SIEMENS

Data Sheet

AT&T Solid-State Relays now manufactured and marketed by
Siemens Optoelectronics Division
19000 Homestead Road, Cupertino, CA 95014

LH1061AB/AAC High-Voltage, Solid-State Relay

Description

The LH1061AB/AAC High-Voltage, Solid-State Relay is a double-pole, single-throw, normally open switch (2 Form A) that can replace electromechanical relays in many applications. The relay features logic-level input control of isolated high-voltage switch outputs. The output is rated at 200 V and can handle loads up to 110 mA. The relay can switch both ac and dc loads and is ideal for audio frequency or dc applications. Typical ON-resistance at 50 mA is 12 Ω.

The LH1061AB/AAC Relay consists of a GaAlAs LED that optically couples control signals to a monolithic integrated circuit. Optical coupling provides 1500 Vrms of input/output isolation. The integrated circuit is a dielectrically isolated, high-voltage die comprised of photodiode arrays, switch control circuitry, and high-voltage DMOS transistor switches.

In operation, the device is exceptionally linear up to 75 mA. Beyond 75 mA, the incremental resistance decreases, thereby minimizing internal power dissipation. Overload currents are clamped at 250 mA by internal current limiting. An extended clamp condition, which increases relay temperature, results in a reduction in clamp current, thereby further reducing internal power dissipation and preserving the relay's integrity. This relay is packaged in an 8-pin, plastic DIP (LH1061AB) or in an 8-pin, surface-mount, gull-wing configuration (LH1061AAC).

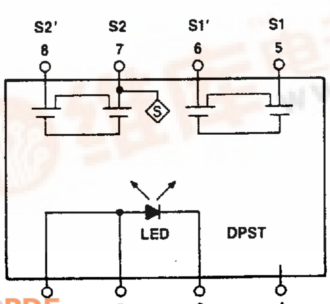
Features

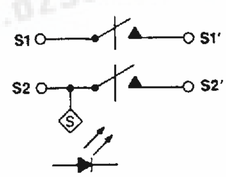
- 1500 Vrms input/output isolation
- High-surge capability
- Low ON-resistance
- Clean, bounce-free switching
- Low power consumption
- Monolithic IC reliability

Applications

- Telephone switchhook
- High-voltage testers
- Industrial controls
- Isolation switching

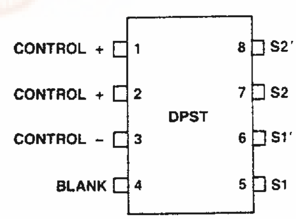
Functional Diagram





EQUIVALENT RELAY DIAGRAM

Pin Diagram



Absolute Maximum Ratings

At 25 °C

Stresses exceeding the values listed under Absolute Maximum Ratings can cause permanent damage to the device. This is an absolute stress rating only. Functional operation of the device at these or any other conditions in excess of those indicated in the operational sections of this data sheet is not implied. Exposure to maximum-rating conditions for extended periods of time can adversely affect the device reliability.

Rating	Symbol	Value	Unit
Ambient Operating Temperature Range	T_A	−40 to +85	°C
Storage Temperature Range	T_{stg}	−40 to +100	°C
Pin Soldering Temperature (t = 7 s max.)	T_S	270	°C
Input/Output Isolation Voltage (t = 60 s min.)	V_{ISO}	1500	Vrms
LED Input Ratings:			
Continuous forward current	I_F	20	mA
Reverse voltage	V_R	10	V
Output Operation:			
dc or peak ac load voltage ($I_L \leq 50\ \mu A$)	V_L	200	V
Continuous dc load current	I_L	110	mA
Power Dissipation	P_{DISS}	600	mW

Recommended Operating Conditions

T_A = 25 °C unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Unit
LED Forward Current for Switch Turn-on (T_A = −40 °C to +85 °C)	I_{Fon}	6	10	20	mA
Continuous dc Load Current (each pole operating independently)	I_L	—	140	165	mA
Continuous dc Load Current (each pole, two poles operating simutaneously)	I_L	—	75	110	mA

Pin Descriptions

Pin	Symbol	Name/Function
1 2 3	Control + Control + Control −	These pins are the positive and negative inputs respectively to the control LED. An appropriate amount of current through the LED closes the circuit path between S and S′.
5, 6 7, 8	S S′	These pins are the switch outputs. The pin designated as S represents one side of a relay pole. The pin designated as S′is the complementary side of a relay pole. S2 is electrically connected to the device substrate. To achieve lowest dv/dt sensitivity and optimum turn-on/off performance, connect S2 to the lowest circuit potential.
4	Blank	This pin can be used as a tie-point for external components. Voltage on this pin should not exceed 300 V.

Characteristics

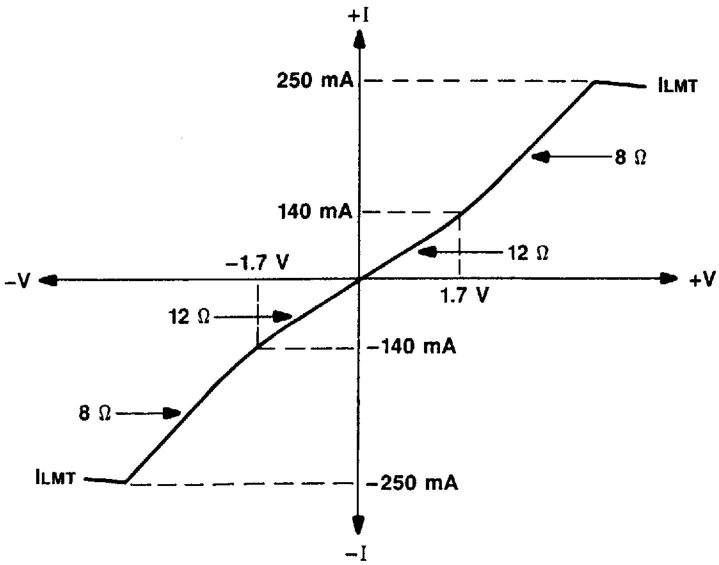


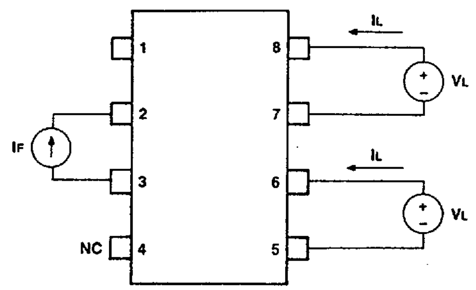
Figure 1. Typical ON Characteristics

Electrical Characteristics $T_A = 25\,^\circ C$

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information purposes only and are not part of the testing requirements.

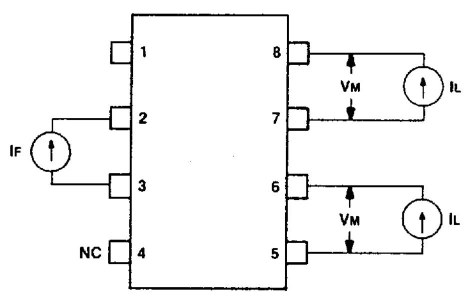
Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
LED Forward Current for Switch Turn-on	I_{Fon}	I_L (min) = 110 mA, V_L = ±5 V, t = 10 ms (See Figure 2.)	—	1.5	2.5	mA
LED Forward Current for Switch Turn-off	I_{Foff}	I_F = 0.2 mA, V_L = ±250 V (See Figure 2.)	0.2	1.4	—	mA
LED Forward Voltage	V_F	I_F = 10 mA	1.15	1.22	1.45	V
ON-resistance	R_{ON}	I_F = 5 mA, I_L = ±50 mA (See Figure 3.)	8	12	15	Ω
Current Limit	I_{LMT}	I_F = 5 mA, V_L = ±5 V, t = 10 ms (See Figure 4.)	220	250	350	mA
Output Off-state Leakage Current	—	I_F = 0, V_L = ±100 V (See Figure 4.)	—	0.03	200	nA
Turn-on Time	t_{on}	I_F = 5 mA, V_L = +150 V, R_L = 4 kΩ (See Figure 5.)	—	2.0	3.0	ms
Turn-off Time	t_{off}	I_F = 5 mA, V_L = +150 V, R_L = 4 kΩ (See Figure 5.)	—	1.5	3.0	ms
Feedthrough Capacitance Pin 5 to 6, Pin 7 to 8	—	I_F = 0, V_L = 4 Vp-p, 1 kHz	—	35	—	pF
Pole-to-Pole Capacitance (S1 - S2)	—	I_F = 0 mA, f = 1 MHz	—	4.5	—	pF
Pole-to-Pole ON-resistance Matching (S1 - S2)	—	I_F = 5 mA, I_L = 50 mA	—	0.1	0.4	ΔΩ

Test Circuits



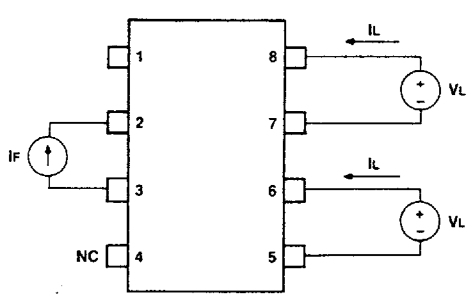
IF	VL	Measure	Parameter
2.5 mA	±5 V	IL	If |IL| ≥ IL (min), then IFon is good.
0.2 mA	±250 V	IL	If |IL| < 5 μA, then IFoff is good.

Figure 2. Test Circuit for LED Forward Current for Switch Turn-On/Turn-Off



IF	IL	Measure	Parameter
5.0 mA	±50 mA	±VM	ON-resistance = $\frac{\lvert V_M \rvert}{50\ mA}$

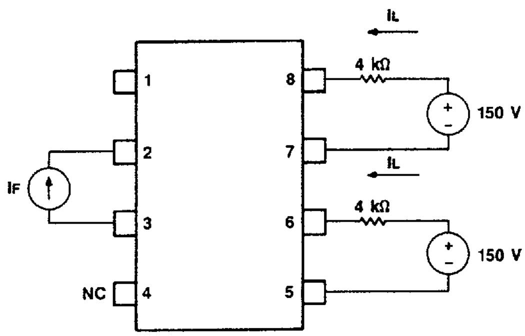
Figure 3. Test Circuit for ON-Resistance

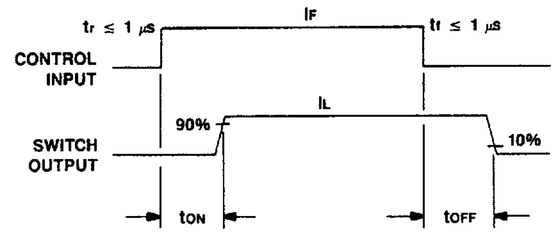


IF	VL	Measure	Parameter
0	±100 V	IL	Leakage = |IL|
5.0 mA	±5 V	IL	Current Limit = |IL|, t = 10 ms

Figure 4. Test Circuit for Leakage and Current Limit

Test Circuits (continued)





IF	VL	Measure	Parameter
5.0 mA	+150 V	IL	ton/toff = Δt IF to IL

Figure 5. ton/toff Test Circuits and Waveforms

Applications

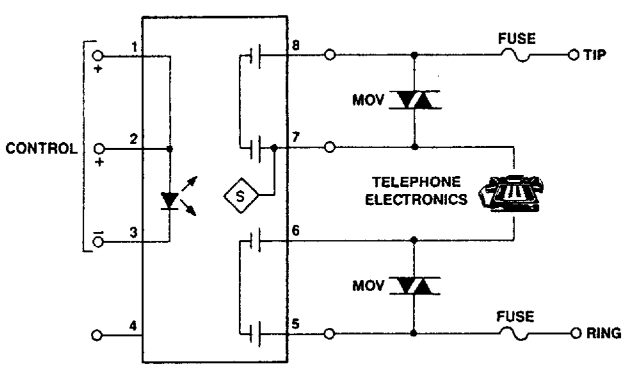


Figure 6. Balanced Switchhook Application

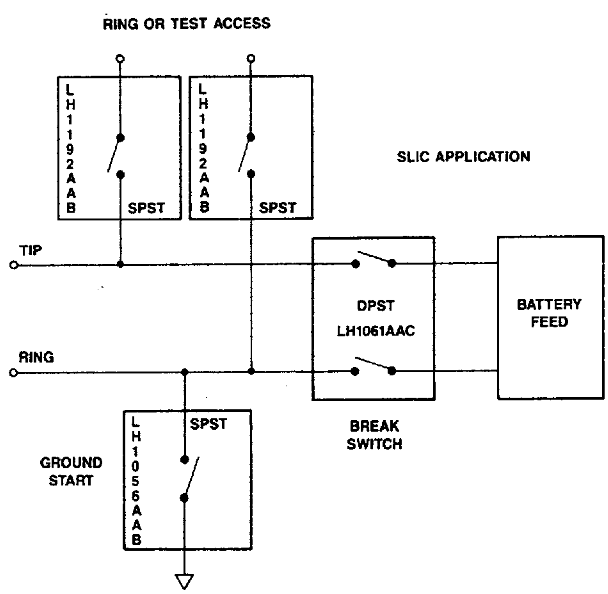
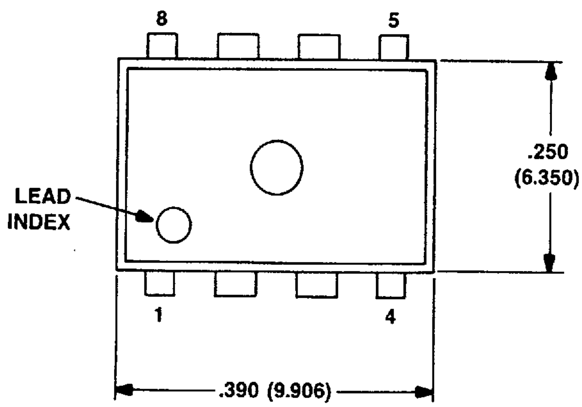


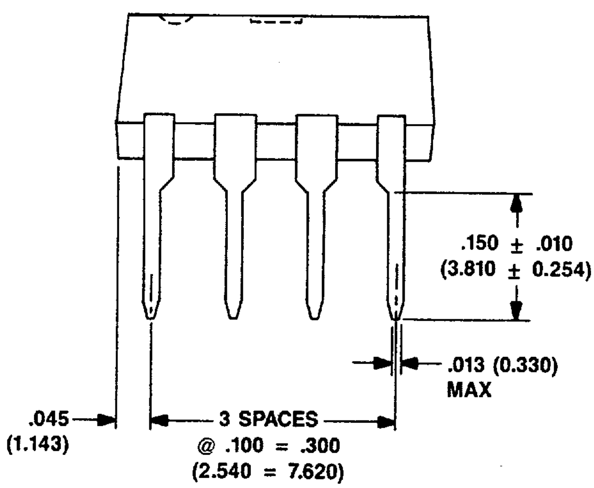
Figure 7. SLIC Application

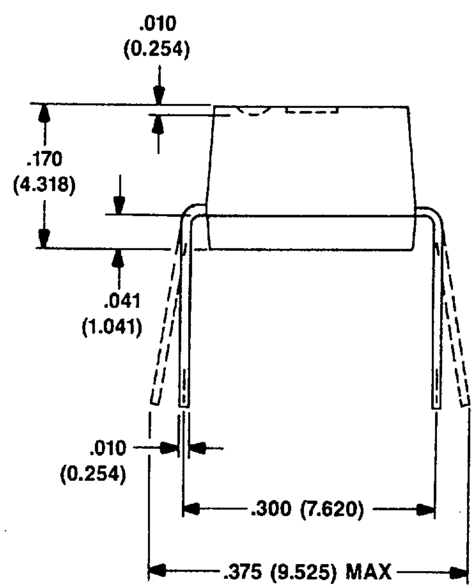
Outline Drawings

8-Pin, Plastic DIP (LH1061AB)

Dimensions are in inches and (millimeters).

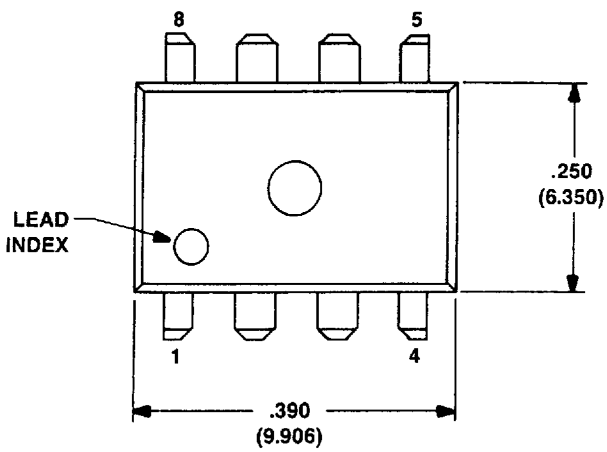


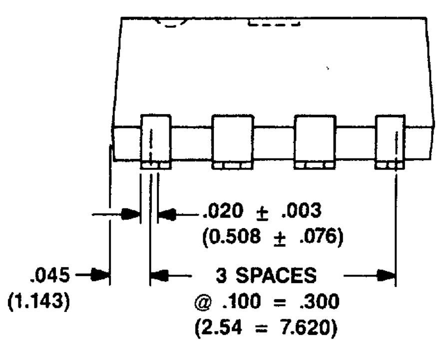


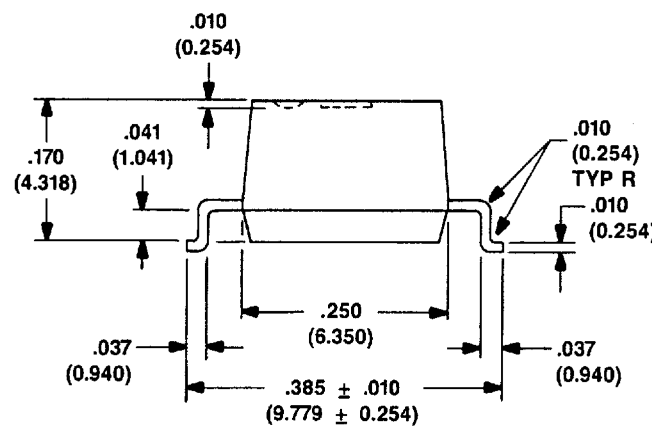


Outline Drawings (continued)

8-Pin, Plastic Gull-Wing (LH1061AAC)
Dimensions are in inches and (millimeters).







LH1061AB/AAC High-Voltage, Solid-State Relay

Ordering Information

Device	Package	Comcode
LH1061AB	8-Pin, Plastic DIP	104384482
LH1061AAC	8-Pin, Plastic Gull-Wing	104395504

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