# SIEMENS

# LH1085
## High-Voltage Solid State Relay

### FEATURES
- 1500 Vrms input/output isolation
- Low ON-resistance
- Clean, bounce-free switching
- dv/dt typically better than 500 V/μs
- Low power consumption
- Monolithic IC reliability

### APPLICATIONS
- High-voltage testers
- Industrial controls
- Telecom switching
- Triac predriver
- Isolation switching

### DESCRIPTION
The LH1085 High-Voltage, Solid State Relay is a single pole, normally open switch (1 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 350 V and can handle loads up to 135 mA. The relay can switch both ac and dc loads and is ideal for audio frequency or dc applications. Typical ON-resistance at 25 mA is 30 Ω.

The LH1085 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 45 mA. Beyond 45 mA, the incremental resistance decreases, thereby minimizing internal power dissipation. Overload currents are clamped at 300 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. The relay is packaged in a 6-pin, plastic DIP (LH1085AT1) or in a 6-pin, surface-mount, gull-wing configuration (LH1085AAB1).

**Absolute Maximum Ratings** $T_A$=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 ot 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:<br>Continuous forward current<br>Reverse voltage | <br>$I_F$<br>$V_R$ | <br>20<br>10 | <br>mA<br>V |
| Output Operation:<br>dc or peak ac load voltage ($I_L \leq 50\ \mu A$)<br>Continuous dc load current<br>Peak load current (t=10 ms) | <br>$V_L$<br>$I_L$<br>$I_P$ | <br>350<br>135<br>400 | <br>V<br>mA<br>mA |
| Power Dissipation | $P_{DISS}$ | 500 | 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) | $I_{FON}$ | 8 | 10 | 20 | mA |
| Continuous dc Load Current | $I_L$ | — | 45 | 135 | mA |
| ac rms Load Current | — | — | 30 | 135 | mA |

**Electrical Characteristics** $T_A$=25°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)=150 mA, $V_L$=±9 V, t=10 ms | — | 1.3 | 2.5 | mA |
| LED Forward Current for Switch Turn-off | $I_{Foff}$ | $I_F$=0.2 mA, $V_L$=±300 V | 0.2 | 1.2 | — | 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, $I_L$= ±25 mA | 20 | 30 | 37 | Ω |
| Current Limit | $I_{LMT}$ | $I_F$=5 mA, $V_L$=±9, t=10 ms | 225 | 300 | 400 | mA |
| Ouput Off-state Leakage Current | — | $I_F$=0, $V_L$=±100 V | — | 0.03 | 200 | nA |
| Turn-on Time | $t_{on}$ | $I_F$=5 mA, $V_L$=+150 V, $R_L$=4 kΩ | — | 1.4 | 2.0 | ms |
| Turn-off Time | $t_{off}$ | $I_F$=5 mA, $V_L$=+150 V, $R_L$=4 kΩ | — | 0.9 | 2.0 | ms |
| Feedthrough Capacitance Pin 4 to 6 | — | $I_F$=0, $V_L$=4 Vp-p, 1 kHz | — | 24 | — | pF |