

## 1 Form A Phototransistor Telecomswitch

### Features

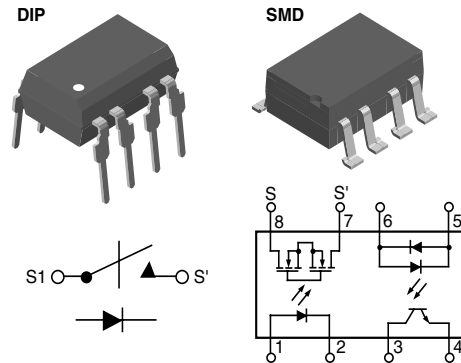
- Solid State Relay
  - 1 Form A (LH1525 Type)
  - Current-limit Protection
  - Clean, Bounce-free Switching
  - Low Power Consumption
- Solid State Relay and an Autopolarity Optocoupler in a Single Package
- Optocoupler
  - Bidirectional Current Detection
- Surface Mountable
- I/O Isolation Voltage, 5300 V<sub>RMS</sub>
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- 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



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### 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 switch hook 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 anti parallel GaAlAs infrared emitting diodes. The optocoupler provides a minimum current transfer ratio (CTR) of 33 %.

### Order Information

Part	Remarks
LH1549AB	Tubes, DIP-8
LH1549AAC	Gullwing, Tubes, SMD-8
LH1549AACTR	Gullwing, Tape and Reel, SMD-8

### 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 continuous forward current		$I_F$	50	mA
LED reverse voltage	$I_R \leq 10\text{ }\mu\text{A}$	$V_R$	5.0	V
DC or peak AC load voltage	$I_L \leq 50\text{ }\mu\text{A}$	$V_L$	400	V
Continuous DC load current , unidirectional operation		$I_L$	120	mA
Ambient operating temperature range		$T_{amb}$	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	- 40 to + 150	$^{\circ}\text{C}$
Pin soldering temperature	$t = 10\text{ s max}$	$T_{sld}$	260	$^{\circ}\text{C}$
Input/output isolation test voltage		$V_{ISO}$	5300	$V_{RMS}$
Output power dissipation (continuous)		$P_{diss}$	600	mW

### 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, switch turn-on	$I_L = 100\text{ mA}$ , $t = 10\text{ ms}$	$I_{Fon}$		0.3	0.5	mA
LED forward current, switch turn-off	$V_L = \pm 350\text{ V}$	$I_{Foff}$	0.1	0.4		mA
LED forward voltage	$I_F = 3.0\text{ mA}$	$V_F$	0.8	1.2	1.4	V

### Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
ON-resistance ac/dc: Pin 4 ( $\pm$ ) to 6 ( $\pm$ )	$I_F = 1.5\text{ mA}$ , $I_L = 50\text{ mA}$	$R_{ON}$	17	25	36	$\Omega$
Current limit ac/dc : Pin 4 ( $\pm$ ) to 6 ( $\pm$ )	$I_F = 5.0\text{ mA}$ , $V_L = \pm 7.0\text{ V}$ , $t = 5.0\text{ ms}$	$I_{LMT}$	170	210	270	mA
Off-state leakage current	$I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$	$I_O$		0.04	200	nA
	$I_F = 0\text{ mA}$ , $V_L = \pm 400\text{ V}$	$I_O$			1.0	$\mu\text{A}$
Output capacitance Pin 4 to 6	$I_F = 0\text{ mA}$ , $V_L = 1.0\text{ V}$	$C_O$		50		pF
	$I_F = 0\text{ mA}$ , $V_L = 50\text{ V}$	$C_O$		9.0		pF

### Transfer

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output)	$V_{ISO} = 1.0\text{ V}$	$C_{IO}$		1.3		pF
Turn-on time	$I_F = 5.0\text{ mA}$ , $I_L = 50\text{ mA}$	$t_{on}$		0.5	1.0	ms
Turn-off time	$I_F = 5.0\text{ mA}$ , $I_L = 50\text{ mA}$	$t_{off}$		0.4	0.9	ms

## Optocoupler Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward voltage	$I_F = 10 \text{ mA}$	$V_F$	0.9	1.2	1.5	V

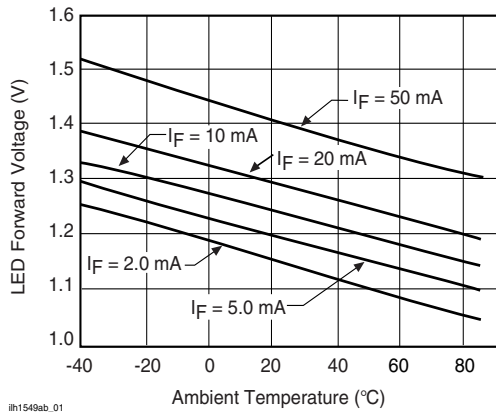
## Optocoupler Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Saturation voltage	$I_F = 16 \text{ mA}$ , $I_C = 2.0 \text{ mA}$	$V_{CE(sat)}$		0.7	0.5	V
Collector-emitter leakage current	$I_F = 0 \text{ mA}$ , $I_C = 5.0 \text{ mA}$	$I_{CEO}$			500	nA
Trickle current leakage	$I_F = 5.0 \mu\text{A}$ , $I_C = 5.0 \text{ mA}$	$I_{CEO}$			1.0	$\mu\text{A}$

## Optocoupler Transfer

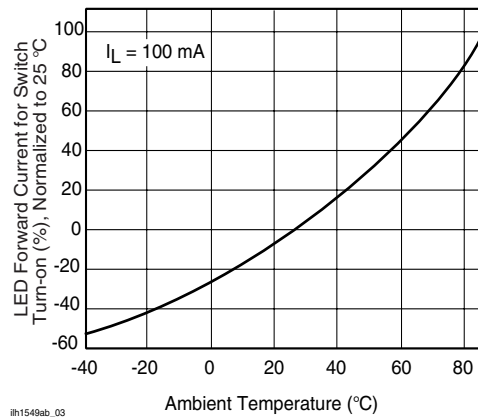
Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
DC Current Transfer Ratio	$I_F = 6.0 \text{ mA}$ , $V_{CE} = 0.5 \text{ V}$	$CTR_{DC}$	33	165		%

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



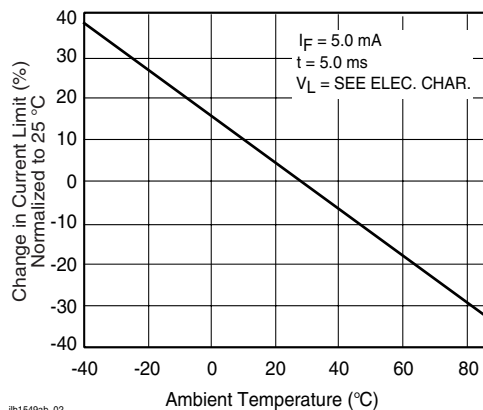
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Figure 1. LED Voltage vs. Temperature



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



ih1549ab\_02

Figure 2. Current Limit vs. Temperature

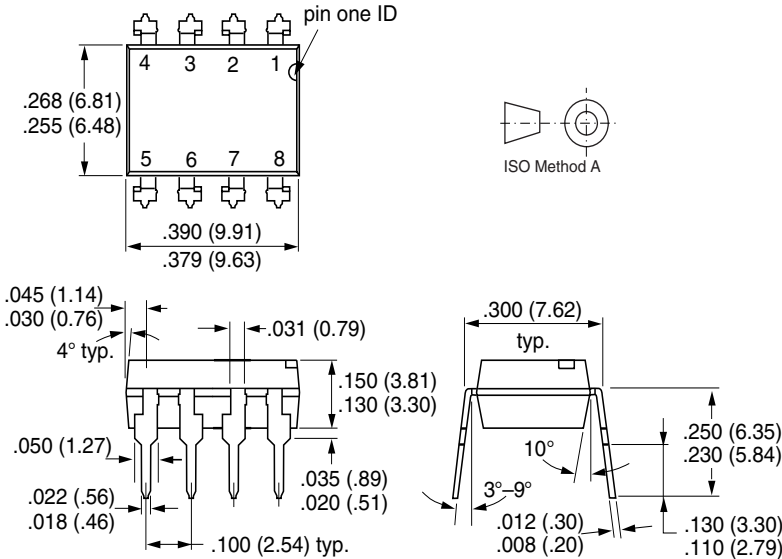
# LH1549AB/ AAC/ AACTR



Vishay Semiconductors

## Package Dimensions in Inches (mm)

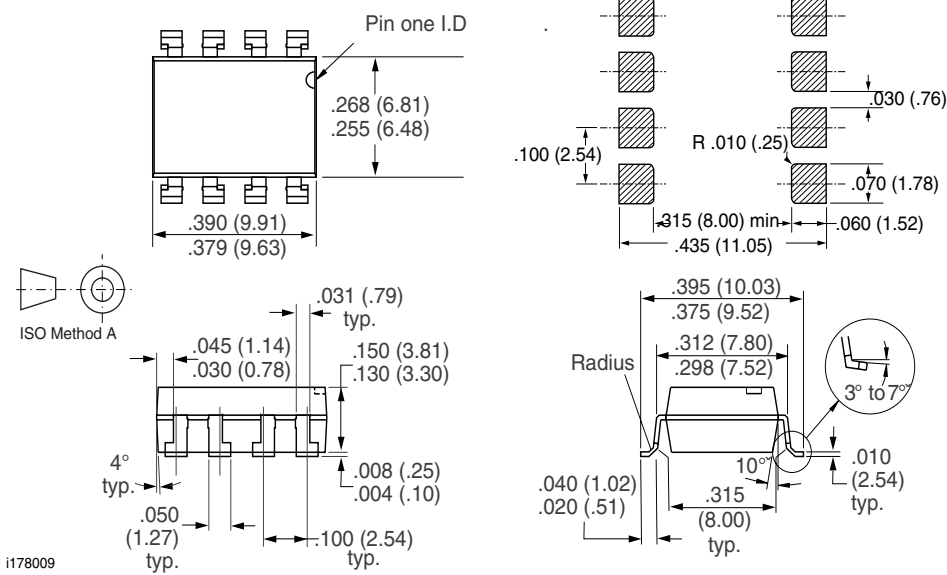
### DIP



i178008

## Package Dimensions in Inches (mm)

### SMD



i178009



## 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.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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