

## MS14 Series Solid State Relay, With DC or Bi-Directional Output to 350mA @ 400V

### Product Facts

- 1000V optical isolation protects control and driver circuitry from load transients.
- Buffered/current limited input for direct drive from CMOS or TTL logic.
- Power MOSFET output chips for low voltage drop.
- 90 & 240mA output current.
- 85, 100 & 400V output voltage.
- Subminiature hermetically sealed .100 grid package.
- Screened per "Y" level of MIL-PRF-28750D.
- Direct replacement for TELEDYNE M92F & M93F series

### Environmental Characteristics

#### Ambient Temperature Range:

Operating: -55°C to +105°C.  
Storage: -55°C to +125°C.

#### Vibration Resistance:

30 G's, 10-3,000 Hz.

#### Shock Resistance:

1,500 G's, 0.5 ms pulse.

#### Constant Acceleration Resistance:

5,000 G's.

### Mechanical Characteristics

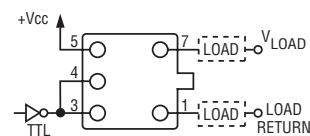
#### Weight (max.):

.07 oz. (2 grams)

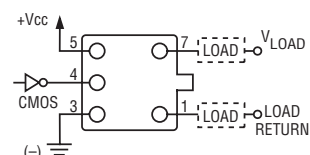
#### Materials:

Case: Nickel, hermetically sealed.  
Pins: Kovar, gold plated

### TTL Configuration



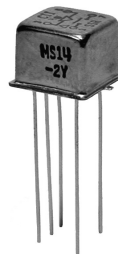
### CMOS Configuration



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MS14 series subminiature SSRs employ state of the art photo-voltaic optical isolation providing 1000Vrms input/output isolation and power mosfet output chips for ultra-reliable

high speed switching of DC or bidirectional loads up to 350mA and 400Vdc. The input is current regulated and buffered to minimize power dissipation and permit driving the relay direct

from CMOS or TTL. The relay is packaged in a custom hermetically sealed low-profile .100 grid package which conserves space for high density PC board circuitry.

### Ordering Information

KILOVAC Part No.	DSCC Drawing/Pin No.	Output Rating
MS14-1Y	87034-001	350mA / 400V
MS14-2Y	87034-002	135mA / 400V
MS14-3Y	87034-003	±240mA / 85V

### Electrical Specifications (-55°C to +105°C unless otherwise specified)

#### Input (TTL Drive)

Input supply voltage range (Vcc)	3.8 - 32 Vdc (Notes 1 & 2, Figures 1 & 2)
Input current (max.) @ 5Vdc	16mA (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	3.8Vdc
Must turn-off voltage	1.5Vdc

#### Input (CMOS Drive)

Control voltage range	0 - 18 Vdc
Control current (max.)	250µAdc @ 5V, 1mA @ 18V
Input supply voltage range (Vcc)	3.8 - 32 Vdc (Notes 1 & 2, Figures 1 & 2)
Input current (max.) @ 5Vdc	16mA (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	0.3Vdc
Must turn-off voltage	2.8Vdc

#### I/O

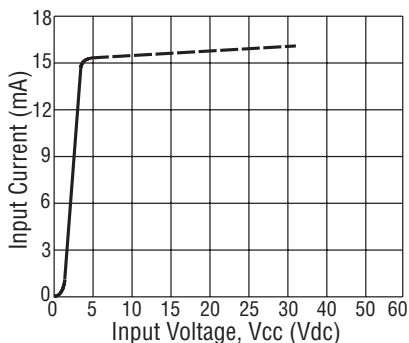
Dielectric Strength (min.)	1,000V rms
Insulation Resistance (min.) @ 500Vdc	10 <sup>9</sup> ohms

#### Output

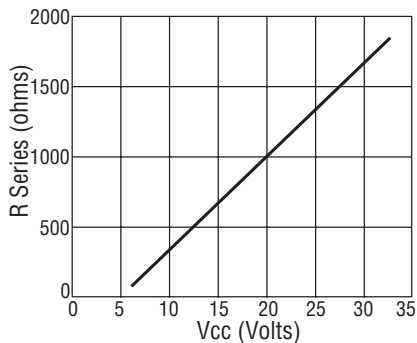
Continuous load current (max.) @ 25°C: MS14-1Y	350mA
Continuous load current (max.) @ 25°C: MS14-2Y	135mA
Continuous load current (max.) @ 25°C: MS14-3Y	+/- 240mA
Continuous load voltage (max.) @ 25°C: MS14-1Y	100Vdc
Continuous load voltage (max.) @ 25°C: MS14-2Y	400Vdc
Continuous load voltage (max.) @ 25°C: MS14-3Y	+/- 85V
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100mA: MS14-1Y	4 ohms
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100mA: MS14-2Y	25 ohms
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100mA: MS14-3Y	8 ohms
Off-state leakage I (max.) @ 80% max. V @ -55 to +25°C	1µA
Off-state leakage I (max.) @ 80% max. V @ =25 to +85°C	50µA
Junction temperature (max.)	150°C
Turn-on time (max.) MS14-1Y & -2Y	.7mS
Turn-on time (max.) MS14-3Y	2mS
Turn-off time (max.) (all versions)	1mS

**MS14 Series Solid State Relay,  
With DC or Bi-Directional Output to 350mA @ 400V** (Continued)

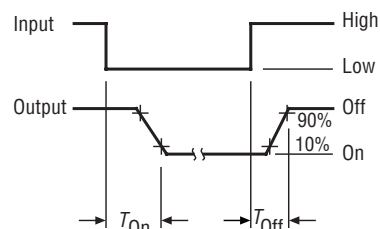
**Figure 1 -  
Max. Input Current vs. Input Voltage**



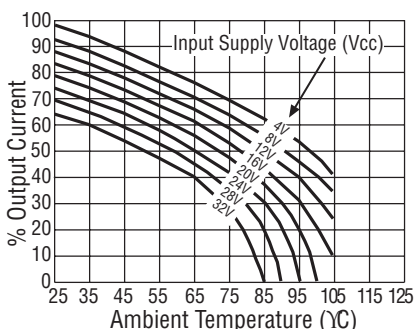
**Figure 2 -  
Series Res. vs. Vcc Supply Voltage (Note 1)**



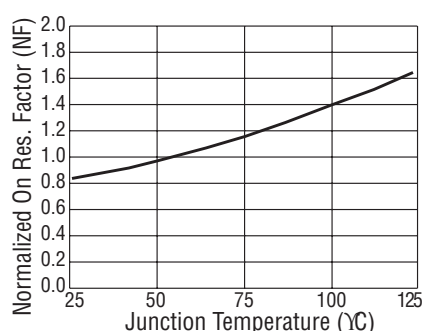
**Figure 3 -  
Output Turn-on and Turn-off Timing**



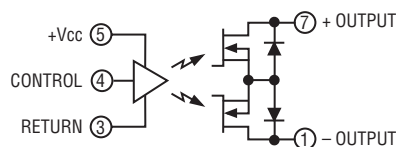
**Figure 4 -  
Temperature Derating Curve**



**Figure 5 -  
On-Resistance vs. Temperature (Note 6)**

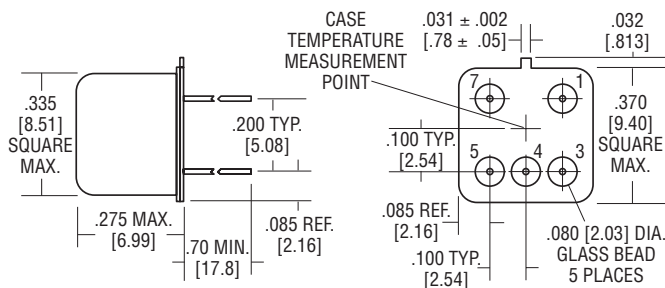


**Figure 6 -  
Simplified Circuit**



**Note:** MS14-1Y and -2Y have a single output chip.

**Figure 7 - Outline Dimensions**



Unless otherwise specified, tolerances are:  
±0.010 [0.25] for 2 place decimals  
±0.005 [0.13] for 3 place decimals

Terminal numbers are for reference only and do not appear on the header.

**Notes**

1. 2 terminal input configuration is compatible with CMOS or open collector TTL (with pull-up resistor).
2. For Vcc levels above 6Vdc, a series limiting resistor is required. See Fig. 2 for resistor value. Use standard resistor value equal to or less than value from the curve.
3. Vcc = 5Vdc for all tests unless otherwise specified.
4. All MS14 Series relays may drive loads connected to either positive or negative referenced power supply lines. Inductive loads must be diode suppressed.
5. If an input series current limiting resistor is used, derating of output current vs. Vcc is not necessary. Curve for 4V applies.
6. On-resistance at any ambient temperature other than 25°C can be computed as follows:  
 $R (@ \text{any } T) = R (@ +25^\circ\text{C}) \times e^{e^{0.006} T}$ , where T = new temperature - 25°C, e = 2.7182818.