# LH1549AB/AAC/AACTR

## 1 Form A Phototransistor Telecomswitch

### FEATURES

- **Solid State Relay and an Autopolarity Optocoupler in a Single Package**
- **I/O Isolation Voltage, 5300 $V_{RMS}$**
- **Surface Mountable**
- **Optocoupler**
  - **– Bidirectional Current Detection**
- **Solid State Relay**
  - **– 1 Form A (LH1525 Type)**
  - **– Current-limit Protection**
  - **– Linear, AC/DC Operation**
  - **– Clean, Bounce-free Switching**
  - **– Low Power Consumption**

### AGENCY APPROVALS

- **UL – File No. E52744**
- **CSA – Certification 093751**
- **BSI/BABT Cert. No. 7980**
- **FIMKO Approval**

### APPLICATIONS

- **General Telecom Switching**
  - **– On/off-hook Control**
  - **– Dial Pulse**
  - **– Ring-current Detection**
  - **– Loop-current sensing**

### DESCRIPTION

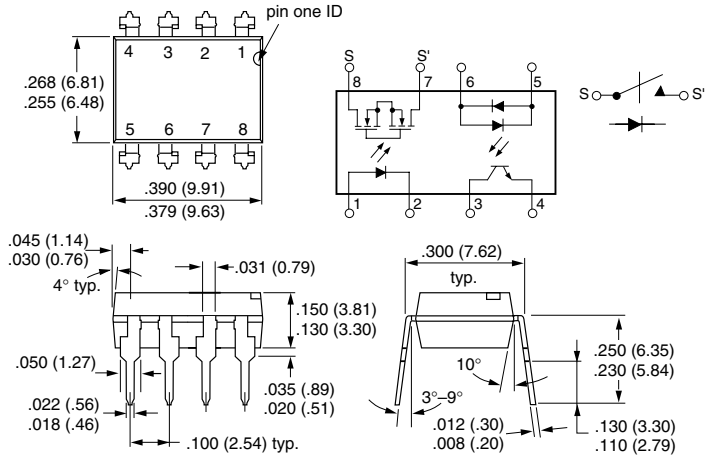
A Telecom Switch consists of an optically isolated, SPST solid-state relay (SSR) and a bidirectional input optocoupler in a single package. The SSR is ideal for performing switchhook and dial-pulse switching while the optocoupler performs ring detect and loop current sensing functions.

The SSR is integrated on a monolithic receptor die. It features low ON-resistance, high breakdown voltage, and current-limit circuitry that protects the relay from telephone line induced lightning surges.

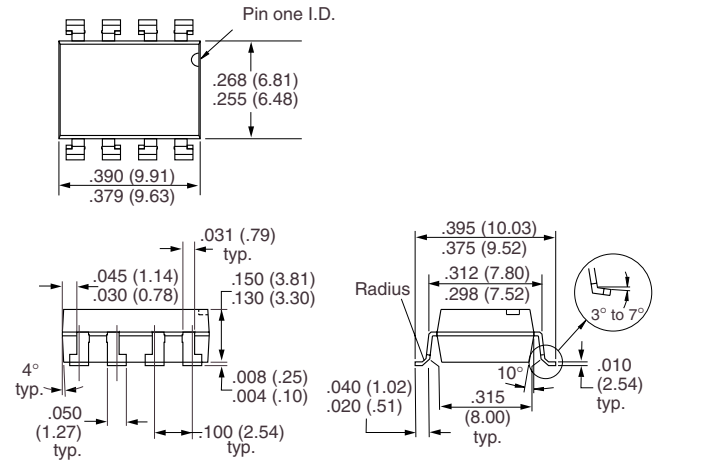
The optocoupler provides bidirectional current sensing via two antiparallel GaAlAs infrared emitting diodes. The optocoupler provides a minimum current transfer ratio (CTR) of 33%.

Package Dimensions in Inches (mm)

**DIP**




**SMD**




**Part Identification**

| Part Number | Description |
|---|---|
| LH1549AB | 8-pin DIP, Tubes |
| LH1549AAC | 8-pin SMD, Gullwing, Tubes |
| LH1549AACTR | 8-pin SMD, Gullwing, Tape and Reel |

**Absolute Maximum Ratings,** $T_A$=25°C

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute Maximum Ratings for extended periods of time can adversely affect reliability.

Ambient Operating Temperature Range ($T_A$) .....–40 to +85°C
Storage Temperature Range ($T_{stg}$) .....–40 to +150°C
Pin Soldering Temperature (t=10 s max) ($T_S$) .....260°C
Input/Output Isolation Test Voltage ($V_{ISO}$) .....5300 $V_{RMS}$

**SSR Ratings**

LED Continuous Forward Current ($I_F$) ..... 50 mA
LED Reverse Voltage ($I_R$≤10 µA) ($V_R$) .....5.0 V
dc or Peak ac Load Voltage ($I_L$≤50 µA) ($V_L$) .....400 V
Continuous dc Load Current ($I_L$)
(Unidirectional Operation) ..... 120 mA
Output Power Dissipation (continuous) ($P_{DISS}$).....600 mW

**Optocoupler Ratings**

LED Continuous Forward Current ($I_F$) ..... 120 mA
Collector-emitter Breakdown Voltage ($BV_{CEO}$) .....30 V
Phototransistor Power Dissipation ($P_{DISS}$).....150 mW

**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 only and are not part of the testing requirements.

| **SSR Characteristics** | **Sym.** | **Min.** | **Typ.** | **Max.** | **Units** | **Test Conditions** |
|---|---|---|---|---|---|---|
| **Input** | | | | | | |
| LED Forward Current for Switch Turn-on | $I_{Fon}$ | — | 0.3 | 0.5 | mA | $I_L$=100 mA, t=10 ms |
| LED Forward Current for Switch Turn-off | $I_{Foff}$ | 0.1 | 0.4 | — | mA | $V_L$=±350 mA |
| LED Forward Voltage | $V_F$ | 0.8 | 1.2 | 1.4 | V | $I_F$=3.0 mA |
| **Output** | | | | | | |
| ON-resistance ac/dc Pins 4 (±) to 6 (±) | $R_{ON}$ | 17 | 25 | 36 | Ω | $I_F$=1.5 mA, $I_L$=50 mA |
| Current Limit ac/dc Pins 4 (±) to 6 (±) | $I_{LMT}$ | 170 | 210 | 270 | mA | $I_F$=5.0 mA, t=5.0 ms $V_L$=±7.0 V |
| Off-state Leakage Current | — | — | 0.04 | 200 | nA | $I_F$=0 mA, $V_L$=100 V |
| | | — | — | 1.0 | µA | $I_F$=0 mA, $V_L$=±400 V |
| Output Capacitance Pin 7 to 8 | — | — | 50 | — | pF | $I_F$=0 mA, $V_L$=1.0 V |
| | | — | 9.0 | — | | $I_F$=0 mA, $V_L$=50 V |
| **Transfer** | | | | | | |
| Input/Output Capacitance | $C_{ISO}$ | — | 1.3 | — | pF | $V_{ISO}$=1.0 V |
| Turn-on Time | $t_{on}$ | — | 0.5 | 1.0 | ms | $I_F$=5.0 mA, $I_L$=50 mA |
| Turn-off Time | $t_{off}$ | — | 0.4 | 0.9 | ms | $I_F$=5.0 mA, $I_L$=50 mA |
| **Optocoupler Characteristics** | **Sym.** | **Min.** | **Typ.** | **Max.** | **Units** | **Test Conditions** |
| **Input** | | | | | | |
| LED Forward Voltage | $V_F$ | 0.9 | 1.2 | 1.5 | V | $I_F$=10 mA |
| **Output** | | | | | | |
| Saturation Voltage | $V_{CE(Sat)}$ | — | 0.7 | 0.5 | V | $I_F$=16 mA, $I_C$=2.0 mA |
| Leakage Current | $I_{CEO}$ | — | — | 500 | nA | $I_F$=0 mA, $V_{CE}$=5.0 mA |
| Trickle Current Leakage | $I_{CEO}$ | — | — | 1.0 | µA | $I_F$=5.0 µA, $V_{CE}$=5.0 mA |
| **Transfer** | | | | | | |
| dc Current Transfer Ratio | CTR | 33 | 165 | — | % | $I_F$=6.0 mA, $V_{CE}$=0.5 V |

## SSR Characteristics

**Figure 1. LED Voltage vs. Temperature**

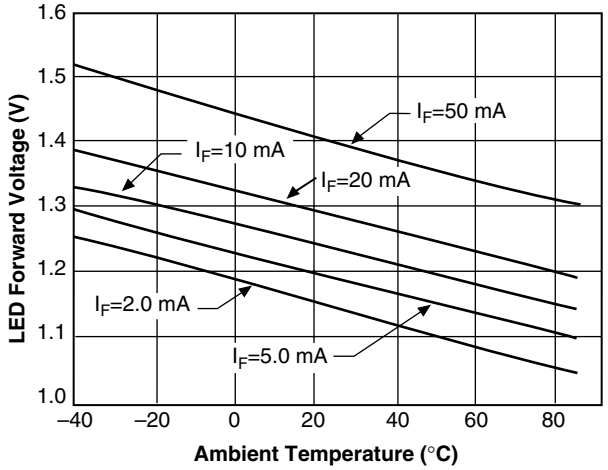



**Figure 2. Current Limit vs. Temperature**

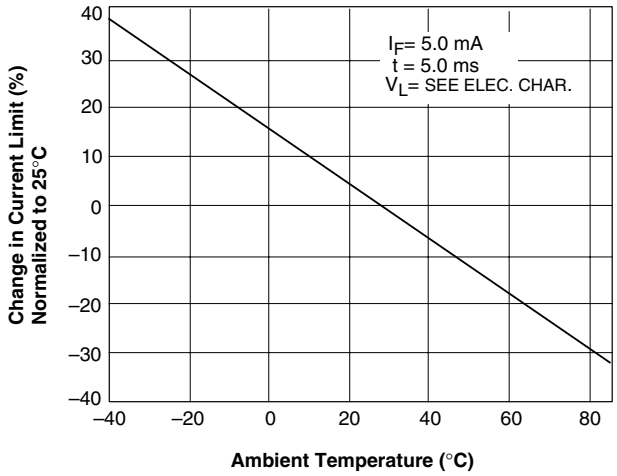



**Figure 3. LED Current for Switch Turn-on vs. Temperature**