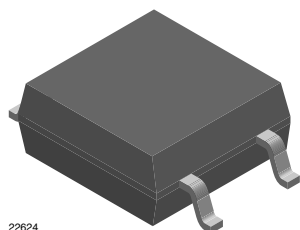
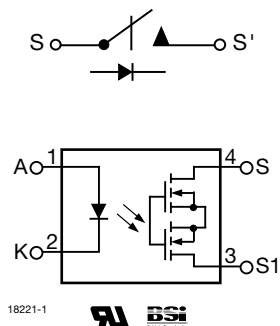


## 1 Form A Solid-State Relay



22624



18221-1



### DESCRIPTION

The LH1546AEF (4 pin SOP) is robust, ideal for telecom and ground fault applications. It is an SPST normally open switch (1 form A) that replaces electromechanical relays in many applications. It is constructed using a GaAs LED for actuation control and MOSFETs for the switch output. In addition, it employs current-limiting circuitry which meets lightning surge testing as per ANSI/TIA-968-B and other regulatory voltage surge requirements when overvoltage protection is provided.

### FEATURES

- Current limit protection
- Isolation test voltage 3750 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 28 Ω
- Load voltage 350 V
- Load current 120 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- SMD lead available on tape and reel
- Equivalent to CPC1035N
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


RoHS  
COMPLIANT

### APPLICATIONS

- General telecom switching
  - On/off hook control
  - Ring relay
  - Dial pulse
  - Ground start
  - Ground fault protection
- Instrumentation
- Industrial controls

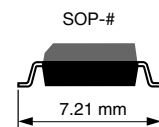
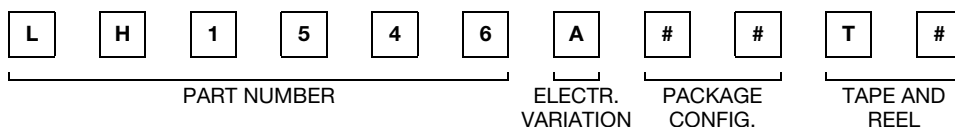
### Note

- See "solid-state relays" (application note 56)

### AGENCY APPROVALS

- UL1577, file no. E52744 system code O
- BSI/BABT certification no. 8500 issue 2

### ORDERING INFORMATION



| PACKAGE                            | UL, BSI     |
|------------------------------------|-------------|
| SOP-4, tape and reel (T2 rotation) | LH1546AEFT2 |
| SOP-4, tape and reel               | LH1546AEFTR |
| SOP-4, tubes                       | LH1546AEF   |



| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                |            |                |                    |
|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------|----------------|--------------------|
| PARAMETER                                                                                       | TEST CONDITION                                                 | SYMBOL     | VALUE          | UNIT               |
| <b>INPUT</b>                                                                                    |                                                                |            |                |                    |
| LED continuous forward current                                                                  |                                                                | $I_F$      | 50             | mA                 |
| LED reverse voltage                                                                             | $I_R \leq 10\text{ }\mu\text{A}$                               | $V_R$      | 6              | V                  |
| <b>OUTPUT</b>                                                                                   |                                                                |            |                |                    |
| DC or peak AC load voltage                                                                      | $I_L \leq 50\text{ }\mu\text{A}$                               | $V_L$      | 350            | V                  |
| Continuous DC load current at 25 °C, bidirectional                                              |                                                                | $I_L$      | 120            | mA                 |
| <b>SSR</b>                                                                                      |                                                                |            |                |                    |
| SSR output power dissipation (continuous)                                                       |                                                                | $P_{diss}$ | 550            | mW                 |
| Ambient temperature range                                                                       |                                                                | $T_{amb}$  | - 40 to + 85   | $^{\circ}\text{C}$ |
| Storage temperature range                                                                       |                                                                | $T_{stg}$  | - 40 to + 150  | $^{\circ}\text{C}$ |
| Soldering temperature <sup>(1)</sup>                                                            | $t = 10\text{ s max.}$                                         | $T_{sld}$  | 260            | $^{\circ}\text{C}$ |
| Isolation test voltage                                                                          | $t = 1\text{ min}$                                             | $V_{ISO}$  | 3750           | $V_{RMS}$          |
| Isolation resistance                                                                            | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$  | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$           |
|                                                                                                 | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$           |

**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.

| ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                            |             |      |      |      |                  |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------|------|------|------|------------------|
| PARAMETER                                                                                         | TEST CONDITION                                             | SYMBOL      | MIN. | TYP. | MAX. | UNIT             |
| <b>INPUT</b>                                                                                      |                                                            |             |      |      |      |                  |
| LED forward current, switch turn-on                                                               | $I_L = 100\text{ mA}, t = 10\text{ ms}$                    | $I_{Fon}$   |      | 1.1  | 2    | mA               |
| LED forward current, switch turn-off                                                              | $V_L = \pm 300\text{ V}$                                   | $I_{Foff}$  | 0.2  | 0.6  |      | mA               |
| LED forward voltage                                                                               | $I_F = 10\text{ mA}$                                       | $V_F$       | 1    | 1.18 | 1.45 | V                |
| <b>OUTPUT</b>                                                                                     |                                                            |             |      |      |      |                  |
| On-resistance, AC/DC: pin 3 ( $\pm$ ) to 4 ( $\pm$ )                                              | $I_F = 5\text{ mA}, I_L = 50\text{ mA}$                    | $R_{ON}$    |      | 28   | 35   | $\Omega$         |
| Off-resistance                                                                                    | $I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$                | $R_{OFF}$   | 0.5  | 5000 |      | $\text{G}\Omega$ |
| Off-state leakage current                                                                         | $I_F = 0\text{ mA}, V_L = \pm 100\text{ V}$                | $I_O$       |      | 0.32 | 200  | nA               |
|                                                                                                   | $I_F = 0\text{ mA}, V_L = \pm 350\text{ V}$                | $I_O$       |      |      | 1    | nA               |
| Output capacitance pin 3 to 4                                                                     | $I_F = 0\text{ mA}, V_L = 1\text{ V}$                      | $C_O$       |      | 55   |      | pF               |
|                                                                                                   | $I_F = 0\text{ mA}, V_L = 50\text{ V}$                     | $C_O$       |      | 10   |      | pF               |
| Current limit                                                                                     | $I_F = 5\text{ mA}, t = 5\text{ ms}, V_L = \pm 6\text{ V}$ | $I_{limit}$ | 170  | 210  | 250  | mA               |
| <b>TRANSFER</b>                                                                                   |                                                            |             |      |      |      |                  |
| Capacitance (input to output)                                                                     | $V_{ISO} = 1\text{ V}$                                     | $C_{IO}$    |      | 0.6  |      | 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.

| SWITCHING CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                         |           |      |      |      |      |
|--------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|------|------|------|------|
| PARAMETER                                                                                        | TEST CONDITION                          | SYMBOL    | MIN. | TYP. | MAX. | UNIT |
| Turn-on time                                                                                     | $I_F = 5\text{ mA}, I_L = 50\text{ mA}$ | $t_{on}$  |      | 2    | 3    | ms   |
| Turn-off time                                                                                    | $I_F = 5\text{ mA}, I_L = 50\text{ mA}$ | $t_{off}$ |      | 0.08 | 3    | ms   |

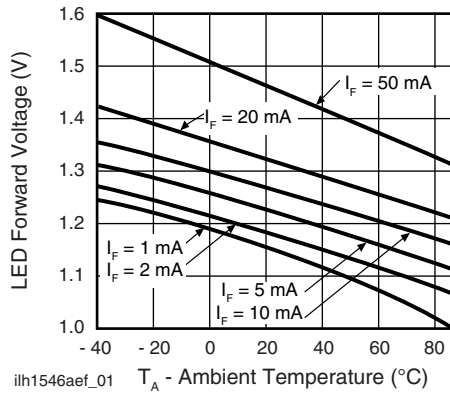
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - LED Voltage vs. Temperature

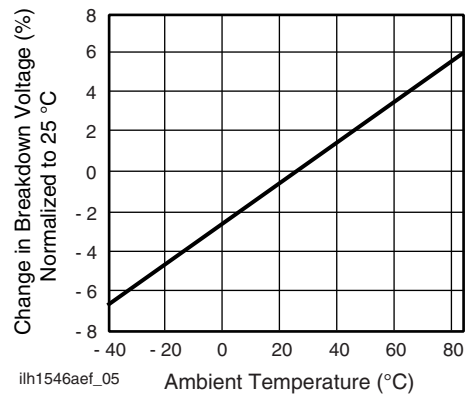


Fig. 4 - Switch Breakdown Voltage vs. Temperature

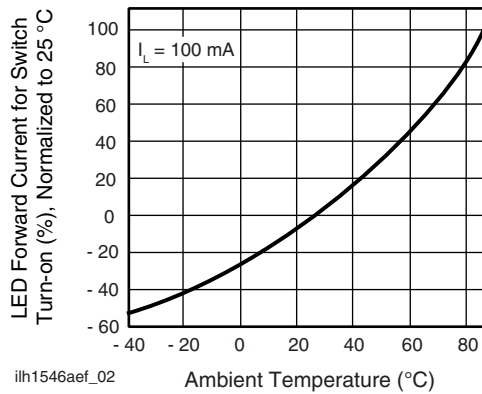


Fig. 2 - LED Current for Switch Turn-on vs. Temperature

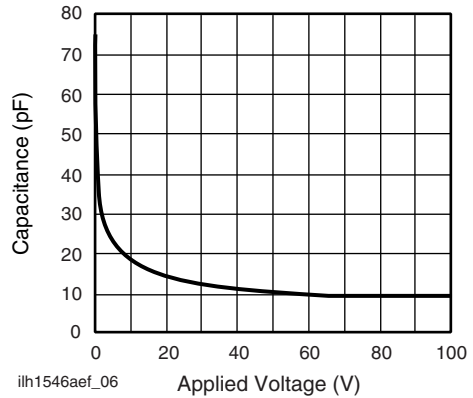


Fig. 5 - Switch Capacitance vs. Applied Voltage

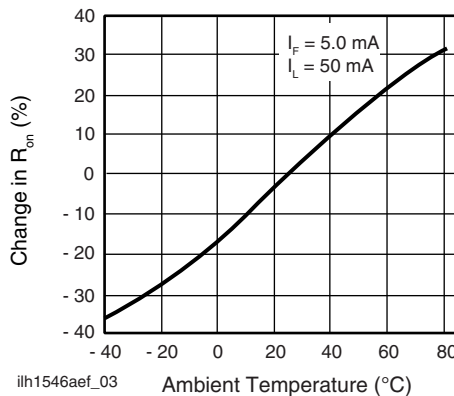


Fig. 3 - On-Resistance vs. Temperature

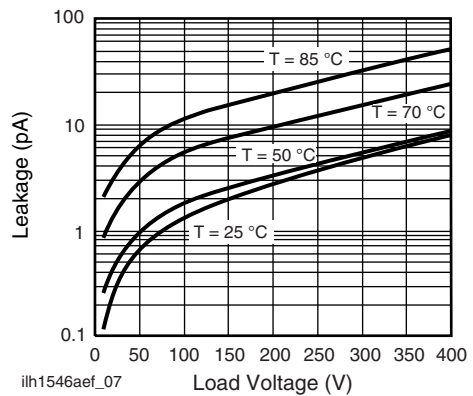


Fig. 6 - Leakage Current vs. Applied Voltage

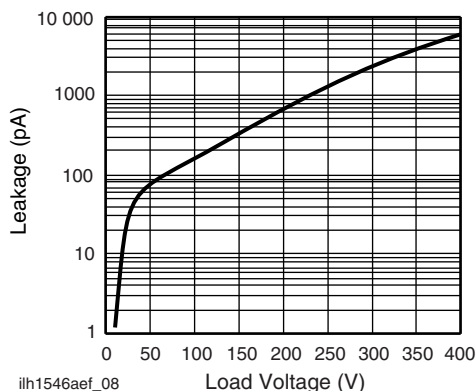


Fig. 7 - Leakage Current vs. Applied Voltage

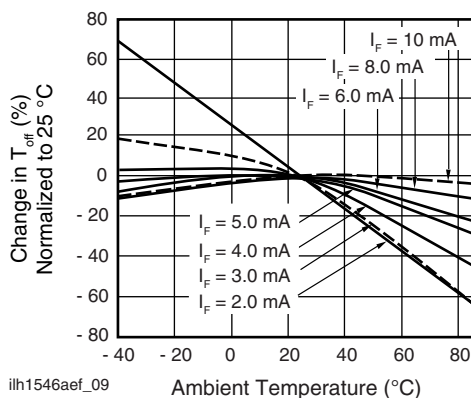


Fig. 8 - Turn-off Time vs. Temperature

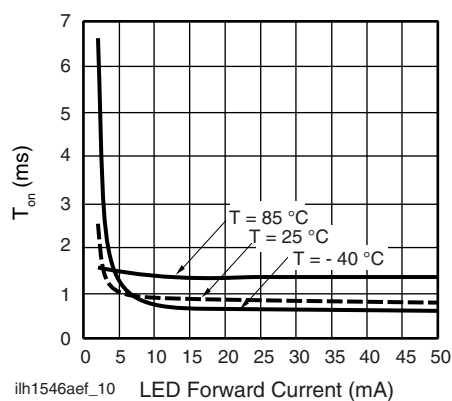
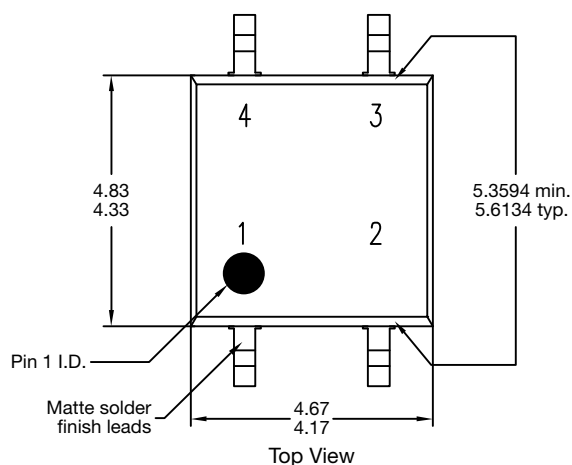
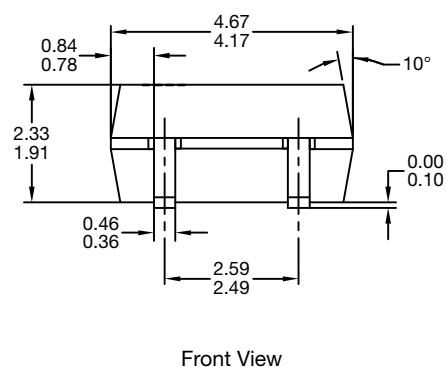
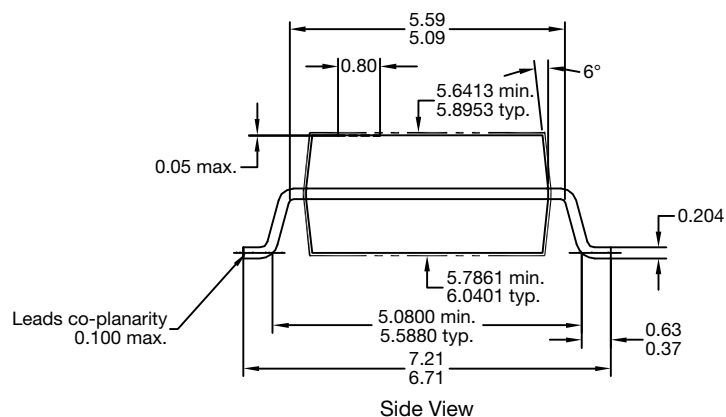


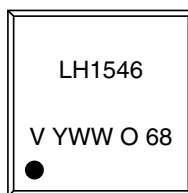
Fig. 9 - Turn-on Time vs. LED Current

### PACKAGE DIMENSIONS in millimeters



22625-1

### PACKAGE MARKING (example)



### Note

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

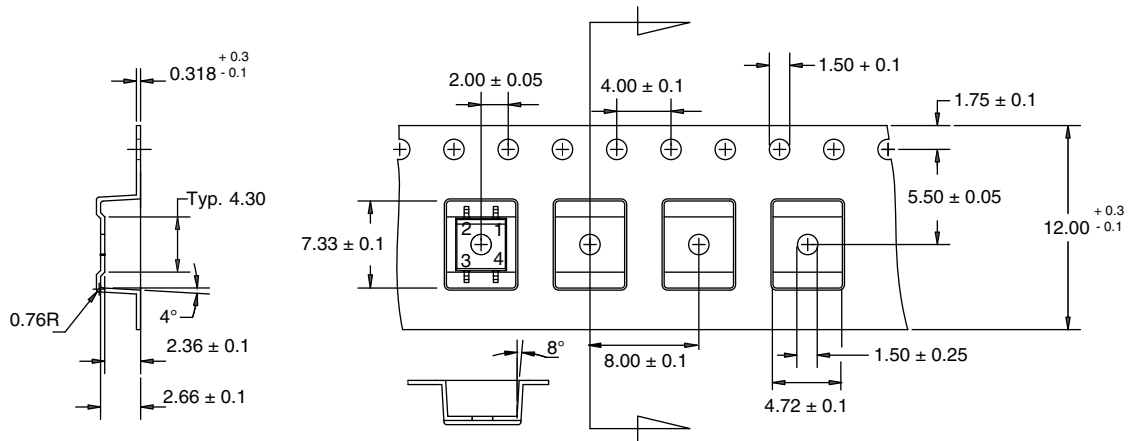
**TAPE ANR REEL DIMENSIONS** in millimeters


Fig. 10 - LH1546AEFTR, 2000 per Reel

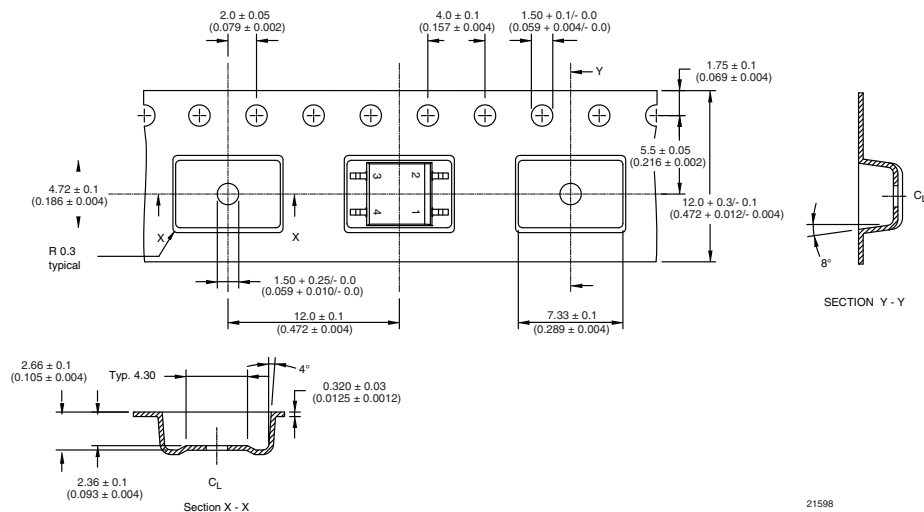


Fig. 11 - LH1546AEFT2, T2 Rotation, 2000 per Reel



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