Alphanumeric Index

Low-signal PC Board Relays 301-338 **3**

NOTE: A question tree that may help you in selecting an appropriate low-signal relay for your application can be found on the next page.

High Performance Relays

If you need a low signal relay capable of switching up to 6Ghz or enduring challenging environments such as extreme shock, vibration, or temperature, you should consider our CII high performance relays. There is an overview of our high performance relay product line in section 14 of this databook.

Low Signal (<3A), PC Board Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application.

What mounting type do you need?

Through-Hole PC Board Terminals

One Pole

159/160 Series
Bridging or Non-bridging, Hg -wetted Reed Relay.

JWD/JWS Series
Dry Reed Relay.

OL Series
Dry Reed Relay.

OMR Series
Dry Reed Relay.

OUAZ Series
Non-polarized.

T81 Series
Non-polarized.

TSC Series
Non-polarized.

V23026 (P1) Series
Low Profile, Polarized.

Two Pole

190 Series
Non-polarized.

FP2 Series
Low Profile, Polarized.

FT2/FU2 Series
Slim, Polarized.

FX2 Series
Slim, Polarized.

IM Series
Ultraminiature, Slim or Low Profile, Polarized.

JWD Series
Dry Reed Relay.

MT2 Series
Non-polarized.

V23079 (P2) Series
Slim, Polarized.

V23105 (D2N) Series
Non-polarized.

Four Pole

MT4 Series
Non-polarized.

Surface Mount PC Board Terminals

One Pole

V23026 (P1) Series
Low Profile, Polarized.

Two Pole

IM Series
Ultraminiature, Slim or Low Profile, Polarized.

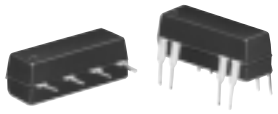
FT2/FU2 Series
Slim, Polarized.

V23079 (P2) Series
Slim, Polarized.

JWD/JWS series

Dual In-Line Package & Single In-Line Package Dry Reed Relays

File E29244 File LR81479



Features

- JWD has dual in-line package (DIP) configuration. (14-pin DIP)
- JWS has single in-line package (SIP) configuration.
- Low cost, dry reed reliability with various contact arrangements.
- Wave solderable and immersion cleanable.
- Optional coil suppression diode.

Contact Data @ 25°C

Arrangements: 1 Form A (SPST - NO) on JWD & JWS. 1 Form B (SPST - NC), 1 Form C (SPDT) and 2 Form A (DPST-NO) on JWD only.
Material: Ruthenium.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life:

	Resistive Load	End of Life Criteria	No. of Operations
Forms A & B	20VDC, 500mA	500mV Loss	1×10^6
	20VDC, 250mA	500mV Loss	20×10^6
	Low Level (5VDC, 1mA)	50 Ohms	100×10^6
Form C	12VDC, 500mA	500mV Loss	1×10^6
	10VDC, 10mA	50 Ohms	25×10^6
	Low Level (5VDC, 1mA)	50 Ohms	100×10^6

Contact Ratings:
Maximum Switched Voltage: 100VDC for Forms A & B; 28VDC for Form C.
Maximum Switched Current: 500mA for all models.
Maximum Switched Power: 10W for Forms A & B; 3W for Form C.
Initial Contact Resistance: 200 milliohms, max. at 10mA, 6VDC.

Initial Dielectric Strength

Between Open Contacts: 250VDC for Forms A & B; 175VDC for Form C.
Between Contacts and Coil: 500VDC.

Initial Insulation resistance

Between Mutually Insulated Conductors: 10^{10} ohms at 100VDC.

Coil Data @ 25°C

See Ordering Information table.

Operate Data @ 25°C

Operate Time (Including Bounce)†: 1.5 ms, max.
Release Time (Including Bounce)†: 0.5 ms, max., for Forms A & B; 3.0 ms, max., for Form C.

† At or from Nominal Coil Voltage.

Environmental Data

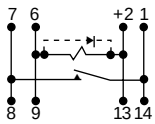
Temperature Range: -35°C to +85°C.
Shock: 100 g, max., in three planes for 8 ms, 1/2 wave pulse.
Vibration: 20 g, max., between 10 and 2,000 Hz.

Mechanical Data

Termination: Printed circuit terminals on 0.100" (2.54mm) grid centers.
Enclosure Type: Black molded epoxy package.
Weight: 0.08 oz. (2.3g) approximately.

Wiring Diagrams (Top Views)

Dia. 1



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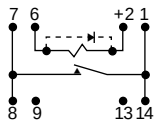
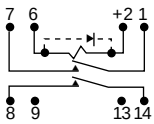


Dia. 3



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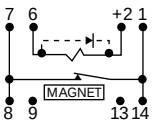

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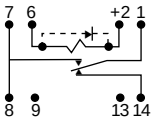
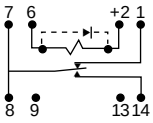
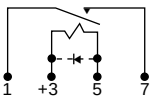


Dia. 6



Dia. 7



Note: Terminal numbers are for reference only and do not appear on relays.

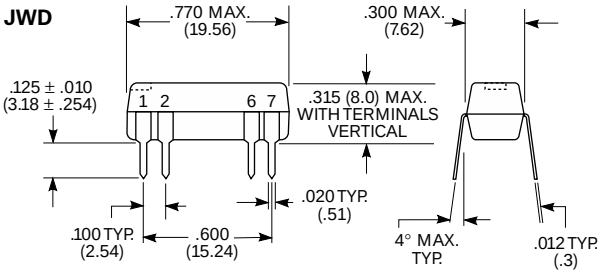
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Ordering Information – Boldface items are more likely to be stocked.

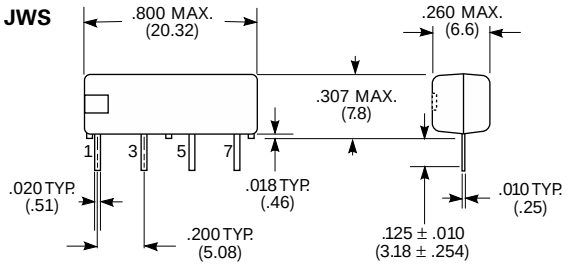
Relay Part No.	Diode	Nom. Voltage (VDC)	Resistance ±10% (Ohms)	Must Operate Voltage (VDC)	Must Release Voltage (VDC)	Max. Voltage (VDC)	Nom. Coil Power (mW)	Wiring Dia. No.
JWD (DIP units) with 1 Form A (SPST-NO) contacts rated 10W max.								
JWD-107-1	No	5/6	500	3.8	0.5	19	50/72	1
JWD-107-5	Yes	5/6	500	3.8	0.5	19	50/72	1
JWD-107-3	No	12	1,200	9.6	1.0	19	120	1
JWD-107-7	Yes	12	1,200	9.6	1.0	19	120	1
JWD-171-5	No	24	2,150	19.2	2.0	40	268	2
JWD-171-10	Yes	24	2,150	19.2	2.0	40	268	2
JWD (DIP units) with 2 Form A (DPST-NO) contacts rated 10W max.								
JWD-171-21	No	5/6	200	3.8	0.5	14	125/180	3
JWD-171-25	Yes	5/6	200	3.8	0.5	14	125/180	3
JWD-171-23	No	12	500	9.6	1.0	19	288	3
JWD-171-27	Yes	12	500	9.6	1.0	19	288	3
JWD-171-24	No	24	2,200	19.2	2.0	40	262	3
JWD-171-28	Yes	24	2,200	19.2	2.0	40	262	3
JWD (DIP units) with 1 Form B (SPST-NC) contacts rated 10W max.								
JWD-171-12	No	5/6	500	3.8	0.5	7	50/72	4
JWD-171-17	Yes	5/6	500	3.8	0.5	7	50/72	4
JWD-171-14	No	12	1,200	9.6	1.0	16	120	4
JWD-171-19	Yes	12	1,200	9.6	1.0	16	120	4
JWD-171-15	No	24	2,200	19.2	2.0	40	262	4
JWD-171-20	Yes	24	2,200	19.2	2.0	40	262	4
JWD (DIP units) with 1 Form C (SPDT) contacts rated 3W max.								
JWD-172-1	No	5/6	200	3.8	0.5	12	125/180	5
JWD-172-5	Yes	5/6	200	3.8	0.5	12	125/180	5
JWD-172-3	No	12	500	9.6	1.0	19	288	5
JWD-172-7	Yes	12	500	9.6	1.0	19	288	5
JWD-172-4	No	24	2,200	19.2	2.0	38	262	5
JWD-172-8	Yes	24	2,200	19.2	2.0	38	262	5
JWD-172-155	No	5/6	200	3.8	0.5	12	125/180	6
JWD-172-159	Yes	5/6	200	3.8	0.5	12	125/180	6
JWD-172-157	No	12	1,000	9.6	1.0	19	144	6
JWD-172-161	Yes	12	1,000	9.6	1.0	19	144	6
JWD-172-158	No	24	2,150	19.2	2.0	38	268	6
JWD-172-162	Yes	24	2,150	19.2	2.0	38	268	6
JWS (SIP units) with 1 Form A (SPST-NO) contacts rated 10W max.								
JWS-117-1	No	5	500	3.8	0.5	16	50	7
JWS-117-6	Yes	5	500	3.8	0.5	16	50	7
JWS-117-3	No	12	530	9.6	1.0	19	272	7
JWS-117-8	Yes	12	530	9.6	1.0	19	272	7
JWS-117-13	No	12	1,850	9.6	1.0	30	78	7
JWS-117-18	Yes	12	1,850	9.6	1.0	30	78	7
JWS-117-5	No	24	2,150	19.2	2.0	36	268	7
JWS-117-10	Yes	24	2,150	19.2	2.0	36	268	7

Outline Dimensions

JWD



JWS



Note: Magnetic shielding may be required between relays when they are placed in very close proximity to one another.

OL series

Dry Reed Relay

Telecommunications, Office Machines.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Low cost, small package dry reed relay.
- 1 Form A and 2 Form A contact arrangements.
- Immersion cleanable, sealed version available. Consult factory.

Contact Data @ 20°C

Arrangements: 1 Form A (SPST-NO), 2 Form A (DPST-NO).
Material: Rh, Ru.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 100 million operations (no load).
Expected Electrical Life: 1,000,000 operations (rated load).
Minimum Load: 1mA @ 1VDC.
Initial Contact Resistance: 150 milliohms @ 100mA, 6VDC.

Contact Ratings

Ratings:
100µA @ 5VDC, 100,000,000 operations.
1mA @ 5VDC, 50,000,000 operations.
5mA @ 5VDC, 50,000,000 operations.

5mA @ 12VDC, 50,000,000 operations.
10mA @ 12VDC, 50,000,000 operations.
100mA @ 12VDC, 10,000,000 operations.

100mA @ 24VDC, 7,000,000 operations.
200mA @ 24VDC, 7,000,000 operations.
400mA @ 24VDC, 5,000,000 operations.

Max. Switched Voltage: **AC:** 120V.
DC: 60V.
Max. Switched Current: 0.5A.
Max. Switched Power: 10VA, 10W.

Initial Dielectric Strength

Between Open Contacts: 200VDC. (1 second).
Between Coil and Contacts: 3,000VDC. (1 second).
Surge Voltage Between Coil and Contacts: 3,000V (10 / 160µs).

Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 100VDCM.

Coil Data

Voltage: 6 to 24VDC.
Nominal Power: 100 mW to 270mW.
Coil Temperature Rise: 30°C max., at rated coil voltage.
Max. Coil Power: 150% of nominal.
Duty Cycle: Continuous.

Coil Data @ 20°C

OL				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
6	34.3	175	4.20	0.60
9	22.5	400	6.30	0.90
12	17.1	700	8.40	1.20
24	11.4	2,100	16.80	2.40

Operate Data

Must Operate Voltage: 70% of nominal voltage or less.
Must Release Voltage: 10% of nominal voltage or more.
Operate Time: 1.0 ms max.
Release Time: 0.5 ms max.

Environmental Data

Temperature Range:
Operating: -30°C to +60°C
Vibration, Mechanical: 10 to 55 Hz., 1.5mm double amplitude
Operational: 10 to 55 Hz., 1.5mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85% RH. (Non-condensing)

Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Snap-on dust cover.
Weight: 0.07 oz (2g) approximately.

Ordering Information

Typical Part Number ▶	OL	-C	-1	12	H	,000

1. Basic Series:
OL = Dry Reed Relay.

2. Enclosure:
C = Snap-on dust cover.

3. Termination:
1 = 1 pole
2 = 2 pole

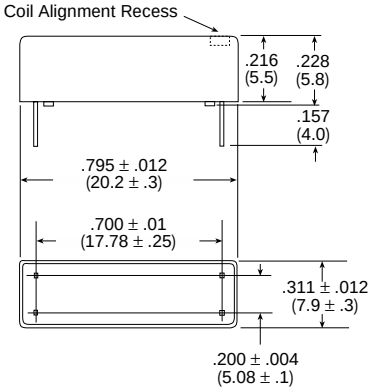
4. Coil Voltage:
06 = 6VDC
09 = 9VDC
12 = 12VDC
24 = 24VDC

5. Contact Rating:
H = 0.1A @ 120VAC

6. Suffix:
,000 = Standard model
Other Suffix = Custom model

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

Outline Dimensions



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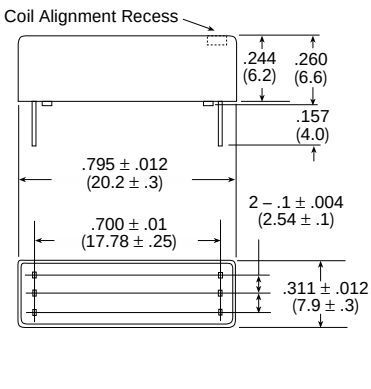
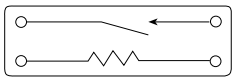


2 Form A

Wiring Diagrams (Bottom View)



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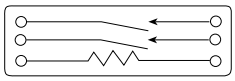
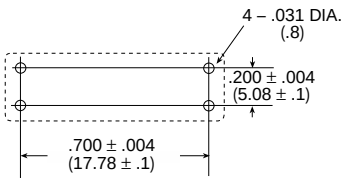
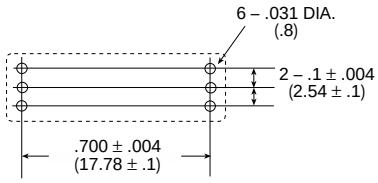


2 Form A

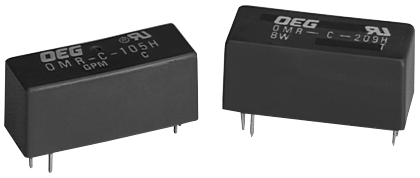
PC Board Layouts (Bottom View)



1 Form A



2 Form A



OMR series

Dry Reed Relay

Telecommunications, Office Machines.

File No. E82292

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Low cost, small package dry reed relay.
- 1 Form A contact and 2 Form A arrangements.

Contact Data @ 20°C

Arrangements: 1 Form A (SPST-NO), 2 Form A (DPST-NO).
Material: Rh, Ru.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 100 million operations (no load).
Expected Electrical Life: 1,000,000 operations (rated load).
Minimum Load: 1mA @ 1VDC.
Initial Contact Resistance: 150 milliohms @ 100mA, 6VDC.

Contact Ratings

Ratings:
100µA @ 5VDC, 100,000,000 operations.
1mA @ 5VDC, 50,000,000 operations.
5mA @ 5VDC, 50,000,000 operations.

5mA @ 12VDC, 50,000,000 operations.
10mA @ 12VDC, 50,000,000 operations.
100mA @ 12VDC, 10,000,000 operations.

100mA @ 24VDC, 7,000,000 operations.
200mA @ 24VDC, 7,000,000 operations.
400mA @ 24VDC, 5,000,000 operations.

Max. Switched Voltage: **AC:** 120V.
DC: 60V.
Max. Switched Current: 0.5A .
Max. Switched Power: 10VA, 10W.

Initial Dielectric Strength

Between Open Contacts: 200VDC. (1 second).
Between Coil and Contacts: 3,000VDC. (1 second).
Surge Voltage Between Coil and Contacts: 3,000V (10 / 160µs).

Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 100VDCM.

Coil Data

Voltage: 6 to 24VDC.
Nominal Power: 100 mW to 280mW.
Coil Temperature Rise: 30°C max., at rated coil voltage.
Max. Coil Power: 160% of nominal.
Duty Cycle: Continuous.

Coil Data @ 20°C

OMR				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
5/6	24.0	250	3.50	0.50
9	12.9	700	6.30	0.90
12	11.4	1,050	8.40	1.20
24	11.5	2,080	16.80	2.40

Operate Data

Must Operate Voltage: 70% of nominal voltage or less.
Must Release Voltage: 10% of nominal voltage or more.
Operate Time: 1.0 ms max.
Release Time: 0.5 ms max.

Environmental Data

Temperature Range:
Operating: -30°C to +70°C
Vibration, Mechanical: 10 to 55 Hz., 1.5mm double amplitude
Operational: 10 to 55 Hz., 1.5mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85% RH. (Non-condensing)

Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OMR: Open, no cover.
OMR-C: Snap-on dust cover.
Weight: 0.16 oz (4.5g) approximately.

Ordering Information

Typical Part Number ▶	OMR	-C	-1	12	H	,000

1. Basic Series:
OMR = Dry Reed Relay.

2. Enclosure:
Blank = Open, no cover.
C = Snap-on dust cover.

3. Termination:
1 = 1 pole 2 = 2 pole

4. Coil Voltage:
06 = 6VDC 12 = 12VDC
09 = 9VDC 24 = 24VDC

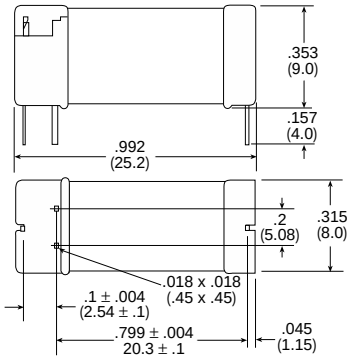
5. Contact Rating:
H = 0.5A @ 120VAC

6. Suffix:
,000 = Standard model Other Suffix = Custom model

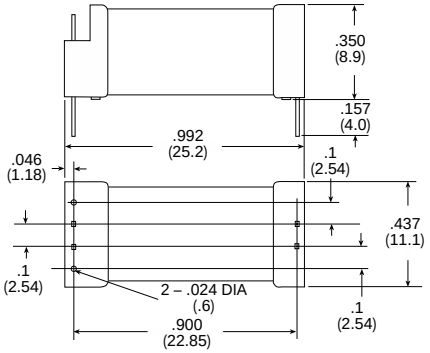
Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

Outline Dimensions

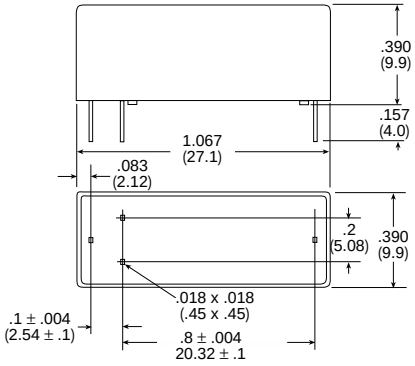
Open Type, 1 Form A



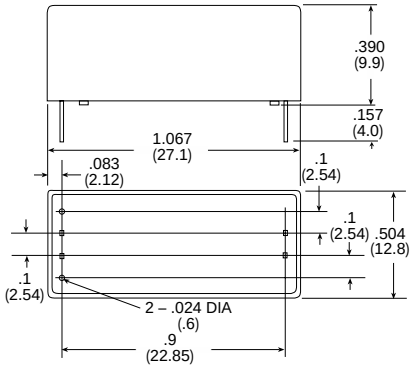
Open Type, 2 Form A



Snap-on Dust Cover Type, 1 Form A

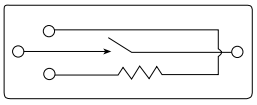


Snap-on Dust Cover type, 2 Form A

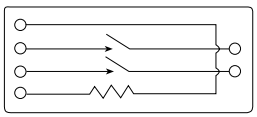


Wiring Diagrams (Bottom View)

1 Form A

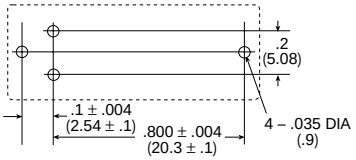


2 Form A

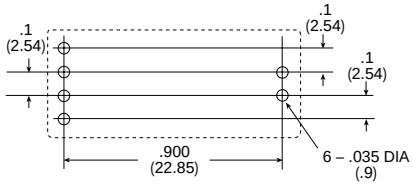


PC Board Layout (Bottom View)

1 Form A



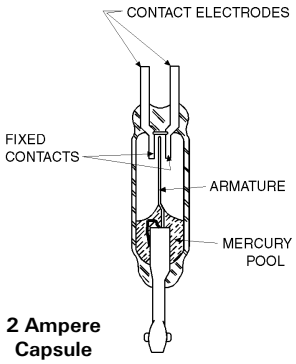
2 Form A



159/160 series

Mercury-Wetted Reed Relays

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.



2 Ampere Capsule

General Information

The mercury-wetted contact relay represents one of the more sophisticated types of relays made today. The early pioneer work in mercury-wetted contact switching dates back to the 1950's, as telephone laboratory scientists sought out the "perfect contact". Mercury-wetted contacts represent the nearest thing to the perfect contact yet developed, being characterized by such parameters as: bounce-free operation; very low and stable contact resistance; hermetic protection; fast operating speeds; Form C or Form D contact, action contact life measured in billions of operations. The only major weakness of a mercury-wetted contact relay is the necessity to mount the relay within 30° of a vertical position, due to its position sensitivity.

While there are several variations of the mercury-wetted contact relay on the market, the basic contact element has essential concepts in common. The mercury-wetted contact element consists of a glass-encapsulated nickel-iron reed with its base immersed in a pool of mercury. The free reed cantilever projects upward between sets of stationary contact electrodes, which have been glass-sealed in proper juxtaposition at the top of the glass chamber. The mercury is induced to flow up the cantilever by capillary action, wetting mercury on both the cantilever contact tip as well as the stationary contacts. Thus a mercury-to-mercury contact is maintained on both the normally-closed and normally-open contacts, and the system is self-replenishing. The 2-ampere mercury-wetted capsule is shown far left.

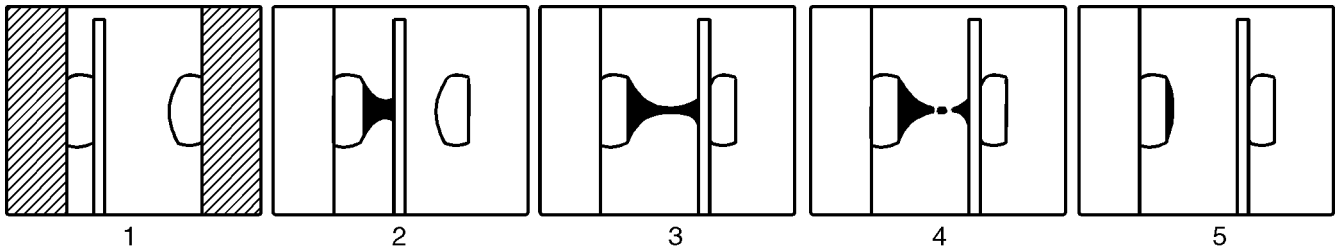
Along with the inherent fast actuation of the capsule and excellent load-handling capacity, the mercury-wetted contacts exhibit extremely long life, as the mercury films re-establish at each closure and contact erosion is eliminated. Contact interface resistance is very low and stable, and as the mercury films are elastic, contact bounce is eliminated. A dynamic sequence of the mercury-wetted contact action is shown below.

While the below sequence portrays a Form D (make-before-break) contact action, a true Form C (break-before-make) contact can be provided by proper control of the mercury film dynamics and the contact electrode spacing.

The mercury-wetted contact capsules generally are mounted within a coil assembly, and with appropriately mounted bias magnets, mounting base and magnetic shielded enclosures. The more popular assemblies contain one or two capsules in a convenient printed circuit mounting module.

Mercury-wetted relays can be adjusted to operate with very low levels of input power, in the order of 10-20 milliwatts. Thus, power gain switching of as great as 10,000 can be realized. For all but very light contact loads, contact protection is required to limit the current or voltage rise time across the contacts.

Form D Mercury-Wetted Contact Action As Seen In High-Speed Sequence



(1) Mercury (shown in black) covers armature and contact points; (2) and (3) as armature moves from open to closed position, mercury filament joins both contacts momentarily; (4) ruptured mercury surfaces accelerate away from each other, providing rapid breaking action; (5) as contact surfaces join, mercury wetting dampens rebound, eliminates electrical chatter, and provides contact reliability.

SPDT (Form C or Form D) Contact Specifications

Material	Rating (Switched Load)	(Carry Load)	Bridging and Transfer Time	Contact Resistance	Life Expectancy
Mercury-wetted platinum contacts hermetically sealed in an inert atmosphere	2 amperes maximum 500 volts maximum 100 VA maximum	5 amperes maximum Not switched	When operated by a single DC pulse, the bridging or transfer time will be greater than 50 microseconds, but less than 500 microseconds.	14 milliohms typical; 20 milliohms maximum Stable within ±2 milliohms throughout life.	1 billion operations minimum at rated load

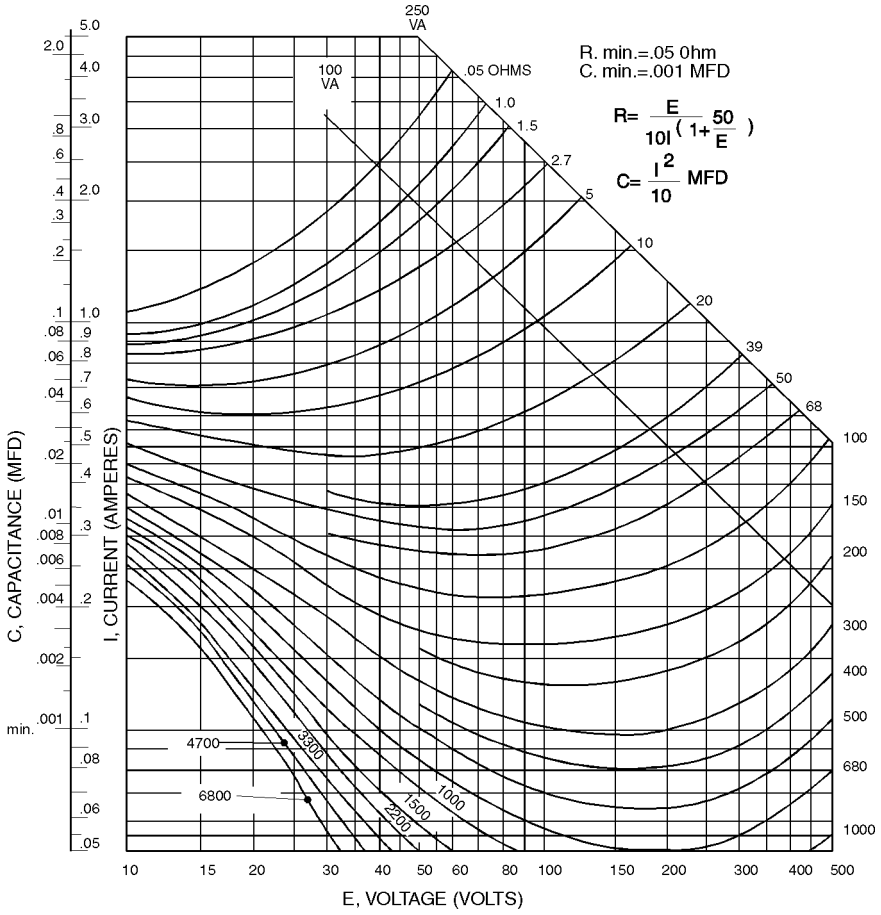
Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.

Mercury-Wetted Relays Contact Protection

The essentially infinite life of mercury-wetted contact relays may only be realized if the requirements for suitable contact protection are observed.

In that the goal is control of the rate of rise of voltage across the contacts when the circuit is opened (rather than peak transient limiting), the only suitable protection recognized is an RC network.

Values of R and C may be calculated using the formula shown, or may be obtained from the direct reading nomograph.



Nomograph Explanation

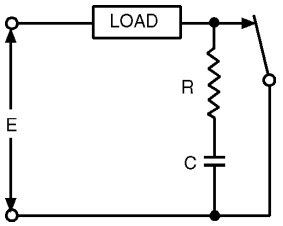
I=Steady state current at time of circuit opening
E=Open circuit voltage
Find I on the ordinate scale. Read C on the scale adjacent to I. R is found at the intersection of I and E.

To reduce voltage transient amplitudes, C may be increased up to 10 times calculated values. (R must be calculated value.)

For I=0.5 amps or less
and
E=50 volts or less
R may be omitted
C must be calculated value

Resistor Tolerances

E	R
Less than 70V	R up to 2R
70V to 100V	±50%
100V to 150V	±10%
Greater than 150V	±5%



Specifications

Parameter		159 Series	160 Series
Coils			
Single Wound–max. ohms		8,600	9,000
Double Wound–max. ohms		4,275	4,500
Rating–Watts Continous		2.0	1.75
Temp. Rise–°C per watt		30°	35°
Dielectric Breakdown–RMS, 60Hz		1,000	1,000
Insulation Resistance–Megohms–500 VDC		1,000	1,000
Capacitance–Armature to Coi pf, Typical		9.0	9.0
Electrostatic Shielding–Optional		yes	yes
Typical Operate Times–mS, 2X Must Operate		1-3	1-3
Typical Release Times–mS, 2X		2.5	2.5
Contact Form Available		Form C, D	Form C, D
Adjustments Available			
Single-side-stable		yes	yes
Bi-stable		yes	yes
Polar 1% Balance		yes	yes
Temperature Range	Operating °C	All types – 38.8°C to + 85°C	
	Storage °C	All types – 65°C to + 100°C	
Weight–ounces		2.0	0.5
Encapsulant		Polyurethane	Polyurethane
Mounting Method		PCB	PCB

159 series

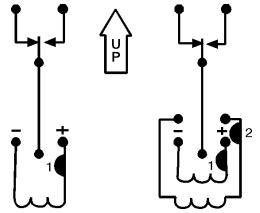
Mercury-Wetted Reed Relays

Features

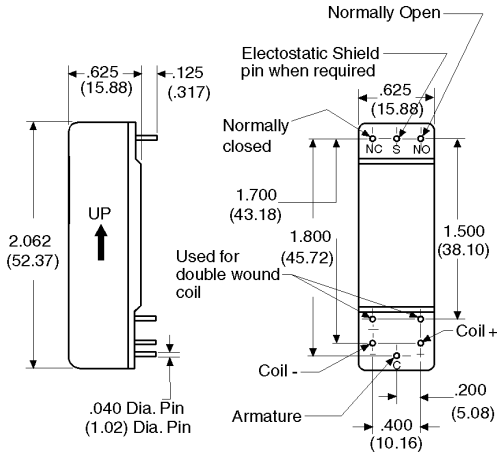
159 series relays are available in a Form C or Form D 2 amp contact arrangement, single or dual coil and printed circuit board terminals.
Weight: 1.0 ounce

Positive potential applied to the start of the winding indicated by the symbol ◠ will close the contacts shown open on the electrical schematics. For reset of bistable relays, reversed polarity must be applied.

Wiring Diagrams



Outline Dimensions



Note: Relay must be mounted within 30° of vertical and suitable contact protection must be used.

Part Numbering System

Relay Series	Enclosure And Terminals	Contacts And Adjustment	Coils	Standard Or Special
160	1–.625 Ht., .125 Lg. 2–.625 Ht., .156 Lg. 3–.625 Ht., .187 Lg. 4–.625 Ht., .250 Lg. 0–Special	1–1D Single-Side-Stable 2–1D Bistable 5–1C Single-Side-Stable 6–1C Bistable 7–1C Dynamic (1%) Balanced Bistable 0–Special	1A-1Z–Single Coil 2K-2V–Double Coil 7A-7T–Single Coil 8A-8Z–Bifilar Coil 9A-9Z–Double Coil (Concentric) 1S and 2S–Special	00–Standard A1-Z9–Special Customer Requirement

Example: 159-151N00 is a 159 series relay, enclosure height of .625 in., pin length of .125 in., Form C contact, single-side-stable adjustment, single coil 1N, of completely standard construction.

Coil Characteristics and Part Numbers

One Winding Single-Side-Stable 40 Milliwatts

Coils	Coil Resistance (Ohms)	Must Operate Current (MA-DC)	Must Operate Voltage (VDC)	Must Release Voltage (VDC)	Maximum Voltage (VDC)	Part Number	
						Form C	Form D
1A	2.2	116	.28	.06	2.1	159-151A00	159-111A00
1B	3.9	86	.37	.07	2.8	159-151B00	159-111B00
1C	6.4	67	.47	.09	3.6	159-151C00	159-111C00
1D	9.0	60	.60	.12	4.3	159-151D00	159-111D00
1E	14	47	.72	.15	5.3	159-151E00	159-111E00
1F	24	35	.93	.19	6.9	159-151F00	159-111F00
1G	34	32	1.2	.24	8.2	159-151G00	159-111G00
1H	56	24	1.5	.30	11	159-151H00	159-111H00
1J	86	20	1.9	.39	13	159-151J00	159-111J00
1K	140	15	2.3	.46	17	159-151K00	159-111K00
1L	225	12	2.9	.59	21	159-151L00	159-111L00
1M	385	9.0	3.8	.73	28	159-151M00	159-111M00
1N	620	7.0	4.8	.95	35	159-151N00	159-111N00
1P	940	5.8	6.0	1.2	43	159-151P00	159-111P00
1Q	1,450	4.8	7.7	1.6	54	159-151Q00	159-111Q00
1R	2,430	3.6	9.7	2.0	70	159-151R00	159-111R00
1T	3,620	2.9	12	2.3	85	159-151T00	159-111T00
1U	5,500	2.5	15	3.0	105	159-151U00	159-111U00
1V	8,600	2.0	19	3.8	130	159-151V00	159-111V00

Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.
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Technical support:
Refer to inside back cover.

159 Series (continued) – Coil Characteristics and Part Numbers

Coils	Coil Resistance (Ohms)	Must Operate Current (MA-DC) (Either Winding)	Must Operate Voltage (VDC) (Either Winding)	Must Release Voltage (VDC) (Either Winding)	Maximum Voltage (VDC) (Either Winding)	Dielectric Stand Off Between Coils (VDC)	Part Number	
							Form C	Form D
Two Windings Single-Side-Stable 80 Milliwatts Per Winding								
2K	70/70	30	2.3	.47	12	500	159-152K00	159-112K00
2L	115/115	23	3.0	.60	15	500	159-152L00	159-112L00
2M	190/190	18	3.8	.79	19	400	159-152M00	159-112M00
2N	325/325	14	5.0	1.0	26	400	159-152N00	159-112N00
2P	490/490	12	6.2	1.3	31	400	159-152P00	159-112P00
2Q	730/730	9.6	7.7	1.6	38	400	159-152Q00	159-112Q00
2R	1250/1250	7.2	10	2.0	50	400	159-152R00	159-112R00
2T	1860/1860	5.8	12	2.5	61	200	159-152T00	159-112T00
2U	2760/2760	5.0	15	3.0	74	200	159-152U00	159-112U00
2V	4275/4275	3.9	18	3.8	92	200	159-152V00	159-112V00
Two Windings Single-Side-Stable 40 Milliwatts Per Winding								
2K	70/70	15	.30	1.2	12	500	159-162K00	159-122K00
2L	115/115	12	.37	1.5	15	500	159-162L00	159-122L00
2M	190/190	9.0	.47	1.9	19	400	159-162M00	159-122M00
2N	325/325	7.0	.62	2.5	26	400	159-162N00	159-122N00
2P	490/490	5.8	.77	3.1	31	400	159-162P00	159-122P00
2Q	730/730	4.8	.97	3.9	38	400	159-162Q00	159-122Q00
2R	1250/1250	3.6	1.2	5.0	50	400	159-162R00	159-122R00
2T	1860/1860	3.0	1.5	6.0	61	200	159-162T00	159-122T00
2U	2760/2760	2.5	1.8	7.5	74	200	159-162U00	159-122U00
2V	4275/4275	2.0	2.3	9.2	92	200	159-162V00	159-122V00
Two Windings Bifilar Windings Bistable 40 Milliwatts Per Winding								
8A	135/135	16	.48	2.4	16.4	500	159-168A00	159-128A00
8B	170/170	15.5	.58	2.9	18.5	400	159-168B00	159-128B00
8C	200/200	13.3	.58	2.9	20.0	400	159-168C00	159-128C00
8D	310/310	11.9	.82	4.1	24.9	400	159-168D00	159-128D00
8E	460/460	7.8	.80	4.0	30.3	400	159-168E00	159-128E00
8F	675/675	6.5	.96	4.8	36.7	400	159-168F00	159-128F00
8G	810/810	6.85	1.2	6.1	40.2	400	159-168G00	159-128G00
8H	1000/1000	6.75	1.5	7.4	44.7	400	159-168H00	159-128H00
8J	1240/1240	5.6	1.4	7.0	49.8	400	159-168J00	159-128J00
8K	2300/2300	3.82	1.9	9.7	67.8	200	159-168K00	159-128K00

Note: All values at 25°C. Resistances specified are ±10%. Maximum voltages based on 2 watts continuous dissipation.

Nominal Resistance (Ohms)	Single-Side-Stable						Bistable				
	Must Operate Current (MA-DC)	Must Operate Voltage (VDC)	Must Release Voltage (VDC)	Maximum Voltage (VDC)	Part Number		Must Operate Current (MA-DC)	Must Operate Voltage (VDC)	Must Release Voltage (VDC)	Part Number	
					Form C	Form D				Form C	Form D
One Winding Single-Side-Stable 115 Milliwatts And Bistable 25 Milliwatts											
18	66.6	1.3	.18	6.0	159-157A00	159-117A00	31.2	.12	.62	159-167A00	159-127A00
65	37.4	2.7	.36	11.4	159-157B00	159-117B00	17.8	.26	1.3	159-167B00	159-127B00
85	33.3	3.1	.42	13.0	159-157C00	159-117C00	15.6	.30	1.5	159-167C00	159-127C00
90	37.7	3.8	.51	13.4	159-157D00	159-117D00	17.6	.36	1.8	159-167D00	159-127D00
115	30.0	3.8	.51	15.1	159-157E00	159-117E00	14.0	.36	1.8	159-167E00	159-127E00
275	17.0	5.2	.77	23.4	159-157F00	159-117F00	8.0	.50	2.5	159-167F00	159-127F00
450	12.9	6.4	.85	30.0	159-157G00	159-117G00	6.0	.60	3.0	159-167G00	159-127G00
675	11.6	8.6	1.1	36.7	159-157H00	159-117H00	5.4	.80	4.0	159-167H00	159-127H00
940	10.1	10.5	1.4	43.3	159-157J00	159-117J00	4.7	.98	4.9	159-167J00	159-127J00
950	12.1	12.7	1.7	43.6	159-157K00	159-117K00	5.7	1.2	6.0	159-167K00	159-127K00
1250	9.4	12.9	1.8	50.0	159-157L00	159-117L00	4.4	1.2	6.1	159-167L00	159-127L00
1425	8.3	13	1.8	53.4	159-157M00	159-117M00	3.9	1.2	6.2	159-167M00	159-127M00
1800	9.4	18.6	2.6	60.0	159-157N00	159-117N00	4.4	1.7	8.8	159-167N00	159-127N00
1950	7.5	17.6	2.1	62.4	159-157P00	159-117P00	3.5	1.5	7.5	159-167P00	159-127P00
2400	7.35	20.6	2.6	69.2	159-157Q00	159-117Q00	3.4	1.8	9.0	159-167Q00	159-127Q00
4000	5.55	24.4	3.3	89.5	159-157R00	159-117R00	2.6	2.3		159-167R00	159-127R00
4000		17.6	2.4	89.5	159-157T00	159-117T00	1.9	1.6	8.3	159-167T00	159-127T00

160 series

Mercury-Wetted Reed Relays

Features

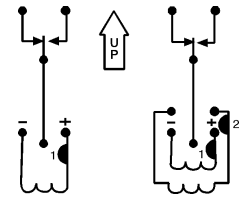
160 series relays are available in a single Form C or Form D two ampere contact arrangement, single or dual coil and printed circuit board terminals.

The part numbers shown on the adjacent page are for relays with 0.093" terminal spacing. The part number designator for the 0.100" grid is a 160-3XXXXX for a pin of 0.09" length, and 160-4XXXXX for a pin of 0.125" length.

Positive potential applied to the start of the winding indicated by the symbol ◠ will close the contacts shown open on the electrical schematics. For reset of bistable relays, reversed polarity must be applied. Weight 0.5 ounces. UL File E55708

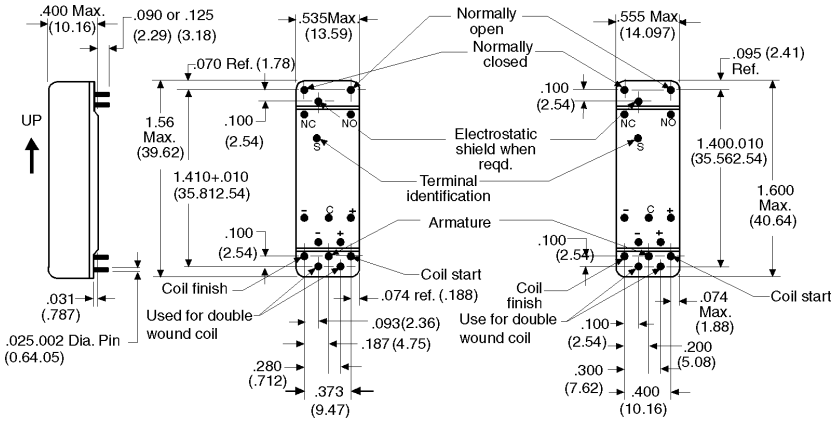
Note: Relay must be mounted within 30° of vertical and suitable contact protection must be used.

Wiring Diagrams



Single Coil Double Coil

Outline Dimensions



Grid 0.093
(160-1)
(160-2)

Grid 0.100
(160-3)
(160-4)

Part Numbering System

Relay Series	Enclosures And Terminals	Contacts and Adjustments	Coil	Standard or Special
160	1–.090 Lg., .093 Grid 2–.125 Lg., .093 Grid 3–.090 Lg., .100 Grid 4–.125 Lg., .100 Grid 0–Special	1–1D Single-Side-Stable 2–1D Bistable 5–1C Single-Side-Stable 6–1C Bistable 7–1C Dynamic (1%) Balanced Bistable 0–Special	1A-1Z–Single Coil 2A-2Z–Double Coil 1S–Special Single Coil 2S–Special Double Coil	00–Standard A1-Z9–Special Customer Requirement

Example: 160-151K00 is a 160 series relay, enclosure height of .400 in., pin length of .090 in., Form C contact, single-side-stable adjustment, single coil 1K, of completely standard construction.

Coil Characteristics and Part Numbers

Two Windings Bistable 20 Milliwatts Per Winding

Coil	Coil Resistance (Ohms)	Must Operate Current (MA-DC) (Either Winding)	Must Not Operate Voltage (VDC) (Either Winding)	Must Operate Voltage (VDC) (Either Winding)	Maximum Voltage (VDC) (One Winding Only)	Dielectric Standoff Between Coils (VDC)	Part Number	
							Form C	Form D
2K	60/60	17	.29	1.1	10	500	160-162K00	160-122K00
2L	90/90	15	.38	1.5	13	400	160-162L00	160-122L00
2M	155/155	11	.49	1.9	16	400	160-162M00	160-122M00
2N	205/205	10	.61	2.3	19	400	160-162N00	160-122N00
2P	340/340	7.5	.73	2.8	24	400	160-162P00	160-122P00
2Q	560/560	6.0	.98	3.6	31	400	160-162Q00	160-122Q00
2R	870/870	4.7	1.2	4.5	39	200	160-162R00	160-122R00
2T	1320/1320	3.8	1.4	5.5	48	200	160-162T00	160-122T00
2U	1980/1980	3.2	1.8	7.0	59	200	160-162U00	160-122U00
2V	3000/3000	2.7	2.3	9.0	73	200	160-162V00	160-122V00
2W	4500/4500	2.1	2.8	11.0	89	200	160-162W00	160-122W00

Note: All values at 25°C. Resistances specified are ±10%. Maximum voltages based on 1.75 watts continuous dissipation.

Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.
www.tycoelectronics.com
Technical support:
Refer to inside back cover.

160 Series (continued) – Coil Characteristics and Part Numbers

One Winding Single-Side-Stable 40 Milliwatts

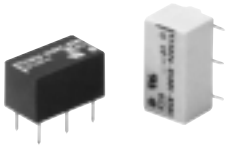
Coil Resistance (Ohms)	Must Operate Current (MA-DC)	Must Operate Voltage (VDC)	Must Release Voltage (VDC)	Maximum Voltage (VDC)	Part Number	
					Form C	Form D
2.2	113	.27	.05	2.0	160-151A00	160-111A00
3.1	103	.35	.07	2.3	160-151B00	160-111B00
4.4	90	.43	.08	2.8	160-151C00	160-111C00
5.9	80	.52	.10	3.2	160-151D00	160-111D00
13.0	49	.71	.14	4.8	160-151E00	160-111E00
18.7	43	.87	.18	5.7	160-151F00	160-111F00
27.7	36	1.1	.22	7.0	160-151G00	160-111G00
50	25	1.4	.28	9.4	160-151H00	160-111H00
70	23	1.8	.35	11	160-151J00	160-111J00
125	16	2.3	.46	15	160-151K00	160-111K00
185	14	2.9	.60	18	160-151L00	160-111L00
325	11	3.8	.77	24	160-151M00	160-111M00
435	10	4.6	.94	28	160-151N00	160-111N00
680	7.5	5.7	1.1	35	160-151P00	160-111P00
1,120	5.9	7.2	1.4	44	160-151Q00	160-111Q00
1,750	4.6	8.8	1.7	55	160-151R00	160-111R00
2,650	3.8	11	2.2	68	160-151T00	160-111T00
3,900	3.2	14	2.7	83	160-151U00	160-111U00
6,100	2.6	17	3.5	103	160-151V00	160-111V00
9,000	2.1	21	4.2	125	160-151W00	160-111W00

Two Windings Single-Side-Stable 80 Milliwatts Per Winding

Coil Resistance (Ohms)	Must Operate Current (MA-DC) (Either Winding)	Must Not Operate Voltage (VDC) (Either Winding)	Must Operate Voltage (VDC) (Either Winding)	Maximum Voltage (VDC) (One Winding Only)	Dielectric Standoff Between Coils (VDC)	Part Number	
						Form C	Form D
60/60	33	2.2	.44	10	500	160-152K00	160-112K00
90/90	29	2.9	.58	13	400	160-152L00	160-112L00
155/155	22	3.7	.74	16	400	160-152M00	160-112M00
205/205	20	4.5	.92	19	400	160-152N00	160-112N00
340/340	15	5.6	1.1	24	400	160-152P00	160-112P00
560/560	10.8	7.9	1.3	31	400	160-152Q00	160-112Q00
870/870	9.3	9.0	1.8	39	200	160-152R00	160-112R00
1,320/1,320	7.5	11.0	2.2	48	200	160-152T00	160-112T00
1,980/1,980	6.4	14.0	2.8	59	200	160-152U00	160-112U00
3,000/3,000	5.3	18.0	3.5	73	200	160-152V00	160-112V00
4,500/4,500	4.2	21.0	4.2	89	200	160-152W00	160-112W00

V23026 (P1) series

Miniature, Sealed PC Board Relay



File E48393
File LR45064-5

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Surface and through-hole mounting types.
- 1 Form C contact arrangement.
- Latching or non-latching versions available.
- Switches loads from dry circuit to 1 amp.
- Washable – meets IEC protection class IP67.
- Low coil power requirement for IC compatibility.
- Terminals arranged on 0.1" grid.
- Designed for compact, high density mounting, 106.6mm^2 surface area.
- Ideal for data and communication systems.

Contact Data @ 23°C

Arrangements: 1 Form C (SPDT) bifurcated contacts.
Material & Style: Palladium-Nickel with Gold-Rhodium overlay.
Expected Mechanical Life: 1 billion operations.
Expected Electrical Life: 50 million ops. at 10mA, 12VDC;
10 million ops. at 100mA, 6VDC;
100,000 ops. at 1A, 30VDC.
Contact Ratings:
Maximum Switched Voltage: 125VDC, 150VAC.
Maximum Switched Current: 1A.
Maximum Carrying Current: 1A.
Maximum Switched Power: 30W (DC), 60VA (AC).
Minimum Switched Capability: 100µV.
UL/CSA Contact Ratings: 1A @ 30VDC;
460mA @ 65VDC;
460mA @ 150VAC.
Initial Contact Resistance: 50 milliohms max. @ 10mA, 20mV.

High Frequency Data

Capacitance: **Between Open Contacts:** 5pF, max.
Between Coil and Contacts: 6pF, max.
RF Characteristics: **Isolation at 100 / 900 MHz:** -30.9 db / -18.0 db.
Insertion loss at 100 / 900 MHz: -0.12 db / -1.9 db.
V. S. W. R. at 100 / 900 MHz: 1.06 / 1.75 .

Initial Dielectric Strength

Between Open Contacts: 500V rms for 1 minute.
Between Contacts and Coil: 1,500V rms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / 10 µs):
Between Open Contacts: 2,000V on request.
Between Coil and Contacts: 2,500V.
Surge Voltage Resistance per FCC 68 (10 / 160 µs):
Between Open Contacts: 1,500V on request.
Between Coil and Contacts: 1,500V.

Note: Consult factory regarding availability of models meeting high surge resistance requirements between open contacts.

Initial Insulation Resistance

Between Mutually Insulated Conductors: 10^9 ohms @ 500VDC.

Coil Data @ 23°C

Voltage: 1.5 to 24VDC.
Thermal Resistance at Continuous Thermal Load: 130°K per Watt.
Maximum Coil Temperature: 85°C.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Maximum Operating Voltage (VDC)	Nominal Power (mW)	Resistance (Ohms) ± 10%	Coil Number Order Designation (Step 4 in Ordering Information chart)
Non-Latching — Through-Hole versions (A1)				
1.5	4.5	63	36	7
3	8.8	66	137	6
5	14.5	67	370	1
9	25.5	69	1,165	5
12	35	64	2,250	2
15	42	72	3,100	3
24	50	128	4,500	4
Non-Latching — Surface-Mount versions (D1)				
1.5	4	80	28	7
3	8	80	113	6
5	13.3	80	313	1
9	24	80	1,013	5
12	32	80	1,800	2
15	40	80	2,813	3
24	50	128	4,500	4
Bistable, Dual Coils — Through-Hole and Surface-Mount versions (B1,E1) (values are the same for each coil)(1)				
1.5	4.25	70	32	7
3	8.55	69	130	6
5	14.75	64	390	1
9	14.75	68	1,200	5
12	29	96	1,500	2
15	29	150	1,500	3
Bistable, Single Coil — Through-Hole and Surface-Mount versions (C1,F1)				
1.5	6	37	61	5
3	13	30	300	6
5	20	34	740	1
9	35	38	2,160	7
12	50	32	4,500	2
15	50	50	4,500	3
24	50	128	4,500	4

(1) The specified voltages apply with only one coil energized.

Operate Data @ 23°C

Must Operate Voltage: 75% of nominal voltage or less.
Must Release Voltage: 10% of nominal voltage or less.
Max. Continuous Thermal Load : 500mW.
Operate Time (Excluding Bounce)†: 1 ms, typ.
Operate Bounce Time†: 1 ms, typ.
Release Time (Excluding Bounce)†: 0.4 ms, typ.
Set Time (Latching)†: 1 ms, typ.
Reset Time (Latching)†: 1 ms, typ.
Maximum Switching Rate: 200 operations/second.
† At or from Nominal Coil Voltage

Environmental Data

Temperature Range: -40°C to +70°C.
Vibration, Operational: 40g, 10-200 Hz; 20g, 200-2000 Hz.
Shock, Operational: 50g at 11 ms 1/2 sinusoidal impulse.
Resistance to Soldering Heat: 260°C for 10s. Internal relay temperature should not exceed 210°C.
Needle Flame Test: Application time 20s, burning time <15s.

Mechanical Data

Termination: Through-hole or surface mount printed circuit terminals.
Enclosure Type: Immersion cleanable, plastic sealed case.
Weight: 0.063 oz. (1.8g) approximately.

Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.
www.tycoelectronics.com
Technical support:
Refer to inside back cover.

Ordering Information

Typical Part Number ▶	V23026	A1	00	2	B201

1. Basic Series:
V23026 = P1 Miniature, printed circuit board relay.

2. Termination:

	Non-Latching	Dual Coil Latching	Single Coil Latching
Through-Hole	**A1**	**B1**	**C1**
Surface Mount	**D1**	**E1**	**F1**

Consult factory regarding availability of models meeting FCC Part 68/1500V surge requirement.

3. Function Type:
00 = Single Coil Non-Latching, Through-Hole terminals
02 = Single Coil Non-Latching, Surface-Mount terminals
05 = Single Coil Latching
10 = Dual Coil Latching

4. Coil Voltage:
7 = 1.5VDC(1) 6 = 3VDC 1 = 5VDC 5 = 9VDC(1) 2 = 12VDC 3 = 15VDC 4 = 24VDC(2)
(1) For single coil latching versions only (C1, F1), 5 =1.5VDC and 7 = 9VDC (2) 24V coil not available on dual coil version

5. Contact Type:
B201 = Bifurcated, 1 Form C (SPDT).

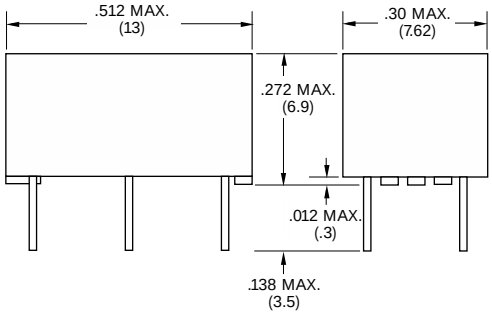
*Consult factory for tape and reel packaging.

Our authorized distributors are more likely to stock the following items for immediate delivery.

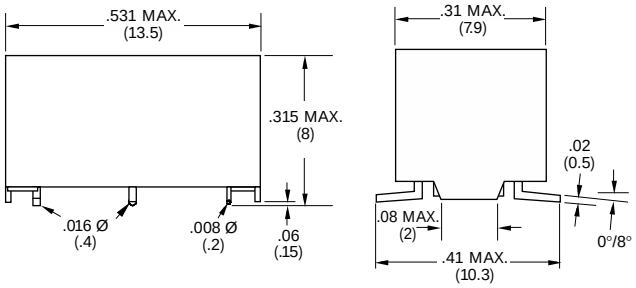
V23026A1001B201 V23026D1021B201
V23026A1002B201 V23026D1022B201
V23026A1004B201 V23026D1024B201

Outline Dimensions

Through-Hole

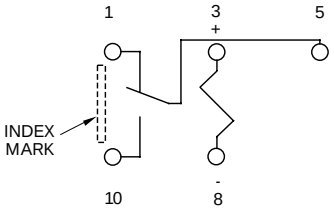


Surface Mount



Wiring Diagrams (Bottom Views)

Single Coil Non-Latching & Single Coil Latching



For non-latching versions, coil polarity must be observed.
For single coil latching versions, polarity shown results in "set" condition.
Reverse polarity results in "reset" condition.
Diagram indicates de-energized position for non-latching and "reset" position for single coil latching.

Dual Coil Latching

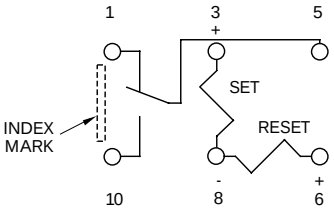
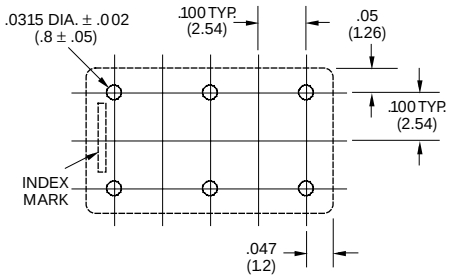


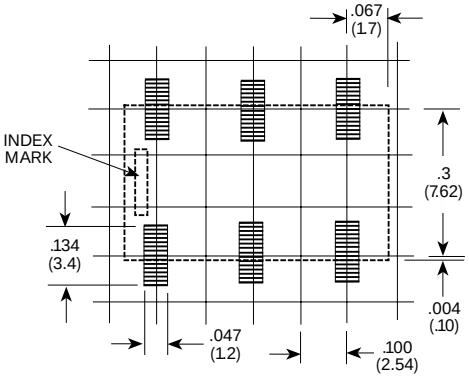
Diagram indicates relay in the "reset" position, with "reset" coil most recently energized as shown. Energizing "set" coil as shown will transfer the contacts.

PC Board Layouts (Bottom Views)

Through-Hole



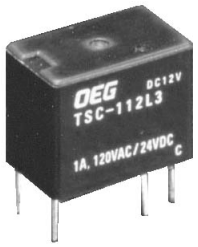
Surface Mount



TSC series

Miniature, Sealed PC Board Relay

Telecommunications, Appliances, Office Machines



UL File No. E82292
CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Designed for thermostat, modem, computer peripherals, video recording and security applications.
- 1 Form C contact arrangement.
- Low coil power requirement for IC compatibility.
- Terminals arrangement on grid pattern.

Coil Data @ 20°C

TSC-L Sensitive				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
5	30.0	166	3.75	0.25
6	25.0	240	4.50	0.30
9	16.7	540	6.75	0.45
12	12.5	960	9.00	0.60
24	6.3	3,840	18.00	1.20
TSC-D Standard				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
5	60.0	83	3.75	0.25
6	50.0	120	4.50	0.30
9	33.4	270	6.75	0.45
12	25.0	480	9.00	0.60
24	12.5	1,920	18.00	1.20

Contact Data @ 20°C

Arrangements: 1 Form C (SPDT).
Material: Gold overlay Silver Nickel Alloy.
Max. Switching Rate: 300ops./ min. (no load).
30ops./ min. (rated load).
Expected Mechanical Life: 5 million ops (no load).
Expected Electrical Life: 100,000 ops (rated load).
Minimum Load: 1mA @ 1VDC.
Initial Contact Resistance: 50 milliohms @ 100mA, 6VDC.

Contact Ratings

Ratings: 1A @ 24VDC resistive.
1A @ 120VAC resistive.
Max. Switched Voltage: **AC:** 120V.
DC: 30V.
Max. Switched Current: 1A.
Max. Switched Power: 120VA, 24W.

Initial Dielectric Strength

Between Open Contacts: 400VAC, 50/60 Hz. (1 min.).
Between Contacts and Coil: 1,000VAC, 50/60 Hz. (1 min.).
Note: Consult factory for higher dielectric version: 1,500VAC, 50/60 Hz. (1 min.).
Surge Voltage Between Coil and Contacts: 1,500V FCC Part 68 (10/160µs).

Initial Insulation Resistance

Between Mutually Insulated Conductors: 1,000Mohm @ 500VDCM.

Coil Data

Voltage: 5 to 24VDC.
Duty Cycle: Continuous.
Nominal Power: **TSC-L:** 150mW.
TSC-D: 300mW.
Max. Coil Power: **TSC-L:** 140% of nominal at 70°C.
TSC-D: 115% of nominal at 70°C.

Operate Data @ 20°C

Must Operate Voltage: 75% of nominal voltage or less.
Must Release Voltage: 5% of nominal voltage or more.
Operate Time: 5ms max.
Release Time: 5ms max.

Environmental Data

Temperature Range:
Operating: -40°C to +80°C.
Vibration, Mechanical: 10 to 55Hz., 1.5mm double amplitude.
Operational: 10 to 55Hz., 1.5mm double amplitude.
Shock, Mechanical: 500m/s² (50G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 45 to 85% RH. (Non-condensing)

Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Plastic sealed case.
Weight: 0.1 oz (3g) approximately.

Ordering Information

Typical Part Number ▶	TSC	-1	05	L	3	H	,000

1. Basic Series:
TSC = Miniature relay

2. Termination:
1 = 1 pole

3. Coil Voltage:
05 = 5VDC 09 = 9VDC 24 = 24VDC
06 = 6VDC 12= 12VDC

4. Coil Input:
L = Sensitive D = Standard

5. Contact Material:
3 = Silver Nickel

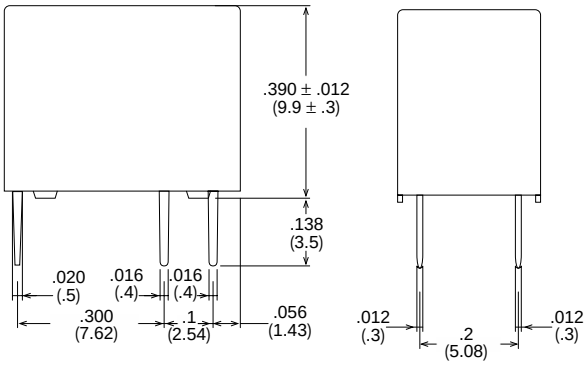
6. Enclosure:
Blank = Vented (Flux-tight) cover H = Sealed plastic case

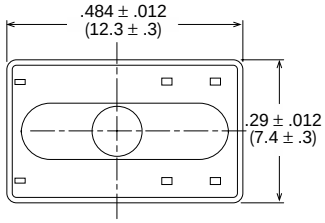
7. Suffix:
,000 = Standard model Other Suffix = Custom model

Our authorized distributors are more likely to stock the following items for immediate delivery.

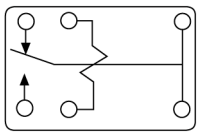
TSC-105L3H,000 TSC-124L3H,000 TSC-112D3H,000
TSC-112L3H,000 TSC-105D3H,000 TSC-124D3H,000

Outline Dimensions

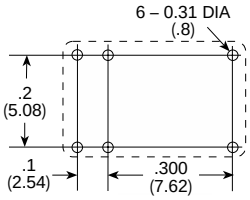




Wiring Diagram (Bottom View)

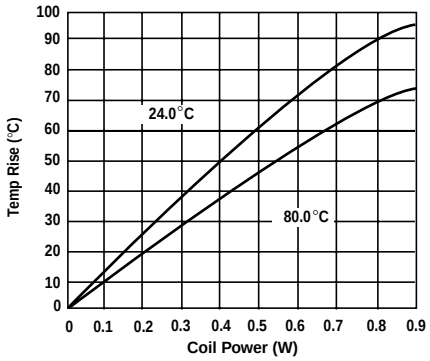


PC Board Layout (Bottom View)

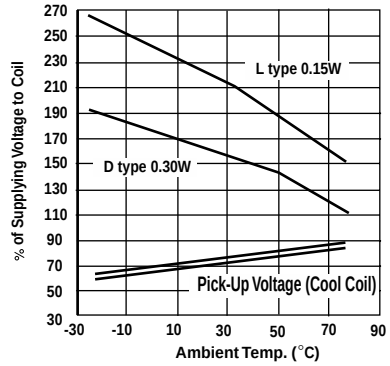


Reference Data

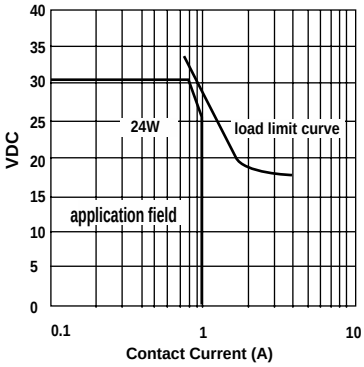
Coil Temperature Rise

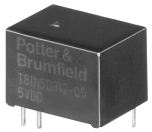


Ambient Temp. & Operate Voltage



Load Limit Curve





T81N/T81H series

Ultraminiature, High Density PC Board Relay

File E29244

File LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Gold clad contacts in a 1 Form C contact arrangement.
- Standard 0.1" x 0.3" grid spacing in a DIP configuration.
- Standard or sensitive DC coils through 24 volts.
- High dielectric strength.
- Well suited for audio communications circuits, logic and process control, vending machines, thermostats and office automation applications.
- Immersion cleanable, plastic sealed case.
- Quiet operation for security applications.

Contact Data @ 20°C

Arrangements: 1 Form C (SPDT).
Material: Gold overlay silver-palladium alloy.
Ratings: 1 amp @ 24VDC, resistive; 0.5 amp @ 120VAC, resistive.
Max. Switching Current: 2A
Max. Switching Power: 60VA/24W.
Max. Switching Voltage: 120VAC/60VDC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 150,000 ops. @ 1A, 24VDC, resistive.
100,000 ops. @ 1A, 120VAC, resistive.
Initial Contact Resistance: 50 milliohms, max., @ 100mA, 6VDC.
Surge Voltage:
Between Coil and Contacts (10 x 160μs): 1,500V: (FCC Part 68).

Initial Dielectric Strength

Between Open Contacts: 500V rms, 50/60 Hz., for 1 minute.
Contact to Coil: 1,000V rms, 50/60 Hz., for 1 minute.

Initial Insulation Resistance

Between Mutually Insulated Conductors: 10^8 ohms @ 500VDC, 20°C and 65% relative humidity.

Coil Data @ 20°C

Voltage: 3 through 24VDC.
Nom. Power (Approx.)**: Std. Coil:** 450 mW; **Sensitive Coil:** 200 mW.
Maximum Power: Std. Coil: 800 mW.;**Sensitive Coil:** 640 mW.
Temperature Rise: Std. Coil: 105°C per watt, typ.
Sensitive Coil: 125°C per watt, typ.
Maximum Coil Temperature: 105°C.
Duty Cycle: Continuous.

Coil Data @ 20°C

Standard Coils		Sensitive Coils	
Nominal Voltage (VDC)	Resistance ±10% (Ohms)	Nominal Voltage (VDC)	Resistance ±10% (Ohms)
3	20	3	45
5	55	5	125
6	80	6	180
9	180	9	400
12	320	12	700
24	1,280	24	2,800

Operate Data @ 20°C

Must Operate Voltage: 70% of nominal voltage or less.
Must Release Voltage: 5% of nominal voltage or more.
Operate Time (Excluding Bounce)†: Standard Coil : 5 ms, approx.
Sensitive Coil : 5 ms, approx.
Release Time (Excluding Bounce)†: All Models: 2 ms, approx.

† At or from Nominal Coil Voltage.

Environmental Data

Temperature Range: Standard Coil: -40°C to +55°C.
Sensitive Coil: -40°C to +75°C.
Vibration: 0.059" (1.5mm) max. excursions for 10-40 Hz.
Shock: Standard Coil: 10g for 11 ms.
Sensitive Coil: 6g for 11 ms.

Mechanical Data

Termination: Printed circuit terminals on 0.1" (2.54mm) centers.
Enclosure: Sealed PBT plastic case.
Weight: 0.14 oz. (4g) approximately.

Ordering Information

Typical Part Number ▶	T81	H	5	D	3	1	2	-12

1. Basic Series:
T81 = Ultraminiature, PC board relay.

2. Coil Sensitivity:
N = Standard coil.
H = Sensitive coil.

3. Contact Arrangement:
5 = 1 Form C (SPDT)

4. Coil Input:
D = DC Voltage.

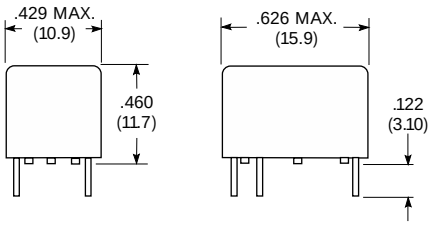
5. Dielectric Strength:
3 = High dielectric strength, UL recognized.

6. Contact Rating:
1 = 1A @ 24VDC; 0.5A @ 120VAC.

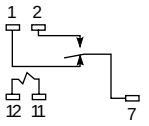
7. Contact Material:
2 = Gold overlay silver-palladium alloy.

8. Coil Voltage:
03 = 3VDC 06 = 6VDC 12 = 12VDC
05 = 5VDC 09 = 9VDC 24 = 24VDC

Outline Dimensions

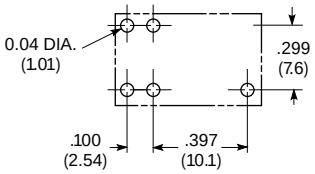


Wiring Diagram (Bottom View)



Terminals - #1 & 2
.023 (0.6) X .018 (0.45)
Terminals - #11 & 12
.023 (0.6) X .016 (0.40)
Terminal - #7
.008 (0.20) X .023 (0.6)

PC Board Layout (Bottom View)



Our authorized distributors are more likely to stock these items.

T81H5D312-05 T81H5D312-12 T81N5D312-05 T81N5D312-24
T81H5D312-06 T81H5D312-24 T81N5D312-12

Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

OUAZ series

Miniature, Sealed PC Board Relay

Telecommunications, Appliances, Office Machines, Audio Equipment.

UL File No. E82292
CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Gold overlay silver palladium alloy contact suitable for low loads.
- High density available on PC board due to small size.
- 2.54mm terminal pitch same as I.C. socket terminal pitch.
- Sensitive and standard coils available.
- Immersion cleanable, sealed version available.

Contact Data @ 20°C

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Gold overlay silver palladium.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 1mA @1VDC.
Initial Contact Resistance: 50 milliohms @ 100mA,6VDC.

Contact Ratings

Ratings: 1A @ 24VDC resistive,
1A @ 120VAC resistive.
Max. Switched Voltage: **AC:** 120V.
DC: 60V.
Max. Switched Current: 1A.
Max. Switched Power: 120VA, 30W.

Initial Dielectric Strength

Between Open Contacts: 500VAC 50/60 Hz. (1 minute).
Between Coil and Contacts: 1,000VAC 50/60 Hz. (1 minute).
Surge Voltage Between Coil and Contacts: 1,500V FCC Part 68 (10/160µs).

Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

Coil Data

Voltage: 5 to 24VDC.
Nominal Power: **OUAZ-D:** 450 mW.
OUAZ-L: 200 mW.
Coil Temperature Rise: **OUAZ-D:** 60°C max., at rated coil voltage.
OUAZ-L: 25°C max., at rated coil voltage.
Max. Coil Power: 130% of nominal.
Duty Cycle: Continuous.

Coil Data @ 20°C

OUAZ-D Standard				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
5	90.9	55	3.50	0.25
6	75.0	80	4.20	0.30
9	50.0	180	6.30	0.45
12	37.5	320	8.40	0.60
24	18.8	1,280	16.80	1.20
OUAZ-L Sensitive				
Rated Coil Voltage (VDC)	**Nominal Current (mA)**	**Coil Resistance (ohms) ± 10%**	**Must Operate Voltage (VDC)**	**Must Release Voltage (VDC)**
5	40.0	125	3.75	0.50
6	33.3	180	4.50	0.60
9	22.5	400	6.75	0.90
12	17.0	700	9.00	1.20
24	8.6	2,800	18.00	2.40

Operate Data

Must Operate Voltage: **OUAZ-D:** 70% of nominal voltage or less.
OUAZ-L: 75% of nominal voltage or less.
Must Release Voltage: **OUAZ-D:** 5% of nominal voltage or more.
OUAZ-L: 10% of nominal voltage or more.
Operate Time: **OUAZ-D:** 5 ms max.
OUAZ-L: 10 ms max.
Release Time: 7 ms max.

Environmental Data

Temperature Range:
Operating: **OUAZ-D:** -30°C to +60°C
OUAZ-L: -30°C to +75°C.
Vibration, Mechanical: 10 to 55 Hz., 1.5mm double amplitude
Operational: 10 to 55 Hz., 1.5mm double amplitude.
Shock, Mechanical: 500m/s² (50G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85% RH. (Non-condensing)

Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OUAZ-SS: Vented (Flux-tight), plastic cover.
OUAZ-SH: Sealed, plastic case.
Weight: 0.12 oz. (3.5g) approximately.

Ordering Information

Typical Part Number ▶	OUAZ	-SS	-1	12	L	M	,900

1. Basic Series:
OUAZ = Miniature, sealed PC board relay.

2. Enclosure:
SS = Vented (Flux-tight)*, plastic cover.
SH = Sealed, plastic case.

3. Termination:
1 = 1 pole

4. Coil Voltage:
03 = 3VDC 06 = 6VDC 12 = 12VDC
05 = 5VDC 09 = 9VDC 24 = 24VDC

5. Coil Input:
L = Sensitive D = Standard

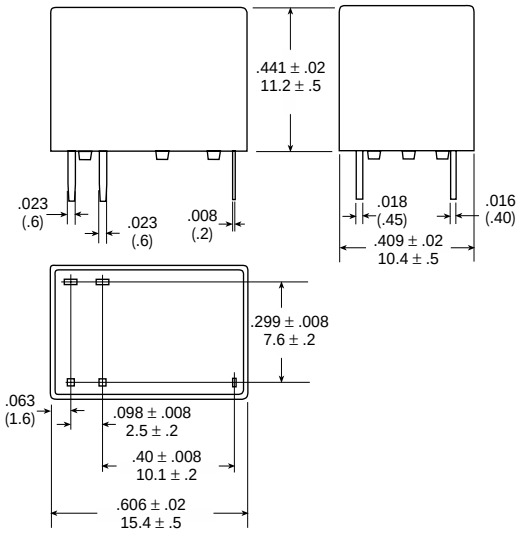
6. Contact Arrangement:
Blank = 1 Form C, SPDT M = 1 Form A, SPST-NO

7. Suffix:
,900 = Standard model Other Suffix = Custom model

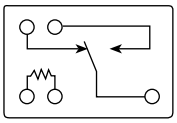
* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

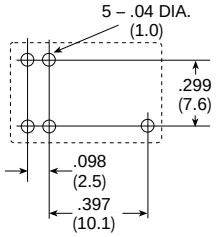
Outline Dimensions



Wiring Diagram (Bottom View)

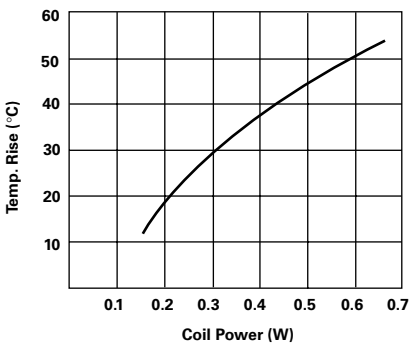


PC Board Layout (Bottom View)

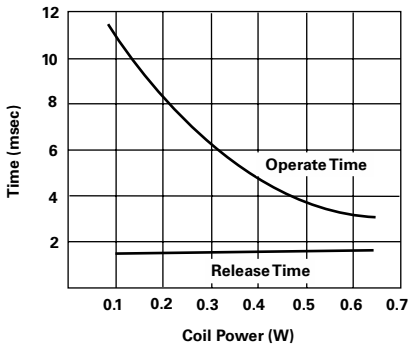


Reference Data

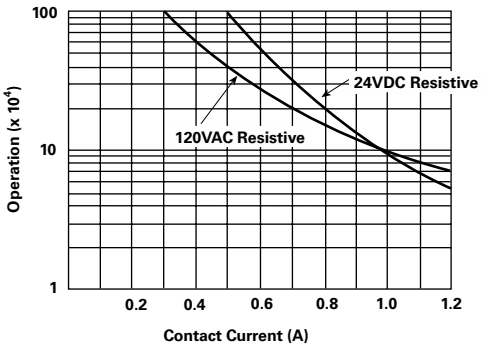
Coil Temperature Rise



Operate Time



Life Expectancy



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

IM series

DPDT Slimline and Low Profile Telecom/Signal PC Board Relays

File E111441
File 169679-1079886
16501-003

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole or surface mount terminals.
- Meets Bellcore GR 1089, FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 100mW coil for latching models, 140mW coil for non-latching.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Palladium-Ruthenium, gold covered.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.
Max. Switched Voltage: 220VDC, 250VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
UL/CSA Ratings: 250mA @ 250VAC; 2A @ 30VDC; 500mA @ 120VDC; 270mA @ 220VDC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 30mVDC.
2 million operations @ cable load open end.
500,000 operations @ 240mA / 125VDC, res.
500,000 operations @ 1A / 30VDC, res.
100,000 operations @ 270mA / 220VDC, res.
100,000 operations @ 2A / 30VDC, res.
100,000 operations @ 250mA / 250VDC, res.
Thermoelectric potential: <10μV.

High Frequency Data

Capacitance: Between Open Contacts: 1pF, max.
Between Coil and Contacts: 2pF, max.
Between Poles: 2pF, max.
RF Characteristics: Isolation at 100 / 900 MHz: -37.0 db / -18.8 db.
Insertion loss at 100 / 900 MHz: -0.03 db / -0.33 db.
V. S. W. R. at 100 / 900 MHz: 1.06 / 1.49 .

Initial Dielectric Strength

Between Open Contacts: 1,000Vrms for 1 minute.
Between Coil and Contacts: 1,800Vrms for 1 minute.
Between Poles: 1,000Vrms for 1 minute.
Surge Voltage Resistance per Bellcore 1089 (2 / 10 μs), FCC 68 (10 / 160 μs) and IEC (10 / 700 μs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 2,500V.
Between Poles: 1,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 1.5 to 24VDC.
Nominal Power: 100mW for 1.5 - 12VDC latching models;
140mW for 1.5 - 12VDC non-latching models;
200mW for all 24VDC models.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Operate/Set Range		Minimum Release/Reset Voltage (VDC)	Resistance ±10% (Ohms)	Part Number
	Minimum Voltage (VDC)	Maximum Voltage (VDC)			
Non-latching 1 coil versions					
1.5	1.13	3.4	0.15	16	IM00
3	2.1	6.8	0.3	64	IM01
4.5	3.15	10.3	0.45	145	IM02
5	3.5	11.4	0.5	178	IM03
6	4.2	13.7	0.6	257	IM04
9	6.3	20.4	0.9	574	IM05
12	8.4	27.3	1.2	1,028	IM06
24	16.8	45.6	2.4	2,880	IM07
Latching 1 coil versions					
1.5	1.13	4.1	-1.13	23	IM40
3	2.25	8.1	-2.25	90	IM41
4.5	3.38	12.1	-3.38	203	IM42
5	3.75	13.5	-3.75	250	IM43
6	4.5	16.2	-4.5	360	IM44
9	6.75	24.2	-6.75	810	IM45
12	9.0	32.3	-9.0	1,440	IM46
24	18.0	41.9	-18.0	2,880	IM47

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 1 ms, typ.; 3 ms, max.
Reset Time [latching](at nominal voltage): 1 ms, typ.; 3 ms, max.
Release Time [non-latching](without diode in parallel): 1 ms, typ.; 3 ms, max.
Release Time [non-latching](with diode in parallel): 3 ms, typ.; 5 ms, max.
Bounce Time (at contact close): 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load): 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 125°C.
Thermal Resistance: < 150K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Shock, half sinus, 0.5 ms: Destructive: 500g.
Vibration, 10-1000 Hz.: Functional: 20g.
Needle Flame Test: Application Time 20s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: Through-hole printed circuit terminals or gull-wing or J-leg surface mount printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.03 oz. (.75g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\,tamb} = K_I \cdot U_{I\,23°\,C}$

and

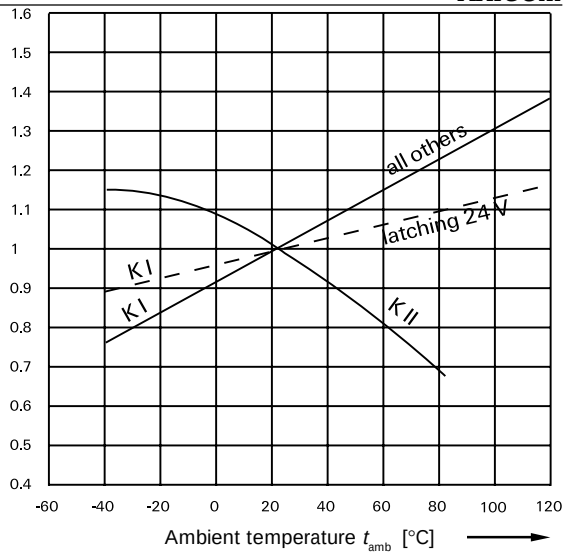
$U_{II\,tamb} = K_{II} \cdot U_{II\,23°\,C}$

t_{amb} = Ambient temperature

$U_{I\,tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\,tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number" column in Coil Data chart on previous page for available base part numbers in the IM series.
For THT versions, add the suffix "TS" to the base part number.
For gull-wing SMT versions, add the suffix "GR" to the base part number.
For J-leg SMT versions, add the suffix "JR" to the base part number.

Packaging Information

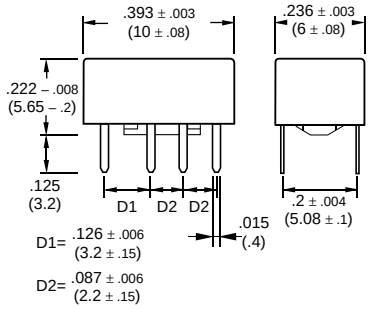
THT IM series relays are shipped in tubes of 50. There are 1,000 relays in a full carton. SMT IM series relays are shipped in reels of 1,000. There are 1,000 or 5,000 relays in a full carton.

Our authorized distributors are more likely to stock the following items for immediate delivery.

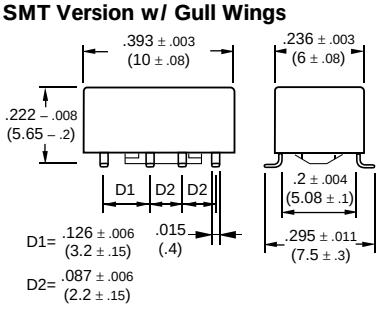
None at present.

Outline Dimensions

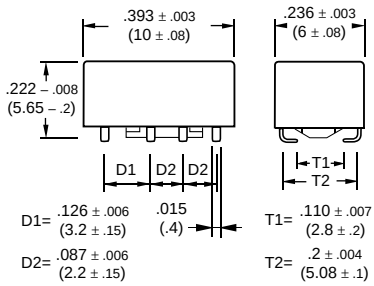
THT Version



SMT Version w/ Gull Wings

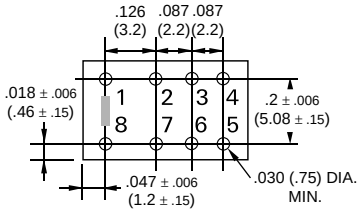


SMT Version w/ J Legs



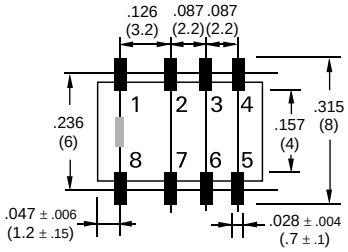
PC Board Layout (Bottom View)

THT Version

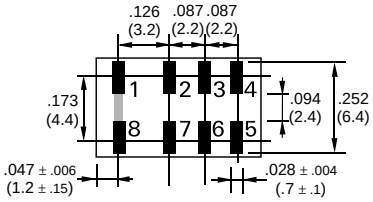


Solder Pad Layout (Bottom Views)

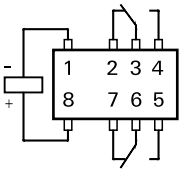
SMT Version w/ Gull Wings



SMT Version w/ J Legs

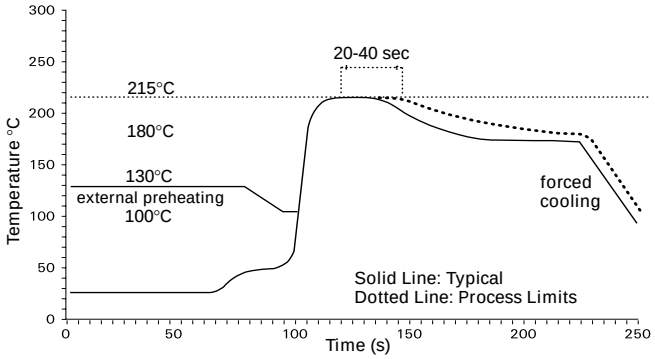


Wiring Diagram (Bottom View)

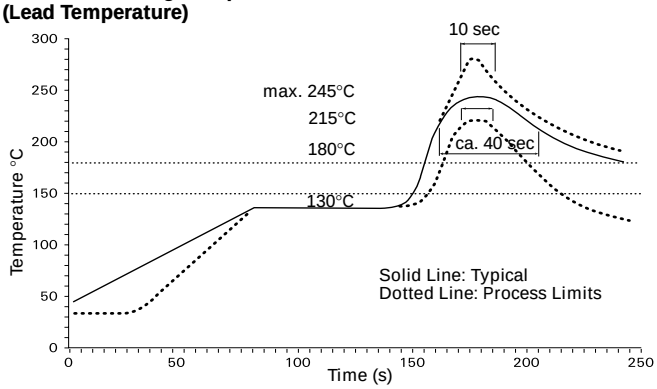


Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile (Lead Temperature)



Infrared Soldering: Temperature/Time Profile (Lead Temperature)



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

FP2 series

DPDT Low Profile Telecom/Signal PC Board Relays

File E111441
File 169679-1079886
16501-003

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole PC board terminals.
- Meets FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 80mW coil for high sensitivity models, 140mW coil for sensitive types.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Silver-nickel, gold covered.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.
Max. Switched Voltage: 125VDC, 250VAC.
Max. Switched Power: 30W DC or 62.5VA AC.
UL/CSA Ratings: 500mA @ 50VDC; 1.25A @ 30VDC; 500mA @ 50VAC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 30mVDC.
2 million operations @ cable load open end.
100,000 operations @ 240mA / 125VDC.
100,000 operations @ 250mA / 250VDC.
100,000 operations @ 1.25A / 24VDC.
Thermoelectric potential: <10µV.

High Frequency Data

Capacitance: Between Open Contacts: 1pF, max.
Between Coil and Contacts: 4pF, max.
Between Poles: 1pF, max.
RF Characteristics: Isolation at 100 / 900 MHz: -40.2 db / -22.3 db.
Insertion loss at 100 / 900 MHz: -0.03 db / -0.25 db.
V. S. W. R. at 100 / 900 MHz: 1.01 / 1.07 .

Initial Dielectric Strength

Between Open Contacts: 700Vrms for 1 minute.
Between Coil and Contacts: 1,000Vrms for 1 minute.
Between Poles: 1,000Vrms for 1 minute.
Surge Voltage Resistance per FCC 68 (10 / 160 µs) and IEC (10 / 700 µs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 3 to 48VDC.
Nominal Power: 80-300mW depending on models. See coil data tables.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nom. Voltage (VDC)	Operate/Set Range		Minimum Release/Reset Voltage (VDC)	Nom. Power (mW)	Resistance ±10% (Ohms)	Part Number
	Min. Voltage (VDC)	Max. Voltage (VDC)				
Non-latching 1 coil versions						
3	2.1	6.8	0.3	140	64	D3006
4.5	3.15	10.3	0.45	140	145	D3004
5	3.5	11.4	0.5	140	178	D3009
6	4.2	13.7	0.6	140	257	D3005
9	6.3	20.4	0.9	140	574	D3010
12	8.4	27.3	1.2	140	1,028	D3002
24	16.8	45.7	2.4	200	2,880	D3012
48	33.6	67.5	4.8	300	7,680	D3013
Non-latching, sensitive 1 coil versions						
3	2.25	9.0	0.3	80	113	D3021
4.5	3.38	13.5	0.45	80	253	D3022
5	3.75	15.0	0.5	80	313	D3023
6	4.5	18.0	0.6	80	450	D3024
9	6.75	27.1	0.9	80	1,013	D3025
12	9.0	36.1	1.2	80	1,800	D3026
24	18.0	54.7	2.4	140	4,114	D3027
48	36.0	72.5	4.8	260	8,882	D3028
Latching 1 coil versions						
3	2.25	8.1	-2.25	100	90	D3041
4.5	3.375	12.1	-3.375	100	203	D3042
5	3.75	13.5	-3.75	100	250	D3043
6	4.5	16.2	-4.5	100	360	D3044
9	6.75	24.2	-6.75	100	810	D3045
12	9.0	29.0	-9.0	100	1,440	D3046
24	18.0	47.5	-18.0	150	3,840	D3047
Latching 2 coil versions						
3	2.1	5.7	2.1	200	45	D3061
4.5	3.15	8.6	3.15	200	101	D3062
5	3.5	9.5	3.5	200	125	D3063
6	4.2	11.4	4.2	200	180	D3064
9	6.3	17.1	6.3	200	405	D3065
12	8.4	22.6	8.4	200	720	D3066
24	16.8	33.7	16.8	200	1,920	D3067

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage)**:** 3 ms, typ.; 4 ms, max.
Reset Time [latching](at nominal voltage)**:** 3 ms, typ.; 4 ms, max.
Release Time [non-latching](w/o diode in parallel)**:** 1 ms, typ.; 3 ms, max.
Release Time [non-latching](with diode in parallel)**:** 3 ms, typ.; 4 ms, max.
Bounce Time (at contact close)**:** 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load)**:** 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 110°C.
Thermal Resistance: < 185K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Shock, half sinus, 11 ms: Destructive: 1,500g.
Vibration, 10-500 Hz.: Functional: 20g.
Needle Flame Test: Application Time 20s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: Through-hole printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.08 oz. (2g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\,tamb} = K_I \cdot U_{I\,23°\,C}$

and

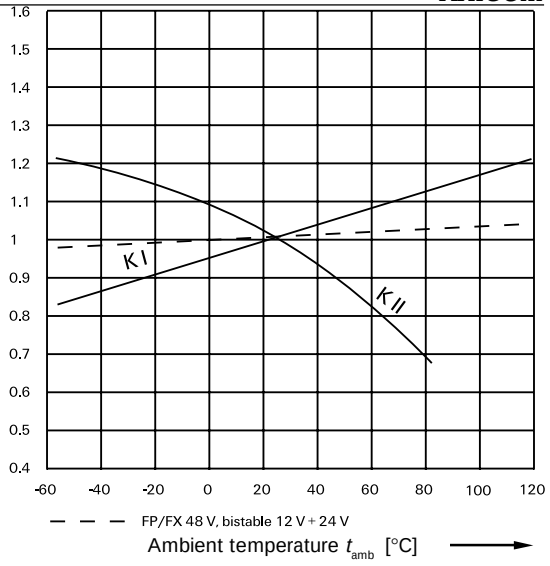
$U_{II\,tamb} = K_{II} \cdot U_{II\,23°\,C}$

t_{amb} = Ambient temperature

$U_{I\,tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\,tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the FP2 series.

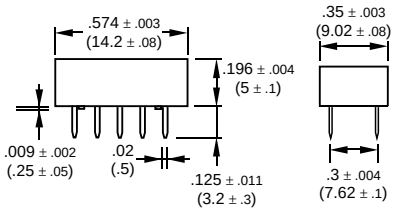
Packaging Information

FP2 series relays are shipped in tubes of 50. There are 1,000 relays in a full carton.

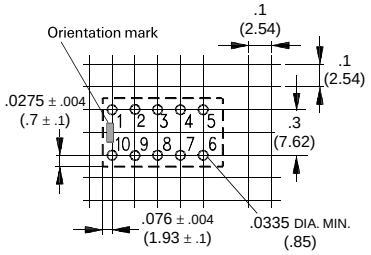
Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

Outline Dimensions

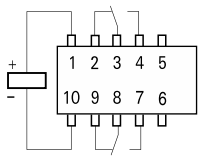


PC Board Layout (Bottom View)

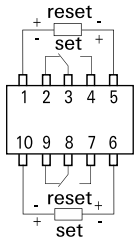


Wiring Diagrams (Bottom Views)

Non-Latching and Latching, 1 Coil Release or Reset Condition



Latching, 2 Coil Reset Condition

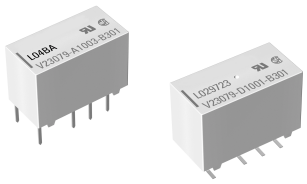


Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.



V23079 (P2) series

5 Amp Switching, High Dielectric DPDT Polarized FCC Part 68 PC Board Relay

File E48393

File LR45064

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Surface and through hole mounting types.
- Breakdown voltage between contacts and coil: 1,500Vrms.
- Surge withstand between contacts and coil: 2,500V (Bellcore).
- High capacity contact: 2A @ 30VDC.
- 2 Form C contact arrangement.
- Board space saving, vertical mount (14.6 x 7.2mm surface area).
- Immersion cleanable, plastic sealed case.
- Single and dual coil latching versions available.
- Basic insulation (coil-to-contact) according to EN 60950 / UL 1950.
- Ultrasonic cleaning is not recommended.

Contact Data @ 23°C

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Gold overlay on silver nickel.
Rating:
Max. Switching Voltage: 250VAC, 220VDC.
Max. Switching Current: 5A.
Max Carrying Current: 2A.
Max Switching Power: 60W, DC; 62.5VA, AC.
Min. Permissible Load: 100µV.
UL/CSA Rating: 1A @ 30VDC; 300mA @ 110VDC; 500mA @ 120VAC; 250mA @ 240VAC.
Expected Mechanical Life: Approx. 100 million ops.
Expected Electrical Life: 50 million ops. @ 10mA, 12V, 10 million ops. @ 100mA, 6V. 1 million ops. @ 1A, 30V, 500,000 ops. @ 500mA, 60V. 200,000 ops. @ 2A, 30V.
Initial Contact Resistance: 50 milliohms @ 10mA, 20mV.
Thermoelectric potential: <10µV.

High Frequency Data

Capacitance: **Between Open Contacts:** 2pF, max.
Between Coil and Contacts: 1.5pF, max.
Between Poles: 1pF, max.
RF Characteristics: **Isolation at 100 / 900 MHz:** -39.0 db / -20.7 db.
Insertion loss at 100 / 900 MHz: -0.02 db / -0.27 db.
V. S. W. R. at 100 / 900 MHz: 1.04 / 1.40 .

Initial Dielectric Strength

Between Open Contacts: 1,000Vrms for 1 minute. (1,500Vrms on request, consult factory for availability).
Between Coil and Contacts: 1,500Vrms for 1 minute. (single coil relay).
Between Poles: 1,000Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / 10 µs):
Between Open Contacts: 2,000V.
Between Coil and Contacts: 2,500V (single coil relay).
Between Poles: 2,500V.
Surge Voltage Resistance per FCC 68 (10 / 160 µs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V (single coil relay).
Between Poles: 1,500V.

Initial Insulation Resistance

Between Mutually Insulated Conductors: 10^9 ohms @ 500VDC.

Coil Data @ 23°C

Voltage: 3-24V.
Nominal Power: 70mW-140mW, dependent on model. See chart below.

Nominal Voltage (VDC)	Operating Range @ 23°C		@ 85°C	Coil Resistance @ 23°C
	Must Operate Voltage (VDC)	Max. Voltage (VDC)	Max. Voltage (VDC)	
Non-Latching, 140mW Nominal Power				
3	2.25	6.5	3.4	64.3 ± 6
4.5	3.375	9.8	5.1	145 ± 15
5	3.75	10.9	5.7	178 ± 18
6	4.50	13.0	6.8	257 ± 26
9	6.75	19.6	10.3	578 ± 58
12	9.0	26.1	13.8	1,029 ± 103
24	18.0	52.3	27.7	4,114 ± 411
Single Coil Latching, 70mW Nominal Power				
3	2.25	9.2	4.8	128 ± 13
4.5	3.375	13.8	7.3	289 ± 29
5	3.75	15.3	8.1	357 ± 36
6	4.5	18.5	9.8	514 ± 51
9	6.75	27.7	14.6	1,157 ± 116
12	9.0	37.0	19.6	2,057 ± 206
24	18.0	74.0	39.2	8,228 ± 823
Dual Coil Latching, 140mW Nominal Power				
3	2.25	6.5	–	64.3 ± 6
4.5	3.375	9.8	–	145 ± 15
5	3.75	10.9	–	178 ± 18
6	4.5	13.0	–	257 ± 26
9	6.75	19.6	–	578 ± 58
12	9.0	26.1	–	1,029 ± 103
24	18.0	52.3	–	4,114 ± 411

Operate Data @ 23°C

Must Operate Voltage: 75% of nominal or less.
Must Release Voltage: 10% of nominal or more.
Operate Time (at nominal voltage)**:** 3 ms, typ.; 5 ms, max.
Reset Time (at nominal voltage)**:** 3 ms, typ.; 5 ms, max.
Release Time (non-latching w/o diode in parallel)**:** 2 ms, typ.; 4 ms, max.
Release Time (non-latching with diode in parallel)**:** 4 ms, typ.; 6 ms, max.
Bounce Time (at contact close)**:** 1 ms, typ.; 3 ms, max.
Maximum Switching Rate (no load)**:** 50 operations/s.

Environmental Data

Temperature Range: -40°C to +85°C.
Maximum Allowable Coil Temperature: 110°C.
Thermal Resistance: < 165K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Shock, half sinus, 11 ms: Destructive: 150g.
Vibration, 10-1,000 Hz.: Functional: 35g.
Needle Flame Test: Application time 20s, burning time <15s.
Resistance to Soldering Heat: 260°C for 10s.

Mechanical Data

Termination: Through hole or surface mount printed circuit terminals.
Mounting Position: Any.
Enclosure: Immersion cleanable (IP67) plastic case.
Weight: .084 oz. (2.5g) approximately.

Ordering Information

Typical Part Number ▶	V23079	A10	01	B301

1. Basic Series:
V23079 = P2 Miniature, printed circuit board relay.

2. Termination:

	Non-Latching Normal Ht.	Non-Latching Reduced Ht.	Dual Coil Latching	Single Coil Latching
Through-Hole	**A10**	**A20**(1)	**B12**	**C11**
SMT Extended Terminal	**D10**	**D20**(1)	**E12**	**F11**
SMT Short Terminal	**G10**	**G20**(1)	**H12**	**J11**

3. Coil Voltage:
08 = 3VDC 11 = 4.5VDC 01 = 5VDC 02 = 6VDC 06 = 9VDC 03 = 12VDC 05 = 24VDC(2)

4. Contact Type:
B301 = Bifurcated, 2 Form C (DPDT), Silver Nickel.

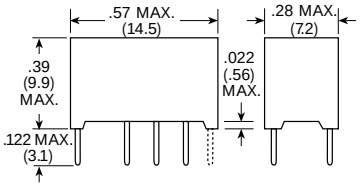
(1) Reduced mounting height of 10.0 mm, as opposed to 10.4 mm (SMT) or 9.6 mm as opposed to 9.9 (through-hole). Non-latching only, not available with 24V coil.
(2) Not available with Termination A20, D20 or G20.

Our authorized distributors are more likely to stock the following items for immediate delivery.

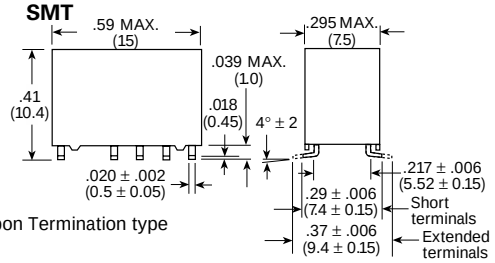
V23079A1001B301	V23079A1011B301	V23079A2011B301	V23079D1005B301	V23079D2003B301
V23079A1003B301	V23079A2001B301	V23079D1001B301	V23079D1011B301	V23079D2011B301
V23079A1005B301	V23079A2003B301	V23079D1003B301	V23079D2001B301	

Outline Dimensions

THT



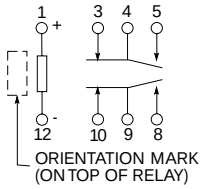
SMT



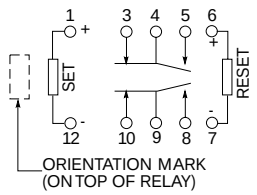
Note: Mounting height varies dependent upon Termination type selected in step 2 of Ordering Information

Wiring Diagrams (Bottom Views)

Single Coil Latching* and Single Coil Non-latching**



Dual Coil Latching***



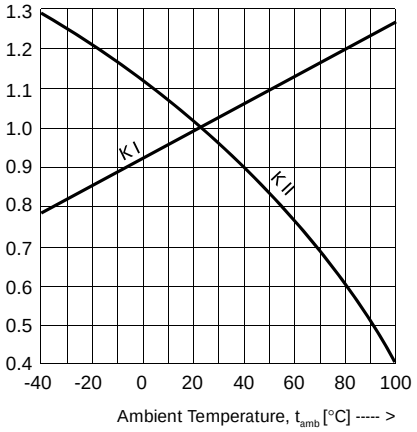
Note: All diagrams shown in de-energized or reset position.
***Note:** For non-latching versions, coil polarity must be observed.
****Note:** For single coil latching versions, polarity shown results in "set" condition. Reverse polarity results in "reset" condition.
*****Note:** The contact position illustrated shows the reset condition. If a positve potential is applied to terminal 1 or 7, the relay adopts the set position.

Coil Limits

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current
U_{II} = Maximum continous voltage at 23°

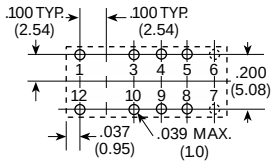
The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\,tamb} = K_I \cdot U_{I\,23°C}$
and
$U_{II\,tamb} = K_{II} \cdot U_{II\,23°C}$
t_{amb} = Ambient temperature
$U_{I\,tamb}$ = Minimum voltage at ambient temperature, t_{amb}
$U_{II\,tamb}$ = Maximum voltage at ambient temperature, t_{amb}
k_I, k_{II} = Factors (dependent on temperature), see diagram

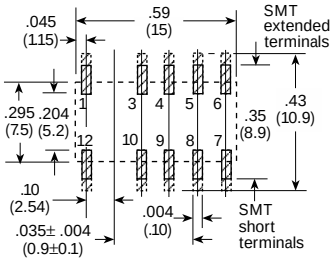


PC Board Layout (Bottom View)

THT



SMT (Solder Pad)

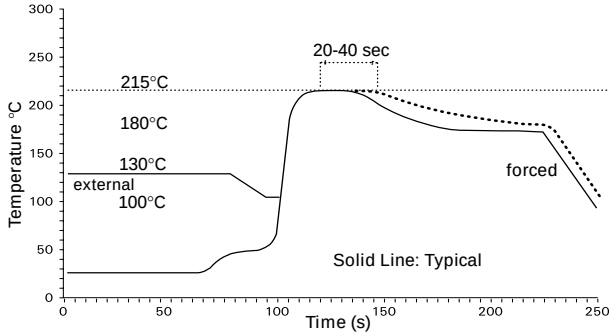


Packaging Information

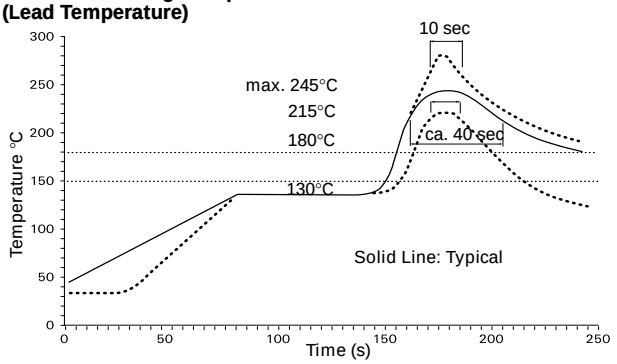
THT P2 relays are shipped in tubes of 50. There are 2,000 relays in a carton. SMT P2 relays with long terminals are shipped in reels of 400, with 2,000 relays in a carton. SMT P2 relays with short terminals are shipped in reels of 500. There are 2,500 relays in a full carton.

Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile (Lead Temperature)



Infrared Soldering: Temperature/Time Profile (Lead Temperature)



Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.
www.tycoelectronics.com
Technical support:
Refer to inside back cover.

FT2/FU2 series

DPDT Slim Package
Telecom/Signal PC Board Relays

File E111441
File 176679-1079886
16504-002

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole PC board terminals.
- High-dielectric (>5,000 V contact-to-coil surge) version available.
- Meets Bellcore GR 1089 and FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- Standard or sensitive coils for 3 - 48 VDC.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Silver-nickel, gold-covered or palladium-ruthenium, gold-covered.

Contact Ratings:	**Silver-nickel**	**Palladium-ruthenium**
Max. Switched Current:	2A	2A.
Max. Carry Current: (at max ambient temp.)	1.25A	2A
Max. Switched Voltage:	125VDC, 250VAC	220VDC, 250VAC.
Max. Switched Power:	30W DC, 62.5VA AC	60W DC, 62.5VA AC.

UL/CSA Contact Ratings: 1.25A @ 125VDC; 1.25A @ 125VAC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 12VDC.
2 million operations @ cable load open end.
100,000 operations @ 250mA / 125VDC, res.
100,000 operations @ 250mA / 250VDC, res.
100,000 operations @ 1.25A / 24VDC, res.
Thermoelectric potential: <10μV.

High Frequency Data

Capacitance: **Between Open Contacts:** 1pF, max.
Between Coil and Contacts: 4pF, max.
Between Poles: 1pF, max.
RF Characteristics: **Isolation at 100 / 900 MHz:** -30.6 db / -13.7 db.
Insertion loss at 100 / 900 MHz: -0.02 db / -0.50 db.
V. S. W. R. at 100 / 900 MHz: 1.02 / 1.27 .

Initial Dielectric Strength

Standard Model
Between Open Contacts: 1,500Vrms for 1 minute.
Between Coil and Contacts: 1,500Vrms for 1 minute.
Between Poles: 1,500Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / 10 μs) and FCC 68 (10 / 160 μs):
Between Open Contacts: 2,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

High-Dielectric Model
Between Open Contacts: 3,500Vrms for 1 minute.
Between Coil and Contacts: 1,800Vrms for 1 minute.
Between Poles: 1,800Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / 10 μs) and FCC 68 (10 / 160 μs):
Between Open Contacts: 5,000V.
Between Coil and Contacts: 2,500V.
Between Poles: 2,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 3 to 48VDC.
Nominal Power: 200-300mW, depending on model. See coil data tables.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nom. Voltage (VDC)	Operate/Set Range Min. Voltage (VDC)	Operate/Set Range Max. Voltage (VDC)	Minimum Release Voltage (VDC)	Nom. Power (mW)	Resistance ±10% (Ohms)	Coil & Sensitivity Code
Sensitive versions						
3	2.25	4.2	0.3	200	45	21
4	3.0	5.7	0.4	200	114	29
4.5	3.38	6.4	0.45	200	101	22
5	3.75	7.1	0.5	200	125	23
6	4.5	8.5	0.6	200	180	24
9	6.75	12.7	0.9	200	405	25
12	9.0	17.0	1.2	200	720	26
24	18.0	33.9	2.4	240	2,400	27
48	36.0	67.9	4.8	240	9,600	28
Standard versions						
3	2.25	5.2	0.3	300	30	01
4.5	3.38	7.8	0.45	300	68	02
5	3.75	8.7	0.5	300	83	03
6	4.5	10.4	0.6	300	120	04
9	6.75	15.6	0.9	300	270	05
12	9.0	20.8	1.2	300	480	06
24	18.0	40.8	2.4	300	1,920	07
48	36.0	81.6	4.8	300	768	08
High dielectric versions						
3	2.25	4.2	0.3	200	45	91
5	3.75	7.1	0.5	200	125	93
12	9.0	17.0	1.2	200	720	96
24	18.0	33.9	2.4	240	2,400	97

Part Number Structure

D3 ____
- Nil THT
- W long terminals
- N short terminals

Coil voltage: 1 = 3 V, 2 = 4.5 V, 3 = 5 V, 4 = 6 V, 5 = 7 V, 6 = 12 V, 7 = 24 V, 8 = 48 V, 9 = 4 V

Sensitivity:
- 0 = 300 mW - Standard Dielectric
- 2 = 200 / 240 mW - Standard Dielectric
- 9 = 200 / 240 mW - High Dielectric Version

Terminal Shape: 4 = THT, 5 = SMT

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage)**:** 3 ms, typ.; 5 ms, max.
Release Time (w/o diode in parallel)**:** 2 ms, typ.; 5 ms, max.
Release Time (with diode in parallel)**:** 4 ms, typ.; 5 ms, max.
Bounce Time (at contact close)**:** 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load)**:** 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 125°C.
Thermal Resistance: < 165K/W.
Shock, half sinus, 11 ms: Functional: 15g.
Shock, half sinus, 11 ms: Destructive: 500g.
Vibration, 10-500 Hz.: Functional: 10g.
Needle Flame Test: Application Time 20s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: Through-hole printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.12 oz. (3g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\,tamb} = K_I \cdot U_{I\,23°\,C}$

and

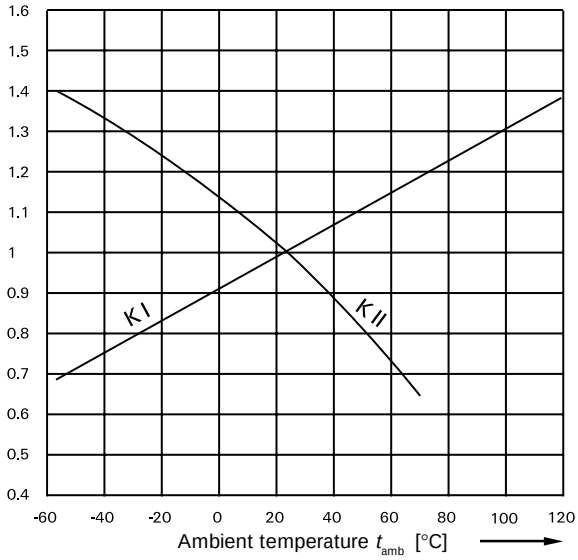
$U_{II\,tamb} = K_{II} \cdot U_{II\,23°\,C}$

t_{amb} = Ambient temperature

$U_{I\,tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\,tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number Structure" chart on previous page for available part numbers in the FT2/FU2 series.

Packaging Information

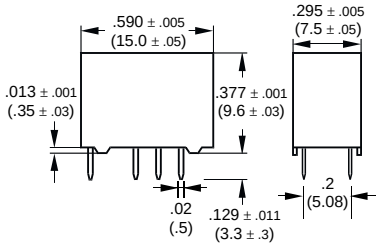
FT2 relays are shipped in tubes of 50. There are 1,000 relays in a carton. FU2 relays with long terminals are shipped in reels of 400, with 2,000 relays in a carton. FU2 relays with short terminals are shipped in reels of 500. There are 2,500 relays in a full carton.

Our authorized distributors are more likely to stock the following items for immediate delivery.

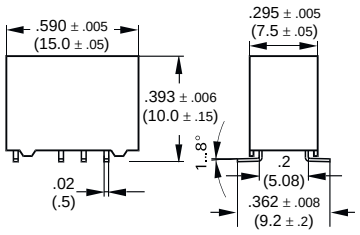
None at present.

Outline Dimensions

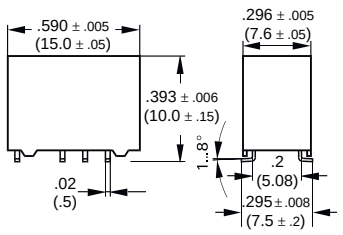
THT Version



SMT Version w/ Long Terminala

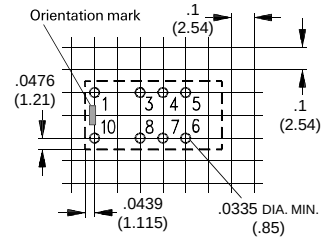


SMT Version w/ Short Terminals



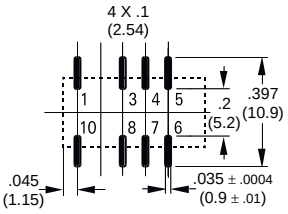
PC Board Layout (Bottom View)

THT Version

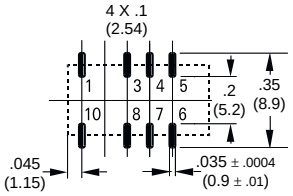


Solder Pad Layout (Bottom Views)

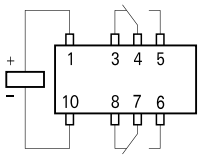
SMT Version w/ Long Terminals



SMT Version w/ Short Terminals

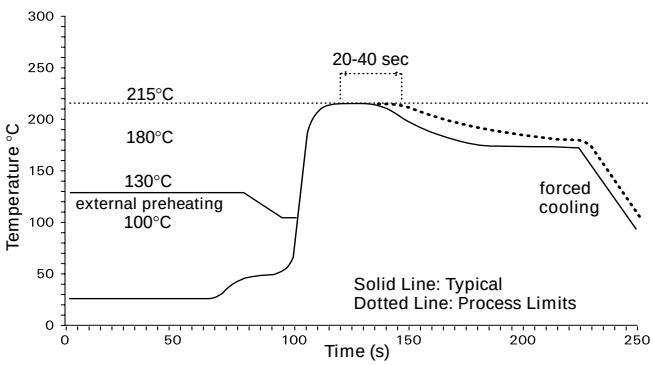


Wiring Diagram (Bottom View)

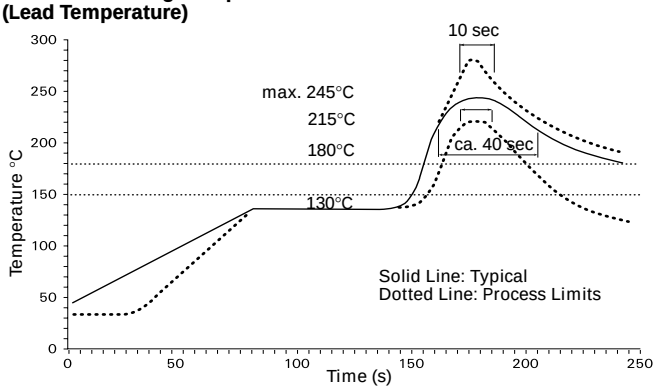


Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile (Lead Temperature)



Infrared Soldering: Temperature/Time Profile (Lead Temperature)



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

FX2 series

DPDT Slim Package
Telecom/Signal PC Board Relays

File E111441
File 176679-1079886
16504-002

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole PC board terminals.
- Meets Bellcore GR 1089 and FCC Part 68.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 80mW coil for high sensitivity models, 140mW coil for sensitive types.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Palladium-ruthenium.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.)
Max. Switched Voltage: 220VDC, 250VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
UL/CSA Ratings: 300mA @ 110VDC; 1A @ 30VDC;
500mA @ 120VAC; 250mA @ 240VAC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 30mVDC.
2 million operations @ cable load open end.
500,000 operations @ 250mA / 125VDC.
500,000 operations @ 1.25A / 24VDC.
500,000 operations @ 2A / 30VDC.
Thermoelectric potential: <10µV.

High Frequency Data

Capacitance: **Between Open Contacts:** 2pF, max.
Between Coil and Contacts: 4pF, max.
Between Poles: 2pF, max.
RF Characteristics: **Isolation at 100 / 900 MHz:** -34.0 db / -15.1 db.
Insertion loss at 100 / 900 MHz: -0.03 db / -0.60 db.
V. S. W. R. at 100 / 900 MHz: 1.07 / 1.45 .

Initial Dielectric Strength

Between Open Contacts: 1,800Vrms for 1 minute.
Between Coil and Contacts: 1,800Vrms for 1 minute.
Between Poles: 1,800Vrms for 1 minute.
Surge Voltage Resistance per Bellcore GR1089 (2 / 10 µs) and FCC 68 (10 / 160 µs):
Between Open Contacts: 2,500V.
Between Coil and Contacts: 3,500V.
Between Poles: 2,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 3 to 48VDC.
Nominal Power: 80-300mW, depending on model. See coil data tables.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nom. Voltage (VDC)	Operate/Set Range		Minimum Release/Reset Voltage (VDC)	Nom. Power (mW)	Resistance ±10% (Ohms)	Part Number
	Min. Voltage (VDC)	Max. Voltage (VDC)				
Non-latching 1 coil versions						
3	2.1	6.8	0.3	140	64	D3206
4	2.8	7.6	0.4	140	114	D3207
4.5	3.15	10.3	0.45	140	145	D3204
5	3.5	11.4	0.5	140	178	D3209
6	4.2	13.7	0.6	140	257	D3205
9	6.3	20.4	0.9	140	574	D3210
12	8.4	27.3	1.2	140	1,028	D3202
24	16.8	45.7	2.4	200	2,880	D3212
48	33.6	67.5	4.8	300	7,680	D3213
Non-latching, sensitive 1 coil versions						
3	2.25	9.0	0.3	80	113	D3221
4.5	3.38	13.5	0.45	80	253	D3222
5	3.75	15.0	0.5	80	313	D3223
6	4.5	18.0	0.6	80	450	D3224
9	6.75	27.1	0.9	80	1,013	D3225
12	9.0	36.1	1.2	80	1,800	D3226
24	18.0	54.7	2.4	140	4,114	D3227
48	36.0	72.5	4.8	260	8,882	D3228
Latching 1 coil versions						
3	2.25	8.1	-2.25	100	90	D3241
4.5	3.375	12.1	-3.375	100	203	D3242
5	3.75	13.5	-3.75	100	250	D3243
6	4.5	16.2	-4.5	100	360	D3244
9	6.75	24.2	-6.75	100	810	D3245
12	9.0	29.0	-9.0	100	1,440	D3246
24	18.0	47.5	-18.0	150	3,840	D3247

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage)**:** 3 ms, typ.; 4 ms, max.
Reset Time [latching](at nominal voltage)**:** 3 ms, typ.; 4 ms, max.
Release Time [non-latching](w/o diode in parallel)**:** 1 ms, typ.; 3 ms, max.
Release Time [non-latching](with diode in parallel)**:** 3 ms, typ.; 4 ms, max.
Bounce Time (at contact close)**:** 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load)**:** 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 110°C.
Thermal Resistance: < 185K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Shock, half sinus, 11 ms: Destructive: 1,500g.
Vibration, 10-500 Hz.: Functional: 20g.
Needle Flame Test: Application Time 20s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: Through-hole printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.10 oz. (2.5g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\,tamb} = K_I \cdot U_{I\,23°\,C}$

and

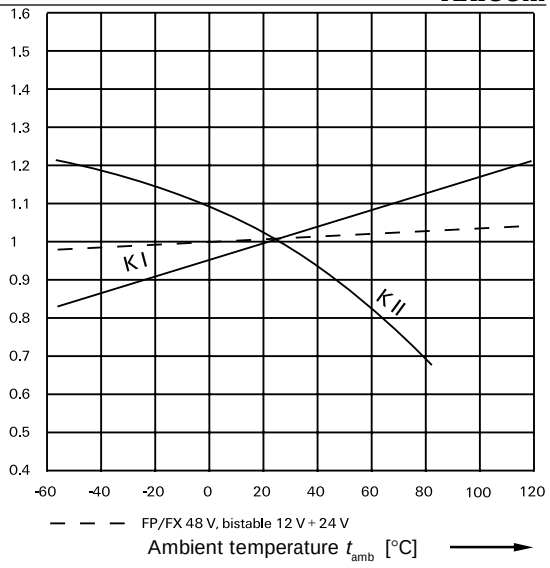
$U_{II\,tamb} = K_{II} \cdot U_{II\,23°\,C}$

t_{amb} = Ambient temperature

$U_{I\,tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\,tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the FX2 series.

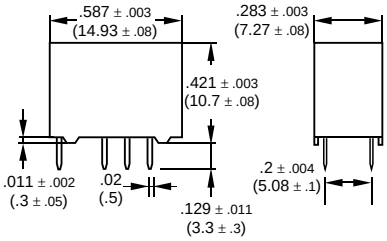
Packaging Information

FX2 series relays are shipped in tubes of 50. There are 1,000 relays in a full carton.

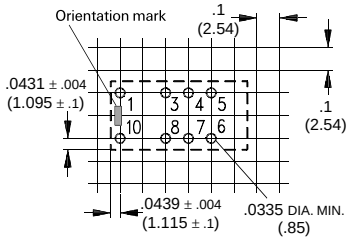
Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

Outline Dimensions

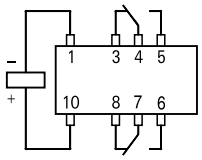


PC Board Layout (Bottom View)



Wiring Diagram (Bottom View)

Non-Latching and Latching, Release or Reset Condition



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

190 series

2 Amp, DPDT, High Sensitivity, DIP PC Board Relay

File E55708
File LR73303

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Standard DIP configuration mates with 16-pin socket.
- Meets FCC Part 68 (10/160µs).
- For applications in telecommunications, office automation, security devices, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- Standard, high and ultra-sensitive coils.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C

Arrangement: Bifurcated 2 Form C (DPDT) contacts.
Material: Stationary: Silver, gold clad.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A.
Max. Switched Voltage (at nom. voltage): 125VDC, 125VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
Min. Switching Load: 10µA, 10mVDC.
Rated Load: 500mA at 125VAC.
Initial Contact Resistance: 50 milliohms.
Expected Mechanical Life: 15,000,000 ops at 36,000 ops/hr.

Initial Dielectric Strength

Between Open Contacts: 750VAC 50/60 Hz. for 1 minute.
Between Coil and Contacts: 1,000VAC 50/60 Hz. for 1 minute.
Between Poles: 1,000VAC 50/60 Hz. for 1 minute.
Surge Voltage Resistance per FCC 68 (10 / 160 µs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 3 to 48VDC.
Nominal Power: 150mW to 580mW. See Coil Data table for details.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Current ±10% (mA)	Maximum Voltage (VDC)	Resistance ±10% (Ohms)	Approx. Power (mW)
Standard sensitivity (Max. Voltage stated @ 65°C, except 48V @ 60°C)				
3	166.7	3.6	18	500
5	100.0	6.0	50	500
6	83.3	7.2	72	500
9	55.6	10.8	162	500
12	41.7	14.4	288	500
24	20.8	28.8	1,152	500
48	12.0	52.8	4,000	580
High sensitivity (Max. Voltage stated @ 70°C)				
3	120.7	3.6	25	360
5	72.0	6.0	70	360
6	60.0	7.2	100	360
9	40.0	10.8	225	360
12	30.0	14.4	400	360
24	15.0	28.8	1,600	360
48	7.5	52.8	6,400	360
Ultra high sensitivity (Max. Voltage stated @ 70°C)				
3	50.0	4.5	60	150
5	30.0	7.5	167	150
6	25.0	9.0	240	150
9	16.7	13.5	540	150
12	12.5	18.0	960	150
24	8.3	36.0	2,880	200
48	6.25	72.0	7,680	300Ap

Operate Data @ 23°C

Operate Voltage: 75% of nominal voltage.
Release Voltage: 5% of nominal voltage.
Operate Time: 7 ms, max. (3.5 ms, mean).
Release Time: 3 ms, max. (0.8 ms, mean).
Bounce Time: Operate: 0.5 ms, approx.
Release: 3.5 ms, approx.
Operating Frequency: Mechanical: 36,000 ops/hr.
Electrical: 1,800 ops/hr at rated load.

Environmental Data

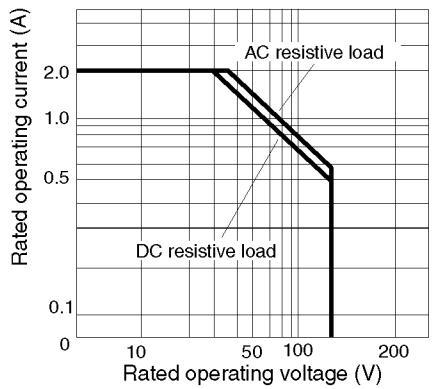
Temperature Range: -40°C to +70°C.
Relative Humidity Range: 35% to 85%.
Shock: Functional: 200m/s² (approx. 10g).
Destructive: 1,000m/s² (approx. 100g).
Vibration: 10-55 Hz., .059 in (1.5 mm) double amplitude.

Mechanical Data

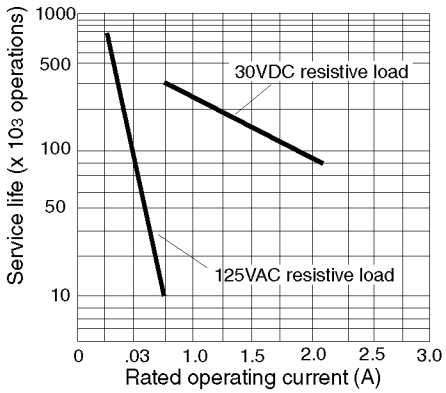
Termination: DIP compatible, printed circuit terminals.
Enclosure Type: Immersion cleanable plastic case.
Weight: 0.21 oz. (6g) approximately.

Operational Performance Curves

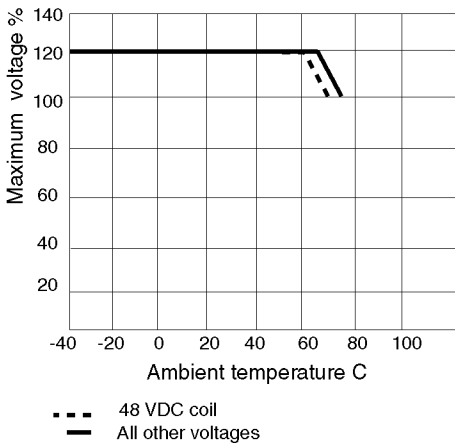
Maximum Switching Capacity



Electrical Service Life



Ambient Temp. vs. Max. Voltage



Ordering Information

Typical Part Number ➤	**190**	**- 2**	**2**	**B**	**2**	**UO**

1. Basic Series:
190 = Miniature PC board relay.

2. Enclosure and Terminals:
2= DIP, 16-pin package, sealed.

3. Contact Arrangement:
2= DPDT (2 form C).

4. Coil Voltage:

J = 3VDC	A= 6VDC	B = 12VDC	D = 48VDC
E= 5VDC	G= 9VDC	C = 24VDC	

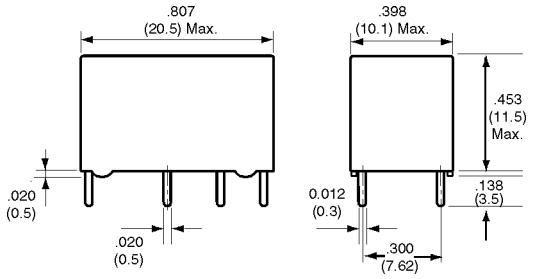
5. Contact Material and Type:
2= Silver, gold clad. Bifurcated crossbar.

6. Coil Sensitivity
UO = Standard sensitivity (Approx. 500-580mW). SO = High sensitivity. (Approx. 360mW) US = Ultra high sensitivity. (Approx. 150-200mW)

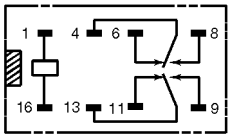
Our authorized distributors are more likely to stock the following items for immediate delivery.

190-22B2UO
190-22C2UO
190-22E2UO

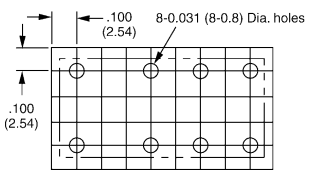
Outline Dimensions



Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

V23105 series

3 Amp, DPDT, High Sensitivity, DIP PC Board Relay

File E48393
File LR45064-27

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Standard DIP configuration mates with 16-pin socket.
- Meets FCC Part 68 (10/160µs).
- For applications in telecommunications, office automation, security devices, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 150mW, 200mW, 400mW or 500mW coil.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C

Arrangement: 2 Form C (DPDT) single contacts.
Material: Stationary: Silver-nickel, gold overlaid.
Ratings: Max. Switched Current: 3A.
Max. Carry Current: 3A.
Max. Switched Voltage (at nom. voltage): 220VDC, 250VAC.
Max. Switched Power: 60W DC or 125VA AC.
Min. Switching Load: 10mVDC.
UL/CSA Ratings: 1A / 30VDC; 300mA / 100VDC;
1A / 125VAC (400 & 500mW coils only);
500mA / 125VAC (150 & 200mW coils only).
Initial Contact Resistance: 100 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 15,000,000 ops.
Expected Electrical Life: 2 million operations @ 100mA / 6VDC.
500,000 operations @ 1.0A / 30VDC.
100,000 operations @ 2.0A / 30VDC for 400mW and 500mW versions only.
300,000 operations @ 500mA / 230VAC.
Thermoelectric potential: <15µV.

High Frequency Data

Capacitance: Between Open Contacts: 1pF, max.
Between Coil and Contacts: 2pF, max.
Between Poles: 1.5pF, max..
RF Characteristics: Isolation at 100 / 900 MHz: -39.0 db / -20.7 db.
Insertion loss at 100 / 900 MHz: -0.02 db / -0.27 db.
V. S. W. R. at 100 / 900 MHz: 1.04 / 1.40 .

Initial Dielectric Strength

Between Open Contacts: 750Vrms for 1 minute.
Between Coil and Contacts: 1,000Vrms for 1 minute.
Between Poles: 750Vrms for 1 minute.
Surge Voltage Resistance per FCC 68 (10 / 160 µs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 3 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Minimum Voltage (VDC)	Maximum Voltage (VDC)	Resistance ±10% (Ohms)	Coil Version Voltage Code
150mW versions				
5	4.0	13.0	167	001
6	4.8	15.6	240	002
9	7.2	23.4	540	006
12	9.6	31.2	960	003
24	19.2	59.5	3,480	005
200mW versions				
3	2.1	6.7	45	308
5	3.5	11.2	125	301
6	4.2	13.5	180	302
9	6.3	20.3	405	306
12	8.4	27.0	720	303
24	16.8	54.1	2,880	305
48	33.6	108.3	11,520	307
400mW versions				
5	3.5	7.9	62	401
6	4.2	9.5	90	402
9	6.3	14.3	203	406
12	8.4	19.1	360	403
24	16.8	37.9	1,440	405
48	33.6	75.8	5,760	407
500mW versions				
5	3.5	6.3	36	501
6	4.2	8.9	70	502
9	6.3	12.5	140	506
10	7.0	15.0	200	504
12	8.4	18.0	280	503
24	16.8	36.0	1,050	505
48	33.6	72.0	4,000	507

Operate Data @ 23°C

Operate Voltage: 70% of nominal voltage (80% for 150mW coil).
Release Voltage: 5% of nominal voltage.
Operate Time (Including Bounce): <10 ms.
Release Time (Including Bounce): <10 ms.

Environmental Data

Temperature Range: 150/200mW coil: -25°C to +85°C.
400mW coil: -25°C to +75°C.
500mW coil: -25°C to +60°C.
Maximum Allowable Coil Temperature: 105°C.
Thermal Resistance: < 100K/W.
Shock: Functional: 10g.
Destructive: 40g.
Vibration, 10-55 Hz.: Functional: 10g.
Needle Flame Test: Application time 20s, burning time <15s.
Resistance to Soldering Heat: 260°C for 10S..

Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.21 oz. (6g) approximately.

Ordering Information

Typical Part Number ►	V23105-A5	4	01	A201

1. Basic Series:
V23105-A5 = Miniature PC board relay.

2. Version:
0 = 150mW coil.
3 = 200mW coil.
4 = 400mW coil.
5 = 500mW coil.

3. Coil Voltage:

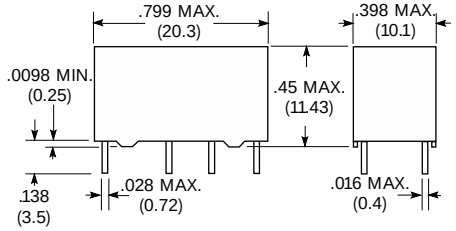
08 = 3VDC (150mW and 200mW coils only)	06 = 9VDC	05 = 24VDC
01 = 5VDC	04 = 10VDC (500mW coil only)	07 = 48VDC (not available with 150mW coil)
02 = 6VDC	03 = 12VDC	

4. Contact Type and Material:
A201 = DPDT, silver-nickel, gold overlaid.

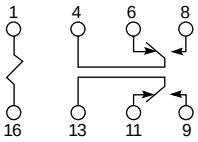
Our authorized distributors are more likely to stock the following items for immediate delivery.

V23105A5001A201	V23105A5401A201
V23105A5003A201	V23105A5403A201
V23105A5005A201	V23105A5405A201
	V23105A5407A201

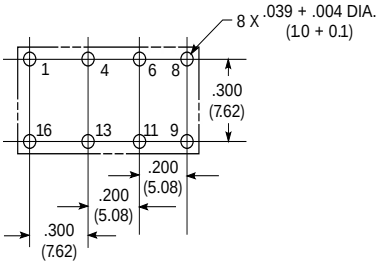
Outline Dimensions



Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



Dimensions are shown for reference purposes only.
Dimensions are in inches over (millimeters) unless otherwise specified.
Specifications and availability subject to change.
www.tycoelectronics.com
Technical support:
Refer to inside back cover.

MT2 series

DPDT Telecom/Signal PC Board Relays

File E111441
File 176679-1079886
16502-001

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole type terminals.
- Meets FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 150mW, 200mW, 300mW, 400mW or 550mW coil.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 2 Form C (DPDT) bifurcatedcontacts.
Material: Stationary: Silver-nickel, gold covered.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 1.25A (at max ambient temperature.
Max. Switched Voltage: 150VDC, 150VAC.
Max. Switched Power: 30W DC or 62.5VA AC.
UL/CSA Ratings: 400mA @ 125VAC; 1.25A @ 24VDC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100,000,000 ops.
Expected Electrical Life: 5 million operations @ 10mA / 30mVDC.
2.5 million operations @ cable load open end.
200,000 operations @ 1.25A / 24VDC, res.
200,000 operations @ 200mA / 150VDC, res.
Thermoelectric potential: <10µV.

High Frequency Data

Capacitance: Between Open Contacts: 2pF, max.
Between Coil and Contacts: 4pF, max.
Between Poles: 2pF, max..
RF Characteristics: Isolation at 100 / 900 MHz: -31.8 db / -14.2 db.
Insertion loss at 100 / 900 MHz: -0.02 db / -0.97 db.
V. S. W. R. at 100 / 900 MHz: 1.03 / 1.31 .

Initial Dielectric Strength

Between Open Contacts: 700Vrms for 1 minute.
Between Coil and Contacts: 1,050Vrms for 1 minute.
Between Poles: 700Vrms for 1 minute.
Surge Voltage: 1,500V surge per FCC Part 68 and IEC.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 4.5 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Minimum Voltage (VDC)	Maximum Voltage (VDC)	Minimum Release Voltage (VDC)	Resistance ±10% (Ohms)	Part Number
150mW versions					
4.5	3.2	10.1	0.45	136	C 93406
5	3.6	11.3	0.50	168	C 93401
6	4.3	13.4	0.60	240	C 93427
9	6.4	20.3	0.90	544	C 93405
12	8.6	27.1	1.2	968	C 93402
24	174.1	54.1	2.4	3,872	C 93404
48	33.1	108.3	4.8	15,468	C 93404
200mW versions					
4.5	2.9	8.7	0.45	101	C 93415
5	3.3	9.7	0.5	125	C 93416
6	3.9	11.6	0.6	180	C 93428
9	5.9	17.5	0.9	405	C 93417
12	7.8	23.3	1.2	720	C 93418
24	15.6	46.7	2.4	2,880	C 93419
48	31.2	93.4	4.8	11,520	C 93420
300mW versions					
4.5	3.1	7.4	0.45	73	C 93433
5	3.4	8.2	0.5	90	C 93434
12	8.25	19.7	1.2	515	C 93412
24	16.5	39.5	2.4	2,060	C 93435
48	32.5	79.0	4.8	8,240	C 93436
400mW versions					
4.5	2.9	6.1	0.45	50	C 93421
5	3.3	6.9	0.5	63	C 93422
6	3.9	8.2	0.6	90	C 93429
9	5.9	12.4	0.9	203	C 93423
12	7.8	16.5	1.2	360	C 93424
24	15.6	33.0	2.4	1,440	C 93425
48	31.2	66.0	4.8	5,760	C 93426
550mW versions					
4.5	2.9	6.0	0.45	36	C 93438
5	3.3	6.8	0.5	45	C 93450
6	3.9	8.1	0.6	66	C 93437
12	7.8	16.7	1.2	280	C 93432
24	15.6	32.4	2.4	1,050	C 93431
48	31.2	64.1	4.8	4,100	C 93430

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 4 ms, typ.; 5 ms, max.
Release Time (without diode in parallel): 1 ms, typ.; 3 ms, max.
Release Time (with diode in parallel): 4 ms, typ.; 6 ms, max.
Bounce Time (at contact close): 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load): 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 125°C.
Thermal Resistance: < 125K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Destructive: 100g.
Vibration, 10-500 Hz.: Functional: 10g.
Needle Flame Test: Application Time 10s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.18 oz. (5g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\ tamb}$ = $K_I \cdot U_{I\ 23° C}$

and

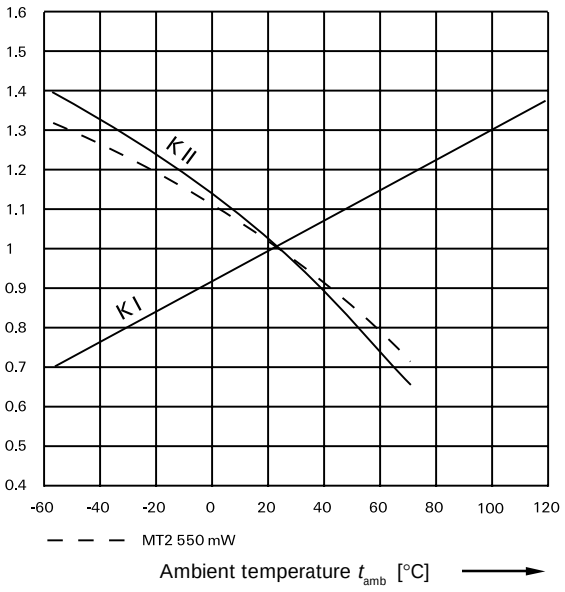
$U_{II\ tamb}$ = $K_{II} \cdot U_{II\ 23° C}$

t_{amb} = Ambient temperature

$U_{I\ tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\ tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the MT2 series.

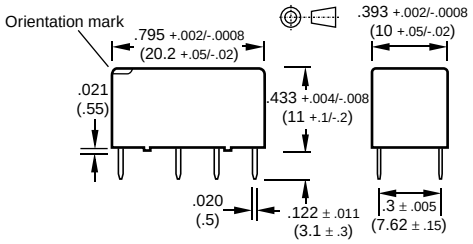
Packaging Information

MT2 series relays are shipped in tubes of 25. There are 500 relays in a full carton.

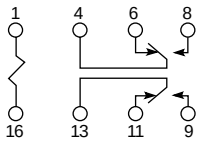
Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

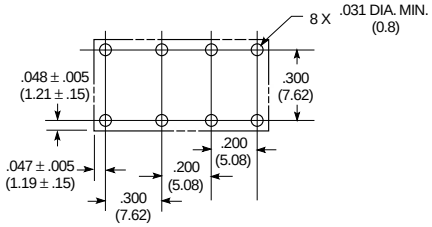
Outline Dimensions



Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

www.tycoelectronics.com
Technical support:
Refer to inside back cover.

MT4 series

4PDT Telecom/Signal PC Board Relays

File E111441
File 176679-1079886
16501-001

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Features

- Through hole type terminals.
- Meets Bellcore GR 1089, FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 300mW coil.
- Ultrasonic cleaning not recommended.

Contact Data @ 23°C (except as noted)

Arrangement: 4 Form C (DPDT) bifurcatedcontacts.
Material: Stationary: Silver-nickel, gold covered.
Ratings: Max. Switched Current: 1.25A.
Max. Carry Current: 1.25A (at max ambient temperature.
Max. Switched Voltage: 150VDC, 150VAC.
Max. Switched Power: 30W DC or 62.5VA AC.
UL/CSA Ratings: 400mA @ 125VAC; 1.25A @ 24VDC.
Initial Contact Resistance: <70 milliohms @ 10mA / 20mV.
Expected Mechanical Life: 100,000,000 ops.
Expected Electrical Life: 10 million operations @ 10mA / 30mVDC.
5 million operations @ cable load open end.
200,000 operations @ 1.25A / 24VDC, res.
200,000 operations @ 200mA / 150VDC, res.
Thermoelectric potential: <10µV.

High Frequency Data

Capacitance: Between Open Contacts: 2pF, max.
Between Coil and Contacts: 4pF, max.
Between Poles: 2pF, max.
RF Characteristics: Isolation at 100 / 900 MHz: -31.2 db / -17.2 db.
Insertion loss at 100 / 900 MHz: -0.05 db / -0.91 db.
V. S. W. R. at 100 / 900 MHz: 1.03 / 1.31 .

Initial Dielectric Strength

Between Open Contacts: 700Vrms for 1 minute.
Between Coil and Contacts: 1,800Vrms for 1 minute.
Between Poles: 700Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / 10 µs), FCC 68 (10 / 160 µs) and IEC (10 / 700 µs):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 2,500V.
Between Poles: 1,500V.

Initial Insulation Resistance

Between Contact and Coil: 10^9 ohms or more @ 500VDC.

Coil Data @ 23°C

Voltage: 4.5 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Coil Data @ 23°C

Nominal Voltage (VDC)	Minimum Voltage (VDC)	Maximum Voltage (VDC)	Minimum Release Voltage (VDC)	Resistance ±10% (Ohms)	Part Number
300mW versions					
4.5	3.2	7.8	0.45	67	C 93807
5	3.6	8.65	0.5	83	C 93801
9	6.4	15.6	0.9	270	C 93805
12	8.6	20.8	1.2	480	C 93802
24	17.1	41.6	2.4	1,920	C 93803
48	34.1	83.2	4.8	7,680	C 93804

Operate Data @ 23°C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 4 ms, typ.; 6 ms, max.
Release Time (without diode in parallel): 1 ms, typ.; 3 ms, max.
Release Time (with diode in parallel): 4 ms, typ.; 6 ms, max.
Bounce Time (at contact close): 1 ms, typ.; 5 ms, max.
Maximum Switching Rate (no load): 50 operations/s.

Environmental Data

Temperature Range: -55°C to +85°C.
Maximum Allowable Coil Temperature: 100°C.
Thermal Resistance: < 105K/W.
Shock, half sinus, 11 ms: Functional: 10g.
Destructive: 100g.
Vibration, 10-500 Hz.: Functional: 10g.
Needle Flame Test: Application Time 10s.
Resistance to Soldering: 260°C for 10s.

Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.25 oz. (7g) approximately.

U_I = Minimum voltage at 23° C after pre-energizing with nominal voltage without contact current

U_{II} = Maximum continous voltage at 23°

The operating voltage limits U_I and U_{II} depend on the temperature according to the formula:

$U_{I\ tamb} = K_I \cdot U_{I\ 23°\ C}$

and

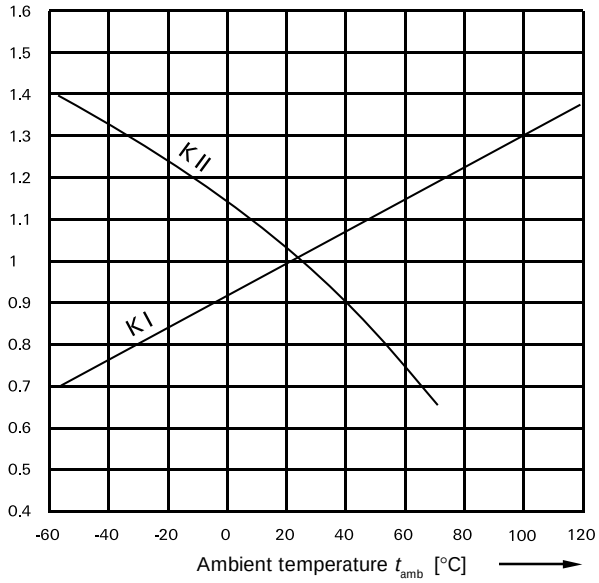
$U_{II\ tamb} = K_{II} \cdot U_{II\ 23°\ C}$

t_{amb} = Ambient temperature

$U_{I\ tamb}$ = Minimum voltage at ambient temperature, t_{amb}

$U_{II\ tamb}$ = Maximum voltage at ambient temperature, t_{amb}

k_I, k_{II} = Factors (dependent on temperature), see diagram



Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the MT4 series.

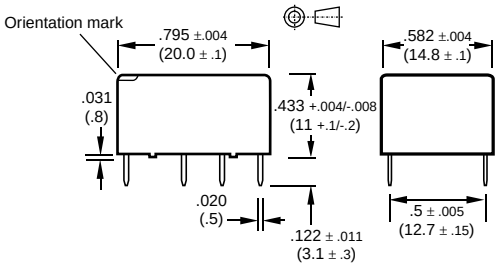
Packaging Information

MT4 series relays are shipped in tubes of 25. There are 500 relays in a full carton.

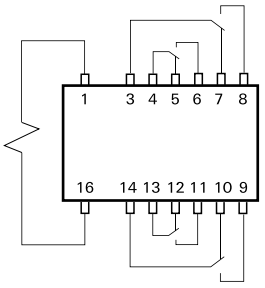
Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

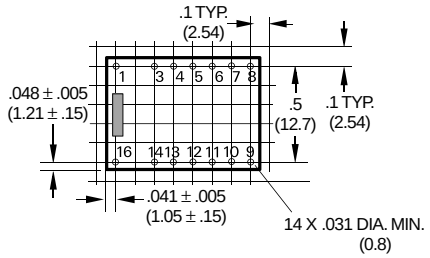
Outline Dimensions



Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



Dimensions are shown for reference purposes only.

Dimensions are in inches over (millimeters) unless otherwise specified.

Specifications and availability subject to change.

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Technical support:
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