TO-5 RELAYS
ESTABLISHED RELIABILITY
MILITARY
DPDT

SERIES	RELAY TYPE
432	DPDT basic relay
432D	DPDT relay with internal diode for coil transient suppression
432DD	DPDT relay with polarity reversal protection and coil transient suppression diode
432TN	DPDT relay with internal transistor driver and coil transient suppression diode

DESCRIPTION

The TO-5 relay, originally conceived and developed by Teledyne, has become one of the industry standards for low-level switching from dry circuit to 1 ampere. Designed expressly for high-density PC board mounting, its small size and low coil power dissipation make the 432 relay one of the most versatile ultraminiature relays available.

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

The 432 feature:

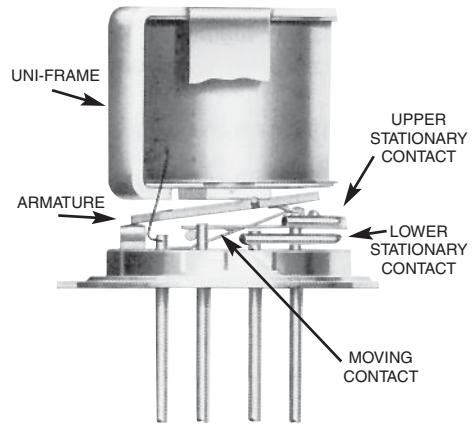
•All welded construction.
- Unique uni-frame design providing high magnetic efficiency and mechanical rigidity.
- High force/mass ratios for resistance to shock and vibration.
- Advanced cleaning techniques provide maximum assurance of internal cleanliness.
- Precious metal alloy contact material with gold plating assures excellent high current and dry circuit switching capabilities.

The Series 432D and 432DD relays have internal discrete silicon diodes for coil suppression and polarity reversal protection. The hybrid 432T relay features an internal silicon suppression diode and transistor driver. This hybrid package reduces required PC board floor space by reducing the number of external components needed to drive the relay.

By virtue of its inherently low intercontact capacitance and contact circuit losses, the 432 relay has shown its worth as an RF switch for frequency ranges well into the UHF spectrum (see Figure 1). In addition, the sensitive Series 432 relay has a high resistance coil, thus requiring extremely low operating power (200 milliwatts, typical at room temperature). The advantages of reduced heat dissipation and power supply demands are a plus.

ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS	
Temperature (Ambient)	–65°C to +125°C
Vibration (General Note I)	30 g's to 3000 Hz
Shock (General Note I)	75 g's, 6ms half sine
Acceleration	50 g's
Enclosure	Hermetically sealed
Weight	0.159 oz. (4.5g) max.

INTERNAL CONSTRUCTION



SERIES 432
GENERAL ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted) (Notes 2 &3)

Contact Arrangement	2 Form C (DPDT)	
Rated Duty	Continuous	
Contact Resistance	0.1 ohm max. before life; 0.2 ohm max. after life at 1A/28Vdc (measured 1/8" from header)	
Contact Load Rating (DC)	Resistive: 1 A/ 28 Vdc Inductive: 200 mA/ 28 Vdc (320mH) Lamp: 100 mA / 28 Vdc (320mH) Low level: 10 to 50 µA @ 10 to 50 mV	
Contact Load Rating (AC)	Resistive: 250 mA / 115Vac, 60 and 400 Hz (Case not grounded) 100 mA / 115 Vac, 60 and 400 Hz (Case grounded)	
Contact Life Ratings	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	
Contact Overload Rating	2 A / 28 Vdc Resistive (100 cycles min.)	
Coil Operating Power	200 mW typical at nominal rated voltage	
Contact Carry Rating	Contact Factory	
Operate Time	4.0 ms max. at nominal rated coil voltage	
Release Time	432: 1.5 ms max.	432D, 432DD, 432T: 7.5 ms max
Contact Bounce	1.5 ms max	
Intercontact Capacitance	0.4 pf typical	
Insulation Resistance	10,000 MΩ min. between mutually isolated terminals	
Dielectric Strength	500 Vrms / 60 Hz @ atmospheric pressure	
	125 Vrms / 60 Hz @ 70,000 ft	
Negative Coil Transient (Vdc) 432D, 432DD, 432T	1.0 Vdc Max.	
Diode P.I.V. (Vdc) 432D, 432DD, 432T	100 Vdc Min.	
432T Transistor Characteristics	Base Voltage to Turn Off (Vdc)	0.3 min
	Emitter-Base breakdown Voltage (BV_{EBO}) (@25°C) (Vdc)	6.0 min
	Collector-Base breakdown Voltage (BV_{CBO}) (@25°C & Ic = 100 µA) (Vdc)	75 min

432 Series

DETAILED ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted) (Notes 3)

BASE PART NUMBERS (432, 432D, 432DD, 432T)			432-5 432D-5 432DD-5 432T-5	432-6 432D-6 432DD-6 432T-6	432-9 432D-9 432DD-9 432T-9	432-12 432D-12 432DD-12 432T-12	432-18 432D-18 432DD-18 432T-18	432-26 432D-26 432DD-26 432T-26
Coil Voltage	Nom.		5.0	6.0	9.0	12.0	18.0	26.5
	Max.		5.8	8.0	12.0	16.0	24.0	32.0
Coil Resistance (Ohms ±10% @25°C)	432, 432D, 432T		100	200	400	850	1600	3300
	432DD		64	125	400	850	1600	3300
Coil Curent (432DD) (mAdc@25°C)	Min		56.8	36.3	18.1	11.7	9.6	7.0
	Max		78.1	48.9	23.6	15.0	12.2	8.8
Coil Curent (432T) (mAdc@25°C) (Note 7)	Min		43.5	26.4	19.7	12.2	9.7	6.9
	Max		59.3	35.4	25.8	16.7	13.1	9.5
Pick-up Voltage (Vdc, Max)	432, 432D		3.5	4.5	6.8	9.0	13.5	18.0
	432DD		3.7	4.8	8.0	11.0	14.5	19.0
	432T (Note 7)		3.6	4.8	8.0	11.0	14.5	19.0
Drop-out Voltage (Vdc)	432, 432D, 432T	Min.	0.14	0.18	0.35	0.41	0.59	0.89
		Max.	2.5	3.2	4.9	6.5	10.0	13.0
	432DD	Min.	0.7	0.8	0.9	1.0	1.1	1.3
		Max.	2.6	3.0	4.5	5.8	9.0	13.0

PERFORMANCE CURVES (Note 2)

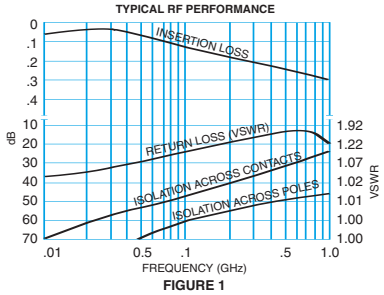


FIGURE 1

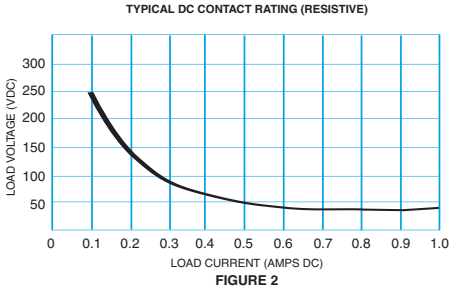
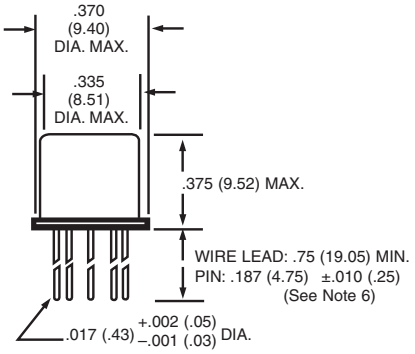


FIGURE 2

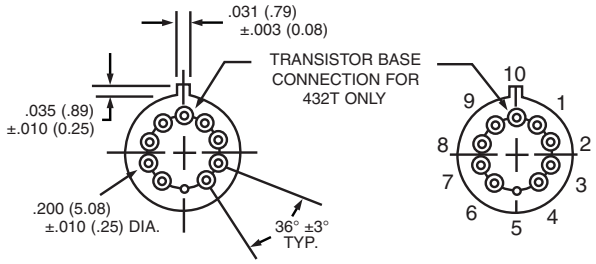
GENERAL NOTES

1. Relay contacts will exhibit no chatter in excess of 10 µsec or transfer in excess of 1 µsec.
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.

SERIES 432
OUTLINE DIMENSIONS

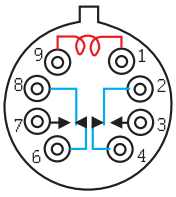


TERMINAL LOCATIONS AND PIN NUMBERING (REF. ONLY)
(Viewed from Terminals)

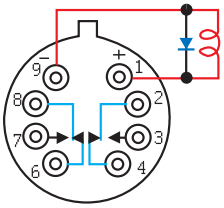


DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

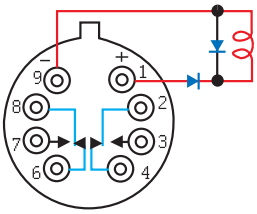
SCHEMATIC DIAGRAMS



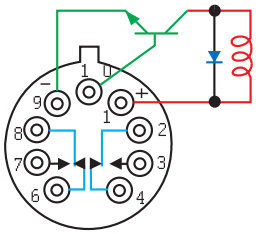
432



432D

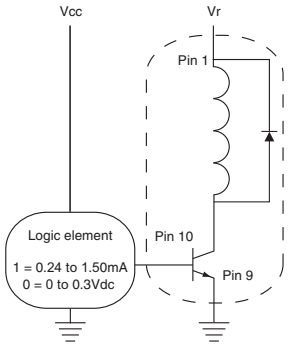


432D



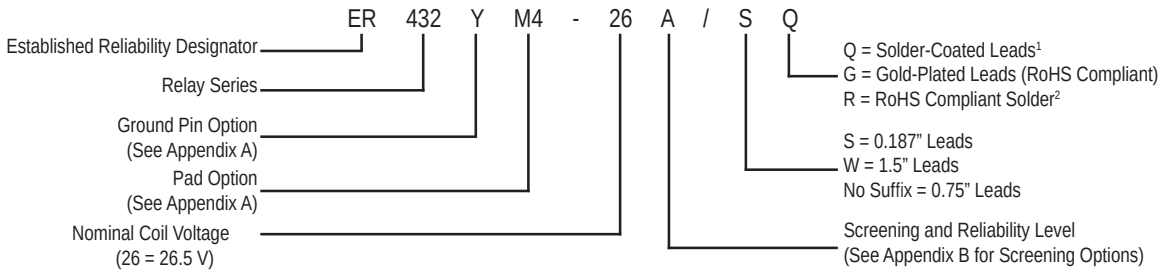
432TN

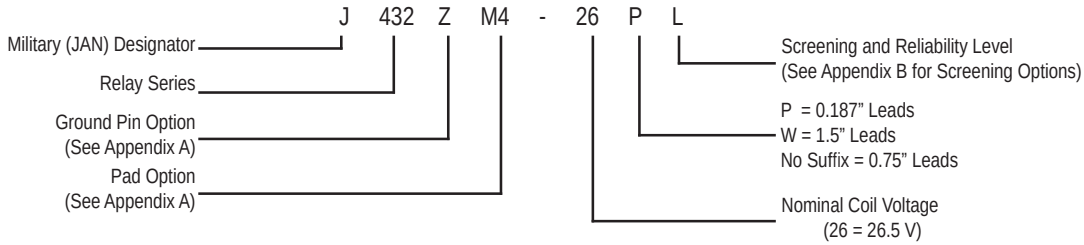
TYPICAL LOGIC INTERFACE
(See Note 8)



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

SERIES 432
PART NUMBERING SYSTEM

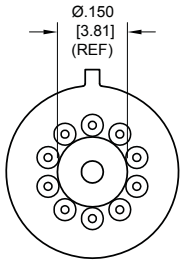
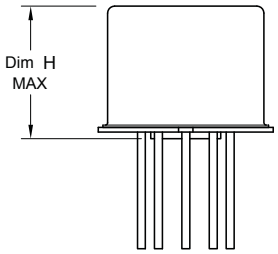
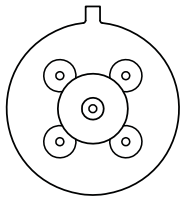
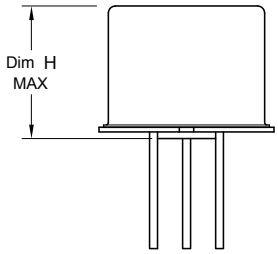
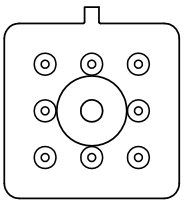
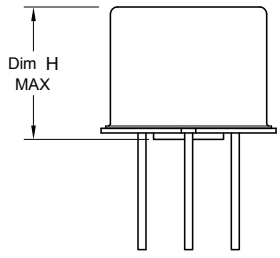
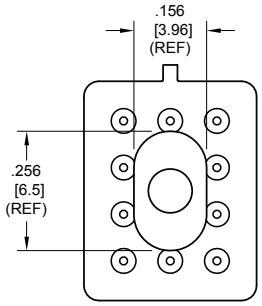
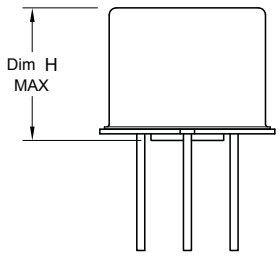




NOTES:

1. RELAY CONTACTS WILL EXHIBIT NO CHATTER IN EXCESS OF 10 MSEC OR TRANSFER IN EXCESS OF 1 MSEC.
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. FOR REFERENCE ONLY. COIL RESISTANCE NOT DIRECTLY MEASURABLE AT RELAY TERMINALS DUE TO INTERNAL SERIES SEMICONDUCTOR. 432DD AND 432T ONLY.
5. UNLESS OTHERWISE SPECIFIED, RELAYS WILL BE SUPPLIED WITH EITHER GOLD-PLATED OR SOLDER-COATED LEADS.
6. THE SLASH AND CHARACTERS APPEARING AFTER THE SLASH ARE NOT MARKED ON THE RELAY.
7. LIMIT BASE EMITTER CURRENT TO 15 MADC.
8. APPLICABLE TO ALL COIL VOLTAGES. SEE BASE CURRENT TO TURN ON.
9. SCREENED HI-REL VERSIONS AVAILABLE. CONTACT FACTORY.

APPENDIX: Spacer Pads

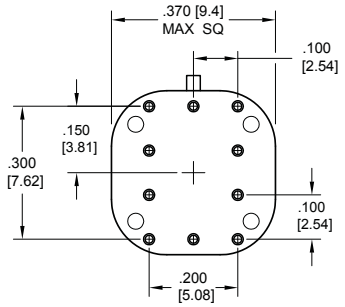
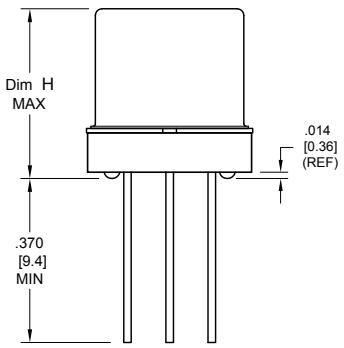
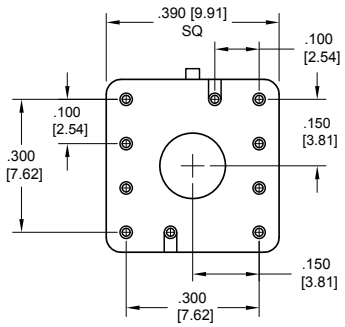
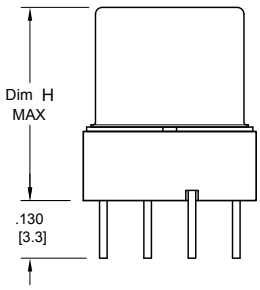
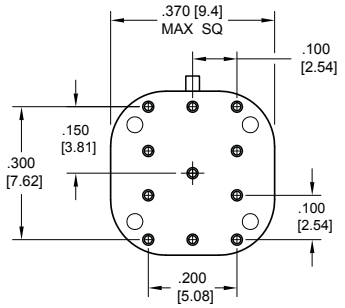
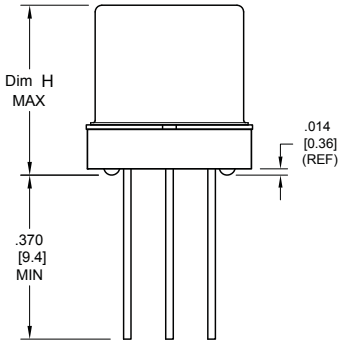
Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 “M4” Pad for TO-5		ER412, ER412D, ER412DD	.295 (7.49)
		712, 712D, 712TN, RF300, RF310, RF320 RF700, RF703	.300 (7.62)
		ER420, ER420D, ER420DD, 421, ER421D, ER421DD, ER422, ER422D, ER422DD, 722, 722D, RF341	.305 (7.75)
		ER431T, ER432T, ER432, ER432D, ER432DD	.400 (10.16)
		732, 732D, 732TN, RF303, RF313, RF323	.410 (10.41)
		RF312, RF332 SI800, SI803	.350 (8.89)
 “M4” Pad for TO-5		ER411, ER411D, ER411DD, ER411T	.295 (7.49)
		ER431, ER431D, ER431DD	.400 (10.16)
		RF311	.300 (7.62)
		RF331	.410 (10.41)
 “M4” Pad for Centigrid®		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 Centigrid®		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 ± .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.

(800) 284-7007 • www.teledynerelays.com • +44 (0) 1236 453124 • www.teledyne-europe.com

APPENDIX: Spreader Pads

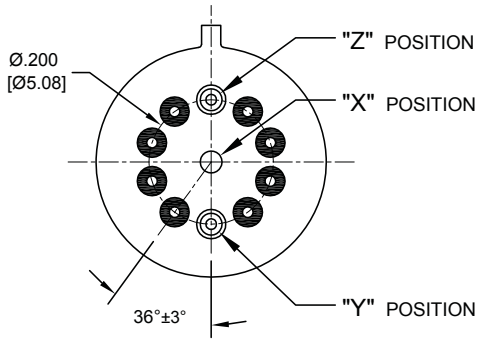
Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 "M" Pad 5/ 6/		ER411T, J411T, ER412, ER412D ER412DD, J412, J412D, J412DD ER412T, J412T	.388 (9.86)
		712, 712D, 712TN	.393 (9.99)
		ER431T, J431T, ER432, ER432D ER432DD, J432, J432D, J432DD ER432T, J432T	.493 (12.52)
		732, 732D, 732TN	.503 (12.78)
		ER420, J420, ER420D, J420D ER420DD, J420DD, ER421, J421 ER421D, J421D, ER421DD J422D, ER422DD, J422DD, 722	.398 (10.11)
 "M2" Pad 7/ 8/		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)
 "M3" Pad 5/ 6/ 9/		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:

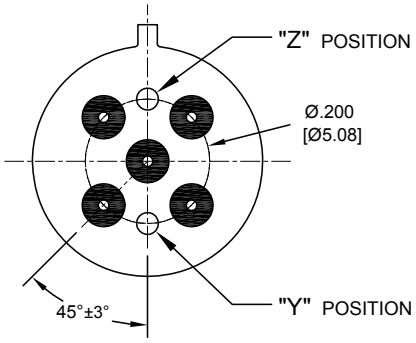
1. Spreader pad material: Diallyl Phthalate.
2. To specify an "M", "M2" or "M3" spreader pad, refer to the mounting variants portion of the part number example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is ± .010" (0.25 mm).

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.)

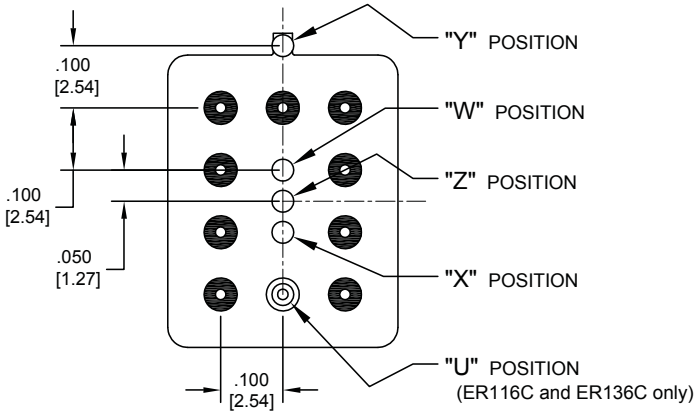
APPENDIX: Ground Pin Positions



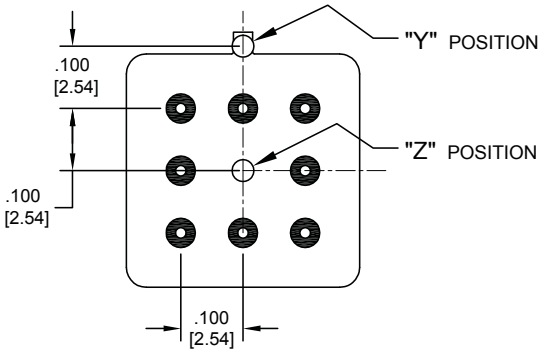
TO-5 Relays:
ER411T, ER412, ER412T, ER420, ER421, ER422, ER431T, ER432, ER432T, 712, 712TN, 400H, 400K, 400V, RF300, RF303, RF341, RF312, RF332, RF310, RF313, RF320, RF323, SI800, SI803, RF700, RF703



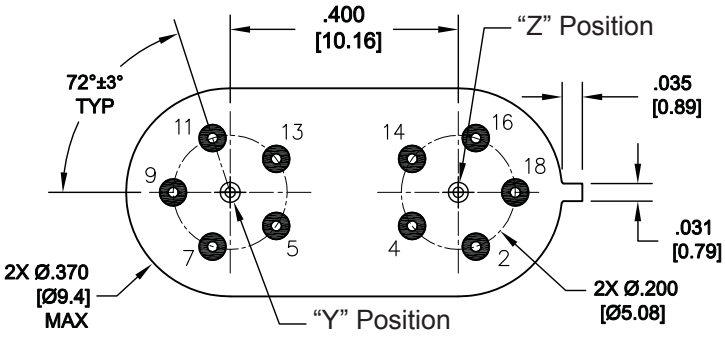
TO-5 Relays:
ER411, ER431, RF311, RF331



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: ± .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.

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