

**53258**

**RADIATION TOLERANT  
120VDC – 5A  
POWER MOSFET OPTOCOUPLER**



**Features:**

- Design for 100 krad(Si) Total Dose
- Hermetically Sealed in Surface Mount Package
- Low On-resistance
- 5A Continuous Output Current
- Operation over Full Military Temperature Range -55°C to +125°C
- Optically Coupled
- Input / Output Isolation Tested to 1000 VDC
- Shock and Vibration Resistance

**Applications:**

- Satellite/Space Systems
- Military/High Reliability Systems
- Power Distribution/Switching
- Solenoid Driver
- Stepper Motor Driver
- Switching Heaters

**DESCRIPTION**

The 53258 is a radiation tolerant Power MOSFET Optocoupler designed for military and space applications. This light-weight device is resistant to damage from severe shock and vibration, and is immune to contact related problems inherent in electro-mechanical relays. The device is enclosed in a hermetic metal package to ensure reliability in harsh environments. Effective isolation of 1000 VDC between control and load circuits is achieved through the use of optical coupling.

Functionally, the device operates as a single-pole single-throw, normally open (1 Form A) DC solid-state relay. The 53258 SSR is actuated by an input current of 10 to 15 mA, which can be supplied from a standard TTL device. Output is provided by a power MOSFET exhibiting very low  $R_{DS(ON)}$  and capable of carrying a continuous current of 5 amperes. This device is designed to function with minimal degradation after exposure to 100 krad(Si) total dose. The 53258 SSR is available in a variety of quality levels including any custom screening requirements.

**ABSOLUTE MAXIMUM RATINGS**

Output Voltage .....	150 VDC
Continuous Output current .....	5 A
Storage Temperature Range .....	-65°C to +150°C
Operating Junction Temperature .....	+150°C
Lead Solder Temperature, for 10 seconds .....	300°C
Continuous Input Current .....	20 mA
Peak Input Current <sup>(1)</sup> .....	100 mA
Reverse Input Voltage .....	6 VDC
Thermal Impedance Junction to Case (Input Diode) .....	311°C/W
Thermal Impedance Junction to Case (output Transistor) .....	0.329°C/W
<b>WEIGHT:</b> .....	3.7 grams (typical)

**RADIATION TOLERANT**

This device contains radiation hardened components and/or other features that provide a level of radiation tolerance. Micropac does not guarantee any level of radiation hardness. Specific lot testing is required to determine the level of radiation hardness. Micropac does not offer this device as compliant to Appendix G (RHA Requirements) of MIL-PRF-38534.

Micropac Industries cannot assume any responsibility for any circuits shown or represent that they are free from patent infringement. Micropac reserves the right to make changes at any time in order to improve design and to supply the best product possible.

## RECOMMENDED OPERATING CONDITIONS:

Parameter	Symbol	Min.	Max.	Units
Output Voltage <sup>(5)</sup>	$V_{O(OFF)}$		120	VDC
Continuous Output Current	$I_{O(ON)}$		5	A
Input Current (on)	$I_{F(ON)}$	10	15	mA
Input Voltage (off)	$V_{F(OFF)}$	0	1	VDC
Operating Case Temperature	$T_C$	-55	125	°C

## ELECTRICAL SPECIFICATIONS (Pre-Irradiation)

 $T_C = -55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  unless otherwise specified

Parameter	Symbol	Min.	Typ.*	Max.	Units	Test Conditions	Notes
Output On-Resistance	$R_{(ON)}$	—	0.110	0.220	$\Omega$	$I_F = 15\text{ mA}$ $I_O = 2\text{ A}$ Pulse width = 10 ms Duty cycle $\leq 10\%$	
Output Leakage Current	$I_{O(OFF)}$	—	—	250	$\mu\text{A}$	$V_F = 1\text{ VDC}$ $V_O = 150\text{ VDC}$	
Input Forward Voltage	$V_F$	—	—	4.20	VDC	$I_F = 15\text{ mA}$	
Input Reverse Breakdown Voltage	$V_R$	6	40	—	VDC	$I_R = 10\ \mu\text{A}$	
Input-Output Leakage Current	$I_{I-O}$	—	—	1	$\mu\text{A}$	$RH \leq 45\%$ , $t = 5\text{ s}$ $V_{I-O} = 1000\text{ VDC}$ $T_C = 25^{\circ}\text{C}$	2, 3
Turn-On Time	$t_{ON}$	—	—	8	ms	$I_F = 15\text{ mA}$ $I_O = 2\text{ A}$ Pulse width = 10 ms Duty cycle $\leq 10\%$	Figure 3
Turn-Off time	$t_{OFF}$	—	—	2	ms		Figure 3
Rise Time	$t_R$	—	—	6	ms		4, Figure 3
Fall Time	$t_F$	—	—	1	ms		

\* All typical values are at  $T_C = 25^{\circ}\text{C}$ 

## Notes:

- Non-repetitive, pulse width  $\leq 100\ \mu\text{s}$ ,  $T_C = 25^{\circ}\text{C}$ .
- Input pins shorted together and output pins shorted together.
- Input-output potential applied momentarily, not a steady state operating condition.
- 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  $V_O$ ).
- 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.

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INPUT	OUTPUT
ON	ON
OFF	OFF

Figure 1. Truth Table

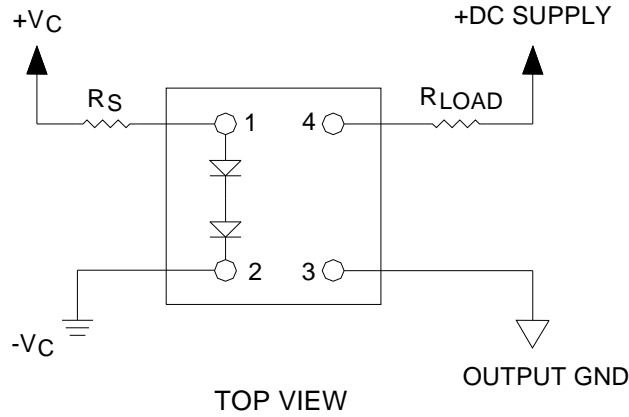


Figure 2. Terminal Connections

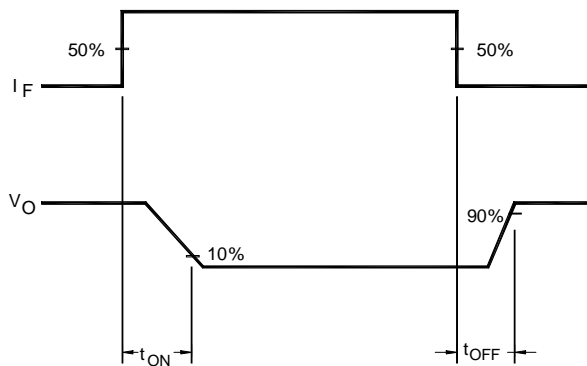
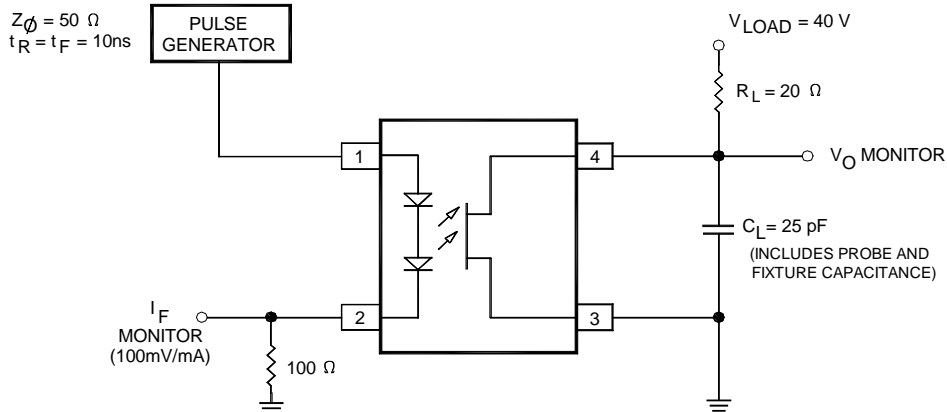
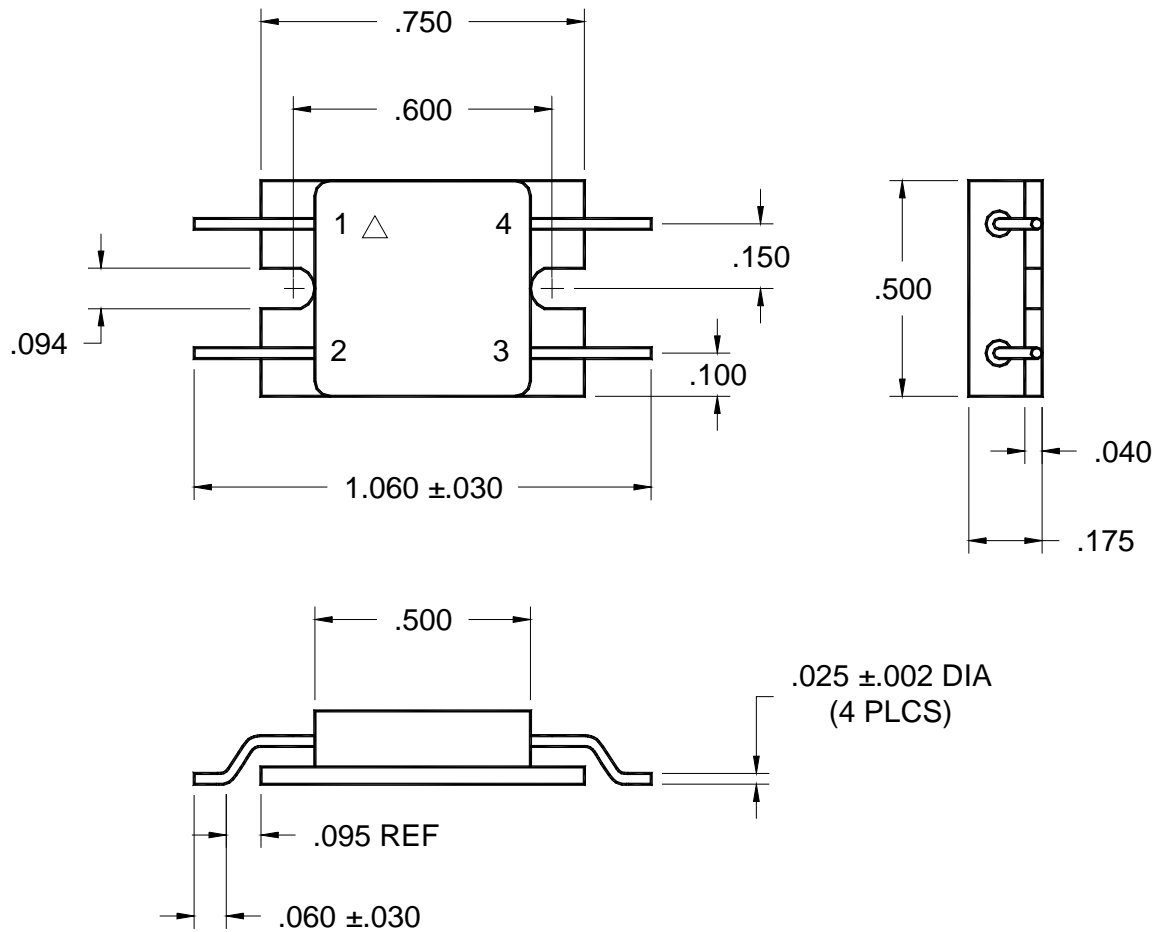


Figure 3. Switching Waveforms and Test Circuits

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**CASE OUTLINE**  
(Dimensions in inches)



**ORDERING GUIDE**

MII DASH NO.	DESCRIPTION	LEAD FINISH	SCREENING LEVEL
53258-101	Rad Tolerant 120VDC -5A Power MOSFET Optocoupler: gullwing package	SOLDER LEADS	NO SCREENING
-102		GOLD LEADS	NO SCREENING
-111		SOLDER LEADS	SCREENING TO "H" LEVEL
-112		GOLD LEADS	SCREENING TO "H" LEVEL
-114		SOLDER LEADS	SCREENING TO "K" LEVEL
-113		GOLD LEADS	SCREENING TO "K" LEVEL

NOTE: Screening to H or K is 100% screening per Table C-IX of MIL-PRF-38534, which includes H or K element evaluation per Table C-I of MIL-PRF-38534. Does not include Quality Conformance Inspection.

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