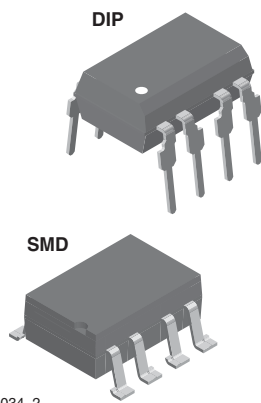
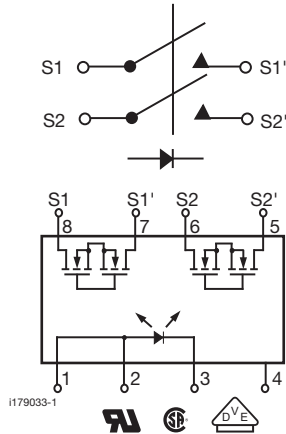


2 Form A Solid-State Relay



i179034_2



i179033-1



FEATURES

- Current limit protection
- Isolation test voltage 5300 V_{RMS}
- Typical R_{ON} 20 Ω
- Load voltage 350 V
- Load current 110 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 LH1503 relays are DPST normally open switches (2 form A) that can replace electromechanical relays in many applications. The relays are constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuitry, and DMOS switches. In addition, these relays employ current limiting circuitry, enabling them 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
 DIN EN: 60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1

ORDERING INFORMATION												
L	H	1	5	0	3	A	#	#	T	R		
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.	TAPE AND REEL				
PACKAGE						UL, CSA						
SMD-8, tubes						LH1503AAC						
SMD-8, tape and reel						LH1503AACTR						
DIP-8, tubes						LH1503AB						



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	I _L ≤ 50 μA	V _L	350	V
Continuous DC load current one pole operating		I _L	150	mA
Continuous DC load current two poles operating		I _L	110	mA
Peak load current (single shot)	t = 100 ms	I _P	(1)	
SSR				
Ambient temperature range		T _{amb}	- 40 to + 85	°C
Storage temperature range		T _{stg}	- 40 to + 150	°C
Pin soldering temperature (2)	t = 10 s max.	T _{sld}	260	°C
Input to output isolation voltage		V _{ISO}	5300	V _{RMS}
Pole-to-pole isolation voltage (S1 to S2)			500	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 current limit performance application note 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 °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}		2	3	mA
LED forward current, switch turn-off	V _L = ± 300 V	I _{Foff}	0.2	0.8		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}	12	20	25	Ω
Pole-to-pole on-resistance matching (S1 to S2)	I _F = 5 mA, I _L = 50 mA			0.2	2	ΔΩ
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}	230	270	370	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 = ± 350 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 = 0 mA			3		pF
	I _F = 5 mA			4		pF
Switch offset	I _F = 5 mA	V _{OS}		0.15		μV
TRANSFER						
Capacitance (input to output)	V _{ISO}	C _{ISO}		1.1		pF

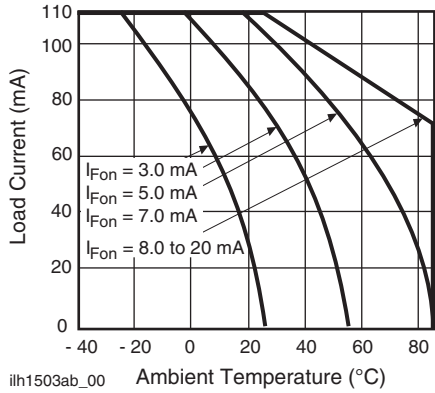
Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. 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 = 10 mA, I _L = 50 mA	t _{on}		1.6	2.5	ms
Turn-off time	I _F = 10 mA, I _L = 50 mA	t _{off}		0.65	2.5	ms

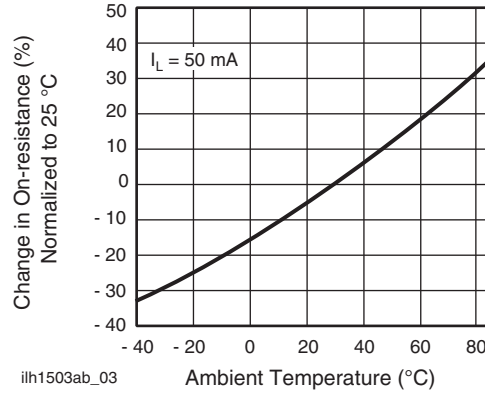


TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)



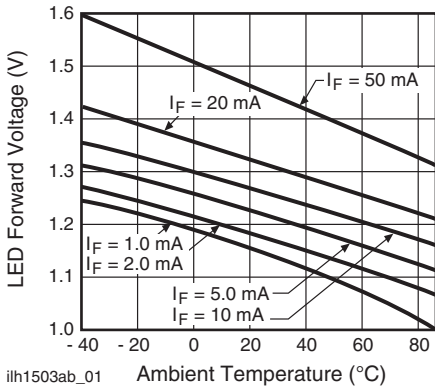
ih1503ab_00 Ambient Temperature (°C)

Fig. 1 - Recommended Operating Conditions



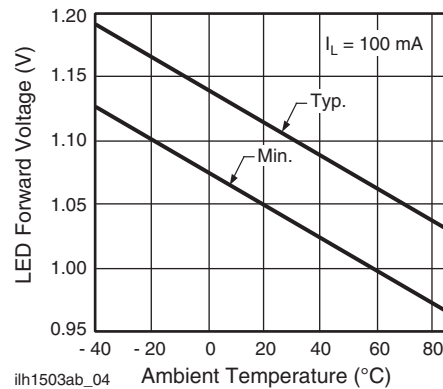
ih1503ab_03 Ambient Temperature (°C)

Fig. 4 - On-Resistance vs. Temperature



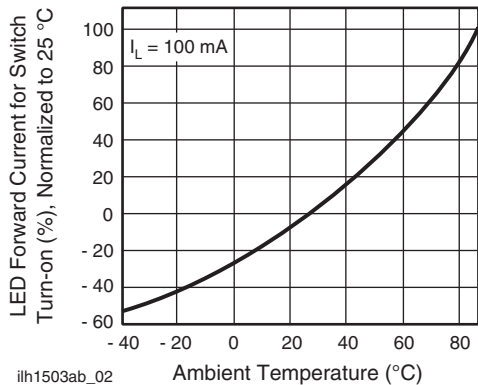
ih1503ab_01 Ambient Temperature (°C)

Fig. 2 - LED Voltage vs. Temperature



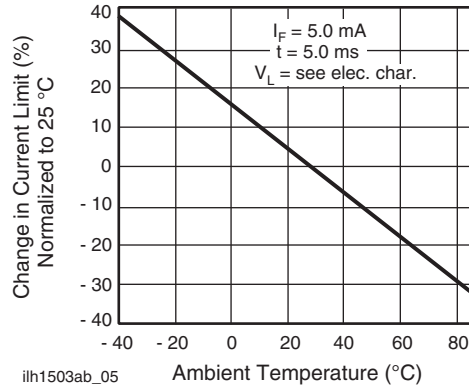
ih1503ab_04 Ambient Temperature (°C)

Fig. 5 - LED Dropout Voltage vs. Temperature



ih1503ab_02 Ambient Temperature (°C)

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



ih1503ab_05 Ambient Temperature (°C)

Fig. 6 - Current Limit vs. Temperature

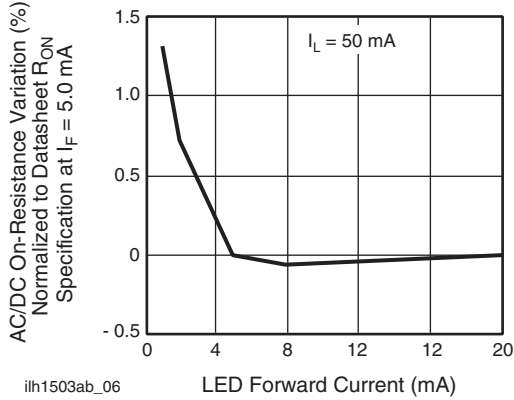


Fig. 7 - Variation in On-Resistance vs. LED Current

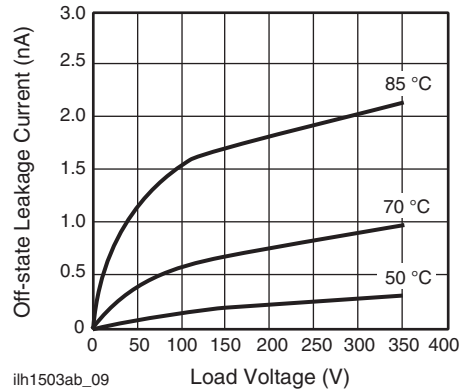


Fig. 10 - Leakage Current vs. Applied Voltage at Elevated Temperatures

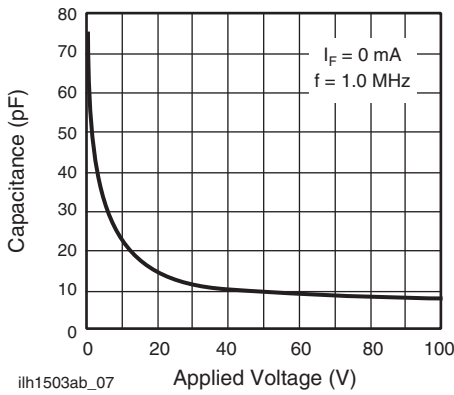


Fig. 8 - Switch Capacitance vs. Applied Voltage

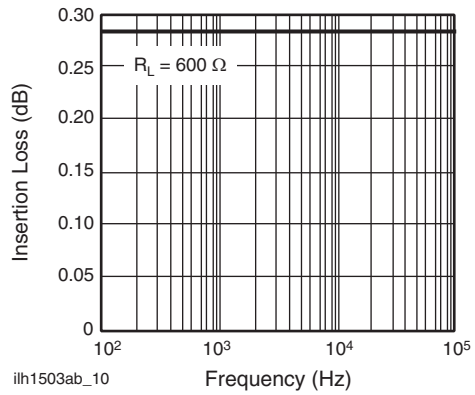


Fig. 11 - Insertion Loss vs. Frequency

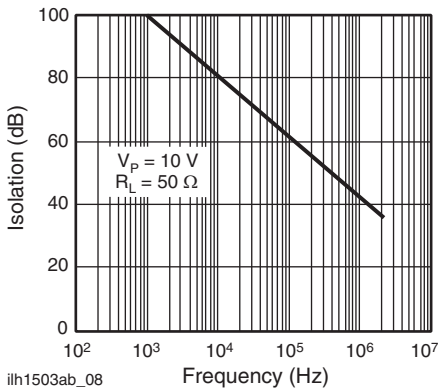


Fig. 9 - Output Isolation

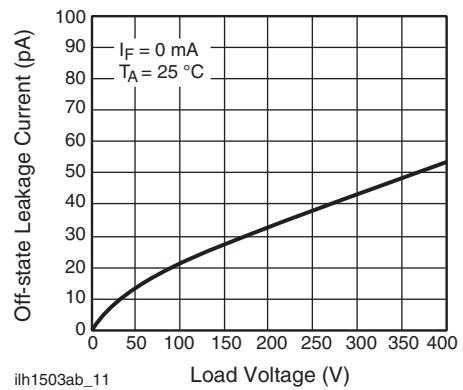


Fig. 12 - Leakage Current vs. Applied Voltage

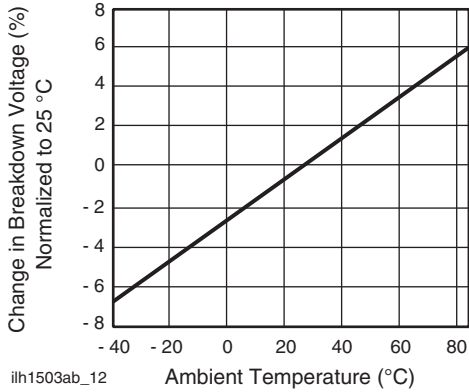


Fig. 13 - Switch Breakdown Voltage vs. Temperature

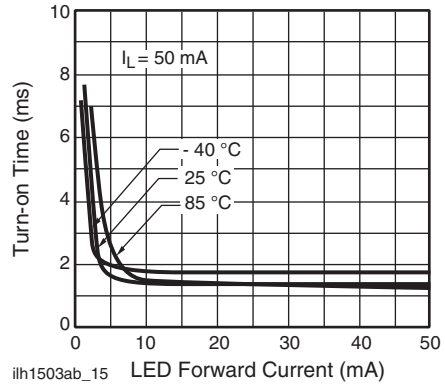


Fig. 16 - Turn-on Time vs. LED Current

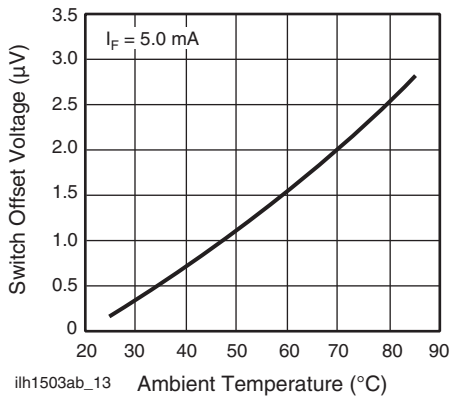


Fig. 14 - Switch Offset Voltage vs. Temperature

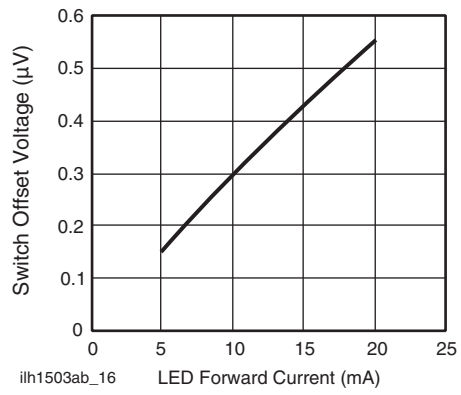


Fig. 17 - Switch Offset Voltage vs. LED Current

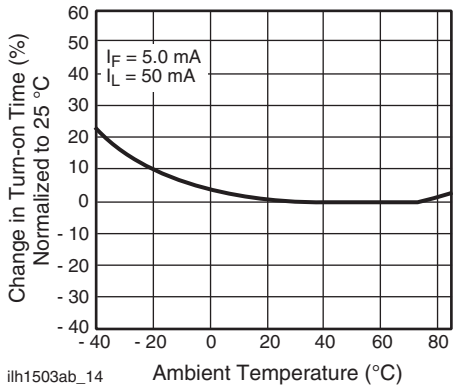


Fig. 15 - Turn-on Time vs. Temperature

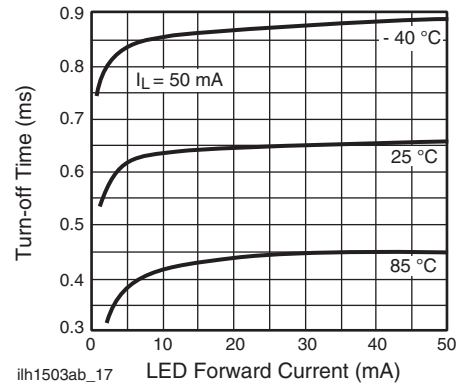
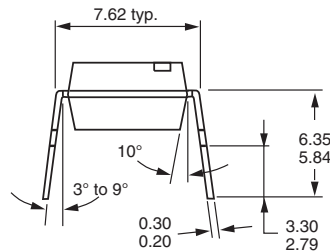
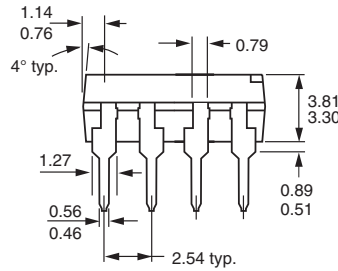
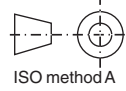
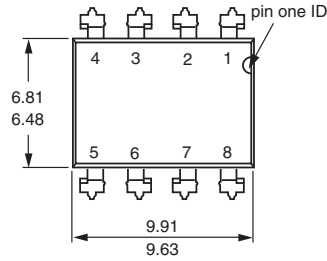


Fig. 18 - Turn-off Time vs. Temperature



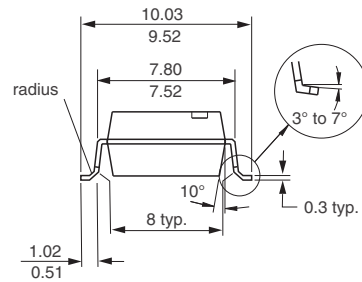
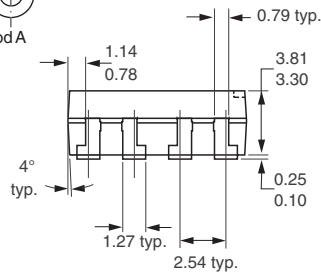
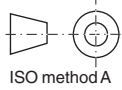
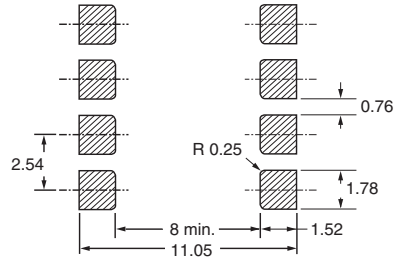
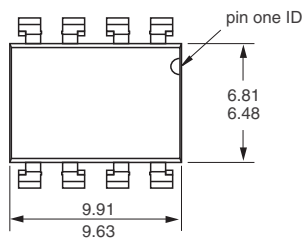
PACKAGE DIMENSIONS in millimeters

DIP



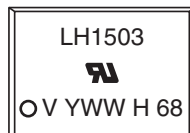
i178008

SMD



i178009

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.