



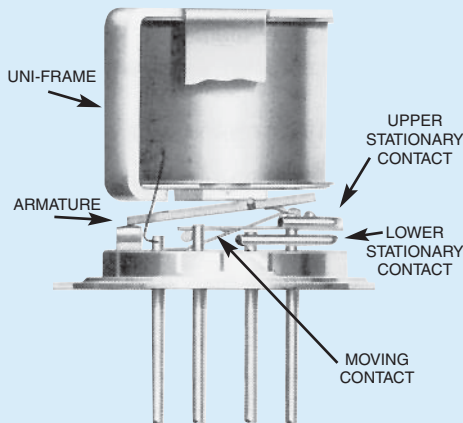
A Unit of Teledyne Electronics and Communications

ESTABLISHED RELIABILITY TO-5 RELAYS SENSITIVE DPDT

SERIES 432

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

INTERNAL CONSTRUCTION



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 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.

- 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 has an internal silicon suppression diode and a 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 1)	30 g's to 3000 Hz
Shock (General Note 1)	75 g's, 6 msec, half-sine
Acceleration	50 g's
Enclosure	Hermetically sealed
Weight	0.159 oz. (4.5g) max.

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 Ratings (DC) (See Fig. 2 for other DC resistive voltage/current ratings)	Resistive: 1 Amp/28Vdc Inductive: 200 mA/28Vdc (320 mH) Lamp: 100 mA/28Vdc Low Level: 10 to 50 µA/10 to 50mV	
Contact Load Ratings (AC)	Resistive: 250 mA/115Vac, 60 and 400 Hz (Case not grounded) 100 mA/115Vac, 60 and 400 Hz (Case grounded)	
Contact Life Ratings	10,000,000 cycles (typical) at low level 1,000,000 cycles (typical) at 0.5A/28Vdc resistive 100,000 cycles min. at all other loads specified above	
Contact Overload Rating	2A/28Vdc Resistive (100 cycles min.)	
Contact Carry Rating	Contact factory	
Coil Operating Power	200 milliwatts typical at nominal rated voltage @ 25°C	
Operate Time	4.0 msec max. at nominal rated coil voltage	
Release Time	432 Series: 2.0 msec max. 432D, 432DD, 432T Series: 7.5 msec max.	
Contact Bounce	1.5 msec max.	
Intercontact Capacitance	0.4 pf typical	
Insulation Resistance	10,000 megohms min. between mutually isolated terminals	
Dielectric Strength	Atmospheric pressure: 500 Vrms/60Hz	70,000 ft.: 125 Vrms/60Hz
Negative Coil Transient (Vdc)	432D, 432DD, 432T	1.0 max
Diode P.I.V. (Vdc)	432D, 432DD, 432T	100 min.
432T Transistor Characteristics	Base Turn Off Voltage (Vdc)	0.3 min.
	Emitter-base breakdown Voltage (BV_{EB0}) (@25°C) (Vdc)	6.0 min.
	Collector-base breakdown Voltage (BV_{CB0}) (@25°C & I_c = 100 µA) (Vdc)	75 min.

ESTABLISHED RELIABILITY

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

BASE PART NUMBERS (See Note 10 for full P/N example)	➔	432-5	432-6	432-9	432-12	432-18	432-26	
		432D-5 432DD-5 432T-5	432D-6 432DD-6 432T-6	432D-9 432DD-9 432T-9	432D-12 432DD-12 432T-12	432D-18 432DD-18 432T-18	432D-26 432DD-26 432T-26	
Coil Voltage (Vdc)	Nom.	5.0	6.0	9.0	12.0	18.0	26.5	
	Max.	7.5	10.0	15.0	20.0	30.0	40.0	
Coil Resistance (Ohms ±10% @25°C)	432, 432D, 432T (Note 4)	100	200	400	850	1600	3300	
	432DD (Note 4)	64	125	400	850	1600	3300	
Coil Current (mAdc @25°C) (432DD Series)	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 Current (mAdc @25°C) (432T Series)	(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	7.8	11.0	14.5	19.0	
Base Current to Turn On (mAdc, Max.) (432T Series) (Note 7)		1.50	1.00	0.75	0.47	0.38	0.24	
Drop-out Voltage (Vdc)	432, 432D, 432T (Note 7)	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)

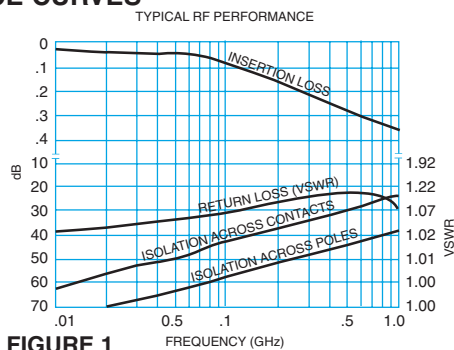


FIGURE 1

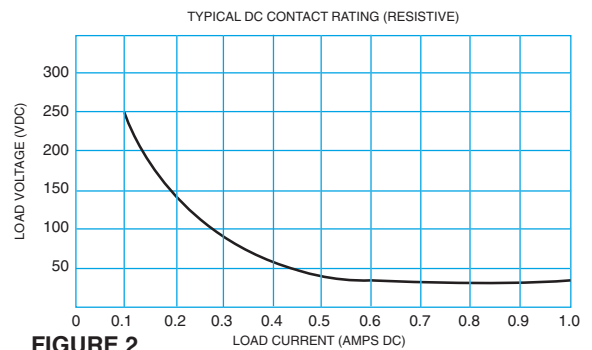
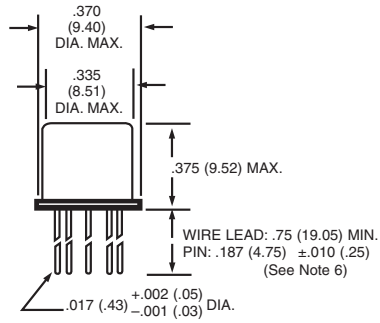
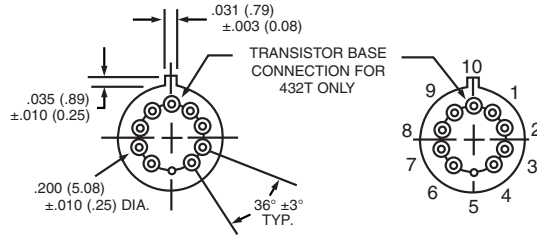


FIGURE 2

OUTLINE DIMENSIONS

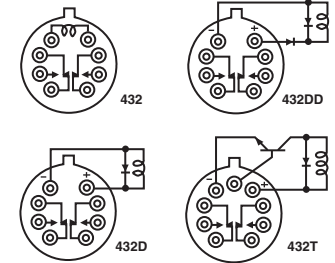


TERMINAL LOCATIONS AND PIN NUMBERING (REF. ONLY)
(Viewed from Terminals)



DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

SCHEMATIC DIAGRAMS



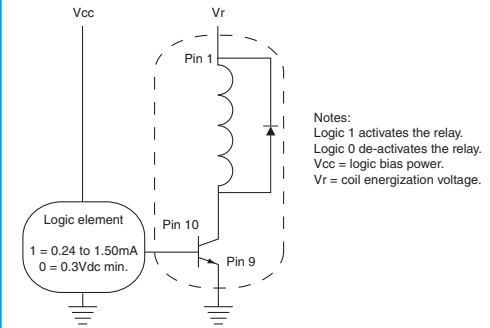
SCHEMATICS ARE VIEWED FROM TERMINALS

GENERAL NOTES

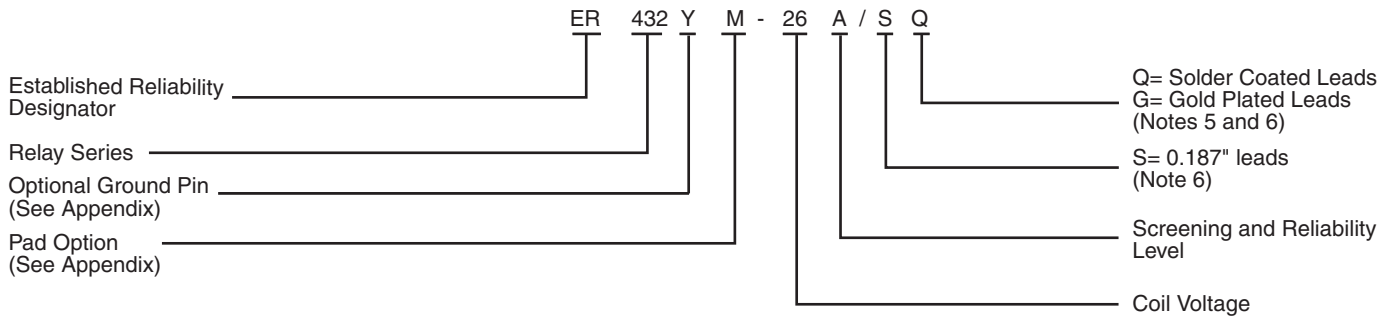
1. Relay contacts will exhibit no chatter in excess of 10 μsec or transfer in excess of 1 μsec.
2. "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
3. Unless otherwise specified, parameters are initial values.
4. For reference 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 mA dc.
8. Applicable to all coil voltages. See Base current to turn on.
9. Screened HI-REL versions available. Contact factory.
- 10.

TYPICAL LOGIC INTERFACE

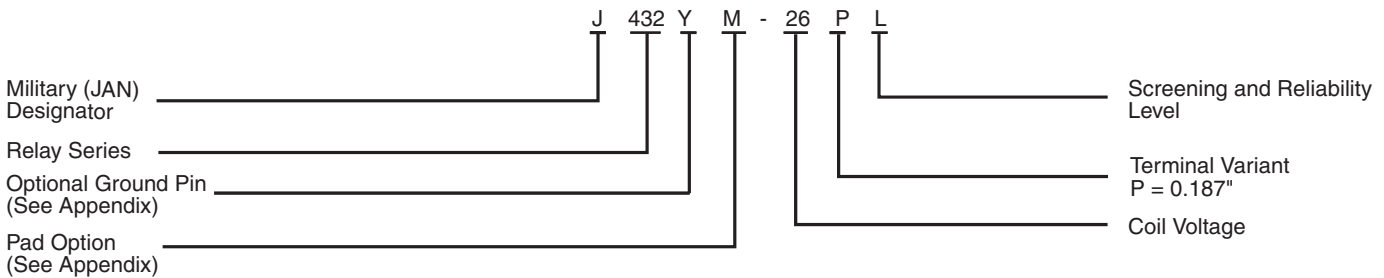
(See Note 8)



Teledyne Part Numbering System for T²R[®] Established Reliability Relay



Teledyne Part Numbering System for Military Qualified (JAN) Relays



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 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.
<p>“M” Pad <u>5/</u> <u>6/</u> <u>9/</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/</u> <u>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/</u> <u>6/</u> <u>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 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



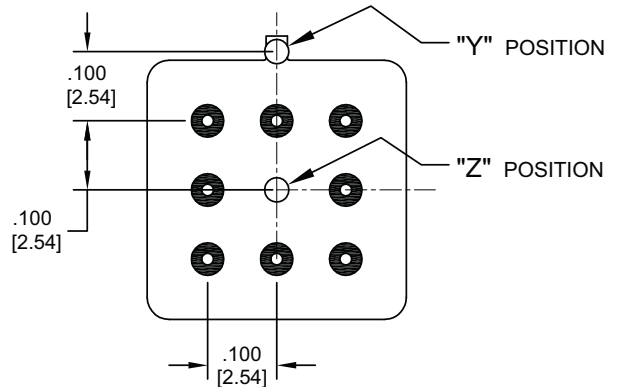
TO-5 Relays:

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.

APPENDIX: Teledyne Relays T²R Program

Teledyne Relays' **T²R** program was developed to provide the JAN relay user an alternate means of specifying and procuring established reliability relays. The form, fit and function of a **T²R** relay is the same as that of its JAN counterpart. **T²R** program requirements differ in certain regimens/tests found in both MIL-PRF-28776 and MIL-PRF-39016 that add cost but no value to the relay.

This program parallels the military specifications in most aspects. The components that make up such a program are intricate and varied. Furthermore, there are additional options of high value for design, manufacturability and operation of high reliability assemblies. The following page presents a table that compares the 100% screening performed on JAN relays and **T²R** relays prior to shipment.

Other significant highlights of the **T²R** program include:

- Two unique screening levels
- The ability to define lead finish
- Spacer pad options which may not be available in military specifications
- Ground pin options which may not be available in military specifications
- Reduced lead time
- Reduced cost

The program is fully defined for both general product requirements and detailed product requirements in the following Teledyne Relays specifications:

TR-R-1
TR-STD-1
TR-STD-2
TR-ERL-1
TR-R-1/XXX
TR Supplement

Copies of these documents are available from Teledyne Relays. We suggest that users check with Teledyne Relays from time to time to assure that they have the latest issue.

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APPENDIX: Teledyne Relays T²R Program

INSPECTION	Screening Levels			
	<i>TR</i> A Level 1.5%/10K Cycles	<i>TR</i> B Level .75%/10K Cycles	JAN L Level 3%/10K Cycles	JAN M Level 1%/10K Cycles
Subgroup 1				
Screening, Internal Moisture AQL ¹	✓	✓	✓	✓
Vibration (Sinusoidal) AQL ¹			✓	
Vibration (Sinusoidal) 100%		✓		✓
Screening, Burn-In (Hybrids only)			✓	✓
Screening, Run-In (Room Temperature)	✓			
Screening, Run-In (+125°C and -65°C)		✓	✓	✓
Subgroup 2				
Coil Resistance or Coil Current	✓	✓	✓	✓
Insulation Resistance	✓	✓	✓	✓
Dielectric Withstanding Voltage	✓	✓	✓	✓
Static Contact Resistance	✓	✓	✓	✓
Pickup and Dropout or Set and Reset Voltage	✓	✓	✓	✓
Operate and Release or Set and Reset Time	✓	✓	✓	✓
Hold Voltage			✓	✓
Turn-On and Turn-Off Time (Hybrids only)	✓	✓	✓	✓
Contact Bounce Time	✓		✓	
Contact Stabilization Time		✓		✓
Turn-On Current (T Hybrids only)	✓	✓	✓	✓
Turn-On Voltage (C Hybrids only)	✓	✓	✓	✓
Turn-Off Voltage (Hybrids only)	✓	✓	✓	✓
Coil Transient Suppression (D, DD and Hybrids only)	✓	✓	✓	✓
Diode Blocking Integrity (DD only)	✓	✓	✓	✓
Zener Voltage (C Hybrid only)	✓	✓	✓	✓
Neutral Screen (Latching Relays only)	✓	✓	✓	✓
Break Before Make Verification			✓	✓
Contact Simultaneity			✓	✓
Subgroup 3				
Solderability 2 Samples per Daily Solderability Inspection Lot	✓	✓	✓	✓
Leak Test	✓	✓	✓	✓
External Visual and Mechanical Inspection 2/Lot for Dimension and Weight Check	✓	✓	✓	✓

¹ AQL = Acceptable Quality Level