S110

SOLID STATE OPTRONICS

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

SCHEMATIC DIAGRAM

MAXIMUM RATINGS

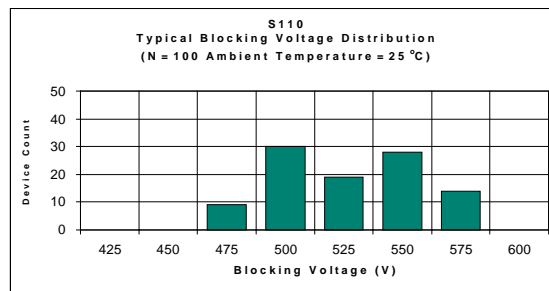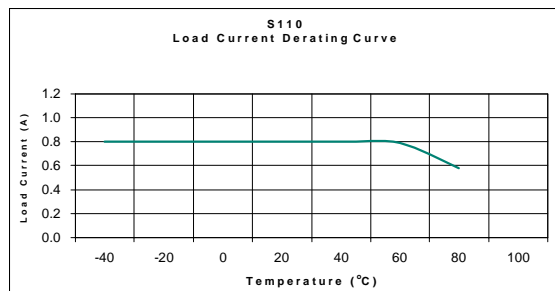| PARAMETER	UNIT	MIN	TYP	MAX
Storage Temperature	C	- 55°	-	125°
Operating Temperature	C	- 40°	-	85°
Continuous Input Current	mA	-	-	40
Transient Input Current	mA	-	-	400
Reverse Input Control Voltage	V	6.0	-	-
Blocking Voltage	V	-	-	± 400
Output Power Dissipation	mW	-	-	500
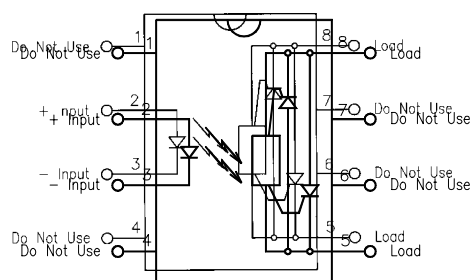
APPROVALS

- BABT 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
INPUT SPECIFICATIONS					
LED Forward Voltage	V	-	1.2	1.5	I_f = 10mA
LED Reverse Voltage	V	6.0	12	-	I_r = 10µA
Must Operate Current	mA	-	2.5	5.0	Full Load, Resistive
Reverse Current	µA	-	-	10.0	V_r = 5.0V
Junction Capacitance	pF	5.0	-	-	V_f = 0V
Input Resistor	Ω	-	250	300	-
OUTPUT SPECIFICATIONS					
Blocking Voltage	V	-	-	400	I_O = 10µA
Continuous Load Current	A	-	-	0.8	I_{in} = 5.0mA
Surge Current Rating	A	-	-	5.0	T = 10µS
Holding Current	mA	-	-	10	-
On-Voltage	V	-	-	1.2	I_o = 0.8A
Voltage Across Load at Turn-On	V	-	-	5.0	I_f = 5.0mA
Leakage Current	µA	-	100	250	V_O = 250V
Thermal Resistance	°C/W	-	150	-	-
Power Factor	-	0.3	-	-	-
Critical Rate of Rise (dV/dt)	V/µS	400	-	-	-
COUPLED SPECIFICATIONS					
Isolation Voltage -H Suffix	V	2500 3750	-	-	T = 1 Minute
Isolation Resistance	Ω	10^{11}	-	-	-
Coupled Capacitance	pF	-	6.0	-	-

PERFORMANCE DATA

S110
Load Current Derating Curve

S110
Typical Blocking Voltage Distribution
(N = 100 Ambient Temperature = 25 °C)

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:
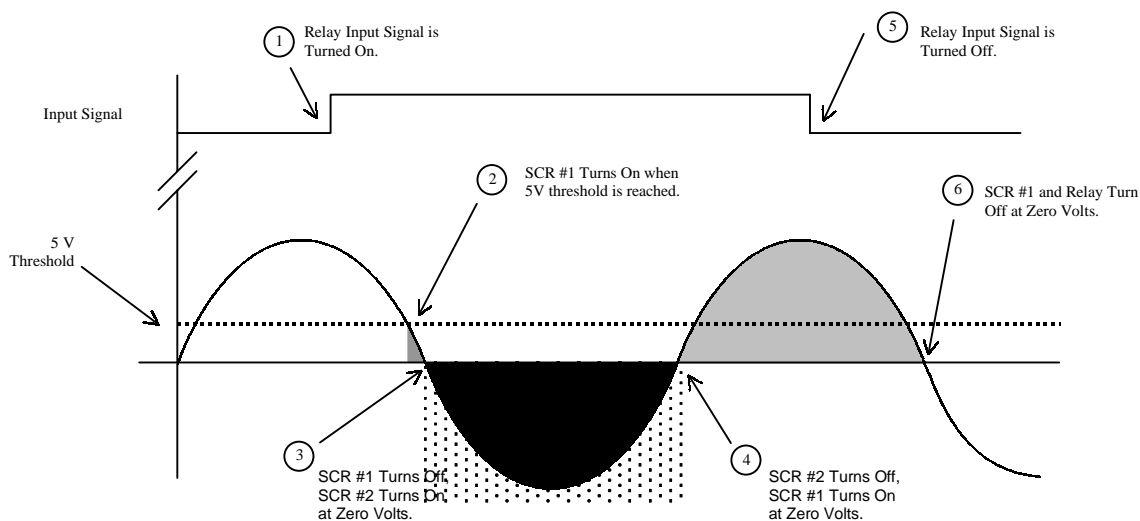
*Figure 1: Zero-Volt Switching*

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 back 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.

SOLID STATE OPTRONICS
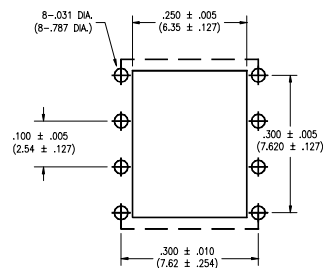
MECHANICAL DIMENSIONS

8 PIN DUAL IN-LINE PACKAGE
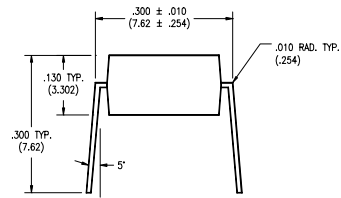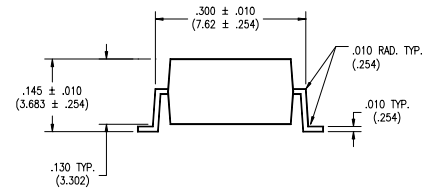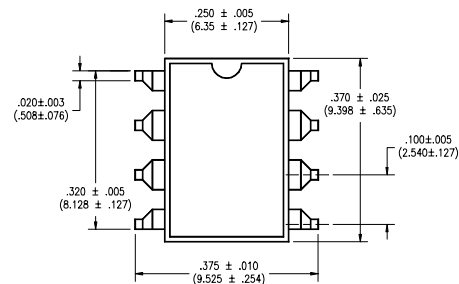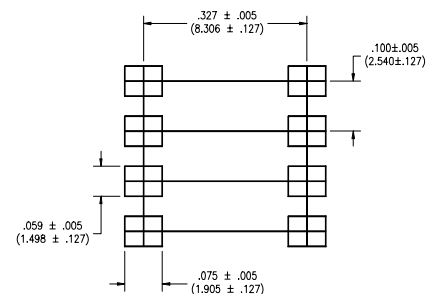
END VIEW
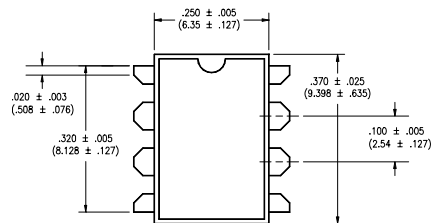
TOP VIEW

*BOTTOM VIEW /
BOARD PATTERN*

8 PIN SURFACE MOUNT DEVICE

END VIEW

TOP VIEW

*BOTTOM VIEW /
BOARD PATTERN*