

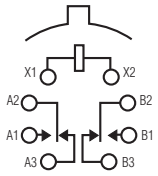
# MS · MSD · MSDD · MST

T0-5 HIGH-PERFORMANCE RELAYS

## MS

**SENSITIVE TO-5  
HIGH-PERFORMANCE RELAY**

**QUALIFIED TO  
MIL-R-39016/11**



TERMINAL VIEW

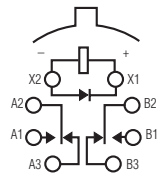
**FEATURES**

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

## MSD

**SENSITIVE TO-5  
DIODE SUPPRESSED  
HIGH-PERFORMANCE RELAY**

**QUALIFIED TO  
MIL-R-39016/16**



TERMINAL VIEW

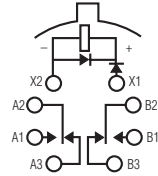
**FEATURES**

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

## MSDD

**SENSITIVE TO-5 DIODE  
SUPPRESSED/PROTECTED  
HIGH-PERFORMANCE RELAY**

**QUALIFIED TO  
MIL-R-39016/21**



TERMINAL VIEW

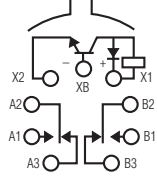
**FEATURES**

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

## MST

**SENSITIVE TO-5 DIODE  
SUPPRESSED/TRANSISTOR DRIVEN  
HIGH-PERFORMANCE  
RELAY**

**QUALIFIED TO  
MIL-R-28776/3**



TERMINAL VIEW

**FEATURES**

- Transistor driver & suppression diode
- 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 48 Vdc

**COIL POWER**  
565 mW max. @ 25°C

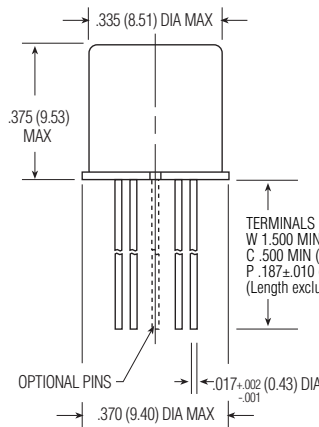
**DUTY CYCLE**  
Continuous

**PICK-UP VOLTAGE**  
Approximately 50% of nominal coil voltage

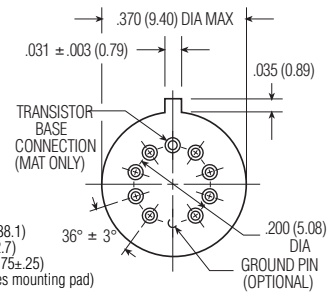
**PICK-UP SENSITIVITY**  
60 mW max. @ 25°C

**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



**OPERATING CHARACTERISTICS**

**TIMING**

Operate Time:  
4.0 ms max.  
  
Release Time:  
MS: 2.0 ms max.  
MSD/MSDD: 7.5 ms max.  
(suppression diode,  
suppression/steering diodes)  
MST: 7.5 ms max .  
(transistor driven)

**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**

0.12 oz. (3.40 gms)  
0.13 oz. (3.45 gms) 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-39016/11 (JMS)  
MIL-R-39016/16 (JMSSD)  
MIL-R-39016/21 (JMSSDD)  
MIL-R-28776/3 (JMST)

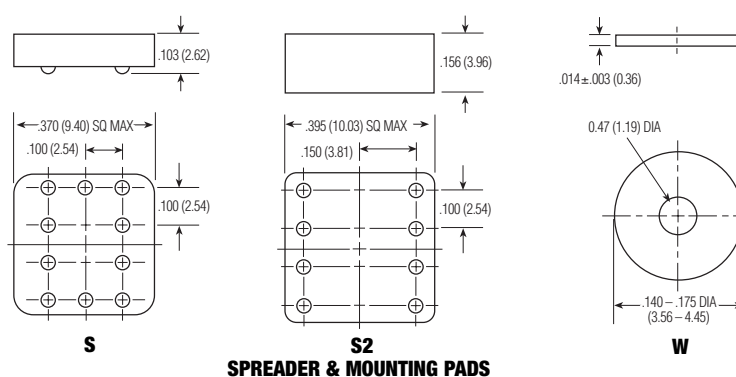
**SEMICONDUCTOR CHARACTERISTICS**

**DIODE**

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

**TRANSISTOR**

0.3 Vdc min. base turn off voltage  
6.0 Vdc min. emitter-base  
breakdown voltage (BV<sub>EBO</sub>) @ 25°C  
80.0Vdc min. collector-base  
breakdown voltage (BV<sub>CBO</sub>) @ 25°C  
& I<sub>C</sub>=100 µA



**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>MS/MSD</b>           |  |   |   |   |                                       |  |  |   |  |                             |                   |             |
| 5.0                     | 100  | n/a                                       | n/a                                       | 2.6                                       | n/a                                   | 3.5  | n/a                                    | 0.23  | 0.12   | 250                         | 7.5               | 5           |
| 6.0                     | 200  | n/a                                       | n/a                                       | 3.4                                       | n/a                                   | 4.5  | n/a                                    | 0.28  | 0.18   | 180                         | 10.0              | 6           |
| 9.0                     | 400  | n/a                                       | n/a                                       | 4.85                                      | n/a                                   | 6.8  | n/a                                    | 0.55  | 0.35   | 203                         | 15.0              | 9           |
| 12.0                    | 850  | n/a                                       | n/a                                       | 7.0                                       | n/a                                   | 9.0  | n/a                                    | 0.64  | 0.41   | 169                         | 20.0              | 12          |
| 18.0                    | 1,600  | n/a                                       | n/a                                       | 9.8                                       | n/a                                   | 13.5                                       | n/a                                    | 0.92  | 0.59   | 203                         | 30.0              | 18          |
| 26.5                    | 3,300  | n/a                                       | n/a                                       | 14.0                                      | n/a                                   | 18.0                                       | n/a                                    | 1.4   | 0.89   | 213                         | 40.0              | 26          |
| 36.0                    | 6,500  | n/a                                       | n/a                                       | 20.0                                      | n/a                                   | 27.0                                       | n/a                                    | 1.8   | 1.25   | 199                         | 57.0              | 36          |
| 48.0                    | 11,000                                       | n/a                                       | n/a                                       | 25.8                                      | n/a                                   | 36.0                                       | n/a                                    | 2.4   | 1.60   | 209                         | 75.0              | 48          |
| <b>MSDD</b>             |  |   |   |   |                                       |  |  |   |  |                             |                   |             |
| 5.0                     | 64   | 78.1                                      | 56.8                                      | 2.9                                       | n/a                                   | 3.7  | n/a                                    | 0.8   | 0.7  | 391                         | 7.0               | 5           |
| 6.0                     | 125  | 48.9                                      | 36.3                                      | 4.0                                       | n/a                                   | 4.8  | n/a                                    | 0.9   | 0.8  | 288                         | 10.0              | 6           |
| 9.0                     | 400  | 23.6                                      | 18.1                                      | 6.1                                       | n/a                                   | 8.0  | n/a                                    | 1.1   | 0.9  | 203                         | 15.0              | 9           |
| 12.0                    | 850  | 15.0                                      | 11.7                                      | 7.8                                       | n/a                                   | 11.0                                       | n/a                                    | 1.3   | 1.0  | 169                         | 20.0              | 12          |
| 18.0                    | 1,600  | 12.2                                      | 9.6                                       | 11.3                                      | n/a                                   | 14.5                                       | n/a                                    | 1.5   | 1.1  | 203                         | 30.0              | 18          |
| 26.5                    | 3,300  | 8.8                                       | 7.0                                       | 15.2                                      | n/a                                   | 19.0                                       | n/a                                    | 1.7   | 1.3  | 213                         | 40.0              | 26          |
| 36.0                    | 6,500  | 6.1                                       | 4.9                                       | 21.7                                      | n/a                                   | 27.2                                       | n/a                                    | 2.3   | 1.7  | 199                         | 57.0              | 36          |
| 48.0                    | 11,000                                       | 4.8                                       | 3.9                                       | 27.8                                      | n/a                                   | 34.8                                       | n/a                                    | 2.8   | 2.0  | 209                         | 75.0              | 48          |
| <b>MST</b>              |  |   |   |   |                                       |  |  |   |  |                             |                   |             |
| 5.0                     | 100  | 59.3                                      | 43.5                                      | 2.8                                       | 0.37                                  | 3.6  | 1.50                                   | 0.22  | 0.14   | 250                         | 7.0               | 5           |
| 6.0                     | 200  | 35.4                                      | 26.4                                      | 3.8                                       | 0.25                                  | 4.8  | 1.00                                   | 0.28  | 0.18   | 180                         | 10.0              | 6           |
| 9.0                     | 400  | 25.8                                      | 19.7                                      | 5.2                                       | 0.18                                  | 7.8  | 0.75                                   | 0.54  | 0.35   | 203                         | 15.0              | 9           |
| 12.0                    | 850  | 16.7                                      | 12.2                                      | 7.4                                       | 0.12                                  | 11.0                                       | 0.47                                   | 0.63  | 0.41   | 169                         | 20.0              | 12          |
| 18.0                    | 1,600  | 13.1                                      | 9.7                                       | 10.0                                      | 0.09                                  | 14.5                                       | 0.38                                   | 0.91  | 0.59   | 203                         | 30.0              | 18          |
| 26.5                    | 3,300  | 9.5                                       | 6.9                                       | 14.2                                      | 0.06                                  | 19.0                                       | 0.24                                   | 1.37  | 0.89   | 213                         | 40.0              | 26          |
| 36.0                    | 6,500  | 6.4                                       | 4.8                                       | 20.0                                      | 0.034                                 | 27.0                                       | 0.17                                   | 1.80  | 1.25   | 199                         | 57.0              | 36          |
| 48.0                    | 11,000                                       | 5.1                                       | 3.7                                       | 25.8                                      | 0.026                                 | 36.0                                       | 0.13                                   | 2.40  | 1.60   | 209                         | 75.0              | 48          |

Note 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.  
Note 2: Set base current at 3 mA to 15 mA during measurements.

| SPECIFYING A PART NUMBER EXAMPLE: | TYPE | TERMINALS | DIODES TRANSISTOR | GROUND PINS | COILS | SPREADER/MOUNTING PADS |
|-----------------------------------|------|-----------|-------------------|-------------|-------|------------------------|
|                                   | MS   | C         | D                 | G           | -26   | S                      |

