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**DS11 Series SSR For DC Loads up to 2A @ 60Vdc**

**Product Facts**

- **Standard options: short circuit/overload protection, switch status and trip status**
- **Optically coupled all solid state relay**
- **TTL & CMOS compatible input**
- **Low on-resistance power MOSFET output**
- **Tested per MIL-PRF-28750D and approved to DSCC drawing 88062 with "Y" level screening**



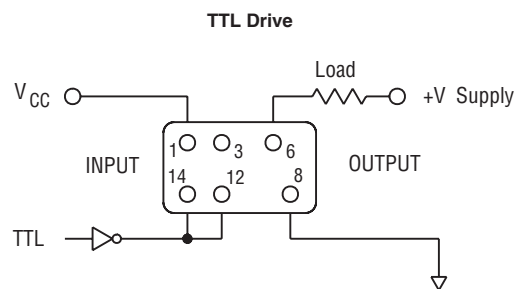
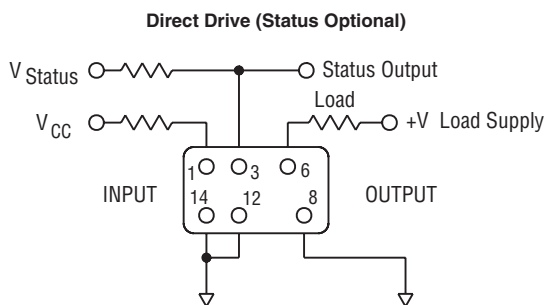
DS11 series SSRs feature state of the art photo-voltaic optical isolation and power MOSFET output chips for ultra-reliable high speed switching of DC loads up to 2 amps, with extremely low on-resistance. Standard options include integral current overload/short circuit protection to provide protection of the relay, load

and wiring; and isolated switch status or trip status. The overload feature provides protection if a short or overload develops while the relay is in the on state or if the relay is turned on into a dead short. Switch status, optically isolated from the load, signals the status of the output and provides a logic "0" when the output is

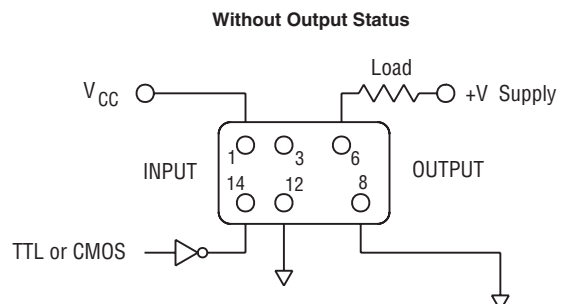
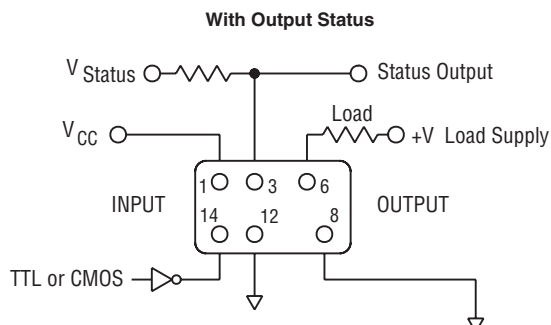
off and a logic "1" when the output is on. Trip status, also optically isolated from the load, provides a logic "1" if the output trips off and a logic "0" when the output is in a normal condition, on or off, and is available only in conjunction with short circuit protection.

CII Part No.	DSCC Dwg. No.	Relay Version
<b>DS11-1Y</b>	88062-008	Basic relay
<b>DS11-1000</b>	88062-004	Relay w/ short circuit protection
<b>DS11-1001</b>	88062-006	Relay w/ switch status
<b>DS11-1002</b>	88062-002	Relay w/ short circuit protection and switch status
<b>DS11-1003</b>	N/A	Relay w/ short circuit protection and trip status

**2 Terminal Input Configuration**



**3 Terminal Input Configuration**



**DS11 Series SSR For DC Loads up to 2A @ 60Vdc** (Continued)

**Environmental Characteristics**
**Ambient Temperature Range** —

Operating — -55°C to +105°C

Storage — -55°C to +105°C

**Vibration Resistance** —

100 G's, 10-3,000 Hz

**Shock Resistance** —

50 G's, 11 ms pulse

**Constant Acceleration Resistance (Y1 axis)** —

5,000 G's

**Mechanical Characteristics**
**Weight (approx.)** —

.176 oz. (5 grams)

**Materials** —

Header — KOVAR

Cover — Nickel

Pins — KOVAR, gold plated

**Electrical Specifications (-55°C to +105°C unless otherwise specified)**
**Input (2 terminal configuration)**

Input supply voltage range (Vcc)	3.8 - 32 Vdc (Notes 1 & 2, Figures 1 & 2)
Input current (max.) @ 5Vdc	15mAdc (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	3.8Vdc
Must turn-off voltage	1.5Vdc
Reverse voltage protection	-32Vdc

**Input (3 terminal configuration)**

Control voltage range	0 - 18 Vd
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	15mADC (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	0.3Vdc
Must turn-off voltage	3.2Vdc

**I/O**

Dielectric strength (min.)	1,000V rms
Insulation resistance (min.) @ 500Vdc	10 <sup>9</sup> ohms
Capacitance (max.)	10pF

**Output**

Continuous load current (max.) @ 25°C	2.1Adc (Figure 7)
Continuous load voltage (max.)	60Vdc
Transient blocking voltage (max.)	80Vdc (Note 5)
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100mA	0.15 ohm (Note 6, Figure 6)
Output voltage drop (max.)	0.5Vdc
Leakage current (max.) @ V = 60Vdc	100µAdc
Leakage current (max.) @ V = 60Vdc, with switch status	2mAdc
Turn-on time (max.)	3 ms (Figure 3)
Turn-off time (max.)	1 ms (Figure 3)
dv/dt (min.)	100V / µs
Electrical system spike	600Vdc (Note 5)
Output chip junction temperature (max.)	125°C
Thermal resistance (max.), junction to ambient	90°C/W
Thermal resistance (max.), junction to case	25°C/W

**Status**

Status supply voltage range	1 - 18Vdc
Status current (max.) @ V <sub>status</sub> ≤ 0.4Vdc	600µADC (Figure 5, Note 8)
Status leakage current (max.) @ 16Vdc	10µAdc
Status turn-on time (max.)	3.5 ms (Figure 4)
Status turn-off time (max.)	8 ms (Figure 4)

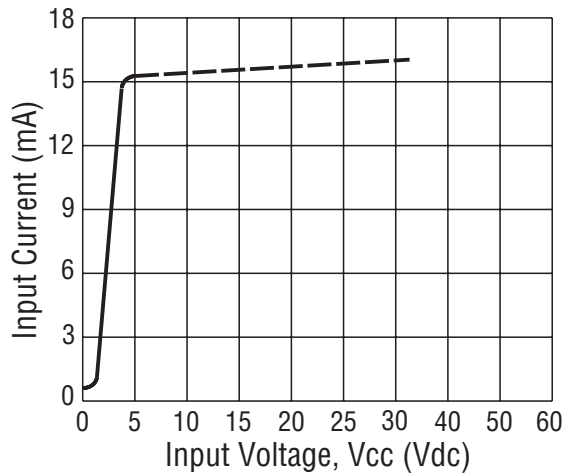
**Short Circuit Protection**

Current surge without tripping (max.), 100ms pulse	4.25Adc
Overload trip current (max.), 0.5 ms pulse, V = 60Vdc	10Adc
Trip time (typical), turning on into short	400µs
Trip time (typical), shorting while relay is on	280µs

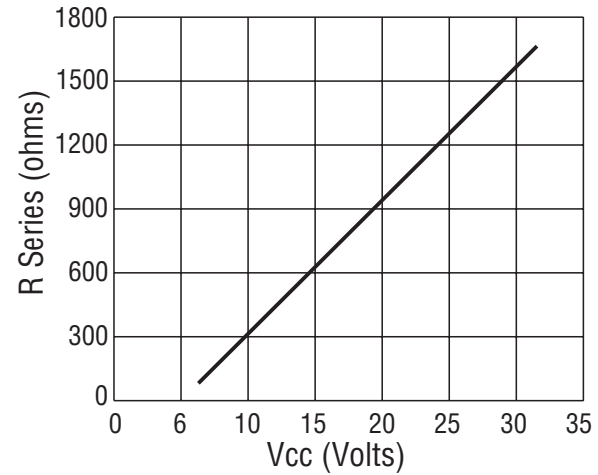
KOVAR is a trademark of Carpenter Technology Corporation.

**DS11 Series SSR For DC Loads up to 2A @ 60Vdc** (Continued)

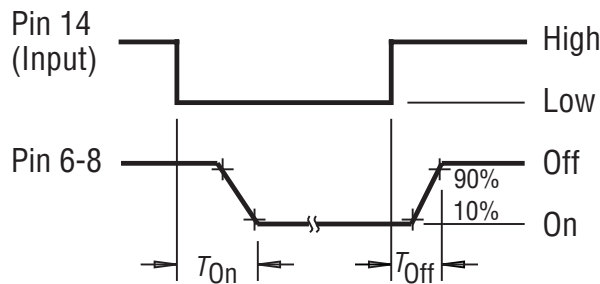
**Figure 1 - Maximum Input Current vs. Input Voltage**



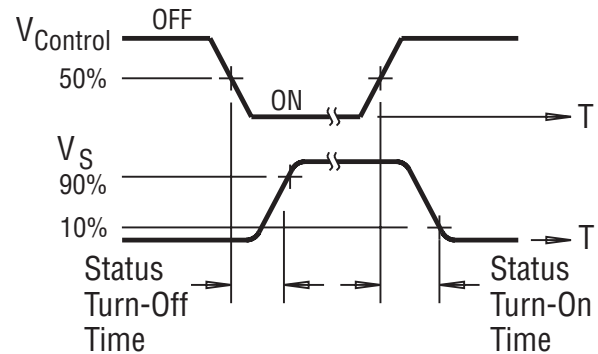
**Figure 2 - Series Resistance vs. Vcc Supply Voltage (Note 1)**



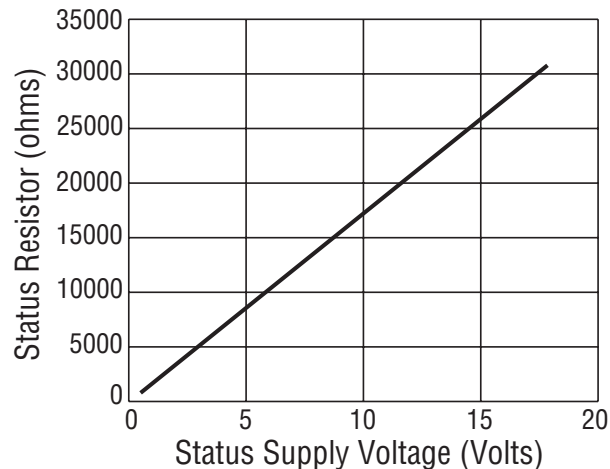
**Figure 3 - Turn-on and Turn-off Timing**



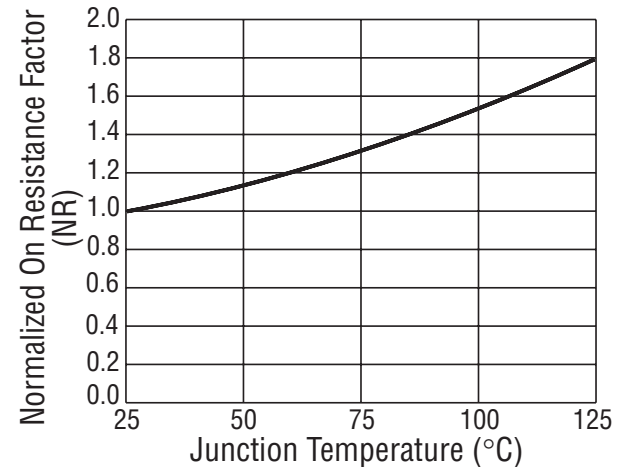
**Figure 4 - Output Status Timing**



**Figure 5 - Status Resistor vs. Status Supply Voltage**

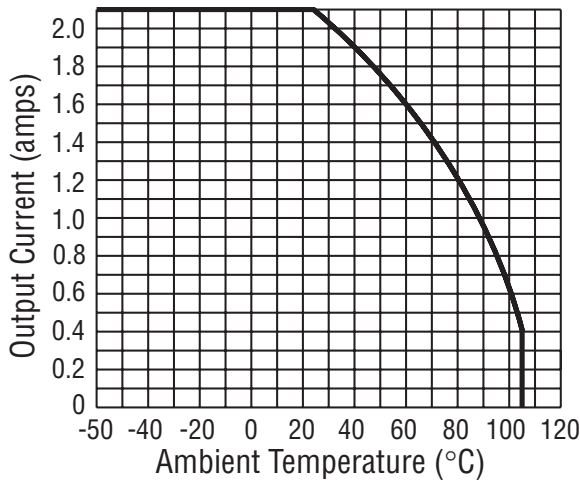


**Figure 6 - On-Resistance vs. Temperature (Note 6)**

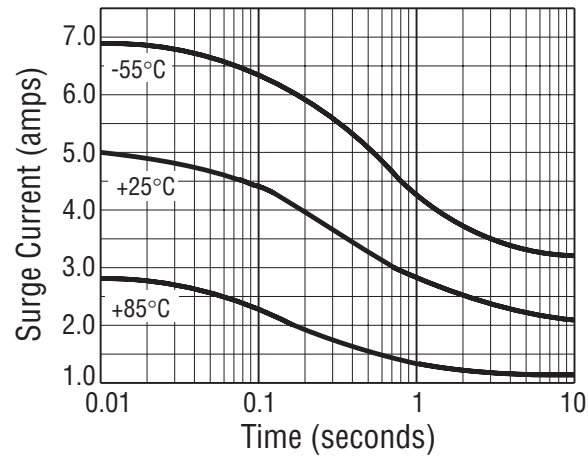


**DS11 Series SSR For DC Loads up to 2A @ 60Vdc** (Continued)

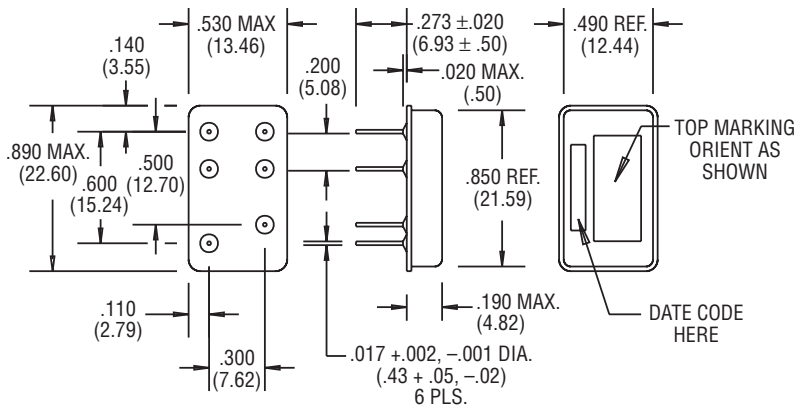
**Figure 7 - Temperature Derating Curve**



**Figure 8 - Maximum Surge Current Without Tripping**



**Figure 9 - Outline Dimensions**



TOLERANCE:  
 ± 0.010 (0.25mm) FOR 2 PLACE DECIMALS,  
 ± 0.005 (0.13mm) FOR 3 PLACE DECIMALS.  
 UNLESS OTHERWISE SPECIFIED

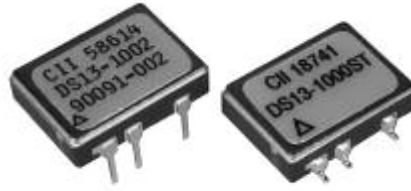
**Notes**

1. 2 terminal input configuration is compatible with CMOS or open collector TTL (with pull-up resistor). 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.
2. Input transitions to be ≤ 1ms duration, and input direct drive should be “bounceless contact” type.
3. Vcc = 5Vdc for all tests unless otherwise specified.
4. All DS11 Series relays may drive loads connected to either positive or negative referenced power supply lines. Reversing polarity of output may cause permanent damage. Inductive loads must be diode suppressed.
5. Transient blocking voltage and electrical system spike tests are performed per MIL-STD-704 (28VDC systems).
6. To determine the maximum on-resistance at any given junction temperature, multiply on-resistance at 25°C (0.15 ohm) by normalized on-resistance factor from curve (Fig. 6).
7. Overload testing per MIL-R-28750 is constrained to the limits imposed by the short circuit protection requirements of this specification and DSCC drawing 88062. Load circuit series inductance for “load shorted” mode of operation to be limited to 50mH max. Maximum repetition rate into a shorted load should not exceed 10 Hz.
8. Proper operation of the status feedback requires a status pull-up resistor. See Fig. 5 for status resistor value.

**DS13 SSR for loads up to 2A @ 60Vdc**

**Product Facts**

- Standard options: short circuit/overload protection and control status.
- Optically coupled all solid state relay.
- TTL & CMOS compatible input.
- Low on-resistance power MOSFET output.
- Tested per MIL-PRF-28750D and approved to DSCC drawing 90091.
- All versions available with Tyco Electronics "W" level screening for CII relays.



DS13 series SSRs employ state of the art photovoltaic optical isolation and power MOSFET output chips for ultra-reliable high speed switching of DC loads up to 2 amps, with low on-resistance. Standard options include integral current overload/short

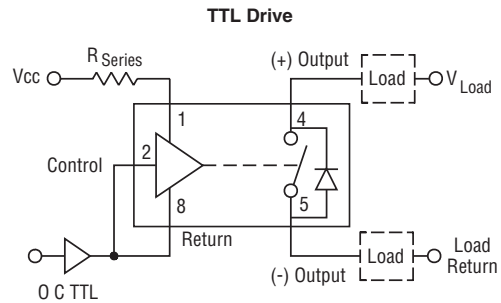
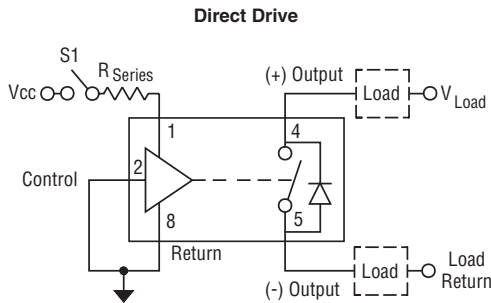
circuit protection and a separate input control status line. The overload feature provides protection of the relay, load and load circuit wiring in the event of a sustained current overload or short circuit while the relay is on or when it is turned on into a short. The

control status provides a built-in test function which provides a logic "0" when the input circuit is energized and functional. The relay is packaged into a custom hermetically sealed low-profile 8-pin ceramic DIP package, with through hole or surface mount pins.

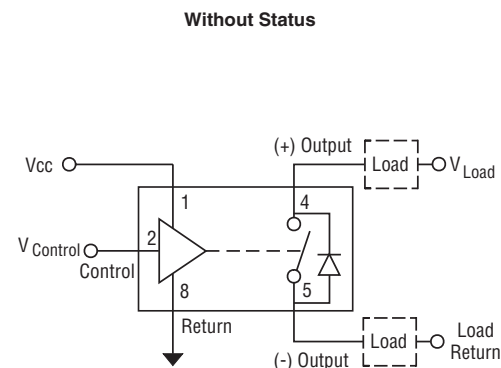
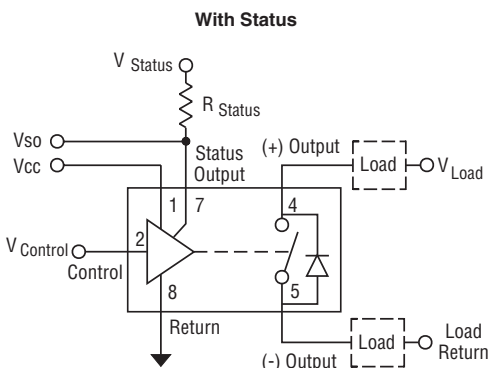
CII Part No.	DSCC Dwg. No.	Relay Version
<b>DS13-1Y</b>	90091-008	Basic relay
<b>DS13-1000</b>	90091-004	Relay w/ short circuit protection
<b>DS13-1001</b>	90091-006	Relay w/ control status
<b>DS13-1002</b>	90091-002	Relay w/ short circuit protection and control status

Notes: Add suffix "S" to part number for surface mount versions.  
 Add suffix "T" to part number for tinned leads.  
 Add suffix "W" to part number for lower screening level.

**2 Terminal Input Configuration**



**3 Terminal Input Configuration**



**DS13 SSR for loads up to 2A @ 60Vdc** (Continued)

**Environmental Characteristics**
**Ambient Temperature Range:**

Operating: -55°C to +105°C.

Storage: -55°C to +125°C.

**Vibration Resistance:**

100 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: DIP, hermetically sealed, ceramic

Pins: Copper, gold plated

**Electrical Specifications (-55°C to +105°C unless otherwise specified)**
**Input (2 terminal configuration)**

Input supply voltage range (Vcc)	3.8 - 32 Vdc (Notes 1 & 2, Figures 1 & 2)
Input current (max.) @ 5Vdc	15mAdc (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	3.8Vdc
Must turn-off voltage	1.5Vdc
Reverse voltage protection	-32Vdc

**Input (3 terminal configuration)**

Control voltage range	0 - 18 Vdc
Control current (max.)	240µAdc @ 5V, 1mA @ 18V
Input supply voltage range (Vcc)	3.8 - 32 Vdc (Notes 1 & 2, Figures 1 & 2)
Input current (max.) @ 5Vdc	15mAdc (Notes 1 & 2, Figures 1 & 2)
Must turn-on voltage	0.3Vdc
Must turn-off voltage	3.2Vdc

**I/O**

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

**Output**

Continuous load current (max.) @ 25°C, without short circuit protection	2.0Adc (Figure 5, Note 3)
Continuous load current (max.) @ 25°C, with short circuit protection	1.0Adc (Figure 5, Note 3)
Continuous load voltage (max.)	60Vdc
Transient blocking voltage (max.)	80Vdc (Note 4)
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100ma, with short circuit protection	0.45 ohm (Note 5, Figure 4)
On resistance (max.) @ T <sub>j</sub> = 25°C, I <sub>L</sub> = 100ma, without short circuit protection	0.22 ohm (Note 5, Figure 4)
Output voltage drop (max.), with short circuit protection	0.6Vdc
Output voltage drop (max.), without short circuit protection	0.75Vdc
Off-state leakage current (max.) @ 60Vdc	100µAdc
Turn-on time (max.)	1.5 ms (Figure 3)
Turn-off time (max.)	.25 ms (Figure 3)
dv/dt (min.)	100V / µs
Electrical system spike	±600Vdc (Note 4)
Junction temperature (max.)	150°C
Thermal resistance (max.), junction to ambient	80°C/W
Thermal resistance (max.), junction to case	20°C/W

**Status**

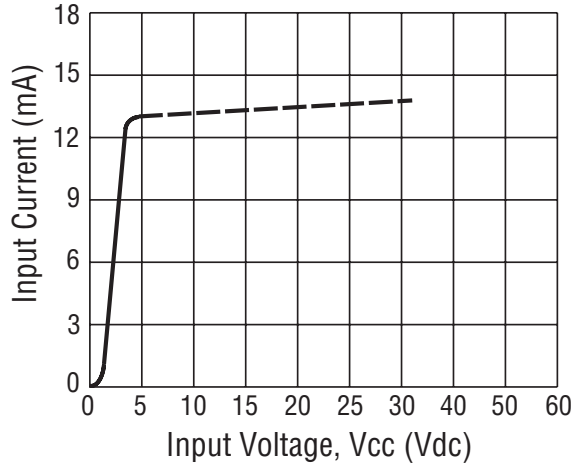
Status supply voltage	30Vdc
Status sink current (max.) @ Vstatus ≤ 0.3Vdc	2mAdc (Note 7)
Status leakage current (max.) @ 15Vdc	4µAdc

**Short Circuit Protection**

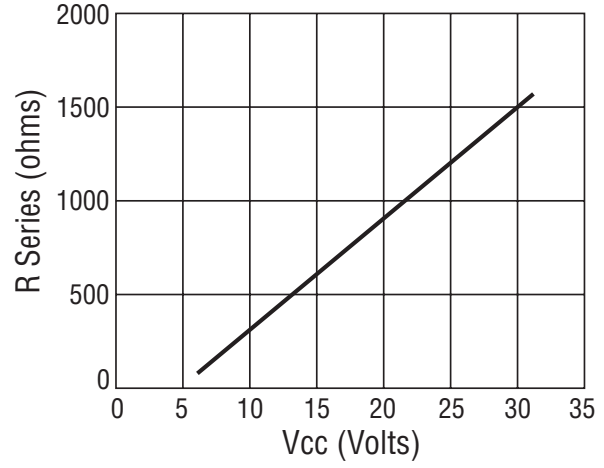
See Figure 6, Note 7

**DS13 SSR for loads up to 2A @ 60Vdc** (Continued)

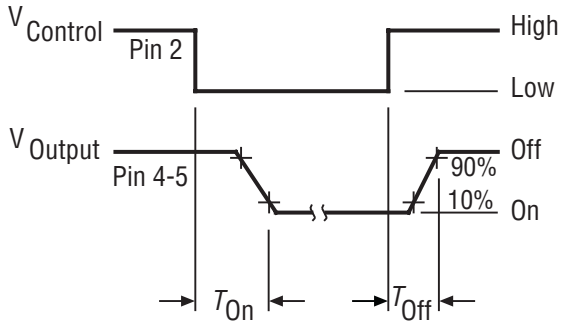
**Figure 1 - Maximum Input Current vs. Input Voltage**



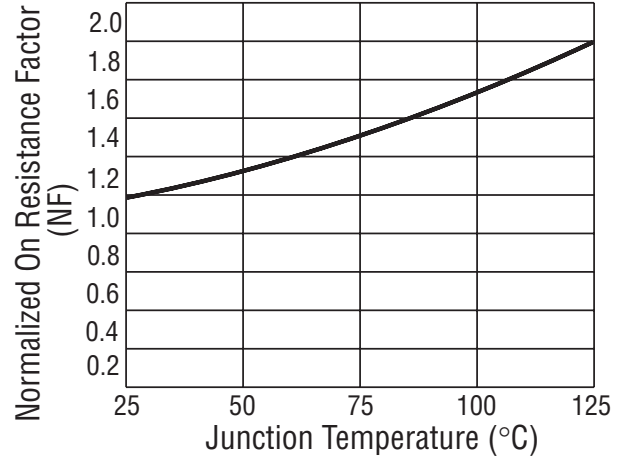
**Figure 2 - Series Resistance vs. Vcc Supply Voltage (Note 1)**



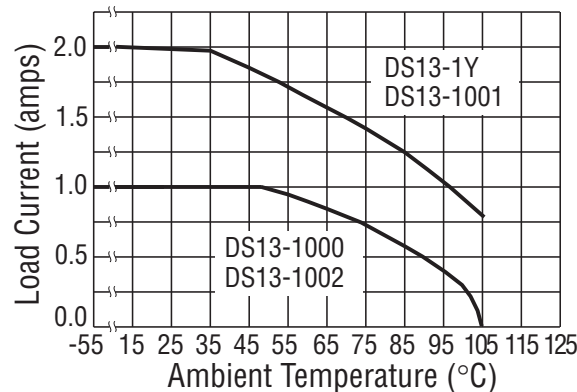
**Figure 3 - Output Turn-on and Turn-off Timing**



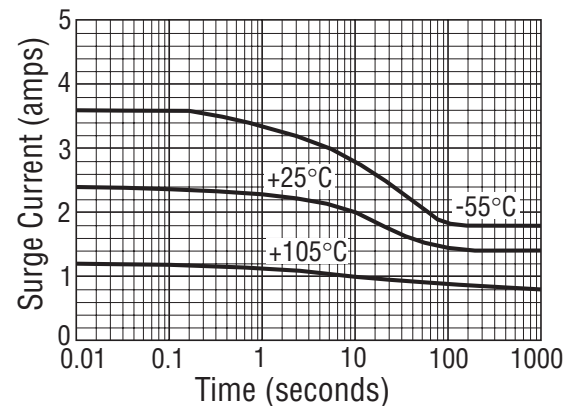
**Figure 4 - On-Resistance vs. Temperature (Note 6)**



**Figure 5 - Temperature Derating Curve**



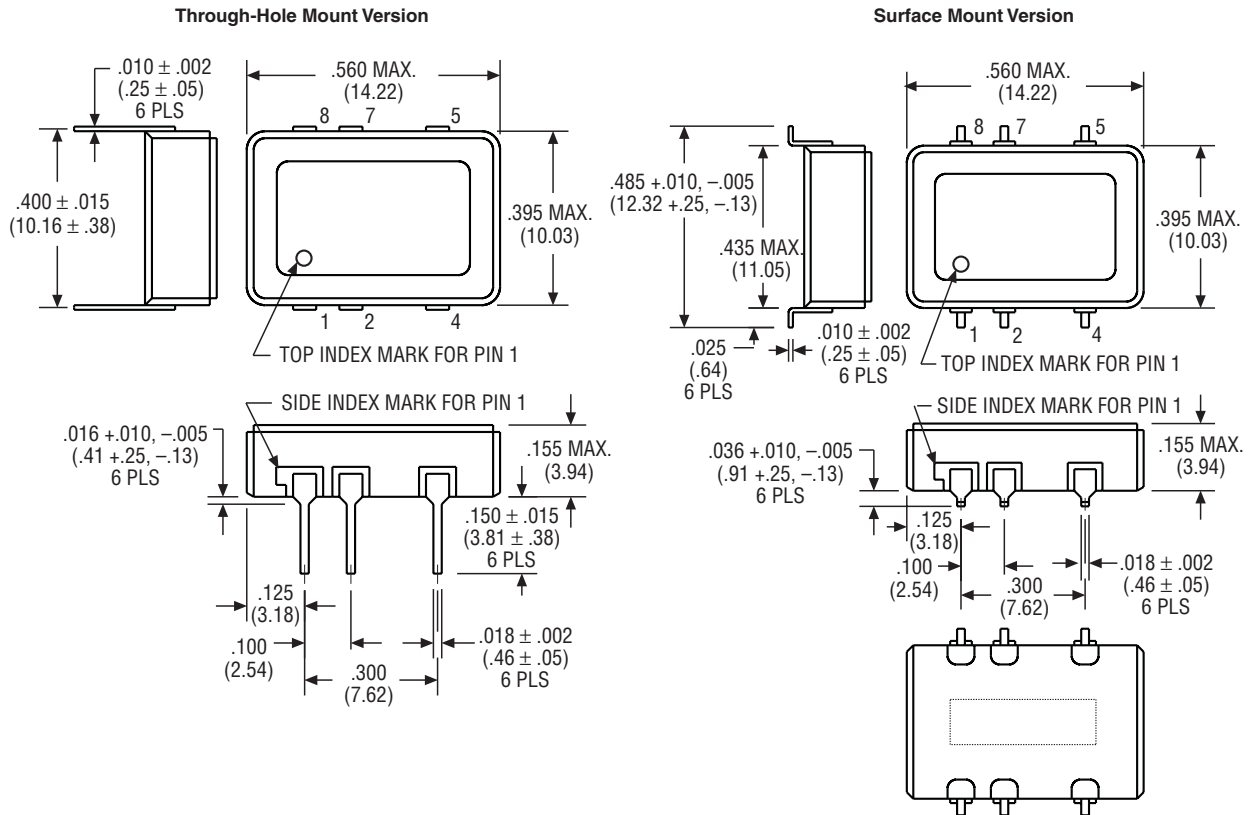
**Figure 6 - Typical Current Trip Levels**





**DS13 SSR for loads up to 2A @ 60Vdc** (Continued)

**Figure 7 - Outline Dimensions**

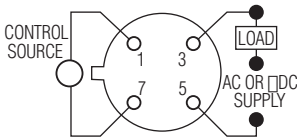
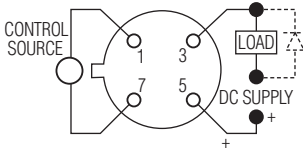


10  
Solid State Relays

**Notes**

1. 2 terminal input configuration is compatible with CMOS or open collector TTL (with pull-up resistor). 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.
2. Vcc = 5Vdc for all tests unless otherwise specified.
3. All DS13 Series relays may drive loads connected to either positive or negative referenced power supply lines. Reversing polarity of output may cause permanent damage. Inductive loads must be diode suppressed.
4. Transient blocking voltage & electrical system spike tests are performed per MIL-STD-704 (28Vdc systems).
5. To determine the maximum on-resistance at any given junction temperature, multiply on-resistance at 25°C by normalized on-resistance factor from curve (Fig. 4).
6. Overload testing per MIL-R-28750 is constrained to the limits imposed by the short circuit protection requirements of this specification and DSCC drawing 90091. Load circuit series inductance for "load shorted" mode of operation to be limited to 50mH max. Maximum repetition rate into a shorted load should not exceed 10 Hz. To calculate maximum on-resistance at any temperature, use the following equation:  $R(on) = R(on) @ 25^{\circ}C \times NF$  (without short circuit protection) and  $R(on) = 0.2 \times NF + .21$  (with short circuit protection) where NF = normalized on-resistance factor from Fig. 4.
7. Proper operation of the status feedback requires a status pull-up resistor. Select the status resistor such that it limits status output current to 2mA:  $R \text{ status} = \frac{V \text{ status} - 0.3V}{2mA}$ .

## JTS5, 6, & 7 Series, DC & Bi-Directional Output, Up to 250mA & 250V Output Rating, TO-5 Package



Terminal View

### Input Characteristics

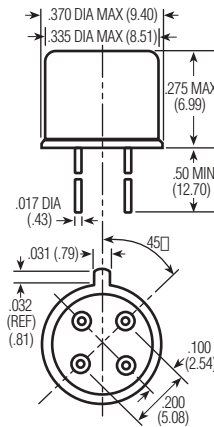
- Input Voltage Range** — 4.0 – 7.0 Vdc
- Maximum Turn-on Voltage** — 5.0 Vdc
- Minimum Turn-off Voltage** — 1.0 Vdc
- I/O Dielectric** — 1000 Vac pk-pk

### Output Characteristics

- Max. Output Current (Continuous, 25°C)** — 50 mAac or mAdc (JTS5-1Y)  
250 mAac (JTS6-1Y)  
100 mAac (JTS7-1Y)
- Max. Output Voltage** — 40 Vac or Vdc (JTS5-1Y)  
40 Vdc (JTS6-1Y)  
250 Vdc (JTS7-1Y)
- Max. On-resistance** — 5 ohms (JTS5-1Y)
- Turn-on Time** — 10 µsec.
- Turn-off Time** — 15 µsec.

### Environmental Characteristics

- Shock** — 1500 G's, 0.5 ms.
- Vibration** — 100 G's, 10 to 2000 Hz
- Operating Ambient Temperature** — -55 to +125°C

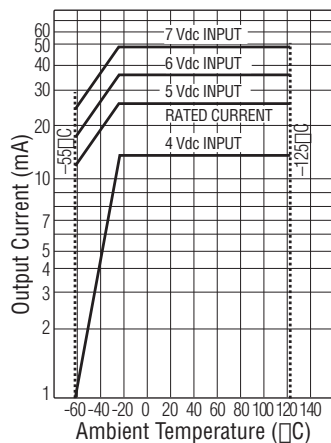


JTS5/JTS6/JTS7

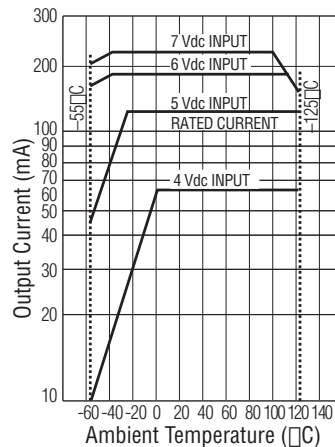
### Product Facts

- Hermetically sealed TO-5 package
- Transformer coupled
- High speed switching
- JTS5-1Y switches AC or DC
- Qualified to M28750/5, 6, & 7

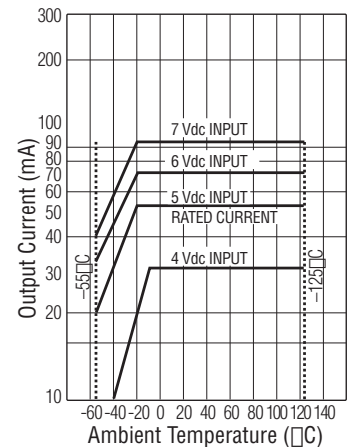
- Notes:**
- 1) Reversing polarity of input (or output except for JTS5-1) may cause permanent damage.
  - 2) Input must be a step function. Rise or fall time, as applicable, not to exceed 100 µsec.
  - 3) Inductive loads must be diode suppressed.
  - 4) For any control voltage, the maximum load current shown on graphs must not be exceeded. Attempting to draw currents in excess of those specified on graphs can cause permanent damage.



JTS5-1Y



JTS6-1Y



JTS7-1Y

Output Current Vs. Input Control Voltage and Ambient Temperature

## MS18-1006 High Performance DC and Bi-directional Solid State Relay For Loads up to 2A @ 80Vdc

### Product Facts

- Bi-directional power FET output
- Optically coupled
- Low on-resistance
- Extremely low leakage current
- Subminiature hermetically sealed package
- Tested per MIL-PRF-28750D and approved to DSCC drawing 89116-006



The MS18-1006 is an optically coupled SSR employing power MOSFET output chips in an inverse series configuration for switching DC or bi-directional loads. A common source connection is provided for the user

to configure the output switching circuit for DC operation up to 2A with very low on-resistance. The relay features fast switching speeds, low off-state leakage, virtually zero offset voltage and the capability to with-

stand high inrush currents up to 350% of rated. The low profile subminiature package is hermetically sealed with pinouts on a 0.1" x 0.3" grid pattern.

10  
Solid State Relays

CII Part No.	DSCC Dwg. No.	Relay Version
MS18-1006	89116-006	Basic relay

### Environmental Characteristics

**Ambient Temperature Range** —  
Operating — -55°C to +120°C  
Storage — -55°C to +125°C

**Vibration Resistance** —  
100 G's, 10-2,000 Hz

**Shock Resistance** —  
1,500 G's, 0.5 ms pulse

**Constant Acceleration Resistance (Y-1 axis)** —  
5,000 G's

### Mechanical Characteristics

**Weight (approx.)** —  
.07 oz. (5 grams)

**Materials** —  
Header — Kovar® Alloy  
Cover — Grade A Nickel  
Pins — Kovar® Alloy, gold plated

KOVAR is a trademark of Carpenter Technology Corporation.

### Electrical Specifications (-55°C to +120°C unless otherwise specified)

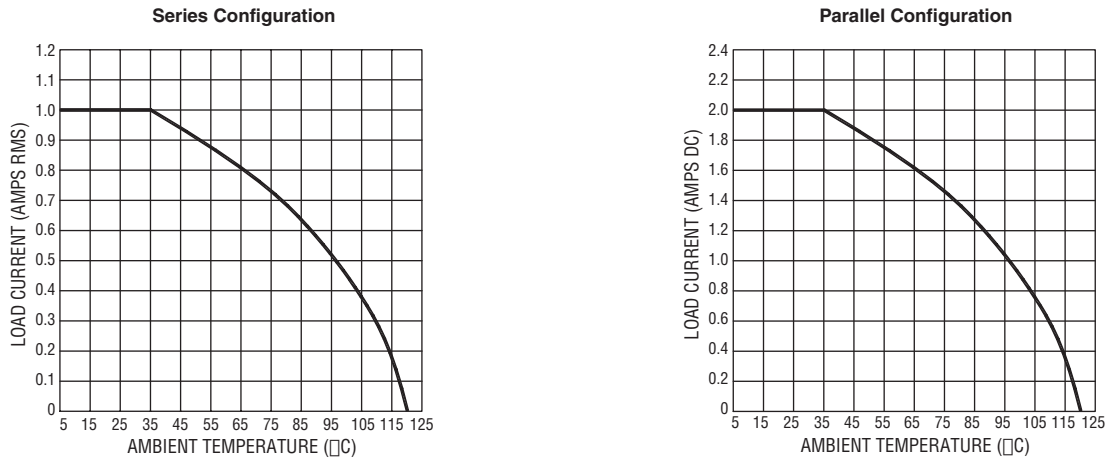
Input	
Input current (max.)	25mA <sub>dc</sub>
Input voltage drop (max. @ 25mA))	1.5 V <sub>dc</sub>
Must turn-on current	10mA
Must turn-off current	10µA
Reverse voltage protection	-5.0V <sub>dc</sub>
I/O	
Dielectric strength (60Hz., 1mA leakage)	500V rms
Insulation resistance (min.) @ 500V <sub>dc</sub>	10 <sup>9</sup> ohms
Capacitance (max. @ 25V <sub>dc</sub> , 1 Mhz)	5pF
Output	
Continuous load current, parallel (DC) configuration (max.)	2A (Figure 2)
Continuous load current, series (bi-directional) configuration (max.)	1A (Figure 2)
Continuous operating load voltage (max.)	+/- 80V
Transient blocking voltage (5 sec max.)	+/- 90V
Overload (100ms, 10% duty cycle, 10 cycles max.)	350% of rated
dv/dt (min.)	100V / µs
On resistance (max.), parallel (DC) configuration	0.4 ohm
On resistance (max.), series (bi-directional) configuration	0.6 ohm
Turn-on time (max, @ +/- 80V)	800µs (Figure 3)
Turn-off time (max, @ +/- 80V)	500µs (Figure 3)
Thermal resistance, junction to ambient	110°C/W
Thermal resistance, junction to case	20°C/W

Figure 1 – Wiring Diagrams

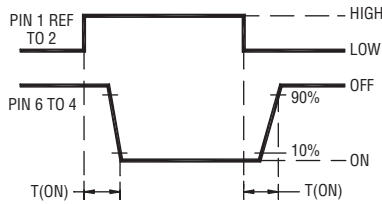


**MS18-1006 High Performance DC and Bi-directional Solid State Relay For Loads up to 2A @ 80Vdc (Continued)**

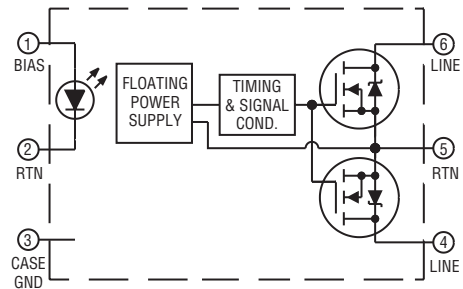
**Figure 2 - Temperature Derating Curves**



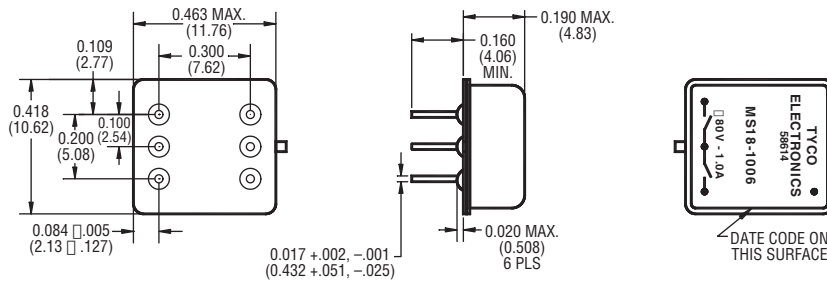
**Figure 3 - Turn-on and Turn-off Timing**



**Figure 4 - Functional Block Diagram**



**Figure 5 - Outline Dimensions**



**Notes**

1. An external resistor must be in series with the input at all times.
2. Do not ramp input current. Input transition should be <1.0ms.
3. Input current/series resistor calculation (Approx.):  $I_{(input)} = V_{IN} - V_{DROD} / R_{SERIES}$ .
4. Unless otherwise specified parametric testing is accomplished at 25ma input current.
5. To calculate  $R_{DS(ON)}$  for temperatures other than 25°C, use the following equation:  $T_{(TEMP)} = (R_{DS(ON)} \text{ at } + 25^{\circ}\text{C}) \cdot e^{(x \cdot \theta T)}$  where  $x = 0.0065$ .
6. Inductive loads must be diode suppressed.
7. Continuous load current is rated under conditions of still air.
8. Load may be connected to either side of relay, sink or source modes.
9. Reverse polarity >5Vdc may cause permanent damage
10. Acceptance testing is accomplished in the series (bi-directional) mode.

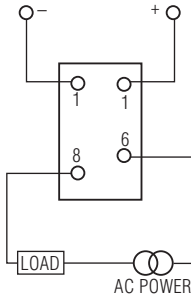
**JDS9 Series, AC Relays, 2A/250Vrms Rating**



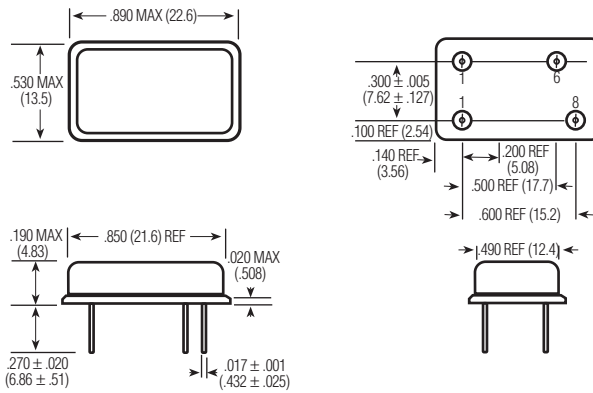
**Input Characteristics**  
**Input Voltage Range** — 3.8 – 32 Vdc  
**Pick-up Voltage** — 3.8 Vdc  
**Dropout Voltage** — 1.5 Vdc  
**I/O Dielectric** — 1500 Vrms

**Output Characteristics**  
**Max. Output Current (Continuous, 25°C)** — 2 Arms  
**Max. Output Voltage** — 250 Vrms  
**Peak Over Voltage Rating** — 500 Vpk  
**Frequency Range** — 40 – 440 Hz  
**Zero Switch Window** — 15 Vpk  
**Thermal Resistance** —  
 Junction to Ambient — 65°C/Watt  
 Junction to Case — 15°C/Watt

**Environmental Characteristics**  
**Shock** — 1500 G's, 0.5 ms.  
**Vibration** — 30 G's, 10 to 3000 Hz  
**Operating Ambient Temperature** — -55 to +110°C



Terminal View

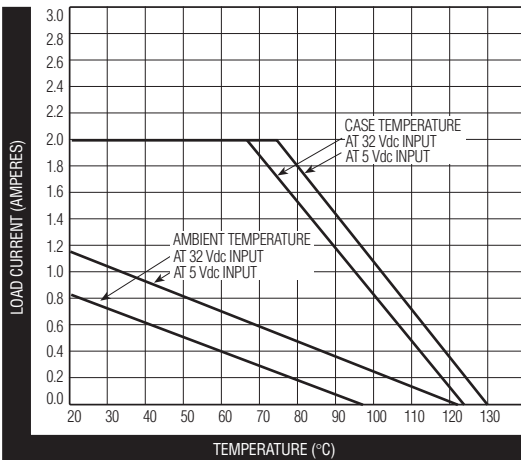


JDS9-1Y

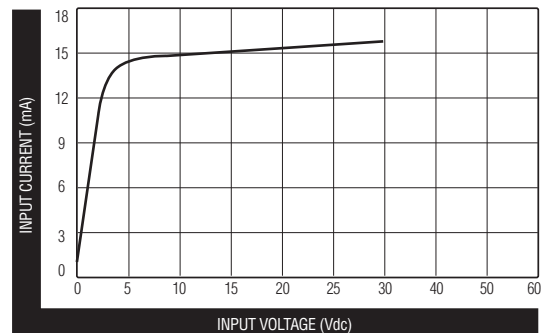
**Product Facts**

- Hermetically sealed
- Thick film hybrid construction
- Optically isolated
- Zero voltage turn-on
- Qualified to MIL-R-28750/9

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Solid State Relays



JDS9 Max. Output Current vs. Temperature



JDS9 Typical Input Current vs. Input Voltage

**PS12 Series High Performance Solid State Relays  
For AC Loads up to 10A @ 250Vrms**

**Product Facts**

- Approved to DSCC drawing 86031
- Optically coupled all solid state relay
- TTL compatible input
- Zero voltage turn-on for low EMI
- Custom power package with screw terminals



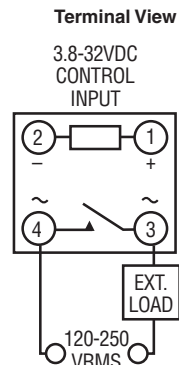
The PS12 series solid state relay is designed for AC power switching up to 10 amps at 250Vrms. The circuit employs back-to-back SCRs with zero voltage turn-on for reliable switching of

resistive or reactive loads. TTL compatible input circuitry is optically isolated to 1,500Vrms from the AC load circuit. The relay is offered in two versions: the PS12-1Y with "Y" level screening per

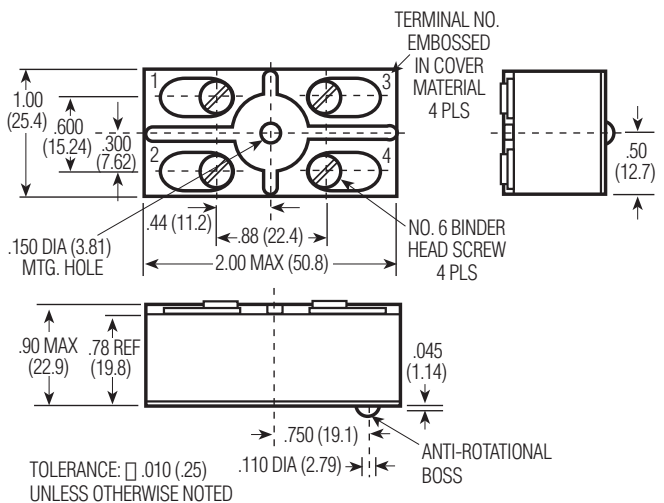
MIL-PRF-28750D, and the PS12-1W screened per Tyco Electronics specifications for CII relays, equivalent to former "W" level of Mil-R-28750.

CII Part Number	DSCC Part Number	Screening Level
<b>PS12-1Y</b>	86031-001	Y
<b>PS12-1W</b>	N/A	W

**Circuit Diagram**



**Outline Drawing**



**PS12 Series High Performance Solid State Relays  
For AC Loads up to 10A @ 250Vrms (Continued)**

**Environmental Characteristics**

**Ambient Temperature Range —**

Operating — -55°C to +95°C  
Storage — -55°C to +110°C

**Vibration Resistance —**

30 G's, 78-2,000 Hz

**Shock Resistance —**

100 G's, 6 ms pulse

**Constant Acceleration Resistance —**

100 G's

**Mechanical Characteristics**

**Weight (max.) —**

3 oz. (85 grams)

**Materials —**

Case — Plastic, self-extinguishing, epoxy filled

Terminals — Brass, nickel-plated

Base Plate — Aluminum

**NOTE:** Do not exceed 180 in-oz when tightening screws.

**Electrical Specifications (-55°C to +95°C unless otherwise specified)**

**Input**

Input supply voltage range (Vcc)	3.8 - 32 Vdc
Input current (max.) @ 5Vdc	16mAdc
Must turn-on voltage	3.8Vdc
Must turn-off voltage	1Vdc
Reverse voltage protection	-32Vdc

**I/O**

Dielectric strength (min.)	1,500V rms/60 Hz.
Insulation resistance (min.) @ 500Vdc	10 <sup>9</sup> ohms
Capacitance (max.)	15pF

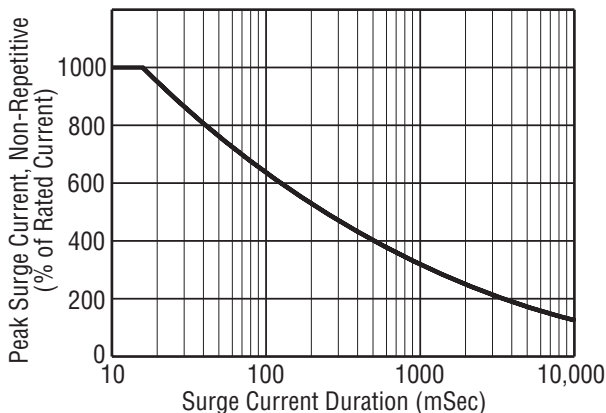
**Output**

Output current rating (max.)	10A rms (Fig. 2, Note 1)
Surge current (max.)	100A pk (Fig. 1, Note 2)
Continuous load voltage (max.)	250V rms
Transient blocking voltage (max.)	460V pk
Frequency range	45 - 440 Hz.
Output voltage drop (max.) @ 25A load current	1.5V rms
Off-state leakage current (max.) @ 220V rms/400 Hz.	9mA rms
Turn-on time (max.)	1/2 cycle
Turn-off time (max.)	1 cycle
Off-state dv/dt (min.), with snubber	200V / $\mu$ s (Note 3)
Zero voltage turn-on window (max.)	$\pm$ 15V pk
Output chip junction temperature (max.)	125°C (Note 1)
Thermal resistance (max.), junction to ambient	11.5°C/W
Thermal resistance (max.), junction to case	2.0°C/W
Fusing I <sup>2</sup> T, 1 ms (max.)	150A <sup>2</sup> s
Load power factor (min.)	0.2
Power dissipation (max.)	1.5W/A

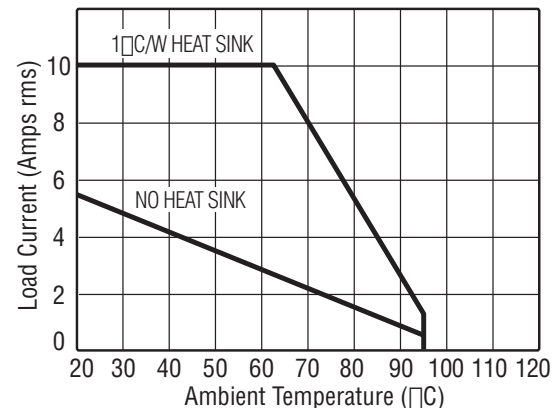
**Notes**

1. Operation at elevated load currents up to 10 amps is dependent on the use of suitable heatsink to limit junction temperature.
2. Heating of output chips during and after a surge may cause loss of output blocking capability until junction temperature falls below maximum rating.
3. Internal snubber network is provided across output chips.

**Figure 1 - Peak Surge Current vs. Surge Current Duration**



**Figure 2 - Load Current vs. Temperature**



**JPS10 Series High Performance Solid State Relays  
For AC Loads up to 2A @ 250Vrms**

**Product Facts**

- Qualified to MIL-PRF-28750D (Mil Part Numbers M28750/10-001Y and M28750/10-002Y)
- Optically coupled all solid state relay
- TTL compatible input
- Zero voltage turn-on for low EMI
- Custom power package



The JPS10 series solid state relay is designed for AC power switching up to 25 amps at 250Vrms. The circuit employs back-to-back photo SCRs with zero voltage turn-on for reliable

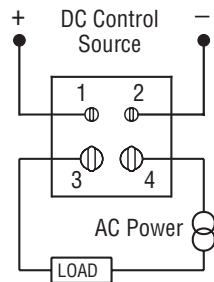
switching of resistive or reactive loads. TTL compatible input circuitry is optically isolated to 1,500Vrms from the AC load circuit. The relay is offered in two versions: the JPS10-1Y with a maximum

zero voltage turn-on window of 15 volts (preferred version for resistive loads), and the JPS10-2Y with a maximum window of 40 volts (preferred version for reactive loads).

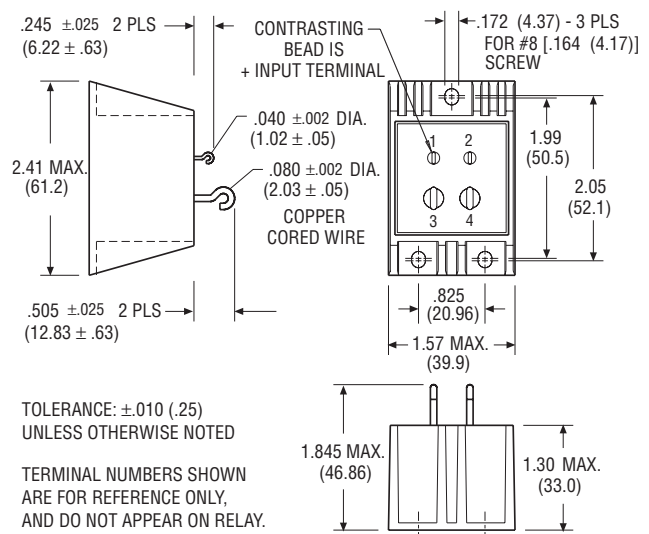
CII Part Number	Military Part Number	Zero Crossing Window
JPS10-1Y	M28750/10-001Y	15 V pk max.
JPS10-2Y	M28750/10-002Y	40 V pk max.

**Circuit Diagram**

**Terminal View**



**Outline Drawing**





**JPS10 Series High Performance Solid State Relays  
For AC Loads up to 2A @ 250Vrms** (Continued)

**Environmental Characteristics**

**Ambient Temperature Range** —  
Operating — -55°C to +110°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  
(Y1 axis)** —  
5,000 G's

**Mechanical Characteristics**

**Weight (max.)** —  
6 oz. (170 grams)

**Materials** —  
Case — Aluminum, hot tin dipped  
Terminals — Copper cored wire, gold plated

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

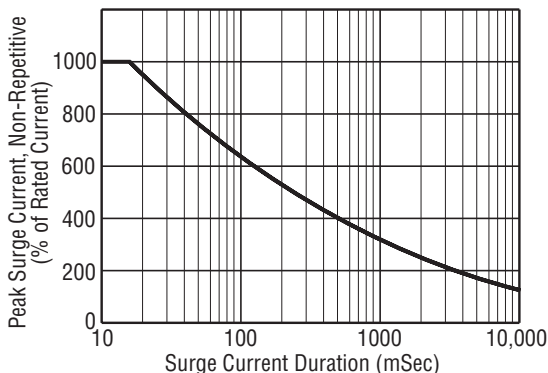
<b>Input</b>	
Input supply voltage range (Vcc)	4 - 32 Vdc
Input current (max.)	16mAdc
Must turn-on voltage	4Vdc
Must turn-off voltage	1Vdc
Reverse voltage protection	-32Vdc
<b>I/O</b>	
Dielectric strength (min.)	1,500Vrms/60 Hz.
Insulation resistance (min.) @ 500Vdc	10 <sup>9</sup> ohms
Capacitance (max.)	20pF
<b>Output</b>	
Output current rating (max.)	25Arms (Fig. 2, Note 1)
Surge current (max.)	80A pk (Fig. 1, Note 2)
Continuous load voltage (max.)	250Vrms
Transient blocking voltage (max.)	500V pk
Frequency range	45 - 440 Hz.
Output voltage drop (max.) @ 25A load current	1.5Vrms
Off-state leakage current (max.) @ 220Vrms/400 Hz.	10mArms
Turn-on time (max.)	1/2 cycle
Turn-off time (max.)	1 cycle
Off-state dv/dt (min.), with snubber	200V/μs (Note 3)
Zero voltage turn-on window (max.), JPS10-1Y	15V pk
Zero voltage turn-on window (max.), JPS10-2Y	40V pk
Waveform distortion (max.)	4Vrms
Output chip junction temperature (max.)	125°C (Note 4)
Thermal resistance (max.), junction to ambient	6.8°C/W
Thermal resistance (max.), junction to case	1.2°C/W

**10**  
Solid State Relays

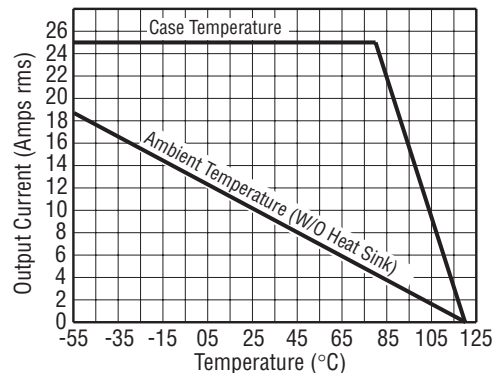
**Notes**

1. Operation at elevated load currents up to 25 amps is dependent on the use of suitable heatsink to maintain case temperature per Fig. 2.
2. Heating of output chips during and after a surge may cause loss of output blocking capability until junction temperature falls below maximum rating.
3. Internal snubber network is provided across output chips.
4. Case temperature measurement point is center of mounting surface.

**Figure 1 - Peak Surge Current vs. Surge Current Duration**



**Figure 2 - Load Current vs. Temperature**



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**Engineering Notes**

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