53012

SPST SOLID-STATE RELAY

Mii

**HYBRID MICROELECTRONICS
PRODUCTS DIVISION**

Features:

- Replacement for M90FS-2
- SPST, Normally Open
- Integral Short Circuit Protection
- Power FET Output Low On-state Resistance
- Full Military Temperature Operation:
  -55ºC to +125ºC
- Military Environmental Screening Available
- Improved Thermal Characteristics
- Built in accordance with 85006-001

Applications:

- Low Level Power Control
- Current Loop Switches
- Isolated Line Driver Selection
- Servo and Synchro Resolver Control
- Military/Aerospace General Purpose Switching

DESCRIPTION

The 53012 is a military SPST solid-state relay. This light-weight device is resistant to damage from shock and vibration, and is immune to contact-related problems (contamination, arcing) associated with mechanical equivalents.

Optical coupling between the input and output stages provides effective isolation up to 1000 volts AC RMS. Power FET outputs eliminate bipolar offset, and minimize output voltage drop.

The control logic is TTL compatible, and will accommodate bias supplies between 3.8 and 32 VDC.

Integral short-circuit protection is provided in the 53012.   This unit senses excessive current flow while under load or while switching, and respond by opening the output. The output will remain blocked indefinitely until the short is removed, and the unit reset. This feature prevents damage to the unit, and also averts further system failures that may be caused by the short-circuit. Resetting the unit can be accomplished by cycling the input control.

This solid-state relay is ideal for use in military systems, or wherever high reliability, low power actuation, and light weight are design considerations. Applications include general purpose signal switching and electronic load control.

ABSOLUTE MAXIMUM RATINGS

Isolation Voltage: 53012 ....1000 VAC RMS
Operating Temperature ....-55ºC to +125ºC Case
Storage Temperature ....-55ºC to +125ºC

ELECTRICAL CHARACTERISTICS*

T_A = +25° C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Current			13	16	MA
Control Voltage Range	See Table 1 – Bias Resistance	3.8		32	VDC
Turn-Off Voltage				1.5	VDC
Turn-On Voltage		3.8			VDC
Continuous Operating Output Voltage				60	VDC
Load Current	25ºC			1.0	Amps
On Resistance			0.2	0.3	Ohms
Output Capacitance	25V, 1MHz			400	pF
Thermal Resistance Θ_{JA}			100		ºC/W
Thermal Resistance Θ_{JC}			25		ºC/W
Rise Time, t_r	10% - 90% Load Voltage			1000	µs
Fall Time, t_r	90% - 10% Load Voltage			100	µs
On Delay, t_{dON}	Min Turn On Volts To 10% Load V			800	µs
Off Delay, t_{dOFF}	Max Turn Off Volts To 90% Load V			500	µs
Surge Voltage	5 Second Maximum			80	Volts
Leakage Current	Max Cont. Operating Output V		10		µA
Dielectric Strength	I-0, 60 Hz Sine Wave			1000	VAC RMS
Isolation Resistance	Input to Case, 500 V		10^9		Ohms
Current Surge	100 ms		2		Amps DC
Overload Trip Current	40 ms Pulse		8.5		Amps DC

NOTES:

1. Limiting resistor may be required for $V_{C >}$ 6V. See Table 1
2. Input transitions should be < 1 ms
3. Maximum input frequency: 50Hz (Normal load). For shorted load, use:
    $$f_{SC} = 50 – (1.17 \text{ X } V_{OUT})$$
4. $t_{ON} = t_r + t_{dON}$, $t_{OFF} = t_f + t_{dOFF}$

APPLICATION INFORMATION
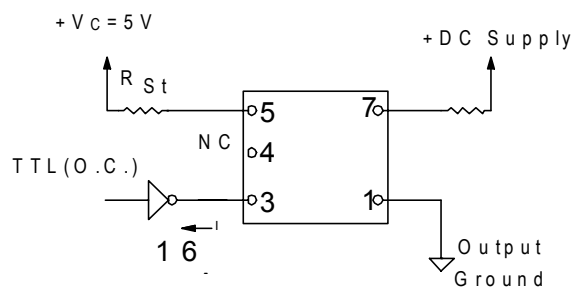
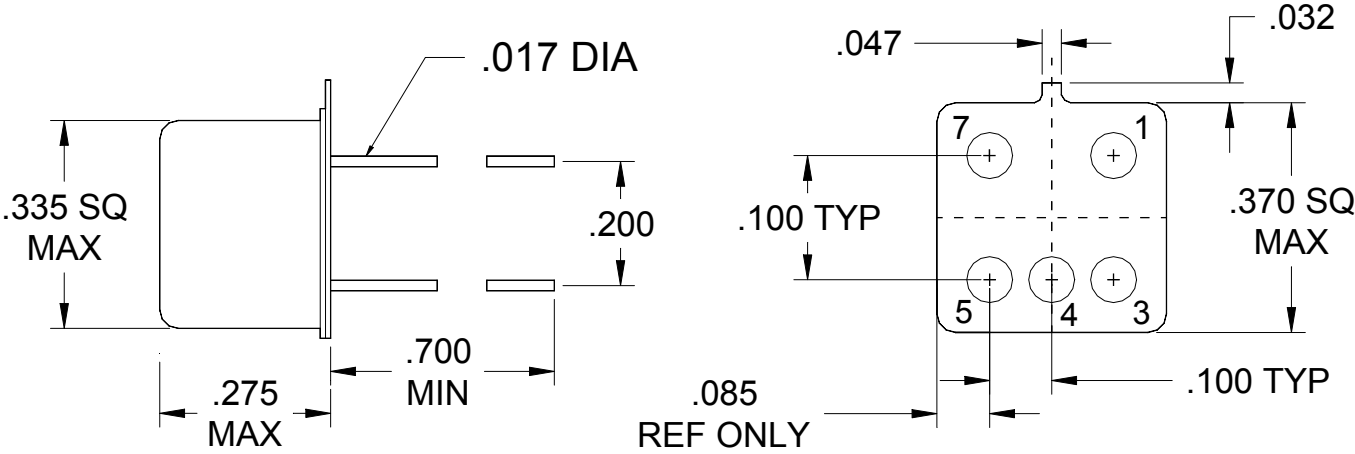
*Limiting Resistor (R_S) May Be Required. See Table 1.

TABLE 1
LIMITING RESISTANCE (R_S) VALUES
(Without Heat Sink)

V_C (VDC)	3.8-6	6 – 10	10 – 14	14 – 18	22 – 26	26 - 32
R_S (Ω)		300	620	910	1500	2000
Rating		1/4	1/4	1/2	1/2	1

Package Dimensions

.017 DIA

.335 SQ
MAX

.200

.275
MAX

.700
MIN

.047

.032

7   1

5   4   3

.100 TYP

.370 SQ
MAX

.100 TYP

.085
REF ONLY

PIN	FUNCTION
1	- Output
3	Ground
4	NC
5	V_{CC}
7	+ Output