

53270**SOLID STATE RELAY, 400VDC- 1.5A
OPTICALLY ISOLATED, SHORT CIRCUIT PROTECTED****Mii**

MICROCIRCUITS DIVISION

Features:

- SPST, Normally Open
- 1000 VDC Optical Isolated Control Input
- Power MOSFET, Low On-state Resistance
- Built-in Short Circuit Protection
- Wide Operating Temperature Range
- Non-hermetic Package

Applications:

- COTS Military Applications
- Gun Turret Controls
- Motor or Solenoid Driver
- Displays/Lamps/Controls
- Industrial Automation

DESCRIPTION

The **53270** Solid State Relay (SSR) is designed for applications in environment where hermeticity is not required. Its solid state "contact" is resistant to damage from shock and vibration. It is also immune to contact related problems (contamination, arcing, bouncing, etc.) associated with the electromechanical relays. Functionally, the device operates as a single-pole single-throw (SPST), normally open (1 Form A) unidirectional high-side or low-side switch. Using a 500 VDC rated N-channel MOSFET as the switching device, the 53270 SSR offers low on-state resistance for lowering the power dissipation, which allows operation over the temperature range of -40°C to $+85^{\circ}\text{C}$ with minimal heat sinking. A built-in current sense circuit offers short circuit protection by turning off the MOSFET switch and allowing no current flow into the load. After the 53270 SSR tripped due to a short circuit load, the output latches in the off-state until its control input recycles. The control input is isolated from the load circuit using an optocoupler. This isolation barrier will eliminate the system ground loop noise of the application. The optocoupler employs a dual high efficiency LED input allowing TTL/CMOS logic to drive the solid state relay. The SSR is actuated by applying an input forward current of 5 to 10 mA to the LED's. The 53270 SSR has no moving parts and is enclosed in a non-hermetic package.

ABSOLUTE MAXIMUM RATINGS (@ $T_C = 25^{\circ}\text{C}$ unless otherwise specified)

Output Voltage	500 VDC
Continuous Output Current @ $T_C = 85^{\circ}\text{C}$	1.5 A
Continuous Control Input Current	20 mA
Storage Temperature Range	-65°C to $+150^{\circ}\text{C}$
Operating Temperature Range	-40°C to $+85^{\circ}\text{C}$
Junction Temperature	150°C
Lead Solder Temperature	300°C for 10 s

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Max.	Units
Output Voltage	$V_{O(OFF)}$	—	400	VDC
Continuous Output Current	$I_{O(ON)}$	—	1.5	A
Control Input Current	I_F	5	10	mA
Operating Case Temperature	T_C	-40	85	$^{\circ}\text{C}$

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ELECTRICAL SPECIFICATIONST_C = -40°C to +85°C, unless otherwise specified.

Parameter	Symbol	Min.	Typ.*	Max.	Units	Test Conditions	Notes
INPUT CHARACTERISTICS							
Input Forward Voltage	V _F	2.0	2.7	3.8	VDC	I _F = 8 mA	
Input Reverse Breakdown Voltage	V _R	6	20	—	VDC	I _R = 10 μA	7
OUTPUT CHARACTERISTICS							
Output On-Resistance	R _(ON)	—	0.8	1.2	Ω	I _F = 8 mA, I _O = 1.5 A Pulse width = 10 ms Duty cycle ≤ 10%	6
Output Leakage Current	I _{O(OFF)}	—	—	250	μA	V _F = 0.6 VDC V _O = 400 VDC	6
Turn-On Time	t _{ON}	—	—	8	ms	I _F = 8 mA I _O = 1.5 A Pulse width = 10 ms Duty cycle ≤ 10%	3 & Figure 2
Turn-Off time	t _{OFF}	—	—	2	ms		
Rise Time	t _R	—	—	6	ms		
Fall Time	t _F	—	—	1	ms		
Over-current Limit	I _{CL}	1.6	—	5.3	A	V _O = 54 VDC R _L = 10 Ω	4
Over-current Trip Time	t _{CL}	—	—	1	ms		
Peak Short Circuit Current	I _{SC(PK)}	—	15	20	A	Short-while-on @ T _C = 25°C	5 & 7
Short Circuit Shut Down Time	t _{SC}	—	—	100	μs		
COMMON CHARACTERISTICS							
Input-Output Leakage Current	I _{I-O}	—	—	1	μA	RH ≤ 45%, t = 5 s V _{I-O} = 1000 VDC T _C = 25°C	1 & 2
Thermal Resistance (junction-case)	θ _{JC}	—	18.5	—	°C/W		7

* Typical values are at T_C = 25°C**Notes:**

1. Input pins shorted together and output pins shorted together.
2. Input-output potential applied momentarily, not a steady state operating condition.
3. Rise time is measured from 10% to 90% of load current (90% to 10% of V_O). Fall time is measured from 90% to 10% of load current (10% to 90% of V_O). Guaranteed but not tested.
4. The minimum over-current limit occurs at T_C of 85°C. The maximum over-current limit occurs at T_C of -40°C.
5. Use 0.25 ohm sense resistor for monitoring the peak short circuit current.
6. The user should apply the appropriate transient suppression technique to the output terminals of the relay when the loads are inductive enough to generate voltage spikes.
7. Guaranteed but not tested.

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Figure 1 – Block Diagram (Low-side Switch shown)

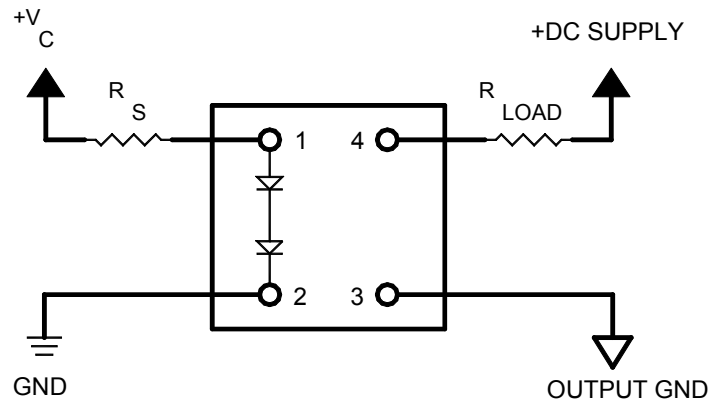
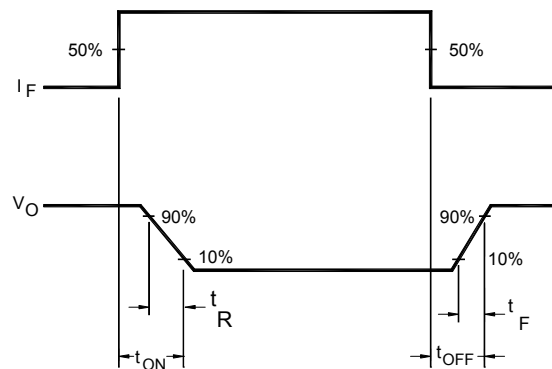
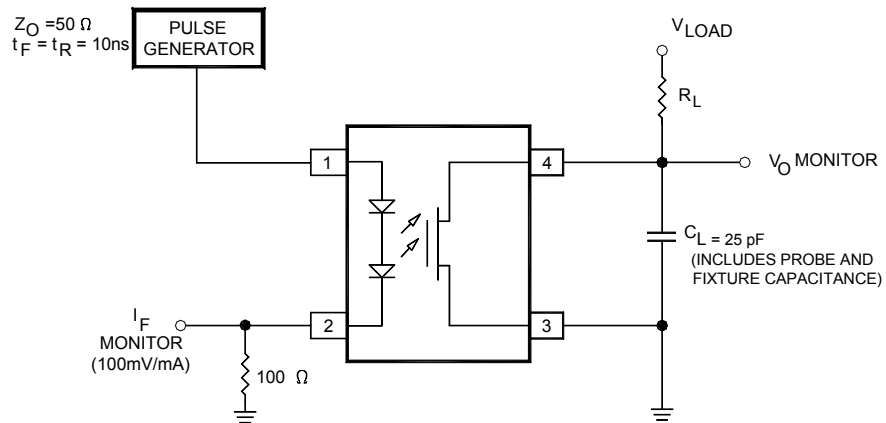


Figure 2 – Switching Test



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Figure 3 – Typical Peak Short Circuit Current (short-while-on)

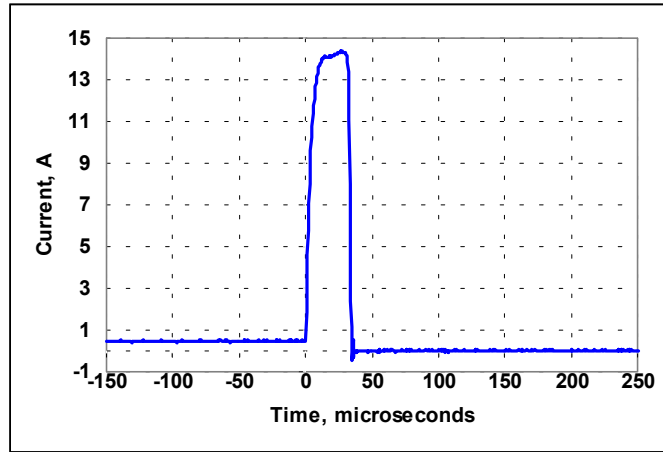


Figure 4 - Case Outline

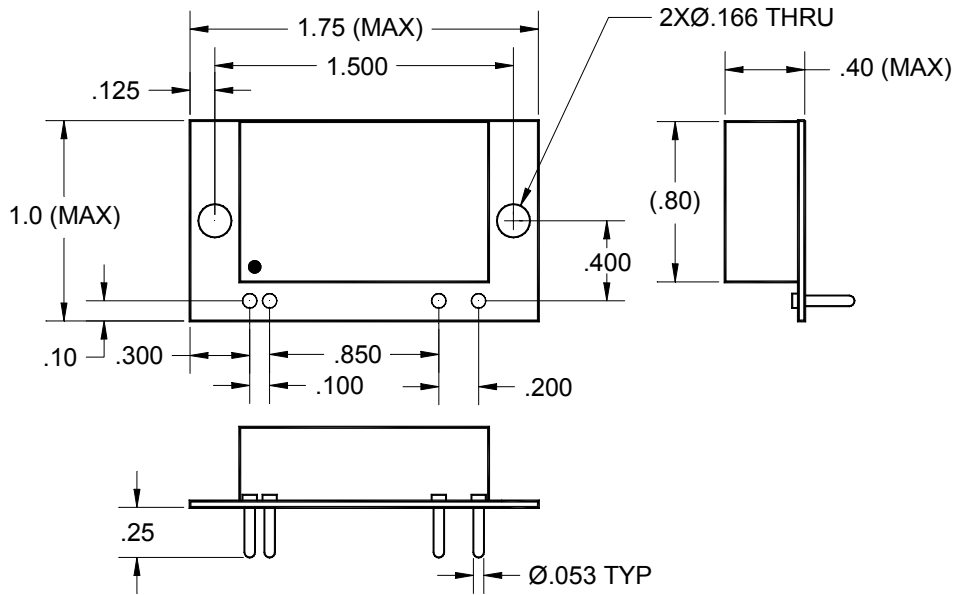


Figure 5 - Pin Assignment

PIN	SYMBOL	FUNCTION
1	+ IN	Control Input
2	- IN	Control Input Return
3	- OUT	Output Return
4	+ OUT	Output

Note: Dot indicates pin 1. Pins are numbered from left to right viewing from the top view.

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