

TELEDYNE RELAYS

*A Unit of Teledyne Electronics and Communications*

# CENTIGRID® MAGNETIC-LATCHING COMMERCIAL RELAYS

## DPDT

## CMOS COMPATIBLE

# SERIES 122C

| SERIES DESIGNATION | RELAY TYPE |
|---|---|
| 122C | DPDT general-purpose magnetic-latching relay with internal power MOSFET driver and diode coil transient suppression |

## DESCRIPTION

The 122C Centigrid® magnetic-latching 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 precludes the need for spreader pads, make it ideal for applications where extreme packaging density and/or close PC board spacing are required.

The basic operating function and internal structure are similar to Teledyne's TO-5, 422 relay series. The 122C is capable of meeting Teledyne Relays' T²R® requirements. The following unique construction features and manufacturing techniques provide overall high reliability and excellent resistance to environmental extremes:

- All welded construction.
- Unique uni-frame design providing high magnetic efficiency and mechanical rigidity.
- High force/mass ratios to withstand 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.

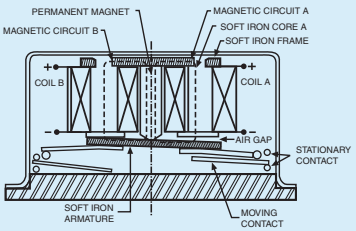
The Series 122C relay has internal silicon diodes for coil suppression, Zener diodes to protect the MOSFET gate inputs, and N-channel enhancement-mode MOSFET chips, which enable direct relay interfacing with most microprocessor and IC logic families (CMOS, TTL and MOS).

The 122C magnetic-latching relay is ideally suited for applications where coil operating power must be minimized. The relays can be operated with a short-duration pulse. After the contacts have transferred, no external coil power is required.

The magnetic-latching feature of the Series 122C relay provides a "memory" capability, since the relays will not reset upon removal of coil power.

By virtue of its inherently low intercontact capacitance and contact circuit losses, the 122C relay has proven to be an excellent ultraminiature RF switch for frequency ranges well into the UHF spectrum. A typical RF application for this Centigrid® 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).

## PRINCIPLE OF OPERATION




Energizing Coil B produces a magnetic field opposing the holding flux of the permanent magnet in Circuit B. As this net holding force decreases, the attractive force in the air gap of Circuit A, which also results from the flux of the permanent magnet, becomes great enough to break the armature free of Core B, and snap it into a closed position against Core A. The armature then remains in this position upon removal of energy from Coil B, but will snap back to position B upon energizing Coil A. 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 magnetically 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 3000 Hz |
| **Shock** (General Note 1) | | 100 g's, 6 msec, half-sine |
| **Acceleration** | | 50 g's |
| **Enclosure** | | Hermetically sealed |
| **Weight** | | 0.10 oz. (2.75g) max. |



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## SERIES 122C
## 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** | | 0.125 ohm max. before life; 0.225 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<br>Inductive: 200 mA/28Vdc (320 mH)<br>Lamp: 100 mA/28Vdc<br>Low Level: 10 to 50 µA/10 to 50mV |
| **Contact Load Ratings (AC)** | | Resistive: 250 mA/115Vac, 60 and 400 Hz (Case not grounded)<br>100 mA/115Vac, 60 and 400 Hz (Case grounded) |
| **Contact Life Ratings** | | 10,000,000 cycles (typical) at low level<br>1,000,000 cycles (typical) at 0.5A/28Vdc resistive<br>100,000 cycles min. at all other loads specified above |
| **Contact Overload Rating** | | 2A/28Vdc Resistive (100 cycles min.) |
| **Contact Carry Rating** | | Contact factory |
| **Operate Time** | | 1.5 msec max. at nominal rated coil voltage @ 25°C |
| **Contact Bounce** | | 2.0 msec max. |
| **Minimum Operate Pulse** | | 4.5 msec width @ rated voltage |
| **Intercontact Capacitance** | | 0.4 pf typical |
| **Insulation Resistance (Note 4)** | | 10,000 megohms min. between mutually isolated terminals |
| **Dielectric Strength (Note 4)** | | Atmospheric pressure: 500 Vrms/60Hz \| 70,000 ft.: 125 Vrms/60Hz |
| **Negative Coil Transient (Vdc)** | | 1.0 max. |
| **Diode P.I.V. (Vdc)** | | 100 min. |
| **Zener Voltage (Vdc)** | | 17 min. to 23 max. |
| **Zener Leakage Current @ 15.2 Vdc (µA)** | | 2.5 max. |
| **Power FET Characteristics –65°C to +125°C** | **Gate Voltage to Turn Off (Vdc)** | 0.5 max. |
| | **Gate Voltage to Turn On (Vdc)** | 3.8 min (Note 8) |
| | **Drain-Source (Vdc)** | 55 max. |

| **BASE PART NUMBERS** (See Notes 3, 10) | | **122C-5** | **122C-6** | **122C-9** | **122C-12** | **122C-18** | **122C-26** |
|---|---|---|---|---|---|---|---|
| **Coil Voltage (Vdc)** | Nom. | 5.0 | 6.0 | 9.0 | 12.0 | 18.0 | 26.5 |
| | Max. | 5.6 | 8.0 | 12.0 | 16.0 | 24.0 | 32.0 |
| **Coil Current (mAdc @25°C) (Note 9)** | Max. | 114.9 | 57.0 | 37.2 | 27.8 | 18.2 | 15.2 |
| | Min. | 82.2 | 41.6 | 27.4 | 20.5 | 13.7 | 11.4 |
| **Coil Operating Power @25°C and Rated Voltage (mW)** | Nom. | 505 | 296 | 288 | 287 | 286 | 351 |
| **Latch and Reset Voltage (Vdc)** | Max. | 3.5 | 4.5 | 6.8 | 9.0 | 13.5 | 18.0 |

## PERFORMANCE CURVES (NOTE 2)

**TYPICAL RF PERFORMANCE**

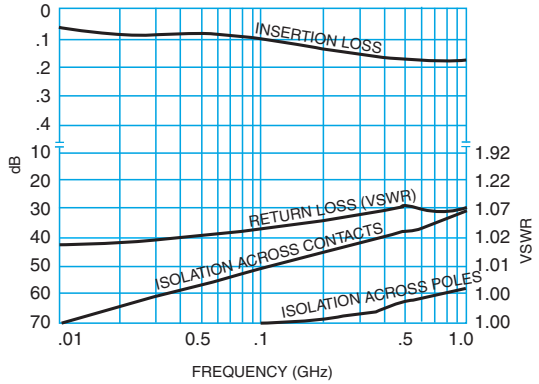



FIGURE 1

**TYPICAL DC CONTACT RATING (RESISTIVE)**

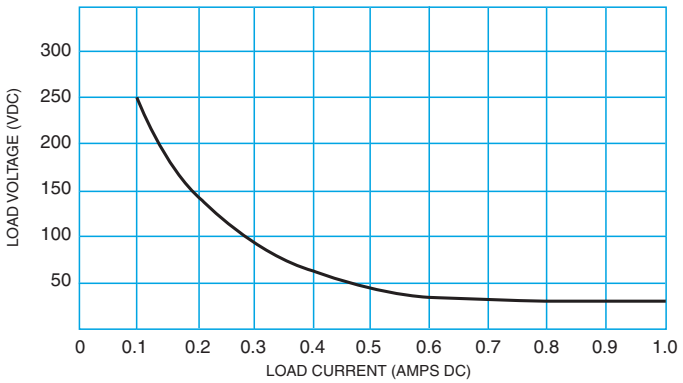
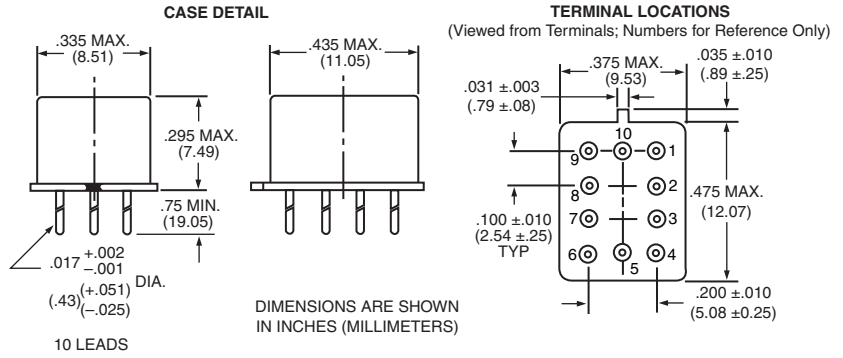



FIGURE 2

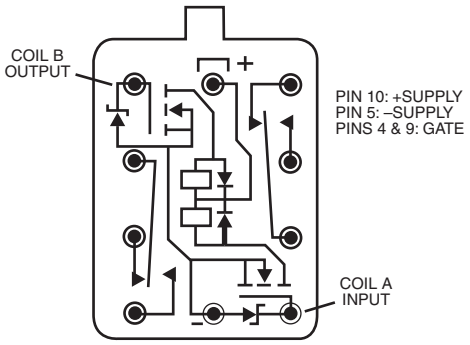



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122C/1203/Q1

## OUTLINE DIMENSIONS

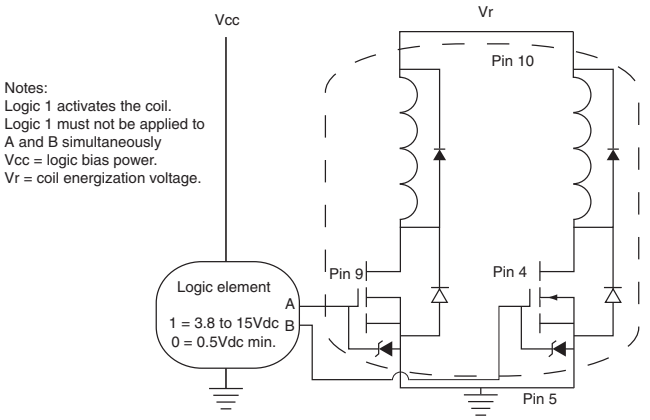



## SCHEMATIC DIAGRAMS




SCHEMATIC IS VIEWED FROM TERMINALS.
CONTACTS SHOWN IN POSITION RESULTING
WHEN COIL A LAST ENERGIZED.

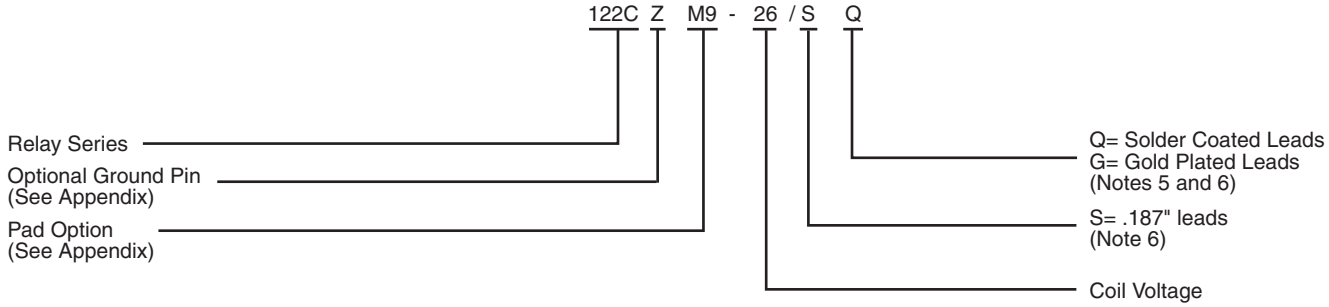
## TYPICAL CMOS INTERFACE CIRCUIT




## 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. Pins 4, 5 and 9 must be shorted when tested for Insulation Resistance and Dielectric Withstanding Voltage.
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. Screened HI-REL versions available. Contact factory.
8. Maximum rated gate voltage = 15 VDC.
9. Measured for 5 sec max. Includes allowance for "on" resistance of MOSFET.
10.

Teledyne Part Numbering System for Relays






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