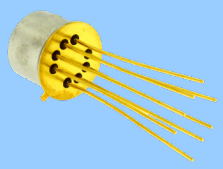
COMMERCIAL TO-5 RELAY NON-LATCHING DPDT



SERIES	RELAY TYPE
712	DPDT basic relay, non-latching
712D	DPDT relay with internal diode for coil transient suppression
712TN	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 for high-density PC board mounting, the 712 relays series are some of the most versatile ultraminiature relays available because of their small size and low coil power dissipation.

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

The 712 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.

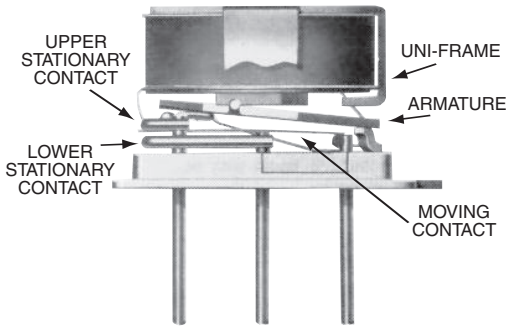
The Series 712D relay has an internal discrete silicon diode for coil transient suppression. The hybrid Series 712TN relay has an internal silicon diode and transistor driver. The integrated packaging of the relay with its associated semiconductor devices greatly reduces PC board floor space requirements as well as component installation costs.

By virtue of its inherently low intercontact capacitance and contact circuit losses, the 712 has proven to be excellent ultraminiature RF switch for frequency ranges well into the UHF spectrum. A typical RF application for the TO-5 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

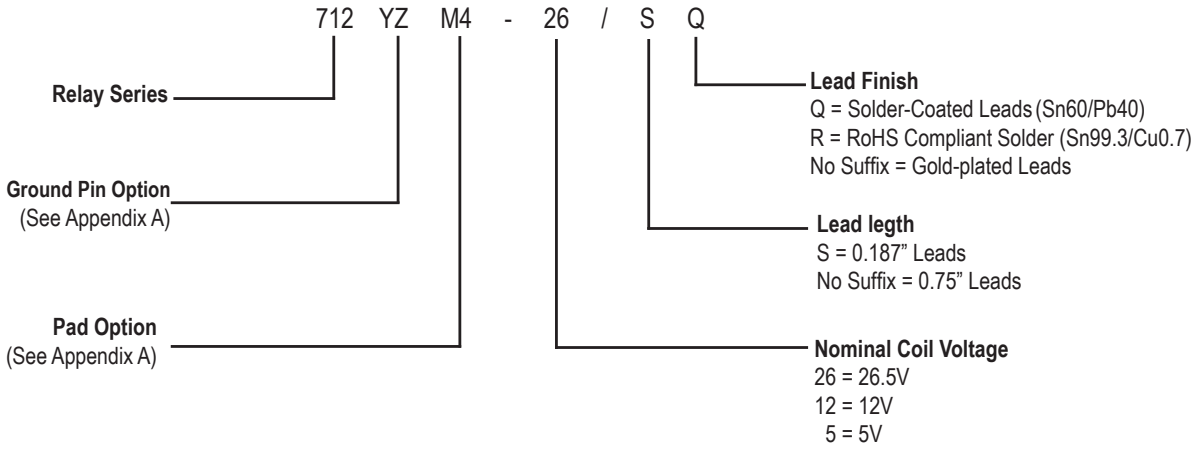
ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

Temperature (Operating)	–55°C to +85°C
Vibration (Note 1)	10 g's to 500 Hz
Shock (Note 1)	30 g's, 6ms half sine
Enclosure	Hermetically sealed
Weight	0.09 oz. (2.55g) max.
Reflow Temperature	260°C max. temp. 1 min. max

INTERNAL CONSTRUCTION



Part Numbering System (Notes 4 & 5)



NOTES:

1. Relay contacts will exhibit no chatter in excess of 10 µs or transfer in excess of 1 µs.
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. Unless otherwise specified, relays will be supplied with gold-plated leads.
5. The slash and characters appearing after the slash are not marked on the relay.

GENERAL ELECTRICAL SPECIFICATIONS (-55 °C to 85 °C unless otherwise noted. See notes 2 & 3.)

Contact Arrangement	2 Form C (DPDT)	
Rated Duty	Continuous	
Contact Resistance	0.15 Ω max.	
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	450 mW typical at nominal rated voltage	
Contact Carry Rating	Contact Factory	
Operate Time	4.0 ms max. @ nominal rated coil voltage	
Release Time	712: 3.0 ms max.	712D, 712TN: 6.0 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	
Negative Coil Transient (Vdc)	2.0 Vdc Max.	
Diode P.I.V. (Vdc)	60 Vdc Min.	
712TN Transistor Characteristics	Base Voltage to Turn Off (Vdc)	0.3 min
	Emitter-Base breakdown Voltage (BV_{EBO}) (Vdc)	6.0 min
	Collector-Base breakdown Voltage (BV_{CBO}) (Vdc)	60 min

DETAILED ELECTRICAL SPECIFICATIONS (-55 °C to 85 °C unless otherwise noted. See note 3.)

BASE PART NUMBERS (712, 712D, 712TN)		**712-5 712D-5 712TN-5**	**712-12 712D-12 712TN-12**	**712-26 712D-26 712TN-26**
Coil Voltage	**Nom.**	5.0	12.0	26.5
	Max.	5.8	16.0	32.0
Coil Resistance (Ohms ±20%)		50	390	1560
Pick-up Voltage (Vdc, Max.) Pulse Operation		3.6	8.4	17.0
712TN Base Current to Turn On (mAdc, min.)		3.00	1.03	0.50

PERFORMANCE CURVES (Note 2)

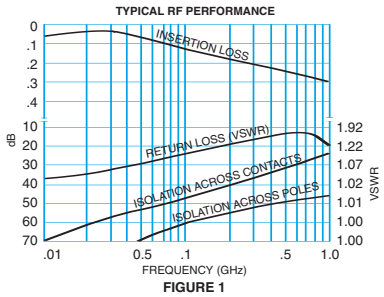


FIGURE 1

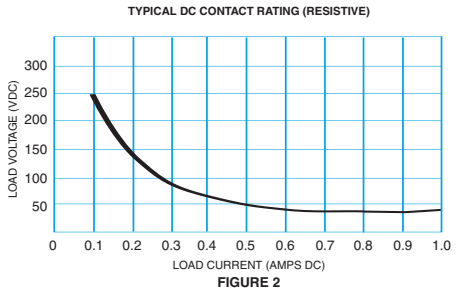


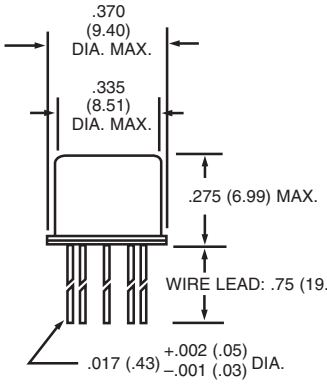
FIGURE 2

GENERAL NOTES

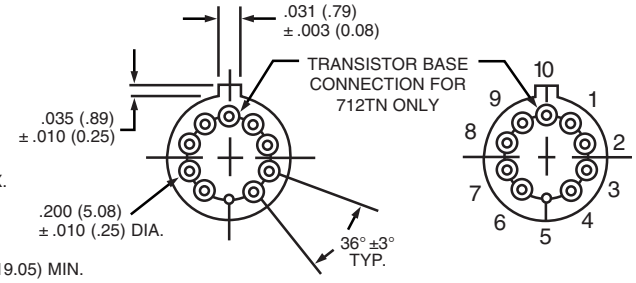
1. Relay contacts will exhibit no chatter in excess of 10 µsec or transfer in excess of 1 µsec.
2. "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
3. Unless otherwise specified, parameters are initial values.
4. Relays can be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

OUTLINE DIMENSIONS

CASE DETAIL

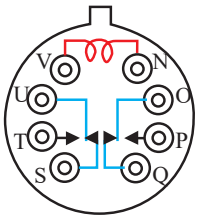


TERMINAL LOCATIONS AND PIN NUMBERING (REF. ONLY)
(Viewed from Terminals)

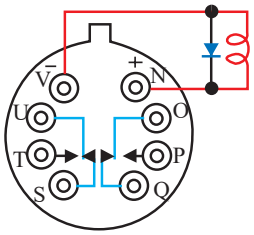


(Viewed From Terminals)

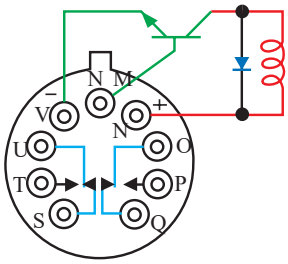
SCHEMATIC DIAGRAMS



712



712D



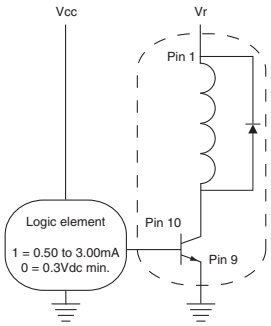
712TN

NOTES:

1. **DIMENSIONS ARE IN INCHES, METRIC EQUIVALENTS SHOWN IN [ ].**
2. **POSITIONS 5 AND 10 ARE FOR UNINSULATED CASE GROUND OPTIONS.**
3. **NO PROTRUSION BELOW BOTTOM OF HEADER WHEN GROUND PINS ARE INSTALLED**
4. **TO ORDER THE CASE GROUND OPTION, AFTER THE SERIES DESIGNATOR, ADD "YZ" TO THE PART NUMBER.**
5. **UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DIMENSIONS ARE ± .010 INCH (0.025 MM)**

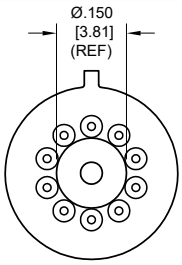
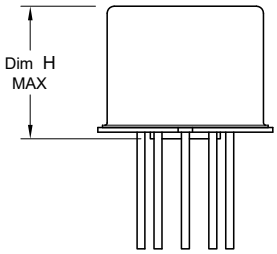
TYPICAL LOGIC INTERFACE

(See Note 5)

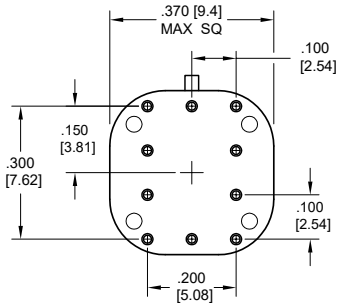
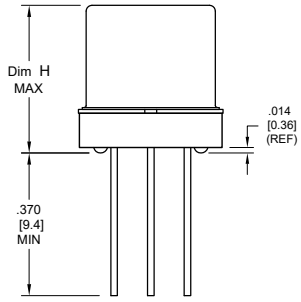


Notes:
Logic 1 activates the relay.
Logic 0 de-activates the relay.
Vcc = logic bias power.
Vr = coil energization voltage.

APPENDIX A : Spacer Pads, Spreader Pads, and Ground Pin Positions

Pad designation and bottom view dimensions	Height	For use with the follow-ing:	Dim. H Max.
 “M4” Spacer Pad for TO-5		712, RF300, RF, RF700, RF703	.300 (7.62)

Notes:
1. Spacer pad material: Polyester film.
2. To specify an “M4” 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.

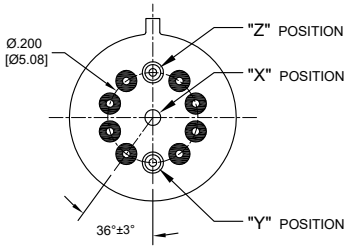
Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
 “M” Spreader Pad 5/ 6/		712	.393 (9.99)

Notes:
1. Spreader pad material: Diallyl Phthalate.
2. To specify an “M” 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.

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.

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