



A Unit of Teledyne Electronic Technologies

0.5A, 400 Vdc Optically Isolated, Short-Circuit Protected for AC or DC Loads DC Solid-State Relay

Part Number*	Relay Description
SR75-3	Solid-State Relay with Terminals for Through-Hole Mount
SR75-3S	Solid-State Relay with Terminals for Surface Mount
* \( \lambda \( \lambda \rangle \) \( \lambda \rangle \rangle \) \( \lambda \rangle \) \( \lambda \rangle \rangle \rangle \) \( \lambda \rangle \rangle \rangle \rangle \rangle \rangle \rangle \) \( \lambda \rangle \rangl	suffix denoting the Carolina reliability screening level, must

\* A 'W' or 'T' suffix denoting the  $S^{\text{oll}}$  Teledyne reliability screening level, must be added to the part number.

## **ELECTRICAL SPECIFICATIONS**

(-55°C TO 105°C, Ambient Temperature, Unless Otherwise Specified)

INPUT SE	PECIFI	ICAT	IONS
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Voltage Range (See Note 2)3.832.0VdcInput Current @ 5 Vdc (See Figure 2)11.0mAMust Turn-On Voltage (See Note 3)3.8VdcMust Turn-Off Voltage1.5VdcReverse Voltage Protection-32.0VdcOUTPUT (LOAD) SPECIFICATIONMinMaxUnitsLoad Voltage Rating400VdcTransient Blocking Voltage (See Note 5)500VdcOutput Current Rating (See Figure 4)0.5AdcOn Resistance (See Figure 3) @ 25°C2.4OhmLeakage Current at Rated Voltage100μATurn-On Time2.5ms	INFO I SPECIFICATIONS						
Input Current @ 5 Vdc (See Figure 2)  Must Turn-On Voltage (See Note 3)  Must Turn-Off Voltage  Reverse Voltage Protection  OUTPUT (LOAD) SPECIFICATION  Min Max Units  Load Voltage Rating  400 Vdc  Transient Blocking Voltage (See Note 5)  Output Current Rating (See Figure 4)  On Resistance (See Figure 3) @ 25°C  Leakage Current at Rated Voltage		Min	Max	Units			
Must Turn-On Voltage (See Note 3)         3.8         Vdc           Must Turn-Off Voltage         1.5         Vdc           Reverse Voltage Protection         -32.0         Vdc           OUTPUT (LOAD) SPECIFICATION           Min         Max         Units           Load Voltage Rating         400         Vdc           Transient Blocking Voltage (See Note 5)         500         Vdc           Output Current Rating (See Figure 4)         0.5         Adc           On Resistance (See Figure 3) @ 25°C         2.4         Ohm           Leakage Current at Rated Voltage         100         μA	Voltage Range (See Note 2)	3.8	32.0	Vdc			
Must Turn-Off Voltage         1.5         Vdc           Reverse Voltage Protection         -32.0         Vdc           OUTPUT (LOAD) SPECIFICATION           Min         Max         Units           Load Voltage Rating         400         Vdc           Transient Blocking Voltage (See Note 5)         500         Vdc           Output Current Rating (See Figure 4)         0.5         Adc           On Resistance (See Figure 3) @ 25°C         2.4         Ohm           Leakage Current at Rated Voltage         100         μA	Input Current @ 5 Vdc (See Figure 2)		11.0	mA			
Reverse Voltage Protection         -32.0         Vdc           OUTPUT (LOAD) SPECIFICATION           Min         Max         Units           Load Voltage Rating         400         Vdc           Transient Blocking Voltage (See Note 5)         500         Vdc           Output Current Rating (See Figure 4)         0.5         Adc           On Resistance (See Figure 3) @ 25°C         2.4         Ohm           Leakage Current at Rated Voltage         100         μA	Must Turn-On Voltage (See Note 3)	3.8		Vdc			
OUTPUT (LOAD) SPECIFICATION  Min Max Units  Load Voltage Rating 400 Vdc  Transient Blocking Voltage (See Note 5) 500 Vdc  Output Current Rating (See Figure 4) 0.5 Adc  On Resistance (See Figure 3) @ 25°C 2.4 Ohm  Leakage Current at Rated Voltage 100 μA	Must Turn-Off Voltage		1.5	Vdc			
Min       Max       Units         Load Voltage Rating       400       Vdc         Transient Blocking Voltage (See Note 5)       500       Vdc         Output Current Rating (See Figure 4)       0.5       Adc         On Resistance (See Figure 3) @ 25°C       2.4       Ohm         Leakage Current at Rated Voltage       100       μA	Reverse Voltage Protection		-32.0	Vdc			
Load Voltage Rating  400 Vdc  Transient Blocking Voltage (See Note 5)  500 Vdc  Output Current Rating (See Figure 4)  0.5 Adc  On Resistance (See Figure 3) @ 25°C  Leakage Current at Rated Voltage  100 μA	OUTPUT (LOAD) SPECIFIC	ATION					
Transient Blocking Voltage (See Note 5) 500 Vdc  Output Current Rating (See Figure 4) 0.5 Adc  On Resistance (See Figure 3) @ 25°C 2.4 Ohm  Leakage Current at Rated Voltage 100 μA							
Output Current Rating (See Figure 4)  On Resistance (See Figure 3) @ 25°C  Leakage Current at Rated Voltage  100 µA		Min	Max	Units			
On Resistance (See Figure 3) @ 25°C 2.4 Ohm  Leakage Current at Rated Voltage 100 µA	Load Voltage Rating	Min					
Leakage Current at Rated Voltage 100 μA		Min	400	Vdc			
	Transient Blocking Voltage (See Note 5)	Min	400	Vdc Vdc			
Turn-On Time 2.5 ms	Transient Blocking Voltage (See Note 5)  Output Current Rating (See Figure 4)	Min	400 500 0.5	Vdc Vdc Adc			
	Transient Blocking Voltage (See Note 5)  Output Current Rating (See Figure 4)  On Resistance (See Figure 3) @ 25°C	Min	400 500 0.5 2.4	Vdc Vdc Adc Ohm			
	Transient Blocking Voltage (See Note 5)  Output Current Rating (See Figure 4)  On Resistance (See Figure 3) @ 25°C  Leakage Current at Rated Voltage	Min	400 500 0.5 2.4 100	Vdc Vdc Adc Ohm μA			



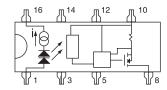
### **FEATURES/BENEFITS**

- Short-Circuit Protected: Prevents damage to system components, assemblies and system wiring
- Designed for AC application using a bridge rectifier.
- Optical Isolation: Isolates control circuits from load transients eliminates ground loops and signal ground noise
- · Low Off-State Leakage
- Switches High Voltages: To 400 Vdc
- Switches High Currents: To 0.5 Adc
- High Noise Immunity: Control signals isolated from switching noise
- High Dielectric Strength: For safety and for protection of control and signal level circuits

## **DESCRIPTION**

The SR75-3 solid-state relay utilizes a power FET switch that is protected against overload and short-circuit currents. The short-circuit protection feature not only provides protection should a short or overload occur while the relay is on, but will also provide protection should the relay be switched into a short. Once the protection trips the relay off it will remain off until reset by cycling the input line. Using the SR75-3 to switch power sources and loads prevents damage to system assemblies and system wiring. The power FET output offers low "ON" resistance and can switch loads in either the high or the low side of the power line. The SR75-3 is packaged in a 16-pin DIP package with either surface mount or through-hole mounting available.

# **BLOCK DIAGRAM**



Junction Temperature

Solderability (10 sec)

Turn-Off Time

dV/dt @ 400 V (See Note 5)

Electrical System Spike (See Note 5)

Dielectric Strength (See Note 5)

Output Capacitance @ 25 Vdc (See Note 5)

Thermal Resistance Junction to Ambient

Input to Output Capacitance at 1 KHz (See Note 5)

Insulation Resistance @ 500 Vdc (See Note 5) 108

0.5

100

 $\pm 600$ 

80

5

130

90

260

1000

ms

V/µs

Vpk

pF

рF

Vrms

Ohm

°C

°C/W

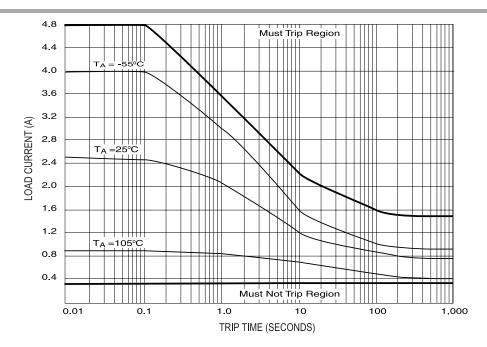
°C



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#### **OUTPUT (LOAD) SPECIFICATION** WIRING CONFIGURATIONS **Max Units** LOAD 14 Load Capacitance C 0.33 $\mu F$ TELEDYNE Load can be on Trip Time (See Figure 6) either side ¥5 Turn-on into a Shorted Load (Note 8) 1.0 msec LOAD Short Load with Relay On (Note 8) 100 μsec TYPICAL WIRING FOR DC APPLICATION **MECHANICAL SPECIFICATIONS** V BIAS = 3.8 to 16 VDC (See Note 2) 3 to 250 VAC - 0.025 (0.64) - 0.025 + .010 - .005 14 12 TELEDYNE TELEDYNE SR75-3S V BIAS = 5.0 VDC \*MicroSemi 2W06 or equivalent 0.600 (15.24) TYPICAL WIRING FOR AC APPLICATION Pins 3, 5, 12 and 14 No Connection FIGURE 5 (5.08)(10.16) 0.700 5.0 Surface Mount Land Pattern ON RESISTANCE (Ohms) 4.0 ⚠ 16 瓜 14 瓜 12 **™** TELEDYNE 0.25 (6.35) 3.0 SR75-3 $\mathbb{T}_3$ $\Psi_5$ 2.0 0.855 + 025 1.0 0.020 (0.51) MIN 0.0 -55 -35 -15 5 25 45 65 85 105 125 L 0.100 (2.54) MIN JUNCTION TEMPERATURE (°C) DIMENSIONS ARE IN INCHES (MILLIMETERS) TYPICAL ON RESISTANCE VS JUNCTION Operating Temperature Range -55°C to 105°C Storage Temperature Range -55°C to 125°C **TEMPERATURE** Weight: 2.0 grams maximum FIGURE 3 Case: 16 pin Dual-In-Line (TO-116) Case Material: Filled Epoxy, self extinguishing FIGURE 1 0.5 12.0 0.4 INPUT CURRENT (MA) LOAD CURRENT (Adc) 10.0 Series Resistor Required in Dashed area 8.0 0.3 See Note 6 6.0 0.2 4.0 2.0 0.1 O 0.0 12.0 30.0 0 2.0 4.0 6.0 8.0 10.0 -55 -35 125 25 105 INPUT VOLTAGE (Vdc) AMBIENT TEMPERATURE (°C) **CONTROL CURRENT VS VOLTAGE** LOAD CURRENT DERATING CURVE FIGURE 2 FIGURE 4

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## TRIP CURRENT VS TIME FIGURE 6

## NOTES:

- Unless otherwise specified, the following conditions shall apply for conformance testing:
  - Input Voltage = 5.0 Vdc for "on-state" and 0 Vdc for the "off-state"
  - Load Voltage = 350 Vdc
  - Load Current = 0.50 Adc at 25°C and -55°C;
    - = 0.25 Adc at 105°C
- For Input Voltage greater than 16.0 Vdc, a series resistor must be used to limit the power dissipation on the input of the relay. The resistor value should be selected using the following equation:

$$R = (V_{Bias} - 16 \text{ volts}) / 11 \text{ mA}$$

- $R = (V_{\text{\tiny Bias}} 16 \text{ volts}) / 11 \text{ mA}$  The Input transitions should be less than 1.0 msec duration.
- Inductive loads must be diode suppresses.
- At +25°C ambient.
- 6 System inductance must be less than 50  $\mu$ H. (The residual inductance at the relay output with the load shorted across.)
- The maximum capacitance across the relays output that will not cause the relay to "latch-off".
- When turning on into a shorted load or when shorting the load with the relay on, the relay will "circuit-breaker" off within the time specified for other overload conditions, see Figure 6.
- SR75-3 though-hole terminal series for solder-dip or wave-solder process +260°C for 10 seconds max per Mil STD 202,
- 10 SR75-3S surface-mount terminal series for soldering process that heat the entire package to ≤ +235°C for 10 seconds max.