



TO-5 CASE RELAY DPDT - 1 A

Series
MA

Product Description

Ultra-miniature, hermetically sealed relays in a TO-5 transistor-style case. The MA series provides low-level to 1 A switching with 2 form C, DPDT contacts and a choice of basic, diode-protected and transistor-driven configurations.



Illustrative product marking: MAPD-26
Terminal dimensions: see page 4.

Construction Features

- All-welded hermetic construction
- Cleaning and sealing for internal cleanliness
- Gold-plated special metal alloy contacts
- Frame and force/mass design for shock and vibration resistance
- Low intercontact capacitance and low coil power dissipation

Series Types

Series	Configuration
MA*	Basic relay; 2 form C, DPDT
MA*D	Internal diode for coil transient suppression
MA*DD	Two internal diodes for suppression and polarity reversal protection
MA*T	Internal transistor driver and coil transient suppression diode

* Terminal variant: C = wire; P = pin; W = long wire.

Environmental and Physical Specifications

Parameter	Specified data
Ambient temperature	-65°C to +125°C
Shock	75 g; 6 ms
Sinusoidal vibration	30 g; 10 to 3000 Hz
Random vibration	0.4 g ² /Hz; 50 to 2000 Hz
Acceleration	50 g
Sealing / weight	All-welded, hermetic / 0.09 oz (2.55 g) maximum



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Contact Load and Electrical Life

Load	Contact rating	Cycles min.
Low level	10 to 50 μ A / 10 to 50 mV	1,000,000
Resistive	1 A / 28 Vdc	100,000
Resistive	250 mA / 115 Vac, 60 and 400 Hz (case not grounded)	100,000
Resistive	100 mA / 115 Vac, 60 and 400 Hz	100,000
Resistive overload	2 A / 28 Vdc	100
Inductive	200 mA / 28 Vdc (320 mH)	100,000
Lamp	100 mA / 28 Vdc	100,000

Ratings apply with grounded case unless otherwise stated.

Electrical Characteristics

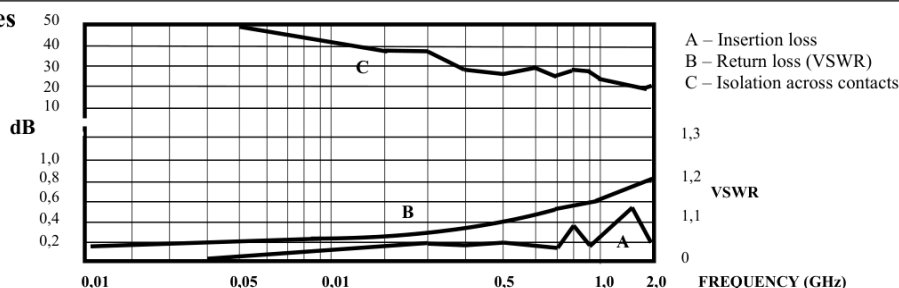
Over the temperature range, unless otherwise noted.

Parameter	Specified data
Contact resistance	0.1 Ω max. initial; 0.2 Ω max. after life
Operate / contact bounce	2.0 ms max. / 1.5 ms max.
Release time	MA*: 1.5 ms max.; MA*D / MA*DD: 4.0 ms max.; MA*T: 7.5 ms max.
Dielectric strength	500 Vrms min. at sea level; 125 Vrms min. at 70,000 ft; 60 Hz, all points
Insulation resistance	10,000 M Ω min., all points at 500 Vdc
Intercontact capacitance	0.7 pF typical
Sensitivity at 25°C	130 mW at pickup; 450 mW at nominal rated coil voltage
Diode P.I.V. / coil transient	100 Vdc min. / 1.0 Vdc max.; MA*D, MA*DD, MA*T
Transistor, MA*T at 25°C	Vebo: 6.0 Vdc min.; Vcbo: 80 Vdc min. at $I_c = 100 \mu$ A; base turn-off voltage: 0.3 Vdc min.

Typical Radio Frequency Characteristics

Figure 1 - Radio Frequency Curves

Note:
Radio frequency curves are typical characteristics based on factory knowledge. Tests to ensure compliance on RF performance, are not performed.





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Coil Data - Typical Characteristics

Resistance, current, pickup and dropout values at 25°C. Coil resistance tolerance: $\pm 10\%$. Voltage code 30 is available for the basic MA relay only.

Voltage code	5	6	9	12	18	26	30 ¹
Nominal coil voltage (Vdc)	5.0	6.0	9.0	12.0	18.0	26.5	30.0
Maximum coil voltage (Vdc)	5.8	8.0	12.0	16.0	24.0	32.0	36.0
Resistance (Ω): MA*, MA*D, MA*T	50	98	220	390	880	1560	2500
Resistance (Ω): MA*DD	39	78	220	390	880	1560	-
Pickup typ. (Vdc): MA*, MA*D, MA*T	2.7	3.5	5.3	7.0	10.5	14.2	17.7
Pickup typ. (Vdc): MA*DD	3.2	4.0	6.3	8.0	11.5	15.2	-
Dropout min. (Vdc): MA*, MA*D, MA*T	0.22	0.28	0.54	0.63	0.91	1.37	1.50
Dropout max. (Vdc): MA*, MA*D, MA*T	1.4	2.0	3.0	4.0	6.0	8.0	10.0
Dropout min. (Vdc): MA*DD	0.6	0.7	0.9	1.1	1.4	1.8	-
Dropout max. (Vdc): MA*DD	2.3	2.8	4.2	5.2	7.3	9.5	-

Coil and Transistor Drive Current at 25°C

Voltage code	5	6	9	12	18	26	30 ¹
Coil current min. (mA _{dc}): MA*DD	93.2	58.3	33.0	25.6	17.5	14.8	-
Coil current max. (mA _{dc}): MA*DD	128.2	78.3	42.9	32.8	22.1	18.5	-
Coil current min. (mA _{dc}): MA*T	82.2	52.9	35.3	26.6	17.9	14.7	-
Coil current max. (mA _{dc}): MA*T	112.1	69.9	47.4	35.8	24.0	19.8	-
Base turn-on current max. (mA _{dc}): MA*T	3.00	2.04	1.36	1.03	0.68	0.50	-

¹ Code 30: basic MA relay only. "-" = not specified / not applicable.

MA*T: limit base/emitter current to 15 mA maximum.

* Terminal variant C, P or W. See ordering information on page 4.



TO-5 CASE RELAY

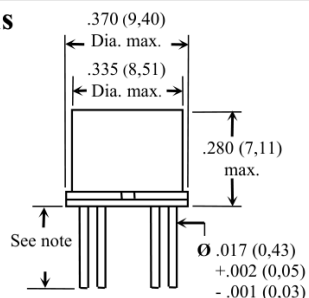
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Dimensions, Terminal Locations and Schematics

Outline Dimensions

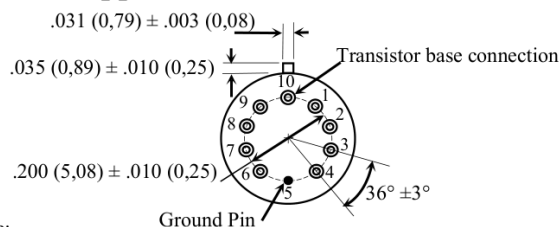


Note:

- Dimensions are shown in inches (millimetres)
- Terminal Variants: - (C) Standard Wire Terminal = .500 (12,7) min.,
- (W) Long Wire Terminal = 1.500 (38,1) min.,
- (P) Pin Terminal = .187 ± .010 (4,75 ± 0,25)

Terminal Locations

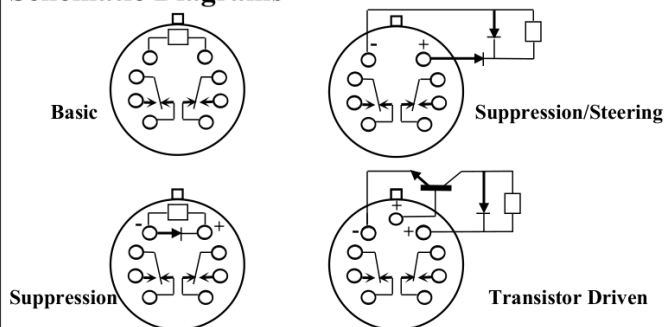
Basic, Suppressed and Transistor Driven



Note:

- Dimensions are shown in inches (millimetres)
- Viewed from terminals, numbers are for reference only
- Ground pin is optional

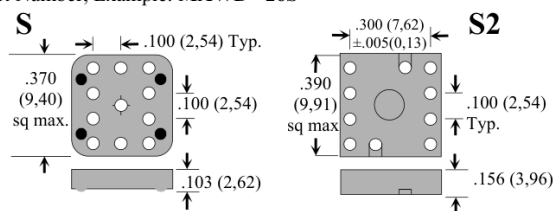
Schematic Diagrams



Note: Schematics are viewed from terminals

Spreader Pads

Relays can be supplied with a spreader pad epoxied to the relay header, to prevent the possible shorting of printed circuit board land lines and to facilitate circuit board cleaning. To order relay with pad add. "S" or "S2" to Part Number, Example: **MAWD - 26S**



Note:

- Dimensions are in inches (millimetres)

How to Order

MA	P	D	G	-26	S
Series	Terminal	Circuit	Ground pin	Coil code	Pad
Field	Available options				
Terminal	C: wire, 0.500 in (12.7 mm) min. W: long wire, 1.500 in (38.1 mm) min. P: pin, 0.187 ± 0.010 in (4.75 ± 0.25 mm)				
Circuit	Omit: basic; D: suppression; DD: suppression/steering; T: transistor driver with suppression				
Ground pin	G: fitted; omit if not required				
Coil voltage code	5, 6, 9, 12, 18, 26; 30 for basic MA only				
Spreader pad	S or S2: pad fitted; omit for no pad				

Example: MAPD-26 = MA series, pin terminals, diode suppression, 26.5 Vdc coil; no optional ground pin or pad.

Example with options: MAWDG-26S = long wire terminals, suppression diode, ground pin and S pad.