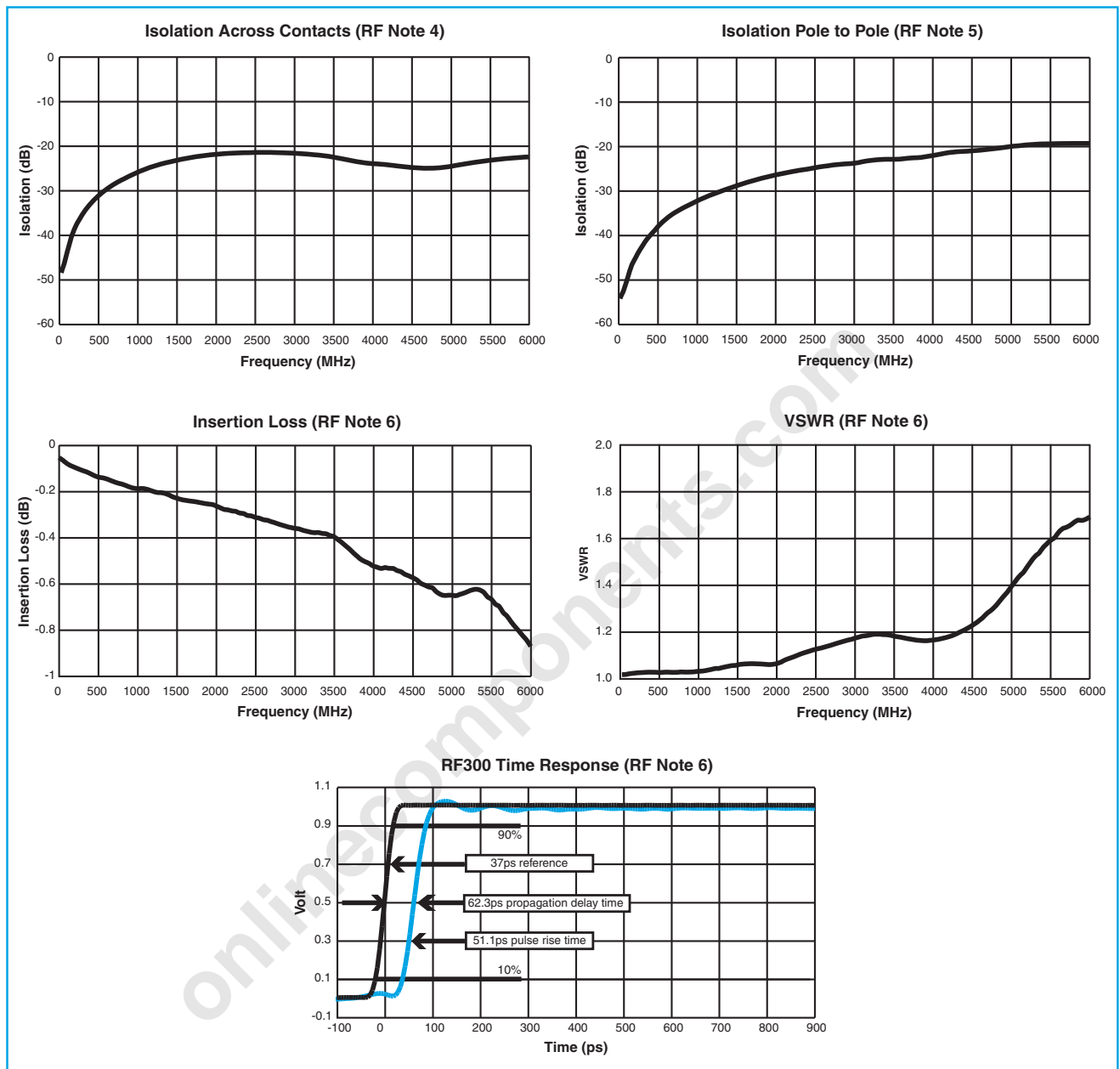
CONSTRUCTION FEATURES

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

- Uni-frame 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.
- Solderable leads.

| ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS | | |
|---|-----------|---------------------------|
| Temperature (Ambient) | Storage | -65°C to +125°C |
| | Operating | -55°C to +85°C |
| Vibration (General Note 1) | | 10 g's to 500 Hz |
| Shock (General Note 1) | | 30 g's, 6 msec, half-sine |
| Enclosure | | Hermetically sealed |
| Weight | RF300 | 0.09 oz. (2.55g) max. |
| | RF303 | 0.16 oz. (4.5g) max. |

SERIES RF300 AND RF303
TYPICAL RF CHARACTERISTICS (See RF Notes)



RF NOTES

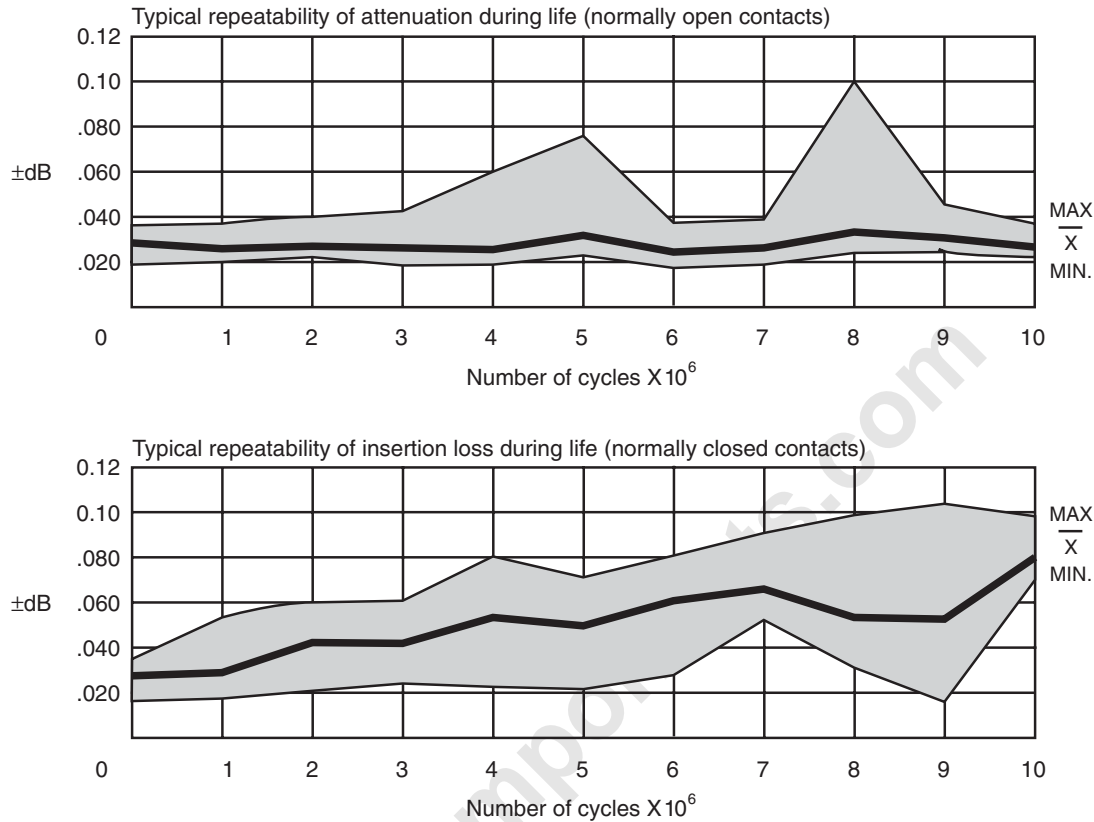
- Test conditions:
 - Fixture: .031" copper clad, reinforced PTFE, RT/duroid® 6002 with SMA connectors. (RT/duroid® is a registered trademark of Rogers Corporation.)
 - Room ambient temperature.
 - Terminals not tested were terminated with 50-ohm load.
 - Contact signal level: -10 dBm.
 - No. of test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

SERIES RF300 AND RF303

RF REPEATABILITY PERFORMANCE (See RF Notes 1, 2 and 3)

1 million cycle repeatability

±0.1 dB from DC to 3GHz



RF NOTES

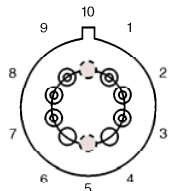
1. One million cycle repeatability data is based upon 396 observations with an average repeatability ±0.033 dB and a range of ±0.093 dB.
2. Repeatability of attenuation values were obtained from tests conducted in a 20 dB attenuator network with a 0 dBm input signal.
3. Relay operates at frequencies higher than 3 GHz with reduced RF performance characteristics.
4. Curves were developed from tests performed on a 0.031" copper clad, reinforced PTFE circuit board at 20°C (ref). The unutilized contacts were terminated in 50 ohms; characteristic impedance of measuring equipment is 50 ohms. The relays were mounted flush to the circuit board ground plane without the relay header soldered to the ground plane.

SERIES RF300 AND RF303
GENERAL ELECTRICAL SPECIFICATIONS (@25°C)

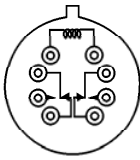
| | | |
|---------------------------------|--------------|--|
| Contact arrangement | | 2 Form C (DPDT) |
| Rated duty | | Continuous |
| Contact resistance | | 0.15 ohm max. initial (measured 1/8" from the header) |
| Contact load rating | | Resistive: 1Amp/28Vdc Low level: 10 to 50 µA, 10 to 50 mV |
| Contact life rating | | 10,000,000 cycles typical at low level |
| Coil operating power | | RF300: 450 mW typical @ nominal rated voltage RF303: 200 mW typical @ nominal rated voltage |
| Operate time | RF300 | 4.0 ms. max. |
| | RF303 | 6.0 ms. max. |
| Release time | RF300 | 3.0 ms. max. |
| | RF303 | 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 | | RF300-5 RF303-5 | RF300-12 RF303-12 |
|------------------------------------|--------------|--------------------|----------------------|
| Coil voltage, nominal, VDC | | 5.0 | 12.0 |
| Coil resistance, ohms ± 20% | RF300 | 50 | 390 |
| | RF303 | 100 | 850 |
| Pick-up voltage max, VDC | | 3.6 | 9.0 |



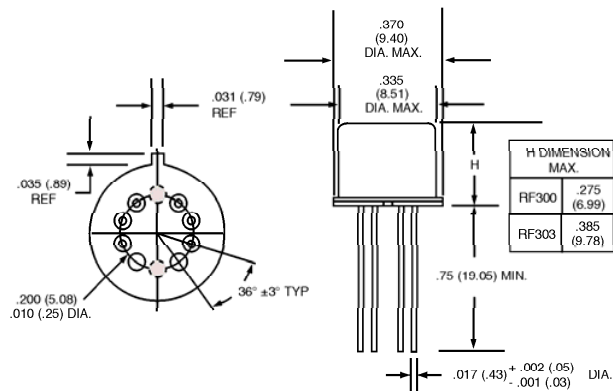
TERMINAL NUMBERING



SCHEMATIC

- HEADER DIMENSIONS, TERMINAL NUMBERING AND SCHEMATIC ARE AS VIEWED FROM THE TERMINALS.
- DIMENSIONS ARE IN INCHES (MILLIMETERS).
- POSITIONS 5 AND 10 ARE FOR UNINSULATED CASE GROUND OPTIONS. SEE APPENDIX.
- NO PROTRUSION BELOW BOTTOM OF HEADER WHEN GROUND PINS ARE INSTALLED.
- TO ORDER THE CASE GROUND OPTION, AFTER THE SERIES DESIGNATOR, ADD "Y" TO THE PART NUMBER FOR POSITION 5 OR "Z" TO THE PART NUMBER FOR POSITION 10.

EXAMPLE: RF300Y-COIL VOLTAGE

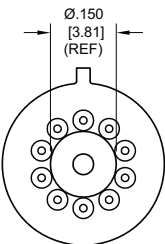
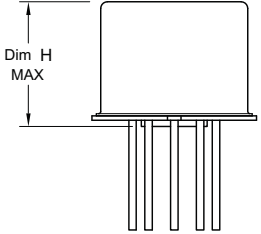
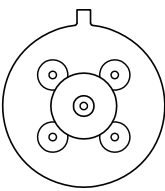
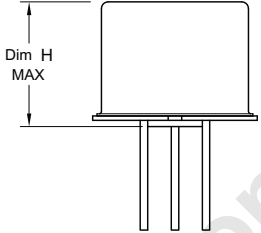
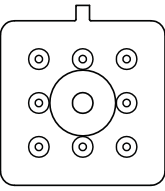
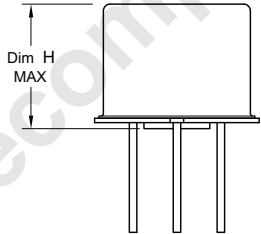
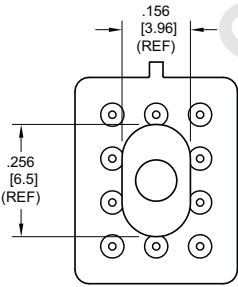
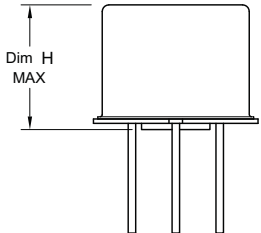


EXTERNAL DIMENSIONS

GENERAL NOTES

1. Relays will exhibit no contact chatter in excess of 10 µsec or transfer in excess of 1 µsec.

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 ER412, ER412D, ER412DD | .295 (7.49) |
| | | 712, 712D, 712TN, RF300, RF310, RF320 | .300 (7.62) |
| | | ER420, ER422D, ER420DD, 421, ER421D, ER421DD, ER422, ER422D, ER422DD, 722, 722D, RF341 | .305 (7.75) |
| | | ER431T, ER432T, ER432, ER432D, ER432DD | .400 (10.16) |
| | | 732, 732D, 732TN, RF303, RF313, 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, J114, J114D, J114DD | .300 (7.62) |
| | | ER134, ER134D, ER134DD, 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 Ω 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.

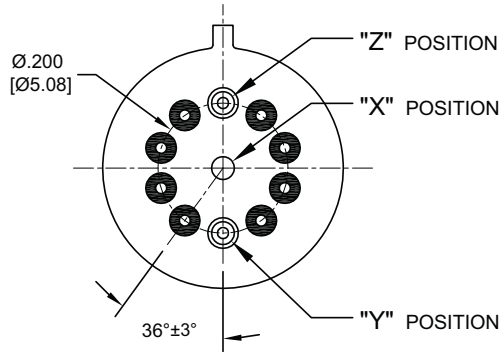
Appendix A: Spreader Pads

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

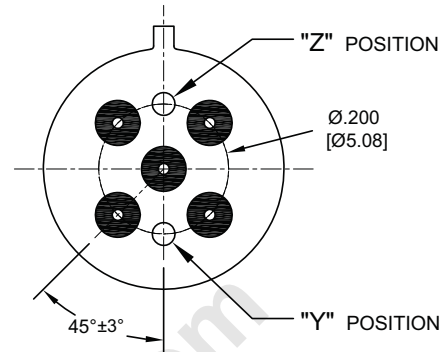
Notes:

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 mΩ 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 mΩ 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.)

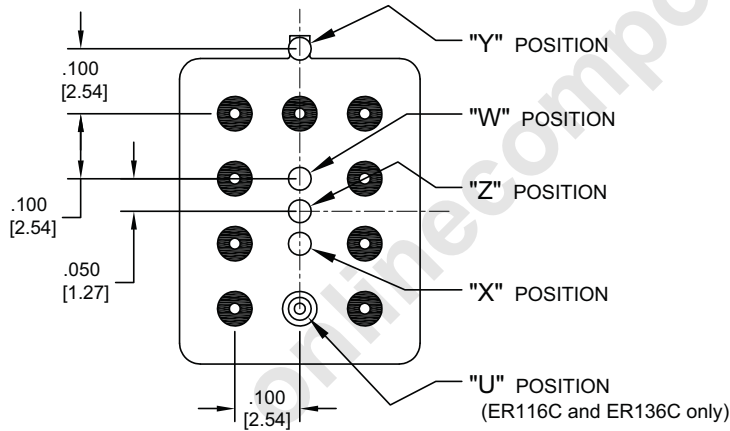
Appendix A: Ground Pin Positions



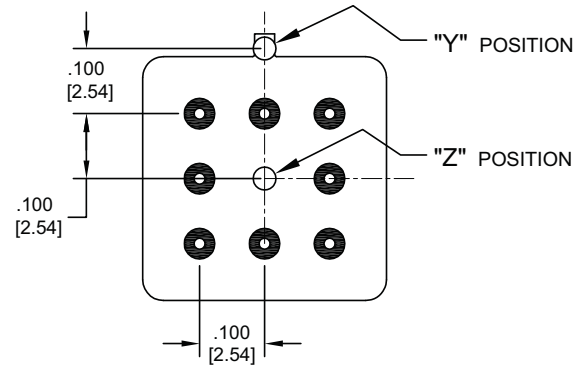
TO-5 Relays:
ER411T, ER412, ER412T, ER420, ER421, ER422,
ER431T, ER432, ER432T, 712, 712TN, 400H, 400K,
400V, RF300, RF303, RF341, RF312, RF310, RF313,
RF320, RF323



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: ± .010 (±.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.