

1 Form A  
Solid State Relay



## DESCRIPTION

The S110 is a multipurpose, bi-directional, single-pole, single-throw, normally open multipurpose relay. The circuit is composed of one LED on the input side which activates an optically coupled IC circuit on the output side - controlling the firing angle of two back-to-back SCRs. This circuit assures no false triggering under most adverse conditions, and a tight zero-volt window not exceeding 5V.

## FEATURES

- Inverse parallel SCR output
- High input to output Isolation
- High transient immunity
- Input to output Isolation exceeds 2500V AC
- 400V maximum Blocking Voltage
- 0.8A maximum Continuous Load Current
- Zero-volt switching

## APPLICATIONS

- Interface between microprocessors and logic circuits
- Drive small lamps / solenoids
- Medical electronic equipment
- Communication equipment

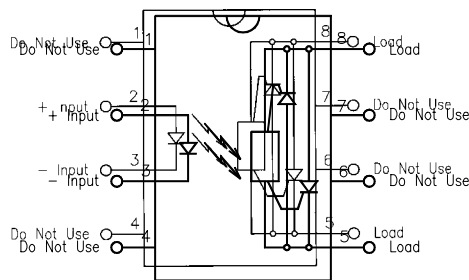
## OPTIONS / SUFFIXES

- -H High Output Isolation
- -S Surface Mount Option
- -TR Tape and Reel
- -X 300w Input Resistor

## MAXIMUM RATINGS

PARAMETER	UNIT	MIN	TYP	MAX
Storage Temperature	C	- 55°	-	125°
Operating Temperature	C	- 40°	-	85°
Continuous Input Current	mA	-	-	40
Transient Input Current	mA	-	-	400
Reverse Input Control Voltage	V	6.0	-	-
Blocking Voltage	V	-	-	± 400
Output Power Dissipation	mW	-	-	500

## SCHEMATIC DIAGRAM



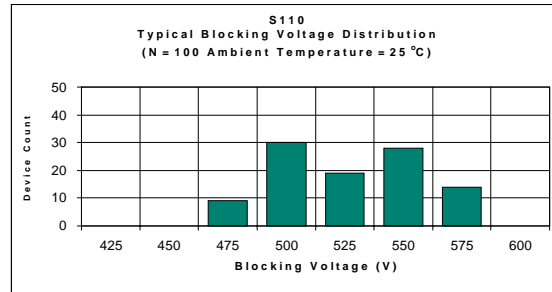
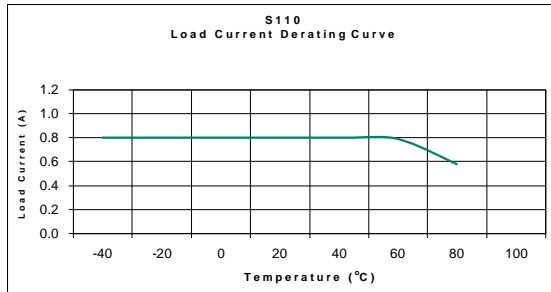
## APPROVALS

- BAPT CERTIFICATE # 608203:  
BS EN 60950, BS EN 41003, BS EN 60065
- UL FILE # E90096

## ELECTRICAL CHARACTERISTICS - 25°C

PARAMETER	UNIT	MIN	TYP	MAX	TEST CONDITIONS
<b>INPUT SPECIFICATIONS</b>					
LED Forward Voltage	V	-	1.2	1.5	$I_f = 10\text{mA}$
LED Reverse Voltage	V	6.0	12	-	$I_r = 10\mu\text{A}$
Must Operate Current	mA	-	2.5	5.0	Full Load, Resistive
Reverse Current	$\mu\text{A}$	-	-	10.0	$V_f = 5.0\text{V}$
Junction Capacitance	pF	5.0	-	-	$V_f = 0\text{V}$
Input Resistor	$\Omega$	-	250	300	-
<b>OUTPUT SPECIFICATIONS</b>					
Blocking Voltage	V	-	-	400	$I_o = 10\mu\text{A}$
Continuous Load Current	A	-	-	0.8	$I_m = 5.0\text{mA}$
Surge Current Rating	A	-	-	5.0	$T = 10\mu\text{S}$
Holding Current	mA	-	-	10	-
On-Voltage	V	-	-	1.2	$I_o = 0.8\text{A}$
Voltage Across Load at Turn-On	V	-	-	5.0	$I_f = 5.0\text{mA}$
Leakage Current	$\mu\text{A}$	-	100	250	$V_o = 250\text{V}$
Thermal Resistance	$^{\circ}\text{C/W}$	-	150	-	-
Power Factor	-	0.3	-	-	-
Critical Rate of Rise (dV/dt)	$\text{V}/\mu\text{S}$	400	-	-	-
<b>COUPLED SPECIFICATIONS</b>					
Isolation Voltage -H Suffix	V	2500 3750	-	-	$T = 1\text{ Minute}$
Isolation Resistance	$\Omega$	$10^{11}$	-	-	-
Coupled Capacitance	pF	-	6.0	-	-

## PERFORMANCE DATA



## ZERO-VOLT SWITCHING

The S110 solid state relay has been designed with a driver circuit that controls the operation of two back-to-back silicon controlled rectifiers (SCRs), each responsible for one half of the AC cycle. If an AC signal is examined, the turn on, turn off, and zero-volt switching can be shown. Figure 1 shows a typical 60Hz, 120Vac signal with a corresponding relay input signal:

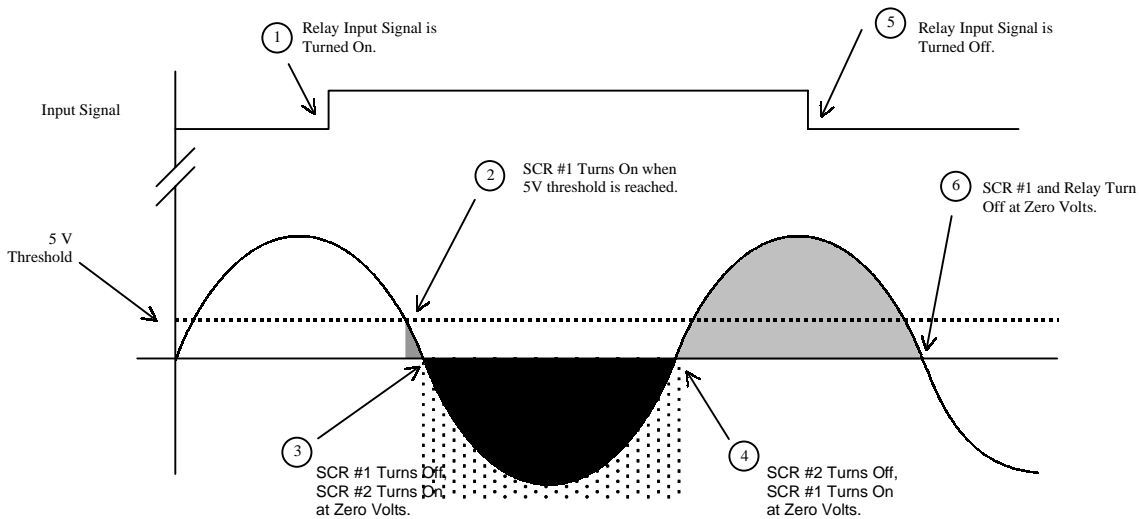
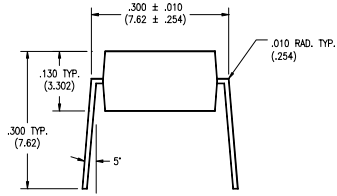


Figure 1: Zero-Volt Switching

Figure 1 shows the sequence of zero-volt switching operation. At Stage 1, an input signal is applied to the relay. The relay will not turn on until the Threshold Voltage of 5V is reached. Once this point (Stage 2) is reached, SCR #1 (Designated as the SCR which controls positive AC voltage) turns on. However, SCR #1 only stays on for an instant, as the cycle quickly crosses zero. At this point (Stage 3), SCR #1 will turn off and SCR #2 (negative AC voltage) will turn on. Likewise, at the next zero cross (Stage 4), SCR #2 will turn off and SCR #1 will turn on. Even though the input signal is terminated at Stage 5, the relay will still continue to conduct (typical SCR behavior) until Stage 6, when SCR #1 crosses zero and turns off. Please note that Turn On can likewise begin on the negative phase of the AC cycle with a -5V threshold as well, even though only the positive phase is shown here.

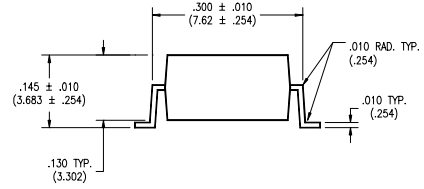
**MECHANICAL DIMENSIONS**

**8 PIN DUAL IN-LINE PACKAGE**

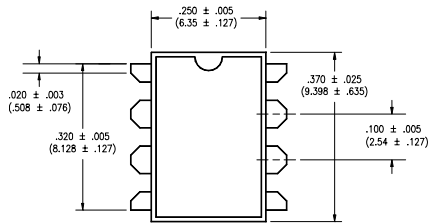


**END VIEW**

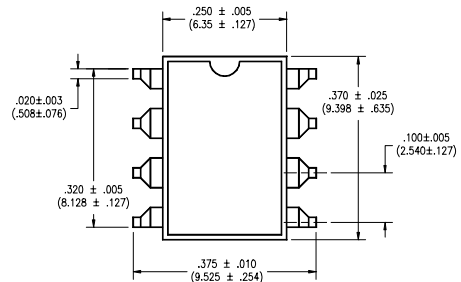
**8 PIN SURFACE MOUNT DEVICE**



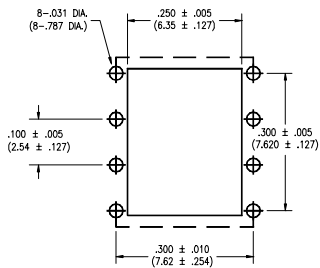
**END VIEW**



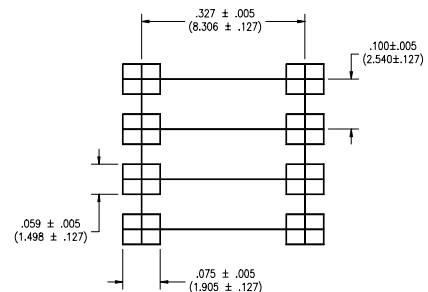
**TOP VIEW**



**TOP VIEW**



**BOTTOM VIEW /  
BOARD PATTERN**



**BOTTOM VIEW /  
BOARD PATTERN**