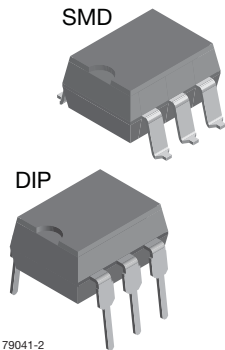
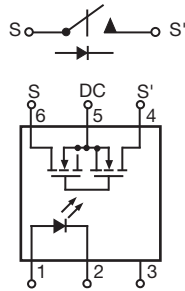


1 Form A Solid State Relay



1179041-2



FEATURES

- Isolation test voltage 5300 V_{RMS}
- Current limit protection
- High reliability monolithic detector
- Low power consumption
- Clean bounce free switching
- High surge capability
- Surface mountable
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS
COMPLIANT

DESCRIPTION

Vishay solid state relays (SSRs) are miniature, optically coupled relays with high-voltage MOSFET outputs. The LH1518 relays are capable of switching AC or DC loads from as little as nanovolts to hundreds of volts.

The relays can switch currents in the range of nanoamps to hundreds of milliamps. The MOSFET switches are ideal for small signal switching and are primarily suited for DC or audio frequency applications.

The LH1518 relays feature a monolithic output die that minimizes wire bonds and permits easy integration of high-performance circuits such as current limiting in normally-open switches. The output die integrates the photodiode receptor array, turn-on and turn-off control circuitry, and the MOSFET switches. The optically-coupled input is controlled by a highly efficient GaAlAs infrared LED.

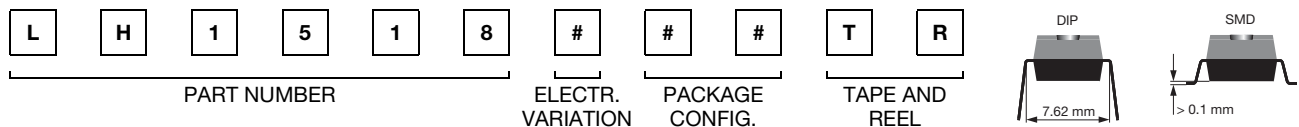
APPLICATIONS

- General telecom switching
- Instrumentation
- Industrial controls

AGENCY APPROVALS

UL1577: file no. E52744 system code H, double protection
 CSA: certification no. 093751
 BSI: certification no. 7979/7980
 DIN EN: 60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1
 FIMKO: 25419

ORDERING INFORMATION



| PACKAGE | UL, CSA, BSI, FIMKO |
|----------------------|---------------------|
| SMD-6, tubes | LH1518AAB |
| SMD-6, tape and reel | LH1518AABTR |
| DIP-6, tubes | LH1518AT |

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|--|------------------------|----------------|-------|------|
| INPUT | | | | |
| LED continuous forward current | | I _F | 50 | mA |
| LED reverse voltage | I _R ≤ 10 μA | V _R | 8 | V |
| OUTPUT | | | | |
| DC or peak AC load voltage | | V _L | 250 | V |
| Continuous DC load current, bidirektional operation | | I _L | 155 | mA |
| Continuous DC load current, unidirektional operation | | I _L | 300 | mA |
| Peak load current (single shot) | t = 100 ms | I _P | (1) | |

| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | |
|--|----------------|------------|---------------|--------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| SSR | | | | |
| Ambient temperature range | | T_{amb} | - 40 to + 85 | $^{\circ}\text{C}$ |
| Storage temperature range | | T_{stg} | - 40 to + 150 | $^{\circ}\text{C}$ |
| Pin soldering temperature ⁽²⁾ | t = 10 s max. | T_{sld} | 260 | $^{\circ}\text{C}$ |
| Input to output isolation voltage | | V_{ISO} | 5300 | V_{RMS} |
| Output power dissipation (continuous) | | P_{diss} | 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.
- ⁽¹⁾ Refer to current limit performance application note 58 for a discussion on relay operation during transient currents.
- ⁽²⁾ Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|--|--|------------|------|------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT | | | | | | |
| LED forward current switch turn-on | $I_L = 100\text{ mA}$, t = 10 ms | I_{Fon} | | 0.8 | 2 | mA |
| LED forward current switch turn-off | $V_L = \pm 200\text{ V}$ | I_{Foff} | 0.2 | 0.7 | | mA |
| LED forward voltage | $I_F = 10\text{ mA}$ | V_F | 1.15 | 1.26 | 1.45 | V |
| OUTPUT | | | | | | |
| On-resistance AC/DC: pin 4 (\pm) to 6 (\pm) | $I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$ | R_{ON} | 10 | 15 | 20 | Ω |
| Off-resistance DC: pin 4, 6 (+) to 5 (\pm) | $I_F = 5\text{ mA}$, $I_L = 100\text{ mA}$ | R_{ON} | 2.5 | 3.75 | 5 | Ω |
| Off-resistance | $I_F = 0\text{ mA}$, $V_L = \pm 100\text{ V}$ | R_{OFF} | 0.5 | 5000 | | G Ω |
| Current limit AC ⁽¹⁾ : pin 4 (\pm) to 6 (\pm) | $I_F = 5\text{ mA}$, t = 5 ms, $V_L = \pm 6\text{ V}$ | I_{LMT} | 170 | 200 | 280 | mA |
| Off-state leakage current | $I_F = 0\text{ mA}$, $V_L = \pm 100\text{ V}$ | I_O | | 0.02 | 200 | nA |
| | $I_F = 0\text{ mA}$, $V_L = \pm 250\text{ V}$ | I_O | | | 1 | μA |
| Output capacitance pin 4 to 6 | $I_F = 0\text{ mA}$, $V_L = 1\text{ V}$ | C_O | | 55 | | pF |
| | $I_F = 0\text{ mA}$, $V_L = 50\text{ V}$ | C_O | | 10 | | pF |
| Switch offset | $I_F = 5\text{ mA}$ | V_{OS} | | 0.15 | | μV |
| TRANSFER | | | | | | |
| Capacitance (input to output) | $V_{ISO} = 1\text{ V}$ | C_{IO} | | 0.8 | | pF |

Notes

- 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.
- ⁽¹⁾ No DC mode current limit available.

| SWITCHING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, 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} | | 1.4 | 3 | ms |
| Turn-off time | $I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$ | t_{off} | | 0.7 | 3 | ms |



| SAFETY AND INSULATION RATINGS | | | | |
|---|--|------------|----------------|------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Climatic classification | IEC 68 part 1 | | 40/85/21 | |
| Pollution degree | DIN VDE 0109 | | 2 | |
| Tracking resistance (comparative tracking index) | Insulation group IIIa | CTI | 175 | |
| Highest allowable overvoltage | Transient overvoltage | V_{IOTM} | 8000 | V_{peak} |
| Max. working insulation voltage | Recurring peak voltage | V_{IORM} | 890 | V_{peak} |
| Insulation resistance at 25 °C | $V_{IO} = 500 V$ | R_{IS} | $\geq 10^{12}$ | Ω |
| Insulation resistance at T_S | | R_{IS} | $\geq 10^9$ | Ω |
| Insulation resistance at 100 °C | | R_{IS} | $\geq 10^{11}$ | Ω |
| Partial discharge test voltage | Methode a, $V_{pd} = V_{IORM} \times 1.875$ | V_{pd} | 1669 | V_{peak} |
| Safety limiting values - maximum values allowed in the event of a failure | Case temperature | T_{SI} | 175 | °C |
| | Input current | I_{SI} | 300 | mA |
| | Output power | P_{SO} | 700 | mW |
| Minimum external air gap (clearance) | Measured from input terminals to output terminals, shortest distance through air | | ≥ 7 | mm |
| Minimum external tracking (creepage) | Measured from input terminals to output terminals, shortest distance path along body | | ≥ 7 | mm |

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

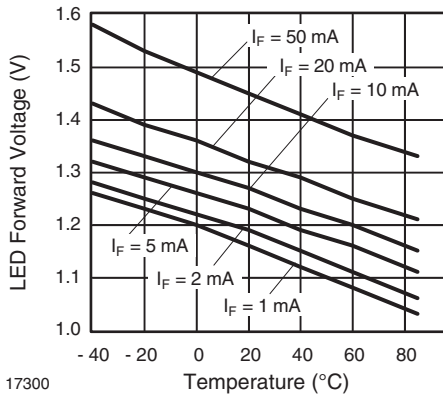


Fig. 1 - LED Voltage vs. Temperature

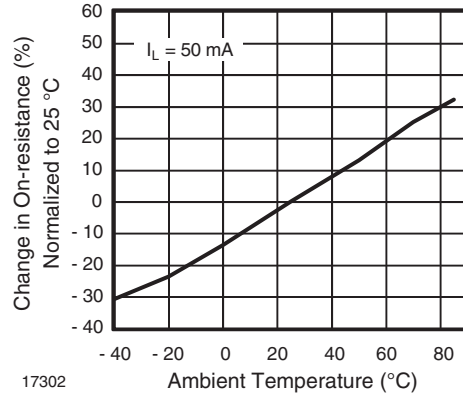


Fig. 3 - On-resistance vs. Temperature

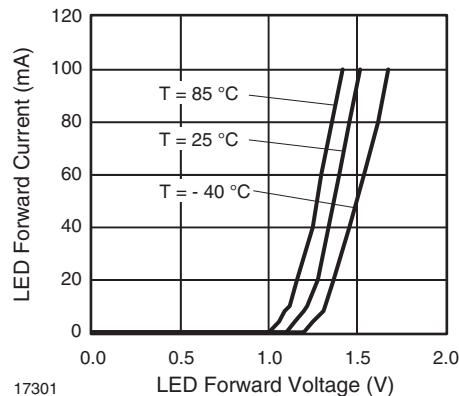


Fig. 2 - LED Forward Current vs. LED Forward Voltage

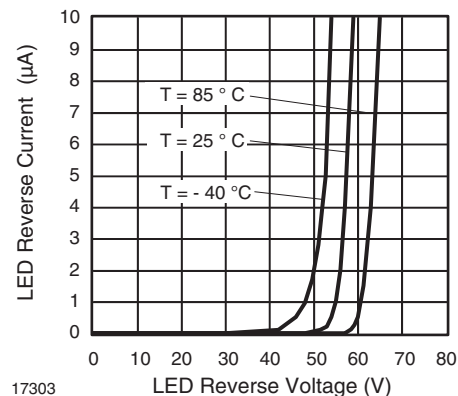


Fig. 4 - LED Reverse Current vs. LED Reverse Voltage

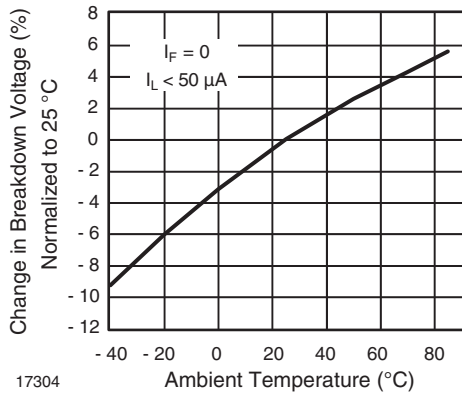


Fig. 5 - Switch Breakdown Voltage vs. Temperature

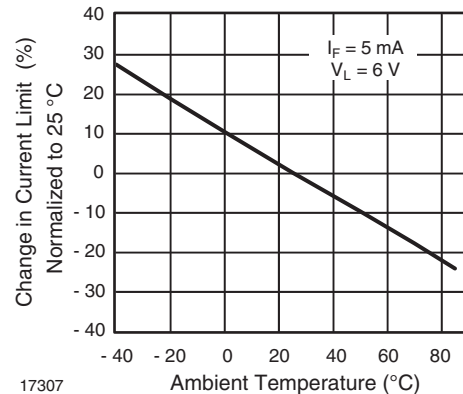


Fig. 8 - Current Limit vs. Temperature

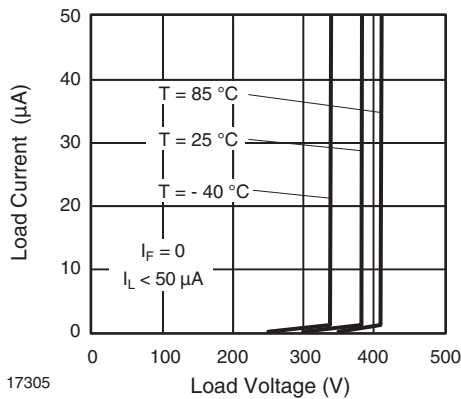


Fig. 6 - Switch Breakdown Voltage vs. Load Current

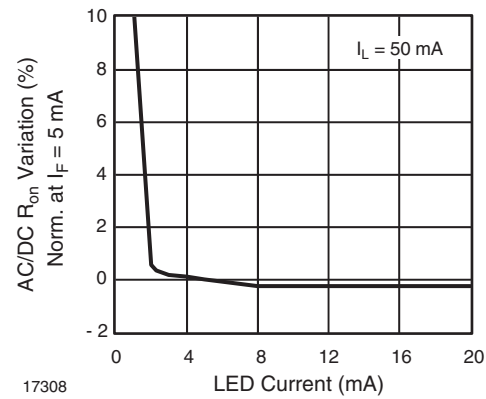


Fig. 9 - Variation in On-resistance vs. LED Current

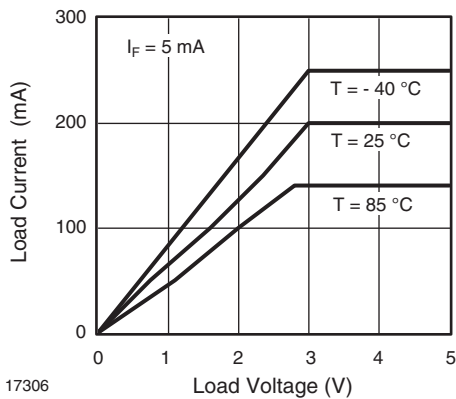


Fig. 7 - Load Current vs. Load Voltage

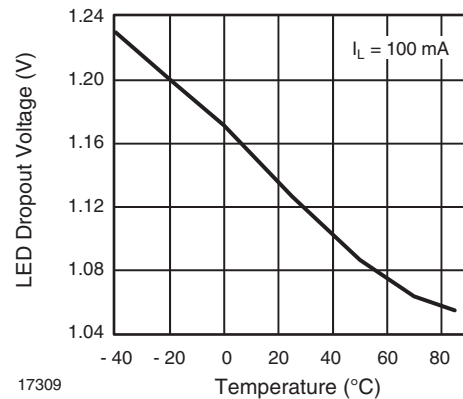


Fig. 10 - LED Dropout Voltage vs. Temperature



LH1518AAB, LH1518AABTR, LH1518AT

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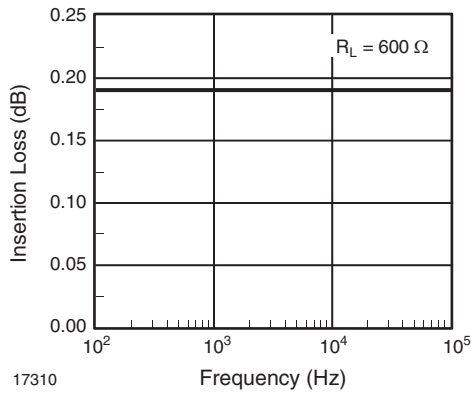


Fig. 11 - Insertion Loss vs. Frequency

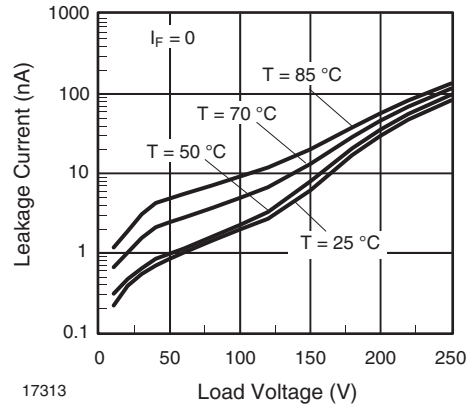


Fig. 14 - Leakage Current vs. Applied Voltage

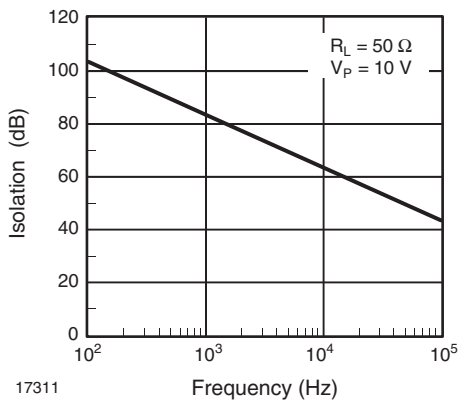


Fig. 12 - Output Isolation

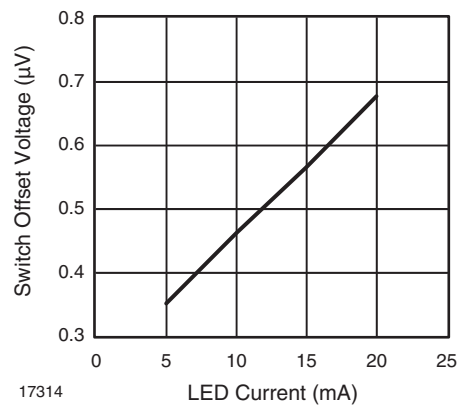


Fig. 15 - Switch Offset Voltage vs. LED Current

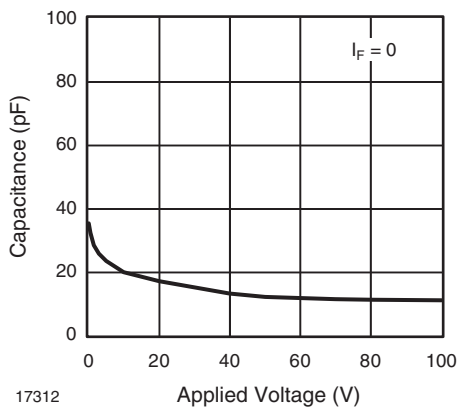


Fig. 13 - Switch Capacitance vs. Applied Voltage

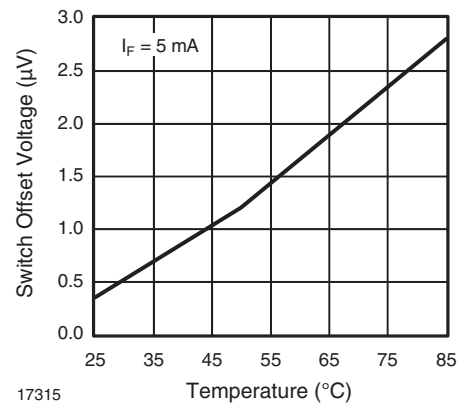


Fig. 16 - Switch Offset Voltage vs. Temperature

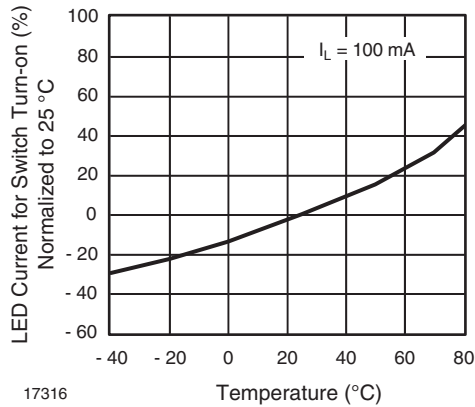


Fig. 17 - LED Current for Switch Turn-on vs. Temperature

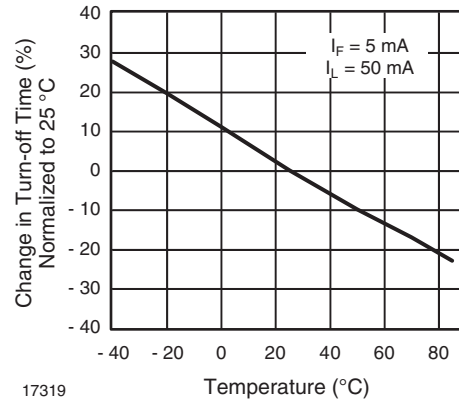


Fig. 20 - Turn-off Time vs. Temperature

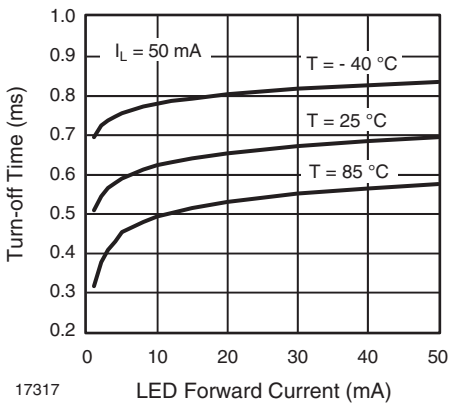


Fig. 18 - Turn-off Time vs. LED Current

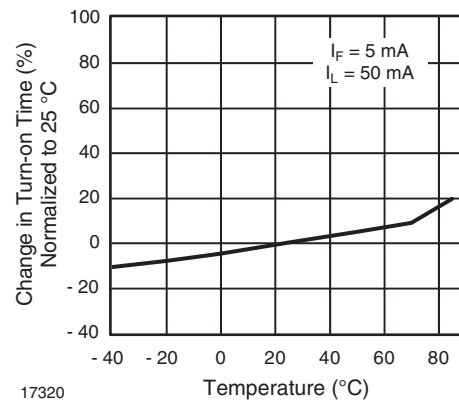


Fig. 21 - Turn-on Time vs. Temperature

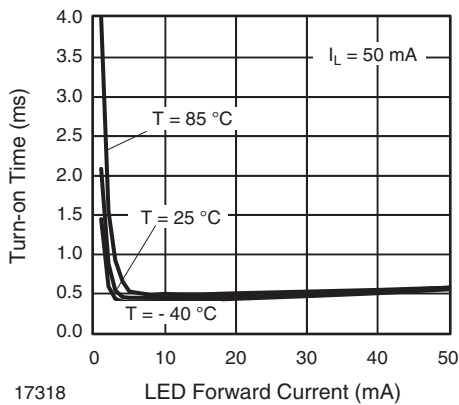


Fig. 19 - Turn-on Time vs. LED Current

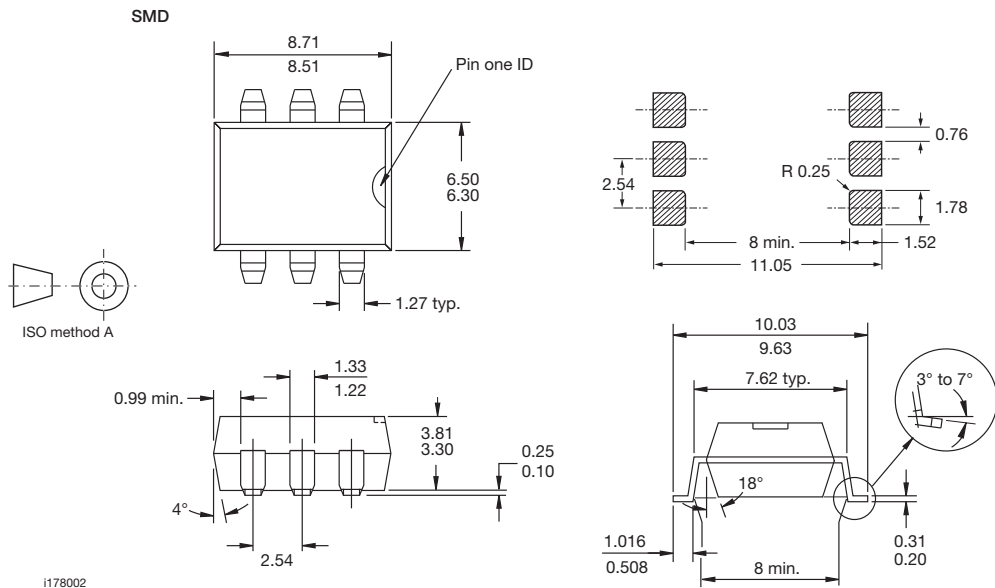
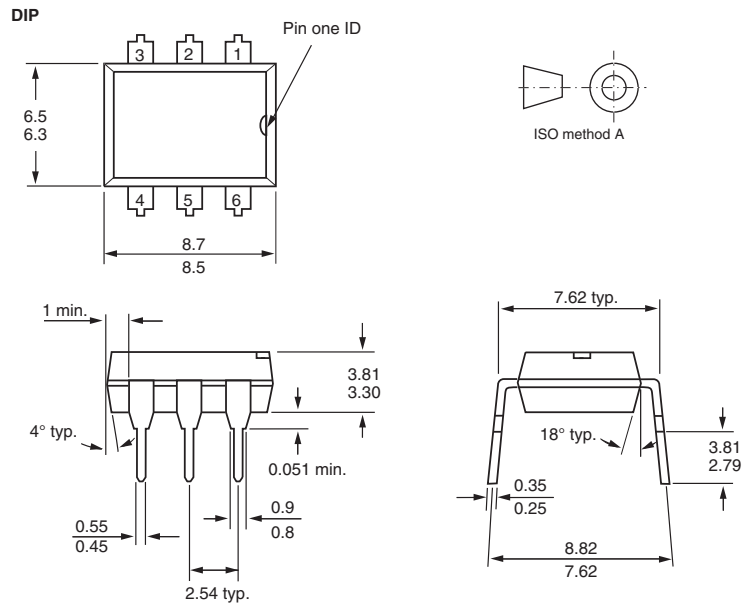


LH1518AAB, LH1518AABTR, LH1518AT

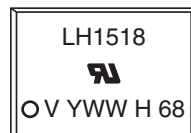
1 Form A Solid State Relay

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PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING



Note

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



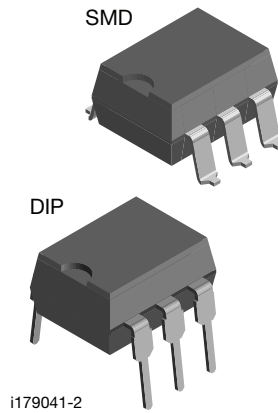
Footprint and Schematic Information for LH1518AAB, LH1518AABTR, LH1518AT

The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

Note that the 3D models for these parts can be found on the Vishay product page.

| PART NUMBER | FOOTPRINT / SCHEMATIC |
|-------------|--|
| LH1518AAB | www.snapeda.com/parts/LH1518AAB/Vishay/view-part |
| LH1518AABTR | www.snapeda.com/parts/LH1518AABTR/Vishay/view-part |
| LH1518AT | www.snapeda.com/parts/LH1518AT/Vishay/view-part |

For technical issues and product support, please contact optocoupleranswers@vishay.com.





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