

## 1 Form A Solid State Relay

### Features

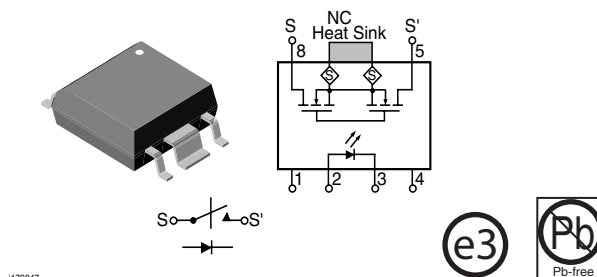
- High-speed Operation
- 2500 V<sub>RMS</sub> I/O Isolation
- Current-limit Protection
- High Surge Capability
- Load Voltage 400 V
- Clean, Bounce-free Switching
- Extremely Low Power Consumption
- High-reliability Monolithic Receptor
- Surface-mountable
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Agency Approvals

- UL1577, File No. E52744 System Code S
- CSA - Certification 093751
- FIMKO Approval

### Applications

PCMCIA Type 2 Cards  
 Battery Powered Switch Applications  
 General Telecom Switching  
 Telephone Line Interface  
 - On/off Hook  
 - Ring Relay  
 - Ground Start  
 Programmable Controllers  
 Instrumentation



1179047



### Description

The LH1525 relay is an SPST normally open switch (1 Form A ) in small-outline package (SOP 8 pin). Relay requires a minimal amount of LED drive current to operate, making relay ideal for battery powered and power consumption sensitive applications.

The relay is constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated BCDMOS technology, is comprised of a photodiode array, switch-control circuitry, and MOSFET switches. In addition, the relay employs current-limiting circuitry enabling it to pass FCC 68.302 and other regulatory surge requirements when overvoltage protection is provided.

### Order Information

| Part        | Remarks                  |
|-------------|--------------------------|
| LH1525ACD   | 8-pin SOP, Tubes         |
| LH1525ACDTR | 8-pin SOP, Tape and Reel |

## Absolute Maximum Ratings, $T_{amb} = 25\text{ }^{\circ}\text{C}$

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the device. 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.

## SSR

| Parameter                                      | Test condition                    | Symbol     | Value         | Unit               |
|------------------------------------------------|-----------------------------------|------------|---------------|--------------------|
| LED input ratings: continuous forward current  |                                   | $I_F$      | 50            | mA                 |
| LED input ratings: reverse voltage             |                                   | $V_R$      | 5.0           | V                  |
| Output operation: dc or peak ac load voltage   | $I_L \leq 1.0\text{ }\mu\text{A}$ | $V_L$      | 400           | V                  |
| Continuous dc load current: one pole operating |                                   | $I_L$      | 110           | mA                 |
| Ambient operating temperature range            |                                   | $T_{amb}$  | - 40 to + 85  | $^{\circ}\text{C}$ |
| Storage temperature range                      |                                   | $T_{stg}$  | - 55 to + 150 | $^{\circ}\text{C}$ |
| Pin soldering temperature                      | $t = 5.0\text{ s max}$            | $T_{sld}$  | 260           | $^{\circ}\text{C}$ |
| Input/output isolation voltage                 |                                   | $V_{ISO}$  | 2500          | $V_{RMS}$          |
| Power dissipation                              |                                   | $P_{diss}$ | 550           | mW                 |
| Thermal resistance, junction to ambient        |                                   | $R_{thja}$ | 200           | C/W                |

## Electrical Characteristics, $T_{amb} = 25\text{ }^{\circ}\text{C}$

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.

## Input

| Parameter                               | Test condition                                 | Symbol     | Min  | Typ. | Max  | Unit |
|-----------------------------------------|------------------------------------------------|------------|------|------|------|------|
| LED forward current for switch turn-on  | $I_L = 70\text{ mA}$ , $t = 10\text{ ms}$      | $I_{Fon}$  |      | 0.3  | 0.5  | mA   |
| LED forward current for switch turn-off | $V_L = \pm 350\text{ V}$ , $t = 100\text{ ms}$ | $I_{Foff}$ | 0.01 | 0.1  |      | mA   |
| LED forward voltage                     | $I_F = 1.5\text{ mA}$                          | $V_F$      | 0.80 | 1.15 | 1.40 | V    |

## Output

| Parameter                                     | Test condition                                                        | Symbol    | Min | Typ. | Max | Unit          |
|-----------------------------------------------|-----------------------------------------------------------------------|-----------|-----|------|-----|---------------|
| ON-resistance: Pin 5 ( $\pm$ ) to 8 ( $\pm$ ) | $I_F = 1.5\text{ mA}$ , $I_L = \pm 50\text{ mA}$                      | $R_{ON}$  | 17  | 25   | 36  | $\Omega$      |
| Current limit                                 | $I_F = 1.5\text{ mA}$ , $t = 5.0\text{ ms}$ ,<br>$V_L = 7.0\text{ V}$ | $I_{LMT}$ | 170 | 210  | 270 | mA            |
| Output off-state leakage current              | $I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$                        |           |     | 0.04 | 200 | nA            |
|                                               | $I_F = 0\text{ mA}$ , $V_L = \pm 400\text{ V}$                        |           |     |      | 1.0 | $\mu\text{A}$ |

## Transfer

| Parameter     | Test condition                                 | Symbol    | Min | Typ. | Max | Unit |
|---------------|------------------------------------------------|-----------|-----|------|-----|------|
| Turn-on time  | $I_F = 1.5 \text{ mA}$ , $I_L = 50 \text{ mA}$ | $t_{on}$  |     | 1.0  |     | ms   |
|               | $I_F = 5.0 \text{ mA}$ , $I_L = 50 \text{ mA}$ | $t_{on}$  |     | 0.5  | 1.0 | ms   |
| Turn-off time | $I_F = 1.5 \text{ mA}$ , $I_L = 50 \text{ mA}$ | $t_{off}$ |     | 0.2  |     | ms   |
|               | $I_F = 5.0 \text{ mA}$ , $I_L = 50 \text{ mA}$ | $t_{off}$ |     | 0.4  | 1.5 | ms   |

## Typical Characteristics ( $T_{amb} = 25^\circ\text{C}$ unless otherwise specified)

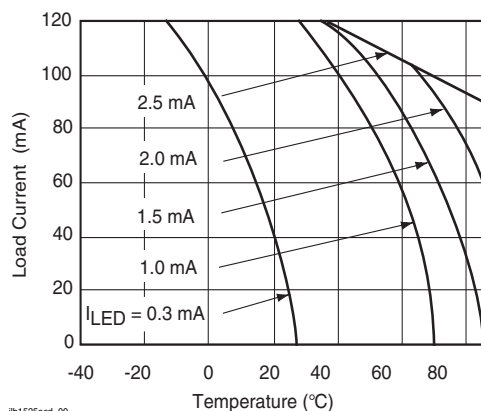


Figure 1. Recommended Operating Conditions

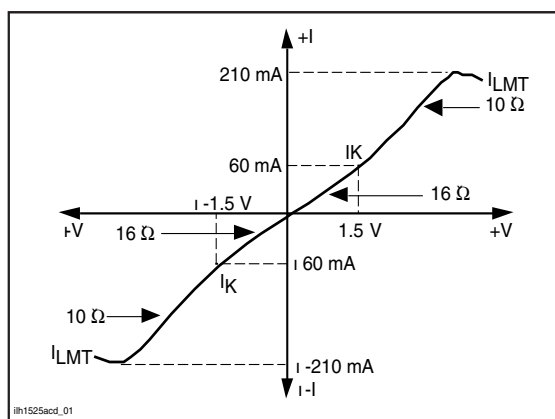


Figure 2. Typical AC/DC ON Characteristics

reducing the current-limit value when relay temperature is increased. An extended clamp condition, which increases relay temperature, decreases the current-limit value, resulting in a current fold back characteristic. When the overload is removed, the relay resumes its normal ON-resistance characteristic.

In a 1 Form A relay, to turn the relay on, forward current is applied to the LED. The amount of current applied determines the amount of light produced for the photodiode array. This photodiode array develops a drive voltage for the MOSFET switch outputs. For high temperature or high-load current operations, more LED current is required.

## Thermal Considerations

To minimize thermal resistance, pins 6 and 7 of the LH1525ACD are formed into a tab. This tab should be soldered to a printed circuit board land pattern of equal or greater size. **Do Not** run metal underneath the device or the input-to-output isolation could be jeopardized.

## Functional Description

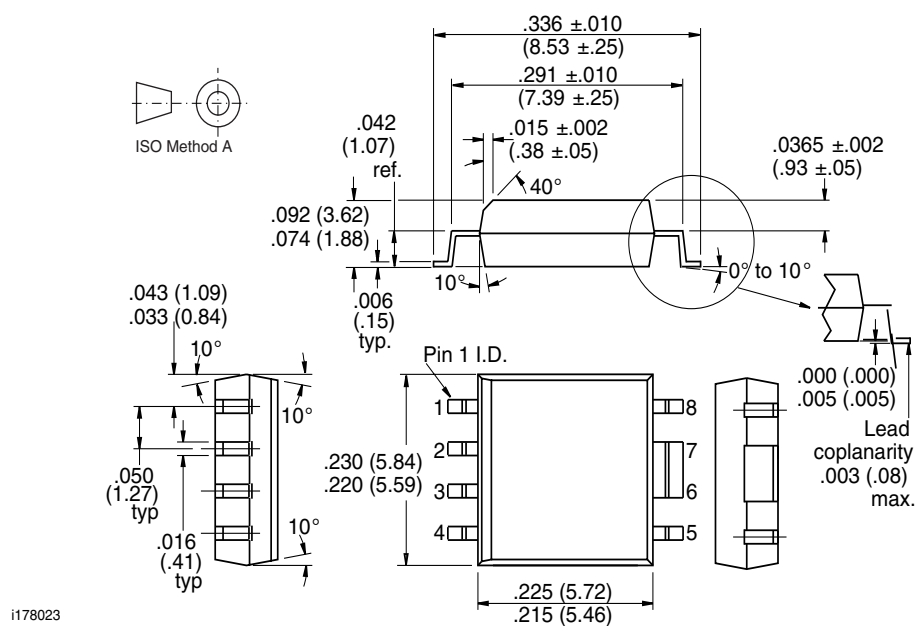
Figure 2 shows the switch characteristics of the relay. The relay exhibits an ON-resistance that is exceptionally linear through the origin and up to the knee current ( $I_K$ ). Beyond  $I_K$ , the incremental resistance decreases, minimizing internal power dissipation. Overload currents are clamped at  $I_{LMT}$  by the internal current-limit circuitry. The current-limiting circuitry exhibits a negative temperature coefficient, thereby

# LH1525ACD/ ACDTR

Vishay Semiconductors



## Package Dimensions in Inches (mm)





## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

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