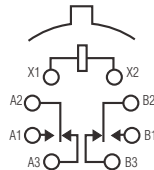


## Double Pole, Electrically Held, 1 Amp and Less

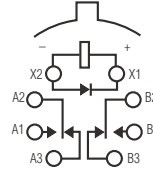
### MA, MAD, MADD

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



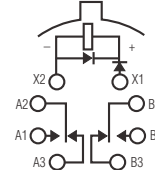
Terminal View

**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
- High shock & vibration ratings
- Spreader pads
- Excellent RF switching

#### 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

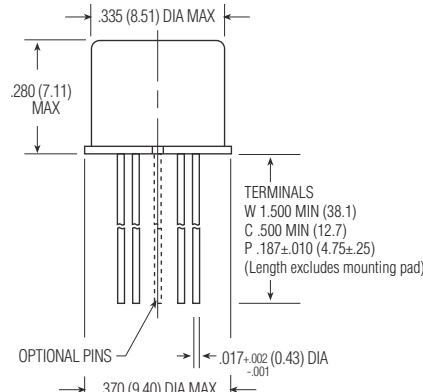
**Duty Cycle** — Continuous

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

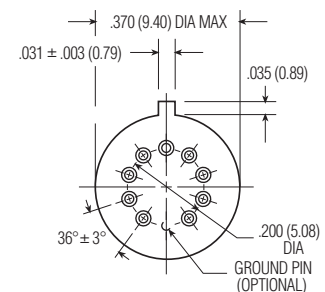
**Pick-up Sensitivity** —  
130 mW max. @ 25°C

#### 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



Header

## 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)

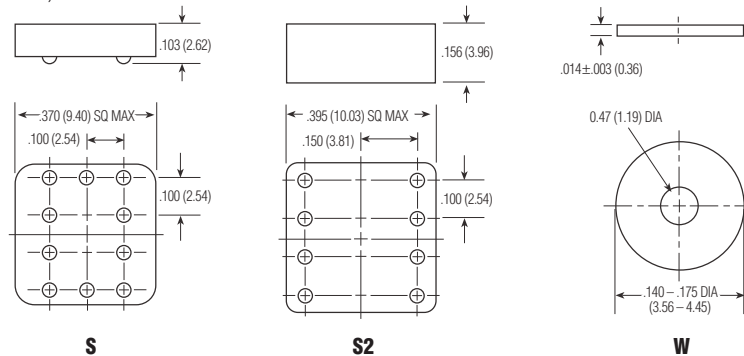
MIL-R-39016/20 (JMADD)

#### 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. |
|-------------------------|----------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|---------------------------------------|--------------------------------------------|----------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------|-------------------|-------------|
| MA/MAD                  |                                              |                                           |                                           |                                           |                                       |                                            |                                        |                                             |                                              |                             |                   |             |
| 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          |
| MADD                    |                                              |                                           |                                           |                                           |                                       |                                            |                                        |                                             |                                              |                             |                   |             |
| 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:

| Type | Terminal | Diodes | Ground Pins | Coils | Spreader/Mounting Pads |
|------|----------|--------|-------------|-------|------------------------|
| 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.