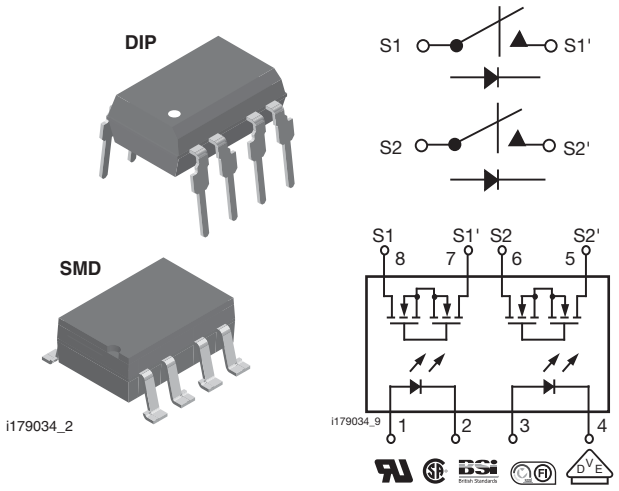
Dual 1 Form A Solid-State Relay



FEATURES

- Two independent relays
- Current limit protection
- Isolation test voltage 5300 V_{RMS}
- Typical R_{ON} 15 Ω
- Load voltage 250 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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The LH1505 contains two normally open switches that can be used as two independent SPST relays or as one DPST relay. The relay is constructed using a GaAlAs LED for actuation control and integrated monolithic dies for the switch outputs. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuity, and DMOS switches. In addition, the LH1505 relay employs current limiting circuitry, enabling it to pass lightning surge testing as per ANSI/TIA-968-B and other regulatory voltage surge requirements when overvoltage protection is provided.

APPLICATIONS

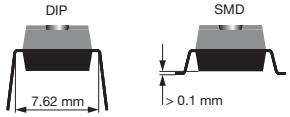
- General telecom switching
  - On/off hook control
  - Ring delay
  - Dial pulse
  - Ground start
  - Ground fault protection
- Instrumentation
- Industrial controls

AGENCY APPROVALS

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

ORDERING INFORMATION

L	H	1	5	0	5	A	#	#	T	R
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.		TAPE AND REEL	



PACKAGE	UL, CSA, BSI, FIMKO
SMD-8, tubes	LH1505AAC
SMD-8, tape and reel	LH1505AACTR
DIP-8, tubes	LH1505AB

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	$I_R \leq 10$ µA	V_R	8	V
OUTPUT				
DC or peak AC load voltage	$I_L \leq 50$ µA	V_L	250	V
Continuous DC load current, one pole operating		I_L	130	mA
Continuous DC load current, two poles operating		I_L	120	mA
Peak load current (single shot), form B	t = 100 ms	I_P	(3)	
SSR				
Ambient operating temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature (1)	t = 10 s max.	T_{sld}	260	°C
Input to output isolation test voltage	t = 1 s, I_{ISO} = 10 µA max.	V_{ISO}	5300	V_{RMS}
Pole-to-pole isolation voltage (S1 to S2) (2), (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		P_{diss}	600	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 reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

(2) Breakdown occurs between the output pins external to the package.

(3) Refer to current limit performance application note for a discussion on relay operation during transient currents.

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
LED forward current, switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		1	2	mA
LED forward current, switch turn-off	V_L = ± 200 V	I_{Foff}	0.2	0.9		mA
LED forward voltage	I_F = 10 mA	V_F	1.15	1.26	1.45	V
OUTPUT						
On-resistance	I_F = 5 mA, I_L = 50 mA	R_{ON}	10	15	20	Ω
Off-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	5000		GΩ
Current limit	I_F = 5 mA, t = 5 ms, V_L = ± 6 V	I_{LMT}	170	200	280	mA
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V	I_O		0.02	200	nA
	I_F = 0 mA, V_L = ± 250 V	I_O			1	µA
Output capacitance	I_F = 0 mA, V_L = 1 V	C_O		55		pF
	I_F = 0 mA, V_L = 50 V	C_O		10		pF
Pole-to-pole capacitance (S1 to S2)	I_F = 5 mA			0.5		pF
Switch offset	I_F = 5 mA	V_{OS}		0.15		µV
TRANSFER						
Capacitance (input to output)	V_{ISO} = 1 V	C_{IO}		1.1		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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_F = 5 mA, I_L = 50 mA	t_{on}		1.4 (1)	4 (1)	ms
Turn-off time	I_F = 5 mA, I_L = 50 mA	t_{off}		0.7 (1)	4 (1)	ms

Note

(1) I_L = 100 mA.

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

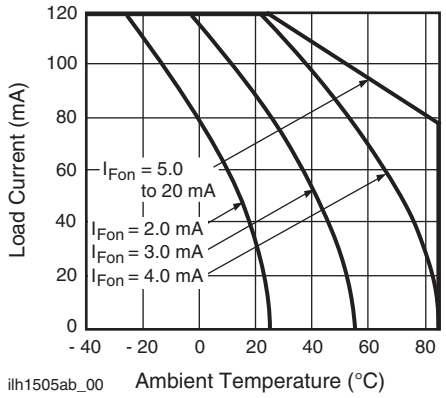


Fig. 1 - Recommended Operating Conditions

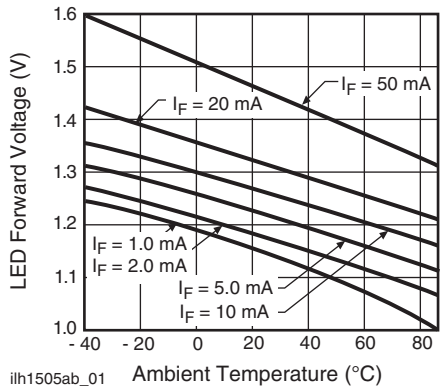


Fig. 2 - LED Voltage vs. Temperature

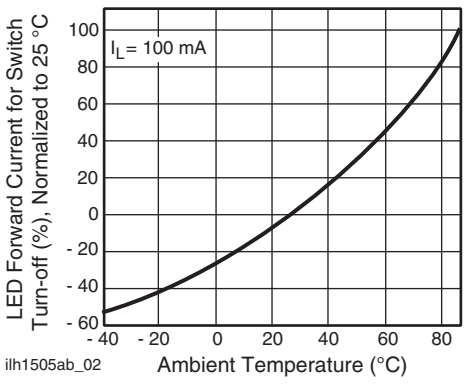


Fig. 3 - LED Current for Switch Turn-on vs. Temperature

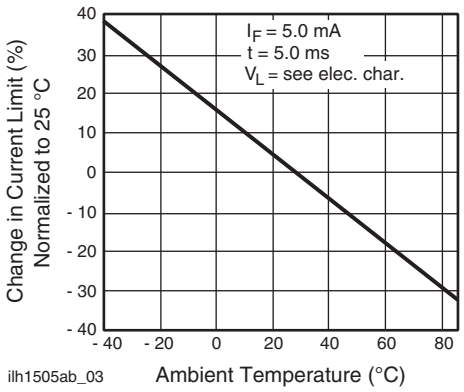


Fig. 4 - Current Limit vs. Temperature

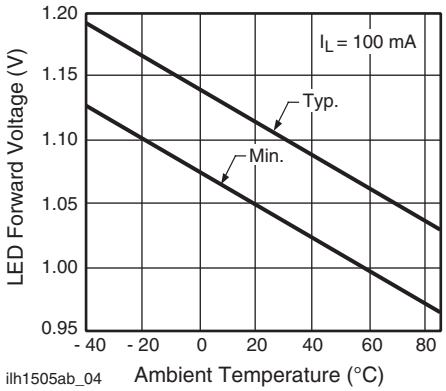


Fig. 5 - LED Dropout Voltage vs. Temperature

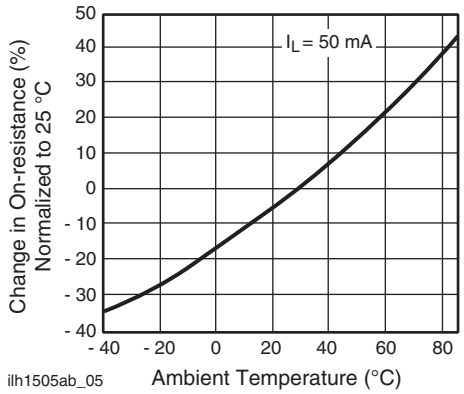


Fig. 6 - On-Resistance vs. Temperature

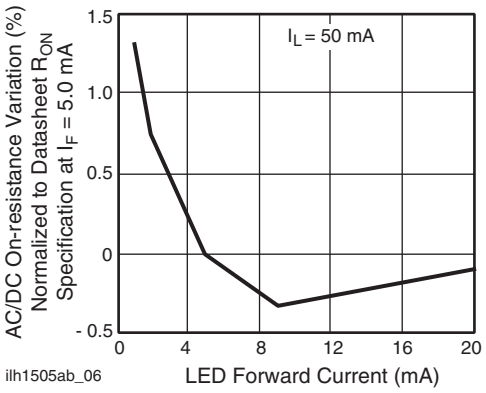


Fig. 7 - Variation in On-Resistance vs. LED Current

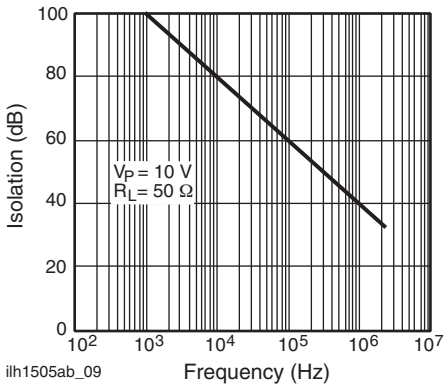


Fig. 10 - Output Isolation

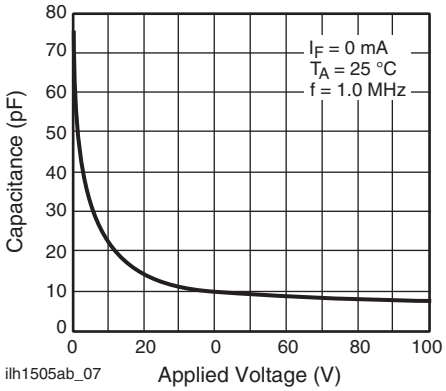


Fig. 8 - Switch Capacitance vs. Applied Voltage

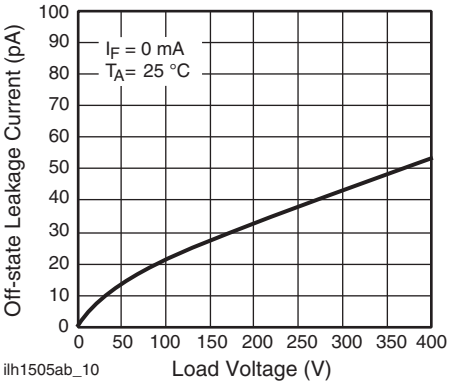


Fig. 11 - Leakage Current vs. Applied Voltage

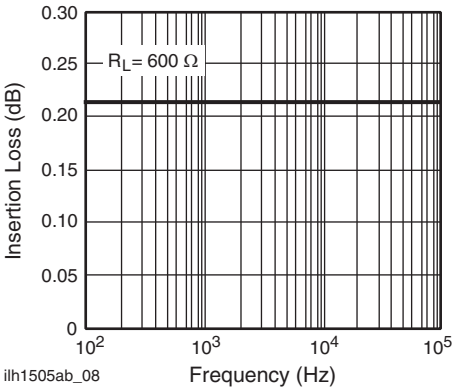


Fig. 9 - Insertion Loss vs. Frequency

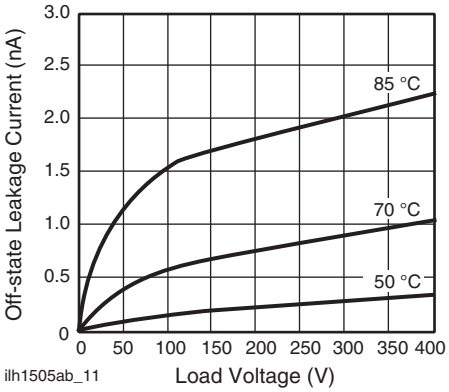


Fig. 12 - Leakage Current vs.
Applied Voltage at Elevated Temperatures

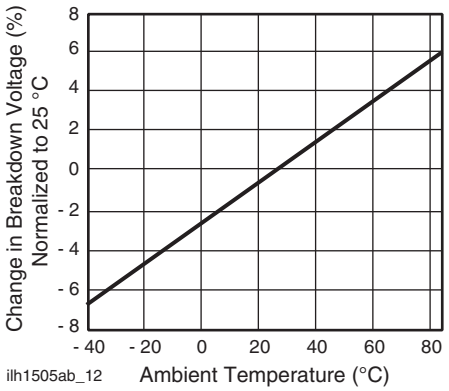


Fig. 13 - Switch Breakdown Voltage vs. Temperature

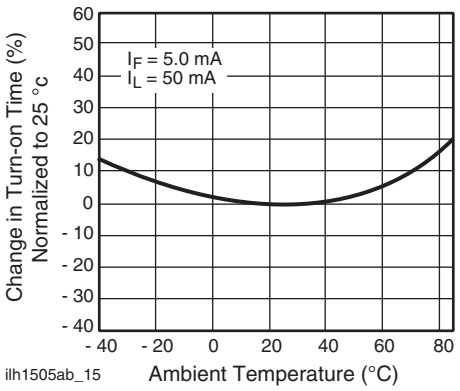


Fig. 16 - Turn-on Time vs. Temperature

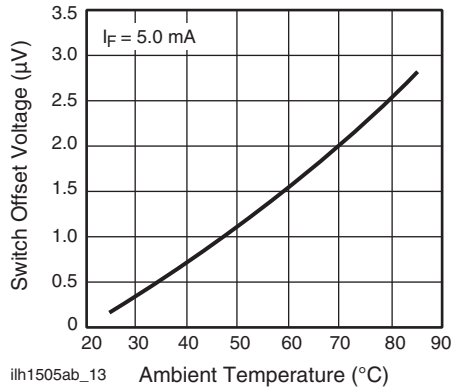


Fig. 14 - Switch Offset Voltage vs. Temperature

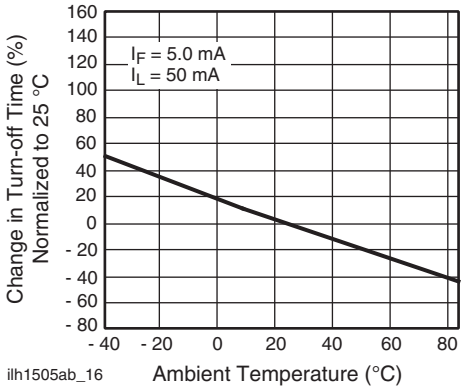


Fig. 17 - Turn-off Time vs. Temperature

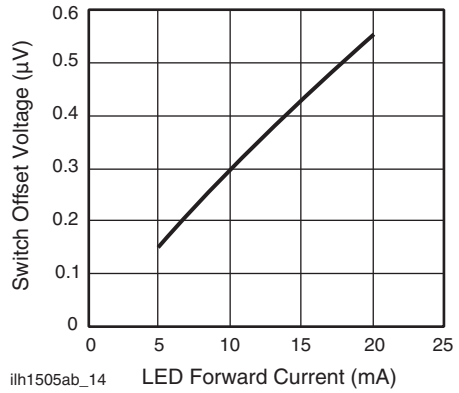


Fig. 15 - Switch Offset Voltage vs. LED Current

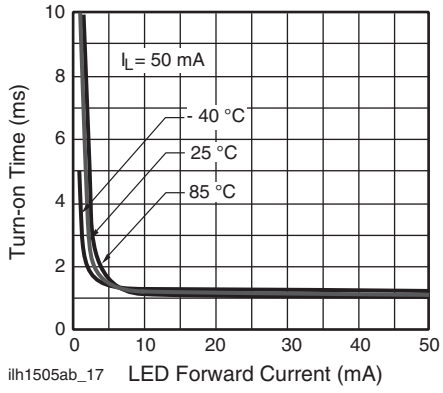


Fig. 18 - Turn-on Time vs. LED Current

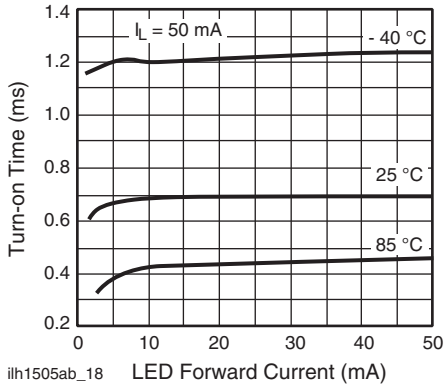
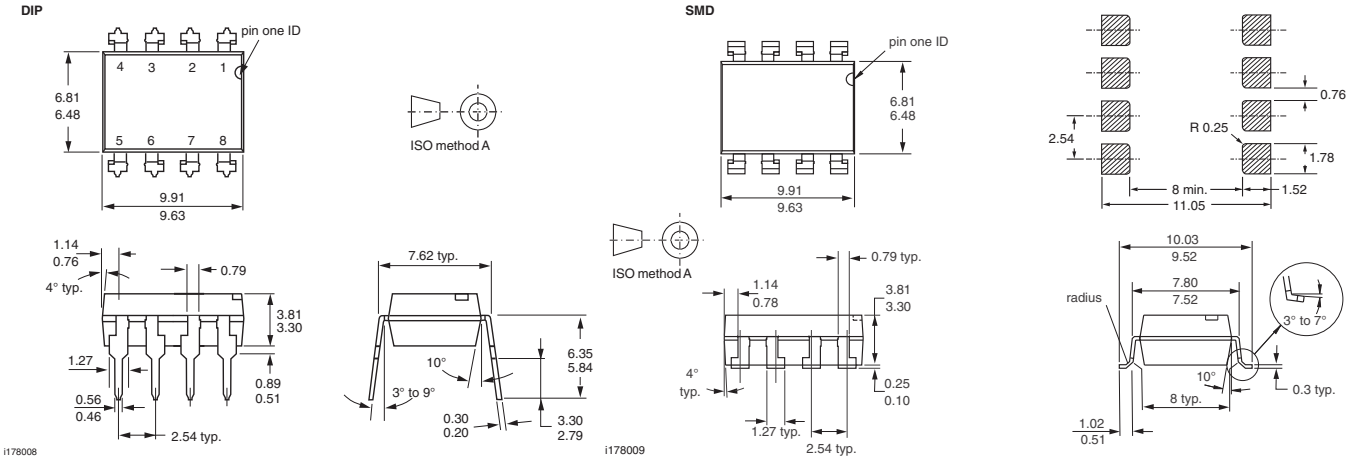
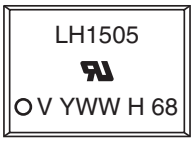


Fig. 19 - Turn-off Time vs. LED Current

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example)



Note

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

Footprint and Schematic Information for LH1505AAC, LH1505AACTR, LH1505AB

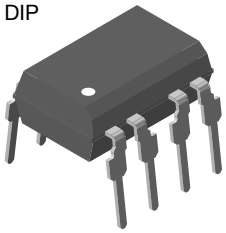
The footprint and schematic symbols for the following parts can be accessed using the associated links. They are available in Eagle, Altium, KiCad, OrCAD / Allegro, Pulsonix, and PADS.

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

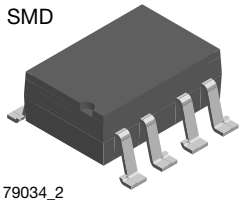
PART NUMBER	FOOTPRINT / SCHEMATIC
LH1505AAC	www.snapeda.com/parts/LH1505AAC/Vishay/view-part
LH1505AACTR	www.snapeda.com/parts/LH1505AACTR/Vishay/view-part
LH1505AB	www.snapeda.com/parts/LH1505AB/Vishay/view-part

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

DIP



SMD



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