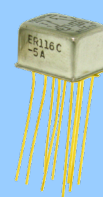


## CENTIGRID® ESTABLISHED RELIABILITY MILITARY DPDT CMOS COMPATIBLE



SERIES	RELAY TYPE
116C	DPDT general-purpose relay with internal power MOSFET driver, Zener diode gate protection, and diode coil suppression

### DESCRIPTION

The 116C Centigrd® relay is an ultraminiature, hermetically sealed, armature relay capable of being directly driven by most IC logic families. Its low profile height and .100" grid spaced terminals, which preclude the need for spreader pads, make it ideal for applications where extreme packaging density and/or close PC board spacing are required.

The basic concept and internal mechanical structure are similar to the 114 DPDT relay. The following unique construction features and manufacturing techniques provide overall high reliability and excellent resistance to environmental extremes:

#### The 116C feature:

- All welded construction.
- Advanced cleaning techniques provide maximum assurance of internal cleanliness.
- Unique uni-frame design providing high magnetic efficiency and

mechanical rigidity.

- High force/mass ratios for resistance to shock and vibration.
- Precious metal alloy contact material with gold plating assures excellent high current and dry circuit switching capabilities.

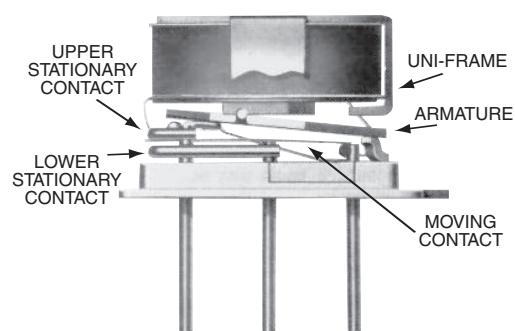
By virtue of its inherently low intercontact capacitance and contact circuit losses, the 116C relay has proven to be an excellent ultraminiature RF switch for frequency ranges well into the UHF spectrum. A typical RF application for this Centigrd® relay is in handheld radio transceivers, wherein the combined features of good RF performance, small size, low coil power dissipation and high reliability make it a preferred method of Transmit-Receive switching (see Figure 1).

The Series 116C utilizes an internal silicon diode for coil suppression, a Zener diode to protect the MOSFET gate input, and an N-channel enhancement mode MOSFET chip, which enables direct relay interfacing with most Microprocessor and IC logic families (CMOS, TTL and MOS).

### ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

<b>Temperature</b> (Ambient)	-65°C to +125°C
<b>Vibration</b> (General Note I)	30 g's to 3000 Hz
<b>Shock</b> (General Note I)	75 g's, 6ms half sine
<b>Acceleration</b>	50 g's
<b>Enclosure</b>	Hermetically sealed
<b>Weight</b>	0.11 oz. (3.12g) max.

### INTERNAL CONSTRUCTION



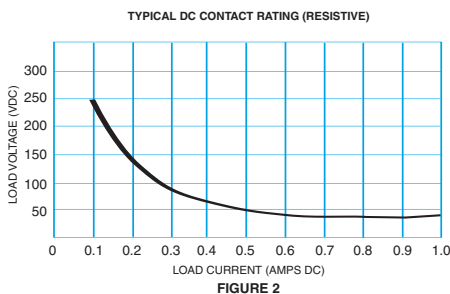
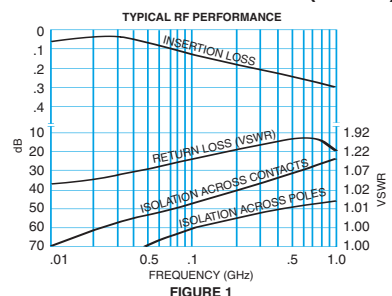
**SERIES 116C**  
**GENERAL ELECTRICAL SPECIFICATIONS (@25°C)**

<b>Contact Arrangement</b>		2 Form C (DPDT)
<b>Rated Duty</b>		Continuous
<b>Contact Resistance</b>		0.1 ohm max. before life; 0.2 ohm max. after life at 1A/28Vdc
<b>Contact Load Rating (DC)</b>		Resistive: 1 A / 28 Vdc Inductive: 200 mA / 28 Vdc (320mH) Lamp: 100 mA / 28 Vdc (320mH) Low level: 10 to 50 $\mu$ A @ 10 to 50 mV
<b>Contact Load Rating (AC)</b>		Resistive: 250 mA / 115Vac, 60 and 400 Hz (Case not grounded) 100 mA / 115 Vac, 60 and 400 Hz (Case grounded)
<b>Contact Life Ratings</b>		10,000,000 cycles (typical) at low level 1,000,000 cycles (typical) at 0.5 A / 28 Vdc resistive 100,000 cycles min. at all other loads specified above
<b>Contact Overload Rating</b>		2 A / 28 Vdc Resistive (100 cycles min.)
<b>Contact Carry Rating</b>		Contact Factory
<b>Operate Time</b>		2.5 msec max. at nominal rated coil voltage
<b>Release Time</b>		1.5 ms max.
<b>Contact Bounce</b>		1.5 msec max.
<b>Intercontact Capacitance</b>		0.4 pf typical
<b>Insulation Resistance</b>		10,000 M $\Omega$ min. between mutually isolated terminals
<b>Dielectric Strength (Vrms/60)</b>		Atmospheric pressure: 500 Vrms      70,000 ft: 125
<b>Negative Coil Transient (Vdc)</b>		1.0 Vdc Max.
<b>Diode P.I.V. (Vdc)</b>		100 Vdc Min.
<b>Zener Voltage (Vdc)</b>	<b>Min.</b>	17
	<b>Max.</b>	23
<b>Zener Leakage Current (<math>\mu</math>A at 15.2 Vdc) (max.)</b>		2.5
<b>Power FET Characteristics (-65°C to +125°C) (Vdc, Max.)</b>	<b>Turn Off Gate Voltage</b>	0.5
	<b>Turn On Gate Voltage</b>	3.8 (Note 4)
	<b>Drain-Source Voltage</b>	55

**116C Series**  
**DETAILED ELECTRICAL SPECIFICATIONS (@25°C)**

BASE PART NUMBERS (116C)		116C-5	116C-12	116C-26
Coil Voltage	Nom.	5.0	12.0	26.5
	Max.	5.6	16.0	32.0
Coil Current (mAdc@25°C)	Max.	132.3	36.1	19.9
	Min.	96.5	24.9	12.9
Coil Operating Power (mW, nominal)		641	369	450
Pick-up Voltage (Vdc, Max) (Note 4)		4.0	9.8	19.5
Pick-up Voltage (Vdc) (Note 4)	Min.	0.13	0.36	0.72
	Max.	2.3	6.5	13.0

**PERFORMANCE CURVES (Note 2)**



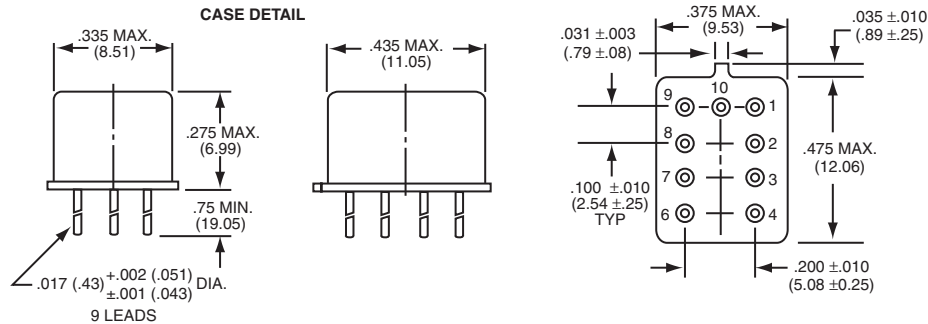
**GENERAL NOTES**

1. Relay contacts will exhibit no chatter in excess of 10  $\mu$ sec or transfer in excess of 1  $\mu$ sec.
2. "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
3. Unless otherwise specified, parameters are initial values.
4. Relays can be supplied with a spacer pad. See appendix.

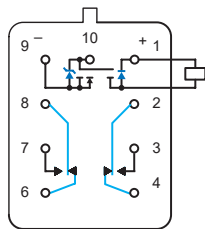
**NOTES:**

1. Relay contacts will exhibit no chatter in excess of 10  $\mu$ sec or transfer in excess of 1  $\mu$ sec.
2. "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
3. Unless otherwise specified, parameters are initial values.
4. Maximum rated gate voltage = 15 Vdc.
5. Unless otherwise specified, relays will be supplied with either gold plated or solder coated leads.
6. The slash and character appearing after the slash are not marked on the relay.
7. Screened HI-REL versions available. Contact factory.

## SERIES 116C OUTLINE DIMENSIONS



## SCHEMATIC DIAGRAMS

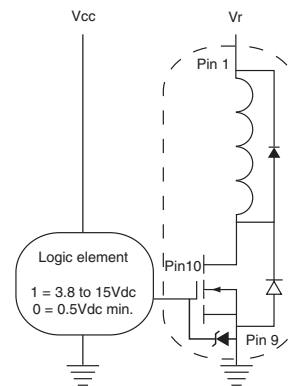


116C

PIN 1: + Supply  
PIN 9: - Supply  
PIN 10: GATE

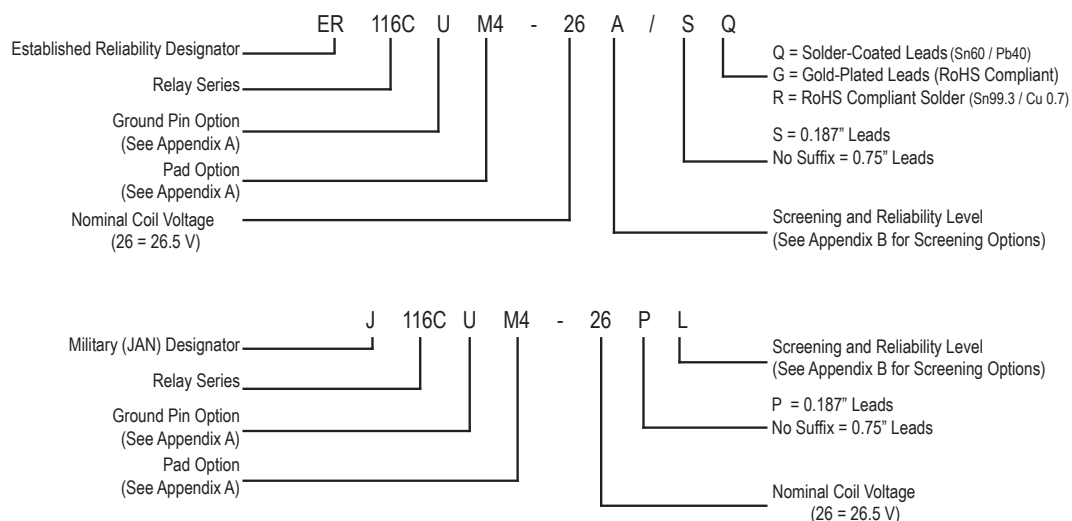
## TYPICAL CMOS INTERFACE CIRCUIT

DC Logic Voltage Supply

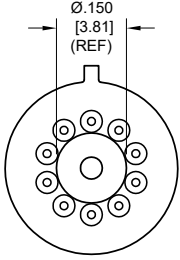
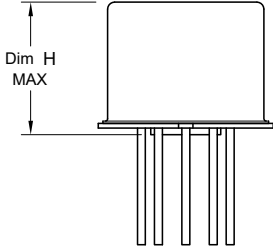
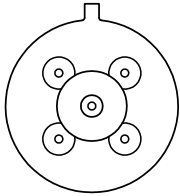
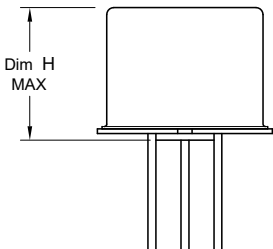
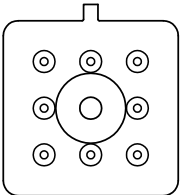
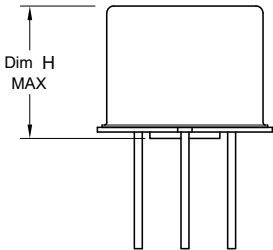
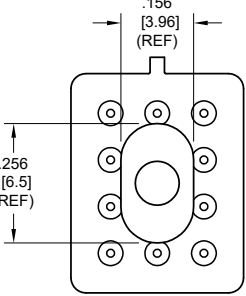
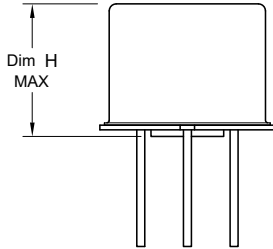


Notes:  
Logic 1 activates the relay.  
Logic 0 de-activates the relay.  
Vcc = logic bias power.  
Vr = coil energization voltage.

## Part Numbering System



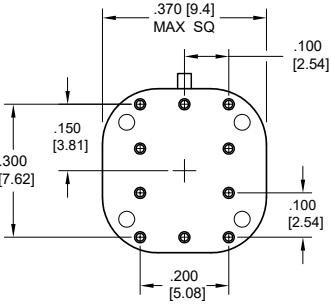
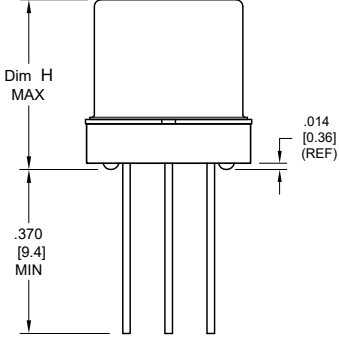
## APPENDIX A : Spacer Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 <p>“M4” Spacer Pad for TO-5</p>		ER412	.295 (7.49)
		712, RF300, RF, RF700, RF703	.300 (7.62)
		ER422, 722	.305 (7.75)
		ER432	.400 (10.16)
		732, RF303	.410 (10.41)
		RF312	.350 (8.89)
 <p>“M4”Spacer Pad for TO-5</p>		ER411	.295 (7.49)
		RF311	.300 (7.62)
		RF331	.410 (10.41)
 <p>“M4” Spacer Pad for Centigrid®</p>		172	.305 (7.75)
		ER114, J114	.300 (7.62)
		ER134, J134	.400 (10.16)
		RF100	.315 (8.00)
		RF103	.420 (10.67)
 <p>“M9”Spacer 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 mm).
5. Add 10 mΩ to the contact resistance shown in the datasheet.
6. Add 0.01 oz. (0.25 g) to the weight of the relay assembly shown in the datasheet.

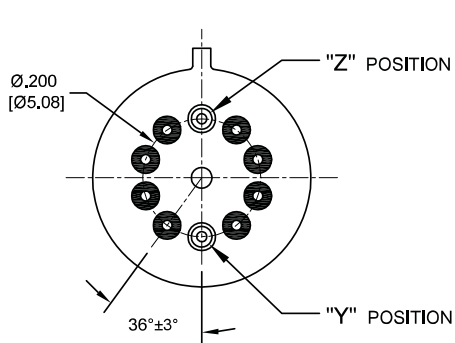
## APPENDIX A : Spreader Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 <p>"M" Spreader Pad <u>5/</u> <u>6/</u></p>		ER411T, ER412, J412	.388 (9.86)
		712	.393 (9.99)
		ER432, J432	.493 (12.52)
		732	.503 (12.78)
		J421, J422, ER422, 722	.398 (10.11)

### Notes:

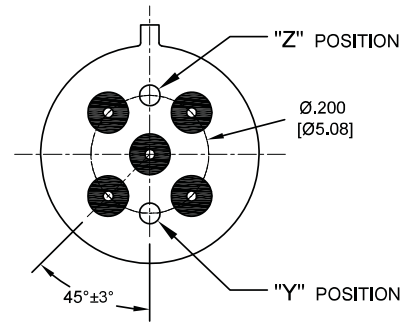
1. Spreader pad material: Diallyl Phthalate.
2. To specify an "M", "M2" or "M3" spreader pad, refer to the mounting variants portion of the part number example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is  $\pm .010$ " (0.25 mm).
- 5/. Add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



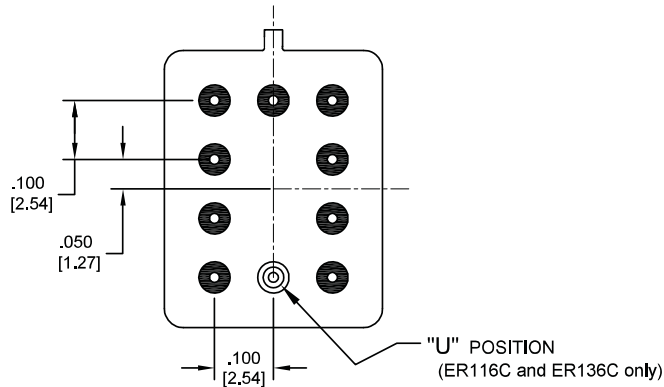
### TO-5 Relays:

ER412, ER412T, ER422, ER432, ER432T, 712, 712TN, 400H, 400K, 400V, RF300, RF303, RF341, RF312, RF332, RF310, RF313, RF320, RF323, SI800, SI803, RF700, RF703



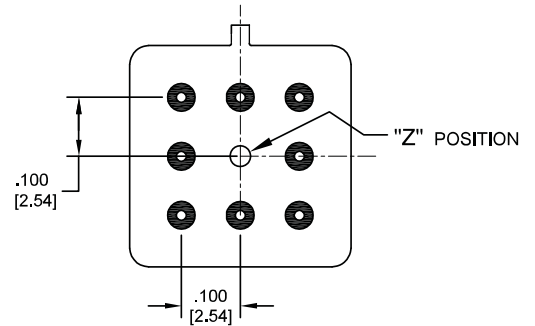
### TO-5 Relays:

ER411, RF311, RF331



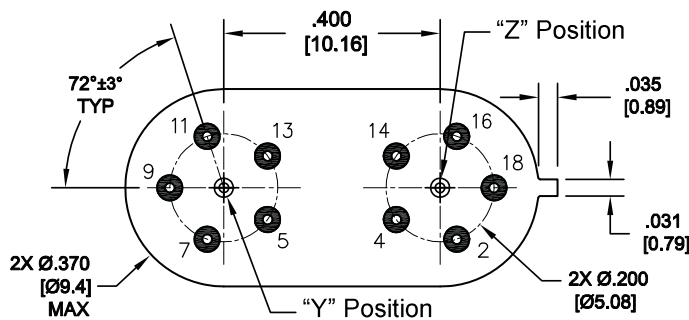
### Centigrid® Relays:

RF180, ER116C, 122C, ER136C



### Centigrid® Relays:

RF100, RF103, ER114, ER134, 172



### Loopback Relays:

LB363

- 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.