

## Double Pole, Electrically Held, 1 Amp and Less

MA, MAD, MADD

**MA**  
Standard TO-5  
High Performance Relay  
Qualified to  
MIL-R-39016/9



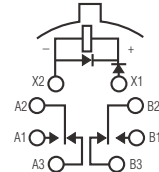
Terminal View

**MAD**  
Standard TO-5  
Diode Suppressed  
High Performance Relay  
Qualified to  
MIL-R-39016/15



Terminal View

**MADD**  
Standard TO-5 Diode  
Suppressed/Protected  
High Performance Relay  
Qualified to  
MIL-R-39016/20



Terminal View

**Product Facts**

- Hermetically sealed
- High shock & vibration ratings
- Spreader pads
- Excellent RF switching

**Product Facts**

- Suppression diode
- Hermetically sealed
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**Product Facts**

- Suppression & protection diodes
- Hermetically sealed
- High shock & vibration ratings
- Spreader pads
- Excellent RF switching

**Electrical Characteristics**

**Contact Arrangement** —  
2 Form C (DPDT)

**Contact Material** —  
Stationary —  
Gold/platinum/palladium/silver alloy  
(gold plated)  
Moveable —  
Gold/platinum/palladium/silver alloy  
(gold plated)

**Contact Resistance** —  
Before Life — 100 milliohms max.  
(measured @ 10 mA @ 6 Vdc)  
After Life — 200 milliohms max.  
(measured @ 1 A @ 28 Vdc)

**Mechanical Life Expectancy** —  
1 million operations

**Coil Voltage** —  
5 to 30 Vdc (MA/MAD)  
5 to 26.5 Vdc (MADD)

**Coil Power** — 675 mW max. @ 25°C

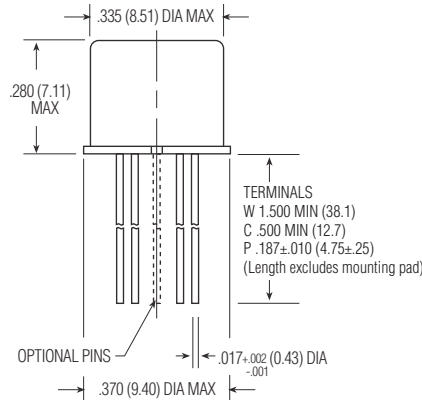
**Duty Cycle** — Continuous

**Pick-up Voltage** — Approximately  
50% of nominal coil voltage

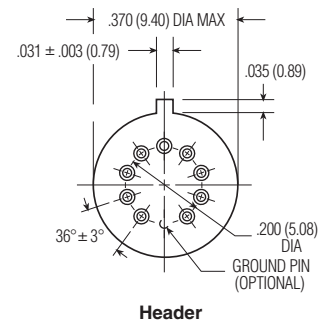
**Pick-up Sensitivity** —  
130 mW max. @ 25°C

**Contact Ratings**

Contact Load	Type	Operations Min.
1.0 A @ 28 Vdc	Resistive	100,000
250 mA @ 115 Vac, 60 Hz & 400 Hz	Resistive (case not grounded)	100,000
100 mA @ 115 Vac, 60 Hz & 400 Hz	Resistive	100,000
0.2 A @ 28 Vdc	Inductive (0.32 Henry)	100,000
0.1 A @ 28 Vdc	Lamp	100,000
30 µA @ 50 mVdc	Low Level	1,000,000
0.1 A @ 28 Vdc	Intermediate Current	50,000



Enclosure



## Double Pole, Electrically Held, 1 Amp and Less (Continued)

**MA, MAD, MADD (Continued)**

**Operating Characteristics**

**Timing** —  
 Operate Time — 2.0 ms max.  
 Release Time —  
 MA — 1.5 ms max.  
 MAD/MADD — 4.0 ms max.  
 (suppression diode, suppression/  
 steering diodes)

**Contact Bounce** — 1.5 ms max

**Dielectric Withstanding Voltage** —

Between Open Contacts —  
 500 Vrms 60 Hz  
 Between Adjacent Contacts —  
 500 Vrms 60 Hz  
 Between Contacts & Coil —  
 500 Vrms 60 Hz

**Insulation Resistance** —  
 10,000 megohms min. @ 500 Vdc  
 1,000 megohms @ 500 Vdc  
 (coil to case @ +125°C)

**Environmental Characteristics**

**Temperature Range** —  
 -65°C to +125°C  
**Weight** —  
 0.09 oz. (2.55 grms)  
 0.10 oz. (2.80 grms) with spreader pad  
 attached

**Vibration Resistance** —

30 G's, 10 to 3,000 Hz

**Shock Resistance** —

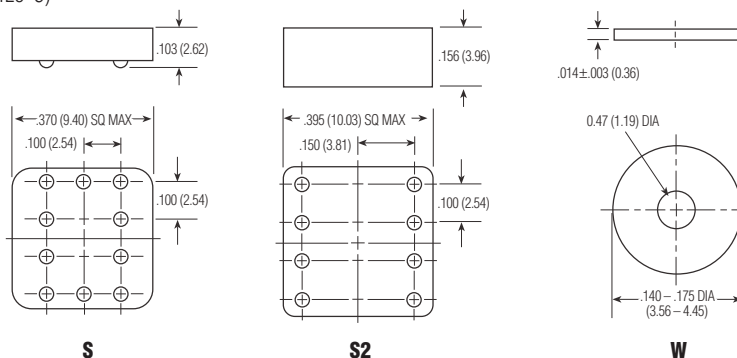
75 G's, 6 ±1 ms max.

**QPL Approval** —

MIL-R-39016/9 (JMA)  
 MIL-R-39016/15 (JMAD)  
 MIL-R-39016/20 (JMADD)

**Semiconductor Characteristics**

**Diode** —  
 100 Vdc peak inverse voltage (PIV)  
 1.0 Vdc max. transient voltage



Spreader & Mounting Pads

**Coil Data**

Nom. Coil Voltage (Vdc)	Coil Resistance in Ohms ±10% @ 25°C (Note 1)	Coil Circuit Current mA (Max.) (Note 1&2)	Coil Circuit Current mA (Min.) (Note 1&2)	Pickup Voltage Vdc (Max.) @ 25°C (Note 2)	Base Turn On Current mA (Max.) @ 25°C	Pickup Voltage Vdc (Max.) @ 125°C (Note 2)	Base Turn On Current mA (Max.) @ 125°C	Drop-Out Voltage Vdc (Min.) @ 25°C (Note 2)	Drop-Out Voltage Vdc (Min.) @ -65°C (Note 2)	Nom. Coil Power (mW) @ 25°C	Max. Coil Voltage	Coil Desig.
<b>MA/MAD</b>												
5.0	50	n/a	n/a	2.7	n/a	3.5	n/a	0.22	0.14	500	5.8	5
6.0	98	n/a	n/a	3.5	n/a	4.5	n/a	0.28	0.18	367	8.0	6
9.0	220	n/a	n/a	5.3	n/a	6.8	n/a	0.54	0.35	368	12.0	9
12.0	390	n/a	n/a	7.0	n/a	9.0	n/a	0.63	0.41	369	16.0	12
18.0	880	n/a	n/a	10.5	n/a	13.5	n/a	0.91	0.59	368	24.0	18
26.5	1,560	n/a	n/a	14.2	n/a	18.0	n/a	1.37	0.89	450	32.0	26
30.0	2,500	n/a	n/a	17.7	n/a	22.0	n/a	1.50	1.00	360	36.0	30
<b>MADD</b>												
5.0	39	128.2	93.2	3.2	n/a	4.0	n/a	0.6	0.6	641	5.8	5
6.0	78	78.3	58.3	4.0	n/a	5.0	n/a	0.7	0.7	462	8.0	6
9.0	220	42.9	33.0	6.3	n/a	7.8	n/a	0.9	0.8	368	12.0	9
12.0	390	32.8	25.6	8.0	n/a	10.0	n/a	1.1	0.9	369	16.0	12
18.0	880	22.1	17.5	11.5	n/a	14.5	n/a	1.4	1.1	368	24.0	18
26.5	1,560	18.5	14.8	15.2	n/a	19.0	n/a	1.8	1.4	450	32.0	26

**Notes:** 1. Coil resistance not directly measurable. Coil current should be within limits shown when tested at nominal voltage at 25°C for 5 seconds max.  
 2. Set base current at 3 mA to 15 mA during measurements.

**Ordering Instructions**

Catalog-selected Relays: The catalog number is derived by choosing the proper CODE for each of the relay characteristics in the order in which the codes are listed.

**Specifying a Part Number Example:**

<u>Type</u>	<u>Terminal</u>	<u>Diodes</u>	<u>Ground Pins</u>	<u>Coils</u>	<u>Spreader/Mounting Pads</u>
MA	C	D	G	-26	S

\* The part number example shown on this page is for catalog items. For a list of specific QPL part numbers, please see the index in Section 15.

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