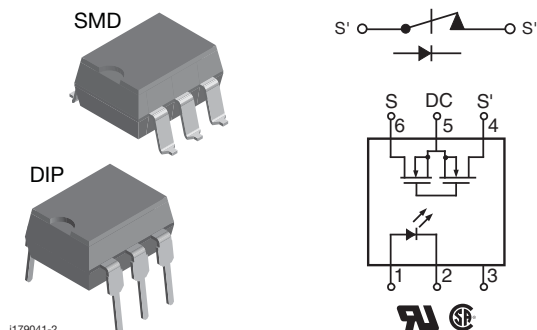


## 1 Form B Solid State Relay



### DESCRIPTION

The LH1501 relays are SPST normally closed switches (1 form B) that can replace electromechanical relays in many applications. The relays are constructed as a multi-chip hybrid device. Actuation control is via an infrared LED. The output switch is a combination of a photodiode array with MOSFET switches and control circuitry. The relays can be configured for AC/DC or DC only operation.

### FEATURES

- Isolation test voltage 3750 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 20 Ω
- Load voltage 350 V
- Clean bounce free switching
- Low power consumption
- SMD lead available on tape and reel
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### APPLICATIONS

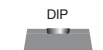
- General telecom switching
- Security equipment
- Instrumentation
- Industrial controls

### AGENCY APPROVALS

UL1577: file no. E52744

CSA: certification 093751

### ORDERING INFORMATION

|                      |              |              |              |              |              |                      |                    |              |                  |              |                                                                                                  |                                                                                                  |
|----------------------|--------------|--------------|--------------|--------------|--------------|----------------------|--------------------|--------------|------------------|--------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <div>L</div>         | <div>H</div> | <div>1</div> | <div>5</div> | <div>0</div> | <div>1</div> | <div>B</div>         | <div>#</div>       | <div>#</div> | <div>T</div>     | <div>R</div> | <div></div> | <div></div> |
| PART NUMBER          |              |              |              |              |              | ELECTR.<br>VARIATION | PACKAGE<br>CONFIG. |              | TAPE AND<br>REEL |              |                                                                                                  |                                                                                                  |
| PACKAGE              |              |              |              |              |              |                      | UL, CSA            |              |                  |              |                                                                                                  |                                                                                                  |
| SMD-6, tubes         |              |              |              |              |              |                      | LH1501BAB          |              |                  |              |                                                                                                  |                                                                                                  |
| SMD-6, tape and reel |              |              |              |              |              |                      | LH1501BABTR        |              |                  |              |                                                                                                  |                                                                                                  |
| DIP-6, tubes         |              |              |              |              |              |                      | LH1501BT           |              |                  |              |                                                                                                  |                                                                                                  |

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

| PARAMETER                                   | TEST CONDITION                         | SYMBOL            | VALUE         | UNIT             |
|---------------------------------------------|----------------------------------------|-------------------|---------------|------------------|
| <b>INPUT</b>                                |                                        |                   |               |                  |
| LED continuous forward current              |                                        | I <sub>F</sub>    | 50            | mA               |
| LED reverse voltage                         | I <sub>R</sub> ≤ 10 μA                 | V <sub>R</sub>    | 5             | V                |
| <b>OUTPUT</b>                               |                                        |                   |               |                  |
| DC or peak AC load voltage                  | I <sub>L</sub> ≤ 50 μA                 | V <sub>L</sub>    | 350           | V                |
| Continuous DC load current - bidirectional  |                                        | I <sub>L</sub>    | 150           | mA               |
| Continuous DC load current - unidirectional |                                        | I <sub>L</sub>    | 200           | mA               |
| Peak load current (single shot)             | t = 100 ms                             | I <sub>P</sub>    | 350           | mA               |
| <b>SSR</b>                                  |                                        |                   |               |                  |
| Ambient temperature range                   |                                        | T <sub>amb</sub>  | - 40 to + 85  | °C               |
| Storage temperature range                   |                                        | T <sub>stg</sub>  | - 40 to + 125 | °C               |
| Pin soldering temperature <sup>(1)</sup>    | t = 10 s max.                          | T <sub>sld</sub>  | 260           | °C               |
| Input to output isolation voltage           | t = 1 s, I <sub>ISO</sub> = 10 μA max. | V <sub>ISO</sub>  | 3750          | V <sub>RMS</sub> |
| Output power dissipation (continuous)       |                                        | P <sub>diss</sub> | 550           | mW               |

### Notes

- 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 the time can adversely affect reliability.

<sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                |            |      |      |      |               |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------|------------|------|------|------|---------------|
| PARAMETER                                                                                                | TEST CONDITION                                 | SYMBOL     | MIN. | TYP. | MAX. | UNIT          |
| <b>INPUT</b>                                                                                             |                                                |            |      |      |      |               |
| LED forward current, switch turn-on                                                                      | $I_L = \pm 150\text{ mA}$ , $t = 10\text{ ms}$ | $I_{Fon}$  | 0.2  | 0.9  |      | mA            |
| LED forward current, switch turn-off                                                                     | $V_L = \pm 300\text{ V}$                       | $I_{Foff}$ |      | 1    | 2    | mA            |
| LED forward voltage                                                                                      | $I_F = 10\text{ mA}$                           | $V_F$      | 1.15 | 1.26 | 1.45 | V             |
| <b>OUTPUT</b>                                                                                            |                                                |            |      |      |      |               |
| On-resistance, AC/DC: pin 4, 6 (+) to 5 (-)                                                              | $I_F = 0\text{ mA}$ , $I_L = 50\text{ mA}$     | $R_{ON}$   |      | 20   | 25   | $\Omega$      |
| On-resistance, DC: pin 4, 6 (+) to 5 (-)                                                                 | $I_F = 0\text{ mA}$ , $I_L = 100\text{ mA}$    | $R_{ON}$   |      | 5    | 6.25 | $\Omega$      |
| Off-resistance                                                                                           | $I_F = 5\text{ mA}$ , $V_L = \pm 100\text{ V}$ | $R_{OFF}$  | 0.1  | 1.4  |      | $G\Omega$     |
| Off-state leakage current                                                                                | $I_F = 5\text{ mA}$ , $V_L = \pm 350\text{ V}$ | $I_O$      |      | 0.08 | 1    | $\mu\text{A}$ |
| Output capacitance                                                                                       | $I_F = 5\text{ mA}$ , $V_L = 50\text{ V}$      | $C_O$      |      | 35   |      | pF            |
| <b>TRANSFER</b>                                                                                          |                                                |            |      |      |      |               |
| Capacitance (input to output)                                                                            | $V_{ISO} = 1\text{ V}$                         | $C_{IO}$   |      | 3    |      | pF            |

## Note

- 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.

| <b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                            |           |      |      |      |      |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------|------|------|------|------|
| PARAMETER                                                                                               | TEST CONDITION                             | SYMBOL    | MIN. | TYP. | MAX. | UNIT |
| Turn-on time                                                                                            | $I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$ | $t_{on}$  |      | 2    | 3    | ms   |
| Turn-off time                                                                                           | $I_F = 5\text{ mA}$ , $I_L = 50\text{ mA}$ | $t_{off}$ |      | 1    | 3    | ms   |

## TYPICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

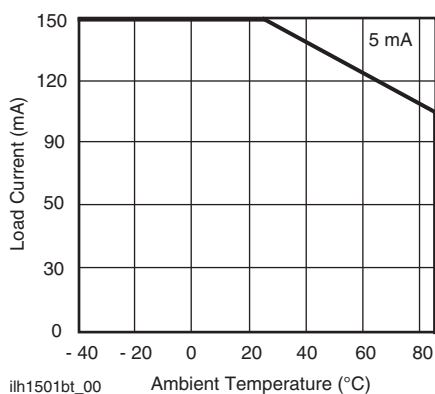


Fig. 1 - Recommended Operating Conditions

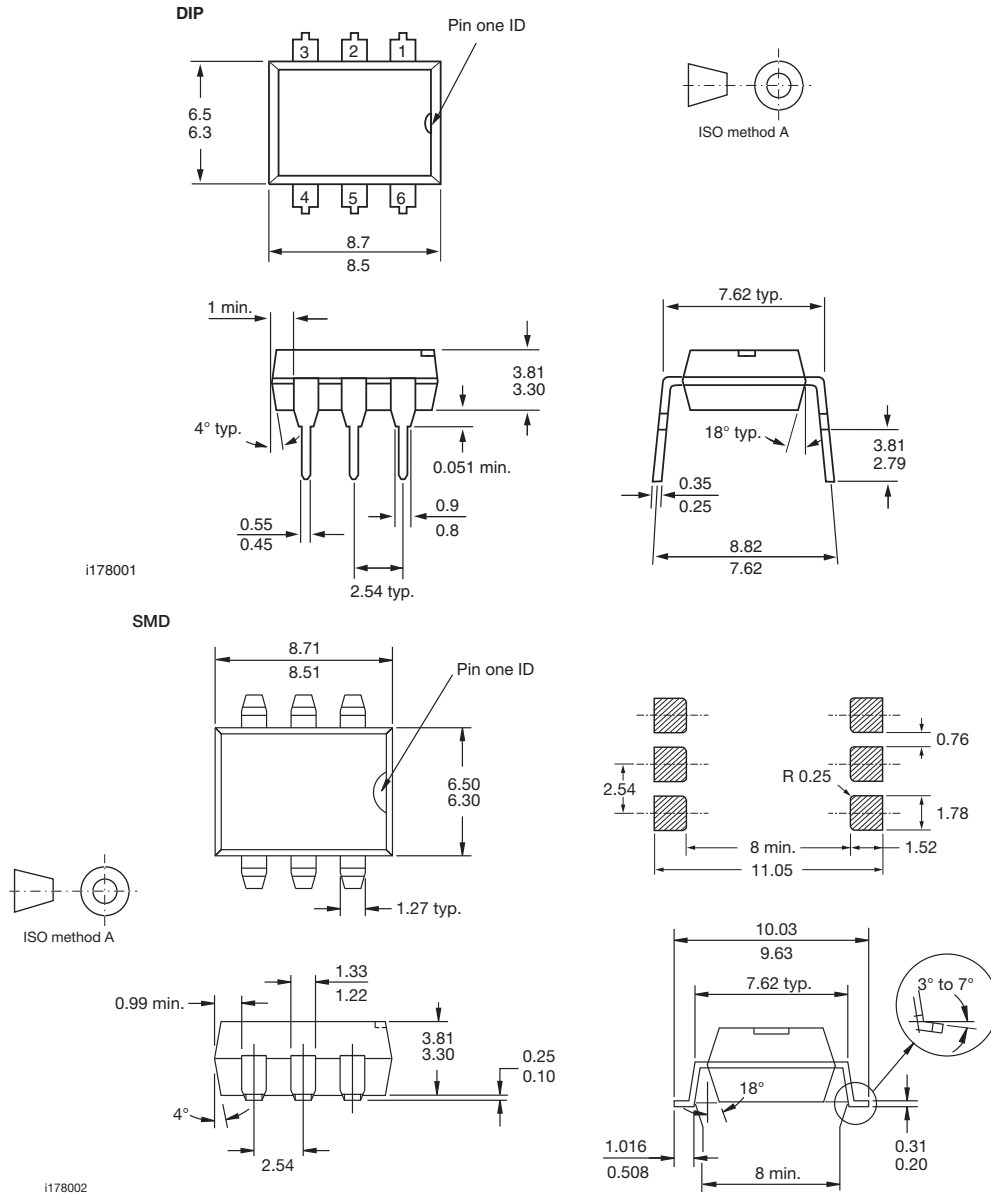


# LH1501BAB, LH1501BABTR, LH1501BT

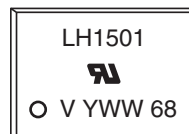
1 Form B Solid State Relay

Vishay Semiconductors

## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING (example)



### Note

- Tape and reel suffix (TR) is not part of the package marking.



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