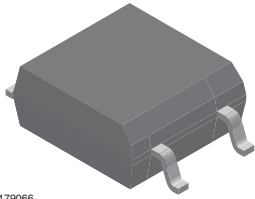
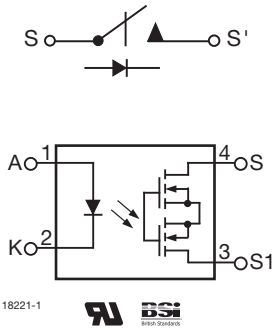


## 1 Form A Solid-State Relay



i179066



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 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, 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 3000 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
- High reliability monolithic receptor
- SMD lead available on tape and reel
- Equivalent to CPC1035N
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



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	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px 5px;">L</div> <div style="border: 1px solid black; padding: 2px 5px;">H</div> <div style="border: 1px solid black; padding: 2px 5px;">1</div> <div style="border: 1px solid black; padding: 2px 5px;">5</div> <div style="border: 1px solid black; padding: 2px 5px;">4</div> <div style="border: 1px solid black; padding: 2px 5px;">6</div> <div style="border: 1px solid black; padding: 2px 5px;">A</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> <div style="border: 1px solid black; padding: 2px 5px;">T</div> <div style="border: 1px solid black; padding: 2px 5px;">#</div> </div>	
PART NUMBER	ELECTR. VARIATION
PACKAGE CONFIG.	TAPE AND REEL
PACKAGE	UL, BSI
SOP-4, tape and reel (product rotated in tape)	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	$t = 1\text{ s}$	$V_{ISO}$	3000	$V_{RMS}$
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.

(1) 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		$G\Omega$
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

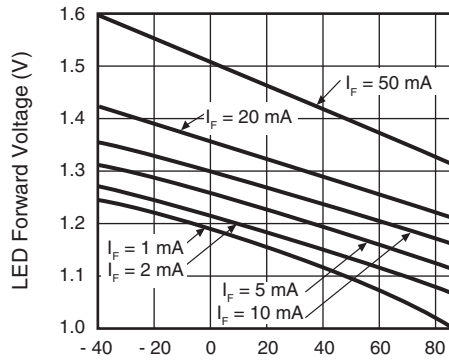
**Note**

- 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

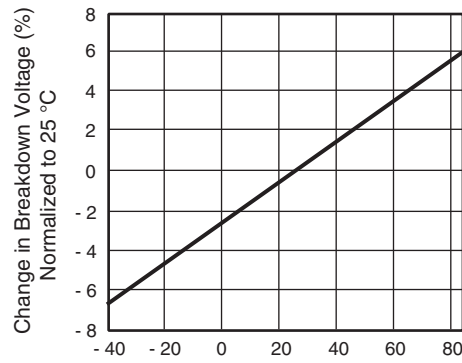


## TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)



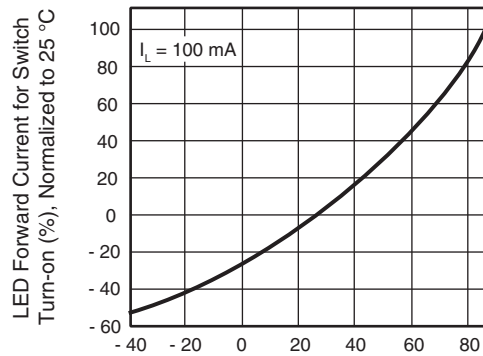
ih1546aef\_01 T<sub>A</sub> - Ambient Temperature (°C)

Fig. 1 - LED Voltage vs. Temperature



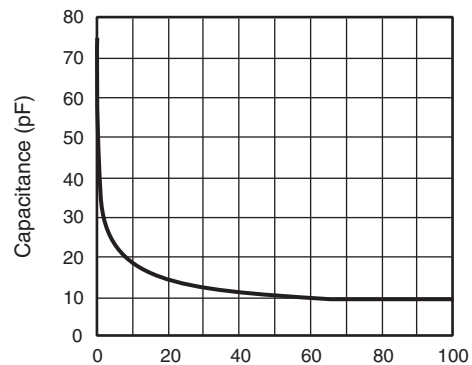
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Fig. 4 - Switch Breakdown Voltage vs. Temperature



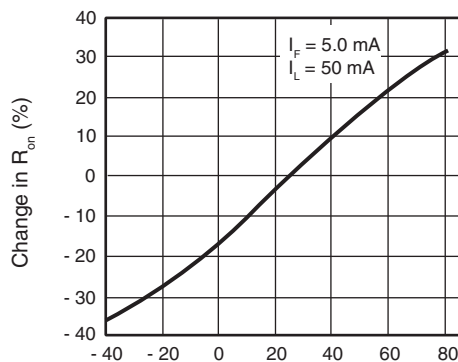
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Fig. 2 - LED Current for Switch Turn-on vs. Temperature



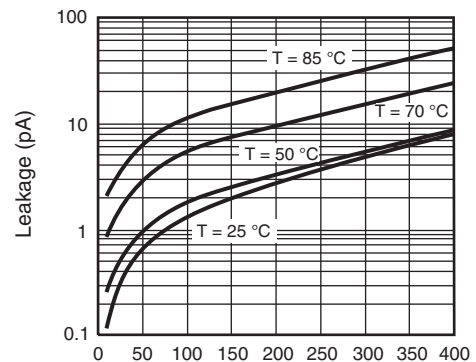
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Fig. 5 - Switch Capacitance vs. Applied Voltage



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Fig. 3 - On-Resistance vs. Temperature



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Fig. 6 - Leakage Current vs. Applied Voltage

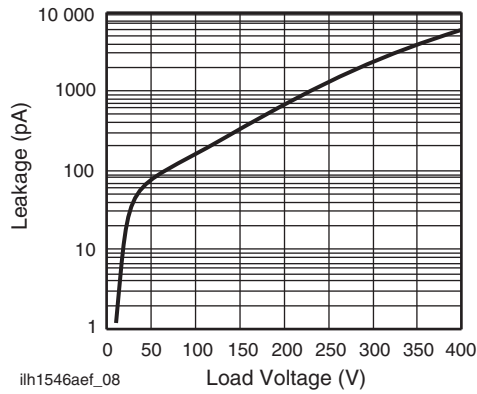


Fig. 7 - Leakage Current vs. Applied Voltage

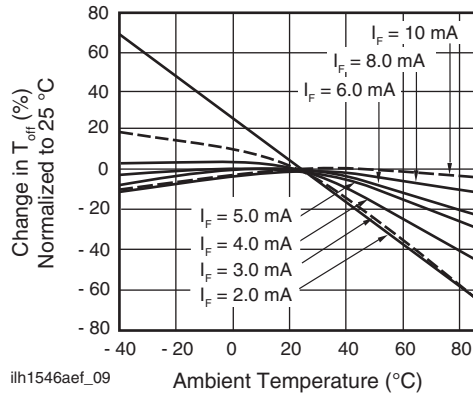


Fig. 8 - Turn-off Time vs. Temperature

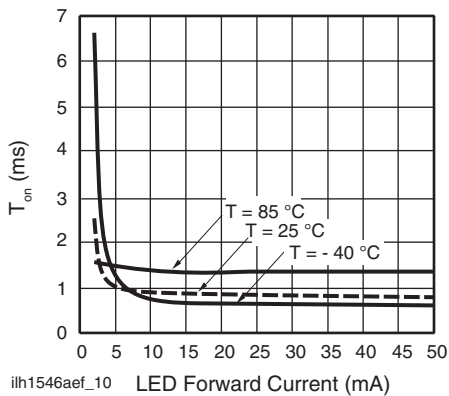
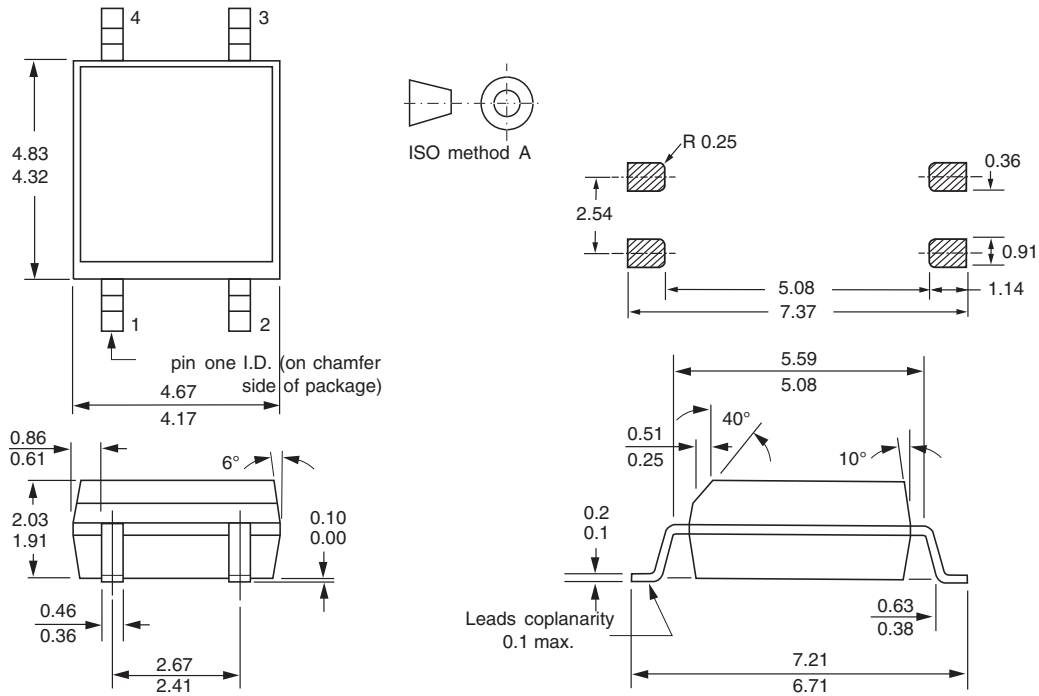


Fig. 9 - Turn-on Time vs. LED Current

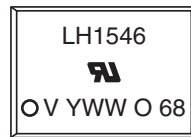


## PACKAGE DIMENSIONS in millimeters



i178030

## PACKAGE MARKING (example)



### Note

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



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