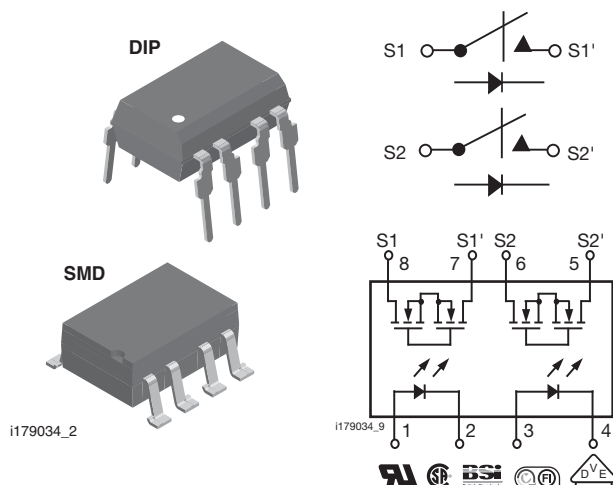


Dual 1 Form A Solid-State Relay



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



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



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10\text{ }\mu\text{A}$	V_R	8	V
OUTPUT				
DC or peak AC load voltage	$I_L \leq 50\text{ }\mu\text{A}$	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	$t = 100\text{ ms}$	I_P	(3)	
SSR				
Ambient operating temperature range		T_{amb}	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	- 40 to + 150	$^{\circ}\text{C}$
Pin soldering temperature (1)	$t = 10\text{ s max.}$	T_{sld}	260	$^{\circ}\text{C}$
Input to output isolation test voltage	$t = 1\text{ s, } I_{ISO} = 10\text{ }\mu\text{A max.}$	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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
LED forward current, switch turn-on	$I_L = 100\text{ mA, } t = 10\text{ ms}$	I_{Fon}		1	2	mA
LED forward current, switch turn-off	$V_L = \pm 200\text{ V}$	I_{Foff}	0.2	0.9		mA
LED forward voltage	$I_F = 10\text{ mA}$	V_F	1.15	1.26	1.45	V
OUTPUT						
On-resistance	$I_F = 5\text{ mA, } I_L = 50\text{ mA}$	R_{ON}	10	15	20	Ω
Off-resistance	$I_F = 0\text{ mA, } V_L = \pm 100\text{ V}$	R_{OFF}	0.5	5000		$G\Omega$
Current limit	$I_F = 5\text{ mA, } t = 5\text{ ms, } V_L = \pm 6\text{ V}$	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	$I_F = 0\text{ mA, } V_L = 1\text{ V}$	C_O		55		pF
	$I_F = 0\text{ mA, } V_L = 50\text{ V}$	C_O		10		pF
Pole-to-pole capacitance (S1 to S2)	$I_F = 5\text{ mA}$			0.5		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}		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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, 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 (1)	4 (1)	ms
Turn-off time	$I_F = 5\text{ mA, } I_L = 50\text{ mA}$	t_{off}		0.7 (1)	4 (1)	ms

Note

- (1) $I_L = 100\text{ mA}$.



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

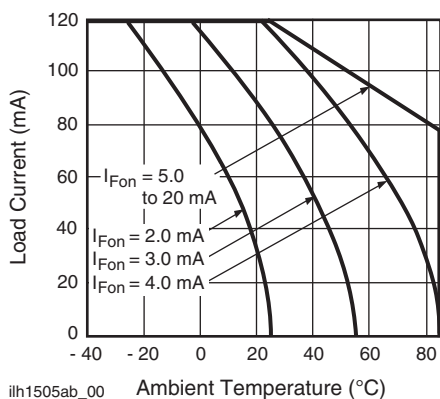


Fig. 1 - Recommended Operating Conditions

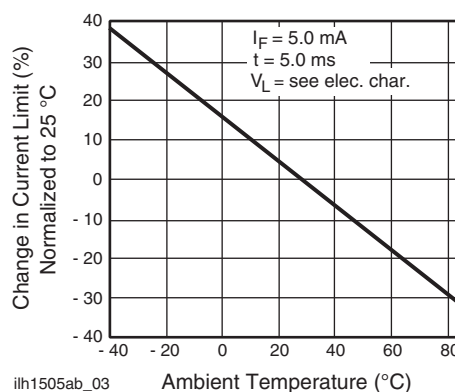


Fig. 4 - Current Limit vs. Temperature

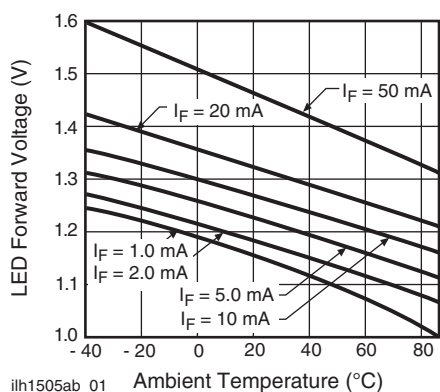


Fig. 2 - LED Voltage vs. Temperature

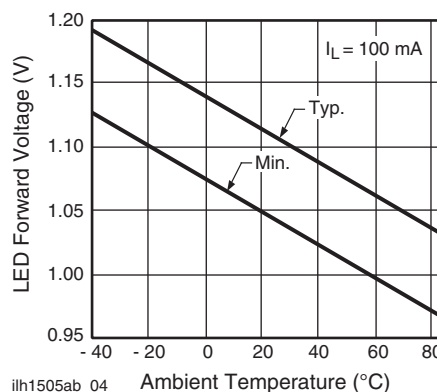


Fig. 5 - LED Dropout Voltage vs. Temperature

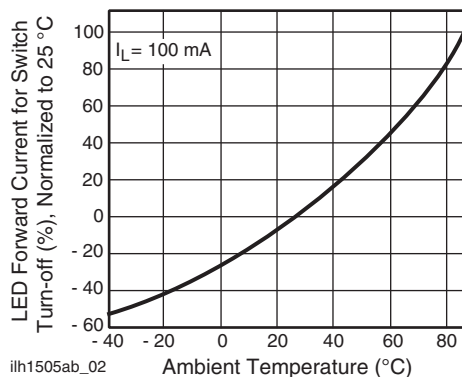


Fig. 3 - LED Current for Switch Turn-on vs. Temperature

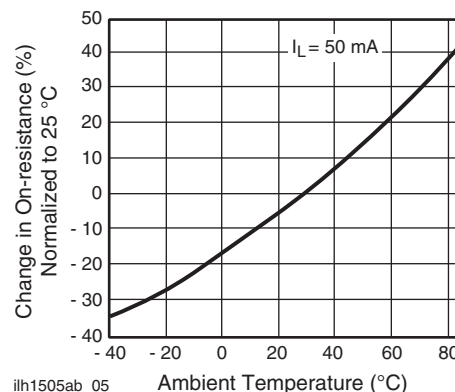


Fig. 6 - On-Resistance vs. Temperature

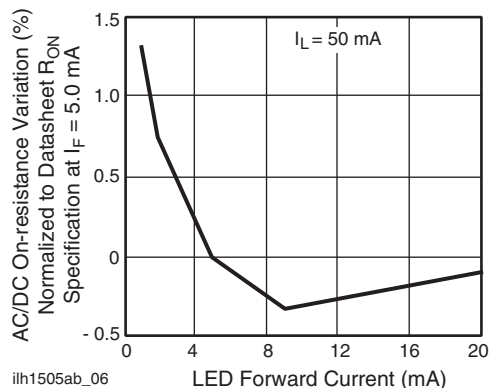


Fig. 7 - Variation in On-Resistance vs. LED Current

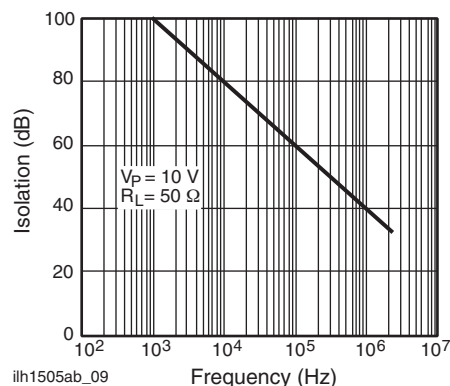


Fig. 10 - Output Isolation

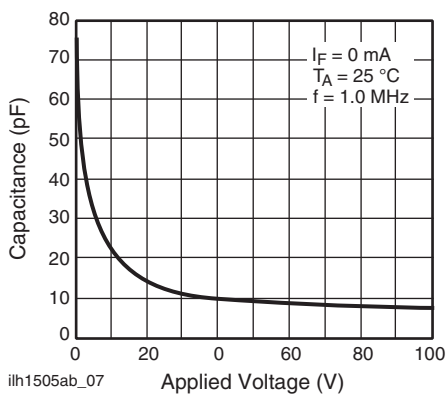


Fig. 8 - Switch Capacitance vs. Applied Voltage

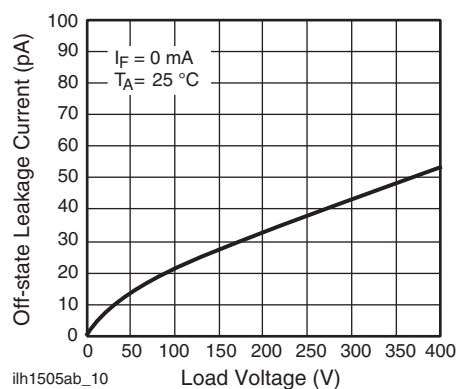


Fig. 11 - Leakage Current vs. Applied Voltage

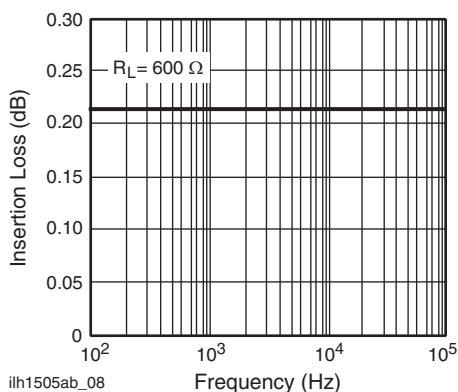


Fig. 9 - Insertion Loss vs. Frequency

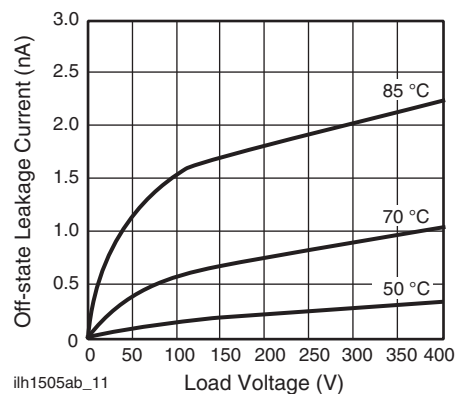


Fig. 12 - Leakage Current vs. Applied Voltage at Elevated Temperatures

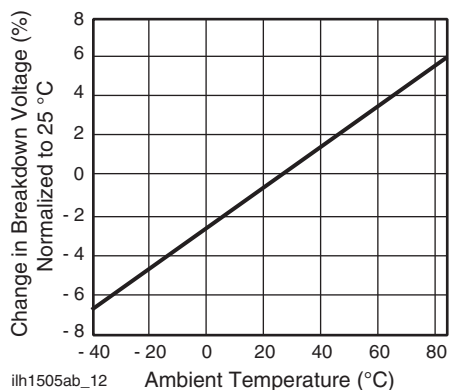


Fig. 13 - Switch Breakdown Voltage vs. Temperature

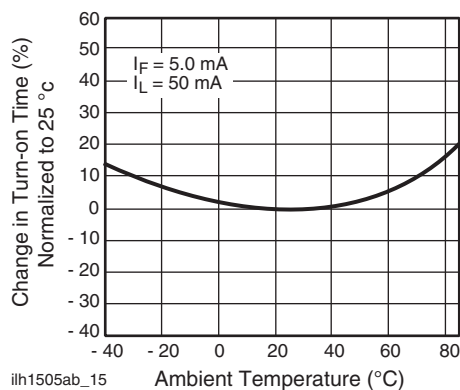


Fig. 16 - Turn-on Time vs. Temperature

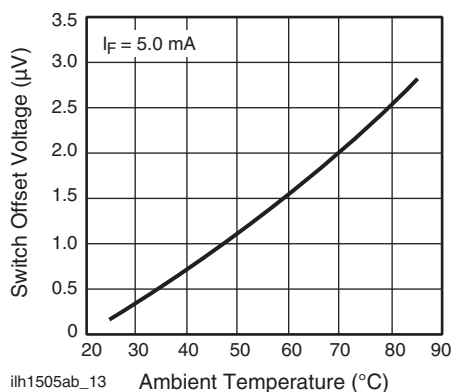


Fig. 14 - Switch Offset Voltage vs. Temperature

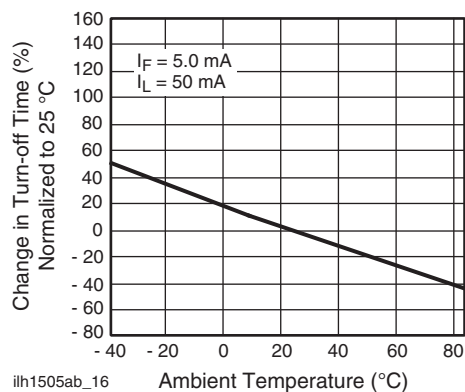


Fig. 17 - Turn-off Time vs. Temperature

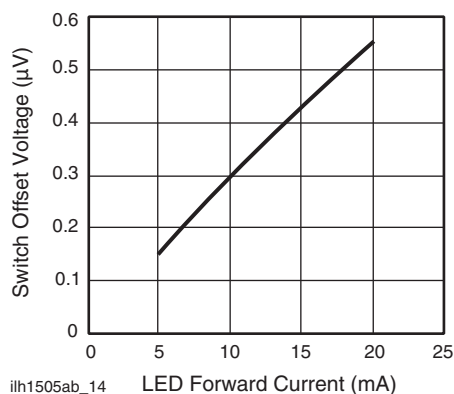


Fig. 15 - Switch Offset Voltage vs. LED Current

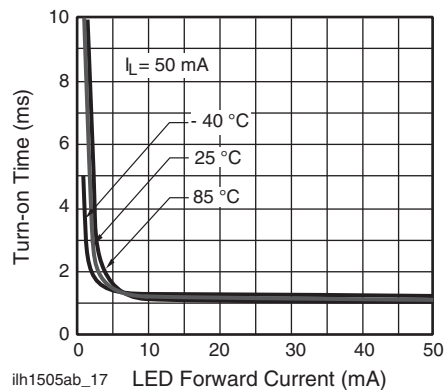


Fig. 18 - Turn-on Time vs. LED Current

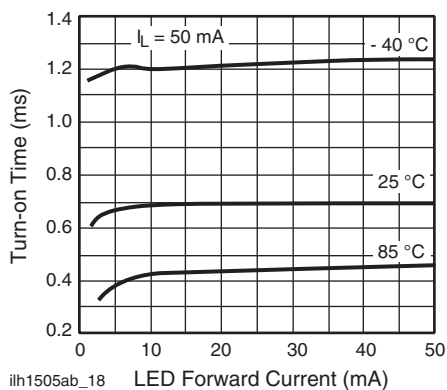
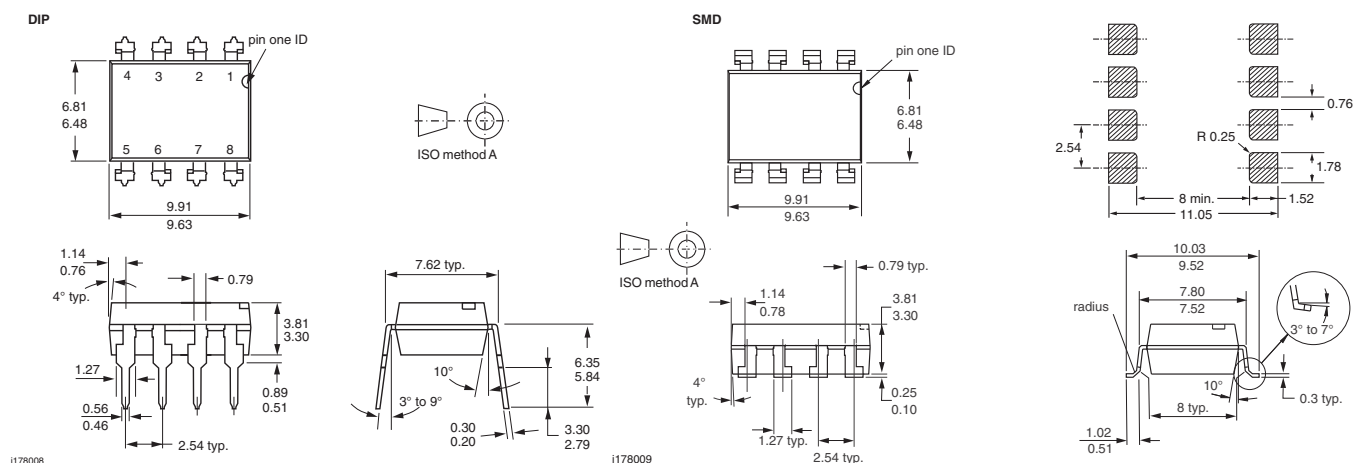
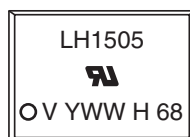


Fig. 19 - Turn-off Time vs. LED Current

PACKAGE DIMENSIONS in millimeters



PACKAGE MARKING (example)



Note

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.