



TELEDYNE
RELAYS

A Unit of Teledyne Electronics and Communications

SURFACE MOUNT, MAGNETIC-LATCHING BROADBAND RF RELAYS DPDT

SERIES GRF180

DESCRIPTION

The Series GRF180 relay is the first hermetically sealed, ultraminiature RF relay designed from inception for surface mount applications. This magnetic-latching relay features extremely low internal circuit losses for exceptional time and frequency domain response characteristics through and beyond the UHF spectrum and into the S band. The GRF180 features 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 GRF180 extends performance advantages over similar RF devices that simply offer formed leads for surface mounting.

The GRF180 is robust to shock, vibration and temperature extremes for use in space applications and other demanding environments. It is engineered for use in RF attenuators, RF

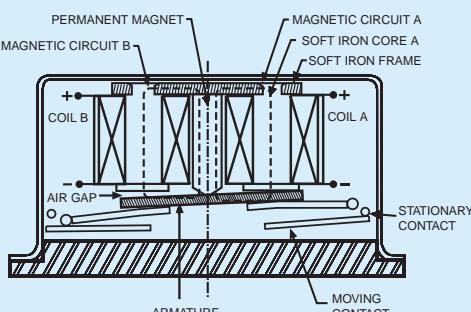
switch matrices, automated test equipment, spacecraft and other applications that require dependable high-frequency signal fidelity and performance. Its low profile and .100" grid spaced terminals make the GRF180 ideal for applications where extreme packaging density and/or close PC board spacing are required.

Unique features and manufacturing techniques include:

- Positive mounting means to RF ground plane.
- Unique uniframe design provides high magnetic efficiency and mechanical rigidity.
- High force/mass ratios for resistance to shock and vibration.
- Advanced cleaning techniques provide maximum assurance of internal cleanliness.
- Gold-plated precious metal alloy contacts ensure reliable dc and RF signal switching, as well as low and stable insertion loss.
- Robust to high temperature solder reflow environments.

PRINCIPLE OF OPERATION

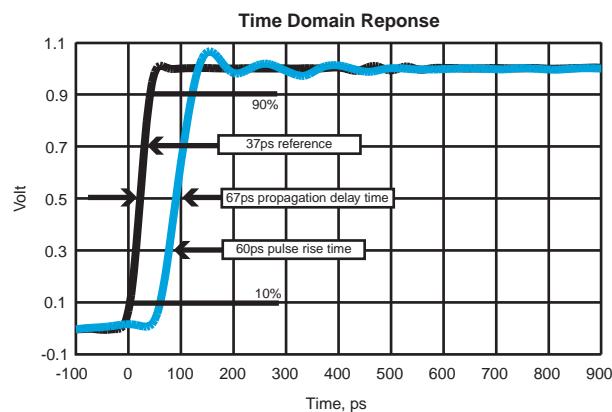
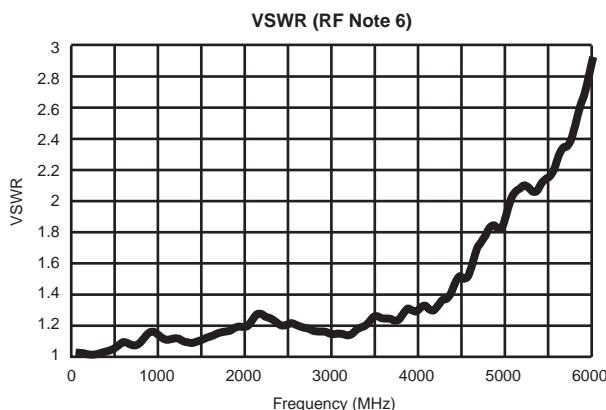
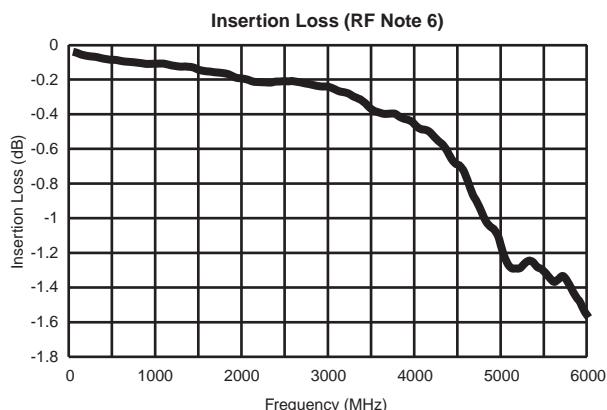
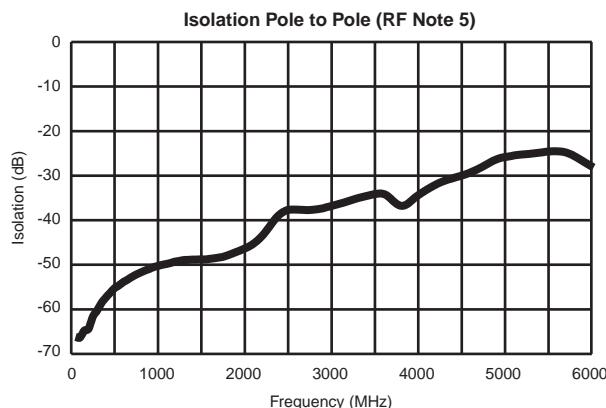
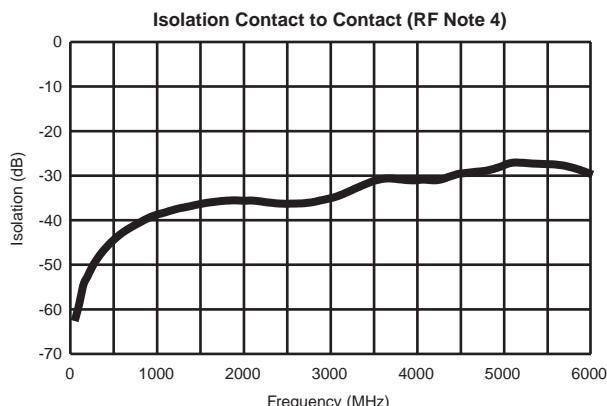
Energizing Coil A produces a magnetic field opposing the magnetic field of the permanent magnet in Circuit A. As the net holding force decreases, the attractive force in the air gap of Circuit B, which also results from the magnetic field of the permanent magnet, becomes great enough to break the armature free of Core A, and snap it into a closed position against Core B. The armature remains in this position upon removal of power from Coil A, but will snap back into position A upon energizing Coil B. Since operation depends upon cancellation of a magnetic field, it is necessary to apply the correct polarity to the relay coils as indicated on the relay schematic.



When latching relays are installed in equipment, the latch and reset coils should not be pulsed simultaneously. Coils should not be pulsed with less than rated coil voltage and the pulse width should be a minimum of three times the specified operate time of the relay. If these conditions are not followed, it is possible for the relay to be in the magnetic neutral position.

ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

Temperature (Ambient)	Storage	-65°C to +125°C
	Operating	-55°C to +85°C
Vibration (General Note 1)		30 g's to 500 Hz
Shock (General Note 1)		100 g's, 6 msec, half-sine
Enclosure		Hermetically sealed
Weight		0.10 oz. (2.9g) max.

SERIES GRF180**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: 3.
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 after Coil A is energized then Coil B is 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 GRF180**GENERAL ELECTRICAL SPECIFICATIONS (@ 25°C) (General Note 2)**

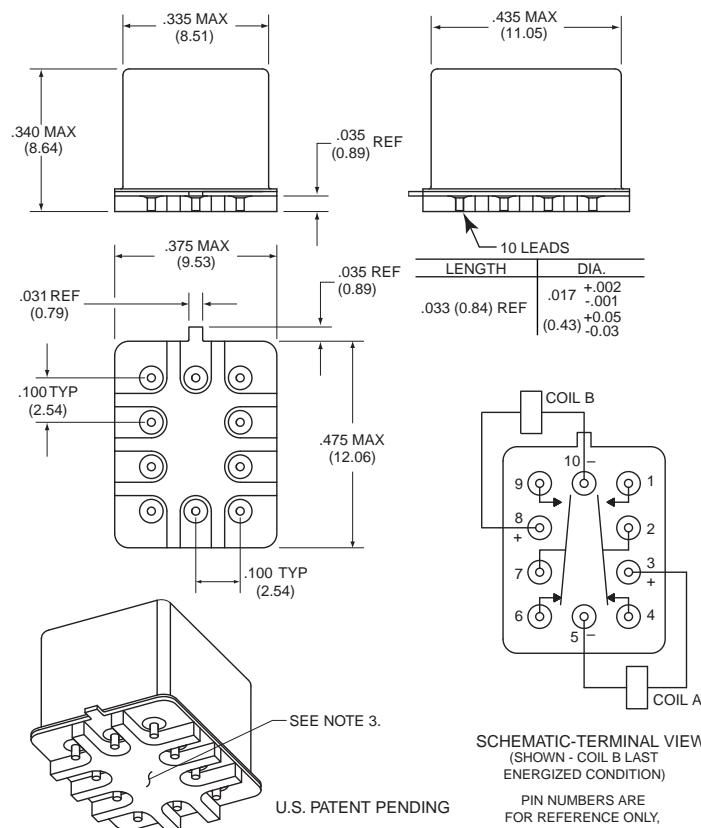
Contact Arrangement	2 Form C (DPDT)
Rated Duty	Continuous
Contact Resistance	.15Ω maximum before life; 0.25Ω maximum after life at 0.25A/28Vdc
Contact Load Rating (DC)	Resistive: 0.25A/28Vdc Low Level: 10 to 50 μA/10 to 50 mV
Characteristic Contact Life Ratings (General Note 3)	10,000,000 cycles (typical) at low level (General Note 3) 100,000 cycles minimum at all other loads specified above
Contact Overload Rating	0.5A/28Vdc Resistive (100 cycles minimum)
Contact Carry Rating	Contact factory
Coil Operating Power	GRF180-5: 410 mW typical @ nominal rated voltage
	GRF180-12: 288 mW typical @ nominal rated voltage
	GRF180-26: 351 mW typical @ nominal rated voltage
Operate Time	2.0 msec. maximum at nominal rated coil voltage
Minimum Operate Pulse	6.0 msec. width at rated voltage
Interconnect Capacitance	0.02 pf typical
Insulation Resistance	1,000 MΩ minimum between mutually isolated terminals
Dielectric Strength	Atmospheric pressure: 350 Vrms (60 Hz)

DETAILED ELECTRICAL SPECIFICATIONS (@ 25°C) (General Note 2)

BASE PART NUMBERS	→	GRF180-5	GRF180-12	GRF180-26
Coil Voltage (Vdc)	Nom.	5.0	12.0	26.5
	Max.	6.0	16.0	32.0
Coil Resistance (Ohms ±20%)		61	500	2000
Set & Reset Voltage (Vdc max.)		3.5	9.0	18.0

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. For extended contact life ratings, contact factory.
4. Contacts shown in position resulting when Coil B last energized.
5. For hi-rel applications, contact factory at (800) 284-7007.
6. Relays may be subjected to 260°C, peak solder reflow temperature, 1 minute, 3 passes.
7. Butt-lead ends are coplanar within .003" (0.08).
8. Application notes available for PCB layout and mounting information.

OUTLINE DIMENSIONS

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.
 “M4” Pad for TO-5		ER411T ER412, ER412D, ER412DD 712, 712D, 712TN, RF300, RF310, RF320	.295 (7.49)
			.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)
 “M4” Pad for TO-5		ER411, ER411D, ER411DD	.295 (7.49)
		ER431, ER431D, ER431DD	.400 (10.16)
		RF311	.300 (7.62)
		RF331	.410 (10.41)
 “M4” Pad for Centrigrid®		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)
 “M9” Pad for Centrigrid®		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 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.

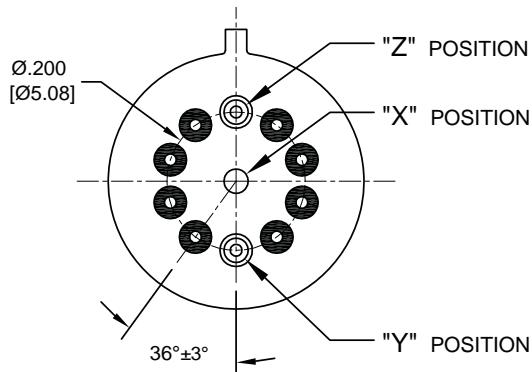
Appendix A: Spreader Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
		ER411T, J411T, ER412, ER412D ER412DD, J412, J412D, J412DD ER412T, J412T 712, 712D, 712TN	.388 (9.86)
		ER411T ER412, ER412D, ER412DD J412, J412D, J412DD 712, 712D	.441 (11.20)
		712, 712D ER421, ER421D, ER421DD 722, 732D ER431T ER432, ER432D, ER432DD 732, 732D	.451 (11.46)
		ER411, ER411D, ER411DD ER411TX ER412X, ER412DX, ER412DDX ER412TX 712X, 712DX, 712TNX	.546 (13.87)
		712X, 712DX, 712TNX ER420X, ER420DX, ER420DDX ER421X, ER421DX, ER421DDX ER422X, ER422DX ER422DDX, 722X, 722DDX	.556 (14.12)
		ER411, ER411D, ER411DD ER411TX ER412X, ER412DX, ER412DDX ER412TX 712X, 712DX, 712TNX ER420X, ER420DX, ER420DDX ER421X, ER421DX, ER421DDX ER422X, ER422DX ER422DDX, 722X, 722DDX	.388 (9.86)
		ER431, ER431D, ER431DD ER431TX ER432X, ER432DX, ER432DDX ER432TX 732X, 732DX, 732TNX	.393 (9.99)
		ER431, ER431D, ER431DD ER431TX ER432X, ER432DX, ER432DDX ER432TX 732X, 732DX, 732TNX	.493 (12.52)
		ER431, ER431D, ER431DD ER431TX ER432X, ER432DX, ER432DDX ER432TX 732X, 732DX, 732TNX	.503 (12.78)

Notes:

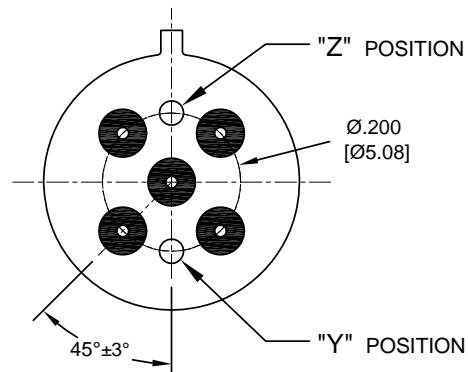
1. Spreader pad material: Diallyl Phthalate.
 2. To specify an "M", "M2" or "M3" spreader pad, refer to the mounting variants portion of the part number example in the applicable datasheet.
 3. Dimensions are in inches (mm).
 4. Unless otherwise specified, tolerance is $\pm .010"$ (0.25).
 - 5/. Add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



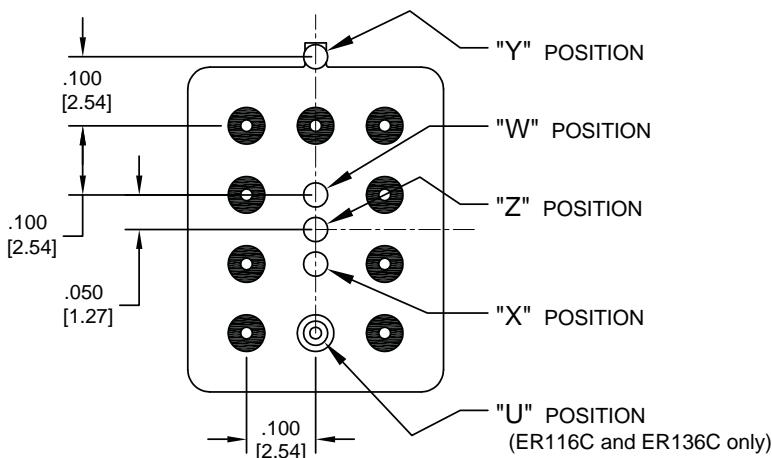
TO-5 Relays:

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



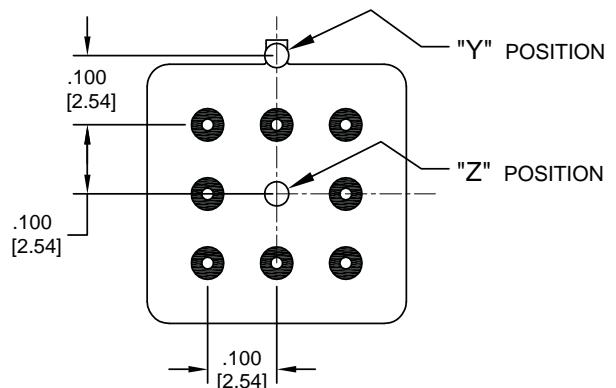
TO-5 Relays:

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.

ООО "ЛайфЭлектроникс"

"LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибуторов 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 дистрибуторских договоров

Мы предлагаем:

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- 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 помочь 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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